# THE TRANSFERABILITY OF TRUSTED DIGITAL REPOSITORY STANDARDS TO AN EAST AFRICAN CONTEXT

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## Declaration of Originality

I, Anthea Seles, confirm that the work presented in this thesis is my own work and that, to the best of my knowledge and belief, it is comprised of original research and ideas, except as acknowledged in the text.

Signed: Anthea Seles
PhD Candidate

To:

Des (1931-2012)
Η βιβλιοθήκη είναι το φαρμακείο του μυαλού
*(A library is a repository of medicine for the mind)*

Marie
*'On ne voit bien qu'avec le coeur. L'essentiel est invisible pour les yeux'*
*Le Petit Prince par Antoine de Saint-Exupéry*

And

Chantal
*'No act of kindness however small is ever wasted'*
*Aesop*

## ABSTRACT

Digital preservation is a topic that has been extensively explored over the last thirty years in the fields of archival and information studies. However, relatively little literature has touched on the topic of Trusted Digital Repositories (TDRs). A TDR is '[A]n archive, consisting of an organization of people and systems that has accepted the responsibility to preserve information and make it available for a Designated Community.'[1] Standards governing TDRs, namely the Open Archival Information System (OAIS) and Repository Audit and Certification (RAC), have been designed and tested by developed nations with minimal reference to the developing world. Little attempt has been made to question whether these standards, entirely developed in one context, are actually transferable or applicable to another. There is an assumption, however, that because these standards have been generalised, they are ubiquitous and robust, transferable to any locale. This thesis seeks to question the basic assumptions that are made when standards or best practice created in the developed world are applied to different contexts outside of the original milieu of elaboration. Further, this thesis considers the applicability of TDRs to the Eastern African archival context.

Using threefold mimesis, the study examines the standards development process, identifying underlying socio-economic, cultural, infrastructural, educational and other presumptions that may exist in the documented standards. It also examines whether these biases impact on the applicability and transferability of standards to Eastern Africa.

[1]TC20/SC13 International Standards Organisation, 'Open Archival Information System - - A Reference Model' (International Standards Organisation, 2013).

During the course of this study the author analyses both the digital preservation scholarship and also research related to technology transfer. Parallels are drawn between technology transfer and standards development and implementation, to identify and detail some of the potential obstacles that may preclude the transferability of TDR standards to Eastern Africa.

In the end, this thesis finds that TDR standards have little relevance both in developed-world case study digital repositories and in the East African national archives context. These findings challenge the notion held by many that standards have been generalised to such an extent that they are transferable to any context. Further this conclusion brings into question the perceived universality of standards as unbiased documents capable of guiding the establishment of TDRs.

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This feels like the academy awards and I think my time is about to run out and the music is going to start playing, so one final thank you to the academy and I'm sorry if I missed anybody.

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## LIST OF ACRONYMS

**AIDS-** Acquired Immune Deficiency Syndrome
**AISI-** African Information Society Initiative
**BSi-** British Standards Institute
**CCSDS**- Consultative Committee on Space Data Systems
**CAD-** Computer Aided Design
**CDA-** Critical Discourse Analysis
**CEDAR-** CURL Exemplars for Digital Archives Research
**CHF-** Swiss Franc
**CLOCKSS-** Controlled Lots of Copies Keeps Stuff Safe
**CRL-** Center for Research Libraries
**CURL-** Consortium of University Research Libraries
**DANS-** Data Seal of Approval
**DCC-** Digital Curation Centre
**DFID-** Department for International Development
**DoD-** Department of Defense (US)
**DoDRMTF-** US Department of Defense Records Management Task Force
**EAC**- East African Community
**ECA-** Economic Commission for Africa
**ECOWAS-** Economic Community of West African States
**EDRMS-** Electronic Document and Records Management System
**ERIC-** Education Resources Information Center
**EU-** European Union
**GIS-** Geographical Information System
**HDI-** Human Development Index
**ICAReq-** International Council on Archives- Guidelines- Principles and functional Requirements
**ICT-** Information Communication Technology
**IEEE-** Institute of Electrical and Electronic Engineers
**IFMIS-** Integrated Financial Management Information System
**IHRPMS-** Integrated Human Resources and Payroll Management System
**IMF**- International Monetary Fund
**InterPARES**- International Research on Permanent Authentic Records in Electronic Systems
**IRMT-** International Records Management Trust
**ISO**- International Standards Organisation
**IT-** Information Technology
**ITU-** International Telecommunications Union
**KNADS-** Kenya National Archives and Documentation Service
**KNAW-** Royal Netherlands Academy of the Arts of Science
**LISA-** Library and Information Studies Abstracts
**MDA-** Ministries, Departments and Agencies
**MDG-** Millennium Development Goals
**MoReq-** Model Requirements for Records Systems
**NARA**- National Archives and Records Administration
**NASF-** National Archives Services of Finland

**NARA-** National Archives and Records Administration- US
**NASN-** National Archives Service of Norway
**NEDLIB-** Network of European Deposit Library
***nestor*-** Network of Expertise in Long-term Storage of Digital Repositories
**NOARK-** Norwegian Functional Recordkeeping Requirements
**NOW-** Netherlands Organisation for Scientific Research
**OAIS**- Open Archival Information System (ISO 14721)
**OCLC**- Online Computer Library Centre
**OECD-** Organisation Economic Cooperation and Development
**PAR-** Participatory Action Research
**PI-** Persistent Identifier
**PROV-** Public Records Office of Victoria
**RAC**- Repository Audit and Certification (ISO 16363)
**RAMD-** Records and Archives Management Department- Tanzania
**RI-** Representation Information
**RLG**- Research Libraries Group
**SÄHKE-** Finnish Functional Recordkeeping Requirements
**SC-** Sub-Committee
**SOAS-** School of Oriental and African Studies
**SPARC-** Scholarly Publishing Academic Resources Coalition
**SMS-** Short Message Service
**TC-** Technical Committee
**TDR-** Trusted Digital Repositories
**TNA-** The National Archives- UK
**TRAC**- Trusted Repository: Audit and Certification
**UBC-MAsProject-** University of British Columbia-Master of Archival Studies Project (*Preservation of the Integrity of Electronic Records*)
**UCL-** University College London
**UCLA-** University of California- Los Angeles
**UN**- United Nations
**UNDP-** United National Development Programme
**UNIDO-** United Nations Industrial Development Organisations
**UPitt-** University of Pittsburgh project (*Functional Requirements for Evidence in Recordkeeping*)
**VERS-** Victoria Electronic Records Strategy
**WB**- World Bank
**WCD-** World Data Center
**WSDA-** Washington State Digital Archives
**XML**- eXtensible Markup Language

# CHAPTER 1: INTRODUCTION

## 1.1 Introduction

Whether we are aware of it or not, standards play an important role in all our lives. Standards help us compare goods in a grocery store by normalising how food labels are presented to consumers. They protect us from injury by establishing requirements for the safe use of workplace machinery and equipment. And they allow us to exchange information electronically by ensuring that computer and information communication technologies are compatible.

The development of standards is governed by international bodies, the best known of which is the International Standards Organisation (ISO), established in 1947 and today the agency responsible for issuing over 19,500 standards worldwide. Other professional and industry groups, including librarians, archivists and engineers, create their own standards and best practice guidelines promulgated through professional bodies such as the Center for Research Libraries (CRL) or the Institute of Electrical and Electronics Engineers (IEEE).

The information studies community (i.e. archivists, librarians and records managers) has developed standards amongst others to guide the development of records management programmes. International record-related standards include ISO 15489, which provides guidance on the nature and scope of effective records management operations, and ISO 15836, which defines minimum requirements for the creation of metadata.[2] Other standards at the national level guide more specific records and archives functions. For example, *Rules for Archival Description*, *Describing Archives:*

[2] TC46/SC11, 'ISO 15489(2001): Information and Documentation- Records Management- Part 1- General' (International Standards Organisation, 2001). TC46/SC4, 'ISO 15836:2009 - Information and Documentation- The Dublin Core Metadata Element Set' (International Standards Organisation, 2009).

*A Content Standard*, and *Describing Archives in Context* define requirements for archival arrangement and description in the countries in which they are used: Canada, the United States and Australia, respectively.[3]

More recently, the library and archives communities have collaborated with the space data community to develop two standards related to Trusted Digital Repositories (TDRs): the Open Archival Information System standard (OAIS) (ISO 14721) and the Repository Audit and Certification standard (RAC) (ISO 16363). These standards provide guidance on the design and articulation of TDRs. They became ISO approved standards in 2003 (revised 2013) and 2012, respectively, and now define the baseline requirements for TDRs around the world.

All standards, including standards for records and archives operations, are developed to help answer a problem. Types of problems that standards have to address include, providing better customer service, creating safe and efficient work environments, ensuring computer networks are secure and establishing consistency and sustainability in the preservation of digital records. There is an underlying assumption, however, that standards, particularly international standards, can be implemented effectively in any environment. The notion is that these standards can be applied successfully regardless of whether the country in question is rich or poor, highly technologically sophisticated or facing severe limitations on infrastructure. Further, the nature of the standards development process means that more input into the design of standards tends to come from the developed world, with less input from developing

[3] Canadian Council of Archives, 'Rules for Archival Description (RAD)' (Canadian Council of Archives, 2008), accessed 15 January 2015, http://www.cdncouncilarchives.ca/archdesrules.html. Society of American Archivists, 'Describing Archives: A Content Standard' (Society of American Archivists, 2012), accessed 15 January 2015, http://files.archivists.org/pubs/DACS2E-2013.pdf. Australian Society of Archivists- Committee on Descriptive Standards, 'Describing Archives in Context' (Australian Society of Archivists, 2007).

countries – a consequence of the complex and costly process involved with standards development – an issue which will be explored during the course of this thesis.

Little literature questions the suitability of standards in real-life situations or challenges the biases that may be built into standards, if they are developed without due consideration for the differences inherent in different countries and regions around the world. In the case of standards for TDRs, little archival and library literature explores the strengths and weaknesses of OAIS and RAC. The information studies community seems to have simply accepted the existence of TDRs without analysing whether the approach recommended in standards such as OAIS and RAC really aligns with the needs of the records and archives profession. Further, there is an implied expectation that TDR standards can be operationalised in any environment, in any area or country in the world regardless of its state of development, or its political, cultural or economic conditions. One result of these implied expectations is that there has been no concerted study of the actual suitability of TDR standards, particularly in more marginalised parts of the world.

Standards transferability is further complicated when organisations like the World Bank, International Monetary Fund (IMF) and United Nations (UN) use standards as a measure of the success or failure of different funded projects, without fully appreciating the complexity of operationalising those standards properly in resource-restricted environments. The endorsement of standards by international donors pre-supposes that they are indeed wholly applicable irrespective of context.

This thesis seeks to examine the development of TDR standards to understand whether they are transferable to contexts that might not have been given full consideration during the development process. In this instance, the region of East Africa

is used as a case study to consider whether the digital records preservation concerns there mirror those in the developed world and the extent to which archival and records practitioners from that region were included in the standards development process. This will enable a better understanding of whether standards take into account East African archival needs and realities, and the extent to which the standards can be effectively operationalised in the region.

This chapter will provide a background to the study and explains the initial impetus for this research (1.2). This discussion will provide the basis for outlining the problems that the researcher identified and the research questions answered through this study (1.3). This chapter also provides a high-level overview of the locations chosen for the case studies (1.4) as well as a delineation of the major concepts addressed in this thesis: Trusted Digital Repository, digital repository and digital record (1.5). Finally, the chapter includes an introduction to different types of standards and to the standards development process (1.6).

**1.2 Background to Study**

The inspiration for this thesis came from the author's experience as co-author of an electronic records preservation training module, produced in 2009 for the International Records Management Trust (IRMT).[4] For this module the author was asked to examine the concept of Trusted Digital Repositories and their applicability in a developing nation context. During the course of that research, the author found that governments in developing nations were creating significant amounts of digital information as a result of widespread ICT implementation. However, national archives tasked with preserving

[4] Sadrack Katuu, Peter Sebina and Anthea Seles, 'Training in Electronic Records Management- Preserving Electronic Records' (International Records Management Trust, 2009), accessed 28 September 2013, http://irmt.org/education-and-training/education-and-training-2.

these vital digital records faced severe operational limitations, notably through inconsistent access to electricity and lack of budget to acquire the necessary IT components (i.e. hardware and software) to support the preservation of digital records.

After completing her work on the module, the author began studying the particular problems faced by countries in Africa, with the idea that perhaps the challenges with digital preservation were not just infrastructural but might also relate to the nature of TDR standards. Was the process used to develop TDR standards based on assumptions and biases that complicated the usefulness of those standards in an African context and in developing countries more generally? At first glance, TDR standards seem to assume that governments and organisations are capable of supporting certain IT architectures and that they have trained personnel and adequate financial resources, and so can support complex digital records preservation functions. The research conducted for the IRMT module seemed to indicate otherwise.

**1.3 Statement of Problem**

The existing literature on TDRs often focuses on criteria for establishing trust in repository operations, but many articles also address the technical and policy structures needed to manage both the repositories and their contents. In addition, a few articles and one monograph address the importance and relevance of the OAIS standard in the establishment of TDRs. The literature currently available, however, does not explore the practical intricacies of establishing a TDR. Further, there has been no critical examination of the TDR standards development process and no discussion of whether there are assumptions in these standards that may complicate their implementation or preclude their usefulness.

The scholarly literature from African countries regarding digital records creation and maintenance has centred on electronic records management and recordkeeping; little attention has been paid to digital records preservation. Three recent examples of in-depth research on electronic records management in Africa are: Trywell Kalusopa's thesis on developing e-records readiness frameworks for labour organisations (2011),[5] David Luyombya's thesis on digital records management in the Government of Uganda (2010)[6] and Segomotso Keakopa's dissertation on electronic records management in Botswana, Namibia and South Africa (2006).[7] Despite the value of these dissertations as contributions to the literature on electronic records, none of them addresses TDRs or digital records preservation.

Given the dearth of scholarly literature on TDRs in particular, and the general lack of discussion of digital preservation issues in African scholarship, the topic of TDRs and their applicability to Africa, particularly Eastern Africa, warrants a more detailed examination, with a particular focus on the resource limitations faced by archival institutions working in this setting. As such, this thesis is the first concerted examination of the application of TDR standards to an East African context.

This thesis does not presume to state that records and archives practitioners in East African countries are incapable of understanding and implementing standards. Rather, the question under consideration is whether the standards make assumptions that fail to take into account the realities of operating in resource-poor and developing

[5] Trywell Kalusopa, 'Developing an E-Records Readiness Framework for Labour Organisation in Botswana', (Thesis, 2011), accessed 8 February 2015, http://uir.unisa.ac.za/handle/10500/5690.

[6] David Luyombya, 'Framework for Effective Public Digital Records Management in Uganda' (University College London, 2010).

[7] Segomosto Masegonyana Keakopa, 'The Management of Electronic Records in Botswana, Namibia, and South Africa: Opportunities and Challenges' (Information Studies, University College London, 2006).

regions. It is this lack of attention that may affect the transferability of TDR standards in these environments.

The hypothesis that underpins this thesis is that the assumptions and biases of standards developers have coloured the development and elaboration of TDR standards, and that the resulting standards documents represent a decidedly developed-world perspective on the establishment and operations of TDRs. Furthermore, these assumptions may complicate the transferability of TDR standards to contexts outside of the developed world, such as in East Africa.

In this thesis, the term 'hypothesis' is employed from a social science perspective and should not be read as a scientific hypothesis. In this situation, the hypothesis is meant to represent the research assumption that has underpinned this study and that will be tested during the course of this thesis.

This study seeks to answer the following questions to assess the hypothesis:

1) Are Trusted Digital Repository (TDR) standards transferable to the Eastern African context?

    a) What are the underlying assumptions built into the standards?
    b) What was the initial problematic that spurred the creation of the standards?
    c) Does the same problematic exist for the East African archival community? If not, how should archivists and archives in the region address their digital records preservation issues?

2) Are TDR standards being used by operational archival digital repositories in the developed world? If not, why? Further, if they are not being used by developed world repositories, how does this affect their applicability to another context?

3) Was the TDR standards development process inclusive and consensus based? Did it privilege certain perspectives? If so, which ones?

4) What are the realities in East Africa that inhibit the operationalisation of TDR standards in the region?

The methodology that guided the collection and analysis of research data to answer these questions is discussed in Chapter 2.

### 1.4 Information on Study Locations

For the purposes of this study, study locales have been divided into two groups: (1) East Africa and (2) the developed world. The East African case study sites all had long-standing e-Government and information communication technology programmes, which allowed the author to look at issues related to TDRs and the implementation of standards. African countries with less-developed ICT programmes would not have allowed such a detailed analysis. Repositories in the developed world were selected based on the level of development of their digital preservation and digital repository initiatives; more mature programmes were chosen over new or less sophisticated programmes to allow a reasonable assessment of the application of standards and processes. Many of these programmes were implemented to improve the creation and management of government information in part to provide more efficient service delivery but also to be more transparent and accountable, particularly around the expenditure of public money.A more in-depth explanation of the rationale for this grouping and the selection of specific institutions is included in Chapter 2. In order to provide a general introduction to the locales, however, a high-level overview of the study countries and case study institutions in both East Africa (Kenya and Tanzania) and the developed world (Washington State in the United States, as well as the United Kingdom, Finland and Norway) is provided below.

### *1.4.1 East African Study Locales*

Developing world study locales were selected based on how well established the digital preservation programmes were; most programmes had been established for over 10 years. After considerable research, the author focused on East African study locales, because of their well established e-Government and Information Communication Technology programmes, which influenced the amount of digital information generated in these governments. These digital records will eventually need to be preserved by the national archives in these study locales and the transfer of these records is imminent. The specific locales chosen are Kenya and Tanzania.

#### *1.4.1.1 East African Community*

The East African Community (EAC) is an intergovernmental organisation and economic development cooperative comprised of five member countries (Burundi, Kenya, Rwanda, Tanzania and Uganda), headquartered in Arusha, Tanzania.[8] The treaty establishing the East African Community was signed on 30 November 1999 by the governments of Kenya, Uganda and Tanzania and entered into force on 7 July 2000. The Republics of Burundi and Rwanda joined the community on 18 June 2007, becoming full voting members on 1 July 2007. The EAC covers 1.82 million square kilometres and represents a population of 130 million people.

[8] All information in this paragraph comes from: East African Community, 'Welcome to the EAC', *East African Community*, n.d., accessed 28 September 2012, http://www.eac.int/index.php?option=com_content&view=article&id=1:welcome-to-eac&catid=34:body-text-area&Itemid=53.

Image 1.1: Map of the East African Community[9]

The EAC's mission is to: '[W]iden, deepen Economic, Political, Social and Cultural integration in order to improve the quality of life of the people of East Africa through increased competitiveness, value added production, trade and investment.'[10] In line with this mission statement, the EAC established a Customs Union (2005) and a Common Market (2010) to promote better regional economic integration for the mutual benefit of member countries.[11] Furthermore, it issues a visioning document every four years with input from member countries. This document outlines strategic economic, developmental, social and cultural goals. In December 2011, the EAC issued its most recent strategic visioning document: *4th EAC Development Strategy (2011/12-2015/16): Deepening and Accelerating Integration.*[12] A major emphasis with this and other visioning documents is the role of technology to drive economic development.

Two EAC countries with strong government-wide ICT programmes are Kenya and Tanzania, which are producing significant amounts of digital information. In the near

[9] Image comes from the University of Guelph (Ontario, Canada) East African Initiative page. The image was adapted from a creative commons images made available by Eric Gaba. See: http://commons.wikimedia.org/wiki/File:Africa_map_blank.svg

[10] East African Community. 'Welcome to the EAC'

[11] East African Community. 'Welcome to the EAC'

[12] East African Community. '4th EAC Development Strategy (2011/12-2015/16): Deepening and Accelerating Integration'. East African Community, December 2011. See page 27 of the plan regarding the role of technology to drive economic development.

future, the national archives and records programmes of these two countries will have to acquire the digital records generated by these technologies. Both institutions are representative of the digital records preservation realities faced by archives in the region. Furthermore, given the placement of these institutions in their respective governments, the Kenyan and Tanzanian examples serve as good counterpoints to each other, as one institution reports to the Ministry of Sports, Culture and the Arts (Kenya), whereas the other is a tutelary of the Office of the President (Tanzania).

#### *1.4.1.2 Kenya*

Kenya, a former British colony, gained its independence on 12 December 1963, one of the last countries in Eastern Africa to do so.[13] The President, at the time of writing in 2015, is Uhuru Kenyatta, of the National Alliance, who was elected in April 2013.[14] The capital of the country is Nairobi and its official languages are English and Swahili.[15] The country covers a total of 580,367 square kilometres and is bordered by Tanzania to the south, Uganda to the west, South Sudan to the northwest, Ethiopia to the north and Somalia to the northeast, with the Indian Ocean to the east.[16]

Kenya has a population of 41.61 million, with at least 42 distinct ethnic groups.[17] According to the 2009 Kenyan census, the main ethnic groupings are Kikuyu (17%), Luhya (14%), Kalenjin (13%), Luo (10%), Kamba (10%), Kisii (6%), Mijikenda (5%), Meru

[13] Charles Hornsby, *Kenya: A History Since Independence* (London and New York: I.B. Tauris, 2012)., 19
[14] Republic of Kenya, 'The Presidency, Republic of Kenya | President Uhuru Kenyatta', accessed 22 November 2014, http://www.president.go.ke/president-uhuru-kenyatta/.
[15] Central Intelligence Agency, 'CIA - The World Factbook', accessed 28 September 2012, https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html.
[16] Central Intelligence Agency. 'CIA - The World Factbook'.
[17] World Bank. 'Kenya | Data', n.d., accessed 12 September 2014, http://data.worldbank.org/country/kenya. Statistics were from 2011.

(4%), Turkana (2.5%), Maasai (2.1%), other indigenous groups (9%) and non-African groups (1%).[18]

Like many countries in the region, the Government of Kenya has published a strategic vision document aligning its country's development with the overall regional objectives set out by the EAC. The *Vision 2030* document[19] details developmental, economic, educational, social and cultural goals that drive policy development and government initiatives, including ICT systems design and implementation. Based on *Vision 2030,* the Kenyan government's e-Government directorate – which is tasked with overseeing the implementation of ICT systems across the Kenyan public service – is planning to develop ICT systems specifically related to land administration, immigration and vital statistics.[20]

Kenya is a regional hub for commerce especially for Information Technology and has been dubbed by some as the 'Silicon Savanna.'[21] The country's industries include: small-scale consumer goods (plastic, furniture, batteries, textiles, clothing, soap, cigarettes and flour); agricultural products and horticulture; oil refining; aluminium steel, lead and cement production; commercial ship repair; and tourism.[22] Although these industries have all contributed to Kenya's economic growth, the country also receives foreign aid from organisations such as the World Bank, United Nations and other international agencies.[23]

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[18] Central Intelligence Agency. 'CIA - The World Factbook'.

[19] Republic of Kenya, 'Vision 2030 | Vision', accessed 28 September 2012, http://www.vision2030.go.ke/index.php/vision.

[20] International Records Management Trust (IRMT), 'Managing Records as Reliable Evidence for ICT/ e-Government and Freedom of Information in East Africa- Kenya Country Report' (International Records Management Trust, September 2011)., 4

[21] Alex Perry, 'The Silicon Savanna', *Time*, 11 July 2011.

[22] Central Intelligence Agency, 'CIA - The World Factbook'**.**

[23] Hornsby, *Kenya: A History Since Independence*., 6

#### 1.4.1.2.1 Kenya National Archives and Documentation Service (KNADS)

The Kenya National Archives and Documentation Service (KNADS) is a department of the Ministry of Sports, Culture and the Arts. It has a staff of approximately 30 individuals with varying qualifications: five have Masters Degrees, three have Post-Graduate Diplomas and 16 have a BA/BSc.[24] KNADS' enabling legislation, the *Public Archives and Documentation Service Act* (1966)[25], was revised in 1991.[26] Revisions included renaming The Public Archives of Kenya to Kenya National Archives and Documentation Service (KNADS) as well as re-designating the Director of the Public Archives as the Chief Archivist.[27]

Section 4 (1), in both the 1966 and 1991 Acts, gives the Director of the National Archives the ability to: '(a) Examine any public records, and advise on the care and preservation, custody and control thereof; (b) require the transfer to his custody of any public records which he considers should be housed in the national archives.'[28] This section effectively tasks the institution with the preservation of records of enduring value to the Government. Because the *Public Archives and Documentation Service Act* is not format specific, KNADS expects that it will be responsible for the management and preservation of digital public records.[29] The Act, however, does not mandate KNADS with any responsibility for managing digital records from the point of creation to transfer, an important distinction when it comes to ensuring their preservation.

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[24] Hornsby, *Kenya: A History Since Independence.*, 7.
[25] Republic of Kenya, *The Public Archives and Documentation Service Act - KNADS*, 1966, accessed 29 November 2013, http://www.archives.go.ke/publications/acts-of-parliament/481-public-archives-act.html.
[26] Lilian Gisesa, 'Libraries and Democracy: The Role of the Kenya National Archives and Documentation Service' (presented at the Role of Libraries in Promoting Democracy: Ensuring Free Access for All, Nairobi, Kenya, 23 July 2008), accessed 28 September 2012, http://www.goethe.de/ins/za/pro/lag/kenya-gisesa.pdf., 2.
[27] Gisesa, 'Libraries and Democracy'., 2.
[28] Republic of Kenya. *The Public Archives and Documentation Service Act*, 1966.
[29] IRMT, 'Managing Records as Reliable Evidence- Kenya'., 8.

#### *1.4.1.3 Tanzania*

Tanzania, formerly a German and British colony called Tanganyika, declared independence on 9 December 1961.[30] After the Zanzibar Revolution in 1963, which overthrew the Arab Sultan of Zanzibar,[31] Tanganyika merged with Zanzibar, becoming the United Republic of Tanzania in 1964.[32]

The Republic of Tanzania covers 947,300 square kilometres[33] and is bordered by Mozambique, Malawi and Zambia to the south, the Democratic Republic of Congo to the west, Burundi and Rwanda to the northwest and Uganda and Kenya to the north, with the Indian Ocean as its eastern coastline. Dar es Salaam is the capital of Tanzania and also its main commercial centre. Although Swahili is the official language, English is the working language for commerce, administration and higher education; in Zanzibar, Kiunguja (Swahili), English and Arabic are spoken. The population of Tanzania is estimated at 46.91 million. The mainland is 99% African, comprising 95% Bantu distributed among 130 tribes, while the remainder of the population is Asian, European and Arab. Zanzibar is made up of Arab, African, and mixed Afro-Arab peoples, but no statistical breakdown is available.

Tanzania has developed a visioning document called *Achieving Economic Growth, Prosperity and Reduction of Poverty by 2025,*[34] which includes, among its strategic areas for continued prosperity, the development of ICTs as a key economic driver to address

[30] Central Intelligence Agency, 'CIA - The World Factbook', *Tanzania*, accessed 28 September 2012. https://www.cia.gov/library/publications/the-world-factbook/geos/tz.html.

[31] Isaria Kimambo and A.J. Temu, eds., *A History Tanzania* (Nairobi, Kenya: East African Publishing House, 1969)., 214-238.

[32] Kimambo and Temu, eds., *A History of Tanzania* ., 249.

[33] Information in this paragraph comes from Central Intelligence Agency, 'CIA - The World Factbook'. United Republic of Tanzania, 'The Tanzania National Website', accessed 29 September 2012, http://www.tanzania.go.tz/profile1f.html.

[34] United Republic of Tanzania, 'The Tanzanian Development Vision 2025' (Government of Tanzania- Planning Commission, n/d), accessed 28 September 2012, http://www.tanzania.go.tz/vision.htm.

poverty.[35] Like Kenya's *Vision 2030,* Tanzania's action plan aligns to overarching regional goals as defined by the EAC in its own strategic plan. To actualise its ICT ambitions the Government of Tanzania introduced the National Information and Communications Technologies policy in March 2003,[36] providing a general framework to guide the provision of government information, along with a more specific regulatory framework to support IT implementation.[37] In addition, in August 2009, the Government developed and disseminated a five-year strategic plan for the development of e-Government systems, coinciding with the development and implementation of government-wide ICT systems such as the Integrated Human Resource and Payroll Management System (IHRPMS), Integrated Financial Management System (IFMIS) and Geographical Information System (GIS).[38]

Tanzania's primary industries include agricultural processing, particularly for products such as sugar, beets, tobacco and sisal; mining; salt, soda ash and cement production; oil refining; clothing manufacture; and the production of wood and fertilizer.[39] Tanzania, like many developing nations, relies on foreign aid to supplement its economy; in 2008 the country received the largest Millennium Challenge[40] compact grant (a US-based foreign aid grant), worth 698 million dollars USD.[41]

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[35] Dr. Zaipuna Yonah, 'ICT Tools for Poverty Reduction', 18 March 2005, accessed 29 September 2012, http://www.tzonline.org/pdf/ictsastoolsforpovertyreduction1.pdf.

[36] United Republic of Tanzania, Ministry of Communications and Transport, 'National Information and Communications Technology Policy' (United Republic of Tanzania, March 2003), accessed 29 September 2012, http://www.tanzania.go.tz/pdf/ictpolicy.pdf.

[37] International Records Management Trust (IRMT), 'Managing Records as Reliable Evidence for ICT/ e-Government and Freedom of Information in East Africa- Tanzania Country Report' (International Records Management Trust, September 2011), accessed 12 September 2012, http://irmt.org/portfolio/managing-records-reliable-evidence-ict-e-government-freedom-information-east-africa-2010-%E2%80%93-2011., 4

[38] IRMT, 'Managing Records as Reliable Evidence – Tanzania'., 4

[39] Central Intelligence Agency, 'CIA - The World Factbook'.

[40] The Millennium Challenge Corporation was created by the US Congress in 2004 to distribute US foreign aid, it seeks to promote good governance, economic freedom and investment in citizens by strengthening investment, commerce and government structures. Accessed 12 September 2014 See: http://www.mcc.gov/pages/about

[41] The Millennium Challenge Corporation, accessed 12 September 2014 http://www.mcc.gov/pages/about

#### 1.4.1.3.1 Records and Archives Management Department (RAMD)

The Records and Archives Management Department of the Government of the United Republic of Tanzania was established through the *Records and Archives Management Act* in 1965. In 2002, this enabling legislation was broadened as part of a DFID-funded records management improvement project (1997–2002) headed up by the International Records Management Trust (IRMT). As a result of these legislative changes, the department was moved from the Ministry of Sports, Culture and Information to the Public Service Management Division of the Office of the President. RAMD has 70 staff members; 40 are trained archives and records management professionals.[42]

The *Records and Archives Management Act* gives RAMD a clear remit over the care of digital records, since records are defined in the Act as '[R]ecorded information regardless of form or medium created, received and maintained by any institution or individual in pursuance of its legal obligations or in the transaction of its business and providing evidence of the performance of those obligations or that business.'[43] Unlike KNADS, RAMD has oversight over the management of active and semi-active records in government, as per Sections 6(1), 11 and 12 of the Act. Section 9 of the Act stipulates the responsibilities of heads of public office in the maintenance of records. It also requires government ministries, department and agencies (MDA) to transfer semi-active records to the National Archives for maintenance and disposition.

In its 2003 ICT strategy, the Tanzanian Government recognised the importance of records management to the accessibility of key digital records by clearly tying the success of the strategy to the existence of a policy that supports the proper creation,

[42] All the information in this paragraphs comes from: IRMT, 'Managing Records as Reliable Evidence - Tanzania'., 9-10

[43] All information in this paragraph comes from: United Republic of Tanzania, *Records and Archives Management Act*, 2002. accessed 29 September 2012, http://www.tzonline.org/pdf/therecordsandarchivesmnagementact.pdf.

management and preservation of records.[44] As a result of the 2009 e-Government strategy, two circulars were issued to underscore the importance of proper information management in the civil service. Circular 5 addresses the duty of care that public servants should exercise when uploading confidential information to portable electronic storage media like flash drives, CDs, DVDs and data tapes. Circular 6 provides guidance to ICT personnel and users of ICT systems regarding the retention and disposition of digital information in those systems. The circular also makes explicit reference to the role of RAMD in preserving digital records 'for future data recovery'.[45]

### *1.4.2 Developed World Study Locales*

Developed world study locales were selected based on how well established their government digital records programmes were and how long the jurisdiction had had an operational digital repository. The locales selected, which represent digital repositories in different jurisdictional contexts, include the Washington State Digital Archives, The National Archives (United Kingdom), the National Archives Service of Finland and the National Archives Service of Norway.

[44] United Republic of Tanzania Ministry of Communication, Science and Technology, 'National ICT Policy' (Government of Tanzania, 2003), accessed 22 November 2014, http://www.mst.go.tz/index.php/joomlaorg/national-ict-policy-2003., 19.

[45] The remaining information from this paragraph comes from: IRMT 'Managing Records as Reliable Evidence - Tanzania'., 5.

Image 1.2: Map of Northern Europe[46]

*1.4.2.1 Washington State*

Washington State was occupied by Britain between 1818 to 1846 before being annexed by the United States in 1846 along with all territories south of the 49th parallel.[47] By 1848 the area occupied by present-day Washington State was renamed the Oregon Territories, becoming known as the Washington territory in 1853. Washington joined the Union with the United States as the 42nd state on 11 November 1889.

Washington State covers 176,600 square kilometres along the Pacific Northwest coast and is bordered by the Pacific Ocean to the west, Canada to the north, Idaho to the east and Oregon to the south. The state capital is Olympia and the state has an estimated population of 6,380,038, as of 2011.[48] The economy is dominated by aviation

[46] Map was made available through http://ian.macky.net/pat/map/neur/neur.html and listed as free and in the public domain. See also for more information http://ian.macky.net/pat/map/country.html .

[47] Watt Crowley, 'HistoryLink.org- the Free Online Encyclopaedia of Washington State History', *About Washington State -- Frequently Asked Questions and Their Answers*, 27 February 2003, accessed 29 September 2012, http://historylink.org/index.cfm?DisplayPage=output.cfm&file_id=5315.

[48] State of Washington, 'Access Washington - State Facts', Informational, accessed 29 September 2012, http://access.wa.gov/statefacts/index.aspx.

manufacturing and software and technology development as well as by agriculture, forestry and fishing.[49]

1.4.2.1.1 Washington State Digital Archives (WSDA)

Washington State Digital Archives, opened on 4 October 2004, was one of the first digital repositories created by an archival institution in the United States, predating even the National Archives and Records Administration's (NARA) Electronic Records Archives, which only became operational in 2008.[50] Planning for the digital archives began under the administration of Governor Sam Reed in 2000.[51] The WSDA is located in Cheney, Washington, on the Eastern Washington University Campus; the building also serves as the repository for the Eastern branch of the Washington State Archives.

The responsibilities of the Washington State Archives are defined in its enabling statute, Revised Code of Washington (RCW) 40.14 *Preservation and Destruction of Public Records*, which gives it oversight (as per section 010) over paper and digital records of enduring value.[52] The legislation also gives the State Archives responsibility for advising and supervising the management of both paper and digital records within State agencies and departments.[53] The records management division reports directly to the State Archivist. Although WSDA is a separate department from the records management programme, the two departments work closely together to ensure the proper

[49] Crowley, 'HistoryLink.org'.

[50] Planning, testing and development for the ERA began in 2000 but it only had an operationally capable system in 2008, accessed 29 September 2012. See: http://www.archives.gov/era/about/history.html#contractor However,, NARA began acquiring and preserving digital records well before the establishment of a formal digital repository. See Charles M. Dollar, 'Appraising Machine-Readable Records', *American Archivist* 41, no. 4 (October 1978): 423–30. Charles M. Dollar, 'Computers, the National Archives and Researchers', *Prologue: The Journal of the National Archives* 8, no. 1 (Spring 1976): 29–34.

[51] Interview 4, 18 July 2010, Washington State Digital Archives, 'Background and History - Washington State Digital Archives', *About Us*, accessed 29 September 2012, http://www.digitalarchives.wa.gov/StaticContent/background.

[52] State of Washington, *Chapter 40.14 RCW: Preservation and Destruction of Public Records*, accessed 29 September 2012 http://apps.leg.wa.gov/rcw/default.aspx?cite=40.14.

[53] State of Washington, *Chapter 40.14 RCW.* See sections 020-025

maintenance of digital records.[54] As per section 030 of the statute, all State departments and agencies must transfer their records to the Archives; however this requirement does not extend to local authorities such as King County or Clallam County. Nevertheless, local authorities are required by law to maintain records of ongoing administrative, fiscal, legal and historical value as per State-approved retention and disposition schedules.[55] These local authorities are also encouraged to transfer their archival materials to either the State Archives or the Digital Archives.[56]

As of September 2012, the Washington State Archives has 110,220,336 born-digital and digitised records in their repository, 36,264,736 of which are searchable by the general public.[57] The software and database applications used at the Washington State Digital Archives include open source, internally designed and commercial Microsoft applications.[58]

*1.4.2.2 United Kingdom*

The United Kingdom is comprised of England, Scotland, Wales and Northern Ireland and spans 243,610 square kilometres. Its closest neighbouring countries are the Republic of Ireland to the west and France to the southeast. Based on the 2011 census the United Kingdom had a population of 63,182,178.[59] Main industries include a strong banking and financial services sector as well as '[m]achine tools, electric power equipment, automation equipment, railroad equipment, shipbuilding, aircraft, motor vehicles and

[54] Interview 3, 17 July 2011.
[55] Interview 3, 17 July 2011.
[56] Interview 3, 17 July 2011.
[57] Washington State Digital Archives, *Home,* n.d. accessed 29 September 2012 http://www.digitalarchives.wa.gov/Home
[58] Interviews 6, 18 July 2011; Interview 1, 18 July 2011; and Interview 7, 18 July 2011
[59] Office of National Statistics, 'UK Census - ONS', 2011, accessed 12 September 2014, http://www.ons.gov.uk/ons/guide-method/census/2011/uk-census/index.html.

parts, electronics and communications equipment, metals, chemicals, coal, petroleum, food processing, textiles and clothing.'[60]

#### 1.4.2.2.1 The National Archives (TNA)

The National Archives (TNA) is a department and executive agency[61] of the Ministry of Justice.[62] TNA was originally established as the Public Records Office in 1838 under the auspices of the *Public Records Office Act*, but between 2003 and 2006 four government agencies were merged: the Public Records Office, Royal Commission on Historical Manuscripts, Her Majesty's Stationery Office and the Office of Public Sector Information, forming the present-day institution, The National Archives.[63]

The National Archives is governed by the *Public Records Act* 1958, with amendments from 1967 and 2000, the latter resulting from the introduction of the Freedom of Information Act. TNA has responsibility to acquire and maintain public records, regardless of form. Section 3(1) states that every person responsible for public records shall ensure that those of enduring value will be transferred to the Public Record Office.[64] The National Archives does advise government departments on the management of their records to ensure that records, paper and digital, of ongoing value are properly identified and transferred into archival custody.

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[60] Central Intelligence Agency, 'CIA - The World Factbook'.

[61] An executive agency in the UK Government consists of a department that has a set of defined functions to deliver to a Minister. The executive agency has control over its own budget and departmental operations. See for more information: Cabinet Office, Agencies and Public Bodies Team. *Executive Agencies: A Guide for Departments*. 2006. accessed 16 January 2015 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/80076/exec_agencies_guidance_oct06_0.pdf

[62] The National Archives of the UK, 'Our Role | The National Archives', *Our Role*, n.d., accessed 29 September 2012, http://www.nationalarchives.gov.uk/about%5Cour-role.htm.

[63] The National Archives of the UK, 'Who We Are | The National Archives', *Who We Are*, accessed 29 September 2012, http://www.nationalarchives.gov.uk/about%5Cwho-we-are.htm.

[64] Government of the United Kingdom, *Public Records Act*, 1958, accessed 29 September 2012, http://www.legislation.gov.uk/ukpga/Eliz2/6-7/51.

The National Archives has been advising and managing digital records since the late 1990s, beginning with a survey Electronic Records in Office Systems (EROS), which sought to understand the types of electronic records management systems in government as well as the governance structures in place to manage them. This survey resulted in the production of guidance on the care of digital records in government departments.[65] Around the same time TNA established the National Archives Digital Archive of Datasets (1997), in partnership with the University of London Computer Centre. The purpose of this initiative was to identify and capture data sets of long-term value produced by government departments.[66] The first digital repository specifically intended to accept digital records (i.e. data and documents) was implemented in 2000, making TNA one of the first national archives in the world to create a formalised framework for managing and preserving digital archival records. This system was re-designed in 2006 and then again in 2011; presently it uses the Safety Deposit Box software package, first designed by TNA in partnership with Tessella and now administered by Tessella/Preservica, as its digital repository software.[67]

#### *1.4.2.3 Finland*

Finland became an independent nation in 1917, joining the European Union in 1995, and became the only Nordic country to adopt the Euro in 1999.[68] Finland covers 338,145 square kilometres bordered by Sweden to the northwest, Norway to the north, Russia and the Gulf of Bothnia to the east, and the Gulf of Finland and the Baltic Sea to the

[65] Public Records Office. 'Public Record Office | Government | The EROS Project', 29 January 1999, accessed 12 July 2015 https://web.archive.org/web/19990129073712/http://www.pro.gov.uk/government/eros/default.htm. and Public Record Office UK. 'Public Records Office EROS Programme- Guidelines on the Management of Electronic Records'. Public Records Office UK, September 1997.

[66] Archives, The National. 'Archiving Datasets | The National Archives'. Accessed 12 July 2015. http://www.nationalarchives.gov.uk/webarchive/archiving-datasets.htm.

[67] Interview 11, 14 September 2012.

[68] All information from this paragraph comes from: Nations Online, 'Finland - Republic of Finland - Country Profile - Suomi - Republiken Finland - Northern Europe', *Nations Online*, accessed 22 November 2014, http://www.nationsonline.org/oneworld/finland.htm.

south. According to the most recent census (2011), the country has an estimated population of 5.4 million. Its main industries are metals and metal production, electronics, the design and production of machinery and scientific instruments, shipbuilding, pulp and paper manufacturing and the production of foodstuffs, chemicals, textiles and clothing.

#### 1.4.2.3.1 National Archives Service of Finland (NASF)

The National Archives Service of Finland emanated from what was called the Senate Archives, which was established in 1816. By 2012 the service comprised the National Archives and seven provincial archives.[69] The Service operates under the Ministry of Education; the enabling *Archives Act* (1994) gives it responsibility over the management of both paper and electronic public records (Chapter 3) as well as statutory authority to issue regulations on matters such as records preservation, registration and cataloguing (Chapter 4).[70] Like the other Nordic archives (i.e. Norway and Sweden) the National Archives is involved in the management of active and semi-active records in the Finnish public service, meaning that it has oversight of digital records from the point of creation. In addition, like Norway and Sweden it has developed a functional requirements standard for government information systems, called SÄHKE.[71] The digital repository programme at the National Archives Service of Finland was established in 2006 and had its first accession of digital records in 2010.[72]

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[69] National Archives Service of Finland, 'Arkistolaitos - History', *History of the National Archives Service*, accessed 30 September 2012, http://www.arkisto.fi/en/arkistolaitos/historia/.

[70] National Archives Service of Finland, 'Arkistolaitos - The National Archives Service', *The Finnish National Archives Service Preserves Documentary Cultural Heritage*, accessed 30 September 2012, http://www.arkisto.fi/en/arkistolaitos/. See also Government of Finland, *Archives Act*, 1994.

[71] Interview 13, 21 September 2012. See also Pekka Henttonen, 'Creating Recordkeeping Metadata', *Atlanti* 19 (2009): 67–76. There is no accessible English version of SÄHKE

[72] Interview 13, 21 September 2012.The reason for the delay is the requirement for ministries, departments and agencies to conform their records metadata to a prescribed schema prior to transfer to the archives. All transfers are rejected until they are capable of meeting this requirement.

*1.4.2.4 Norway*

Norway became an independent country in 1905, at which time the government restored the monarchy as a constitutional monarchy. [73] Norway has held two referendums on EU membership, in 1972 and 1994; in both instances the country rejected joining the EU. Norway covers 323,802 square kilometres and is bordered to the north by the Barents Sea, Finland and Russia, to the east by Sweden, to the south by the North Sea and to the west by the Norwegian Sea. The current population stands at 5 million, including 315,000 foreign nationals and 20,000 Sami, the indigenous populations that live in the northern part of the country. Its main industries include petroleum and gas production, shipbuilding, food processing, pulp and paper manufacture, fishing, mining and the production of chemicals, timber and textiles.

1.4.2.4.1 National Archives Service of Norway (NASN)

The National Archives was originally founded in 1817 and in 1850 a separate institution was created to manage state archives.[74] The state and national repositories were merged to create the National Archives Service of Norway, which today consists of 10 different institutions, plus the national archives.[75]

The National Archives Service of Norway is responsible for overseeing the creation, management and preservation of records in any form that have long-term value to the Government of Norway and its citizens.[76] This institution is mandated by the Norwegian *Archives Act* (1992), which stipulates the roles and responsibilities of the National

[73] All information from this section comes from Nations Online, 'Norway - Country Profile - Norge - Kongeriket Norge - Tourism in the Kingdom of Norway', accessed 24 November 2014, http://www.nationsonline.org/oneworld/norway.htm.

[74] National Archives Service of Norway, 'About Us- Arkivverket', accessed 24 November 2014, http://www.arkivverket.no/eng/The-National-Archives/About-us

[75] State archives in Oslo, Hamar, Kongsberg, Kristiansand, Stavanger, Bergen, Trondheim and Tromsø; Sami Archives; and the National Health Archives. See National Archives Service of Norway, 'About Us- Arkivverket'.

[76] National Archives Service of Norway 'About Us- Arkivverket'. The researcher was not able to find an English Version of the *Archives Act* 1992.

Archives as well as of National Archivist, national government ministries, department and agencies in the preservation of record of enduring value.

Norway has developed a functional requirement standard, NOARK, to ensure the proper capture and retention of digital records in recordkeeping systems. The first version of NOARK was published in 1984; however, compliance with the standard was optional until the introduction of the *Archives Regulation* on 1 January 1999.[77] The regulation made it mandatory for public bodies to use the functional requirements standard when procuring government information management systems.

The National Archives has had a digital repository since the 1980s and began designing an OAIS-compliant repository in 2008.[78] The NOARK standard allows for metadata to be exported in a standardised XML schema, enabling the digital repository system in Norway to ingest records automatically.[79]

### 1.5 Delineation of Concepts and Terms

This section will discuss and define key terms used in this thesis to explain their use and application herein. Additional terms will be defined upon first use during the course of the study.

#### *1.5.1 Machine-Readable, Electronic Records and Digital Records*

The terminology used to identify outputs from computer systems has changed over the years. In the 1970s, such outputs were called machine-readable records and defined as any record '[i]n a medium or format that requires a mechanical device to make it intelligible to humans.'[80] In the early days of computerisation, records and data were

[77] International Records Management Trust, *Norway Case Study for Openness,* personal research notes. Unpublished. These research notes made by the author during IRMT work on Open Government initiatives in Norway.
[78] Interview 14, 17 February 2013.
[79] Interview 14, 17 February 2013.
[80] Richard Pearce-Moses, *Society of American Archivists: A Glossary of Archives and Records Terminology,* accessed 23 October 2010, http://www2.archivists.org/glossary/terms/m/machine-readable.

recorded on punch cards and magnetic tapes, which had to be fed into computers to be read or interpreted. As computer systems evolved, however, information was soon stored directly on computer hard drives. This change in technology did not mean that disks, tapes and other external devices were abandoned, merely that they were not required to act as the sole information carriers. Rather, external devices were used for back up or to save information in order to prevent corruption or loss and enable retrieval.

Around the late 1980s to early 1990s, the terminology changed as technology evolved, as demonstrated by two key research projects, the University of Pittsburgh and International Research on Permanent Authentic Records in Electronic Systems (InterPARES) projects, which both employed the term 'electronic record'.[81] In the *Society of American Archivists: A Glossary* an electronic record was defined as '[d]ata or information that has been captured and fixed for storage and manipulation in an automated system and that requires the use of the system to render it intelligible by a person.'[82]

In the early 2000s, another change in terminology took place with the adoption of the term 'digital record' in preference to 'electronic record'. There is an ongoing debate in the archives and records community about the difference between the two terms, and they are often used interchangeably.[83] Since recent archival scholarship has

[81] InterPARES, 'The Long-Term Preservation of Authentic Electronic Records: Findings of the InterPARES Project' (InterPARES Project, 2002), accessed 10 October 2010, http://www.interpares.org/book/index.cfm. Richard Cox, 'Re-Discovering the Archival Mission: The Recordkeeping Functional Requirements Project at the University of Pittsburgh, A Progress Report', *Archives and Museum Informatics* 8, no. 4 (1994): 279–99.

[82] Pearce-Moses, *Society of American Archivists*. The reference material used to construct the definition ranges from 1996-2003.

[83] Pearce-Moses, *Society of American Archivists*. In the glossary the definition for digital record refers back to the electronic record definition. Henry M Gladney, *Preserving Digital Information*. (Leipzig: Springer, 2007)., 270. In the latter text the definition for electronic record is: '(noun phrase) in the context of the federal government, any information that is recorded by or in a format that only a computer can process that satisfies the definition of a *federal record* in 44 U. S. C. 3301'.

tended towards the term 'digital record', for the purposes of this thesis any information created by Information Communication Technology (ICT) systems and computers will be referred to as a 'digital record', and defined as follows: 'A record made, received and set aside, as part of the usual course of business, in a coded format that can be accessed by a computer system that converts the numbers into a form that can be comprehended by the humans.'[84] Digital records can be comprised of digitised or digitally-born records. Digitised records are paper or analogue materials that have been rendered into a digital form through scanning or digitisation. Digitally-born records, the focus of this study, are records that were originally created in a digital environment.

### *1.5.2 Digital Repository and Trusted Digital Repository*

For the purpose of this thesis, the terms digital repository and Trusted Digital Repository (TDR) need to be defined clearly. There is a proliferation of definitions for digital repository but in each instance the usage is dependent on the discipline using the term, such as librarianship, the social sciences or medicine. In order to focus the discussion, it is useful to concentrate on definitions provided by the information studies community (i.e. library, archives and records management). It is also important to differentiate between types of repositories, such as national, institutional, and domain repositories.[85] National repositories hold materials collected by a particular nation and would include, for instance, articles, records, publications and data sets of significance. Institutional repositories maintain records and data collected by researchers at individual institutions

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The Digital Preservation Coalition (UK) in their *Handbook* also makes no distinction between electronic record and digital record. They use the terms interchangeably. The definition for the electronic record is: Records created digitally in the day to day business of the organisation and assigned formal status by the organisation. They may include for example, word processing documents, emails, databases, or intranet pages. Accessed 24 October 2010 (http://www.dpconline.org/publications/digital-preservation-handbook)

[84] Definition is based in part on the one used by the IRMT in 'Training in Electronic Records'. 10 October 2010, http://www.irmt.org/education-and-training/education-and-training-2.

[85] Alan Schwartz, Cleo Pappas, and Leslie J. Sandlow, 'Data Repositories for Medical Education Research: Issues and Recommendations' *Academic Medicine* Vol 85 No. 5 (May 2010): 837-43., 838.

such as universities or research facilities, particularly in the form of archived publications (i.e. articles, conference proceedings, etc.). Domain repositories maintain records and data sets particular to a discipline or field of study.[86]

In the archival literature surveyed, no single definition was given for a digital repository; therefore, literature from a range of other disciplines was consulted. In library sciences the term digital repository is often used interchangeably with institutional repository to refer to a database of digital resources (i.e. digital documents and datasets) available either through a local area network or online portal.[87] It was decided to use the following definition for archival digital repository: 'A repository of digital records with enduring long-term value available through a networked environment.' The definition covers archival institutions that have been tasked with oversight for the care and maintenance of digital records but have not been certified as 'trusted' repositories.

The formal definition for trusted digital repository (TDR) is included in the *Open Archival Information System* (OAIS) standard: '[A]n archive, consisting of an organization of people and systems that has accepted the responsibility to preserve information and make it available for a Designated Community'.[88] The library and archives communities have developed their own definition of a TDR: '[O]ne whose mission is to provide reliable long-term access to managed digital resources to its designated community,

[86] Schwartz et al., 'Data Repositories for Medical Education Research'., 838.

[87] Cecelia Brown and June M. Abbas, 'Institutional Digital Repositories for Science and Technology: A View from the Laboratory' *Journal of Library Administration* 50, no. 3 (19 March 2010): 181–215., 188. Brian Quinn. 'Reducing Psychological Resistance to Digital Repositories' *Information Technology and Libraries* vol. 29 No. 2 (June 2010): 67-75., 67. Isabel Galina Russell, 'Electronic Resources and Institutional Repositories in Informal Scholarly Communication and Publishing' (University College London, 2009)., 72. Brown and Abba, and Quinn have a similar definition of digital repository as Galina-Russell's definition of institutional repository.

[88] TC20/SC13, 'Open Archival Information Systems- - A Reference Model Reference'.

now and in the future'.[89] The problem with the OAIS and professional community definitions is that they do not explain what constitutes 'trust' in a digital repository. The designation of 'trustworthiness' can only really be offered through audit and certification, a process where institutions provide evidence to verify the integrity and quality of their operations in the management and preservation of digital records.[90] The terms 'trusted' and 'trustworthy' are used interchangeably in many documents that discuss TDRs. It should be noted, however, that no standard can by itself ensure that a repository is 'trusted.' A standard only serves as a tool to ascertain how worthy of trust (i.e. trustworthy) that repository may be, based on assessment of its operations against the standard in question. That said, the accepted term used to distinguish a repository that is deemed trustworthy from any other type of repository is 'Trusted Digital Repository.'

For the purposes of this thesis, then, the the term Trusted Digital Repository is defined as : 'An archives or repository of digital records, which have long-term administrative, legal, fiscal and historical value to an organisation or institution, and which can be audited and certified to ensure ongoing access to these records for its designated community.' This definition recognises that archival repositories have a responsibility to oversee the preservation of digital records with integrity and acknowledges that there must also be mechanisms in place, such as processes for audit and certification, that ensure the operations can be confirmed as 'trusted'.

[89] RLG-OCLC, 'Trusted Digital Repositories: Attributes and Responsibilities' (Research Libraries Group, May 2002), accessed 10 October 2010, http://www.oclc.org/research/activities/past/rlg/trustedrep/repositories.pdf., 2.
[90] Seamus Ross and Andrew McHugh, 'The Role of Evidence in Establishing Trust in Repositories', *DLib Magazine* 12, no. 7/8 (2006), accessed 15 March 2011, http://www.dlib.org/dlib/july06/ross/07ross.html., 2.

## 1.6 Standards

A number of types of standards exist and depending on the type of standard in question they may be developed and used in many different ways. This section will examine the types of standards and their purpose (1.6.1) in order to define the functions of OAIS and RAC. This section will also detail the standards development process to better contextualise discussions in later chapters regarding the development of OAIS and RAC standards, in particular.

### *1.6.1 Types of Standards*

A standard as defined by ISO is: '[A] document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose.'[91] This definition is fairly broad, because standards govern everything from food labelling to car registrations, computers and recordkeeping programmes. Most standards can be grouped into three broad categories: reference, minimum quality and compatibility standards.[92]

A reference standard is an anticipatory standard that seeks to frame future working strategies by identifying high-level issues related to a particular problem (e.g. digital preservation). This type of standard can streamline terminology and pinpoint areas that require more standardisation.[93] OAIS is classified as an anticipatory reference standard; more specifically it is a reference model. A reference model as described by

[91] International Standards Organisation, 'Standards- ISO', accessed 24 November 2014, http://www.iso.org/iso/home/standards.htm.
[92] Ole Hanseth, Eric Monteiro, and Morten Hatling, 'Developing Information Infrastructure: The Tension between Standardization and Flexibility', *Science, Technology and Human Values* 21, no. 4 (Autumn 1996): 407–26., 411.
[93] Christopher Lee, 'Defining Digital Preservation Work: A Case Study of the Development of the Reference Model for an Open Archival Information System' (University of Michigan, 2005)., 52.

Christopher Lee is a standard that '[t]end[s] to be used at a higher level of abstraction',[94] which can set out high-level concepts or serve to bound different user groups involved in a standardisation process (i.e. those involved at specific points during a quality checking process).[95] For example, OAIS provides a standard set of agreed terms and functions related to TDRs that gives anyone developing, designing or discussing TDRs a common starting point.

Minimum quality standards are developed to increase the quality of materials or products.[96] Certification and audit standards are classified as quality standards: through the process of audit and certification they seek to accredit organisations, processes or systems as meeting certain minimum requirements for quality. The ISO 9000 series for quality management[97] is a good example of a minimum quality standard; ISO 9000 standards seek to help companies provide products and services that satisfy customer needs and requirements. The 9000 series standards allow organisations to certify their operations, demonstrating that they are capable of meeting the minimum quality requirements for ensuring good operations and customer service.[98] TDR certification standards like RAC enable organisations to measure the quality of their digital repository operations, to ensure that records are maintained in an environment that protects their integrity. RAC sets the baseline requirements for TDR operations with the intention that any organisation that wishes to be called a TDR must certify against the standard's criteria.

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[94] Lee, 'Defining Digital Preservation Work', 52.
[95] Lee, 'Defining Digital Preservation Work', 53. Lee provides an exhaustive listing of reference models.
[96] Uri Ronnen, 'Minimum Quality Standards, Fixed Costs, and Competition', *The RAND Journal of Economics* 22, no. 4 (1 December 1991): 490–504., 490
[97] British Standards Institute, 'ISO 9001 Quality Management | BSI Group', accessed 24 November 2014, http://www.bsigroup.co.uk/en-GB/iso-9001-quality-management/.
[98] See International Standards Organisation URL on ISO 9000 series, accessed 15 January 2015: http://www.iso.org/iso/iso_9000.

Compatibility standards allow different products by different producers to interface successfully with each other making it possible to use '[c]omplementary goods and services, or to be connected in networks'.[99] This type of standard can affect common goods like audio speakers, computer hardware or software. They enable users to use products interchangeably without requiring specific components or tools to support the use of different but similar products. For example, an individual who needs audio speakers for his computer can go to a store and select from several different models because the components and plugs interoperate with their computer hardware. These speakers can also be used interchangeably with MP3 players, iPods, tablets and other devices as a result of compatibility standards.

It is also important to clarify that within these broad categories of standard – reference, minimum quality and compatibility – there can be subsets known as *de jure* or *de facto* standards also exist. *De jure* standards are developed by standards bodies like the International Standards Organisation, whereas *de facto* standards are those which have gained widespread acceptance in certain communities of practice.[100]

*De jure* standards are formally prescribed, usually by some sort of law, regulation or requirement. Such standards are often developed according to a prescribed process to ensure that they receive the widest possible input from experts in a given field. The processes are meant to build consensus across business sectors or professional communities of practice, in order for a standard to receive widespread use. Examples of de jure standards may include standards developed by the International Standards

[99] Ellen Burud and Karoline Flaaten, 'The Economic Impact of Compatibility Standards' (Center for Research in Economics and Management- Norwegian School of Management, 2010), accessed 24 November 2014 http://www.bi.edu/InstitutterFiles/Samfunns%C2%B0konomi/2010_08_Workingpaper.pdf., 15.

[100] Hans Hofman, 'Standards: Not "One Size Fits All'', *The Information Management Journal*, no. May/June (2006): 36–45.,37 Hanseth et al, 'Developing Information Infrastructure'.,411.

Organisation for example ISO 15489 on records management. Other examples include HTML (e.g. ISO/IEC 15445) and PDF (e.g. ISO 32000-1) could be used, which started as *de facto* standards and have now been formally adopted as *de jure* standards .

De facto standards are customs or practices that have become adopted and commonly used but are not prescribed by law. For example, Excel may be considered a *de facto* standard for accounting and data compilation, but there is no formal requirement to use Excel to perform those functions in order to ensure the accuracy or reliability of the accounting or data compilation process. Similarly, the Microsoft DOC file extension is a de facto standard; even though the Microsoft Corporation has changed the specific format specifications for documents created using its Word software, DOC has remained the standard file extension for word processed documents.

### *1.6.2 Standards Development Process*

In order to understand the role and purpose of standards it is important to understand the process in which they are developed. Both OAIS and RAC are ISO standards, so it is relevant to examine the ISO standards development process. The International Standards Organisation is divided into 250 technical committees.[101] The Technical Committees (TC) each have a specific thematic focus, such as screw threads (TC 1) or information and documentation (TC 46). The TCs can then be broken down into specialised Sub-Committees (SC), such as metric series wires for measuring screw threads (TC1/WG15), technical interoperability for information and documentation systems (TC 46/SC 4) or archives/records management (TC 46/SC 11). Standards can be identified and developed at either the TC, SC level or even by liaison groups.

[101] International Standards Organisation, 'Who develops standards? - ISO'.accessed 24 November 2014 http://www.iso.org/iso/home/standards_development/who-develops-iso-standards.htm.

The Technical Committees and Sub-Committees are comprised of industry experts, Non Governmental Organisations (NGO), specialists and other stakeholders.[102] Members are drawn from national standards boards or other ISO full member bodies, like the Consultative Committee for Space Data Sciences. National standards boards if they wish to feed into the development process related to particular types of standards such as, metrics series for measuring screw threads (TC1/WG15) or archives and records management (TC46/SC11) must have similar technical committees at the national level. For example, the British Standards Institute (BSi) has a committee of experts on archives and records management,[103] who also represent that committee on TC46/SC11. If there is no similar technical committee, experts can create one along with other industry experts, with approval from their national standards board. However if such a technical committee cannot be created then experts cannot feed into the standards development process at the international level. For example, neither Tanzania nor Kenya have technical committees at the national level dedicated to space data standards, as such any space data experts would not be able to feed into the ISO standards development process for TC20/SC13 which is the committee dedicated to developing standards related to space data and information transfer systems.[104]

Not only do technical committees at the national level feed into the ISO development process but also professional bodies such as the Consultative Committee on Space Data Systems (CCSDS). The Consultative Committee on Space Data Systems (CCSDS), established in 1982, was created to serve as an international forum for space

[102] International Standards Organisation, 'Who develops standards? - ISO'.
[103] British Standards Institute. 'Information Management', accessed 1 March 2015. http://www.bsigroup.co.uk/en-GB/industries-and-sectors/information-management/.
[104] International Standards Organisation, 'ISO - Technical Committees - ISO/TC 20/SC 13 - Space Data and Information Transfer Systems', accessed 2 March 2015, http://www.iso.org/iso/standards_development/technical_committees/other_bodies/iso_technical_committee.htm?commid=46612.

data scientists to discuss and develop standards. CCSDS also has close ties with ISO TC20/SC13, which develops space data standards, and ISO TC20/SC13 often draws directly from CCSDS work. In actuality CCSDS has a cooperative agreement with TC20/SC13, whereby standards developed by the committee can proceed through the ISO standards process, without having to be proposed as a new work item to the SC13.[105] CCSDS is also listed, on TC20/SC13's ISO website, as a Liaison A committee which is defined as: 'Organizations that make an effective contribution to the work of the technical committee or sub-committee for questions dealt with by this technical committee or sub-committee.'[106] Both TDR standards studied in this thesis (e.g. OAIS and RAC) were developed by CCSDS and then submitted to TC20/SC13 for finalisation and approval as ISO standards.

Member bodies can choose to be observing members (O-members) or participating members (P-members).[107] P-members are active members of the TC or the SC, who must not only contribute to the standard development process but are also required to vote on all questions submitted to the technical committee. O-members cannot vote or comment on any standards in development, they are only able to observe the standards development process.

ISO has established four principles in the development of standards. Standards must answer a market need (1), and they must be developed by team of international experts (2), who must be drawn from various industries and sectors to ensure a

[105] Brian Lavoie, 'Meeting the Challenges of Digital Preservation: The OAIS Reference Model', *OCLC Newsletter*, February 2000., 26.

[106] International Standards Organisation, 'Organizations in Liaison - ISO', *Consultative Committee for Space Data Systems*, accessed 2 March 2015, http://www.iso.org/iso/home/about/organizations_in_liaison/organizations_in_liaison_details.htm?id=9301.

[107] All the information from this paragraph comes from: International Standards Organisation, 'Who develops standards? - ISO'.

balanced representation of interests (3).[108] Finally the standards must be based on consensus, and the comments and opinions of all stakeholders must be given equal weight and consideration (4).

The standards development process for Technical Committees and Sub-Committees is identical. Although OAIS and RAC were developed by CCSDS, by virtue of the reciprocal agreement between CCSDS and TC20/SC13, the standards were vetted and approved at the Sub-Committee level (TC20/SC13), as such the description of the development process here will use the term Sub-Committee, not Technical Committee. The entire development process is broken down, below, but it should be noted that OAIS and RAC proceeded through the ISO process from step 3, onwards.

1. A standard is proposed by a P-member of a Sub-Committee (SC).
2. If the proposal is accepted, then a working group within the SC is established to prepare an initial draft.
3. The draft is shared with the SC committee and the central secretariat (ISO-SC).
4. If consensus is reached within the SC about the contents of the draft standard, then that draft standard is shared with all ISO national bodies through the central secretariat.
5. A draft standard can only received full standard status if it receives 2/3 of the vote from P-members that were actively involved in its development and 75% of the ISO national bodies. If the draft standard is not approved it is sent back to the SC committee to be revised.[109]

This development process is particular to ISO but an understanding of the layers involved in the ISO standards development process will inform the reader's understanding of discussions in the data analysis chapters. It is acknowledged, though, that other standards bodies have their own development and approval mechanisms that differ from those established by ISO.

[108] Information from this paragraph comes from: International Standards Organisation, 'Standards Development- ISO', accessed 24 November 2014, http://www.iso.org/iso/home/standards_development.htm.

[109] International Standards Organisation, 'Standards Development- ISO' See also International Standards Organisation, 'ISO/IEC Directives, Part 1-Consolidated Supplement- Procedures Specific to ISO' (International Standards Organisation, 2014).

## 1.7 Conclusion

This chapter has provided the background to the thesis research; the problem statement; a description of the study locations; definitions for the major terms used in the thesis; and an overview of the standards development process, using the ISO as a model. The thesis itself is divided into eight (8) chapters, including this chapter; the subsequent chapters are outlined below.

Chapter 2 discusses the various methodologies and analytical frameworks considered for this research, noting that mimesis was selected as the methodology used to guide the development of the research framework. This chapter also explores the usage of mimesis in different research studies, in particular its usage in studying language and reality construction. This analysis leads into a discussion of Ricoeur's threefold mimetic model,[110]which served as the inspiration for constructing the research framework for the thesis. An explanation and justification for the selection of study locales, along with a detailed discussion about data collection and analysis, are also included in this chapter.

Chapter 3 discusses archival scholarship related to digital records preservation. This contextualisation of the topic from the literature leads into an examination of the factors that contributed to the development of the idea of a digital repository and a Trusted Digital Repository. The chapter considers the development of OAIS, along with the work that contributed to the elaboration of audit and certification standards, in particular RAC. This chapter also deconstructs the notion of trust, especially the meaning of the term in reference to 'trusted' digital repositories.

[110] Paul Ricoeur, 'Chapter 3: Time and Narrative: Threefold Mimesis', in *Time and Narrative*, vol. 1, 3 vols. (London and Chicago: University of Chicago Press, 1984).

Chapter 4 analyses the impact of international donor policies on information communication technology initiatives in the developing world, based on a review of literature from the field of technology transference. This chapter also examines whether or not assumptions in foreign donor policies indirectly contributed towards the failure of ICT projects in Africa. This discussion will seek to provide the reader with an understanding of the potential effect that implied expectations can have on the successful implementation of technology projects in Africa. However, the chapter also studies the factors that have contributed to successful IT projects in the developing world. In closing, there will be an overview of African archival research and scholarship to juxtapose the observations in the technology transference literature and the realities of digital records preservation in the region.

Chapter 5 is an analysis of the data collected from case study digital repositories, examining how current digital repositories are constructed and whether they adhere to TDR standards. The chapter compares a selection of TDR standards requirements against the realities of case study repositories.

Chapter 6 uses interview findings from practitioners in the East African Community to consider the realities of digital records preservation in the region. This chapter studies the impact of legislative frameworks and the position of the national archives in government on digital records preservation initiatives. It also examines the effects of weak infrastructure and the absence of trained personnel to support digital preservation initiatives. In closing, the chapter will analyse the perceived usefulness of TDR standards by East African practitioners.

Chapter 7 contains an analysis of the intent of the standards in question, in order to consider the extent to which they can meet digital preservation needs in East Africa. It

also examines the standards development process in detail, asking whether there was a privileging of voices, how equitable the development process was and the perceived usefulness of TDR standards by practitioners in the developed world.

Chapter 8 summarises the findings of this thesis and makes recommendations to help to resolve identified problems or shortcomings in the development and application of TDR standards. The chapter also includes suggestions for areas requiring further research and exploration.

# CHAPTER 2: METHODOLOGY

## 2.1 Introduction

This thesis examines the transferability of Trusted Digital Repository (TDR) standards to an Eastern African context, by determining if there are assumptions built into TDR standards (specifically OAIS and RAC) that might affect the ability of developing nations, such as those in the Eastern African Community (EAC), to apply them effectively.

A qualitative approach to the research supports the task of exploring both the reasoning behind TDR standards and the realities of operationalising them. Qualitative research is: '[a] process of enquiry that draws data from the context in which events occur, in an attempt to describe these occurrences, as a means of determining the process in which events are embedded and the perspectives of the participants in the events.'[111] In order to understand the transferability of TDR standards to different geopolitical environments, it is necessary to understand the context in which those standards have been developed and applied, as well as the perspectives of those participants involved in implementing them. This methodology helps provide the framework in which the presumptions built into TDR standards can be identified and deconstructed.

The methodological framework used in this thesis was designed specifically for this study, using Ricoeur's threefold mimetic model. This model has proved useful in the research because it has enabled a structured analysis of data collected through onsite visits to case study institutions and interviews with standards developers, digital repository operators and archival practitioners in the developed world and East Africa. The findings from the analysis of interviews, site visits and observational data will be

[111] G. E. Gorman and Peter Clayton, *Qualitative Research for the Information Professional: A Practical Handbook* (London: Library Association Publishing), 1997., 23.

used to answer the research questions proposed in Chapter 1. The design, development and application of the framework will be explained in greater detail in this chapter.

To understand the reasoning behind the selection of Ricoeur's threefold mimetic model and the development of the research framework, the reader needs to first understand what is meant by the term 'text' (2.2). This will be followed by a discussion of the research methodologies that were considered and rejected (2.3), before providing an overview of the chosen theoretical framework: constructivism and mimesis. The chapter will then offer a definition of constructivism and mimesis and an examination of the use of mimesis as a methodology for deconstructing texts (2.4). Ricoeur's threefold mimetic methodology will be then examined, in order to assess its viability as a research methodology (2.4.2). The chapter will include a discussion of the application of mimesis in this study (2.5.1), as well as a description of the parameters of the study and the data collection points chosen (2.5.2), and an explanation of the methods used to collect and analyse data (2.5.3 and 2.5.4).

**2.2 Definition of 'Text'**

The notion of 'text' is central to this thesis and the methodological framework. Therefore the term needs to be clearly understood and defined. A definition of text offered in the *Oxford English Dictionary* is: 'The wording of anything written or printed; the structure formed by words and phrases and sentences as written.'[112] This definition offers a broad understanding of what constitutes text and is one which linguists might feel does not adequately represent the granularity of the notion. Further it does not offer as comprehensive an understanding of what constitutes 'text' as is needed in this thesis.

[112] Oxford English Dictionary, 'Text, n.1', *OED Online* (Oxford University Press), accessed 18 January 2015, http://www.oed.com/view/Entry/200002.

In text and discourse analysis, text is defined as a 'Communicative Event', which has text internal and text external factors that mediate its construction and understanding.[113] The distinction offered by Titschler, Meyer, Wodak and Vetter differentiates linguistic analysis, which focuses on text internal constructs (i.e. syntax, co-location of words, semantics,) from text external factors, which are the focus of discourse analysis.[114] External factors that influence text creation (i.e. writing) and reception (i.e. reading) are: '[t]he broader discursive framework; the social and cultural conditions in which texts are made; the complex networks of communicative practices…'[115] These elements interplay in the notion of text, which are helpful for the purposes of this thesis.

This thesis analyses several texts including TDR standards and transcripts of interviews. The importance of these texts in this thesis is not their internal construction but rather the discursive and external elements that influence their creation. In other words, the focus of this methodological framework is on external factors that influence text construction, such as culture or personal biases. To support this research, therefore, the following definition of 'text' has been adopted for this thesis: 'A document in printed form, such as a standard or interview transcription, which is implicitly reflective of the external circumstances of its creation (e.g. personal perception, culture and social conditions).' This interpretation of 'text' aligns with this study's research questions and methodological framework.

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[113] Stefan Titschler et al., *Methods of Text and Discourse Analysis* (London, Thousand Oak, New Delhi: SAGE Publications, 2000)., 22-23. The authors discuss in particular Robert de Beaugrande and Wolfgang Dressler's 1981 article on the seven criteria for defining what constitutes a text.

[114] Titschler et al., *Methods of Text and Discourse Analysis,* 24.

[115] Louise J. Ravelli, *Museum Texts: Communication Frameworks* (London and New York: Routledge, 2006)., 9. See also Titschler et al., *Methods of Text and Discourse Analysis* .,24.

**2.3 Methods, Methodologies and Conceptual Frameworks – Considered and Rejected**

Ethnography, participatory action, hermeneutics, psychology and critical discourse analysis are all qualitative research methodologies that study human social and behavioural constructs. These and many other methodologies were examined to determine their viability for this study, with particular focus on hermeneutics, Participatory Action Research (PAR) and Critical Discourse Analysis (CDA). This section includes a discussion of the methodologies considered and the reasons they were rejected.

Hermeneutics, which seeks to understand human linguistic and non-linguistic expression,[116] was identified as a potential theoretical framework for the research. Of particular interest was objective hermeneutics.[117] Objective hermeneutics research studies texts to understand not the context of their creation but rather the context in which they are interpreted, identifying any latent structures (i.e. personal biases, cultural and social constructs) held by the reader that may influence their interpretation.[118] This methodology might have potential for studying the relevance of TDR standards by having East African practitioners and digital repository operators read standards texts in advance of data collection interviews. This approach would have elucidated any personal biases they brought to their reading of the standards; however, it presented several problems.

Firstly, it would have required interviewees to read OAIS and RAC, about 150 pages in total. Most interviewees would likely not have wanted to read such a large

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[116] Ramberg and Kristin Gjesdal, 'Hermeneutics', in *The Stanford Encyclopaedia of Philosophy*, ed. Edward N. Zalta, Summer 2009, accessed 3 March 2012, http://plato.stanford.edu/archives/sum2009/entries/hermeneutics/.

[117] Uwe Flick, Ernst Von Kardoff, and Ines Steinke, eds., *A Companion to Qualitative Research* (California: SAGE Publications, 2005)., 205.

[118] Flick et al., *A Companion to Qualitative Research.,* 204. See also Uwe Flick, *An Introduction to Qualitative Research* 5ed. (California: SAGE Publications, 2014)., 330.

amount, due to other commitments and time constraints. This requirement, therefore, would have severely truncated the sample set. Secondly, such an approach would not have enabled the research to answer the research questions effectively or test the research hypothesis because it would focus entirely on user interpretation of texts, not on the impetus behind the creation of those texts and how this would affect both their contents and their interpretation by readers.

Another methodology considered was Participatory Action Research (PAR). PAR requires the researcher to expose explicit and implicit biases in organisational structures where there may be marked power imbalances or problematic situations.[119] For example, this method has been used successfully to study issues such as the nature of government AIDS policies and programmes and their effects on AIDS patients. The PAR process requires the researcher to directly and knowingly engage with research subjects in order to create pragmatic and actionable results, ideally leading to social change, including a correction in power imbalances. Participants in PAR are invited to actively engage in data collection and interpretation, assisting the researcher in producing practical results. This approach encourages participants to have a vested interest in overseeing and ensuring the implementation of research findings once the research is completed.

Employing the PAR methodology might have yielded interesting results by encouraging participants at data collection sites, and other archival practitioners in East Africa, to engage with the development of standards. Part of this process might also have included the identification and redressing of problems that would have prevented the transferability of TDR standards. Nevertheless, this research methodology was not

[119] All the information from this paragraph from: Sara Kindon, Rachel Pain, and Mike Kesby, eds., *Participatory Action Research Approaches and Methods: Connecting People, Participants and Place* (London: Routledge, 2009)., 1-3.

practical for a number of reasons. Firstly, the level of participant involvement would have been unsustainable and unmanageable given the scope of this study: the process of collecting input and feedback from East African Community (EAC) participants would have been too onerous for the researcher. Secondly, given the highly politicised and polarised environment in some study countries, participant input could have potentially skewed research findings, by reflecting overarching ideological interests rather than identifying actual obstacles in the transferability of standards. Finally, given the aims and objectives of this research, PAR would not have produced the data needed to answer the overarching research questions. The focus of this research methodology is on correcting power imbalances, and the aims of this research are to understand how TDR standards were created in order to identify whether any biases have been built into standards and how those biases might affect their interpretation and usefulness in an East African context. Thus, it was concluded that PAR would not be appropriate.

A third research methodology considered was Critical Discourse Analysis (CDA). CDA seeks to examine underlying power structures and inequalities latently constructed into texts.[120] CDA research has focused on language use in the political sphere and in the media, specifically in the creation and use of propaganda.[121] One type of CDA method considered for this thesis was the discourse-historical research approach, which seeks to examine the historical impetuses that influence text creation and looks for mitigating extra-linguistic factors.[122] For example CDA has been used to study the anti-immigration

[120] Ruth Wodak *Language, Power and Ideology: Studies in Political Discourse*, Critical Theory: Interdisciplinary Approaches to Language, Discourse and Ideology 7 (Amsterdam/Philadelphia: John Benjamins Publishing Company, 1989)., xi. Ruth Wodak and Michael Meyer, *Methods of Critical Discourse Analysis* (London, Thousand Oak, New Delhi: SAGE Publications, 2001)., 10.

[121] Wodak and Meyer, *Methods of Critical Discourse Analysis*.,6. Florian Menz, 'Manipulation Strategies in Newspapers: A Program for Critical Linguistics', in *Language, Power, and Ideology: Studies in Political Discourse* (Amsterdam/Philadelphia: John Benjamins Publishing Company, 1989), 227–49.

[122] Titschler et al., *Methods of Text and Discourse Analysis*., 24.

stance taken in Austria in the early 1990s with the 'Austria First Petition'.[123] Using the CDA method, the study provided a history of Austria's immigration policies to contextualise and then deconstruct and explain the propaganda surrounding the petition.[124]

CDA as a form of text interrogation, although valuable, would not have enabled the research into TDR standards to examine the research questions. The methodology seeks only to deconstruct the texts and their context of creation; it does not assist in understanding a reader's perspective of the texts and how they are received. As such this methodology was not considered suitable.

**2.4 Constructivism and Mimesis**

In the end, the methodological framework of constructivism, particularly mimesis, was chosen for the thesis research. These methodologies are discussed below.

***2.4.1 Constructivism***

Constructivism is an umbrella term for various schools of thought concerned with human reality and epistemological constructs. Studies in this area examine cognitive processes and language use in constructing and mediating human perceptions, interactions and interpersonal relationships. Essentially, constructivism seeks to analyse '[c]ultural systems of meaning [which] are assumed to somehow frame perception and making of subjective and social reality.'[125] These constructed realities and perceptions are unconsciously iterated in verbal, visual and written forms, relying not only on pre-existing cultural and social conventions but also on individual frames of reference.[126] A

[123] Wodak and Meyer, *Methods of Critical Discourse Analysis.*, 72.
[124] Wodak and Meyer, *Methods of Critical Discourse Analysis.*, 72.
[125] Uwe Flick ed., *An Introduction to Qualitative Research,* 2nd ed. (London, Thousand Oaks: Sage Publication) 2002., 22.
[126] Jonathan Rose, *The Intellectual Life of the British Working Classes* (New Haven and London: Yale Nota Bene and Yale University Press, 2001). See Rose's discussion on 'frame theory' p 4. See also Ian Rowlands, Tamara Eisenschitz, and David Bawden, 'Frame Analysis as a Tool for Understanding Information Policy', *Journal of Information Science*

frame of reference is the way individuals organise their experiences in order to process information about the world around them.[127]

Constructivism acknowledges that texts are tools by which individuals reflect and construct their social reality, both in terms of text creation and reception.[128] As authors of texts, we unknowingly and implicitly reflect our understandings of the world in our written output; moreover as readers we filter and assimilate information through these same constructs.

Research texts (i.e. reports, articles or theses) are not exempt from this process, as they are created by researchers who are also influenced by their individual perceptions and biases.[129] In addition, readers of these texts filter and interpret them based on their socio-economic background, education and other filters. Standards also constitute a form of constructed textual knowledge. They are developed to address a given problematic[130] and are produced by individuals who are indelibly steeped in their own social and cultural realities. Readers of standards understand these texts based on their personal perceptions and frames of reference, which may enable or constrain their ability to interpret and use them.

Given that constructivist research looks at social and cultural conventions involved in text creation and reception, it was chosen as the most suitable methodology for this study, which seeks specifically to look at these constructs in the creation and application of TDR standards. Because there are many different approaches to

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28, no. 1 (2002): 31–38.

[127] Rose, *The Intellectual Life of the British Working Classes*.,6.

[128] Flick et al., *A Companion to Qualitative Research*., 91.

[129] Flick et al., *A Companion to Qualitative Research.,* 91. They specifically discuss scientific knowledge as text and social constructs that are built into research texts especially in the social and psychological sciences. Flick specifically cites such modes of study as 'world as text' (Garz and Kraimer 1994a); life as a story (Bruner, 1990). See also Jerome Bruner, 'Life as Narrative', Social Research, 54 (1) (Spring 1987): 11-32.

[130] Nils Brunsson and Bengt Jacobsson, 'Chapter 1: The Contemporary Expansion of Standardization', in *A World of Standards*, ed. Nils Brunsson, Bengt Jacbsson, and associates (Oxford: Oxford University Press, 2000), 2–16., 6.

conducting constructivist research, a precise methodology needed to be chosen. After further investigation it was determined that mimesis would be most appropriate as it is built on the notion that texts are social constructs and that in order to comprehend their value and usefulness the process of text elaboration needs to be deconstructed. This approach aligns effectively with the aims of this research.

### *2.4.2 Mimesis*

Mimesis comes from the Greek *mimos* and refers to a person who imitates or a performance based on the imitation of stereotypical characters or traits.[131] The usage of the term mimesis has changed over time, reflecting the views of various historical artistic and literary movements. As noted by Gebauer and Wulf: '[A] spectrum of meanings of mimesis have unfolded over the course of its historical development, including the act of resembling, of presenting the self and expression as well as mimicry, imitation, representation and nonsensuous similarity.'[132]

Mimesis has been used to study the representation of reality in Western literature from the classical to the modern.[133] In addition, it has been used by psychoanalysts to examine identity formation,[134] by feminist theorists to deconstruct perceptions around gender and sexuality[135] and by researchers in post-colonial studies to understand racial segregation and ethnicity.[136] Mimesis has also been used to conduct

[131] Matthew Potolsky, *Mimesis: The New Critical Idiom* (New York and London: Routledge, 2006)., 16.
[132] Gunter Gebauer and Christoph Wulf, *Mimesis: Art, Culture and Society*, trans. Don Reneau (Berkeley/Los Angeles/ London: University of California Press, 1995).,1. See also Potolsky, *Mimesis: The New Critical Idiom*., 2.
[133] Erich Auerbach, *Mimesis: The Representation of Reality in Western Literature* (Princeton and Oxford: Princeton University Press, 2003).
[134] Potolsky, *Mimesis: The New Critical Idiom*.,117.
[135] Judith Butler, 'Imitation and Gender Insubordination', in *Inside/Out: Lesbian Theories, Gay Theories*, ed. D Fuss (New York: Routledge, 1989), 13–31.
[136] Homi Bhabha, 'Of Mimicry and Man: The Ambivalence of Colonial Discourse', in *The Location of Culture* (London: Routledge, 1994), 85–92.

research in biology[137] as well as in cultural studies and computer sciences to study the transmission of ideas and the phenomenology of viral videos, blog posts and tweets.[138]

This section examines the use of mimesis in constructing language and text, by analysing the work of anthropological linguist Walter Benjamin and philosopher Jacques Derrida. The section ends with a discussion of Paul Ricoeur's threefold mimesis model, which will be the data analysis framework for this thesis.

*2.4.2.1 Language and Text as a Social Reality Construct*

All cultures use language to convey thoughts and ideas, including using the written word in texts to formalise those thoughts and ideas. Recent academic discussions in philosophy and sociolinguistics have examined how individuals mimetically represent abstract notions and concepts through language and in text. For instance, as children, we learn the proper names of objects; as time goes on our vocabulary expands, permitting us to assign words to increasingly abstract and complex thoughts such as emotions (e.g. love and hate) or concepts (e.g. gender or politics). In language, we attempt to represent thoughts and emotions mimetically: words are their mimetic embodiment. Thus, when an individual speaks or writes they are associating words to ideas in order to articulate a point of view.

Reading and understanding texts is an active process of producing reality.[139] For example, a person who is reading is not only assimilating ideas but also reformulating them according to their own understanding and perceptions. Readers then go on to create new forms of knowledge by interpreting what they have assimilated and

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[137] Richard Dawkins, *The Selfish Gene* (Oxford: Oxford University Press, 1976). Dawkins in his book introduces the concept of the meme, which has since been taken up by those studying the transmission of viral videos etc. See p 158.

[138] L. Xie et al., 'Visual Memes in Social Media: Tracking Real-World News in You Tube Videos', in *MM'11 - Proceedings of the 2011 ACM Multimedia Conference and Co-Located Workshops*, 2011, 53–62.

[139] Flick ed., *An Introduction to Qualitative Research*., 33.

conveying it to new audiences. This interpreted information can then be used by others, resulting in a mimetic circle of information consumption, interpretation and re-use.[140] For example academic A writes a research report and then academic B reads it, interpreting the findings in the report in light of their research. Academic B then incorporates their understanding and views of the research findings in their academic paper. The academic paper is then read by a doctoral student who assimilates and re-purposes the information contained in the paper.

Mimesis is a relational network whereby we are constantly receiving, through language and text, one person's symbolic representation of their thought processes and incorporating them into our own culturally and socially mediated episteme.[141] As Gebauer and Wulf point out:

> The individual "assimilates" himself or herself to the world via mimetic processes. Mimesis makes it possible for individuals to step out of themselves, to draw the outer world into their own world, and to lend expression to their interiority. It produces an otherwise unattainable proximity to objects and is thus a necessary condition of understanding.[142]

The authors state that language, both verbal and written, can act as an expression of our 'interiority': in other words, our thoughts and ideas. Flick reinforces this fact when he states: 'The understanding of texts – and by extension of social reality – becomes an active process of producing reality in which not only the author of texts or versions of the world is involved but also the person for whom these are produced and who "reads" or understands them.'[143] Therefore, language mimetically represents thoughts, which form the basic building blocks for constructing and transmitting knowledge, including normative behaviour and social realities.

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[140] Douglas Ezzy, *Qualitative Analysis Practice and Innovation* (London: Routledge, 2002).,25.
[141] Gebauer and Wulf, *Mimesis: Art, Culture and Society*., 3.
[142] Gebauer and Wulf, *Mimesis: Art, Culture and Society.,* 3.
[143] Flick ed., *An Introduction to Qualitative Research*., 92.

The notion of text and language as mimetical representations of reality can be found in the works of Walter Benjamin (1892-1940), the anthropological linguist, and Jacques Derrida (1930-2004), the philosopher. Benjamin posited the notion of sensuous and non-sensuous apprehensions, which are facets of mimetic representation. Sensuous apprehension consists of reproducing similarities of objects or people: for example, a child holding out their arms to represent an airplane is a direct act of mimesis.[144] Non-sensuous apprehension, on the other hand, consists in identifying similarities which are not immediately apparent but which must be decoded or capable of being decoded. Gebauer and Wulf interpret non-sensuous similarity to mean:

> [S]imilarities that are not directly legible and must be decoded […] the sense of which is always there to be exposed to minds capable of decoding it in an act of reading. […] The sense of the world is revealed to the individuals by way of the individual's adaptation to the world.[145]

For example, in Shakespearian plays there are many expressions, allusions or terms that would have been immediately decodable to a sixteenth century English audience. However, it is more difficult for a contemporary audience to understand these literary cues; often the assistance of teachers, professors or theatre professionals is required to decode their meaning. The interpretation of the definition does not explicitly mention language as non-sensuous similarity, but Benjamin believed language could be interpreted as such. In his opinion, the act of 'naming' was a mimetic act in which humans assign a given word to an object, perception or thought.[146] The word chosen is meant to imitate and embody that specific object, perception or thought, serving as its

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[144] Information from this paragraph comes: Gebauer and Wulf, *Mimesis: Art, Culture and Society*. ,270.

[145] Gebauer and Wulf, *Mimesis: Art, Culture and Society.,* 270. This is Gebauer and Wulf's interpretation of non sensuous similarity as presented in Walter Benjamin, 'On the Mimetic Faculty', in *Reflections- Walter Benjamin: Essays, Aphorisms, Autobiographical Writings*, ed. Peter Demetz, trans. Edmund Jephcott (New York: Schocken Books, 1986), 333–36., 335. See also and Potolsky, *Mimesis: The New Critical Idiom*., 142.

[146] Walter Benjamin, 'On Language as Such and on the Language of Man', in *Reflections- Walter Benjamin: Essays, Aphorisms, Autobiographical Writings*, ed. Peter Demetz, trans. Edmund Jephcott (New York: Schocken Books, 1986), 314–32., 317.

symbolic representation. This representation is particularly exemplified in the use of onomatopoeia, which is the representation of a sound in a word, such as 'Bang!' or 'Boom!' both of which symbolise sudden, loud noises.[147] Benjamin underscores this point when he states that '[L]anguage communicates mental being *in* it not *through* it.'[148] For Benjamin, language is a mimetic representation,[149] which must be capable of being decoded by the reader. However, decoding the semantics of text is contingent on the supposition that the reader understands the built-in conventions or codes and so can fully apprehend their meaning.

Jacques Derrida builds on this idea and provides another perspective on text as reality construct. In his work, Derrida examined the mimetic nature of texts, and he acknowledges that there is always an antecedent text that serves as the basis for subsequent ones. Linguistically this relationship between old and new is referred to as intertextuality.[150] According to Derrida, texts inherently reflect the signs and symbols that we mimetically acquire through cultural or interpersonal interactions and that we then incorporate into our realm of knowing.[151] We then express ourselves using these symbolic modes to convey as well as comprehend our social realities. According to Gebauer and Wulf, Derrida is saying that mimesis is a process of production as well as reproduction:

> [M]imesis should no longer be limited to the imitation of objects, that is, to reproduction. For mimesis also encompasses the imitation of processes and the production of processes and objects. Second, Derrida wants to make it clear that

[147]Benjamin, 'On the Mimetic Faculty'., 335.
[148] Benjamin, 'On Language as Such and on the Language of Man'., 316.
[149] Benjamin, 'On the Mimetic Faculty'., 336. See also Gebauer and Wulf, *Mimesis: Art, Culture and Society*., 274.
[150] Gebauer and Wulf, *Mimesis: Art, Culture and Society*., 294. See also Jacques Derrida, 'Economimesis', *Mimésis des articulations,* edited by Sylviane Aagacisnski, (Paris: Aubier-Flammarion, 1964)., 58 and 74. Intertextuality means: 'On the one hand it suggests that a text always relates to preceding or simultaneously occurring discourse, and other the hand it also implies that there are formal criteria that link texts to each other in particular genres or text varieties.' This quote comes from Titschler et al., *Methods of Text and Discourse Analysis*., 23.
[151] Remaining information in this section comes from Gebauer and Wulf, *Mimesis: Art, Culture and Society*., 306. See also Jacques Derrida, 'Economimesis'., 58 and 74.

> mimetic processes must not be examined in isolation from the political and economic, that, in fact, mimetic processes cross over boundaries drawn between culture and economy.[152]

Like Benjamin, Derrida sees mimesis as a process of interpreting symbolic worlds in the form of signs, images or, more specifically, words and texts. In the end, readers must be capable of deconstructing and comprehending the latent structures in texts to make sense of them and to allow for meaningful information exchange.

The works of Benjamin and Derrida demonstrate how individuals use language and text both to construct and reflect their understanding of the world around them. In the next section Paul Ricoeur's work on mimetics and text construction is examined, with specific focus on his threefold mimetic methodology, which forms the basis for the analytical framework used in this thesis.

#### *2.4.2.2 Ricoeur's Threefold Mimesis*

Paul Ricoeur (1913-2005) was a philosopher who wrote about philosophical anthropology, hermeneutic phenomenology and hermeneutic anthropology.[153] Ricoeur developed the concept of threefold mimesis in his book *Time and Narrative*.[154] He initially intended his book to be a philosophical examination of the concepts of temporality and narrativity in fictional writing in opposition to historical writing, using threefold mimesis to deconstruct and compare these different textual methods. However, this tripartite model can also offer insights into the planning, development and reception of texts in general, and in their role in constructing reality. Like Derrida, Ricoeur recognises that stories contain signs, symbols and norms, which must be

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[152] Gebauer and Wulf, *Mimesis: Art, Culture and Society.,* 302. See also Jacques Derrida, 'Economimesis'., 80.

[153] Bernard Dauenhauer, and David Pellauer, 'Paul Ricoeur (Stanford Encyclopaedia of Philosophy)', *Paul Ricoeur (Stanford Encyclopaedia of Philosophy)*, Summer 2011, accessed 18 January 2012 http://plato.stanford.edu/entries/ricoeur/#3.5.

[154] Paul Ricoeur, *Time and Narrative*, 3 vols. (London and Chicago: University of Chicago Press, 1984).

identified and interpreted by the reader.[155] In a literary milieu, these symbolic cues contextualise the action taking place in a fictional plane. Ricoeur goes on to state that 'it is "as a function of" such a symbolic convention that we can interpret this gesture as meaning this or that.' These symbolic worlds exist unconsciously in our psyche and are inadvertently iterated in written form, arguably even in texts such as standards.

In his work Ricoeur represents the mimetical phases of text development as: Mimesis 1 (M1), Mimesis 2 (M2) and Mimesis 3 (M3). He defines Mimesis 1 (M1) as: '[T]he composition of plot [which] is grounded in a pre-understanding of the world of action, its meaningful structures, its symbolic resources, and its temporal character.'[156] M1 is the process by which we cognitively give form to our thoughts through language. Usually this is the point at which the author is mentally creating their characters or formulating plots based on personal experiences. It is during this initial text planning and formulation phase that mimetically assimilated beliefs and presumptions subconsciously present themselves, to be concretised in written form under Mimesis 2.

Mimesis 2 (M2) is the intermediary between writer and reader. It is the text itself, reflecting the author's symbolic worlds, which are then understood and interpreted by a reader. Ricoeur explains M2 in connection with emplotment, which in a literary sense refers to the process of ordering action into a logical sequence of events.[157] Flick offers a more tangible explanation of M2 in relation to social science research, paralleling it to the production of research reports, where the researcher must formally articulate their findings and observations, gathered as part of M1.[158] Thus, it is in M2 that the abstract thought processes of M1 are transformed into a written text.

[155] Information in the remaining part of this paragraph comes from: Ricoeur, 'Chapter 3: Time and Narrative'., 58.
[156] Ricoeur, 'Chapter 3: Time and Narrative'., 54.
[157] Ricoeur, 'Chapter 3: Time and Narrative'., 65.
[158] Flick et al, *A Companion to Qualitative Research*., 92.

However, the report, article or text can only have effect when it is read, during Mimesis 3.

Mimesis 3 (M3) is the point in Ricoeur's cycle where the text is read and interpreted by a reader, who views the text through their particular social and cultural frames of reference.[159] Even Ricoeur acknowledges the constructs that interplay in the reception of texts when he states: '[T]he listener or reader receives it [the narrative] according to their own receptive capacity, which itself is defined by a situation that is both limited and open to the world's horizons.'[160] The reader assimilates the knowledge contained in the text, amalgamating it into their epistemological constructs. This information can confirm existing presumptions and understandings or further inform those presumptions, potentially influencing the reader's own written output. This process, in turn, contributes to the development and construction of reality and knowledge. Paradoxically, M3 both completes Ricoeur's mimetical process and is a launching point for further text production and interpretation.

The mimetic process posited by Ricoeur represents a more granular understanding of Benjamin's non-sensuous apprehension, while supporting Derrida's views that texts have no referential starting point but are, instead, an amalgam of an infinite number of preceding texts. However, all of these authors (Benjamin, Derrida and Ricoeur) acknowledge the role of culture, economy, education and other mediating factors in the formulation and interpretation of texts. These factors also influence the construction of social reality through the propagation and reformulation of knowledge.

[159] Ricoeur, 'Chapter 3: Time and Narrative'., 71.
[160] Ricoeur, 'Chapter 3: Time and Narrative'., 77.

## 2.5 Study Parameters, Data Collection and Analysis Methods

In this section of the thesis, the application of mimesis to this study is examined (2.5.1), in order to establish boundaries around the parameters of the research and explain the reasoning behind the selection of data collection sites and interviewees (2.5.2). This section also includes an examination of the data analysis methods used (2.5.3), in order to allow readers to understand how the data were interrogated, grouped and then interpreted in the thesis (2.5.4).

### *2.5.1 Mimesis' Application to this Study*

Mimesis, and especially Ricoeur's threefold mimesis model, is applicable to this research because it acknowledges that texts are social constructs that contain the views and biases of their authors. This approach seeks to deconstruct these latent characteristics of text and expose them to further interrogation. Ricoeur's threefold mimetic model facilitates the exploration of the standards development process and helps answer the question of whether the perspectives of the authors of those standards might impede the transferability of the standards to other contexts. Further, this model will enable a better understanding of how users have interpreted and applied these standards.

The TDR standards studied in this thesis were developed, tested and written in the developed world. There is a presumption that they are objective resources and are sufficiently generalised to be transferable to any context. Mimesis will be used to identify these implicit presumptions in standards. However, the mimetic process is not simply concerned with the construction of texts but also with their reception, because the act of reading, like the act of writing, is mediated by frames of understanding and by social realities. Simply reading a text is not enough. A reader also needs to decode the implicit signs, symbols and conventions in that text, or the information it contains might

be misinterpreted or lost. Using mimesis in this research will help to determine whether latent meanings and assumptions are barriers which may prevent practitioners in East Africa from fully operationalising TDR standards in their context.

Ricoeur's threefold mimetical model (M1, M2 and M3) will be used to facilitate the comparative analysis of research findings and deconstruct the standards development process to identify whether any text external factors (i.e. presumptions, cultural biases) have been built into these texts. Further, this methodology will enable an examination of the interpretative processes involved in the reception of standards (M3) and the effect this interpretation might have on operationalising the standards in various contexts. Using mimesis and Ricoeur's model will facilitate a structured analysis of the thesis data to provide an understanding of the transferability of TDR standards.

### *2.5.2 Study Parameters and Data Collection Sites*

This study is bounded in two main ways, firstly by geography then according to mimetic groupings. Below is an explanation of the process used to define these geographic parameters and to select the standards to be analysed, followed by a breakdown of interviewees and collection sites by mimetic grouping.

The research itself has been divided into two major groups: developed world and East African Community. The United Nations Development Programme (UNDP) Human Development Index (HDI) was used to define what is understood by 'developed world.' The HDI is a comparative measure of life expectancy, education and quality of life in countries around the world. The HDI is divided into four categories: very high human development, high human development, medium human development and low human

development.[161] These categories allow a greater degree of flexibility in measuring development but countries ranked as very high human development are considered developed nations.[162] This definition is adopted for the purposes of this study and includes all countries identified in Chapter 1 as developed world study locales.

The East African Community (EAC), whose countries all fall into the low human development HDI category, was selected for the study of the transferability of TDR standards for a number of reasons. During the author's doctoral studies, she was also working with the International Records Management Trust (IRMT) on large-scale research projects in this region, helping her gain a well-rounded understanding of the state of recordkeeping. That work also helped her better comprehend the realities faced by national archives in the region and their abilities to influence digital recordkeeping processes and preserve digital records. More practically, the author's work with IRMT permitted her to identify EAC data collection sites with greater ease.

The choice of EAC countries was not made only on the basis of practicality. The author looked closely at the state of development in the EAC and in other parts of Africa, noting that the EAC shares many characteristics with other countries on the African continent, such as proliferation of mobile technology and the rapid growth of the technology sector, along with poor infrastructure and lack of trained personnel. The precise state of development varies country by country in the region and across the continent, but it was determined that focusing this study on the EAC would provide a

[161] United National Development Programme, *Human Development Report 2014: Sustaining Human Progress-Reducing Vulnerabilities and Building Resilience.* (New York: UNDP, 2014)., 161.

[162] Lynge Nielsen, 'Classifications of Countries Based on Their Level of Development: How It Is Done and How It Could Be Done' (World Bank, 2011), accessed 18 January 2015, https://www.imf.org/external/pubs/ft/wp/2011/wp1131.pdf., 19.

meaningful overview of many of the common problems faced elsewhere in Africa and in other parts of the developing world.

For the purposes of this study, several TDR good practice guidelines and standards were assessed to determine which should constitute the focus of this thesis, including the *Open Archival Information System* (OAIS) (ISO 14721:2013), *Repository Audit and Certification* (RAC) (ISO 16363: 2012), *Digital Repository Audit Method Based on Risk Assessment* (DRAMBORA), *Network of Expertise in Long-term Storage of Digital Resources* (nestor), *Data Seal of Approval* (DANS) and *Trusted Repositories: Audit and Certification* (TRAC). Of the guidelines and standards studied, only two, OAIS and RAC, are recognised formally as International Standards: ISO 14721: 2012 (OAIS) and ISO 16363: 2012 (RAC). Consequently, these two standards have a higher profile and are more likely to be adopted by organisations around the world. Moreover, both these standards are widely accepted within the archival and information studies communities as good practice measures for the design, implementation and maintenance of TDRs.

It was believed that these standards, of all those TDR standards currently in place, were having and would continue to have the greatest impact in both the developed and developing world. Further as ISO standards they are more likely to be used to assess the success or failure of TDR operations. Therefore it was determined that these two standards would be the chosen texts for analysis in this research.

Data collection sites were selected based on Ricoeur's threefold mimetic model, as shown in Table 2.1.

**TABLE 2.1: GENERAL OVERVIEW OF RICOEUR'S THREEFOLD MIMETIC METHODOLOGY BASED ON GENERAL STUDY PARAMETERS**

| **Level of Mimesis** | **Developed World** | **Eastern African Community** |
|---|---|---|
| *M1* | OAIS and RAC standards developers (M1(DW)) | Digital Records specialists and archival practitioners (M1(EAC)) |
| *M2* | OAIS and RAC standards (M2) | |
| *M3* | Case study digital repositories (M3(DW)) | Case study national archives (M3(EAC)) |

In M1, the objective is to understand how individuals in the sample sets chosen for the developed world and the Eastern African Community sample sets verbalise digital records problems. In a developed world context (M1(DW)) the focus will be on understanding the impetus behind OAIS and RAC and the initial problematic that led to the development of these standards. Part of this analysis involves attempting to discern any biases exhibited by standard developers, in order to determine whether these biases have been incorporated into the standards and whether this incorporation impedes the usefulness of those standards in other contexts.

Interviewees under M1(DW) were standards developers who had been involved in the development and testing of either OAIS (2003, revised in 2013), RAC (2012)or TRAC (2007). It is important to clarify why some interviewees consisted of TRAC developers: when this research began, RAC had not been officially endorsed by the ISO. Further, even though RAC was endorsed by the ISO in 2012, it has not yet been officially used as a certification standard, whereas TRAC has been. Also, many interviewees involved in the development of TRAC were also involved in the development of RAC. Moreover RAC draws heavily from TRAC, as demonstrated by an unpublished analysis by

Dr. Nancy McGovern, Michael Perry and Anna Cox.[163] Since the two documents are so closely interrelated, it was felt that by studying the development of TRAC as well as RAC it would be possible to assess the possible future usefulness of RAC.

In the Eastern African context (M1(EAC)), the study specifically seeks to determine whether digital records challenges are similar to those identified in the developed world. If a similar problematic is extant in Eastern Africa, then there is a greater probability that current TDR standards could be applicable, as long as any infrastructural and technical issues associated with implementation are addressed.

Since there are no equivalent standards developers for the EAC, M1 (EAC) interviewees were selected from East African academics and practitioners. Other criteria for the selection of interviewees included the nature of their contributions to scholarly journals, research projects or other major archival and records management initiatives in the region. It was felt that those academics and practitioners who had been significantly involved in initiatives across the EAC would be best able to comment on digital preservation needs in this community.

Under M2, OAIS and RAC were reviewed in relation to the M1 interviews with standards developers, in order to ascertain if any assumptions or biases were incorporated into the standards. The interviews were used to try to triangulate any sentiments or biases that may have filtered into the standards. Where such latent elements existed they were studied and discussed in conjunction with M1 (EAC) interview findings to determine whether the presumptions or biases have any effect on standard transference. The results of this analysis will also be triangulated using M3 data.

[163] Nancy McGovern, Michael Perry and Anne Cox, *TRAC-RAC Comparison*, 2010, Unpublished.

In M3, the goal was to understand how standards have been received by practitioners in both the developed world and the EAC, in order to assess whether the expectations of the standards met the needs of both communities.

All M3(DW) case study digital repositories were archival digital repositories. The author decided to exclude from the study digital repositories responsible only for the preservation of data as opposed to records. The reason for this exclusion was that both standards were heavily influenced by developers who operated data repositories, not records repositories. In data or science repositories the formats are more homogenised (i.e. data) and easier to manage whereas in the archival context there are multiple different file formats to manage with varying levels of complexity when it comes to preserving them.[164] By studying archival digital repositories we can appreciate the complexities of digital records preservation and the applicability of TDR standards in these contexts.

Under M3 developed nation (M3(DW)), the focus was on assessing how cultural heritage institutions have interpreted and implemented TDR standards. To carry out this research, the author visited three of the case study digital repositories *in situ* to examine their facilities and operations, in order to understand if any issues arose with the implementation of TDR standards that might in turn hamper the wholesale transferability of those standards. Ultimately, if the standards cannot be effectively implemented by developed world institutions – which can be assumed to have access to the necessary resources and expertise – then the ability to implement those standards in Eastern African archives may be greatly reduced.

[164] Chris Rusbridge, 'Representation Information: What Is It and Why Is It Important?', *Digital Curation Centre- Digital Curation Blog*, 6 July 2007.www.digitalcuration.blogspot.co.uk

M3 (DW) case study digital repositories were selected based on their geographical location, the author's knowledge of the suitability of their operations for this study and also the ability of the author to conduct site visits. However, a deciding factor in the selection of study repositories was the age of the digital repository programme. Only a few archival repositories have been in operation for more than 10 years and this will permit a more comprehensive view of the intricacies of repository operations. However, as some of these repositories were created before the propagation of TDR standards, it was not possible to consider how much the standards actually influenced repository establishment. Nevertheless, examining the relevance of TDR standards within the context of an operational digital repository can help identify any complications in operationalising TDR standards and whether these conditions will affect the transferability of standards to an EAC context. In the end, four case study digital repositories were selected: Washington State Digital Archives (WSDA), The UK National Archives (TNA), National Archives Service of Norway (NASN) and National Archives Service of Finland (NASF). Each archive follows a different digital repository model, influenced in large part by the nature of the jurisdiction in which they operate as well as by their particular enabling archival legislation.

The author was only able to visit WSDA, TNA and NASF in person to carry out the interviews. Due to financial constraints she was not able to visit NASN as part of her thesis research but she did interview the Assistant Director of Digital Records Preservation to gather information on the NASN repository and its operations.

M3 (EAC) data collection sites were the Kenya National Archives and Document Services (KNADS) and the Tanzanian Records and Archives Management Department (RAMD). These archival institutions were selected because they have stable ICT and e-

Government programmes. These programmes have implemented a number of government-wide information systems that are generating digital records. Those records will need to be retained for their enduring value, and so there is a strong likelihood that the national archives will need to establish the mechanisms to acquire those records in the near future. In the M3, Eastern African context (M3 (EAC)) the study will endeavour to understand the perceptions held by national archives regarding the applicability of OAIS and RAC to their operational environments.

Of the two sites selected the researcher was only able to visit RAMD *in situ*, which helped her better understand the realities of operating a digital preservation service in the region. A similar visit was not possible for KNADS due to financial constraints but the researcher was able to meet with the Chief Archivist responsible for the acquisition and management of digital records at KNADS to conduct an interview about national archives operations.

### *2.5.3 Data Collection Methods*

The data collection and data analysis methods used in this thesis are described below. The data collection methods include literature reviews (2.5.3.1.), observational data (2.5.3.2) and semi-structured interviews (2.5.3.3).

#### *2.5.3.1 Literature Review*

The selection of articles, journals, websites and other secondary reference materials as part of the literature review was an important component of the thesis research. This documentation serves to contextualise current thoughts on digital records preservation, metadata, cultural impact of technology transference, ICT development in the developing world, the nature of digital records as evidence and related topics. The information gathered through this literature review supports the analysis of the research

findings, helping to ensure the study addresses not just regional but global issues in digital records preservation as well as differences in standards transference between the developed and the developing world.

In the literature review the researcher queried library catalogues at University College London (UCL), British Library, School of Oriental and African Studies (SOAS), Senate House, School for Advanced Legal Studies and databases such as Scopus and Library and Information Science Abstracts (LISA). For a review of archival sciences literature the researcher used search terms such as 'digital preservation', 'digital records preservation', 'digital records authenticity', 'trust and digital records', 'trusted digital repositories', 'TDRs', 'Open Archival Information System', 'audit and certification standards', 'digital records and evidence' and 'digital records.' Articles were selected based on the date, with the most recent reviewed first, and then by the name of the author with an emphasis placed on authors who typically were recognised theorists or practitioners in the field of digital records preservation. The researcher also examined bibliographies, endnotes and footnotes for all sources read in order to identify other relevant sources of information.

For the technology transference literature review, the researcher used library catalogues (UCL and SOAS) and databases such as Scopus and INSPEC. Search terms used included 'technology transference', 'technology use', 'developing world and technology', 'culture and technology', 'ICT and the developing world', 'Africa and technology', 'e-Government and Africa', 'developmental policies and IT' and 'computers and the developing world.' With the Scopus database she used the *analyse* feature to select articles based on subject area such as computer science or engineering. In other instances she selected articles initially based on their dates, by choosing the most

recent. However, as she became more familiar with the literature she began selecting articles based on authorship, focusing first on those authors with a recognised reputation in the area of technology transference. As with the review of archival literature, the author also used the bibliographies, endnotes and footnotes to point her to other relevant literature.

*2.5.3.2 Observational Data*

Observational data were collected using non-participant observation. This method requires little participant interaction. Instead, the researcher observes participants with their knowledge and considers the collected information in line with the study's research questions.[165] The observational data gathered not only helped the researcher understand the reality of TDR and other operations in the field but also helped her to triangulate interview findings by identifying or corroborating limitations or other problems. This method was only used for M3 site visits to case study digital repositories (M3(DW)) and East African Community national archives (M3(EAC)), alongside the interviewing process.

Observational data were also collected during site visits to Washington State Digital Archives, the National Archives Service of Finland and the Tanzanian Records and Archives Management Department. During M3(DW) site visits, the author examined how employees carried out digital repository functions such as ingest and cataloguing, recording findings in a research notebook. During the M3 (DW) site visits the researcher also received guided tours of the facility, allowing her to assess in person the organisational infrastructure and technical capacity of digital repositories, helping her to

[165] Alison Jane Pickard, *Research Methods in Information* (London: Facet Publishing, 2007); Gorman and Clayton, *Qualitative Research for the Information Professional*., 105.

understand the realities of operating such programmes. These notes were also recorded in a research notebook.

The researcher was not able to collect observational data from the remaining M3 (DW) sites. There was no time at the end of the interview to permit such a visit and she was not able to schedule any follow up visits.

During the RAMD site visit, observational data were only collected from the guided tour, as RAMD did not have a digital repository. The data collected from the site visit were recorded in a research notebook.

Other observational data used in this thesis stems from the author's involvement in IRMT initiatives. From 2010 to 2013 the researcher served as a Project Officer and consultant with the International Records Management Trust. . During the researcher's time at as a consultant with IRMT she gained considerable field experience in Africa, which gave her a much greater and more multi-faceted understanding of the digital recordkeeping realities in the region. She has drawn on these experiences with archival repositories and governments in Africa during her research for this study. Of particular value was the researcher's work with IRMT in 2011 on *Managing Records as Reliable Evidence for Information Communication Technology (ICT), e-Government and Freedom of Information in East Africa.*[166] This project, which was intended to examine whether records management or recordkeeping requirements were factored into e-Government, ICT and access to information initiatives in the region, allowed the researcher to participate in high-level scoping studies for Burundi and Rwanda, to ascertain the state of recordkeeping in these countries and to determine whether recordkeeping was

[166] International Records Management Trust, 'Managing Records as Reliable Evidence for ICT/ E-Government and Freedom of Information in East Africa' (International Records Management Trust, September 2011), http://irmt.org/portfolio/managing-records-reliable-evidence-ict-e-government-freedom-information-east-africa-2010-%E2%80%93-2011.

factored into ICT, e-Government or Access to Information initiatives. The notes gathered during this research are used when discussing findings related to M1(EAC) and M3(EAC), as supplementary materials which help to illustrate, elucidate and underscore issues identified in this thesis. In those instances where the researcher draws on her own field experience and knowledge to reinforce a point, she will use the expression 'in her experience' to clarify the source of her observations for the reader. The data were used with permission of the International Records Management Trust.

*2.5.3.3 Interviews*

Semi-structured interviews were identified as the most appropriate data collection method for this research, given that a goal of the research was to identify potential assumptions built into TDR standards. Pickard, whose view is corroborated by Hopf, notes this value of interview data when she states: 'Interviews are usually used when we are seeking […] in-depth data that is specific to the individual…'[167]

Given the volume and breadth of data necessary for analysis, the most appropriate interview technique for this study was determined to be the semi-structured interview. Semi-structured interviews are composed of a preset number of open-ended questions, which allow the researcher to collect enough qualitative data to analyse the responses given by research subjects in a comparative manner.[168] The data generated was transcribed and analysed, with the particular goal of identifying any perceptions or biases, particularly unacknowledged precepts, held by the interviewees.

Several interview questionnaires were developed, based on the parameters of each of the different mimetic categories described earlier in this chapter: M1 (DW) –

[167] Pickard, *Research Methods in Information*. Christel Hopf, '5.2. Qualitative Interviews: An Overview' *Companion to Qualitative Research* ed. Uwe Flick, Ernst Von Kardoff, and Ines Steinke (California: SAGE Publications, 2005)., 203.
[168] Christiane Schmidt, 'The Analysis of Semi-structured Interviews', *Companion to Qualitative Research* ed. Uwe Flick, Ernst Von Kardoff, and Ines Steinke (California: SAGE Publications, 2005)., 253.

Standards Developers , M1 (EAC) – East African Academics and Practitioners, M3 (DW) – Digital Repository Operators and M3 (EAC) – East African National Archives (See Appendix B). In M1 (DW), the questions sought to elicit the impetus behind the standards and the structuring of the development process. In M1 (EAC), the questions were developed to determine the digital preservation needs of East African Community practitioners. The M3 (DW) questions were intended to understand the requirements for designing and implementing TDRs and the role of TDR standards in the development of digital repositories, allowing the researcher to determine the actual level of TDR standards uptake. The M3 (EAC) interview questions sought to ascertain the realities of managing digital records in an East African context, in particular the level of awareness of and the perceived applicability of TDR standards in that context.

A total of 28 interviews were conducted with 32 interviewees. The discrepancy between number of interviews and number of interviewees stems from the fact that several individuals were interviewed at the same time in one session. The majority of interviews took place between July 2011 and October 2012 but two were carried out in 2013. Of the two interviews conducted in 2013 one was delayed from an earlier appointment because an interviewee had been unable to meet with the researcher prior to this. The other interview took place later because the author could not travel to the East African Community in order to conduct the interview in person and, since Skype connectivity to mobile phones is poor, the interview was arranged later when both the researcher and the interviewee were in the same city.

The interviews, which averaged about 45 minutes, were recorded using a digital voice recorder. A total of 16 interviews took place in person, and another 12 were conducted using Skype. A list of interviewees can be found in Appendix C.

The following table provides information on the number of interviewees according to the mimetic level to which they apply.

**TABLE 2.2 MIMETIC BREAKDOWN OF INTERVIEWEES**

| Level of Mimesis | Developed World | Eastern African Community |
|---|---|---|
| *M1* | Nine (9) standards OAIS, RAC and TRAC standards developers (M1(DW)) | Three (3) academics and digital records specialists (M1(EAC)) |
| *M3* | 17 individuals at case study digital repositories (M3(DW)) | Three (3) practitioners at case study national archives (M3(EAC)) |

Nine interviews were conducted in the M1 (DW) level. Of the nine interviewees, three were involved with the development of OAIS, one as committee chairperson. All the interviewees had been involved in the development of TRAC, although two of the nine were only involved in the testing of the certification process. Four interviewees were also involved in the development and testing of RAC.

There are only a limited number of academics in the EAC capable of providing an overview of digital preservation needs in the region, as reflected in the low number of interviewees. In the end, three individuals interviewed in the M1 (EAC) level, all of whom are well-respected academics and practitioners who had been involved in many large-scale digital research initiatives in the region. Two interviewees had over 20 years experience working in the EAC and had also been involved in a major RAMP study in 1990 to assess archives and records management in the region. The other interviewee is a professional with 15 years' experience working with various archival institutions on the African continent and had recently started working with international non-governmental organisations.

The 17 interviewees in the M3 (DW) level were representatives from each of the case study digital repositories and were involved with the daily operations of the repositories: eleven (11) were from Washington State Digital Archives, two (2) from The UK National Archives, one (1) from the National Archives of Norway and three (3) from the National Archives of Finland. The reason there were so many interviewees representing Washington State Digital Archives is two-fold. Firstly, WSDA is a dedicated digital archives and does not sit as a subset to a larger archival programme. Further, it has a large staff to operate the digital repository, which means there are more potential interviewees in WSDA than in other. Secondly, the senior archivist at WSDA kindly organised the researcher's two-day visit and set up an interview programme for her, which exposed the researcher to many more individuals than she might have been able to contact had she arranged the interviews herself.

### *2.5.4 Data Analysis*

This section begins with a description of the data collection consent form and arrangements to support interviewee confidentiality (2.5.4.1) followed by an exploration of the data analysis tools and methods used in this thesis (2.5.4.2)

#### *2.5.4.1 Data Collection and Confidentiality*

A data collection consent form was developed as part of the collection process (see Appendix D). The form advised interviewees that interview data would be used and secured under the 1998 UK Data Protection Act. Interviewees were also told that interviews would be recorded and transcribed. Once transcribed the interviewee would be invited to review the transcript and correct any oversights, omissions and errors. A total of 27 interview transcripts were sent out to interviewees for feedback. As mentioned, several interviewees took part in a single interview session but when emails

were sent out they were sent to all interviewees involved in a given interview. In one exception, an interviewee was later excluded from the thesis because that person was firstly a preparatory interview for the thesis and secondly identified as an examiner for the viva .[169]

Each interview was given a running number and each interviewee was given a generic identification, such as “TRAC and RAC standards developer from the United States” or “network administrator at Washington State Digital Archives”. This descriptor has been used in place of personal names in the thesis text. The author has endeavoured as much as possible to protect the identity of all respondents interviewed as part of this thesis. Full anonymity, however, cannot be given nor guaranteed as in some instances there may only be one individual affiliated to a particular institution or position.

At the time this research was undertaken UCL ethics clearance was not required for the observational data and interview data collected during this thesis. UCL has since revised the parameters for ethics clearance for observational and interview data and it is acknowledged that if this research had been undertaken within the last year clearance would have been needed. However, it should be noted that in all instances where observational data was collected interviewees were verbally informed and the researcher has endeavoured as with the interview data to maintain the confidentiality of the research subjects by anonymising where possible with the understanding that complete anonymity is not achievable.

[169] In conformance with university regulations, if the data collected from particular subjects are used in the thesis, those subjects cannot serve as examiners. Given the adequate volume of data the researcher had in hand, and the small number of individuals who could act as external examiners, it was decided to remove that particular interview from the study.

*2.5.4.2 Data Analysis Tools and Methods*

The literature review, interviews and observational data needed to be analysed to draw meaning to determine whether the research hypothesis (see Chapter 1) is correct or false and to ascertain whether and how research questions could be answered. The section below outlines the tools and methods used to collate and analyse the data collected as part of this thesis.

For the literature review, the author used Zotero, a freely available bibliographic database management software. This tool provides preset document types such as books, book chapters, journals and conference presentations. Information gathered could then be input into fields specifically linked to those types of resource. As the author read secondary references, relevant information and citations were captured using the 'notes' field. During the writing of the literature review, information was exported into a Microsoft Word document and re-organised into thematic headings to allow further analysis.

Interview and observational data were then uploaded into NVivo7. NVivo is qualitative data analysis software, designed for large-scale text analysis. The tool was used over the UCL-WTS network because the author did not have the capacity within her own computer to run a local desktop version and the network also allowed more robust data backup. Interviews and observational data were grouped for coding according to the mimetic groupings such as M1(DW), M1(EAC), M3(DW) and M3(EAC).

Initially data were coded using tree nodes[170] such as 'Education and Capacity' or 'TDR Set Up', in order to facilitate cross-comparative analysis.

[170] Tree nodes allow you to organise the data into a hierarchical structure. You have a parent node and then you can several children nodes beneath it.

However, after a time the author began to use free nodes[171], as she identified issues specific to particular mimetic groups. Once all the interviews were coded the author was left with a number of free nodes as follows: 30 for M1 (DW), 24 for M1 (EAC), 54 for M3 (DW) and 15 for M3 (EAC).

As the researcher began using free node coding, she began to create common headings across mimetic groupings to enable a cross-comparison of topics and themes. For example, using free node coding to analyse M3(DW) technical capabilities and M3(EAC) technical capabilities allowed the researcher to examine the level of technical expertise needed to operate a digital in the EAC as well as the technical capabilities at different national archives to support these types of IT infrastructures. Further, by cross-coding in this manner, the researcher could conduct a vertical comparison of mimetic groupings such as M1(DW) and M3(DW), as well as a transversal examination such as M1(EAC) and M3(DW).

These free nodes, along with the tree nodes, were grouped together under broader headings that mirrored the thematic headings for the data analysis chapters (Chapters 5 to 7). During the writing of the data analysis chapters, the author also examined tree and free nodes for any issues that cut across the M1 and M3 groupings, in order to identify any topics common to both developed world and East African contexts.

The analysis of M1 (DW) and M3 (DW) data sets in NVivo allowed the author to interrogate TDR standards. M1 (DW) interview findings were used to determine whether there are any extant assumptions in the standards. M1 (EAC) and M3 (EAC) data were used to ascertain the effect that these assumptions may have on the transfer of these

[171] Free nodes have no hierarchical structure. They allow you to freely assign codes which is particularly helpful for data that may not be related to any other code.

standards into another context, such as East Africa. Table 2.3 illustrates the purpose of this analysis and the anticipated outcomes. It should be noted that, when the interview data is used in this thesis, multiple interviews included in one reference represents a collective opinion or view amongst a group of interviewees, whereas when only one interview is referenced it represents the view of that individual interviewee.

**TABLE 2.3 DATA ANALYSIS OVERVIEW WITH ANTICIPATED OUTCOMES**

| **Mimesis** | **Developed World (DW)** | **East African Community (EAC)** | **Outcome** |
|---|---|---|---|
| M1 | Identify the issues and problems that led to the development of OAIS and RAC. | Identify current digital records preservation issues. | - Examine whether the issues that spurred the development of TDR standards matches the issues faced by EAC countries.<br>- Determine whether there are assumptions in the standards that prevent or complicate their transference into the EAC. |
| M2 | Study *Open Archival Information System* and *Repository Audit and Certification* | | - Determine, based on M1 interviews, if any presumptions exist in standards and how they may impact the transferability of standards to other contexts.<br>- M3 interview data will be used to triangulate whether standards are transferable. |
| M3 | Examine the ways in which the standards are interpreted and operationalised in developed world organisations. | Determine the capacity of EAC institutions to implement TDR standards | - Identify issues that may impact implementation of TDR standards in developed nations and that will also affect EAC countries.<br>- Determine any EAC explicit problems that |

| | | | |
|---|---|---|---|
| | | | would affect the applicability of TDR standards. |

### *2.5.5 Anticipated Problems and Difficulties Experienced with the Study*

Anticipated constraints with this study include the author's own cultural or societal biases, which will inevitably affect her ability to delve as deeply into the subject matter as possible. The author is not from the East African region, nor does she come from a developing country, which she understands may impede her capability to understand fully the realities faced by East African records and archives practitioners. While her experience consulting in developing countries has given her insights into the constraints and challenges of digital records management in the EAC, she knows that because she has not lived in the region she is not fully versed in the culture.

Another difficulty with the research resulted when two potential interviewees failed to respond to interview requests. The two interviewees were standards developers (M1 (DW)), both of whom had been heavily involved with the development of TRAC and RAC. They were considered important interviewees, but after many unsuccessful attempts to contact them, they were removed from the sample set. In the end, the author does not believe their omission greatly affects the findings of this thesis but she acknowledges that their insights would have been helpful.

Finances were a significant constraint on data collection. The author is grateful for the support offered by the IRMT, which allowed her to visit most of her data collection sites. However, limitations on finances meant it was not possible to conduct a site visit to the Kenyan National Archives and Records Service or the National Archives Service of Norway.

## 2.6 Conclusion

This chapter has explored the use of mimesis in the fields of linguistics and philosophy to explain language formation and reality construction through text. This analysis of mimesis concluded with an examination of Ricoeur's threefold mimetic methodology and its relevance to this study, contextualising the use of mimesis and highlighting the application of this theoretical model in other discourses. Of particular interest was the discussion of the works of Walter Benjamin, Jacques Derrida and Paul Ricoeur.

Benjamin and Derrida underscored the socially constructed and culturally mediated nature of text planning and reception. Based on their arguments, it can be agreed that individuals in society implicitly incorporate into texts, social conventions, cultural norms and other mitigating influences. Readers living in the same time and space are assumed to be capable of decoding these social and cultural cues in the documents. However, there is an implied understanding in these discussions that readers who do not share the same time and space as the author of a text may have difficulties understanding the latent structures present in the document. Ricoeur attempted to deconstruct these underlying subtexts while studying narrativity and time in fictional and historical texts by developing the threefold mimetical methodology.

Mimesis is particularly germane to this thesis, as it seeks to deconstruct how texts are created and to consider the external processes that affect their development and interpretation. By extension, the argument can be made that the standards development, interpretation and operationalisation are not exempt from these pre-existing constructs. Biases are built into documents such as standards by virtue of the fact that standards developers cannot escape their own reality – they live in their own particular time and space. The readers of those standards are also not able to extricate

themselves from the overarching paradigms that influence their understanding of the world around them, which equally colours their interpretation of texts.

Ricoeur's mimetical model formalises a methodology for a comparative analysis of both the development and reception of standards, allowing the researcher to decode assumptions in the text. It is important to underline again that both OAIS and RAC were formulated and tested in the developed world with no input from developing nations, especially from the Eastern African region. Therefore, there exists a very strong possibility that standards developers have made certain cultural, infrastructural, educational and economic suppositions, incorporating these into the standards. Using Ricoeur's model allows the researcher to determine if this possibility is, in fact, true.

Methodology guides and supports the research process, providing the researcher with a framework to answer research questions concretely. Any methodology must be carefully selected and aligned to the specific aims and objectives of the research in question, otherwise the hypothesis that frames the study cannot be adequately tested in order to arrive at well-founded conclusions. The methodology used must also adapt to the realities of the research situation. For instance, in this study the researcher was able to draw on extensive field experience in Africa, and in order to ensure that personal experience is clearly identified she adopted conventions for introducing experiential information in the body of the text. Other realities included variations in the availability of interviewees, with an abundance of interview subjects in some jurisdictions and fewer such subjects in another. In the end, every effort has been made to follow the methodology chosen while ensure it is reasonably adapted to the circumstances on the ground during field research.

The next chapter examines developed world archival literature touching on topics such as preservation and access and ideas related to digital records authenticity and reliability as well as notions of trust and their impact on TDR certification standards. This examination will feed into later analyses of M1(DW) and M3(DW), as archival literature along with that of digital libraries and space data science have informed current understandings of digital preservation and TDRs.

# CHAPTER 3: DIGITAL RECORDS PRESERVATION AND TRUSTED DIGITAL REPOSITORIES – A REVIEW OF DEVELOPED WORLD LITERATURE

## 3.1 Introduction

The topic of digital records has been explored by the archival community for the past 30 years. The earliest discussions focused on the preservation and access to digital records; from there research and scholarship began to emphasise the authenticity and reliability of digital records. These explorations considered questions around what qualifies as an authentic digital record in an electronic system and what system functionalities are required to ensure that these qualities are built into records from the point of creation. The studies completed during this time helped guide archivists and records professionals to develop methods for managing and preserving digital records.

As digital information has grown in volume and complexity, other communities of professional practice have also attempted to develop methods for ensuring the ongoing accessibility of digital objects. In library science, the challenges of managing digital libraries, ensuring open access and addressing the rising costs of serials pushed librarians to consider more efficient and cost-effective service delivery models for disseminating publications online. This led to the idea of a digital repository, a place where data, documents and other useful information can be stored and made accessible digitally via an online portal.

Another group concerned with digital records preservation was the space data community. Scientists from NASA and other space agencies had been attempting for some time to develop a strategy to ensure the integrity and longevity of data from scientific studies and space missions. Their concerns would eventually spur the

establishment of a committee to examine the question of digital data preservation, contributing to the creation of TDR standards.

The notion of a TDR emerged when the archival, library and space data communities converged to create OAIS. OAIS was meant to provide an overarching framework for establishing TDRs by defining the functions of a TDR and by creating a common terminology for discussing TDR operations. As the idea of TDRs gained currency amongst digital records preservation professionals, standards developers began to realise that they needed to create a set of metrics to define what exactly constituted 'trustworthy' digital operations according to the OAIS framework. Thus developers, along with practitioners and academics from the information studies community, began developing audit and certification criteria for TDRs, which eventually led to the creation of the RAC standard.

This chapter will examine the digital records preservation literature and consider the different discourses that have contributed to the development and understanding of TDR standards as noted above. The discussion draws on literature from the library sciences, from social science data management community and from space data sciences, but emphasises scholarly research from the archival profession. The chapter is divided into three parts according to the issues examined in the literature: accessibility and preservation (3.2), authenticity and reliability (3.3) and trusted digital repository standards, certification and trust (3.4).

Section 3.2 begins with a discussion of archival concerns about digital records access and preservation (3.2.1), followed by an examination of the concerns of the digital library community, particularly in relation to digital libraries and open access (3.2.2). The work carried out by these two communities culminated in the publication of

two seminal documents: *Preserving Digital Information* (1996) and *Trusted Repository: Attributes and Responsibilities* (2002), both of which played an important role in the development of TDR standards (3.2.3).

Section 3.3 examines the notions of authenticity and reliability and their impact on archival perceptions about digital records preservation. The section begins with an overview of archival conceptions of authenticity and reliability and the importance of these principles in the protection of digital records. This discussion is followed by an examination of several large-scale research projects that sought to define the characteristics of digital records integrity. This section also considers the role of authenticity and reliability in the admissibility of digital records as evidence and concludes with an examination of the role of functional requirements standards in ensuring the proper creation and maintenance of digital records as evidence.

Finally, section 3.4 provides an overview of TDR standards, beginning with an examination of OAIS and a discussion of how the concept of trust has affected the development of TDR audit and certification criteria. The section ends with an overview of the history of audit and certification standards, culminating in the development of RAC.

**3.2 Accessibility and Preservation**

This section provides an overview of archival and library scholarly literature that made significant contributions towards defining TDRs and their operations. The conceptualisation of TDRs, however, begins with a consideration of their underlying purpose: to support digital records access and preservation. Both of those issues are topics that have been at the heart of debates in archival studies and library sciences for many years. To support the analysis in this thesis, access and preservation in the digital

environment are defined as follows: Access is the ability of a user (i.e. researcher) to be able to utilise and understand digital records. Preservation constitutes the activities or interventions performed by trained professionals inside an organised preservation system designed to maintain digital records in order to enable ongoing access.

### *3.2.1 Archival Literature on Preservation and Accessibility*

Since the 1970s archivists have endeavoured to develop methods to preserve and make accessible digital records, which in the early years were called machine-readable records. The first articles on this topic were written by an archivist from the United States, Charles Dollar, who described NARA's approach and his work appraising and preserving machine-readable records.[172] Machine-readable records at this time consisted of punch cards and computer tapes which required large mainframe computers to process them.

Dollar's methods for the treatment of machine-readable records were inspired by the work of social science data librarians, who had been working on access to and preservation of machine-readable records, in particular research data sets, since the 1960s. [173] Many librarians had set up places of deposit to ensure that data were captured in an appropriate fashion to guarantee their usefulness.[174] Dollar's articles were significant not because of the specific methods he proposed but rather because his are the first scholarly articles in archival studies that attempted to develop a strategy for managing and providing access to digital records.

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[172] Charles M. Dollar, 'Appraising Machine-Readable Records', *American Archivist* 41, no. 4 (October 1978): 423–30. Charles M. Dollar, 'Computers, the National Archives and Researchers', *Prologue: The Journal of the National Archives* 8, no. 1 (Spring 1976): 29–34.

[173]Carolyn Geda, 'Social Science Data Archives', *American Archivist* 42, no. 2 (April 1979): 158–66. Richard Bisco L, 'Social Science Data Archives: A Review of Developments', *The American Political Science Review* 60, no. 1 (March 1966): 93–106.

[174] Bisco, 'Social Science Data Archives'.

The treatment and management of machine-readable records continued to be a concern for the archival community after Dollar's first contributions to the discourse, but as computers became increasingly complex, the existing methods to preserve machine-readable records were no longer viable. Archivists needed to develop new techniques to ensure the longevity and availability of digital records, and also began to question what components of a digital record needed to be preserved: either the contents of records, or the contents along with systems used to create them. This question led to one of the significant debates of the late 1990s around the relative merits of emulation (the use of technologies to access digital records in their original computer environment) versus migration (the transfer of digital records from one format to another to support access).

Proponents of emulation argued that for researchers to understand the value and meaning of a digital record they needed to access it in the computer environment in which it was created. To do this, both the contents of the records and the various application layers (e.g. operating system, graphical user interface, software) needed to be preserved.[175] The only drawback to the emulation argument was that this method depended on the availability of emulation software to render digital records in their original operating environment. This emulation software itself can become obsolete over time, requiring an emulator to emulate the original emulator to continue making digital records accessible.[176] This complex requirement proved a significant drawback to the emulation approach and is the main reason that the strategy remains under-utilised by the archival community.

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[175] Jeff Rothenberg, 'Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation' (Council on Library and Information Resources, 1998), accessed 30 March 2012 http://www.clir.org/pubs/reports/rothenberg/contents.html. For an overview of Rothenberg's arguments see also: Stewart Granger, 'Emulation as a Digital Preservation Strategy', *D-Lib Magazine* 6, no. 10 (October 2000).

[176] David Bearman, 'Reality and Chimeras in the Preservation of Electronic Records', *D-Lib Magazine* 5, no. 4 (April 1999), accessed 30 March 2013 www.dlib.org/dlib/april99/bearman/04bearman.html. See also: Granger, 'Emulation as a Digital Preservation Strategy'.

The alternative view, migration, contends that the essence of a record is its contents. In other words, what the record says, not the way in which it is presented, attests to its evidential value.[177] Migrating records consists of moving a digital record from one format to another to ensure its ongoing accessibility, thus protecting it from corruption and technological obsolescence.[178] An example of migration is moving a Word Perfect document first to Word 1995, then to Word 2003, then to Word 2007, and so on. This approach does not rely specifically on any particular type of software; it is most often used with simpler record formats (e.g. word processed documents), rather than more complex ones like Geographic Information Systems (GIS) or Computer-Aided Design (CAD) files, which are less easy to migrate. Despite this limitation, migration has received widespread acceptance as a digital records preservation method.

Migration and emulation were often placed in opposition to each other as preservation methods. More recently, however, a balanced view has emerged, which was reflected in an article by Carroll, Farr, Hornsby and Ranker. The article discussed the preservation and presentation of the Salman Rushdie papers at Emory University, a process that involved using both migration and emulation to preserve digital records. The project board working on the preservation of the Rushdie papers considered the content of the record, the systems of creation and desired user experience along with the availability of institutional finances to determine what preservation approach they wanted to take for different sets of records in the collection.[179]

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[177] Bearman, 'Reality and Chimeras in the Preservation of Electronic Records'. See also: Granger, 'Emulation as a Digital Preservation Strategy'.

[178] Pearce-Moses, 'Society of American Archivists Glossary'.

[179] Laura Carroll, Erika Farr, Peter Hornsby and Ben Ranker, 'A Comprehensive Approach to Born-Digital Archives', *Archivaria* 72 (Fall 2011): 61–69.

Preservation continues to be an overriding concern for archivists because of the threat of technological obsolescence and digital corruption. Some practitioners argue obsolescence is not an immediate concern because most systems are still capable of reading digital records from 10 years ago. In his article *Parsimonious Preservation,* Gollins feels that archival concerns are misplaced and that there is no evidence to indicate that obsolescence is a problem that will present itself in the immediate future.[180] Rather he argues that archivists should take a more strategic approach to preservation, such as only accepting formats the repository has the capability to read and protect.[181] The basis of these suggestions is, in part, to make preservation more cost-effective by limiting the number of interventions on a record and to avoid damaging the integrity of the record through unnecessary migration. However, there will come a point where different strategies and processes will be required to ensure the ongoing availability of digital records.

Discussion of digital access and preservation in archival literature has been limited in scope, in that it has only focused on specific challenges, such as file formats (e.g. machine-readable records), and on the topics of migration and emulation. There was some discussion in the 1990s about developing digital archival repositories, but at that time exporting records from native systems to preserve them in separate repositories was deemed too costly and the idea was abandoned.[182] As a result, the archival profession never developed an overarching digital archives preservation

[180] Tim Gollins, 'Parsimonious Preservation: Preventing Pointless Processes' (National Archives of the UK, 2009), accessed 23 January 2015, http://www.nationalarchives.gov.uk/documents/parsimonious-preservation.pdf., 76.
[181] Gollins, 'Parsimonious Preservation'., 76-77.
[182] Margaret Hedstrom, 'Electronic Archives Integrity and Access in a Networked Environment', *American Archivist* 58, no. Summer 1995 (1995): 312–24., 320.

framework that would enable the management of digital records from the point of receipt to their display and use in an archival setting.

### *3.2.2 Digital Libraries and Open Access*

Digital access and preservation were not simply an archival concern. The library community re-examined their practices in light of the challenges posed by the digital environment. These explorations led to the development of the new concept of a digital library. The idea of a digital library was first posited in 1991 but gained wider acceptance within the library community with the launch of the 1994 Digital Libraries Initiatives in the United States.[183]

Definitions varied about what constituted a digital library, but at a workshop at UCLA - in 1996 - two views emerged. Digital libraries were defined as, '1. a set of electronic resources and associated technical capabilities for creating, searching and using information' or '2. constructed, collected and organised by (and for) a community of users, and their functional capabilities support the information needs and uses of that community.'[184] These early discussions also sought to define the contents and functions of digital libraries and to clarify the role of the librarian in the digital environment.[185]

At the same time as digital libraries were being examined, a debate re-emerged about the question of open access. The topic was first raised in the mid-1960s with the launch of the Education Resources Information Center (ERIC), which provided access to

[183] Edward Fox, 'The Digital Libraries Initiatives: Update and Discussion', *Bulletin of the American Society for Information* 26, no. 1 (November 1999), accessed 23 January 2015, http://www.asis.org/Bulletin/Oct-99/fox.html. Edward Fox, Marcos Andre Goncalves, and Rao Shen, *Theoretical Foundations for Digital Libraries: The 5S (Societies, Scenarios, Spaces, Structures, Streams) Approaches* (California: Morgan and Claypool, 2012)., xiii.

[184] Fox et al, *Theoretical Foundations for Digital Libraries*., 3-4.

[185] Ian Rowlands and David Bawden, 'Digital Libraries: A Conceptual Framework', *Libri* 49 (1999): 192–202. David Bawden and Ian Rowlands, 'Digital Libraries: Assumptions and Concepts', *Libri* 49 (1999): 181–91. Lee, 'Defining Digital Preservation Work'., 33.

computer tapes, copies of source materials, abstracts, bibliographies and thesauri.[186] The drive behind open access was, and remains, to provide: '[F]ree online access to scientific and scholarly research literature especially peer-reviewed journals and their pre-prints.'[187]

The idea of open access gained new currency amongst the library community as a result of what became known as the 'serials-crisis' in the 2000s. The 'serials-crisis' stemmed from an increase in journal prices, especially e-journal subscription costs, which rapidly outstripped the financial capacity of academic and mainstream libraries to maintain their collections. A longitudinal study of scholarly journal pricing between 2000-2006 shows the severity of the problem by demonstrating that median prices for biomedical and social science journals rose by 39% in six years, while general retail prices in the marketplace only rose by 16%.[188]

In response to this crisis, academics, researchers and librarians began exploring the possibility of making publications freely available online for subsequent re-use, thus subverting the prohibitive cost models used by journal publishers.[189] This approach was formalised in a number of statements, such as the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities and the Bethesda Statement on Open Access Publishing, both issued in 2003.

As a result of the 'serials-crisis', and in the spirit of open access principles, institutions and professional communities of practice started establishing centralised e-

[186] Peter Suber, 'Timeline of the Open Access Movement', 2009, accessed 23 January 2015 http://legacy.earlham.edu/~peters/fos/timeline.htm. ERIC, '50 Years of ERIC', 2014, accessed 23 January 2015, http://eric.ed.gov/pdf/ERIC_Retrospective.pdf.

[187] Suber, 'Timeline of the Open Access Movement'. Charles W. Bailey, Jr, 'Chapter 2: What Is Open Access?', in *Open Access: Key Strategic, Technical and Economic Aspects*, ed. Neil Jacobs (Oxford: Chandos Publishing, 2006), 13–26., 19. This is where the author discusses the Berlin Declaration.

[188] Sonia White and Claire Creaser, 'Trends in Scholarly Journal Prices 2000-2006' (Oxford University Press, March 2007)., iv.

[189] Jean-Claude Guedon, 'Chapter 3: Open Access: A Symptom and a Promise', in *Open Access: Key Strategic, Technical and Economic Aspects*, ed. Neil Jacobs (Oxford: Chandos Publishing, 2006), 27–38., 28.

print repositories in order to make research data and articles more widely available over the internet. The science community in particular took the lead in this area by creating online repositories such as arXiv to store and make available scholarly research and publications. [190] University libraries also began to consider ways of increasing access to faculty and student publications by establishing institutional repositories. This approach was formalised in the Scholarly Publishing and Academic Resources Coalition (SPARC) paper *A Case for Institutional Repositories* (2002) .[191]

The library community became increasingly concerned with ensuring the ongoing availability of resources in digital libraries and e-print repositories. The CURLS Exemplar for Digital Archives research project (1998-2002), for example, was one of the earliest attempts to develop a strategy to preserve digital resources acquired by digital libraries and repositories.[192]

The preoccupation with preservation was reflected by the open access community through the Bethesda Statement, issued in 2003. This statement stipulated that publications should not only be freely accessible through the internet, but also deposited in an online repository, which was defined as an '[A]cademic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access, unrestricted distribution, interoperability, and long-term archiving.'[193]

The Berlin Declaration, also issued in 2003, by the open access community addressed the issue of access. It stipulated that institutions that subscribed to open

[190] www. http://arxiv.org/
[191] Raym Crow, 'The Case for Institutional Repositories: A SPARC Position Paper' (The Scholarly Publication and Academic Resources Community, 2002).
[192] Consortium of University Research Libraries, 'CURL - CEDAR Project', 11 October 2004, 24 January 2015 http://web.archive.org/web/20041011141405/http://www.curl.ac.uk/projects/cedars.html.
[193] 'Bethesda Statement on Open Access Publishing.', 20 June 2003, accessed 23 May 2013 http://legacy.earlham.edu/~peters/fos/bethesda.htm.

access principles should require their researchers to deposit all published articles into their repository and also encourage researchers to publish their findings in open access journals.[194]

In addition to a focus on open access, other concerns around digital access and preservation began to emerge, such as the legal and intellectual property implications of migrating digital reference materials from one platform to another.[195] However, the emphasis on open access was pivotal, leading to the development of actual repositories for digital information. Early digital library discussions on the establishment and operations of digital repositories also played an important role in defining the notion of trusted digital repository, in particular delimiting its functions and activities.

### *3.2.3. Early Explorations About Trusted Digital Repositories*

In 1994, the Research Libraries Group (RLG) – along with the Commission on Preservation and Access – established the Task Force on Digital Archiving, which was mandated with studying critical issues related to digital records preservation. [196] As part of its mandate the Task Force made recommendations to the library and archives communities both to address immediate concerns and to identify areas for further research and development. The final report, *Preserving Digital Information* (1996),[197] touched on a number of concerns at the time, such as archiving digital information and archival roles and responsibilities in the digital domain. This document is a seminal work not only because of its specific findings, but more important because of the influence it had on the development of both OAIS and RAC.

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[194] Bailey, Jr, 'Chapter 2: What Is Open Access?'., 19.
[195] Rowlands and Bawden, 'Digital Library: A Conceptual Framework'., 195.
[196] Task Force on Archiving of Digital Information, 'Preserving Digital Information' Research Libraries Group, 1996. accessed 16 June 2012, http://www.clir.org/pubs/reports/pub63watersgarrett.pdf.
[197] Task Force on Archiving of Digital Information, 'Preserving Digital Information'.

*Preserving Digital Information* was used by OAIS standard developers to frame digital preservation problems that needed to be addressed. The report's most important contribution was to provide a conceptual and terminological grounding for understanding digital records preservation.[198] It also served as the impetus for the creation of TDR audit and certification standards, as one of its recommendations was to '[I]nstitute a dialogue among the appropriate organizations and individuals on the standards, criteria and mechanisms needed to certify repositories of digital information as archives'.[199]

Another important document produced a few years later was the RLG and the Online Computer Library Center (OCLC) report *Trusted Digital Repositories: Attributes and Characteristics* (2002).[200] Taking its inspiration from *Preserving Digital Information,* this white paper was designed to provide a framework to help research institutions establish authoritative TDRs. The TDR attributes outlined in the paper included an organisational framework (i.e. policies and procedures), financial resources and system security features. The paper divided TDR responsibilities into two functions: curatorial and operational. Curatorial responsibilities included properly defining the scope of the collection and considering issues such as the cost implications of running a digital repository. Operational responsibilities included negotiating the transfer of digital records from records creators and making information available to end users.

The RLG and OCLC documents ultimately sought to inform the growing discussions surrounding TDRs and to address the need to establish formal frameworks to preserve digital records. The RLG-OCLC paper can be seen as one of the earliest

[198] Lee, 'Defining Digital Preservation Work'., 188.
[199] Task Force on Archiving, 'Preserving Digital Information'., 42.
[200] RLG-OCLC, 'Trusted Digital Repositories: Attributes and Responsibilities'.

attempts to define the criteria for a trusted digital repository, becoming a springboard for later audit and certification initiatives.

### 3.3 Authenticity and Reliability

Access and preservation were important themes in both archival and library sciences scholarship. Authenticity and reliability, in contrast, were concepts of more concern to archivists than librarians and are topics that have long informed archival theory and practice. To be authentic, a record must be what it purports to be. And to be reliable, a record must be capable of '[a]cting for the facts to which it attests'.[201] The combination of authenticity and reliability speak to the overall trustworthiness and integrity of a record.[202] The principles of authenticity and reliability help define how archivists acquire, treat and preserve records in their care, with the underlying intent of maintaining the evidentiary value of records over time. This evidentiary value is critical in allowing record creators to document their actions, decisions and transactions.

Digital records challenge traditional methods for assessing records authenticity and reliability (i.e. fixity, sign and symbols).[203] In paper records elements – such as signs, seals and annotations – would have been immediately apparent to a reader. However with digital records, the elements that support authenticity and reliability are hidden; therefore other methods are needed to ascertain the integrity of the information contained in the records and its value as evidence. Another traditional feature of authenticity and reliability in the paper world was fixity: the idea that the form and

[201] Heather MacNeil, *Trusting Records: Legal Historical and Diplomatic Perspectives*, Vol. 1. The Archivist's Library. (London: Kluwer Academic Publishers, 2000)., xi. Luciana Duranti, 'Reliability and Authenticity: The Concepts and Their Implications', *Archivaria* 39 (Spring 1995): 5–10., 8. Duranti in the latter article provides the following definition for by stating that reliability refers: '…to the authority and trustworthiness of the record as evidence, the ability to stand for the facts which they are about.'

[202] MacNeil, *Trusting Records*., xi.

[203] For a more detailed discussion on the authenticity and reliability of paper records, see Luciana Duranti, *Diplomatics: New Uses for an Old Science* (Lanham, Maryland, and London: The Scarecrow Press, Inc, 1998).

shape of a textual record was stable, thus supporting the use of the record as evidence. But with the malleability of digital information, fixity could no longer be a central tenet in determining authenticity.

One method for ascertaining the authenticity and reliability of digital records is to use metadata. Metadata, or data about the data, '[d]escribes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource'.[204] Metadata is considered key to tracing the provenance and context of the creation of records, information critical to confirming a record's authenticity and reliability. MacNeil states that metadata should be embedded into procedural elements of an electronic business system, in order to ensure that administrators can and do document the use and handling of digital records.[205] Metadata such as authorship information, confirmation of dates of creation or audit trails, allow users to attest to the integrity of a digital record by understanding who wrote it, when it was created and when and how it might have been accessed or altered.

Given the unstable nature of digital records and the need to develop new and different mechanisms such as metadata management, in order to ensure records integrity, the archival community began to question the relevance of basic archival principles such as provenance and original order. These traditional principles existed in large part as ways to affirm and support the authenticity and reliability of paper and

[204] National Information Standards Organization, 'Understanding Metadata' (NISO Press, 2004)., 1.

[205] Luciana Duranti and Heather MacNeil, 'The Protection of Integrity of Electronic Records: An Overview of the UBC-MAS Research Project', *Archivaria* 42, no. Fall (1996): 46–67., 16. MacNeil, *Trusting Records*., 98 David Bearman, 'Archival Data Management to Achieve Organizational Accountability for Electronic Records', in *Archival Documents Providing Accountability Through Recordkeeping*, ed. Sue McKemmish and Frank Upward (Melbourne: Ancora Press, 1993), 215–27., 220. D Bearman and K Sochats, 'Functional Requirements for Electronic Evidence: The Pittsburgh Project: Recovered Web Site: Metadata Requirements for Evidence', accessed 5 November 2011, http://www.archimuse.com/papers/nhprc/BACartic.html. National Information Standards Organization, 'Understanding Metadata'., 2.

analog records.[206] In the end, consensus was reached that these principles were still valid for contextualising and validating the integrity of digital records. Rather than redefining the principles themselves archivists argued it was necessary to re-conceptualise concepts such as provenance, original order, authenticity and reliability to make them valid across all records environments.

### *3.3.1. Early Research on Authenticity and Reliability of Digital Records*

By the early 1990s, archivists were beginning to look closely at questions related to digital records integrity. Several large research projects endeavoured to understand and define the characteristics needed for digital records to be considered authentic and reliable. Specifically, the University of Pittsburgh project (UPitt) on *Functional Requirements for Evidence in Recordkeeping* (1993-1997), the University of British Columbia (UBC) project on *The Preservation of the Electronic Records* (UBC-MAS project) (1994-1997) and UBC's project on *International Research on Permanent Authentic Records in Electronic Systems 1* (InterPARES 1) (1998-2001) all contributed to defining current understandings of digital records integrity.

The UPitt and UBC-MAS projects studied the creation of digital records in active business systems in order to delineate what attributes needed to exist in order for a record to have integrity. The UPitt project aimed to develop a set of functional requirements, including a metadata schema, for recordkeeping systems in order to ensure that the records generated from these systems could meet evidentiary requirements in various legal, administrative and organisational contexts.[207] The UBC-

[206] Bearman, 'Archival Data Management '., 217. David Bearman and Richard Lytle, 'Power of the Principle of Provenance', *Archivaria* 21, no. Winter (1985-1986): 14–27. For further information on Bearman's contributions see: Terry Cook, 'The Impact of David Bearman on Modern Archival Thinking: An Essay of Personal Reflection and Critique', *Archives and Museum Informatics* 11 (1997): 15–37.

[207] Richard Cox, 'Functional Requirements for Evidence in Recordkeeping: The Pittsburgh Project: Recovered Web Site', *Functional Requirement for Evidence in Recordkeeping*, 1997, accessed 26 January 2013

MAS project focused on developing a conceptual framework for ensuring the creation of authentic and reliable records in electronic systems.[208] In order to test the research findings, investigators partnered with the US Department of Defense Records Management Task Force (DoDRMTF) and developed a functional requirement standard for recordkeeping system entitled *Electronic Records Management Software Application Criteria Standard* (DoD 5015.2).[209]

Both the UPitt and the UBC-MAS research projects attempted to develop generalisable models to assist system developers, records managers and archivists to build recordkeeping systems capable of creating and managing digital records with integrity. However, all the research projects identified one basic reality: in order for digital records to be authentic and reliable, the necessary characteristics for authenticity and reliability needed to be embedded into the record from the point of creation. This fact meant that features supporting authenticity and reliability had to be programmed into records systems at the point of design.[210] As a result, Duranti and MacNeil argued that archivists should be involved in system design, or at the very least, provide input into the process.[211] By having an archivist involved, they argued, necessary recordkeeping functionalities and metadata elements would be incorporated into the

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http://www.archimuse.com/papers/nhprc/.

[208] Luciana Duranti, Terence Eastwood, and Heather MacNeil. 'UBC Project: Genesis & Preservation - ToC'. *The Preservation of the Integrity of Electronic Records*, accessed January 26, 2013, http://www.interpares.org/ubcproject/index.htm. For a good comparison between the aims, objectives and outcomes of the UPitt and UBC projects see Margaret Hedstrom, 'Building Record-Keeping Systems: Archivists Are Not Alone on the Wild Frontier'. *Archivaria* 44 (Fall 1997): 44–71.

[209] ASSISTANT SECRETARY OF DEFENSE FOR NETWORKS AND INFORMATION INTEGRATION/ DEPARTMENT OF DEFENSE CHIEF INFORMATION OFFICER, 'Electronic Records Management Software Applications Design Criteria Standard' (United States Department of Defense, 1997), http://www.dtic.mil/whs/directives/corres/pdf/501502std.pdf. Hedstrom contends in her article, however, that when developing the functional baseline requirements for DoD 5015.2 the task force examined both UBC and UPitt project outputs, as well as NARA regulations on electronic records. See Hedstrom, 'Building Record-Keeping Systems'.

[210] Duranti and MacNeil, 'The Protection of Integrity of Electronic Records'., 62.Cox, 'Functional Requirements'.

[211] Duranti and MacNeil, 'The Protection of Integrity of Electronic Records'., 62.

system from the beginning, guaranteeing that digital records would be created within an authenticity framework.[212]

However, other scholars have argued that the recommendations and findings of these projects presume that there is only one correct way of creating and caring for digital records.[213] Hedstrom instead has suggested that archivists should identify a combination of policies, standards and principles that could be applied to records regardless of format.[214] Another criticism of the findings of these research initiatives was that they were too costly to implement. At Indiana University, for instance, the archives and records management division tried to implement the UPitt metadata schema into their institutional recordkeeping system, but the project team found the schema was too costly and complex to fully operationalise. [215] Instead, they needed to implement a truncated version of the schema. Whilst there may be shortcomings to the approaches proposed by UPitt and UBC-MAS it is important to acknowledge that they have contributed significantly to current understandings of digital records reliability and authenticity.

The UBC-MAS project laid the groundwork for another large-scale research project the InterPARES project. The first phase of the InterPARES project sought to qualify the authenticity and reliability of records in legacy systems (InterPARES 1).[216] A subsequent phase examined similar requirements for dynamic, interactive and experiential records (InterPARES 2).[217] Of pertinence to this thesis are the findings of the

[212] Duranti and MacNeil, 'The Protection of Integrity of Electronic Records'., 62
[213] Hedstrom, 'Building Record-Keeping Systems'.,63.
[214] Hedstrom, 'Building Record-Keeping Systems'., 63.
[215] Information in this paragraph comes from: Paul C. Bantin, 'Developing a Strategy for Managing Electronic Records-The Findings of the Indiana University Electronic Records Project', *American Archivist* 61, no. Fall (2008): 328–64., For implementation issues see 348 and 357
[216] InterPARES, 'The Long-Term Preservation of Authentic Electronic Records'.
[217] Luciana Duranti and Randy Preston, eds., 'International Research on Permanent Authentic Records in Electronic

first InterPARES project and the benchmark and baseline requirements developed for records creators and records preservers.[218] These requirements detail the metadata elements needed both to ensure the authenticity and reliability of records in legacy systems and to retain those qualities into the future. The requirements articulated in InterPARES 1 underline the role of metadata as a method for ascertaining and maintaining records integrity.

All these projects (UPitt, UBC-MAS and InterPARES) provided a strong foundation for subsequent discussions and developments in the management and preservation of digital records. In their own way, each project defined the internal qualities of digital records that must be protected in order to support their integrity as evidence. Further, these initiatives highlighted the role that recordkeeping systems play in embedding elements of integrity into records. Another key result from these projects is the recognition of the overall role that system functions play in attesting to authenticity and reliability. This last finding eventually led to the development of functional requirement standards for recordkeeping systems.

### *3.3.2 The Role of Authenticity and Reliability in Evidence*

Processes governing the creation, maintenance and preservation of traditional records were developed by the archival community to ensure the integrity of those records. Arguments vary as to the underlying purposes for ensuring records integrity – ranging from the value of records for accountability and transparency to the role of records in

Systems (InterPARES) 2: Experiential, Interactive and Dynamic Records' (InterPARES Project, 2008).

[218] These requirements are found in Appendix 2: Requirements for Assessing and Maintaining the Authenticity of Electronic Records to the research findings and can be found at http://www.interpares.org/book/index.cfm A benchmark is meant to assess how organisations measure up against each other. Baseline are the minimum requirements to carry out a given task or function, it can also be the minimum criteria set used to measure the success of a project or initiative.

supporting social justice[219] – but the majority of the literature agrees that, ultimately, preserving records integrity is done in order to preserve their evidential value.[220]

Evidential value is defined as the ability of a record to act as a statement of an action, decision or transaction. More specifically, evidential value is seen as: '[T]he importance or usefulness of something to prove or disprove a fact'.[221] The legal admissibility of digital records is a topic that has been examined by both archival[222] and legal experts.[223] In these discussions, authenticity and reliability have both played an important role in determining the weight and admissibility of digital evidence.

Mason and MacNeil explain that in Common Law, evidence is assessed and weighed through various rules of evidence, including the hearsay, business exception to hearsay and best evidence rules. Each of these rules speaks to the admissibility and weight of evidence to attest to decisions, actions and transactions.[224] In England and Wales, the assessment of admissibility and weight of evidence is left up to the judge in cases without a jury.[225] As Mason, MacNeil and Force suggest in the case of digital records this assessment will likely include an examination of system operations,

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[219] Wendy Duff, 'Issues of Authenticity, Social Accountability, and Trust with Electronic Records', *The Information Society* 17, no. 4 (2001): 229–31. Terence Eastwood, 'Reflections on the Development of Archives in Canada and Australia', in *Archival Documents Providing Accountability Through Recordkeeping*, ed. Sue McKemmish and Frank Upward (Melbourne: Ancora Press, 1993), 27–39.

[220] Bearman and Sochats, 'Functional Requirements for Electronic Evidence'. MacNeil. *Trusting Records.*

[221] Pearce-Moses, 'Society of American Archivists Glossary'.

[222] MacNeil, *Trusting Records*. and Donald Force, '"Pursuing the Usual and Ordinary Course of Business": An Explanatory Study of the Role of Recordkeeping Standards in the Use of Records as Evidence in Canada' (University of British Columbia, 2013).

[223] Stephen Mason, *Electronic Evidence: Disclosure, Discovery, and Admissibility* (London: LexisNexis Butterworths, 2007).

[224] See for further information Stephen Mason, 'Investigation and Examination of Digital Evidence', in *Electronic Evidence: Disclosure, Discovery, Admissibility* (London: LexisNexis Butterworths, 2007), 41–100. Stephen Mason, 'Chapter 11: Authenticity and Evidential Weight of Digital Evidence in Legal Proceedings', in *Managing Records in Global Financial Markets Ensuring Compliance and Mitigating Risk*, ed. Lynn Coleman et al., Principles and Practice in Records Management and Archives (London: Facet Publishing, 2011), 149–63. MacNeil, *Trusting Record.* In MacNeil see Chapter Two: Trusting Records as Legal Evidence: Common Law Rules of Evidence.

[225] Mason, 'Chapter 11: Authenticity and Evidential Weight of Digital Evidence'., 152. See also for a comprehensive overview of legal requirements for digital evidence in England and Wales. Mason, 'Chapter 8: England and Wales'. In *Electronic Evidence: Disclosure, Discovery, Admissibility*, 175–282. (London: LexisNexis Butterworths, 2007).

metadata and audit trails, along with retention disposition rules and records management policies, in order to attest to how records were created and kept.[226] As argued by scholars such as Mason and Force, adhering to and enforcing national and international best practice principles and standards for digital records management provides a strong basis for demonstrating the integrity of records, supporting their use as evidence in legal proceedings.[227]

There is still a sense in the archival community, however, that digital information should be held to a higher standard than paper information in order to maintain its authenticity and integrity.[228] Lynch argues that aspects of authenticity and reliability are based on the: '[M]echanical characteristics of digital objects; they do not speak to the deeper questions of whether the contents of a digital object are accurate or truthful when judged objectively'.[229] This is partly true, but one can also argue that it is by assessing the mechanics of the document, particularly its metadata and the systems functionality, that the integrity of the records can be confirmed. Further, there are no archival or legal criteria that can unequivocally prove the veracity of the contents of any document, paper or digital, or that can speak to the truthfulness of the record.

### *3.3.3 Functional Requirement Standards*

In the digital age, protecting and ensuring the integrity of records, to enable them to act as evidence, can be achieved at least in part by the application of standards like

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[226] Mason, 'Chapter 11: Authenticity and Evidential Weight of Digital Evidence'., 161. Mason, 'Chapter 4: The Evidential Foundations' Stephen Mason, 'Investigation and Examination of Digital Evidence', in *Electronic Evidence: Disclosure, Discovery, Admissibility* (London: LexisNexis Butterworths, 2007), 66-100., 67. Donald Force, 'The Admissibility of Business Records as Legal Evidence: A Review of the Business Records Exception to the Hearsay Rule in Canada', *Archivaria* 78, no. Fall (2014): 25–51., 33. MacNeil. *Trusting Record.,* 98.

[227] Mason, 'Chapter 4 The Evidential Foundations'., 66. This thesis is dedicated to investigating this particular topic: Force, '"Pursuing the Usual and Ordinary Course of Business".

[228] Clifford Lynch, 'Authenticity and Integrity in the Digital Environment: An Explanatory Analysis of the Central Role of Trust', *Council on Library and Information Resources*, no. May 2000, accessed 12 January 2011 http://www.clir.org/pubs/reports/pub92/lynch.html.

[229] Lynch, 'Authenticity and Integrity in the Digital Environment'.

functional requirements for recordkeeping systems. Functional requirements for recordkeeping systems are guidelines that provide system designers and records creators with system features and functions for the creation and maintenance of digital records in information management systems. Functional requirements are often seen as technical solutions, and whilst they do provide a list of technical specifications, they should be based on organisational processes to ensure the capture of essential business records.[230]

One of the earliest examples of functional requirements for recordkeeping systems was DoD 5015.2, discussed earlier. This standard was a continuation of the work done by the UBC-MAS project, but it also incorporated UPitt project findings and regulations set by the US National Archives and Records Administration (NARA).[231] DoD 5015.2 was one of the first functional requirement standards to receive widespread support within the US Government when it was endorsed by both the Department of Defense and NARA In 1998.[232] Since then, DoD 5015.2 has been seen as a *de facto* standard for the design of recordkeeping systems for use in the US Government.[233] Today, however, many other functional requirements standards are in place for recordkeeping systems, at the international, national and regional levels.

Two international standards are the *Model Requirements for Electronic Records Management* (MoReq) and the ICA's *Principles and functional requirements for records in electronic office environments* (ICA Req).[234] MoReq was developed by the Document

[230] Bearman, 'Archival Data Management'., 225.
[231] Hedstrom, 'Building Record-Keeping Systems'., 53.
[232] ASSISTANT SECRETARY OF DEFENSE, 'Electronic Records Management Software'., 2. John Carlin, 'Baseline Requirements for Automated Record Keeping', 18 November 1998, accessed 28 April 2013, http://www.archives.gov/records-mgmt/policy/automated-recordkeeping-requirements.html.
[233] Carlin, 'Baseline Requirements for Automated Record Keeping'.
[234] DLM Forum Foundation, 'Modular Requirements for Recordkeeping System (MoReq 2010): Core Services and Plug-In Modules' (DLM Forum Foundation, 2010). International Council on Archives. 'ICA-Req Principles and Functional

Lifecycle Management (DLM) forum with assistance from the European Commission; it was first published in 2001 and revised in 2010.[235] MoReq 2010 allows vendors to certify their systems against a core set of requirements; as long as their system meets these requirements, they can then validate their software against an optional set of modules.[236]

ICA Req is the only functional requirements standard to receive endorsement as an ISO standard: ISO 16175. Unlike MoReq, ICA Req is a guideline for organisations rather than a certification standard for actual systems.[237] Organisations can verify the records functionality of their systems against the ICA Req standard or they can adapt the standard according to their own requirements when designing an information management system. [238] ICA Req has been used by organisations like the National Archives of New Zealand, where it formed the basis for a discretionary functional requirement standard for recordkeeping systems in government.[239]

Some jurisdictions have chosen to develop their own requirements informed by their particular contexts of operation. One example is the Public Records Office for Victoria (PROV), Australia, which developed the Victoria Electronic Records Strategy (VERS) standard (PROV 99/007). VERS is intended to guide departments and offices in the development of digital records management systems so that those systems are

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Requirements'. International Council on Archives, 2008.

[235] DLM-Forum on Electronic Records, 'Model Requirements for the Management of Electronic Records (MoReq2): Update and Extension' (CECA-CEE-CEEA, European Commission, 2008)., 2. and DLM, 'Modular Requirements. Revisions in MoReq reflect changes in Information Communication Technology (ICT). DLM developed a more modular standard capable of being implemented in different jurisdictions.

[236] Robert Smallwood, *Managing Electronic Records: Methods, Best Practices and Technologies.* Wiley CIO (Hoboken, New Jersey: John Wiley & Sons, 2013)., 242. James Lappin, 'How MoReq2010 Differs from Previous Electronic Records Management System Specifications', Blog, *Thinking Records*, (2011), accessed 24 January 2015, http://thinkingrecords.co.uk/2011/05/06/how-moreq-2010-differs-from-previous-electronic-records-management-erm-system-specifications/.

[237] Smallwood, *Managing Electronic Records.,* 242.

[238] Smallwood, *Managing Electronic Records.,* 242.

[239] Archives New Zealand, 'Digital Recordkeeping Standard- Mapping Database Procedure', *Archives New Zealand*, n.d., accessed 24 January 2015, http://archives.govt.nz/advice/public-offices/digital-recordkeeping/digital-recordkeeping-standard-mapping-database-procedur.

capable of maintaining authentic and reliable digital records.[240] This approach has resulted not only in the creation of standardised digital records across government, but also supported the export of records to PROV for preservation.[241] Other jurisdictions have implemented similar requirements, including Norway (NOARK) and Finland (SÄHKE). These functional requirements standards were designed to regulate and control the production of digital records in recordkeeping systems, thus ensuring records integrity over time.

### 3.4 Digital Repositories Standards, Certification and Trust

As discussed at the outset of this thesis, two ISO standards, OAIS and RAC, are the focus of this study. This section provides some historical context for these standards (3.4.1 and 3.4.3), in order to illustrate their purpose and scope and to address the notion of trust and its role in TDR certification (3.4.2).

#### *3.4.1 Open Archival Information System (OAIS)*

For some time, researchers in the space data community and those working at NASA tried to address the management of data and other digital output from scientific studies and space missions. As early as 1955, the World Data Center (WDC) was established to interpret space data as well as to capture and preserve it. The creation of the Center marks the first attempt by the space data community to manage and preserve its digital data.[242]

[240] Public Records Office of Victoria, 'Victorian Electronic Records Strategy » Public Record Office Victoria - Archives of the State Government of Victoria', accessed 11 January 2015, http://prov.vic.gov.au/government/vers. Public Records Office Victoria, 'Management of Electronic Records Standard' (Public Record Office Victoria, 2003).

[241] Public Records Office Victoria, 'Management of Electronic Records', 3. See in particular the section titled: PROV 99/007 Specification 5: Export of Electronic Records to PROV.

[242] Lee, 'Defining digital Preservation Work,' 19.

The issue of data management continued to be a concern for NASA as the number of magnetic reels containing important scientific data continued to grow.[243] As both the amount and complexity of the data grew, scientists at NASA began looking for models or methods to guide them in the preservation of this information. Failing to find any established framework for digital preservation that encompassed the management of digital objects (i.e. data and records) from creation to preservation, the space data community and NASA resolved to bridge the gap.[244]

In 1994, the CCSDS management committee assigned a working group, Panel 2 to be responsible for developing standards related to Standards Information Interchange Processes and with developing a digital preservation framework entitled 'Space Systems-Archiving Space Data.'[245] This framework was intended to '[e]ncourage commercial support for the provision of archives services which would truly preserve our valuable data, not only for space related data but also for all long term data archives.'[246] As its work evolved the committee agreed that a reference model would be a better approach, given the lack of any formal digital preservation framework. The reference model would lay the conceptual foundations for discussing TDRs and would act as a '[f]irst step before adopting or developing specific standards needed to support archives services.'[247]

The archiving space data work item would eventually be called the Open Archival Information System, or OAIS. It was designed to be a generic model for digital records preservation and for the establishment of trusted digital repositories. It also provided a common terminology and articulated core concepts that would help guide cultural

[243] Lee, 'Defining Digital Preservation Work'. 20.
[244] Lee, 'Defining digital Preservation Work'., 20. Robin Dale and Emily Gore, 'Process Models and the Development of Trustworthy Digital Repositories' *Information Standards Quarterly* 22, no. 2 (Spring 2010): 1–7., 1.
[245] Lee, 'Defining Digital Preservation Work'., 90 and 259.
[246] Lee, 'Defining digital Preservation Work'., 92.
[247] Lee, 'Defining digital Preservation Work.'., 93.

heritage institutions as well as organisations that did not have experience in preserving digital records.[248] Given the high level of the OAIS guidance, the reference model could be adapted by any discipline in order to develop a trusted digital repository system.

Initially the committee working on OAIS was entirely comprised of space data scientists, but early on in the development of the standard, CCSDS members realised that a broad cross-section of professions and institutions should be included in the development process.[249] Don Sawyer, a space data specialist and founding member of OAIS, in particular, acknowledged that questions of access and preservation of digital assets extended far beyond the concerns of space data scientists. Between 1997 and 1999, a call was put out by CCSDS for wider involvement which resulted in the participation of organisations such as the Network of European Deposit Library (NEDLIB) and from digital preservation research initiatives like the CURL Exemplars in Digital Archives Research (CEDAR). Not only was there widespread consultation to ensure a representative understanding of the problems related to digital preservation, but CCSDS also looked closely at related research and white papers in other disciplines, such as the RLG's *Preserving Digital Information*.

The finalised document was presented to TC20/SC13 in January 2002 for final approval. As noted by Lee the process was merely seen as the formalisation of the OAIS as an international standard and no changes were made by TC20/SC13, it unanimously passed the balloting process.[250]

The final version of OAIS has six (6) modules: ingest, archival storage, data management, administration, preservation planning and access. Ingest (module 1) is the

[248] Lavoie, 'Meeting the Challenges of Digital Preservation'., 26
[249] All the information from the paragraph comes from: Lee, 'Defining Digital Preservation'. 94.
[250] Lee, 'Defining Digital Preservation'., 94 and 137-138

process by which an item is accepted or received from a records creator (Producer).[251] Once ingested, the archival storage function (module 2) stores and enables the retrieval of digital records in the TDR, while data management (module 3) allows administrators to manage, maintain and render access to records. Overall administration of the digital repository, such as negotiating ingests and policies and procedures, is addressed under the heading 'administration function' (module 4), while preservation planning (module 5) includes monitoring the environment in which digital records are kept and ensuring their ongoing accessibility. Finally, under the auspices of 'access' (module 6) are details pertaining to end-user search and retrieval from the repository. All these functions provide an overarching framework for managing digital records from the point they are received by the repository to the time at which they are displayed for and used by researchers.

As a reference model, OAIS was never intended to be used as a minimum quality standard. It was merely intended to identify at a high-level the activities of a TDR. However, some digital repositories began using the standard as a method for measuring the credibility of repository operations by claiming they were 'OAIS compliant.'[252] Increasingly OAIS standards developers, as well as archival and library science practitioners and scholars, became concerned about this use of OAIS and started to develop methods of measuring or assessing trustworthy digital repository operations, leading to the development of TDR audit and certification tools and standards.

[251] All this information in this paragraph comes from: TC20/SC13, 'Open Archival Information System- - A Reference Model'., 4-1 and 4-2.
[252] Interview 28, 26 March 2012.

### *3.4.2 Notions of Trust and Certification*

Before considering the history of TDR audit and certification standards, it is necessary to define the notion of trust in connection with certification.

The definition of trust varies. Some view trust as a commitment where one individual relies on another to fulfil promised obligations.[253] Others feel that trust is a reciprocal exchange: by giving and expecting trust in return, we influence other parties involved in a transaction to be equally as trusting of us as we are of them.[254] For the purposes of this discussion, trust is defined as relational: '[C]onstituted of a relationship between someone who trusts, and someone or something to be trusted in.'[255] This relational concept of trust has played an important role in how archivists have come to understand their profession and their practices.

Archivists have often juxtaposed their role, as intermediaries between records creators and end users, with that of a trusted custodian.[256] Archivists ensure that records received from creators are authentic and reliable and, in turn, archivists are implicitly trusted by the creator to maintain these records in order to guarantee their integrity over time. The interactions between archivists and users are equally mediated by a latent trust relationship. Users trust the archivist, as a guardian or keeper of the records, to make all relevant information available to them whenever possible. Archivists also contextualise their relationship with the records they preserve in terms of

[253] Katherine Hawley, *Trust: A Very Short Introduction*, Very Short Introductions (Oxford: Oxford University Press, 2012)., 6.
[254] Onora O'Neill 'A Question of Trust', British Broadcasting Corporation, *Reith Lectures*, 2002, accessed 3 June 2013 www.bbc.co.uk/radio4/reith2002/.
[255] Anneli Sundqvist, 'Documentation Practices and Recordkeeping: A Matter of Trust or Distrust?', *Archival Sciences* 11 (2011): 277–91., 279.
[256] Luciana Duranti, 'InterPARES 2 Project- The Power of Archives: The Findings of InterPARES', n.d., www.ica.org/download.php?id=495.

trust. Their responsibility is to maintain the authenticity, reliability and trustworthiness of records so they can to serve as instruments of accountability.[257]

In the digital domain, however, the expectation of trust is no longer a *de facto* reality, for archivists or for society as a whole. In her 2002 Reith lectures, Onora O'Neill provides one possible explanation for this loss of trust, which she says is more than a 'crisis in confidence'[258] but a crisis of suspicion that has embedded itself in society. O'Neill contends that society has created an audit culture, where the prevailing idea is that in order to gain trust one has to find some way of quantifying and measuring it. She goes on to say: 'This audit explosion […] has often displaced or marginalised older systems of accountability,' which, she contends include traditional professional codes of practice. To O'Neill, older accountability mechanisms do not meet current expectations of ascertaining and having trust. Trust must now be measured and quantified in order to be considered valid.

Where archivists had previously been afforded trust by virtue of their position, this is no longer the case. In a growing climate of mistrust, combined with the fluid and transient nature of digital records, archivists are required to provide hard evidence that they are trustworthy professionals and that the archival processes they use to manage, preserve and make records available can also be trusted.[259] Arguably, TDR audit and certification standards provide records creators and end-users with the confidence that records can be trusted if an archival digital repository's operations can be certified as trustworthy.

[257] Duff, 'Issues of Authenticity'., 229-230.
[258] Information from this paragraph comes from: O'Neill, 'A Question of Trust'.
[259] Duff, 'Issues of Authenticity'., 229. Task Force on Archiving, 'Preserving Digital Information'., iii.

### *3.4.3 History of Certification Standards and the Development of RAC*

The notion of a 'trusted system', or 'trusted repository', to manage digital records was proposed quite early in archival scholarship. Hedstrom proposed the use of trusted systems to control the management of digital records, although many of the functionalities she proposed mirror those used by digital recordkeeping systems.[260] Her approach is based mainly on system functionalities, which differ from TDR audit and certification criteria in that they seek to assess not just the functionality of digital repository systems but also the finances, personnel capacity and regulatory frameworks surrounding digital records and archives management. Audit and certification criteria were only created after the development of OAIS, beginning with *nestor* (2003), followed by DRAMBORA (2006), TRAC (2007), DANS (2008) and finally RAC (2012). These initiatives are outlined below.

In 2003, a German initiative called *nestor* or the Network of Expertise in Long-term Storage of Digital Resources began working on audit and certification criteria for digital repositories. *nestor* has a two-pronged approach to repository certification: 'soft' and 'hard'. 'Soft' certification is achieved by coaching repositories to take up a standard voluntarily, such as using Persistent Identifiers (PI) for their digital materials.[261] Persistent Identifiers are permanent references attached to digital records that allow them to be retrieved in perpetuity. The goal of 'hard' certification is: '[E]nsuring the highest level of trust […] only admitting those [repositories] that follow very strict rules.' The objective of *nestor* is first to encourage and lay the groundwork for establishing a trusted digital repository by promoting the use of good practice or standards, in the

[260] Hedstrom, 'Building Record-Keeping Systems'., 58.

[261] All information from this paragraph comes from: Susanne Dobratz and Astrid Schoger, 'Nestor Digital Repository Certification: A Report from Germany', *RLG DigiNews on Repository Certification*, accessed 11 September 2011, accessed 11 September 2011, http://edoc.hu-berlin.de/oa/articles/reh7CbxRopdUA/PDF/23yn183UoMBU.pdf.

hopes that this voluntary compliance would lead to the implementation of more rigorous practices and regulatory frameworks. The final outcome would be that through the continued application of voluntary measures for digital repository management the repository could receive 'hard' certification as a trusted digital repository as per the *nestor* requirements.

The Digital Repository Audit Method Based On Risk Assessment (DRAMBORA) was developed jointly by the Digital Curation Centre (DCC) and Digital Preservation Europe in response to the RLG-OCLC white paper *Trusted Digital Repositories: Attributes and Responsibilities* (2002). Many practitioners and academics felt that although the RLG-OCLC white paper provided a good starting point, it did not give enough actual metrics or quantifiable methods for assessing what constituted a trusted digital repository.[262] DRAMBORA is a risk-based assessment method similar to that used by financial or business auditors. Repository auditors collect documentary evidence and conduct interviews to locate risks and to identify mechanisms to mitigate them.[263] The auditors rank the risks based on the likelihood of occurrence and their overall impact to the organisation (i.e. reputational damage).

*Trusted Repository Audit and Certification* (TRAC) (2007)[264] was a joint RLG-NARA initiative. The TRAC certification method allows organisations to either self-assess their repository operations (soft certification) or to be externally audited (hard certification). Following TRAC, organisations assess their digital repository operations based on three

[262] Ross and McHugh, 'The Role of Evidence'., 2.
[263] Digital Curation Centre and Digital Preservation Europe, 'Digital Repository Audit Method Based on Risk Assessment DRAMBORA' (DRAMBORA, 2007).
[264] RLG-NARA, Digital Repository Certification Task Force, 'Trusted Repositories: Certification and Audit' (National Archives and Records Administration, 2007), accessed 9 May 2011 http://www.crl.edu/sites/default/files/attachments/pages/trac_0.pdf.

criteria: 'Organizational Infrastructure', 'Digital Object Management and Technologies' and 'Technical Infrastructure and Security'.

'Organizational Infrastructure' requirements seek to measure and assess governance structures, policy frameworks, financial sustainability and legalities (i.e. transfer agreements and copyright) related to digital repository management. 'Digital Object Management' focuses on examining whether the repository has the capabilities of managing digital records from ingest to preservation and display. Finally, 'Technologies, Technical Infrastructure and Security' assesses the repository's technical capabilities, including information technology architecture and overall network security. This audit mechanism developed by the TRAC committee would serve as the foundation for the *Repository Audit and Certification* (RAC) standard (2012), which is discussed further below.

Before considering RAC, another certification tool must be mentioned. The Data Seal of Approval (DANS) was established by two Dutch science organisations; the Royal Netherlands Academy of the Arts and Sciences (KNAW) and the Netherlands Organisation for Scientific Research (NOW). This certification and audit criteria tool was specifically designed for use in the assessment of research data repositories. Organisations that wish to certify through DANS must first self-certify their operations against 16 guidelines that consider the following questions, among others: can the data be found on the internet; is the data in useable format; and is the data reliable? [265] Once repositories have completed their self-assessment they can then submit their audit for

[265] Royal Netherlands Academy of the Arts and Sciences and Netherlands Organisation for Scientific Research, 'Assessment| Data Seal of Approval', accessed 24 January 2015, http://www.datasealofapproval.org/en/information/assessment.

peer review. If they pass the peer review the repository is awarded a data seal of approval.[266]

Finally, leading on from the work done by OAIS, as well as other certification initiatives, the CCSDS began developing the *Repository Audit and Certification* (RAC) standard or ISO 16363 (2012). The development of RAC began in 2007 with the approval of the CCSDS management committee, and an ad hoc committee was formed, which consisted of former OAIS and TRAC committee members.[267] Once RAC was finalised it was presented to ISO TC20/SC13 and it became an ISO standard in 2012.[268] As mentioned in Chapter 1, RAC relies heavily on the work of TRAC, and the assessment criteria in RAC differ very little from that earlier document.[269] RAC, however, does incorporate elements from other repository certification standards such as *nestor*, DRAMBORA and DANS.

RAC is divided into three sections: 'Organizational Infrastructure', 'Digital Object Management' and 'Infrastructure and Security Risk Management'. 'Organizational Infrastructure' addresses requirements related to regulatory framework (i.e. policies and procedures), staffing expertise and development, repository financing and preservation frameworks.[270] 'Digital Object Management' details the processes needed to ensure the efficient management of digital records from the point at which they are transferred by the records creator, to their preservation and then to end-user access. 'Infrastructure and Security Risk Management' provides requirements to help organisations manage risks related to technical infrastructure and security.

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[266] Royal Netherlands Academy of the Arts and Science et al, 'Assessment'

[267] Interview 23, 1 June 2012.

[268] Interview 23, 1 June 2012.

[269] McGovern, et al., 'TRAC_RAC Comparison Document'.

[270] All information from this paragraph comes from: TC20/SC 13 International Standards Organisation, 'Space Data and Information Transfer Systems -- Audit and Certification of Trustworthy Digital Repositories' (International Standards Organisation, 2012).

Ultimately the purpose of each of these audit and certification standards was to provide the evidence necessary to demonstrate that digital repository systems are capable of maintaining authentic and reliable records. Certification, in the end, allows the creators, custodians and users of records to prove that the contents of TDRs are managed with integrity.

**3.5 Conclusion**

This chapter sought to provide an overview of developed world research and scholarship on digital records preservation, leading to the development of TDR standards. Topics such as access and preservation, authenticity and reliability were explored to provide some context about developments in the library and archival communities that led to the decision to develop TDRs. These discussions within the different professions contributed to the creation of reports such as *Preserving Digital Information*, which would in turn inform TDR standards like OAIS.

Ultimately, an explanation of the history of OAIS and RAC shows that TDRs are a convergence of views from different communities of professional practice, each of which was concerned with digital records preservation. Space data scientists, librarians and archivists all sought frameworks to guarantee the integrity of records once they were transferred from records creators to digital repositories.

The question of the nature of trust and how it was measured began to pervade discussions of digital records preservation. This in turn influenced how the information studies community understood their relationship to TDRs. O'Neill's analysis of trust provides a valuable perspective on the use of audit and certification criteria in today's Westernised societies. The question of whether audit and certification standards like RAC actually generate more trust in digital repository operations remains to be seen. By

O'Neill's estimation such metrics are artificial measures; they are attempts by an increasingly suspicious society to measure trust.

The next chapter turns its attention to Africa and examines the impact of foreign donor technology transference policies on the implementation of Information Communication Technologies (ICTs). The analysis includes a review of literature related to technology transference, as well as an examination of African research on digital records preservation. The goal is to determine the state of digital records understanding in Africa and to assess how prepared the African recordkeeping community is to develop systems and processes for the preservation of digital records.

# CHAPTER 4: TECHNOLOGY TRANSFERENCE IN AFRICA AND AFRICAN DIGITAL PRESERVATION SCHOLARSHIP

## 4.1 Introduction

Technology transference has played an important role in the evolution of human societies. Technology transference occurs when one culture learns from another, appropriating and re-purposing methods of working and thinking. It is through such transfer of skills that knowledge and methods of working evolve and change. In the twentieth century, the World Bank and international donor organisations focused a considerable amount of effort on technology transfer as a way to address development issues such as poverty, poor health care and corruption.

There has long been a perception, articulated in international development policies, that technology transference is culture-neutral and therefore transferable from society to society without change. As will be discussed in this chapter, there has been little recognition of the impact of cultural, societal, political or economic determinants in the success or failure of information technology initiatives. There is also little acknowledgement of the latent cultural structures that are built into Information Communication Technology (ICT) systems, stemming from the socio-cultural environment in which they are developed, or of how this bias affects their application in recipient societies. This perception of the innate transferability of technology permeates a wide range of development initiatives, including policies related to ICT implementation.

ICT is defined as modes of transmitting, receiving and reading digital information, through such devices as mobiles, faxes, computers, email and the internet.[271] In the late

[271] Mitchell Rice, 'Information and Communication Technologies and the Global Digital Divide: Technology Transfer,

twentieth century, foreign donor approaches to ICT implementation in Africa were informed by two policies issued in 1996: the *African Information Society Initiative* (AISI)[272] issued by the Economic Commission for Africa (ECA) and *Africa's Infrastructure: The African Green Paper*[273] issued by the International Telecommunications Union (ITU). The framework established by these policies still influences the vision and direction for successive technology initiatives in Africa.

As will be shown in this chapter, although this framework has guided ICT initiatives, the actual implementation of ICT projects has been piecemeal, often focusing on systems and infrastructure, but failing to ensure the existence of the underlying conditions, such as enforceable and sustained regulatory structures or access to trained personnel, which are needed to provide ongoing support and sustainability for ICT systems. This inconsistent approach to ICT implementation can be seen as a direct result of the ad hoc nature and short duration of international donor-funded projects, which seek to make quick, short-term gains: with the focus on getting the system 'live' rather than ensuring sustainability.

The approach taken to ICT implementation by international donors has affected the types and quality of digital records created in the developing world, complicating their preservation. This chapter outlines the impact of international donor initiatives on digital records preservation by addressing several key issues. In section 4.2, the notion of technology transference is explained, along with a discussion of foreign donor policies

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Development and Least Developing Countries', *Comparative Technology Transfer and Society* 1, no. 1 (April 2003): 72–88, doi:10.1353/ctt.2003.009., 78.

[272] Economic Commission for Africa, 'United Nations- Economic and Social Council, Economic Commission for Africa- Africa's Information Society Initiative (AISI): An Action Framework to Build Africa's Information and Communication Infrastructure', *UNESCO*, 1996, accessed 21 December 2014, http://www.unesco.org/webworld/telematics/cm22-6.htm. See also Economic Commission for Africa, 'African Information Society's Initiative (AISI): A Decade's Perspective' (Economic Commission for Africa, 2008).

[273] International Telecommunication Union, 'The African Green Paper: Telecommunication Policies for Africa' (International Telecommunication Union, 1996).

(i.e. AISI and *The African Green Paper*) connected to ICT implementation in the developing world. This overview helps to contextualise the drivers behind technology initiatives in Africa, in order to highlight the impact foreign donor policies have had on digital records creation and preservation.

Section 4.3 focuses more specifically on how the assumptions underlying foreign donor policies have affected the success of technology implementation in Africa and the developing world, more broadly. The discussion looks particularly at the assumptions contained in the *African Information Society Initiative*, followed by an examination of professional literature that considers the major issues inhibiting the implementation of ICT systems in the developing world. Most notably among these are the state of infrastructure and level of access to necessary computer hardware; staff and resource capacity for ICT implementation; and differences in cultural constructs that influence actions and decisions related to technology.

By way of comparison, section 4.4 examines successful technological initiatives in the developing world, discussing the factors that have contributed to their success. Finally, in section 4.5, African scholarly and professional research into digital records preservation is analysed, in order to assess how well prepared the community is to preserve digital records. The insights learned through this research serve to inform discussions related to M1 (EAC) and M3 (EAC) of the methodological framework, both of which are explored in greater depth in Chapters 6 and 7.

**4.2 Technology Transference and Foreign Donor Policies**

Foreign donor philosophies and policies related to technology transfer have influenced the way ICT has been implemented in the developing world. These philosophies and policies have also informed the way that developing nations view technology. The intent

underlying technology transfer is to spur economic growth and foster greater accountability and transparency in government operations; unfortunately, technological solutions have been treated as a panacea to address the many challenges faced by developing nations, such as poor administration, weak infrastructure and limited economic capacity.

The challenge is not the transfer of technology per se; rather, the problems stem from the predilection to treat technology as a stand-alone solution for dealing with developmental problems, without fully taking into consideration the realities of local culture, the technical capabilities in the country or the availability of trained personnel to support systems once they are installed.[274] A prevailing philosophy behind ICT initiatives in the developing world is modernism: the belief that developing nations are merely pre-industrialised nineteenth century replicas of the developed world and that the solution to economic, social and financial problems is simply a direct transfer of technology from the developed world.[275] This philosophy and policies guiding the implementation and use of technology will be developed on further reading.

First it is necessary to define the term 'technology transfer'. Technology transfer is defined by the United Nations Industrial Development Organisation (UNIDO) as '[T]he communication, use, and application of the latest knowledge, skills, and practices for mitigating and adapting to change, and it covers the processes of transfer in and between developed countries, developing countries and transition economies'.[276] According to this definition, technology transfer is the exchange of ideas and practices

[274] Jorn Braa, Eric Monteiro, and Erik Reinert, 'Technology Transfer Vs. Technological Learning: IT-infrastructure and Health Care in Developing Countries.', *Information Technology for Development* 6 (1995) 15-23., 15.
[275] Peter Shields and Jan Servaes, 'The Impact of Transfer of Information Technology on Development', *The Information Society* 6, no 1-2 (1989): 47-59., 49
[276] As cited in Rice, 'Information and Communication Technologies., 54.

between various economies and cultures. UNIDO also states that technology transfer cannot successfully develop technological capabilities unless favourable government policies are also in place, along with learning strategies, particularly in the enterprise and technology sector, which support learning and innovation.[277]

In the UNIDO definition there is an implied mutual exchange between developed and developing worlds, but the reality is less so. The underlying philosophy behind many technology initiatives and policies makes the process less of a mutual exchange and more of a one-way street, largely because the development policies and philosophies that underpin foreign donor initiatives are influenced by modernist modes of thought.[278]

The modernist approach is premised on the idea that developing nations are merely copies of the developed world, still in a pre-industrialised state; the solution to economic, social and financial problems in the developing world is simply to complete a direct transfer of technology.[279] The World Bank, for instance, has allocated significant amounts of money to technology implementation believing that those funds will overcome the challenges faced by developing nations, particularly their weak infrastructures, poor economies and susceptibility to corruption.[280] As noted by Nulens, the World Bank approach asserts that '[A] simple transfer of Western technologies to the South will close the gap…'.[281] Unfortunately, this approach fails to take into account much more complex cultural, societal and political constructs at play in ICT design and implementation. This weakness in approach is point out by Lopez and Vilaseca, who

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[277] David Bennett, 'Innovative Technology Transfer Framework Linked to Trade for UNIDO Action' (United National Industrial Development Organization, 2002), accessed 17 August 2013 http://www.unido.org/fileadmin/import/userfiles/hartmany/wssd_tech_transfer.pdf., 7.

[278] Gert Nulens, 'Information Technology in Africa: The Policy of the World Bank', in *Information Technology in Context: Studies from the Perspective of Developing Countries*, ed. C Avgerou and G Walsham (Aldershot: Ashgate, 2000), 264–75., 273.

[279] Shields and Servaes, 'The Impact of Transfer of Information Technology on Development' , 49.

[280] Nulens, 'Information Technology in Africa'., 273.

[281] Nulens, 'Information Technology in Africa., 273.

argue that '[E]xternal debts, information poverty, obsolete infrastructure and poor commercial development, all […] hinder efforts to develop […] information technological changes and trends'.[282]

ICT implementation in the developing world is informed by the two policies mentioned earlier: *The African Information Society Initiative* (AISI) and *Africa's Infrastructure: The African Green Paper*. In 1996, the United Nations ECA adopted AISI, having worked with limited success since the early 1980s to strengthen computerisation and information exchange on the African continent.[283] Finally in May 1995 the ECA Executive Secretariat was tasked with establishing a high level committee of African experts to draft a continental ICT implementation action plan: AISI. AISI's vision was that by 2010 an information society would exist in Africa in which every: '[M]an, woman, child, village, public and private sector office has secure access to information and knowledge through the use of computers and the communication media'.[284] The initiative included a multi-pronged implementation strategy involving international, regional, sub-regional and national.

The intent of the AISI strategy was to help modernise Africa by helping governments on the continent address developmental challenges through improved access to information. The ECA and foreign donors sought to use technology to create a better political and economic environment for citizens. The vision articulated in AISI was embodied in many international, regional and national economic development strategies, which perceived ICT as an economic driver and a catalyst for social change.

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[282] Enrique J. Lopez and Maby Gonzalez Vilaseca, 'IT as a Global Economic Development Tool', in *Information Technology, Development and Policy*, ed. Edward R. Roche and Michael J. Blaine (Aldershot: Avebury, 1996), 57–75., 57.

[283] All the information in this paragraph comes from: Economic Commission for Africa, 'African Information Society's Initiative (AISI): A Decade's Perspective'., 1-5.

[284] Economic Commission for Africa, 'African Information Society's Initiative (AISI): a Decade's Perspective'., 8,

Technology was seen as an economic driver because it was believed that greater administrative efficiencies could be achieved through the computerisation of government operations, resulting in better service delivery and information retrieval, thus limiting corruption.[285] Even at the outset of AISI, two-thirds of the technology initiatives funded by the World Bank related to the implementation of information, finance and accounting management systems.[286] AISI encouraged governments on the African continent to embed ICT strategies in regional and national policies and to link technology development to economic and e-Government strategies.[287]

The East African Community has consistently viewed ICT as a strategic economic goal for member countries, which are encouraged to include ICT strategies in their visioning documents. Even in its most recent strategic development planning document, the *4th EAC Development Strategy (2011/12-2015/16)*, the EAC has continued to emphasise the ongoing importance of ICT in achieving economic growth.[288] This focus has also influenced the national visioning documents of member countries such as *Vision 2030* (Kenya) and *Vision 2025* (Tanzania).[289]

AISI also viewed technology as a catalyst for social change by empowering citizens to change their society through access the internet, a vision which influenced developmental initiatives involving ICT implementation. In 2000, when the United Nations and the Organisation for Economic Co-operation and Development (OECD) adopted the Millennium Development Goals (MDG),[290] a set of general principles to

[285] Anne Thurston, 'Records Management in Africa: Old Problems, Dynamic New Solutions', *Records Management Journal* 5, no. 1 (1995): 187–99., 190.
[286] David Mundy, 'IT in Developing Countries: A loss of independence?', in *Information Technology, Development and Policy*, ed. Edward R. Roche and Michael J. Blaine (Aldershot: Avebury, 1996)., 47.
[287] Economic Commission for Africa 'African Information Society's Initiative (AISI): a Decade's Perspective'., 13.
[288] East African Community, '4th EAC Development Strategy'.
[289] Republic of Kenya, 'Kenya Vision 2030'. United Republic of Tanzania, 'The Tanzanian Development Vision 2025'.
[290] Millennium Development Goals are comprised of 8 high level goals, along with targets and measures to guide

streamline international development initiatives, technology was seen as an important component for both achieving and measuring them.[291] Citizen access to technology, in particular to the internet, was also seen as a means of reaching the goals set by the MDG. An added benefit of enabling citizen access was the promotion of greater socio-political equality, the empowerment of citizens and the redressing of inequalities.[292]

*Africa's Information Infrastructure: A Green Paper* was developed to address a gap in the AISI strategy, namely the continent's weak infrastructural capacity, which prevented the widespread implementation of technology.[293] At the time the Green Paper was published, the African telecommunications sector was still predominantly state owned, stifling progress and limiting competition. The Green Paper made recommendations for building infrastructure for ICT implementation and for reconfiguring Africa's telecommunications sector.[294] It proposed the liberalisation of the telecommunications sector through the separation of basic services from value-added services.[295] Many foreign donors developed funding programmes that supported the process of change through improved and more market-driven telecommunications services.[296] The result has been greater competition in some parts of the industry, including the growth of a range of mobile phone networks.[297]

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international development initiatives and policies. For more information see: http://www.un.org/millenniumgoals/

[291] Allam Ahmed, Ghoneim Sherine, and Kim Ronald, 'Knowledge Management as an Enable of Change and Innovation in Africa', *International Journal of Technology Management* 45, no. 1/2 (2009) 10-26., 14. Allam Ahmed and Josephine Anne Stein, 'Science, Technology and Sustainable Development: a World Review', *World Review of Science, Technology and Sustainable Development* 1, no. 1 (2004) 5-24., 13.

[292] Waayunda Leonard Chilimo and Patrick Ngulube, 'Role of Information and Communication Technologies in Sustainable Livelihoods in Selected Rural Areas of Tanzania', *African Journal of Library and Information Science* 21, no. 2 (2011) 145-157., 146. Rice, 'Information and Communication Technologies'., 78.

[293] Leo Van Audenhove, 'Information and Communication Technology Policy in Africa: A Critical Analysis of Rhetoric and Practice', in *Information Technology in Context: Studies from the Perspective of Developing Countries*, ed. C Avgerou and G Walsham (Aldershot: Ashgate, 2000), 277–89., 283.

[294] Van Audenhove, 'Information and Communication Technology Policy'., 283.

[295] Van Audenhove, 'Information and Communication Technology Policy'., 283.

[296] Aaditya Mattoo, Julia Nielson, and Hildegunn Kyvik Nordas, *Liberalization and Universal Access to Basic Services : Telecommunications, Water and Sanitation, Financial Services, and Electricity* (The World Bank, 1 January 2006), accessed 31 August 2014, http://documents.worldbank.org/curated/en/2006/01/17565634/liberalization-universal-

As will be discussed in the next section, these two policies have affected the way that technology has been implemented in Africa. AISI, in particular, contains assumptions that inhibit the ability of foreign donors to achieve the policy's aims: as will be shown, such assumptions may have, in fact, contributed to widespread ICT failure.

### 4.3 Foreign Donor Policies and ICT System Failures in Africa

This section examines some themes that recur in the literature and considers factors that may be contributing to ICT system failure. The section concludes with an analysis of the effect of poor ICT infrastructure, a discussion of the impact of a lack of knowledge and capacity and the influence of differing cultural constructs built into technology. The discussion seeks to draw parallels between foreign donor policies and philosophies and problems with ICT systems implementation.

#### *4.3.1 Foreign Donor Policies and Rates of ICT System Failure*

The assumptions contained in the modernism paradigm and embodied in particular in the AISI policy have complicated the successful implementation of ICT initiatives in Africa. These assumptions include the following:

1) Information technology is neutral and easily transferable.
2) Information as such is neutral.
3) Through ICTs, African citizens have access to information, which is necessary and sufficient to accelerate development.
4) Information will be free or nearly free in the information society.[298]

These observations challenge the belief that technology is culture-neutral and can simply be implemented without consideration for cultural, social or political realities. The approach of foreign donor policies couches technology as a tool to improve quality of life merely by its widespread availability. This perception is corroborated by Heeks,

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access-basic-services-telecommunications-water-sanitation-financial-services-electricity.

[297] Asif Hashmi, 'Mob Rule: Africa's Mobile Phone Kiosks: Tech Hubs Set to Rival Silicon Valley?', *Brussels Airlines B.spirit! Magazine*, 2010., 53-56.Alex Perry, 'The Silicon Savanna', *Time*, 11 July 2011., 43-46.

[298] Van Audenhove, 'Information and Communication Technology Policy'., 280.

who states: 'Recipients must have access to the technology, and must have the skills and confidence to access and interpret the information provided'.[299] As with many developmental initiatives that argue for the transformative power of technology, the emphasis is entirely on technology as a catalyst for change and empowerment. Little consideration is given to the need to make technology accessible, available and understandable, in order to enable such change.

Some have argued that this utopian vision of technology transfer as a tool for socio-economic betterment can actually privilege existing power structures within developing countries rather than empowering citizens through improved access to technology.[300] The reasoning behind this assertion is that newer mediums of communication and technology can be too expensive for most citizens unless such technology is made freely available through government programmes. As a result, it is the more affluent members of society who can afford new technology and exploit it for their own ends, reinforcing existing social inequalities.

> While these tools [social media], have the potential to increase citizen involvement in collection, debate and action, in practice, they're being used by a small, elite group […] these discussions are open only to people with access to the Internet (which cuts out people in countries who censor, people in unsderserved [sic] rural areas, as well as people who don't have money to spend time online); primarily open to people who speak and write English well; primarily open to people who can afford to spend time online engaging in these dialogues…[301]

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[299] Richard Heeks, 'Information Technology, Information Systems and Public Sector Accountability', in *Information Technology in Context: Studies from the Perspective of Developing Countries*, ed. C Avgerou and G Walsham (Aldershot: Ashgate, 2000), 201–19., 208.

[300] Stephen Graham, 'Bridging Urban Digital Divides? Urban Polarisation and Information and Communications Technologies (ICTs)', *Urban Studies* 39, no. 1 (2002)33-56., 36. Michael Gurstein, 'Effective Use: A Community Informatics Strategy beyond the Digital Divide', *First Monday* 8, no. 1 (December 2003), accessed 14 August 2012 http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/1107/1027. Van Audenhove, 'Information and Communication Technology Policy'., 277.

[301] Ethan Zuckerman, 'Making Room for the Third World in the Second Superpower', in *Extreme Democracy*, 2004, accessed 28 October 2011, http://www.extremedemocracy.com/chapters/Chapter13-Zuckerman.pdf. This is also corroborated by Heeks, 'Information Technology'., 208.

The presumption that knowledge acquisition through online access is sufficient to drive political and economic change fails to address the deep-seated challenges faced in the developing world, in particular Africa. In fact a 2011 study in Tanzania examining sustainable livelihoods challenged the notion that knowledge acquisition[302] through online sources was sufficient to engender transformative change, observing that '[T]he use of Internet and mobile phones for knowledge acquisition, which is the primary component of the human capital, was not very common'.[303] The view held by foreign donors of technology as a solution to developmental challenges may have contributed to widespread ICT failure in developing countries.

While accurately measuring the rate of ICT system failure is difficult, a 2008 survey by Heeks suggested that 35% of e-Government projects in the developing world were total failures, 50% were partial failures and 15% were successes.[304] In this study, failures were defined as initiatives that were never begun or were implemented, but abandoned. Partial failures were defined as projects where the high-level aims were not reached and/or there were undesired outcomes. And successes were defined as projects where stakeholders attained their desired aims and there were fewer undesired outcomes.[305] The study also found that World Bank-funded public-sector ICT projects were almost all partial failures and were closed down after one year in operation.[306] Many factors that may have contributed to total and partial ICT system failures, such as accessibility to computer hardware and software, availability of trained personnel and

[302] Knowledge acquisition consists of gathering information from a source (i.e. book, internet).
[303] Chilimo and Ngulube, 'Role of Information'., 152.
[304] Richard Heeks, 'eGovernment for Development - Success and Failure Rates of eGovernment Projects in Developing/Transitional Countries', *eGovernment for Development*, 2008, accessed 26 October 2014 http://www.egov4dev.org/success/sfrates.shtml.
[305] Heeks, 'eGovernment for Development'.
[306] Heeks, 'eGovernment for Development'.

the presence of cultural constructs in technology will be explored in the following section.

### *4.3.2 Infrastructure and Accessibility to Computers*

One of the factors identified in the literature as contributing towards the failure or partial failure of ICT projects in Africa is the state of information technology infrastructure. Infrastructure such as copper wiring and fibre optics, along with access to hardware such as computers, is essential to the successful implementation and use of ICT systems; however, in the author's experience the basic infrastructure needed to support ICT initiatives in the developing world is often out of date or non-existent, leading to project failure. Access to computers is also problematic, given the lack of finances to procure and maintain the equipment needed.

In the first decade of the twenty-first century, significant effort and considerable resources were invested in connecting the East African region to fibre optic networks. The laying of fibre optic cable in the region began in November 2009, with the goal of connecting major urban centres on the East and Southern African such as Nairobi, Kenya; Arusha, Tanzania; and Darfur, Somalia.[307] The laying of the fibre optic cables continues, but most of the region, and the continent as a whole, continues to rely on limited copper wiring infrastructure, making it difficult to connect government and citizens. As noted in a 2011 study by Williams, Mayer and Minges, '[T]he lack of suitable copper wireline infrastructure has not only limited access to broadband internet but also increased the role of wireless infrastructure in providing such access…'.[308] The basic infrastructure that enables connectivity is weak, and affordable internet access is also

[307] East African Submarine Cable System, 'EASSY Milestones', *EASSy*, accessed 26 October 2014, http://www.eassy.org/milestones.html.

[308] Mark D. J. Williams, Rebecca Mayer, and Michael Minges, *Africa's ICT Infrastructure: Building on the Mobile Revolution*, Directions in Development- Infrastructure (Washington D.C.: World Bank, 2011)., 7.

limited. Williams, Mayer and Minges also found that average broadband costs on the African continent were $92 USD (£59) for a monthly subscription, making it prohibitive for the average African citizen to afford internet access, as monthly income can range from £13 to £142.[309]

In the author's experience, the ability to procure hardware, like computers and computer parts, is also a concern. Computer hardware and software can be expensive, especially as most of these materials come from outside the African continent. Materials have to be ordered and imported. The import tariffs placed on hardware and software make it difficult even for those people making good salaries to afford to have computers in their homes. And maintenance of those systems is costly and difficult.

A particular experience the author encountered, while anecdotal, demonstrates the challenge. While working in Addis Ababa, Ethiopia, the author learned from local residents, who had well-paid positions with an international organisation, that the cost of acquiring computer technology was prohibitively expensive, as import tariffs were sometimes as much as 30% of the cost of the computers themselves. If an individual paid £600 for a laptop, they would be faced with an additional £180 charge in import tariffs. The difficulty of acquiring technology is compounded when that technology requires repairs. In another example identified during a project site visit to Burundi, the author noted that the National Archives had received a donation of a microfilm reader and dehumidifier. Unfortunately, a short time after receiving the donation, the

[309] Williams et al, *Africa's ICT Infrastructure*., 4. See Living Wage Indicator Organisation: http://www.wageindicator.org/main/salary/living-wage/living-wage-map. Prices on the site are calculated according to local currencies or in Euros. The figures provided come from data on Tanzania and Kenya, and the conversion to GBP was calculated on 24 February 2015. According to Living Wage, the minimum monthly wage range in Tanzania is between €18-184 (£13-135), whereas in Kenya the minimum monthly wage rage is between €43-194 (£32-142)

equipment broke, but the National Archives could not afford to purchase the parts needed to complete repairs.[310] The equipment was rendered useless as a result.

The inability of citizens and governments to afford the computer hardware and other technologies needed for internet access, including affordable broadband services, essentially renders government initiatives like e-Government impossible to implement. In her thesis on the management of electronic records in the governments of Botswana, Namibia and South Africa, Segomotso Keakopa observed that neither the general public nor government employees could access e-Government services.

> While great importance has been attached to the computerisation of government services, the majority of employees and the general public still cannot access these services electronically either because they have no access to the facilities in their areas or because they are not trained to use the technology.[311]

Keakopa's research demonstrates that computerisation may not be having the desired development results. If government employees, who ostensibly would need to operate the system to input or retrieve information, do not have, or do not know how to use, the technology, the overall effectiveness of ICT systems and initiatives is seriously compromised.

Although foreign donor policies have sought to improve both telecommunications infrastructures and access to information, these policies often do not take into account the complexities of operating in resource-restricted environments, making success extremely difficult.

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[310] Research notes from *Aligning Records Management for Information Communication Technology, e-Government and Access to Information in the East African Community.*

[311] Keakopa, 'The Management of Electronic Records'., 254.

### *4.3.3 Capacity and Knowledge Transfer*

Adequate knowledge about how ICT systems work and an ability to understand and use the information provided through the technology, along with the capacity to operate, maintain and use ICT systems effectively are also challenges to the success of ICT initiatives, as discussed here.

Ensuring there are sufficient properly trained and well qualified personnel to run and maintain ICT systems and networks is critical to success; as Lopez and Vilaseca argue, '[A] country's ability to educate and train the new generation of technical managers is key in its IT development plan'.[312]

Many donor projects presume that there are enough qualified personnel readily available in the developing world to support ICT initiatives. As will be discussed this is not the case and it appears to be a contributing factor in ICT project failure, which can also have long-term detrimental effects on foreign donor development policies and in-country strategic goals. In the author's experience, donors are not including funds to support longer-term capacity building and knowledge transfer in IT. Rather, most ICT projects focus strictly on system implementation. Much of the funding provided for education in developing countries has been allocated to primary and secondary school education, whereas little money has been earmarked to develop post-secondary institutions like technical colleges or universities.[313] As a result, many East African

[312] Lopez and Vilaseca, 'IT as a Global Economic Development Tool'., 67. This is also supported in Allam Ahmed, 'Managing Knowledge and Technology for Sustainable Development in Africa', *International Journal of Technology Management* 45, no. 1–2 (2009): 1–9., 2. When the author states: 'Attention to human capital at the national level and to learning mechanisms at the firm level is the imperative for technological development in Africa'

[313] Richard Heeks and Julian Bass, 'Changing Computing Curricula in African Universities: Evaluating Progress and Challenges via Design-Reality Gap Analysis', *The Electronic Journal on Information Systems in Developing Countries* 48, no. 5 (2011): 1–39., 2.

countries, with the possible exception of Kenya, rely on out-of-date curricula for information technology and computer science programmes.[314]

In one example, a 2011 study in Burundi found that the computer science students at the national university were only taught the theoretical precepts of computer science. They did not have access to computers and so could not conduct any hands-on computer training. ICT professionals working in the Burundi government, themselves educated in Kenya, noted that graduates of this national university programme were not able to work as IT specialists.[315] Ultimately, this weakness in education and training means that there are not enough properly trained IT professionals to support the country's aspirations to computerise government services.[316]

The problem of capacity is not simply one of ensuring enough trained IT professionals are available; also important is ensuring that civil servants are capable of using IT systems effectively.

In the author's experience from her time in East Africa, ICT systems implementation is most often coordinated by consultants. There is, however, often little knowledge transfer from the consultants to the civil servants responsible for operating the systems. This gap in knowledge transfer can be a consequence of limited project timescales or because the training function has not been factored into a project contract. Knowledge transfer may also be complicated by varying levels of computer literacy: the consultant may have in-depth experience with the ICT system, but civil

[314] Heeks and Bass, 'Changing Computing Curricula'., 2.

[315] This information is in the author's research notes from the Burundi scoping visit, conducted as part of the *Managing Records As Reliable Evidence for ICT/e-Government and Freedom of Information in East Africa.*

[316] International Records Management Trust, 'Managing Records as Reliable Evidence for ICT/ E-government and Freedom of Information in East Africa- Final Report' (International Records Management Trust, September 2011), accessed 9 December 2011 http://irmt.org/portfolio/managing-records-reliable-evidence-ict-e-government-freedom-information-east-africa-2010-%E2%80%93-2011.

servants may only have basic word processing skills.[317] The lack of knowledge transfer means employees are unable to maintain ICT systems, often resulting in project failure.[318]

Issues of capacity and knowledge transfer are reflected in a case study, from 2000, by Abiodun Bada regarding the adoption of information systems in the Nigerian banking industry.[319] Bada found that five out of the six banks studied used banking packages developed outside Nigeria, meaning they had to rely on external vendors or an in-country representative for systems maintenance and upgrades. Consequently, there was an over-reliance on vendors, while internal IT personnel did not learn how to troubleshoot systems issues. Rather, internal IT staff served as liaisons between the vendors and the banks. If technology issues could not be solved over the phone, the vendors would have to send representatives to the banks, at cost, to fix the problems. Although vendors gained financially, there was little evidence of knowledge transfer from the vendor to the bank's IT staff, reducing the sustainability of the IT system over time.

Knowledge transfer is an essential component for ICT capacity building in developing world governments. Knowledgeable employees not only ensure that systems are properly operationalised but also ensure that the systems chosen are well suited to the tasks that governments wish to automate. A well-trained member of a government can also help identify whether or not applications recommended from vendors or donor agencies will actually meet the organisation's particular needs.

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[317] Mundy, 'IT in Developing Countries'., 49 and 52. See also Ahmed et al, 'Knowledge Management'., 17.
[318] Mundy, 'IT in Developing Countries'., 51.
[319] Abiodun w. Bada, 'Institutional Intervention in the Adoption of Computer-Based Information Systems (CBIS): The Case of the Nigerian Banking Industry', in *Information Technology in Context: Studies from the Perspective of Developing Countries* (Aldershot: Ashgate, 2000), 168–81.

The need for IT knowledge and capacity is not limited to civil servants; a lack of ICT capacity also affects the ability of individuals across a developing nation to interact with computers and online resources. As noted by Van Audenhove in his analysis of the shortcomings of AISI, many citizens in the developing world do not know how to use computers or even how to understand the language in which information is conveyed.[320] As Keakopa noted, the lack of any systematic and widespread public education programmes addressing computer literacy is another factor contributing to information system failure.[321] As mentioned earlier, in the author's experience ,many foreign donor ICT projects focus solely on implementing stand-alone systems, without regard to the capacity of users to access the system, understand its functionality, interpret the information or use it for their own ends. Mundy points out that end-user training in IT-based systems is an important part of the innovation process in developing countries: without appropriate training, people will be unable to benefit from IT implementation or exploit it in innovative ways.[322]

This lack of capacity can be especially problematic when ICT systems are implemented with the goal of promoting greater transparency and accountability because the developers of those systems presume the widespread availability of information via online portals and the ability of citizens to read as well as make use of that information this will be discussed in greater detail in the next section. Ultimately,

[320] AISI shortcomings were pointed out in Van Audenhove, 'Information and Communication Technology Policy'. Impact of the presumptions in ICT initiatives discussed in: Zuckerman, 'Making Room for the Third World'. Danish Dada, 'The Failure of E-Government in Developing Countries: A Literature Review', *Electronic Journal of Electronic Systems in Developing Countries* 26, no. 7 (2006): 1–10., 3.

[321] Keakopa, 'The Management of Electronic Records'., 250.

[322] Mundy, 'IT in Developing Countries'., 51.This point is also corroborated by Segomosto Masegonya Keakopa, 'Automated Records Management Systems in the ESARBICA Region', *ESARBICA Journal* 21 (2002) 41-48., 43.Ahmed and Stein, 'Science, Technology and Sustainable Development: A World Review'., 12.

the absence of knowledge transfer dramatically reduces the ability of citizens to assess and question government decisions and actions.

### *4.3.4 Cultural Constructs in Technology*

The majority of information technology solutions are designed and tested in developed nations, and they are informed by, and intended to address, specific issues or work processes informed by the core values and standards of the developed world.[323] There is an assumption that these core values and standards are similar, if not identical, to those of developing nations, and that the resulting technology is culture-neutral and transferable from the countries of creation to any other countries or regions around the world, as discussed earlier when examining the AISI policy in Section 4.3.1.

In reality, however, these cultural constructs may in fact complicate the usage of technology in the developing world, contributing to information system failure. Some scholars have argued that this belief in the transferability of technology is tied to the modernisation agenda (e.g. AISI).[324] But what this approach fails to consider is that technology is not neutral. Rather, as argued in this thesis, all technology is based on implied cultural constructs or cultural inscriptions. Technologies contain within them '[V]isions of (or predictions about) the world,'[325] including: '[I]nscriptions of how processes will be undertaken; of the values that people will have; of the structures in which they are to be placed and so on'.[326] Systems and computers are designed to help

[323] Christopher Westrup, 'What's in Information Technology? Issues in Deploying IS in Organisations and Developing Countries', in *Information Technology in Context: Studies from the Perspective of Developing Countries*, ed. C Avgerou and G Walsham (Aldershot: Avebury, 2000), 96–110., 97-98.

[324] Richard Heeks, 'Information Systems and Developing Countries: Failures, Success, and Local Improvisations', *The Information Society* 18, no. 2 (2002): 101-12., 107. Shields and Servaes, 'The Impact of Transfer'., 49. Mundy, 'IT in Developing Countries'., 50.

[325] Akrich, 1992 as quoted in Heeks, 'Information Systems and Developing Countries'., 208.

[326] Heeks, 'Information Systems and Developing Countries: Failure'., 104. See also Shields and Servaes, 'The Impact of Transfer'., 50.

individuals work in a specific way to achieve certain ends, such as better productivity or more efficient information retrieval.

For example, financial management systems are designed to enable accounting personnel to manage finances and retrieve information pertaining to expenses. Human resources software systems are intended to account for employees, track absences and vacations and track years of service to calculate pensions. Telemarketing software is intended to create sales efficiencies by tracking an employee's time spent on the phone, along with capturing data to support performance measurement. All these system features support developed-world notions of time and cost-effective business operations by rationalising work processes.[327]

The design-reality gap model posited by Heeks argues that when a user's needs are removed from the system's design process, the system will not be responsive to their needs. Computer systems are created by a designer based on their understanding of the needs of system end-users. During the design process, the designer operates on a certain number of assumptions, including the needs the system is addressing; the user's ICT skills; and the ability of the user to access and understand how to use infrastructure. By taking all these factors into account, the designer should be able to create a system that will enable the user to use and interact with it effectively to achieve desired aims.[328]

Most ICT systems are constructed around the notions of rationalism, efficiency, organisational hierarchy, speed and individualism.[329] The designer and user coming from

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[327] Dominique Van Ryckeghem, 'Computers and Culture: Cases from Kenya', in *Information Technology, Development and Policy* (Aldershot: Avebury, 1996), 154–70., 153.

[328] All the information in this paragraph is drawn from Heeks, 'Information Systems and Developing Countries: Failure'., 105.

[329] Per Lind, 'On the Design of Management Assistance Systems for SMEs in Developing Countries', in *Information Technology in Context: Studies from the Perspective of Developing Countries*, ed. C Avgerou and G Walsham (Aldershot: Ashgate, 2000)., 47.Majharul Talukder and Carmen Joham, 'A Multi-Perspective Cultural Study of Information Technology in Developing and Developed Countries', *International Journal of Business Innovation and*

the same geopolitical environment share a similar time and space and share similar ideas as well as understandings of the world, which could be deemed cultural proximity.[330] Thus, software systems and applications designed by developed world programmers for developed world users are usually successful provided they answer a need in the market. But that success is not necessarily mirrored when developed-world programmers design systems for developing world without taking into account the realities of that geopolitical environment.

The design-reality gap model argues that when user needs are not carefully considered at the point of system design, the transferability of ICT systems from one context to another becomes more difficult and failure becomes a significant risk.[331] International donors and developing world governments fail to recognise the latent cultural constructs that may not blend well with methods of work or organisational constructs within 'traditional societies.'

> [The] fundamental assumptions underlying many information technologies – such as the importance of speed, efficiency or the supremacy of numerical and statistical analysis over more intuitive, holistic approaches – are antithetic to the intrinsic values of traditional societies.[332]

Software programmes come with varying levels of cultural inscription, with some applications more heavily programmed with these biases. As mentioned, cultural inscriptions are presumptions built into the system about how work processes should be carried out based on specific understandings of time and personnel abilities.

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*Research* 3, no. 4 (2009): 402–24., 403. Shields and Servaes, 'The Impact of Transfer'., 50. Van Ryckeghem, 'Computers and Culture'., 153.

[330] Heeks, 'Information Systems and Developing Countries: Failure., 106.

[331] Heeks, 'Information Systems and Developing Countries: Failure'., 106. Heeks also uses the same method in Heeks and Bass, 'Changing Computing Curricula'.

[332] Quote is from Edward R. Roche, and Michael J. Blaine, eds. 'Introduction: Information Technology, Development and Policy', in *Information Technology, Development and Policy*, 1–17. Aldershot: Avebury, 1996., 2. This view is corroborated by Lind, 'On the Design'., 47.Talukder and Joham, 'A Multi-Perspective Cultural Study'., 403. Shields and Servaes, 'The Impact of Transfer'., 50. Van Ryckeghem, 'Computers and Culture'., 153.

Some researchers have argued that there are two types of cultural inscriptions, each of which affects the success of donor-funded technology initiatives differently. Design-imposing applications have 'deep inscriptions' such as financial and accounting systems or digital repository systems, which are heavily value-laden, thus demanding the presence of certain processes, skills, capacity and infrastructure for successful use.[333] For example, financial management systems need the presence of a certain type of IT architecture to operate these systems or a specific operating system. Further, financial management systems are heavily codified expecting users to input financial data in a specific way. As mentioned by Lind:

> [T]he methods for measuring financial performance are the most sophisticated and the most deeply entrenched. Accountants have been refining these methods [for] double-entry bookkeeping […] Today their codification is enforced by a vast institutional infrastructure made up of professional educators, public accounting firms, and regulatory bodies.[334]

Similar inscriptions exist in digital repository software as it presumes certain ways of acquiring, preserving and rendering access to records.

On the other hand, actuality-supporting applications, such as word processing applications, have 'shallow inscriptions'; they contain fewer implied cultural presumptions or requirements pertaining to system operation.[335] Nevertheless, even software with shallow inscriptions still makes assumptions regarding skills, infrastructure and work processes. However, because they are not rigidly programmed, these applications allow for some adaptation to local needs. In the end, the implied constructs that exist in different ICT systems play a determining role in the effectiveness of their roll-out.

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[333] Heeks, 'Information Systems and Developing Countries: Failure.', 109. Roche and Blaine, eds. 'Introduction'., 2.
[334] Lind, 'On the Design'., 41.
[335] Information from this paragraph comes from: Heeks, 'Information Systems and Developing Countries: Failure'., 109.

Latent cultural constructs and system design gaps are further reinforced during the ICT implementation process, since advisors and consultants involved in ICT implementation projects also incorporate their own cultural perceptions into the process.[336] The cultural assumptions behind consulting inputs, training and implementation planning can help to reinforce or even legitimise developed-world modes of thought. The impact of cultural constructs in technology is best exemplified in two studies and one anecdotal episode, discussed below. The first study, by Van Ryckeghem, examined computer usage in Kenya. The second study, by Mansaray, analysed the implementation of a trade statistics systems in West Africa. The anecdotal data comes from the author's experience working in Burundi and documents the stratification of computer access.

In the Kenyan study, Van Ryckeghem considered implied constructs such as efficiency through individual agency (functional rationality) and notions of time and examined how these concepts affected how well an IT system was utilised.[337] Individual agency refers to the user's ability to use their own judgement and choose how they will interact with the system. Functional rationality is the means and methods applied to realise an aim or a goal; these include promoting greater efficiency for financial gain. Notions of time are the way time is structured in applications; it is conceived as being linear and to be maximised to carry out many tasks in a limited amount of time.

Van Ryckeghem found that although computers did help improve efficiency to some extent, the social and hierarchical constructs incorporated into systems design prevented them from being used to their full potential.[338] Because computer systems

[336] Heeks, 'Information Systems and Developing Countries: Failure'., 106.
[337] All the information in this paragraph comes from: Van Ryckeghem, 'Computers and Culture'., 155. .
[338] All information in this paragraph comes from: Van Ryckeghem, 'Computers and Culture'., 159, 162 and 164-166.

rely to a great degree on individual agency, they encourage decentralisation of the work processes and personal decision making. This assumption did not transpose well into the Kenyan context, where there is a highly structured social contract between junior and senior staff members. Because senior staff members delegate tasks and junior employees execute them, the actual use of computers for data entry was segmented, reducing the efficiency intended by the applications. The work was segmented or fragmented because work processes that the systems designers assumed would be carried out by one individual, were in fact carried out by several. In this example senior staff would read data out to junior employees who would then input it into the system.

This type of highly formalised working structure reflects many African work environments, where deference is shown by junior officers to their superiors, who are responsible for delegating work tasks and assignments. As Van Ryckeghem notes:

> Within the Kenyan context … political, social and economic realities are interdependent, both internal and external to the workplace. Task division and hierarchical status – and hence specialization – are ritualized procedures which connect the African to the larger social world, and thus *encompass* the economic and the political spheres rather than *separating* one from them.[339]

In the Kenyan study, the use of computers was relatively successful by developed world standards in that it enabled greater efficiency, but its fragmented use did not permit the best utilisation of all the system's features. The highly stratified working environment caused difficulties in the project. System designers had not factored the need for multiple users to access the system at one time to carry out one specific task, like data entry. The study highlights a mismatch between Kenyan cultural and social constructs and latent structures within the computer programmes.

[339] Van Ryckeghen, 'Computers and Culture'., 165 [Emphasis in original]

The Kenyan study is reinforced by the author's anecdotal evidence from Burundi, where access to hardware was stratified. While the author was conducting field research in-country, she found that lower-level employees in government did not always have access to computers, whereas senior managers often had personal computers at their disposal.[340] It was generally understood that computers were seen as status symbols. Even though senior managers did not always know how to use the technology, they were given priority when computers became available. If administrative staff were permitted to access a computer, they were generally secretarial staff who worked for senior officials and were responsible for preparing correspondence.[341] When decisions about access to ICT resources are based on hierarchy, ICT initiatives are impeded: those employees who could actively use the computers to do government business do not have access to them.

The second case study involves the implementation of the Trade Statistic Information System by the Economic Community of West African States (ECOWAS). The intention of the ICT system was to streamline the collection of trade data at the national level, allowing the ECOWAS to compile accurate regional statistics. [342] The project encountered considerable difficulties in a number of areas, which weakened the efficacy and usefulness of the system. For instance, there was a lack of clarity regarding the roles and responsibilities of Customs and National Statistics Offices in the compilation of the statistics. Both agencies, at the national level, were collecting trade data and the Customs Officers did not want to reconcile the data against what was collected by the

[340] IRMT, *'Managing Records As Evidence'*, unpublished research notes.
[341] IRMT, *'Aligning Records Management',* unpublished research notes.
[342] Information from this paragraph comes from: Mohammed Lamin Mansaray, 'Managing Roadblocks to the ECOWAS Trade Statistics Network', in *Information Technology in Context: Studies from the Perspective of Developing Countries*, ed. C Avgerou and G Walsham (Aldershot: Ashgate, 2000), 248–63., 249.

Office of National Statistics in case there were significant discrepancies between the two data sets. As well, two regional agencies were tasked with project oversight, which resulted in competition between them to control the initiative. In addition the system used as part of this project had been based on a designer's worldview, which was removed from West African reality and needs. As noted by Mansaray, this worldview '[N]ot only overlooked the need for implementation context analyses, but also failed to take into account the data transmission interface problems…'.[343] Data was meant to be extracted from national trade systems and transmitted to a central server held at ECOWAS but there were interfacing problems which had not been accounted for in the original design of the system which meant data could not be transmitted.[344]

In the ECOWAS project, issues stemmed from a contentious political environment, but also from a failure by project planners and system designers to account for how toll data would be collected by customs officials and this resulted in poor data entry. This fact, coupled with the data transmission interface problems, meant that the design-reality gaps were not only about culture and work processes, but a failure by those implementing the system to take into account the technical environment in which the system was deployed. The ECOWAS trade statistics project exemplifies the problems of trying to transfer ICT systems into a developing nation context without taking into account the political, cultural and economic realities faced by these countries.

The design-reality gap in the projects outlined above is evident; we can see in both case studies the needs of end-users were not considered in the design of the systems. The projects also did not account for stratified work environments, contentious

[343] Mansaray 'Managing Roadblocks '., 254.
[344] This explained in greater detailed in Mansaray 'Managing Roadblocks'., 250-253.

political situations or data collection methods that were not in conformance with system functionalities. In Burundi, the stratification of computer access also illustrates the impact of the design-reality gap on work processes.

**4.4 Successful African Technology Initiatives**

Despite the failures discussed above, there have been some successful technology initiatives in Africa, particularly in urban centres. The literature seems to indicate that successful technology initiatives in Eastern Africa are predicated on the ability of these solutions to answer the needs of a low-resource environment. These solutions build upon initiatives intended to reinforce existing infrastructure, while at the same time circumventing current infrastructural problems. This section will examine cases of successful ICT implementation and consider the factors that have contributed to their success. As discussed below, the development of the wireless infrastructure in Africa has led to some of the most notable achievements in ICT implementation.

Over the past decade, there has been a significant push by international organisations to build up wireless information infrastructures in Africa, particularly in urban centres such as Nairobi and Arusha.[345] International agencies have assisted governments on the continent with the installation of phone masts and undersea cables to reinforce existing structures, improving access to the fibre optic networks.[346] The perception was that infrastructure building and widespread IT implementation would enable African countries to 'leap-frog' economically, enabling them to compete with developed world markets.[347] This infrastructure development has yielded success in the

[345] Hashmi, 'Mob Rule'. ,53. Williams et al, *Africa's ICT Infrastructure: Building on the Mobile Revolution*.,7.
[346] Hashmi, 'Mob Rule'., 53.
[347] Lopez and Vilaseca, 'IT as a Global Economic Development Tool'., 74. Hashmi, 'Mob Rule'., 53 Carlson Bernard, 'Diversity and Progress How Might We Picture Technology Across Global Cultures?', *Comparative Technology Transfer and Society* 5, no. 2 (August 2007) 128-155., 133.

establishment of regionally based technology industries, like the newly established technology sector in Kenya.[348]

Reinforcing the wireless infrastructure in Africa, a technology success itself, created the climate for another of the continent's most successful technology initiatives: the expansion of access to and use of mobile phones. Mobile phones have inexorably altered the way Africans interact with each other and with their governments, but the success of mobiles is not simply predicated on better infrastructure. In reality, the increase in the popularity of cell phones is a reaction to infrastructural weaknesses such as poor electricity provision, unreliable phone lines and the lack of affordable internet access.

At the turn of the twenty-first century, there were almost no mobile phones on the African continent, but at the time this thesis research was completed, nearly one in every two Africans possessed a mobile phone, and some people were willing to spend as much as 50% of their disposable income on the purchase of a cell phone.[349] A study on mobile phone ownership and usage in 2011 indicated that nearly 50% of all Africans and 92% of Kenyans accessed the internet or online resources via mobile phone.[350]

Many in the international donor community, along with a range of African scholars, contend that this technology, along with mobile phone applications (apps), will bridge digital divides and redress unequal access to online resources. The transformative effect of mobile technologies is increasingly highlighted in popular media too, such as in a 2012 BBC Worldwide piece that explained how farmers in Kenya use their cell phones

[348] Perry, 'The Silicon Savanna'., 44.

[349] Perry, 'The Silicon Savanna'., 44. Regarding costs see: Randy Spence and Matthew Smith, 'A Dialogue on ICTs, Human Development, Growth, and Poverty Reduction' (Publius Project, 14 June 2010), accessed 21 October 2011, http://publius.cc/dialogue_icts_human_development_growth_and_poverty_reduction/091109., 2. Ethan Zuckerman, 'A Response to "A Dialogue on ICTs, Human Development, Growth and Poverty Reduction"', 18 September 2009., 1.

[350] Perry, 'The Silicon Savanna'., 45.

to access information about cattle and seeds and how entrepreneurs in Ghana access the internet through their phones, when previously they were not even able to make a phone call using conventional telecommunications tools.[351] This ease of use and knowledge acquisition is due to the fact that the mobiles used by most Africans are simple (e.g. Nokia 1100) and do not require advanced technical skills, as with complex software programmes like financial or human resource systems.[352] To further underscore this point, a 2014 Pew Research Center study pointed out that traditional cell phones, like the Nokia 1100, still outnumber smartphones and of the 82% of Kenyans that had a mobile, only 19% had a smartphone.[353]

There are still varying levels of connectivity between rural and urban areas, but some researchers believe that cellular telephone technology will bridge the digital divide in African society and will thus be one of the most significant entry points to the African information society.[354] In particular, they argue that the increasing availability and ease of use of cell phones will enable those living in rural areas to remain connected with family, regardless of the remoteness of their location.[355] There are several reasons for this, namely cell phones enable users to eschew out-of-date infrastructure like poor or non existent phone lines and old copper wiring that cannot support internet connectivity.

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[351] Marieme Jamme, 'BBC - Future - Technology - Reinventing Technology in Africa for Africans', News, *BBC*, (10 August 2012), accessed 10 August 2012, http://www.bbc.com/future/story/20120810-reinventing-technology-in-africa.

[352] Perry, 'The Silicon Savanna'., 46.

[353] Pew Research Center., 'Emerging Nations Embrace Internet, Mobile Technology', *Pew Research Center's Global Attitudes Project*, accessed 13 February 2014, http://www.pewglobal.org/2014/02/13/emerging-nations-embrace-internet-mobile-technology/.

[354] Chilimo and Ngulube, 'Role of Information'., 146.

[355] Chilimo and Nugulube, 'Role of Information'., 146 and 151. See also Williams, Mayer, and Minges, *Africa's ICT Infrastructure: Building on the Mobile Revolution*.,6 In William et al they mention that the rural vs urban ICT divide is lessening and getting better. They contend that approximately 48% of the rural populace in Africa live in reach of a mobile network Spence and Smith, 'A Dialogue on ICTs'., 3. In this article they mention the transformative power of technology for promoting individual freedoms and democratisation.

One of the most notable innovations in mobile technology was the development of mobile banking apps or M-Banking, of which M-Pesa is probably the best known. M-Pesa (*M* is for mobile and *pesa* is Swahili for money)[356] was one of the first mass-mobile banking apps developed by the Kenyan based company Safaricom, in conjunction with the international company Vodafone with support from IBM and DFID.[357] This app allows people, especially the unbanked, or those that do not meet the parameters of the African banking system to be able to open a bank account,[358] to set up accounts for transferring money and paying bills. Some people even have their salaries deposited directly into their mobile banking accounts.[359] The evolution and uptake of mobile services and banking have facilitated the expansion of markets, businesses and public services.[360]

The proliferation of mobile phones, along with foreign aid initiatives to strengthen infrastructure such as wireless or fibre optic networks in order to promote technology penetration on the continent, have led to the establishment of several technology hubs: centralised areas for research and development. In East Africa, Kenya is seen by many as the focal point for new African-based technological innovations. In a *Time* magazine article on Nairobi, Perry explains that technologists, programmers and business people are starting to actively invest in Kenya's nascent technology sector. In 2010, entrepreneur Erik Hersman established the first iHub in Nairobi, a place where entrepreneurs, coders and technophiles could come together and work on technology

[356] Perry, 'The Silicon Savanna'., 44.
[357] Perry 'The Silicon Savanna'., 44. See also Ethan Zuckerman, 'A Response'., 1.
[358] The African banking system requires clients to deposit money at regular intervals to open a bank account and continue to use it. This is not possible for the vast majority of Africans who have temporary or seasonal jobs. For more information see Dr. Lennard Bangens and Bjorn Soderberg, 'Mobile Banking- Financial Services for the Unbanked' (SPIDER: The Swedish Program for ICT in Developing Regions, 2008).
[359] Chilimo and Ngulube, 'Role of Information'., 140. For more information about mobile banking issues and innovations, see also Bangens and Soderberg, 'Mobile Banking'.
[360] Spence and Smith, 'A Dialogue on ICTs'., 1.

issues[361] and develop solutions for developing world needs. These apps are locally based initiatives that seek to circumvent local conditions that prevent Africans accessing information and services such as connecting to the internet, making a phone call or opening a bank account.

Examples of applications developed in this way include M-Pedigree, which fights the proliferation of counterfeit medication, and Ushahidi, which documents instances of civil unrest.

Ushahidi was developed by Kenyan programmers in the aftermath of the 2008 elections, which were marked by pervasive violence and rioting. The Ushahidi system enabled Kenyans to document immediate instances of civil unrest by uploading updates via SMS text messages. [362] Since its development, Ushahidi has been used in a variety of contexts. For example, it has been utilised to monitor the integrity of Senegalese elections and share expectations about the use of environmental resources, such as with the Great Lakes Commons Map.[363] Ushahidi has recently expanded its operations and the developers are now building open source tools to '[C]hange the way information flows in the world and empower people…'.[364]

Like other mobile technologies, Ushahidi was born out of a specific need and was designed with an understanding of the constraints faced by citizens in Africa, including limited financial resources and poor technological infrastructures. Ushahidi capitalised on the power of mobile technology, along with the ubiquity of mobiles phones, making it popular not only across the continent but also around the world. In 2012, Ushahidi sought to circumvent local conditions with the launch of their newest product: BRCK.

[361] Jamme, ' Reinventing Technology in Africa for Africans'.
[362] Ushahidi, 'Mission', *Ushahidi*, accessed 5 September 2014, http://www.ushahidi.com/mission/.
[363] See www.ushahidi.com for more information. Accessed: 24 August, 2013
[364] Ushahidi, 'Mission'.

BRCK is a self-powered, mobile wifi device that enables users to access the internet in the absence of electricity. [365] The product was developed in response to the uneven provision of electricity in many African cities and it allows users to remain connected to the internet and continue working.

Proliferation of mobiles, development of apps and other technological innovations (i.e. BRCK) have all either been taken up to side step or developed in response to local conditions. They respond to an immediate need of African citizens and do not require sophisticated technological applications in order to gather information and get access to services.

**4.5 African Archival Research on Digital Records Management and Preservation**

The earlier sections of this chapter considered the impact of foreign donor policies on ICT systems implementation along with successful technology initiatives in order to contextualise the realities faced by African archival practitioners in the management and preservation of digital records.

Research and scholarship on digital records management in Africa has largely focused on the management of digital records in government and the impact of widespread ICT implementation on the creation and management of records. There has been little or no exploration of digital records preservation. This section examines current African discourse on digital records management in government and also reviews the available literature on digital preservation in Africa.

***4.5.1 Digital Records Management – Remit, Capacity and Finances***

The focus of African scholarship over the last 20 years has been on digital records management, an orientation that seems to coincide with the implementation of AISI

[365] See www.brck.com/ for more information. Accessed: 24 August, 2013.

policies and with increased computerisation in government. Much of the discussion has centred on several recurring themes, particularly a history of poor recordkeeping; weak archival remits; and a lack of resources and capacity. These explorations have been influenced to a great degree by the research and work carried out by the International Records Management Trust.

The Trust was created 25 years ago by Dr. Anne Thurston to build better recordkeeping systems to enable more efficient and accountable government operations, and to enhance the protection of human and civil rights.[366] One concern that has spurred the work of this organisation was the poor state of records management in Africa and its effect on government operations. African public recordkeeping has steadily worsened since the end of the colonial era, with the collapse of the colonial registry systems.[367] As countries gained independence from Britain or other colonial powers and developed their own government structures, records were not seen as a valuable resource that needed to be actively managed. As a result, few controls were imposed to regulate how records were filed, stored and maintained.

> In many ministries, files were simply opened in running sequence, with no classification or indexing system and no means of tracking file movements. The result is that policy was developed and implemented on an ad hoc basis and government officials suffered daily embarrassment as they were unable to respond when information was required of them. Nor were they able to monitor key state resources such as finance and personnel.[368]

Thurston's observations about the impact of poorly maintained records continue to be valid concerns, as corroborated by other practitioners and academics.[369]

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[366] International Records Management Trust ,'About The Trust | International Records Management Trust', accessed 7 September 2014, http://irmt.org/about.

[367] Alistair Tough, 'Records Management Standards and The Good Governance Agenda in Commonwealth Africa', *ESARBICA Journal* 22 (January 2003): 2–15., 3.

[368] Thurston, 'Records Management in Africa'., 190.

[369] Tough, 'Records Management Standards'., 3. Keakopa, 'The Management of Electronic Records'., 32. Luyombya, 'Framework for Effective Public Digital Records'., 35.

For many years research on the state of African recordkeeping was primarily concerned with management of paper records, although developed world archival scholars, such as Thurston, did highlight concerns regarding the creation and management of digital records. Government officials failed to see that records and data are the backbone of ICT. Computerisation and automation seek to make information retrieval more efficient, but ICT project stakeholders sometimes failed to consider how to structure the records in order to support retrieval and preservation. This weakness in records structures meant that records or data were not transferred from older systems to newer systems, resulting in gaps in organisational memory and diminished operations. [370]

Inaccurate and poorly managed data can undermine governmental work, including accountability and transparency initiatives. As Heeks noted, '[O]ften inaccurate data within computerised accountability systems is given credibility because of the perceived objectivity of computers. Computerisation can lead recipients to believe in inaccurate accountability information, thus undermining the process of accountability'.[371] In the researcher's experience, the ability of archivists to influence this process, thereby ensuring that ICT systems are well planned and effectively implemented, is reliant upon a strong remit for the archival agency within its government. Only with a strong records management responsibility can the archival agency participate in discussions about and influence decision making with regard to ICT projects.

[370] Kimberly Barata, F. Jochen Kutzner, and Justus Wamukoya, 'Records, Computers, and Resources: A Difficult Equation for Sub-Saharan Africa', *Information Management Journal* 35, no. 1 (January 2001): 34–42.,35-36.
[371] Heeks, 'Information Technology, Information Systems and Public Sector Accountability'., 209.

The issue of archival remit is an ongoing concern for scholars. Research findings from the first decade of the twenty first century indicate that national archives in Africa have difficulty engaging with government officials on recordkeeping issues because their remits are out of date or are not enforced. Research from 2010-2011 confirmed that the strength or weakness of the national archives remit has affected their ability to engage in digital records management, but the data also indicated that the position of the records and archives programme within government affected the perceived value and usefulness of the programme to support recordkeeping.[372] The result is that many African governments do not properly manage their records and the national archives do not have the ability to monitor the state of records management in order to ensure compliance with accepted records practices. As Keakopa notes, '[L]egal barriers (outdated legislation and lack of standards) have limited the view of electronic records and the justification of archival programmes to effectively participate in management of electronic records'.[373]

In 1995, the Directors of the National Archives in Commonwealth Africa acknowledged that little or no effort was put into the management of records from the point of creation to disposition.[374] Their ability, or inability, to influence recordkeeping practices in government inevitably affects the quality of digital records management. As governments continue to implement ICT systems, therefore, the current weak state of

[372] International Records Management Trust, 'Managing Records as Reliable Evidence for ICT/ E-Government and Freedom of Information in East Africa- Situation Analysis'. (International Records Management Trust, September 2011), http://irmt.org/portfolio/managing-records-reliable-evidence-ict-e-government-freedom-information-east-africa-2010-%E2%80%93-2011., 13

[373] Keakopa, 'Automated Records Management Systems'., 46, Also mentioned in Keakopa, 'The Management of Electronic Records'., 255 Nathan Mnjama, 'Archives and Records Management in Africa', *Information Development* 9, no. 1⁄2 (June 1993): 83–86., 83. IRMT, 'Managing Records - Situation Analysis'., 13 Patrick Ngulube and Vivian Fuh Tafor, 'The Management of Public Records and Archives in the Member Countries of ESARBICA', *Journal of the Society of Archivists* 27, no. 1 (April 2006): 57–83., 58.

[374] Justus Wamukoya, 'Records a Neglected Information Resource in Africa', *Records Management Journal* 5, no. 1 (1995): 15–22., 18.

archival influence may have an adverse affect on the quality of recordkeeping across Africa.

Scholars have also expressed concern about the lack of capacity and resources for digital records management across the region as many researchers have noted the availability of trained personnel to advise on digital recordkeeping is limited, presenting a significant impediment to digital record integrity. Poor staff capacity not only limits the ability of national archives to provide authoritative advice and guidance to government departments but also reduces the potential of archival agencies to meet their responsibilities for digital records management.[375] This limited capacity continues to be a problem, as confirmed by an IRMT study in 2011 on the East African Community's records management practices.[376]

According to the literature, capacity problems stem from both the lack of training at post-secondary institutions and the absence of professional development opportunities. As noted by Barata, Kutzner and Wamukoya, '[a] recurrent problem throughout the region with managing electronic records is training and education'.[377] The absence of knowledgeable archivists in the community means that there is a risk that digital records will not be properly maintained and may be lost.

Archives must also have the finances to pay for the infrastructure (i.e. hardware and software) required to maintain digital records once they are acquired. In 2006, Nugulube and Tafor surveyed members of the East and Southern African Regional Branch of the International Council on Archives (ESARBICA) regarding the state of public

[375] Barata et al., 'Records, Computers, and Resources'., 38. TheiIssue also discussed in Keakopa, 'Automated Records Management Systems'., 43 Patrick Ngulube, 'Implications of Technological Advances for Access to the Cultural Heritage of Selected Countries in Sub-Saharan Africa', *Government Information Quarterly* 21 (2004): 143–55, 148.
[376] IRMT, 'Managing Records - Situation Analysis'., 17.
[377] Barata et al., 'Records, Computers, and Resources'., 40.

records management. They found that many records management initiatives had failed because of inadequate funding; most respondents could not raise funds for projects and equipment.[378] This lack of resources echoes earlier discussions in section 4.3.2 on infrastructure and access to hardware, where it was shown that institutions could not sustain donor-funded ICT initiatives because of lack of finances.

Poor remit, lack of trained personnel and inadequate finances not only affect the management of records but can also have an impact on the ability of archivists in the region to preserve digital records in the long term. Although issues surrounding the creation and maintenance of digital records have been widely discussed in the literature, there has been little or no thought on the topic of digital records preservation. The next section examines the current literature on that topic.

### *4.5.2 Digital Records Preservation*

Even though the African archival community is cognisant of the complexities of digital records management, researchers and scholars have yet to study in depth the topic of digital records preservation. Some discussions pertaining to preservation have been tied to reformatting and digitisation, but most analysis of digital resource management comes from the digital library community. As Keakopa notes,

> [M]uch of the literature on archival and records management developments in the region […] have tended to focus on: the history and origin of archival services; problems of training; collection and preservation of oral traditions; problems of conservation and preservation of archival material in the region and budgetary provisions. Although archivists in the region have been concerned with automation, the main emphasis has been on adopting new technology without any clear strategy on how the region would get there.[379]

[378] Keakopa, 'Automated Records Management Systems'., 64 and 63, respectively. The issue of finances for digital records management also comes up in an article by Barata et al, 'Records, Computers, and Resources'., 34.
[379] Keakopa, 'Automated Records Management Systems'., 42.

This finding is corroborated by Ngulube, who observes that much of the emphasis in preserving digital records has been on institutionally oriented approaches, not on the development of regional and national strategies.[380]

In the author's experience, both when working with the IRMT and when speaking with colleagues in the region, she found that for a time, developmental initiatives saw digitisation as a first step towards automating work processes, but those projects often failed to consider the long-term viability of digital records. Furthermore, digitisation was seen as a way to decrease the amount of paper needed for government work, premised on the understanding that digital records were more efficient to retrieve and manage.[381] What foreign donors and senior government officials largely failed to understand, however, was that the process of scanning paper records results in the creation of large digital files, which must be managed effectively in order to ensure accessibility and stability over time. As Ngulube notes, '[H]uge digital files can also be expensive to store and difficult to transfer. The cost implications are often ignored by digital technology enthusiasts'.[382] Ultimately, digitisation becomes problematic when decision makers fail to appreciate the long-term investments needed to ensure the ongoing accessibility and integrity of digitised records. As yet, no cohesive strategy has been developed to guide African archival practitioners, across the continent or in any of the different regions, to support effective digitisation and the preservation of digitised records.

Some studies have examined the possible effect of government ICT strategies on digital records preservation in Africa.[383] Keakopa examined the implementation of ICT on

[380] Ngulube, 'Implications of Technological Advances'., 145.
[381] Joseph Tegbe, 'Telecoms Fees Impact Broadband and Digitisation in Africa | IT News Africa- Africa's Technology News Leader', accessed 2 November 2014, http://www.itnewsafrica.com/2014/07/telecoms-fees-impact-broadband-and-digitisation-in-africa/.
[382] Ngulube, 'Implications of Technological Advances'., 122.
[383] Richard Wato, 'Challenges of Archiving Electronic Records: The Imminent Danger of a "Digital Dark Age"' (presented

the continent in her 2008 paper. She studied obstacles to successful ICT implementation such as accessibility to technology and availability of trained personnel but she also examined how ICT has changed how information professionals in Africa interact with their users and with government.[384] In the end, Keakopa observed that most African archives do not have the capacity or the infrastructure to acquire and preserve digital records, noting in particular the impact of power cuts on the ability of national archives to retain digital records effectively and securely. She does make recommendations, such as improving the reach of ICT in rural areas, liberalising of the ICT market and creating a university research consortium; however, she makes no direct recommendations pertaining to the improvement of digital records preservation on the continent.

In another paper, Kenyan archivist Richard Wato highlights the disconnect between ICT professionals and the archival community,[385] surmising that this gap will have a negative effect on the availability of digital records in the future. Wato contends that IT professionals have a short-term view of digital information, failing to understand their long-term value and, therefore, the need to preserve them on an ongoing basis. Wato proposes several strategies to address digital preservation, including print-to-paper, migration and format standardisation; however, like Keakopa, he does not provide a direction for archivists to pursue; rather, he lists various digital preservation techniques.

A new discourse is emerging amongst digital librarians on the topic of institutional repositories. Van Wyck and Mostert examine the problems associated with

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at the XVII eastern and Southern African Regional Branch of the International Council on Archives (ESARBICA), Maputo, Mozambique, 2011).

[384] Segomosto Masegonyana Keakopa, 'Trends in Long-Term Preservation of Digital Information: Challenges and Possible Solutions for Africa' (presented at the Conference on Electronic Publishing and Dissemination, Dakar, Senegal, 6 October 2008), accessed 8 February 2015 www.codesria.org.

[385] Wato, 'Challenges of Archiving Electronic Records'.

creating institutional repositories in Africa, pointing to the high costs and suggesting that there has been some lack of thought about how to build trust amongst stakeholders.[386] While their focus is on institutions, not individuals, they do highlight some issues reminiscent of the concerns with digital records management, particularly the lack of staff capacity and skills.[387]

Wato, Van Wyck and Mostert wrote their articles in 2011, suggesting that digital preservation scholarship may be growing on the African continent. Still the focus has remained on identifying the barriers to digital initiatives, such as lack of capacity or financial resources and on tasks associated with the creation and management of digital records, not strategies for their long-term preservation.

**4.6 Conclusion**

This chapter has provided an overview of international development policies that have influenced and informed ICT system implementation in the developing world, particularly in East Africa. The modernisation paradigm has greatly influenced and continues to inform ICT project implementation in the developing world. Research shows, though, that this method of approaching developmental problems has resulted in more failures than successes. Various technology transfer initiatives have made some progress over almost 30 years, but the African continent still faces endemic corruption, poor health care, inadequate education opportunities and widespread poverty. Until foreign donor programmes incorporate strategies for addressing the impact of different constructs for culture, politics and economics, the ICT implementation initiatives they

[386] Brenda Van Wyck and Janneke Mostert, 'Towards Enhanced Access to Africa's Research and Local Content: A Case Study of the Institutional Depository Project, University of Zululand, South Africa', *African Journal of Library and Information Science* 21, no. 2 (2011): 133–44. 136.

[387] Van Wyck and Mostert, 'Towards Enhanced Access'. In the article they discuss the difficulty of finding skilled metadata cataloguers (139) and mention that the new Uniquely institutional repository, which received start up finding from the Andrew Mellon Foundation, may potentially encounter financing as there is some question as to whether there sufficient funds to ensure its ongoing operations (140).

support will continue to fail or, at best, have only moderate success. More strategic ICT system planning, based on the use of meaningful reality-gap assessments, may help address some of the issues encountered in ICT implementation projects.

To date, the most successful ICT innovations in developing countries have responded to local needs and realities. The proliferation of mobile phone technology, for example, has been a successful ICT initiative, providing the poor with an affordable and reliable communication mechanism that obviates the need for expensive landlines and removes the reliance on inconsistent electricity supplies. On the other hand, unsuccessful initiatives have often been the result, at least in part, of misplaced assumptions about the cultural neutrality of technology, as illustrated in the two case studies presented, one from East Africa and one from West Africa. The evidence seems to suggest that part of the problem lies not only with the implicit constructs in technology but also with the policies that have spurred technology implementation.

The African archival literature has identified many of the same challenges for digital records management and preservation as those encountered in ICT implementation in the region, namely poor infrastructure and an inability to access resources such as computer equipment and trained personnel. Unfortunately, at this point, the information management community does not seem well placed to inform ICT implementation to promote better digital records management or to support the long-term preservation of digital records.

Technology plays an important part not only in the creation of digital records but also in the capacity of the creators of those records to preserve them for the long term. Public records are essential evidence, helping to protect the rights and entitlements of government and citizens. When those records are lost or technologically corrupted,

there could be serious negative consequences for the rule of law, good governance, transparency and accountability.

Chapters 3 and 4 have presented the literature related to the thematic topics covered by this thesis, including archival theory and practice, history of TDR standards and technology transference. The following chapters present the data analysis, which help us to examine the research questions relating to the development and implementation of TDR standards.

# CHAPTER 5: TDR REQUIREMENTS AND CURRENT CONSTRUCTS

## 5.1 Introduction

Trusted digital repositories are more than just technological solutions. To be a trusted repository an institution must have in place the requisite trained personnel, infrastructure, finances and a clear regulatory framework. How these requirements are achieved in practical terms will vary. TDR standards (e.g. OAIS and RAC) were designed and tested to address developed world digital preservation needs (as will be examined in Chapter 7 using M1 (DW) data, but it is not known whether they can actually meet the realities faced by developed-world digital repositories (as will be examined using M3(DW) in this chapter). The design of these standards may in fact be based on an idealised implementation environment, which is an environment where finances are easily obtainable and where trained personnel and resources are widely available. This chapter considers whether and to what extent standards are a reflection of the realities facing digital repositories and thus are capable of helping them address their operational needs. This assessment will help to ascertain the level of compliance with TDR standards in established repositories in developed countries as a baseline to assess the usefulness of those standards in an East African context.

The analysis presented in this chapter is based on an assessment of the uptake of TDR standards in a group of case study repositories, helping to fill a gap in the archival literature on TDR standards. The archival discourse thus far has focused its attention on the history of TDR standards, on the notion of trust in relation to the care of digital records and on the need to measure trust in order to demonstrate the credibility and capacity of repositories to manage digital records. But little attention has been paid to

whether or how current TDR standards map on to the requirements of archival digital repositories, such as the need to maintain the integrity of digital records.

OAIS and RAC have greatly influenced the establishment of digital repositories and trusted digital repositories in many parts of the world, and the interview data gathered from developed-world repository operators suggests that these standards are almost considered a *fait accompli* when it comes to designing and planning digital repositories. However, there is little scholarly research into the actual implementation of TDR standards or evidence of the effect they are having on current digital repository constructs. This chapter aims to identify if there are gaps between the intent of TDR standards and the reality in the repository.

Section 5.2 examines the organisational structures needed to support TDR operations, including the role of enabling legislation and regulatory frameworks (5.2.1), personnel capacity (5.2.2), finances (5.2.3) and contingency planning (5.2.4). Section 5.3 looks specifically at some of the more technical elements of TDR operations, namely ingest and access. An analysis of selected requirements is carried out, in relation to the ability of case study digital repositories to operationalise these activities in each of their juridical contexts. Section 5.4 summarises the findings of the chapter.

Although the analysis in this chapter draws from both the OAIS and RAC standards, the breadth of and detail in each standard makes it impractical to conduct a complete examination in the space available. Such a detailed examination would also be very repetitive. Instead, a sample of TDR requirements were selected for consideration based on the major themes that emerged from the M3(DW) interview data, in order to focus on examples that best illustrate the capabilities of case study repositories to operationalise requirements. The requirements chosen are: remit and regulatory

framework; personnel capacity; finances; contingency planning; ingest; and access. These requirements were chosen for analysis in part by a review of the inputs received from digital repository operators during interviews. A complete list of the TDR requirements examined throughout this chapter can be found in Appendix A.

The case study repositories that form the basis of the discussion of this chapter are institutions from North America (Washington State Digital Archives), Scandinavia (National Archives of Norway and National Archives of Finland) and Europe (The UK National Archives).

## 5.2 Organisational Infrastructure

Organisational infrastructure is an integral component of TDR operations. Organisational infrastructure refers to the regulatory framework and non-technical structures that enable TDR processes. Infrastructure elements may include the existence of mandate documents such as archival legislation, mission statements and policies and procedures intended to give the repository the authority to manage digital records. Other elements include the availability of trained personnel, emergency planning and backup plans and the provision of financial resources. The different standards include different levels of guidance about organisational infrastructures: OAIS offers general advice, whereas RAC is much more specific. The analysis below highlights key sections of the standards related to organisational infrastructure and considers how they are applied in some of the repositories studied.

### *5.2.1 Remit and Regulatory Framework*

#### *5.2.1.1 OAIS and RAC Requirements*

Much of the organisational infrastructure required for trusted digital repository operations is assumed to derive from frameworks including an institutional remit – a

mission statement or mandate – and formal regulatory requirements such as policies and procedures that define TDR operations, providing the TDR with the formal parameters for preserving digital records. In order to assess whether or not this assumption in the standards is true, the regulatory requirements of OAIS and RAC are analysed below. Table 5.1 provides an overview of the relevant regulatory requirements in OAIS and RAC, which are then discussed in more detail.

**TABLE 5.1: SELECTED OAIS AND RAC REQUIREMENTS PERTAINING TO REMIT AND REGULATORY FRAMEWORK[388]**

| Requirement | OAIS | RAC |
|---|---|---|
| *Remit and Mission Statement* | ***2.3.1 Management Interaction*** 'Management provides the OAIS with its charter and scope. The charter may be developed by the archives but it is important that Management formally endorse archive activities.' (2-9)<br><br>Management should also support the OAIS in establishing procedures to regulate the TDR's operation and ensure that the repository is properly used and engaged by Producers as well as Consumers. (2-9) | At a very basic level, the definition of a TDR must start with 'a mission to provide reliable, long-term access to managed digital resources to its Designated Community.' (19)<br><br>3.1.1. The repository shall have a mission statement that reflects a commitment for the preservation of, long term retention of, and access to digital information. (21) |

OAIS offers a more high-level conceptual framework for TDR operations than RAC. It is therefore quite general in its stipulations concerning remit and regulatory framework, only requiring some level of management support for the digital repository. The RAC requirements are much more precise, requiring, for example, a specific mission statement that explicitly or implicitly calls for the preservation of information.[389] Yet there is no guidance in either standard on how to assess the adequacy of a remit. This is

[388] Page references for OAIS are based on the section numbering provided in the 2012 standard. For RAC it is based on the pagination of the BSI version of the standards.

[389] TC20/SC 13, 'Audit and Certification of Trustworthy Digital Repositories'., 21.

left to the judgment of the institution during a self-assessment and to the auditor during accreditation. As stated in Section 1.6 of RAC: 'Conformance to these metrics, as with all other such standards, is a matter of judgment'.[390] In the next section we will examine the applicability of the OAIS and RAC requirements for remit, in order to understand the realities of applying these standards.

*5.2.1.2 Remit and Regulatory Framework in Practice*

Three of the case study repositories have formal responsibility for the care and management of digital public records within their respective jurisdictions. These remits are detailed in their enabling legislation: The *Archives Act* 1994 (National Archives of Finland), the *Archives Act* 1992 (National Archives of Norway) and *RCW 40.14 Preservation and Destruction of Public Records* (Washington State Digital Archives). The UK *Public Records Act* 1958 (The National Archives) does not specifically identify digital records in its legislation, but it does interpret 'records' to include 'not only written records but records conveying information by any other means whatsoever'. [391]

At first glance the format of a public record does not seem problematic given that RAC stipulates that a remit may be implied, not explicit. There is disagreement among standards developers on this point, however. During the testing of RAC, some test sites were disqualified by RAC developers because they did not have a clearly articulated remit in place that tasked them with responsibility for the long-term preservation of digital records.

> [A]ctually the only place in our list that had a true mission out of those five/six places we went to that had a true mission as an archives, a long-term archive was [names institution] […] the other ones were all data centres and the way their mission was written was they were serving the scientists, […] but it was much more in the present. Now they all thought they were a long-term repository […]

[390] TC20/SC13, 'Audit and Certification of Trustworthy Digital Repositories'., 18.
[391] Government of the United Kingdom, *Public Records Act*, 1958. Section 1(1) and Section 10 (1), respectively.

> and that it was their mission and when you looked at the actual mission statement it wasn't and then when it isn't you have to look at whoever they are answering to what are they thinking.[392]

The question becomes, what constitutes an authoritative remit for OAIS and RAC, especially since RAC states that remit can be implied? A lack of clarity about what comprises remit may exclude organisations like TNA from becoming TDRs. Although having a remit is an important element in managing an archival organisation or a TDR, it should not be a required metric for evaluating repository operations; after all, remits, like policies and procedures or laws, can be created but sometimes they cannot be enforced.[393] The ambiguity of the concept of remit becomes quite problematic, especially as an articulated remit, in the form of a mission statement, mandate or charter, is supposed to serve as the foundational document for TDR operations.

Both OAIS and RAC have a limited definition of remit and neither standard includes substantive discussion on the role or impact of recordkeeping on the integrity of digital records or on their preservation. The standards simply provide a reference to ISO 15489.[394] However, the consensus in the archival profession is that archivists need to advise on the management of digital records from the point of creation to transfer in order to help protect the integrity of the records.

However clearly their remit is articulated, all the case study institutions do have a role in either advising or directly influencing digital records management. The different legislation in each jurisdiction allows varying degrees of archival control over

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[392] Interview 21, 19 October 2012

[393] International Records Management Trust, 'Managing Records as Reliable Evidence for ICT/ E-Government and Freedom of Information in East Africa- Uganda Country Report' (International Records Management Trust, September 2011), accessed 10 September 2013, http://irmt.org/portfolio/managing-records-reliable-evidence-ict-e-government-freedom-information-east-africa-2010-%E2%80%93-2011. In Uganda, an FOI law was developed in order to meet international donor requirements, however it was not enforced by the government and thus has not had any effect on citizen access to information or freedom of information in the country.

[394] TC20/SC13, 'Open Archival Information System- - A Reference Model.', 1-5, TC20/SC 13, 'Audit and Certification of Trustworthy Digital Repositories.', 83.

recordkeeping. Two specific approaches to recordkeeping control – direct and indirect – were examined as part of this thesis research.

The direct method is exemplified in Norway and Finland, where both national archives have issued functional requirement standards to control the creation of digital records in information management systems.[395] These functional requirements for recordkeeping systems – known as SÄHKE in Finland and NOARK in Norway – provide specifications for systems designers and vendors on the design of information management systems. These requirements dictate the types of security measures, metadata requirements and other digital information documentation elements that must exist in order for government information systems to produce digital records that have integrity and authority. Vendors in Norway and Finland are required to adhere to these standards before they can market their information management software to government ministries and departments.[396]

As the digital archivist for the National Archives of Finland stated: 'Typically in these [information management] systems we have strict functional requirements for records management systems [and] what kind of functionalities they should have in the process to produce those strictly defined metadata elements'.[397] Of the two standards, NOARK is the older, having been put into practice at the National Archives in the 1980s.[398] Mandatory compliance with NOARK and SÄHKE is recent, however, dating from 1999 (NOARK) and 2006 (SÄHKE).[399]

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[395] Interview 13. 21 September 2012 and Interview 14, 17 February 2013.

[396] Interview 13, 21 September 2012. Interview 14, 17 February 2013. See also for Norway: National Archives Service of Norway, 'NOARK 5'., 9.

[397] Interview 13, 21 September 2012

[398] Interview 14, 17 February 2013. Initially NOARK was intended to govern the operations of electronic registry systems particularly the police registry systems and statistical programmes.

[399] National Archives Service of Norway, 'NOARK 5.'., 9.Henttonen, 'Creating Recordkeeping Metadata'., 71Pekka Henttonen, 'A Comparison of MoReq and SAHKE Metadata and Functional Requirement Standards', *Records*

The direct methods used in Norway and Finland to control digital records production, and thereby help guarantee a record's integrity, may not be feasible for all institutions, but the approach does create a closer link between archival management and the processes of records creation and production. A further advantage in these Nordic models is that compliance by software vendors is mandatory, guaranteeing, to some extent, a standardised method for creating records and metadata.

The indirect approach to recordkeeping control can be seen in WSDA and TNA. The statute governing archives and records management services in the State of Washington assigns functions and powers to the state archives, but digital preservation and records management sit in two separate departments within the institution. In practice, the departments work closely together, and the strength of the relationship between the digital repository and the electronic records management unit helps to ensure that the integrity of digital information is maintained.[400] As the WSDA Digital Archivist noted, the relationship between records manager and archivist is important: 'I'm concerned with all archival records but with electronic I like to be involved from the beginning, from creation, so that we make sure that they're being arranged and managed in a manner that will make it easy to transfer them to the archives.'[401]

At The UK National Archives (TNA), the Information Management and Practice Division provides advice and guidance to government departments on records management and records transfers. Traditionally, departments have transferred records to TNA after 20 years, and the long gap between records creation and preservation

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*Management Journal* 19, no. 1 (2009): 26–37., 26.

[400] Interview 3. 18 and 19 July 2011.

[401] Interview 3, 18 and 19 July 2011.

raised the risk that digital records might be lost over time.[402] In order to address the preservation of digital records prior to transfer, TNA developed the *Digital Continuity* programme,[403] which involves sending an information management consultant (IMC) to work with departments to help develop digital continuity plans and to ascertain whether the proper measures are in place to guarantee the continued accessibility to and integrity of records until they come into the custody and control of the archives.[404]

In a few instances digital records are slated for immediate transfer to the archives, such as, in the TNA, with records of special commissions like the Leveson Inquiry on ethics and practices in the British media or special events such as the 2012 Olympics.[405] Unlike Norway or Finland, though, neither TNA nor WDSA have the statutory capabilities to compel compliance with any recordkeeping standards. Instead they must rely on the more indirect methods of guidance and persuasion to help ensure digital records are adequately managed.

Direct and indirect control over digital records management have different consequences, particularly when it comes to the transfer of records into digital repositories. The lack of a connection between the definition of remit and the need for recordkeeping controls to ensure the integrity of digital records may result in records lacking in authenticity and reliability. This oversight may stem from the origins of TDR

[402] In August 2013, TNA announced that it was changing its legislated transfer dates from 30 years to 20 years. See the following press release for more information: National Archives of the UK, 'Files from 1983 Released as 20-Year Rule Transition Begins | The National Archives', accessed 12 February 2015, http://www.nationalarchives.gov.uk/news/866.htm.

[403] Interview 10, 10 October 2011 and Interview 11, 14 September 2012. See also: National Archives of the UK, 'Digital Continuity Service | The National Archives', *Digital Continuity Service*, accessed 2 December 2013, http://www.nationalarchives.gov.uk/information-management/our-services/digital-continuity.htm.

[404] Interview 10, 10 October 2011 and Interview 11, 14 September 2012

[405] National Archives of the UK, 'Inquiry into the Culture, Practices and Ethics of the Press (Leveson Inquiry): Transcripts and Evidence', digital record(s), (2012 2011), LEV 2, The National Archives, Kew. National Archives of the UK, 'London Organising Committee of the Olympic and Paralympics Games: Publications', file(s), (2012 2004), LOC 6, The National Archives, Kew.

standards in the space data community, which was primarily concerned with the preservation of mission data not with the management of that data prior to ingest.

The existence of a formal remit – such as enabling legislation with clear articulation of digital records management – can have a major effect on the capabilities of case study repositories to influence digital records management, thus influencing the design and capabilities of digital repositories. OAIS and RAC use the existence of a remit as the first authoritative metric for measuring whether a repository can be considered 'trusted,' but as demonstrated in this section, there are ambiguities with the concept and application of a remit. Is simply having a high-level remit sufficient to qualify a repository for certification? What constitutes a certifiable remit? These points are not made clear in either standard, thus making it difficult to measure success accurately.

### *5.2.2 Personnel Capacity*

#### *5.2.2.1 OAIS and RAC Requirements*

In theory, one begins with the assumption that sufficient personnel with adequate training in digital records preservation will be essential to the successful operation of a TDR. There must be staff available to design the TDR, to ensure the system fulfils all its functional and administrative requirements for preserving digital records and support the ongoing administration and sustainability of a TDR programme. This section critically examines how OAIS and RAC address issues of personnel capacity and qualifications and how those requirements are fulfilled in the case study repositories.

The first finding of note is that OAIS does not address staffing specifically, so the analysis is limited to RAC. Figure 5.2 notes the sections in RAC related to personnel capacity and qualifications.

**TABLE 5.2: SELECTED OAIS AND RAC REQUIREMENTS ON PERSONNEL AND STAFFING**

| Subject of requirement | Open Archival Information System | Repository Audit and Certification |
|---|---|---|
| *Personnel Capacity* | No explicit requirement related to staffing. The standard as a whole implies the existence of qualified staff. | 3.2.1. The repository shall have identified and established the duties that it needs to perform and shall have appointed staff with adequate skills and experience to fulfill these duties. (23)<br><br>3.2.1.2. The repository shall have the appropriate number of staff to support all functions and services. (24) |

As noted, OAIS is entirely silent on the matter of personnel qualifications and training, although its wording and structure presume the existence of knowledgeable personnel capable of carrying out the functions delineated in the standard. RAC is much more detailed in its expectations, requiring repositories to identify staff roles and responsibilities and to ensure that the repository has enough personnel to support operations. Despite the level of detail provided in RAC, however it is still unclear what actually constitutes 'staff with adequate skills and experience', The explanatory note for 3.2.1.2 only states that a repository needs to: '[D]etermine the appropriate number and level of staff that corresponds to requirements and commitments'.[406]

To assess the applicability of this RAC requirement, the following section examines the levels of staffing at case study repositories and considers the challenges they face in ensuring they have enough trained staff to manage repository operations.

[406] TC20/SC 13, 'Audit and Certification of Trustworthy Digital Repositories'., 24.

#### *5.2.2.2 Personnel Capacity in Practice*

Overall the case study repositories have sufficient staff capacity to meet and even exceed their needs. All repositories studied have a number of staff with a high degree of technical expertise, as well as a number of records or archives personnel with technical knowledge serving in supervisory positions.

WSDA has eight staff members who play direct roles in the daily operations of the repository. One is a qualified archivist with experience in electronic records management. The remaining employees have backgrounds in aspects of information technology, such as database management, systems administration and programming. Established in 2003, WSDA was one of the earliest purpose-built digital repositories in North America, and it recruited individuals with technical expertise to design and operate digital repository systems that met institutional and user needs. The WSDA team designed AutoTodd, a software tool that automated ingest activities such as extracting information from hard drives and generating access copies of digital records. As explained by one interviewee:

> AutoTodd does then all the work [the Data Ingest Coordinator] used to have to do manually for that process. But we build the two tapes, you know, that we keep one in our vault here and one off site and then we dump it into there and immediately our image processors, this is our code that our developers have custom written…[407]

The custom-built systems developed at WSDA, like those mentioned by this interviewee, require that the institution secure and retain staff with advanced technical knowledge, a requirement that can become costly over time. Only a limited number of repositories will be able to follow this employment strategy. And even though WSDA was forward

[407] Interview 6, 18 July 2011. Similar expertise was demonstrated in Interview 3, 18 and 19 July 2011; Interview 1, 18 July 2011 and Interview 9, 19 July 2011. The necessity of properly qualified staff was mentioned in Interview 11, 14 September 2012.

thinking in its digital repository planning, the repository was originally designed to accept digitised records, not born-digital records, and WSDA has had to adapt its systems to accommodate born-digital materials. As such, WSDA created a storage system called the Holding Electronic Records Tank (HERT) intended to store digital-born records temporarily until it could dedicate the necessary resources to managing them.[408]

Like WSDA, the National Archives of Norway has a number of information technology specialists on the staff to oversee systems operation. Most of the IT staff have advanced training in XML programming, a critical capacity since the ingest process is built around XML schemas that enable the transfer of digital records from information systems to the digital repository. The Assistant Director for Digital Records worked for many years as a digital records manager, bringing knowledge of records management and archives business rules, which he incorporated into the digital repository to ensure it would operate according to community standards. Further, he regularly attends international archival conferences and sits on international committees dealing with the issue of digital records preservation.

The scale of the digital repository at the National Archives of Finland is smaller than at the National Archives of Norway or WDSA. The institution has four employees working in the areas of digitisation and digital records preservation. Finland's digital repository only recently accepted its first ingest in 2010: '[U]ntil few years ago we got first real stuff [digital-born public records] inside it was this taxation database'.[409] The staffing levels can be attributed both to government cutbacks and to the outsourcing of the digital repository IT architecture.[410] But it is also important to note that the

[408] Interview 1, 18 July 2011.
[409] Interview 13, 21 September 2012.
[410] Interview 13, 21 September 2012.

programme is fairly young and the number of records transfers small. The newness of the programme may be a reason that the institution does not have a large number of staff on hand to manage the repository and ingest processes, compared with more mature digital transfer programmes.

In the UK, TNA has nine staff members with IT and digital records preservation backgrounds. It was pointed out during one of the interviews with TNA staff that there is an absence of expertise in relation to the management of more complex records formats such as Computer Aided Design (CAD), Geographic Information Systems (GIS) or virtual reality formats.[411] In order to address technological and budgetary constraints, TNA has taken a much more pragmatic approach to preserving digital records.

> [I]t's CAD and it's GI mapping, it's these virtual reality games, you know, things. There's […] actually three public enquiries that uses […] virtual reality models […] so it's very important but it's also technologically difficult. I mean there are constraints because we don't have a huge budget and we don't have expertise in some of these more obscure areas […] we've got a small team and we've just got to operate within the constraints, technological and budgetary constraints we've got and do best and our best is by no means perfect.[412]

Most of TNA's records transfers are small, relating not to widespread departmental activities but to special events, inquiries or inquests. These transfers contain recently created records, which can include complex record formats, this explains TNA's need to engage staff with more technical expertise.

It could be argued, based on the TDR standards requirements, that the case study repositories examined have sufficient archival and technical expertise to support digital repository operations. However, as shown in the discussion of remit and regulatory framework, the question of what constitutes a 'sufficiently' staffed repository is unclear. What is apparent from the interview data is that digital repositories are hiring

[411] Interview 10, 12 October 2011 and Interview 11, 14 September 2012.
[412] Interview 11, 14 September 2012.

individuals with more advanced IT capabilities to facilitate repository operations, whilst archives and records professionals occupy management or supervisory roles. Archivists in these settings must have a high degree of IT knowledge so that they can explain archival principles and practices and also provide the IT context necessary to allow IT staff to translate those requirements in a digital environment. Nevertheless, the question remains: how will intervening factors, such as budgetary limitations, affect repository operations and their ability to hire qualified staff to meet their TDR requirements? The challenge to all repositories is to ensure the sustained preservation of digital records regardless of formats, even in constrained budgetary environments. The standards do not provide detailed guidance about the staff levels needed to address that requirement.

### *5.2.3 Finances*

Finances influence all aspects of TDR operations, from staffing and professional development to technical infrastructure and escrow management. How much money an organisation can devote to its digital repository will have a direct impact on the success of its operations. This section considers how financial requirements are articulated in the standards and how they are applied in the case study repositories.

#### *5.2.3.1 OAIS and RAC Requirements*

**TABLE 5.3: SELECTED OAIS AND RAC REQUIREMENTS ON FINANCES**

| Subject of requirement | Open Archival Information System | Repository Audit and Certification |
|---|---|---|
| *Finances* | **Establish Standards and Policies function** is responsible for establishing and maintaining archive systems standards and policies. It receives *budget* information and *policies* such as OAIS | 3.4.1 The repository shall have short- and long-term business planning processes in place to sustain the repository over time. (30)<br><br>3.4.2 The repository shall have |

| | | |
|---|---|---|
| | charter, scope, resource utilization guidelines, pricing policies from Management. (4-12 to 4-13) | financial practices and procedures which are transparent, compliant with relevant accounting standards and practices, and audited by third parties in accordance with territorial legal requirements. (30)<br><br>3.4.3 The repository shall have an ongoing commitment to analyze and report on financial risk, benefit, investment and expenditure (including assets, licenses, and liabilities). (31) |

The finance function described in OAIS only states that a repository will receive budget information; the standard provides no other requirements pertaining to the financial operations of a TDR. RAC, on the other hand, focuses on the importance of sustained reporting procedures that support transparent and accountable financial management. The existence of audited and analysed financial reports gives an overview of current finances, but these reports provide no indication of how much control a repository may have over those finances. Surprisingly, neither standard measures or assesses the level of budgetary authority the repository has- in other words its ability to set and manage budgets as well as generate and allocate revenues.

*5.2.3.2 Finances in Practice*

Based on the interview findings, there was no indication that any of the case study repositories were substantially lacking in finances, but in many instances they could not grow their operations. The financial concerns expressed by interviewees related to wanting to expand IT departments to support more complex preservation processes, or wanting to ensure sufficient resources were available to preserve different records formats. Much of the discussion about finances in the interviews did not touch on

expenditures associated to establishing a digital repository rather they were tied to ongoing repository costs. To examine this issue further the author analysed the available financial reports for the case study repositories. Only two (TNA and National Archives of Norway) of the four study repositories make their strategic and financial reports available online through the institutional website, and the National Archives of Norway repository was only available in Norwegian.[413] The other repositories compile financial or strategic reports, but they were not accessible to the author.

The most easily accessible reports were from TNA, which reported, for 2012-2013, that the archives had a budget of £34.7 million, with £11.9 million allocated to the digital preservation through 'Preservation and Protection' funding category.[414] In 2013-2014, the approved budget was £33.9 million, a reduction resulting from overall cutbacks in government funding. Of that amount TNA spent £12.5 million on 'Preservation and Protection'.[415] Despite this reduction in the overall budget for TNA, the 'Preservation and Protection' budget has risen by £600,000, which indicates a sustained financial and organisational commitment to the preservation of records, including digital records and information.

Although case study repositories are able to sustain their operations, they indicate in the interviews that they cannot expand them without external government support. As the volume of records grows and becomes more complex this limitation on funding may become problematic, particularly in an era of fiscal restraint in

[413] The annual and strategic reports available through the *Offentlig Elektronisk Postjounal* (OEP) such as the Arkivplan for Arkivverket pr. 31.12.2011. Information sheet that contains basic information about the referenced document: http://www.oep.no/search/resultSingle.html?journalPostId=3975498 To get a copy of the document you must order it.

[414] National Archives of the UK, 'The National Archives Annual Report and Accounts 2013-2014' (National Archives of the UK and Wales, 2014), accessed 16 August 2014, http://www.nationalarchives.gov.uk/about/our-performance.htm., 71.

[415] National Archives of the UK, 'The National Archives Annual Report and Accounts 2013-2014'., 71.

governments in many parts of the world. As such, for the time being archives have had to be both pragmatic and selective in their preservation interventions, some of which can be quite costly. One repository operator, for example, attempted to reduce the costs of digital preservation by arguing that no interventions should be undertaken at ingest. In other words records should be accepted in the original state of creation, they should not be migrated into other formats; rather, the institution would monitor the records and intervene if there was a potential the records might become obsolete or inaccessible.

> It's about…it's about being parsimonious, it's about saying – actually we are going to do […] nothing to this object at all, unless we have to for some over – riding reason. Because everything we do, doesn't necessarily cost us money in terms of processing time but it costs us money in terms of developing the system and process to do it and we don't want to do that.[416]

Given its resource limitations, this institution has chosen a strategic risk management approach to digital preservation, adopting a reactive, not proactive approach. Some repositories have sought to create revenue generation streams to offset operational costs.

In some instances, it may be necessary for archives to supplement institutional finances with funds from a sustainable revenue stream, in order to facilitate expensive digital preservation work. According to some repository operators, repositories need to build these revenue streams to support preservation and other repository activities: '[B]uild in a sustainable revenue stream because once the glory of being new or unique or whatever wears off, it takes money.'[417] Another repository suggested that their extra revenue allows them to operate at a sustainable level. '[W]e turn over a substantial number of millions […]we would be 10-15% smaller organisation without that

[416] Interview 10, 12 October 2012.
[417] Interview 4, 19 July 2011.

income…'.[418] The amount of revenue needed to sustain operations will ultimately depend on the complexity and size of the repository but there is also the very real possibility that repositories may not be able to generate sufficient revenue to offset costs.

The financial needs of digital repositories are operational and practical, focusing on ensuring that there is enough money to preserve records. The standards, on the other hand, emphasise reporting structures and regulatory framework that do not address issues of finances or on budgetary governance. The standards do not acknowledge the importance of ensuring TDRs can control finances, create revenue or measure their financial health in order to determine the success of the digital records preservation function. Further, the standards do not provide repositories with any authoritative measures to determine whether their financial operations are viable for the short-, medium- or long term.

### *5.2.4 Contingency Planning*

The purpose of contingency planning is, in theory, to ensure that the contents of a digital repository are secured in case of a disaster. Security is usually achieved through duplication and offsite storage of the contents of the repository. This section considers the OAIS and RAC requirements for contingency planning and then examines the actions taken by case study repositories, particularly in relation to backup creation and management, long-term planning, risk management and disaster recovery, in order to consider the relationship between the requirements and their application in actual practice.

[418] Interview 10, 12 October 2012.

*5.2.4.1 OAIS and RAC Requirements*

**TABLE 5.4: SELECTED OAIS AND RAC REQUIREMENTS ON CONTINGENCY PLANNING**

| *Subject of requirement* | **Open Archival Information System** | **Repository Audit and Certification** |
|---|---|---|
| *Contingency Planning* | **Disaster Recovery** function provides a mechanism for duplicating the digital content of the archive collection and storing the duplicate in a physically separate facility. (4-9) | 5.1.1 The repository shall identify and manage the risks to its preservation operations and goals associated with system infrastructure. (65)<br><br>5.1.1.2 The repository shall have adequate hardware and software support for backup functionality sufficient for preserving the repository content and tracking repository functions. (70-71)<br><br>5.2.1 The repository shall maintain a systematic analysis of security risk factors associated with data, systems, personnel and physical plant. (76-77) |

Contingency planning encompasses a variety of functions related to security, emergency planning and risk management. OAIS explicitly states under the 'Disaster Recovery' function that a repository should backup its contents and store them in a separate physical location. This process ensures that, in the event of a system-wide failure or natural disaster that compromises repository operations, the archival records can be reconstituted. The OAIS requirement is echoed by RAC 5.1.1.2, which requires that the repository has sufficient technology to support backups, preservation and tracking. RAC also addresses risk management as part of contingency planning, indicating, in requirements 5.1.1 and 5.2.1, a variety of tasks that repositories should perform to support risk and mitigation strategies. The following section details the realities faced by case study repositories in the area of contingency planning.

*5.2.4.2 Contingency Planning in Practice*

It is recognised that backups and offsite storage are an essential component in the administration of any IT system. Network administrators or other IT technicians can use backups to restore digital records that have been overwritten, corrupted or lost.

Two of the four case study repositories specifically mentioned in their interviews the existence of formal programmes for backing up digital records. Although the repositories all faced different challenges and followed different approaches in managing these programmes, two issues arose: first, the challenge of backing up large volumes of data and, second, the difficulties of managing backups in outsourced environments.

Although backing up digital records might seem to be a fairly simple process, the amount of digital data that needs to be copied can often become a challenge for IT administrators. In one instance, it took one institution up to 22 LTO 5[419] tapes to back up the contents of its digital repository. The effort, time and resources needed to complete such large backups meant that ensuring a timely capture was difficult.

> [S]o that's my crisis I'm working on right now, backups get 'em. We're doing really good on getting backups off the Storage Area Network, our production ones over to our spinning disk backups, it's jus getting them to tape I'm having problems with speeds aren't good enough, you know … you know it takes like two weeks to get those tapes built […] That's where I'm hurting right now.[420]

The scale of the backup process, and the need to ensure the timely duplication of vast amounts digital information, are common problems for digital repositories, especially as the volume of digital information created by governments continues to grow. Although copying large volumes of data is difficult, at least if the function is managed internally by

[419] Linear Tape- Open are a type of magnetic tape storage set. LTO 5s can hold up to 1.5 TB of data each.
[420] Interview 6, 18 July 2011.

the repository, it can retain control over the process and decide for itself the mitigation strategies it might pursue.

In one instance, however, a repository has outsourced its entire IT function, including backups, which means that ensuring the quality and timeliness of backups is technically outside of institutional control. However, the national archives in question has clearly defined its IT needs and expectations in a memorandum of understanding with the service provider, to guarantee performance targets were met.

> Yes we have defined very precisely what they have to do, how they do [it] and how they report it to us and what kind of service, if there are some network errors, for example about the accessibility of whatever and when they are reporting to us […] [U]pgrades for user operating systems or whatever they are doing, they are doing business as usual…[421]

The existence of a service agreement allows the repository to retain some oversight of the backup programme and confirm the integrity of system operations, but still the repository has no direct control over the actual backup process.

There are advantages and disadvantages to managing IT infrastructures, including backups, internally or externally. Managing a TDR's IT infrastructure internally results in increased costs as repositories must procure and maintain hardware and software to manage servers, backups and other services. This model, however, gives repositories direct control over IT services, meaning any problems that arise can be addressed quickly. Managing a TDR's IT infrastructure externally may offer cost savings but there are other risks involved, even with a service agreement or memorandum of understanding in place. The repository that outsources its IT infrastructure is not able to ensure direct quality control over processes such as backups, relying instead on the integrity and professionalism of the IT service provider. Essentially the repository is

[421] Interview 13, 21 September 2012.

reliant upon the provider to fulfil the requirements of the memorandum of understanding or service license agreement in a timely and efficient way.

While OAIS does not address the identification and management of risks specifically, RAC does include requirements to identify and mitigate risks (5.1.1 and 5.2.1). Only one of the case study repositories (TNA) published a risk register in their annual reports; therefore, while other repositories may well compile this information, it was not available to the author.

In the 2012-2013 annual report, TNA identified a specific risk related to the preservation of digital records, noting that 'Organisational pressures in our relationship with information suppliers, technology advances and the burden of handling more closed records, all associated with the risk in the increasing move to acquire near-contemporaneous records'.[422] This risk is common to many of the study repositories. Records creators often do not have the capacity to manage and retain digital records with their authenticity and integrity intact, and they often do not take steps to secure the records until the point at which they are actually required to transfer them into archival custody. As a consequence, digital records in the offices of creation are often neglected, especially if resources are limited, an issue that was addressed early on in the digital preservation literature but that has only become a practical concern in recent years.[423]

Acquiring recently created records changes traditional archival paradigms. Normally, archivists would wait until records were no longer of immediate use to the creating agency before accepting them into the archives. As one interviewee noted, '[A]nd the

[422] National Archives of the UK and Wales, 'The National Archives Annual Report and Accounts 2012-2013', accessed 16 August 2014,http://www.nationalarchives.gov.uk/about/our-performance.htm)., 44-45.
[423] Task Force on Archiving, 'Preserving Digital Information'.

essential characteristics […] is that they are not 30 years old, they're not 20 years old, they're 20 weeks old, you know. We're taking records very soon after they are created and not some old historical thing, they're new stuff'.[424] But now some case study repositories are actively encouraging earlier digital records transfers to mitigate neglect and address the lack of creator resources. As one interviewee said,

> [I]n practice we are attempting to encourage them to deposit digital material very very much earlier. […] There's a cliff somewhere in between the two [10 to 30 years] in my view and so we're very, very keen to see the material come to us early. But we can't mandate it, so we have to negotiate.[425]

Early intervention does bring with it, however, certain risks and costs, especially with regard to resource allocation and strategic planning. For example, one case study repository received an unexpected records transfer which doubled their holdings from approximately 34 million to 74 million records.[426] Large, unexpected digital records accessions can also affect the ingest process because systems may not be able to cope with the larger number of acquisitions.

OAIS and RAC do not address issues such as early intervention in digital preservation, nor do they offer anything more than general guidelines for assessing contingency planning measures. At most, the two standards only require the existence of policies, procedures, risk assessments or backup strategies. For example, OAIS only indirectly deals with outsourced IT infrastructures in its discussion of federated archives (institutions that have come together to create economies of scale or to share resources).[427] And RAC offers no guidance on issues such as outsourcing.

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[424] Interview 11, 14 September 2012.
[425] Interview 10, 12 October 2012.
[426] Interview 7, 19 July 2011.
[427] TC20/SC13, 'Open Archival Information System- - A Reference Model.', 6-2 and 6-9. TC46/SC11 Archives and Records Technical Committee is in the process of developing a standard for Third party Trusted Digital Repositories, which will deal directly with the requirements for outsourcing IT infrastructures for TDRs.

In reality, most of the contingency planning challenges and risks being addressed by the case study repositories fall outside the scope of what is covered in the standards. It is worth highlighting some of these risks and challenges in order to consider how the case study repositories, and other archival institutions around the world, are addressing them in relation to the overall requirement for adequate contingency planning.

Security risks are a concern for many of the case study repositories, even though the OAIS and RAC standards offer only general guidance about identifying and analysing security and other risk factors. Of prime concern is the need to prevent illicit access to the TDR and to ensure the integrity of ingested records. IT security plans and strategies have been developed in tandem with IT departments or have been built on the institution's other IT security policies.[428] Some repositories have used ISO's IT security standard (ISO 27001) to help them build secure information technology architectures to protect the contents of their repositories: 'We took into consideration other aspects, other ISO standards that had to do with data security and so on'.[429] Another method employed by some repositories is consulting with ministries, agencies and departments that oversee government-wide system security requirements and building on those requirements for digital records systems. The end result is that the repository may incorporate government-mandated security measures to mitigate the risks associated with illicit access (i.e. hacking) while strengthening the mechanisms in place to protect records from tampering. As one interviewee noted, '[W]e get security advice from […], a government electronic securities organisation and we follow their standards a lot…'.[430]

[428] Interview 14, 17 February 2013 and Interview 6, 18 July 2011.
[429] Interview 14, 17 February 2013.
[430] Interview 11, 14 September 2012.

All the repositories use some type of security measures to protect the integrity of the records during the transfer process. For instance, some repositories use secure networks (i.e. SFTP) to receive transfers, whereas others received records over encrypted High Density Drives (HDD) or external hard drives. One repository that accepts external hard drives as part of the ingest process has implemented stringent security measures to guarantee that the drives have not been tampered with in transit.

> These hard drives were always security tagged. We had a security tag on it so that there would be a chain of custody as far as the data was concerned. We'd send a security tag when we sent it to make sure that they knew that we had formatted it and that it was totally empty and that when they got it they security tagged it. [431]

Upon receiving records, this and many other repositories also follow rigorous verification processes such as double virus scanning. Repositories also use checksums, an alpha-numeric representation of a digital record, to ensure that the contents of a transfer have not been altered. While this process can be time consuming, one interviewee argued that '[O]ur data integrity here has to be top, you know…'.[432] Incorporating integrity controls into the system and into the transfer process is seen by many repositories as a concrete way to meet or exceed the contingency planning requirements identified in standards such as OAIS and RAC.

In sum, case study analysis shows that, in the area of contingency planning, the repositories are looking far beyond the general and limited requirements of OAIS and RAC in order to address a broad range of challenges with data security and risk management.

[431] Interview 5, 18 July 2011.
[432] Interview 5, 18 July 2011. Similar verification process was used at another repository see Interview 11, 14 September 2012.

## 5.3 Ingest and Access

Two core functions of a Trusted Digital Repository are ingest – the process of receiving records into the repository – and access – the process of making records available for use. While preservation is also considered a core function, it was found during the interviews that respondents focused more on processes for preparing records for transfer and accepting them into the digital repository system than they did on the management of digital objects once in the repository.

### *5.3.1 Ingest*

The ingest process is one of the most challenging aspects of operating a digital repository. Ingest involves preparing digital records transfers so that they can be formally taken into the digital repository; it is the first step to preserving digital records for the long term.

In the paper world, archives were received – i.e. "ingested" – through the process of accessioning, involving the physical transfer of materials and the formal acknowledgement of receipt. In the digital world this process of accessioning has been replaced by the process of ingesting digital records, which involves exporting records and metadata from their original systems, validating them to ensure they have not been corrupted as part of the transfer into the digital repository, then actually accepting them into the repository.

This section provides a high-level overview of the expectations of the OAIS and RAC standards in relation to ingest and examines the practices of the case study repositories.

*5.3.1.1 OAIS and RAC Requirements*

**TABLE 5.5: SELECTED OAIS AND RAC REQUIREMENTS ON INGEST**

| Subject of Requirement | Open Archival Information System | Repository Audit and Certification |
|---|---|---|
| *Ingest: Acquisition of Contents* | **2.3.2 Producer Interaction** defines that OAIS and Producers should develop submission agreements to define how information will be submitted to the repository and at what interval. (2-9 to 2-10)<br><br>**3.2.1 Negotiates and Accepts Information** a mandatory responsibility of any TDR, to determine what types of information will be submitted and preserved by the repository. (3-2)<br><br>**3.2.2 Obtains sufficient control for preservation**. This requirement deems that the OAIS must ensure when information is transferred they have legal authority of the digital records and are not infringing any copyright or intellectual property. Rights over digital acquisitions must clearly be granted to the OAIS, as well as any limitations placed by the Producer. (3-2 to 3-3)<br><br>**4.1.1.2 Ingest functional model** details all the requirements related to the ingest function which includes: receiving submission and quality assurance, which is to ensure that file transfer errors have not occurred during transfer of SIP. (4-5 to 4-7) | 4.1.1 The repository shall identify Content Information and the Information Properties that the repository will preserve. (37)<br><br>4.1.3 The repository shall have adequate specifications enabling recognition and parsing of the SIPs. (39) |

OAIS has quite a few generic requirements that touch on the ingest process, which cover the interaction between producers (i.e. records producers) and the repository. In particular there is the expectation that the repository can establish standardised transfers at regular intervals. OAIS 4.1.1.2 and RAC 4.1.3 echoes OAIS 2.3.2 requirement by designating that ingest packages (SIPs) must have sufficient information to allow

them to be recognised and processed by the system. In reality the ability of case study repositories to meet these requirements is dependent upon the recordkeeping controls exerted on the records from the point of creation. As previously mentioned, neither standard discusses the need for or impact of recordkeeping controls on repository functions.

In the end recordkeeping controls will not only affect the ingest process but also the ability of repositories to define information properties for an ingest (RAC 4.1.1) and their ability to gain sufficient control of digital records for preservation (OAIS 3.2.2).

*5.3.1.2 Ingest in Practice*

Distinct differences are observed in the ingest processes used by the case study repositories, depending on whether the repositories followed indirect or direct recordkeeping methods, introduced earlier. WSDA and TNA can be defined as indirect recordkeeping institutions, whereas Finland and Norway national archives can be defined as direct recordkeeping institutions. In this discussion, the benefits and drawbacks of each approach is considered in relation to their impact on the process of ingest.

The indirect approach has its advantages, as records producers are not required to manage their records in a specific fashion or conform to stringent transfer procedures, such as exporting digital records with a detailed set of metadata. The repository must undertake much more curation, however, in order to prepare records for transfer, including supplementing or correcting existing metadata. WSDA does not have any metadata requirements for born-digital records. WSDA simply ingests the

records with whatever metadata can be supplied by the creating agencies.[433] These records are then placed in a holding area within the digital repository until the repository has the resources and capabilities to manage them.[434]

TNA best exemplifies the challenges of an indirect recordkeeping approach. The institution has to interface with up to 250 different records producing agencies, each of which maintains records in its own systems with varying levels of metadata. TNA only advises on recordkeeping good practice and cannot compel government departments to adhere to standards, nor can TNA demand that departments export records in a specific format with preset metadata elements. As a result, TNA is not able to automate its ingest practices, as mentioned by one TNA interviewee: 'You're trying to juggle […] we interface with 250 different institutions […] at ingest. There is no way we can seriously automate that interaction, you know, it's just not gonna happen so we shouldn't attempt it'.[435] Despite this reality, TNA does have seven mandatory metadata elements that must be received at ingest (title, identifier, date, file/folder, checksum, copyright and closure) but these seven elements only provide a limited amount of contextual information about record transfers.[436] In practice, TNA will accept other metadata elements, depending on the system used to generate and manage the records. As a result TNA must assess on a case-by-case basis which elements will be needed at transfer. Streamlining the ingest process is difficult, given the number of manual interventions required.

[433] Interview 1, 18 July 2011.
[434] Interview 1, 18 July 2011.
[435] Interview 10, 12 October 2011
[436] National Archives of the UK, 'The National Archives - Homepage', *The National Archives*, accessed 16 August 2014, http://www.nationalarchives.gov.uk/information-management/manage-information/selection-and-transfer/digital-records-transfer/digital-transfer-steps/. The seven fields are: title, identifier, date, file/folder, checksum, copyright and closure

> Interviewee 10: …again it's back to the fact that most of the issues aren't to do with the preservation, they're to do with the cataloguing, the manipulations…
> AS: …so the processing…
> Interviewee 10: …the processing of the data. So is the metadata in? Is the metadata coming in, in lots of varied forms? Is the catalogued metadata in lots of varied forms? Or is it in one relatively standardised form? Is the data itself coming as file systems? Is it coming in on tapes? […] All these things vary and you have to construct elements to the system that cope with that variation.
> AS: So it's almost streamlining…
> Interviewee 10: …streamlining is the essence of it.

The amount of work TNA must perform once a transfer is received slows down the ingest process even more, highlighting the problems that arise when insufficient recordkeeping and metadata controls exist at the point of record creation.

The indirect recordkeeping method does have some advantages for ingest. In particular this approach allows repositories to be more flexible in their acquisition of digital records because they do not have demanding metadata schemas for ingest.

The direct approach to controlling recordkeeping processes in government systems may seem ideal, but there are strengths and drawbacks to this method as well. The records management functional requirements used by the National Archives Services of Norway and Finland support a more cohesive and regimented digital records creation environment. These standards require that the government information systems export digital records in a standardised fashion with a set of metadata elements, which must match a pre-determined set of metadata fields required by the national archives.[437] If metadata exports do not conform to the ingest schema, parsing errors may occur, resulting in the rejection of the transfer.

It could be assumed that because records creation is standardised, the resulting ingest process should be simplified. After all, information management systems would

[437] Interview 14, 17 February 2013.

all be creating the same metadata fields, facilitating the preparation of packages and the automation of the ingest process. In practice this is not the case in either Norway or Finland.

In Finland, the stringent application of the SÄHKE has actually prevented digital records transfers from government departments to the digital repository because departments have not been able to prepare transfers according to preset requirements.[438] Since the ingest process is automated, the metadata exports from government information management systems need to conform to the SÄHKE requirements. As one interviewee points out:

> [B]ecause basic principle is that this process [ingest] must be very automatic, when is produced in right way, in right form then we accept it and put it and we don't do anything to it, so it's automatically in the right structure in the archives, to be preserved it permanently as is. So, in this sense the key challenge is to guide the producers that way and to indicate them certain guidelines and help and best practices and this kind of stuff.[439]

Thus even when there are functional requirements standards in place, issues still arise with ensuring the consistent application of these requirements in practice.

In Norway, lack of compliance with NOARK has meant that ingest packages have not been properly generated, resulting in parsing errors and processing backlogs. One transfer resulted in tens of thousands of pages of parsing errors because the government department had not properly applied NOARK: '[W]hen you do this parsing that's so complex and you detect like one million errors and […] the employees of the section learned that when they are doing this parsing, XML parsing, they detect […] in

[438] Interview 13, 21 September 2012.
[439] Interview 13, 21 September 2012.

some of the submission we got like 42,000 pages of error report'.[440] The time required for processing archivists to locate and fix all these errors would be prohibitive.

Both the direct and indirect approaches to records management have posed significant problems for case study repositories at the point of ingest. While standardising the ingest process, as done in Scandinavia, means that the process can be automated and can allow repositories to accept larger volumes of records, it will still only be successful if records producers comply with functional requirement standards.

The use of indirect recordkeeping methods means that repositories such as TNA and WSDA must be less stringent in their ingest requirements. As a result, repository staff then have to spend significant amounts of time doing metadata quality control in order for the records to be properly ingested into the system adequately. Moreover, non-standardised approaches mean that repositories must develop different ingest processes on a case-by-case basis, which draws on staff time and organisational resources. As the size and frequency of ingests grows in future, these less stringent methods may not be scalable. Essentially, the direct and indirect approaches affect not only the amount of work required at ingest but also impact how repositories can comply with OAIS and RAC.

### *5.3.2 Access*

Access is another key feature of trusted digital repositories. Indeed, repositories exist not just to preserve digital records but to make them available to users, whether academics, students or the general public. Access is the outward-facing component of the digital repository and the main service to users. Both OAIS and RAC have sections that deal with digital repository access and delivery methods to users.

[440] Interview 14, 17 February 2013.

*5.3.2.1 OAIS and RAC Requirements*

**TABLE 5.6: SELECTED OAIS AND RAC REQUIREMENTS PERTAINING TO ACCESS**

| Subject of requirement | Open Archival Information System | Repository Audit and Certification |
|---|---|---|
| *Access* | **2.3.3 Consumer Interactions** explains how the OAIS will interact with consumer (e.g. users) and the types of activities this interaction will engender. (2-10 to 2-11)<br><br>**3.2.6 Makes the information available**. Another requirement of an OAIS which is that it will make its information available via DIP to users, upon request. (3-6) | 4.6.1 The repository shall comply with Access Policies. (61) |

The OAIS and RAC requirements include provisions related to end-user access to the contents of the repository. Essentially the standards require that repositories make records available upon request, according to the access policies established by the repository. The RAC explanatory statement for 4.6.1 indicates that access provisions will be contingent on the repository's mandate but can include: '[S]tatements of what is accessible to which community, and on what conditions; requirements for authentication and authorisation of accessors; and enforcement of agreements applicable to access conditions…'.[441] However, the realities faced by case study repositories differ from the requirements set out in the two standards.

*5.3.2.2 Access in Practice*

Three of the four case study repositories have a web interface for accessing digital records. The one repository that did not had only just received its first acquisition of digital records; however its parent organisation does have a web portal for digitised

[441] TC20/SC 13, 'Audit and Certification of Trustworthy Digital Repositories'., 61.

archival records.[442] During the course of data collection interviews, several respondents pointed to a major issue that has complicated their ability to provide access to digital records online: privacy.

Digital records may be received into the repository with large or small amounts of metadata. One of the metadata elements that might be included is information about the level of sensitivity of the records or any privacy or access requirements that must be met. Case study repositories have relied on producers to provide them with information on privacy and access restrictions. As one practitioner stated:

> I don't act as gatekeeper to records that are online so I really need to know what the restrictions are and, you know, besides […] [for] things like that for educations records, for health records, […] [we have] 300 categories of public disclosure exempt information, so I really depend on the agencies to let me know what their records restrictions are.[443]

Managing privacy effectively while providing access would require repositories to have a detailed understanding of the contents of digital records even down to the item level. In the paper domain, access restrictions could be set at the file level, but digital records are often made available through archival portals at the item level. Websites holding digital records are often crawled by search engines like Google, making the digital records much more discoverable but also opening up archives to possible privacy breaches, if records producers and/or archivists have not been diligent in identifying restricted or closed materials.[444]

The acquisition of near contemporaneous records, discussed above, will likely exacerbate the challenge of protecting privacy. Very recent records may be

[442] Interview 12, 21 September 2012. The interviewee details the digitisation and access of archival records for this national archives.

[443] Interview 3, 18 and 19 July 2011. Also discussed in Interview 10, 12 October 2011 and Interview 11, 14 September 2012.

[444] Tim Gollins, 'The National Archive Sensitivity Review by Tim Gollins', accessed 28 September 2014, http://www.slideshare.net/ITaaUn/i-taa-u20conference20digital20sensitivity20review20v005-36503304.

inappropriately released through archival websites, or the repository may have to hold considerable quantities of information in storage before releasing the records, which may stretch already limited resources. Nevertheless, the repository must provide information to users if access requests are made under Freedom of Information or Access to Information laws.

> [T]here are problems of sensitivity which relates to the security side with paper records it's very easy to see what's sensitive and what isn't because you get files with titles of them but digital records are very granular […] it's much more hard to identity sensitive material and then increasingly we've got complex issues of freedom of information so we have to build a system that enables us to keep records closed but if somebody submits a freedom of information request then we've got to be able to deliver a copy of that record…[445]

As this interviewee notes, there is a perception that identifying personal or sensitive information is easier in paper files than in digital records. This perception could arise because digital records are sometimes poorly organised, which means identifying sensitive records may be difficult and may become even more complicated when dealing with large volumes of data. Some case study repositories have restricted access according to time frames or have only allowed digital access through computers located on their premises.

> AS: Okay. Now, what type of images do you actually restrict? I know you're scanning material but why would you restrict a scanned image?
> Interviewee 12.i: Personal registers. […] Like church books. So we have a…we have to restrict the use of 100 to 125 years […] people don't have to login but they have to be at our archives, they cannot be in the internet.[446]

Even though access to digital records is a vital component of archival service, and is the *raison d'etre* of any digital repository, the increasingly complex ICT environment presents challenges to the task of balancing access and protection.

[445] Interview 11, 14 September 2012.
[446] Interview 12, 21 September 2012.

Neither OAIS nor RAC touch on these problems of access; rather they simply stipulate that access must be rendered; that the parameters for access should be detailed in an Access Policy; and that there should be reasonable enforcement of requirements and conditions[447]. However, the standards do not provide an explanation of what constitutes meaningful enforcement and whether that meaningful enforcement is within the capabilities of the repositories. Neither OAIS nor RAC recognise the complexities of attempting to render access to sensitive records. In the author's experience, presenting redacted versions of records is a challenge, even for the most sophisticated of repositories. The standards do not provide guidance about what 'meaningful enforcement' would look like.

Instead, the standards are more concerned with search feature and capabilities. For instance, OAIS's Consumer Interaction, the module which governs repository-user interactions, speaks only of how a consumer can order digital records and how to refine search criteria.[448] RAC stipulates that the repository must have access policies but does not provide any guidance about how to measure and monitor access practices. The inappropriate release of personal or confidential information can have serious repercussions and opens the question of whether a repository that cannot guarantee respect for privacy provisions can in fact be considered 'trusted.'

**5.4 Summary**

This chapter has examined some of the core requirements of two TDR standards, OAIS and RAC, and considered the practicalities of implementing those requirements in the four case study repositories. The requirements examined included organisational infrastructure, specifically archival remit, regulatory framework, personnel capacity,

[447] TC20/SC 13 'Audit and Certification of Trustworthy Digital Repositories' 1-4 and 4-25
[448] TC20/SC13, 'Open Archival Information System- - A Reference Model'., 2-10.

financing and contingency planning. In addition, the chapter included an analysis of the practical application of requirements related to ingest and access. The purpose was to determine the extent to which the requirements set out in OAIS and RAC meet the needs of institutions establishing digital repositories in developed country contexts.

The analysis demonstrated that there were significant gaps between the expectations articulated in the standards and realities of digital repository operations. In most instances the standards do not provide sufficient detail to determine whether a repository would meet a particular requirement. For example, the standards do not provide a concrete measure to determine what would constitute an authoritative remit; what is meant by 'sufficient' levels of technology or staffing; or what steps must be in place to ensure ingest is performed effectively. Although some may argue that this is not the role of standards to provide this level of detail about how to achieve compliance, one must ask if such additional information ought not to be included. If the purpose of a standard is to provide a measure for best practice, there should be more information on how repositories can begin assessing their operations in order to comply with that best practice requirement. Moreover, there is in fact little guidance within the digital preservation community about how to create the necessary structures for a trusted digital repository. Whether within standards themselves or within supporting documentation, there needs to be clearer guidance about how to comply with the requirements outlined in the standards. The difficulty many repositories are having with the application of TDR standards is that there does not seem to be path forward to help them to begin assessing their operations and enacting changes to move towards compliance.

The greatest disparity between the TDR standards and the operating environments of case study digital repositories relates to ingest. Both standards fail to acknowledge the impact of recordkeeping on the ease or difficulty of the ingest process. The case study repositories examined revealed that the poor quality of transfer packages from records creators meant that repository staff had to spend a considerable amount of time curating or repairing the metadata in order to enable the system to accept and process the records.

Another area where the standards failed to provide any substantive guidance was under contingency planning, especially in relation to the management of risks related to the acquisition of near contemporaneous records, which many of the repositories are attempting to address. Repository operators recognised that they would likely need to take in recently created records, but as there is no guidance in the standards the operators have failed to take into account the risks and complications associated with acquiring recent records such as limited server space or the need for sufficient staff levels to the increased number of ingests.

Ostensibly one would assume that TDR standards would be easily operationalised by developed-world digital repositories as they were designed to respond to digital preservation needs and standardise repository operations. However, the findings suggest otherwise, raising the question of the transferability of those TDR standards into other contexts, particularly in the developing world. To understand how transferable TDR standards are to the developing country context, the next chapter examines the realities faced by archivists in East Africa in the management of digital records.

# CHAPTER 6: DIGITAL PRESERVATION REALITIES IN EASTERN AFRICA

## 6.1 Introduction

Over the past decade, important technological initiatives have helped to connect the African continent to the rest of the world. The push towards computerisation as a result of foreign donor ICT initiatives coupled with the incorporation of ICT, within regional and national strategic development plans has acted as a mechanism for economic development. Ultimately, this push for technological development has allowed many countries in the EAC to leap-frog across platforms, by moving not from personal computer to laptop then to tablet but by moving straight from little technology to tablets and mobile phones. These factors – combined with foreign donor ICT initiatives, regional and national economic development plans and technological leap-frogging – have affected the way digital records are created and maintained in the region.

Digital records, however, are not considered in many EAC and national initiatives dealing with ICT systems, even though these records serve as evidence of actions, transactions and decisions. Failure to address recordkeeping controls in system design can undermine the integrity of digital records. When these factors are coupled with the lack of infrastructure and capacity, such as stable supply of electricity or the absence of trained personnel, the preservation of digital records is further complicated. These regional challenges also bring into the question the applicability of TDRs and TDR standards.

This chapter examines the digital preservation realities in the East African region by drawing on interview data from East African practitioners and academics (M1(EAC)) and national archives staff from Kenya and Tanzania (M3 (EAC)). The first section (6.2) will discuss the impact of remit and organisational placement on the ability of national

archives to engage in strategic projects such as ICT implementation or digital records management. The focus of this section will be on the situation in Kenya and Tanzania, as case studies, before expanding the analysis to consider the significant challenges and obstacles that practitioners in the region face in the preservation of digital records. Section 6.3 will consider the challenges of infrastructure, access to technology and the absence of qualified records personnel, all factors that complicate the task of establishing digital repositories. Also included in this section will be a discussion of the impact that the lack of discourse on digital records preservation has had on the East African archival community.

The final section of this chapter (6.4) will examine the archival practitioners' perception of the usefulness of TDR standards and will consider the relevance of other records and archives standards and the complications encountered when trying to implement such standards in East Africa.

It must be noted that whilst this particular discussion focuses on challenges and problems related to digital preservation in the East African region, many archival institutions face similar problems all over the world, particularly with regard to limited authority, inadequate resources or access to qualified personnel. It is important to note, though, that those problems are more easily resolved, and less systemic, in more developed parts of the world than in Africa. The focus of this thesis is on the developing country context, with East Africa as the region chosen for case study analysis, but as noted in the conclusion the lessons learned can be adapted more widely to records and archives operations internationally.

## 6.2 Impacts of Remit, Positioning and Records Management Programmes on Digital Records Initiatives in East Africa

The strength or weakness of a national archives' remit and its position within the structure of government can have wide-ranging consequences for its ability to carry out core functions. In East Africa, weak or outdated archival legislation has impeded the efficient operations of many national archives, especially with regard to digital records management and preservation. Weak mandates also reduce the ability of national archives to enforce regulatory frameworks or participate in planning for digitisation projects or ICT and e-Government initiatives. Much of the analysis in this section will draw on observations and comments collected through various interviews with East African academics, practitioners and national archives staff (drawing on data from M1 (EAC) and M3 (EAC)), focusing particularly on the two case study jurisdictions RAMD and KNADS.

### *6.2.1 Records and Archives Management Department (RAMD) of Tanzania*

As discussed in Chapter 1, RAMD has a far reaching and well defined remit, which enables it to oversee and control not only digital preservation but more importantly digital records management, a responsibility integrated into the Archives' enacting legislation, as noted by a member of staff at the national archives.[449]

> Interviewee 16.ii: It is contained in the archive law. Because when you read the definition of what are records. This is the act regardless of format, or media. Even the electronic record, when it comes to policy we have specific statements specifically for electronic records management on top of the legislation relating to the records management.[450]

Through its clear definition of what constitutes a record, the Tanzanian legislation ensures unambiguous authority over the management of digital records. Although the

[449] United Republic of Tanzania, *Records and Archives Management Act*, 2002.
[450] Interview 16, 4 August 2011.

articulation of digital records management in the legislation gives RAMD a strong mandate to provide advice and guidance, it is the position of the institution within government that has had the greatest impact.

The Tanzanian archives and records service is located in the Public Service Management unit of the Office of the President, a placement that gives the institution greater influence because it is tied to the most senior government department. [451] As a result of its position within government, any circulars or directives coming from the national archives are more likely to be followed.

In 2011, the Tanzanian Cabinet approved a government-wide records management policy, providing more weight to the work of RAMD in its role as recordkeeping advisor. '[I]t [records management policy] has already been approved by the Cabinet ministers and now we are going to start to develop the guidelines and the standards in different areas…'.[452] Such a wide-reaching records management policy gives RAMD influence not only over the design of records management processes but also over the recordkeeping systems that will generate digital records. This policy framework would, in theory, support the efforts of RAMD to help government departments produce records with integrity, but the records management programme is still in its early stages. Personnel across government are still struggling with effective records control, in large part because, in the absence of uniform guidance, they have often implemented their own information management systems according to their own priorities and needs.

When asked whether Electronic Document and Records Management Systems (EDRMS) were being implemented in government, a representative from the national

[451] IRMT, 'Managing Records - Tanzania'., 10.

[452] Interview 16, 5 August 2011. The National Archives of Tanzania has issued one circular, Circular 5,which provides government ministries, agencies and departments with guidance on retaining and disposing digital records created on ICT systems. For more information see: IRMT, 'Managing Records - Tanzania'., 5.

archives stated: '[T]hey are but in a fragmented way. Each institution has adopted the way it will work for them, the system that will work for them. The integration is a problem'.[453] This type of fragmentation in the implementation of recordkeeping systems will create an uneven records production environment, as each of these systems will generate different contextual information (metadata) or none at all. The lack of standardised metadata creation and inconsistency in recordkeeping practice reduces the ability of the Archives to confirm the authenticity and reliability of digital records[454]. If RAMD is not able to intervene, now that it has the authority to do so, either by acquiring records shortly after production or by supplementing the existing systems metadata with information essential to records management and preservation, the integrity of these digital records may further degrade over time. The existence of multiple records systems will also make the future ingest of records into RAMD very difficult; the institution may need to design individualised ingest protocols for each ministry that uses its own recordkeeping system, which, as shown in Chapter 5, happens now in digital repositories in the developed world. The strong position of RAMD helps mitigate this problem, giving it the authority to interact directly with ministries tasked with ICT development and implementation, which may well lead to the design of more effective and accountable records systems in future.

Most recently, RAMD has been invited to participate actively in the establishment of a National Information Centre, a centralised repository for government data and records.

> The initiatives are many. The Information Management Centre which is in the Public Service Management have decided to have something like a digital

[453] Interview 16, 5 August 2011.

[454] See Chapter 3 for a more detailed discussion of metadata and its role in establishing the authenticity and reliability of digital records.

> repository for the whole of government. They are looking for a building […] where all important information will be stored as a digital repository, where we can access information, if something happens so we can file, so ministries can continue their business.[455]

Given its remit and position in government, RAMD has an opportunity to regularise practices and ensure the creation of digital records with integrity, which would help to resolve the current fragmentation in recordkeeping processes. The inclusion of RAMD as a stakeholder in an ICT project is unique in the region but it reflects the high-level authority and responsibility it has in government.

### *6.2.2 Kenya National Archives and Document Services (KNADS)*

The situation in Kenya is markedly different from that in Tanzania. The enabling legislation for the national archives in Kenya (KNADS) allows the institution to exert control over semi-active paper records management processes but that same authority does not extend to the management of digital records in government.[456] This gap is most likely a result of the wide margin of interpretation of what constitutes a record in the *Public Archives and Documentation Services Act*. As a result, KNADS has great difficulty asserting control over digital records management and preservation. The vague concept of a public record has created segmentation in the administration of digital records management across government, as evidenced from the *Managing Records as Reliable Evidence for ICT/E-Government and Freedom of Information in East Africa* project. That study suggests that public officials felt that: '[R]ecords created electronically are not records but data' and by extension that KNADS did not have responsibility for the management of these digital outputs. [457] KNADS' positioning within the Ministry of Sport, Culture and the Arts has devalued its role as an agency that supports

[455] Interview 16, August 5, 2011.
[456] IRMT, 'Managing Records - Kenya'., 7.
[457] IRMT, 'Managing Records - Kenya'., 9.

accountability and efficiency in recordkeeping and reinforced the perception that it has no role in the management of digital records. This finding is underscored by IRMT's recent research into the region, which observed:

> The location of national archives in ministries with responsibilities for cultural programmes in some countries diminishes the potential impact that national archives can have in influencing or overseeing records management government-wide and reduces the possibility that it will be close to the development planning process.[458]

As a result, KNADS has only a limited ability to change current perceptions regarding the archives service or to participate actively in the administration of the government's records management and ICT programmes.

Currently, digital records management tasks are performed by ministries, departments and agencies across government, resulting in a general absence of centralised oversight of records management, which has created confusion and led to inconsistency in practice.[459] Moreover, the perceptions held by government officials that KNADS does not have a role to play in digital records management has resulted in the exclusion of KNADS from digital records management initiatives as well as the fragmentation of the function amongst three departments: the Personnel Office in the Ministry of Public Service, Communication Commission of Kenya and the Freedom of Information Commission.

The Personnel Office in the Ministry of Public Service has taken on a core records management function, providing comprehensive guidance on recordkeeping issues. The Head of the Personnel Office has even succeeded in creating a records management

[458] The issue of position and the impact of archival remit is alluded to in IRMT, 'Managing Records - Regional Situation Analysis'., 12.
[459] IRMT, 'Managing Records -Kenya'., 8-9.

cadre in the civil service, thus acknowledging the professional credentials associated with a records manager.

> [B]ut on the other hand I would still say it was good that it was created. For one it was put at a very influential ministry, the Ministry of Public Service within the Office of the President […] and therefore it was possible to create all those structures, you know, the scheme of service, the establishment, anything and everything. If probably initially it was the National Archives most of those things won't have happened, right now they have more officers than we have at the National Archives.[460]

In large part, the Personnel Office has been successful in this endeavour because its parent ministry is located in the Office of the President giving it greater power and authority to carry out its work. At the same time, a portion of the digital records management function has also been delegated to the Freedom of Information Commission, which is tasked with ensuring public agencies and offices retain and dispose of digital records.[461] Further, the Kenyan *Information and Communication Act* 2009 gives the Communications Commission of Kenya oversight for the ICT system implementation in Government and as a by product of that responsibility over the management of current digital records.[462] However, the Act only makes provisions for creating and managing the records whilst they are being actively used in ICT systems, it does not account for the need to retain and preserve those records.[463] Neither the Freedom of Information Commission, nor the Communication Commission has issued guidance, at this point, on the management or disposition of digital records. Nevertheless, the management of digital records is divided between three distinct entities in Government which could lead to the issuance of conflicting advice on the

[460] Interview 15, 4 July 2013
[461] IRMT, 'Managing Records - Kenya'., 6.
[462] Republic of Kenya, *Information and Communication Act 2009*, accessed 5 January 2015, http://www.researchictafrica.net/countries/kenya/The_Kenya_Information_and_Communications_Act_2009.pdf. See Part VIA- Electronic Transaction. IRMT, 'Managing Records - Kenya'., 4
[463] Republic of Kenya Information, *Information and Communications Act 2009*. IRMT, 'Managing Records – Kenya'., 5.

management and preservation of digital records.[464] At this point only the Personnel Office has been actively engaging in the management of current records.

KNADS has not been able to actively engage in discussions with the Personnel Office regarding the implementation of its records management plans. This confusion about roles and responsibilities, and the fact that KNADS is not in charge of the records management cadre established by the Personnel Office, along with its inability to engage with the Communications Commission or control the retention and disposal process managed by the Freedom of Information Commission has exacerbated the poor perception of KNADS. This is reinforcing the belief that the National Archives is irrelevant in the management of current and digital records. As argued by the interviewee quoted above, if KNADS had tried to implement a similar records management programme as that run by the Head of the Personnel Office, it would most likely not have been as successful. But the records management programme as currently configured is robust and well functional, which raises the question of whether and how KNADS can play a role in records and archives management in the future. Will government ministries, departments and agencies be more receptive to guidance coming from a programme situated in the Office of the President, the Communication Commission, or by one administered by the Freedom of Information Commission? What is the duty of a national archives in this scenario? Although this example raises some interesting questions for KNADS' future involvement with records management in government, the exclusion of KNADS from current records management initiatives has meant that the long-term preservation of digital records have not been considered, which puts the sustainability and integrity of digital records at risk.

[464] IRMT, 'Managing Records – Kenya'., 6.

Until KNADS is more closely involved with these initiatives and the discrepancy in roles and responsibilities has been reconciled, there will no doubt continue to be a disjointed approach to the care and management of digital records before their deposit in the National Archives. The National Archives already has extensive experience and practice managing paper records in government and many of the principles are transferable to the digital environment however, some up-skilling needs to occur for staff to ensure the effective management of digital records. The effective management of digital records from the point of creation to disposition is critical if records are to maintain their probative value over time. By involving other offices in government (i.e. Personnel Office, Communications Commission and Freedom of Information Commission) that do not have the background and the knowledge regarding good practice in records management, digital records may not be properly managed. Moreover, without a coordinated approach that includes KNADS, there is a risk that vital digital records may be lost or accidentally destroyed.

### *6.2.3 RAMD and KNADS Comparison*

An examination of the enabling legislation of the national archives of Tanzania and Kenya illustrates the impact of strong or weak archival remits on institutional operations, especially pertaining to the management of digital records. The fact that RAMD operates with well-articulated and powerful records legislation means it has been able to move its digital and paper records management programmes forward, as well as to engage directly with ICT initiatives. The Kenyan archival legislation is ambiguous about the concept of a public record, and KNADS is poorly situated to provide strong recordkeeping guidance, relegated instead to a position as advisor on paper records management and a repository for paper records. As a response to this weak

administrative placement, the records management function has been assigned to ministries deemed as more competent with the Ministry of Public Service taking the lead where KNADS has been unable to do so.

RAMD's involvement in the development of the National Information Centre underscores how positioning and remit can affect the perception of archival programmes in government and their inclusion in strategic initiatives. If the same initiative had taken place in Kenya, it is more than likely that KNADS would not have been considered a useful participant. For all the differences between RAMD and KNADS, however, there are some commonalities between the programmes worthy of note, including the limited access to resources, as noted by one interviewee.

> The national archival institutions that are supposed to be providing leadership in this area … they have units that they call preservation units but many of them are out of equipment, many of them are out of expertise and many of them are actually … probably don't have adequate resources.[465]

This interviewee highlights a key issue faced by both case study archives, as well as by the wider East African region: lack of capacity, expertise and resources. These problems have greatly affected the operations at KNADS and, if not properly addressed by RAMD, may undo whatever progress that institution is making in Tanzania. All in all, strong remits and positioning are critical but they must be supported with the concomitant expertise, personnel and finances to make a digital records and archives service truly successful and sustainable.

### 6.3 Obstacles and Challenges to Digital Preservation and the Establishment of TDRs in East Africa

Digital preservation endeavours face many obstacles and challenges, especially in East Africa. Not only are organisations trying to capture and preserve complex documentary

[465] Interview 17, 18 September 2012.

materials and develop the requisite technological infrastructure to support this work, but they also must surmount gaps in infrastructure and expertise. Many of the challenges to digital records preservation identified by interviewees in the East African region mirror complications discussed in Chapter 4 on technology transference, such as weak infrastructure and absence of trained personnel. This section will examine these issues along with the impact of regional and national ICT policies on digital preservation, the accessibility of technology and the lack of discourse on digital preservation.

### *6.3.1 Regional Policies and the Disconnect Between Archives and ICT*

ICT implementation is a pillar in most development plans in Africa. As mentioned, the EAC's current regional development plan considers the role of ICT as an economic driver and a tool to improve social capacity across the region.[466] The EAC has even tied the success of the region's Common Market strategy, which seeks to promote economic cooperation as well as improve socio-political development, to the implementation of ICTs. [467]

> Information and communication technology (ICT) is increasingly becoming the EAC Common Market's priority area in pursuit of economic growth and development among partner states. ICT is critical towards socio-economic and political developments in the region. In addition, ICT is considered as a channel through which the EAC common market will improve global access of her people and competitiveness of goods and services from the region.[468]

Clearly, the EAC has significant expectations for the positive impact of ICT in the region. Indeed, as noted earlier (section 4.2 Technology Transference and Foreign Donor

[466] East African Community, '4th EAC Development Strategy., 63. See also chapter 4 for a more detailed discussion.

[467] Part of the Common Market Protocol that would enable the free movement of persons and labour, as well as free movement of services between EAC member countries. In particular the protocol seeks to harmonise infrastructure and ICT services across the countries to enable better information exchange. See for more information: Jean Claude Nsegiuymva, 'EAC Integration Process: Achievements and Challenges in the Implementation of a Common Market' (PowerPoint presented at the Lake Tanganyika Basin Development Conference, Bujumbura, Burundi, 27 November 2011), accessed 29 August 2014, http://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CDIQFjAC&url=http%3A%2F%2Fwww.eac.int%2Fnews%2Findex.php%3Foption%3Dcom_docman%26task%3Ddoc_download%26gid%3D304%26Itemid%3D78&ei=8loAVMntHtCWat6CgagK&usg=AFQjCNG8V6IZnCv-kFqTctVggcdMfJLJXA&bvm=bv.74115972,d.d2s.

[468] East African Community, '4th EAC Development Strategy'., 27.

Policies) in the EAC strategic development plan, ICT has been identified as a priority in the integration of regional development initiatives[469] such as Vision 2030 (Kenya) and Vision 2025 (Tanzania), directly influencing the development of strategies of member countries.

The Kenyan and Tanzanian strategic visioning documents also identify technology as a means to create better socio-economic equality while driving economic growth. In Kenya's Vision 2030, ICT initiatives are linked to improved infrastructure and economy.[470] Similarly, in Tanzania's Vision 2025, ICT strategies are tied to infrastructure development, on the assumption that ICT can help with: '[M]eeting the basic needs of the people, increasing productivity and promoting competitiveness'.[471] These vision documents serve as guiding principles for development in Kenya and Tanzania, but they also specifically influence the design and implementation of ICT systems in these countries.

The problem with these economic development plans is that technology is seen as a solution to the information management problem faced by government. Little consideration is given to the importance of records management protocols and how these might potentially improve the ability of users to retrieve information in ICT systems.

> Well, I suppose it's typical of how ICT people look at it. I mean we all keep complaining that the IT people are very good at developing the systems and rolling them out and giving people computers to use and that they don't pay attention to records management functionality. I think that typifies what is also going to happen, or what is happening at the national level, in terms of the ICT systems: that the push is really going to be on the technology itself without any attention or any concerns being raised about what then happens to this

[469] East African Community, '4th EAC Development Strategy'., 63.
[470] Republic of Kenya, 'Vision 2030 | Vision'. See also Vision 2030 website, under the pillars for Economy and Enablers and Macros, accessed: August 29, 2014, http://www.vision2030.go.ke/index.php/pillars .
[471] United Republic of Tanzania, 'The Tanzanian Development Vision 2025.', 21.

information at the end of it all.[472]

This shortsightedness in ICT system use focuses on the value of technology as a tool to solve an immediate problem, without looking at quality control measures as well as the policies and procedures required to ensure that digital records are retained. As a result, information systems such as those for payroll management or procurement are being implemented without due consideration for the quality of the information contained in these systems; as one interviewee noted, this lack of a policy framework is a 'big problem'.[473]

This disconnect was also underscored in a recent study by the IRMT *Managing Records as Reliable Evidence of ICT/e-Government and Freedom of Information East African* (2010-2011). The study sought to examine whether records management was factored into ICT, e-Government and access to information initiatives in the East African Community. The findings indicated that there was little connection between e-Government and ICT programmes in the region.

> In spite of the profile of ICT/ e-Government plans and the high level of importance being accorded their implementation, there is little evidence that any of the countries are addressing records management concerns in the planning process. Similarly, there was no evidence that functionality for the management of records is rarely being incorporated in the planning for ICT/ e-Government systems. [474]

Not incorporating records management controls at the point of system design also affects the integrity and preservation of digital records. An interviewee noted that while governments are implementing ICT systems they are not concerned with the long-term preservation of records.

A number of the governments in eastern and southern Africa keep talking about

[472] Interview 19, 17 September 2012.
[473] Interview 17, 18 September 2012.
[474] IRMT, 'Managing Records - Situational Analysis'., 11.

> e-Governance and e-Government and […] introduced ICT policies at the national level, but most of that is typically technology driven, and therefore the emphasis is on acquiring and applying information and communication technologies themselves. But very little then happening downstream, in terms of 'OK, all these things are going to generate digital records and therefore we should consciously then do something about creating a digital repository.[475]

It can be argued that the disconnect between ICT implementation and records management requirements, including requirement for the long-term preservation of digital records is the result of a lack of understanding by senior government officials and IT specialists about the role of the archives and records management in providing the business rules for creating and managing authentic and reliable digital and paper records.[476] This argument also reinforced by one interviewee who stated: '[T]here is a disconnect between the e-Government Secretariat and the national archival institutions which are supposed to be specialist in records and so on and so I think that's a problem'.[477]

In the author's experience, there are many other reasons that records management is not considered in the development of ICT systems. For instance, many IT professionals are primarily concerned with overseeing day-to-day system operations and often do not have the time or resources to think about requirements for maintaining the digital records held by those applications. Further, funding for these projects is normally time limited, supporting development and implementation but not ongoing maintenance. Rarely are contingencies in place to fund systems maintenance or future repairs, much less ongoing support for the preservation of digital records. As well, responsibility for digital records management is often left with IT staff; as noted by one

[475] Interview 19, 17 September 2012. See also Interview 17, 18 September 2012 and Interview 18, 15 June 2012
[476] IRMT, 'Managing Records - Situation Analysis.' 11. Also based on my findings from my participation in the *Managing Records as Reliable Evidence.*
[477] Interview 17, 18 September 2012.

interviewee: '[I]n most cases you find that responsibility of managing electronic records somehow is left to the ICT personnel…'.[478] In the author's experience, the consequence of this IT focus is that system administrators apply technological approaches – 'archiving' older information by placing it in offline or deep storage – rather than applying methodologies necessary for ensuring the integrity and accessibility of digital records and archives. Generally, the evidential value of records only becomes an issue when records are lost or corrupted or must be migrated from one system to another.

### *6.3.2 Infrastructure and Accessibility of Technology*

African archival management programmes encounter two significant challenges when trying to preserve digital records. The absence of infrastructure capable of supporting digital records preservation initiatives such as consistent electricity supplies complicates the task of establishing these programmes in the region. Further, accessing the technology needed to preserve digital records can be quite complicated both logistically and financially for most Sub-Saharan archives. This section explores these issues.

#### *6.3.2.1 Infrastructure*

Weak or poor ICT infrastructures in the East African region and elsewhere on the African continent seriously hamper efforts to establish sustainable digital records preservation programmes and TDRs. Power fluctuations, a consequence of weak electrical grids, are endemic through the region. Corruption, mismanagement and poor maintenance of infrastructures mean that power can only be provided through rolling coverage to various locations. This reality is confirmed by scholarly literature, interview data and is supported by the author's own observations from a data collection site visit to RAMD.

[478] Interview 15, 4 July 2013.

Keakopa notes that one of the significant challenges to digital records preservation is the availability of consistent electricity.[479] When the author went to Tanzania to interview employees at the national archives, the power went off for about two hours. Archives personnel advised that this was not a rare event; power failures are accepted as a daily occurrence, forcing government and other staff to take measures to ensure that computer servers and other computer hardware are not damaged as a result. As one interviewee noted, '[W]e need to manage them [computer systems] very carefully – what with the fluctuation in power, we have to do it. We need to get hold of the situation very quickly…'.[480]

This inconsistency in electrical supplies not only affects the preservation of records in archival custody but also risks damage to digital records held at ministries, departments and agencies of government, before they can even be transferred into the archives. Keakopa corroborated this risk during her interviews with government staff; when she asked respondents to give examples of situations that affected access to electronic records and they pointed to computer viruses, power failures, network problems and lack of training and awareness.[481]

In addition to basic infrastructure challenges, many archives face their own internal structural problems, operating without adequate supplies, equipment, or the hardware and software needed to care for both digital and paper records. Air conditioning units or microfilm machines may be installed in an archives repository but could soon fall into disrepair, and the absence of spare parts and the limited financial resources needed to effect repairs mean that archivists are just trying to keep current

[479] Keakopa, 'Trends in Long-Term Preservation'.
[480] Interview 16, 5 August 2011.
[481] Keakopa, 'The Management of Electronic Records'., 157.

holdings from deteriorating to the point of irreparable damage. As one interviewee noted:

> [A] number of archival institutions in the last few years, and what you are seeing there are just symptoms of economic depression, of systems that were introduced and that are no longer working at all. Air conditioning systems that were commissioned a couple of years ago, spare parts, no spare parts, non-functional […] Grappling with those sort of challenges you can see that there is very limited space for them to even think about the technological requirements, the application of international standards, I mean, they are not even meeting the basics […] trying to make sure that these records are preserved.[482]

The absence of even the most basic resources to support records preservation prevents the national archives from ensuring the longevity of both analogue and digital materials. The digital challenge is even more severe than the paper, but circumstances mean that records staff focus on the paper, not the digital. For instance, computer servers need to be kept in an environment that is cooled and well ventilated or they will overheat, resulting in damage to equipment. Repairs are prohibitively expensive, as is the purchase of new equipment as explained in Chapter 4.

In the author's experience, given the lack of resources to procure computer equipment, records professionals focus instead on what they can address, which is, most often, the protection of paper records. By focusing their efforts on paper records, archivists and records professionals fail to consider implementing even the most elementary interventions needed to guarantee the accessibility of digital records, including infrastructural capacity.

> Capacity in term of hardware because obviously it's not just a matter of storing the records maybe they could come in on DVDs or whatever hard discs, they'll ultimately need to be accessible. But how to make them accessible would mean we would need to have equipment to upload them to the users.[483]

[482] Interview 19, 17 September 2012.
[483] Interview 15, 4 July 2013.

The capacity needed to make these digital records available to citizens and government is absent. Furthermore, even if archives manage to make digital contents accessible to the general public via an online portal, the weakness of electrical service and poor internet connectivity means that access is primarily available to people in urban areas, while those in rural areas have limited or no access to these resources.[484]

*6.3.2.2 Accessibility of Technology*

Archives also need technology (i.e. hardware and software) to access, preserve and make digital records available to users, but their ability to gain access or procure technology is problematic. Most technology is produced outside of Africa, which means that purchasing equipment and having it imported can be expensive. Not only are the shipping costs high, but high import tariffs inflate the costs of hardware and software.[485] However, even if there was a locally based software or hardware vendor in country, the vendor may not have a wide selection of products to choose from. For example, some software platforms that seem ideal for an organisation may not be supported by a local or regional vendor. Further, a local vendor may go out of business, leaving a ministry, department or agency with a particular tool in place but without any external support for updating, fixing or maintaining the tool over time. As well, a government may find a suitable local vendor, but that company may not be able to access parts or resources necessary to provide adequate repair or maintenance services.

> [T]he technological choices that are available, insofar as you then are limited to a large extent by which operatives are operating in that particular areas. There's no point in acquiring what would probably be an ideal system if that system has no vendor locally or in the region so the choices are limited by which vendors are operating and therefore are able to provide maintenance and services […].

[484] Chilimo and Ngulube, 'Role of Information and Communication Technologies., 146

[485] In chapter 4, we mentioned the situation in Ethiopia where there are import tariffs of up to 30% on any hardware or software imported into the country, making it prohibitively expensive for most citizens to afford their own computer.

> Secondly, there are also many cases where a vendor provides technology only to go down under after a couple of years, leaving the client without anywhere that they can go. […] and then they found someone who said "Well we will do it for you for time" but they themselves also then found themselves with a problem, in that they couldn't get the spare parts that were needed to keep the machines, equipment working, so literally they were sitting on top of these huge rooms with all these tapes and no technology to run that…[486]

The consequence of these weaknesses in technological support is a serious risk to the preservation of and access to digital records. If ICT systems fall into disrepair and there are no vendors or service providers in the region able to provide necessary support, irreplaceable public records and data may become irretrievable. This loss seriously diminishes the effectiveness of government operations and leads to widespread negative consequences for citizens. For instance, individuals may be unable to claim pensions, assert land rights or receive fair court judgements.

Although infrastructure and access to technology are significant issues for these institutions, another critical challenge facing both ICT and records and archives sectors is lack of capacity and expertise.

### *6.3.3 Capacity and Expertise in Digital Records Preservation*

A critical challenge to the preservation of digital records is a lack of professional capacity and expertise in digital records management and preservation. '[I] think there is not enough financial and human resources to get the job done…'.[487] The views expressed by this practitioner were echoed by other interviewees as well as through recent research conducted in the region. There seem to be two emerging factors that have contributed to the capacity and expertise problem in the region: the lack of post-secondary courses addressing digital records management and preservation, as well as the absence of professional development programmes in the region. Moreover as a result of absent

[486] Interview 19, 17 September 2012.
[487] Interview 18, 15 June 2012.

educational training programmes dedicated to the management and preservation of digital records there is a capacity crisis at national archives across the region.

#### *6.3.3.1 Post-Secondary Education and Professional Development*

As with the scholarly literature in the region, the emphasis of most training programmes in the EAC has been on digital records management. Even so, classes in digital records management tend to be theoretical and very high level, offering students little or no practical training on how to manage digital records effectively.

> University programmes exist for records and archives management in some countries, but few of the courses in these programmes touch on the management of electronic records, and if they do it is not from a practical perspective. Furthermore, the programmes tend to be theoretical in nature and tend not to provide students with a solid grounding or 'reality check' concerning what it means to manage electronic records.[488]

The problem is not so much that digital records management and preservation is not being taught but, rather, that the courses offered do not address these matters in sufficient depth and specificity to help students understand both the theory and practice involved. This observation was further corroborated by another interviewee who, when asked how to address the issue of digital records preservation capacity in the region, stated: '[We] need to strengthen the archival schools especially those teaching preservation. We need to look at the curriculum, so the curriculum also shifts from just being a theoretical thing to inculcating some practical skills…'.[489] Ultimately the emphasis on theory and the limited guidance provided by post-secondary archival and records management training courses does not provide most graduates with the knowledge and skills needed to advise or coordinate digital records programmes

[488] IRMT, 'Managing Records - Situation Analysis'., 16.
[489] Interview 17, 18 September 2012.

adequately. What is needed is a complete review of the records and archives curricula in the region.

Records management initiatives support the efficient and preservation of authentic digital records. By understanding digital information needs from the point of inception to disposition, students will be able to better plan for the preservation of digital records. Furthermore, without sufficient preparation, graduates cannot efficiently engage with records producers to ensure that digital records are created with integrity, nor can they guarantee that the records under the custody and control of the archives receive the necessary attention.

> [T]he training sector a lot still has to be done […]because like for myself what I know in digital records it's what I've learnt on my own, you know, through individual initiatives. When you go to most of these universities and colleges I'm quite certain they don't have the capacity to deliver on digital records, very few[…] and therefore even when you look at their curriculum you find they don't touch on the digital records it's just as a by the way, not because they don't want to do it but I believe they lack the capacity to deliver on that.[490]

Personnel capacity in digital records management and preservation capacity has been an ongoing issue not only for the EAC but also for other regions in Africa. Keakopa, in her study of digital records management in Namibia, Botswana and South Africa, reported that in Botswana records officers were not equipped with the necessary skills to properly manage digital records.[491]

Digital records programmes need to be strengthened not only in terms of content but also in relation to the capacity of teaching staff. Most teaching staff themselves do not have sufficient expertise with and knowledge about the topics of digital records management and preservation to instruct their students adequately. Such knowledge is essential if professors are to keep abreast of contemporary and constantly

[490] Interview 15, 4 July 2013.
[491] Keakopa, 'The Management of Electronic Records'., 179.

changing issues in the field. When asked to clarify what capacity issues prevented the teaching of advanced digital records management and preservation classes in universities, one interviewee responded: 'I think it's the tutors themselves, first need to go back to school […] [and] acquire the skills'.[492] This view is supported by Heeks and Bass, when they point to comparable problems when trying to update computer science programmes in Ethiopia. The authors had been contracted by the Ethiopian government to update post-secondary computer science curricula using international sources to guide their development process.[493] During the implementation, however, they found that faculty did not have enough knowledge to be able to teach the new courses and struggled to meet the demands of the newly developed curricula. Ultimately, until university educators have sufficient knowledge and resources about digital records issues, there will continue to be a shortage of qualified professionals in the field.[494]

Professional associations, unfortunately, have not been able to bridge the digital records management and preservation knowledge gap left by the absence of post-secondary programmes. Even professional associations in the region offer only very basic classes to their membership. '[W]ithin the country they can still get just the basics but probably to get any advanced level of skills they'll probably need to go out, they are not quite…I think that that [professional development programmes] area is still at the very, very early stages'.[495] This is further corroborated by another interviewee who stated: '[I]n terms of capacity an education and training programmes is necessary to increase the kinds of in-depth knowledge that current professionals should have

[492] Interview 15, 4 July 2013.

[493] The remaining information in this paragraph comes from: Heeks and Bass, 'Changing Computing Curricula'., 11 and 21.

[494] Another issue brought up by Heeks and Bass (17-18), which has equally been mentioned anecdotally by professors in the East African region is the difficulty in acquiring up to date publications (i.e. books, journals, conference proceedings etc.) that would help professors design better curricula for students.

[495] Interview 15, 4 July 2013.

because I don't think we have enough knowledge to tackle the issue around digital recordkeeping'.[496]

The absence of trained digital records management and preservation specialists, in part as a result of weak post-secondary programmes and the lack of available professional development courses has had an impact on many national archives programmes in the region. Essentially there are not enough trained personnel to provide advice on the management and preservation of digital records.

*6.3.3.2 National Archives Capacity*

The shortage of qualified personnel hampers the ability of national archives to engage actively in discussions connected to digital records creation and preservation. Practitioners working in these settings openly admit that they need more practical training and would like to benefit from lessons learnt elsewhere to improve their own practices: 'We have been trained. But we need the practical training. We need to learn from others who are a little bit ahead of us'.[497] Most people working in the national archives have only basic computer skills, for instance, as noted by one interviewee, '[I] would say there only two people who can talk about those issues in the National Archives, most of the other people even, you know, basically when it comes to the computer they are just running […] and therefore I would say we don't have adequate capacity'.[498] This admission illustrates some of the significant issues facing digital preservation programmes in the region.

Whilst admitting the importance of the knowledge gap at the national archives, there does not seem to be a cohesive approach within the region to bridging it. Often

[496] Interview 18, 15 June 2012.
[497] Interview 16, 5 August 2011.
[498] Interview 15, 4 July 2013.

learning from 'others' consists of asking for a consultant to develop a solution. As one interviewee said, when asked about whether they had identified core requirements for a digital repository, 'We are thinking of having a consultant to lead us on how effectively we can do that'.[499] Engaging a consultant may provide national archives with a roadmap to support the establishment of a digital repository but based on the data, national archives do not have the capacity to achieve these aims and objectives. In order for the archives to implement such an initiative successfully there would have to be a significant amount of knowledge transfer between staff and the consultant which is unlikely given the timeframes and constraints on most consultancy initiatives. Research has shown that there is minimal knowledge transfer between consultants and employees in developing nation ICT projects, in part because of the disparity in expertise.[500] There is also the added problem that consultants, for ICT projects, are hired for their expertise not to train employees within the organisation.

Archival work requires qualified personnel with the skills, knowledge, and expertise necessary to ensure the proper management of and access to records of ongoing value. Despite the growth in digital records and implementation of ICT systems in East Africa, particularly over the last 10 years, post-secondary and professional development programmes have been unable to meet educational needs for digital records management and preservation, affecting the viability of digital records preservation programmes in the region.

#### *6.3.4 Absence of Professional Discourse and Leadership on Digital Preservation*

The topic of digital preservation has not featured prominently in the records and archives discourse in the East Africa region, where the focus has been more on digital

[499] Interview 16, August 5, 2011
[500] Mundy, 'IT in Developing Countries'., 49 and 52.

records management.[501] As a result, the community has not reflected on the digital records preservation challenges they face, which some practitioners have attributed to a lack of leadership in the archival community.

The general consensus amongst many of the experts interviewed was that digital preservation has not been given a great deal of thought, in the East African Community or elsewhere on the continent.

> [I] mean they're [archivists/records managers] still grappling with just trying to bring order to paper records. And then, come on top of that the digital records that are being generated. […] Procedures are not really being made in terms of how digital records are going to be preserved.[502]

Few plans are in place to ensure the ongoing maintenance of digital records, as records professionals are still attempting to come to terms with paper records management challenges. Quite often, discussions about digital records management and preservation are confused with issues of paper records preservation, often because there is a lack of knowledge about the processes involved with caring for digital materials. After all, very few archives in the region have acquired digital materials yet. As one interviewee noted,

> It is a new field [digital records preservation]. It is almost new even to third world countries. It is a challenge now […] My repository is too full of paper archives. I can't collect more because I have no place to put them. And it is a problem. And there are many contemporary records lying in the ministries – and we need them so the public can continue to access these records. So if we can't shift now that means we are in danger of not having enough archives material in our repositories.[503]

While it is clear that digital records preservation is a concern, staff interviewed simply do not have experience or knowledge about the issues involved with managing digital records and making them accessible. Only KNADS acknowledged receiving any digital

[501] See for example: Keakopa, 'The Management of Electronic Records'. Keakopa, 'Automated Records Management Systems.' David Luyombya, 'Framework for Effective Public Digital Records'.
[502] Interview 19, 17 September 2012.
[503] Interview 16, 5 August 2011.

record accessions, as a result of the promulgation of the new Kenya Constitution in 2010:

> At the moment we have received very little, one case I remember are records from the committee of experts that were drafting the Kenya Constitution, they transferred all the records to the National Archives and some of those were in electronic format but we don't have much in electronic format but we anticipate that we are going to be receiving quite a lot of those in the very near future.[504]

Although KNADS has received a digital records transfer and it is technically the appropriate repository for the government's historical digital records, there was no indication by the interviewee of any preservation interventions to ensure continued access to these records. Although the interviewee did indicate that KNADS would be receiving more digital records transfers in the near future, given the current perception in government as to the institution's relevance in the management of digital records, it remains to be seen whether there will be any further digital records transfers.

In reality, even though digital records are being transferred to some (or at least one) national archives in the region, the case study national archives are not prepared to acquire digital records and do not have the basic resources or regulatory frameworks needed to establish a consistent and coordinated ingest process. The Kenyan example underscores the lack of thought given to digital records preservation and emphasises how unprepared archives are to receive and manage digital records.

One reason that there has been no substantive consideration of digital preservation could be that there is a perception that digital records challenges are insurmountable, perhaps because of a lack of strong professional leadership in the archives and records community. As noted by one interviewee, 'I think the whole issue of data, the whole issue of records, the whole issue of memory has not been addressed

[504] Interview 15, 4 July 2013.

and I don't know how is going to take the lead on this, but we are all worried [about] that...'.[505] The absence of decisive leadership inside the profession, which would allow records and archives managers to get their message out effectively to society and to government, will not only negatively affect government operations but will also result in the loss of corporate memory in the long term.

Equally, however, the lack of thought means that the community has not yet addressed deeper philosophical issues and considered how this will affect archival practices in future. Two such issues are: the proliferation of mobile technology, and the cultural constructs in technology. How do these two realities affect digital records preservation initiatives in the region?

The need for the archival community to engage in a wide-ranging discussion on digital records management and preservation is highlighted by the proliferation of mobile technology. A recent study by the Pew Research Center examining mobile and internet technology use in the developing world stated that nearly 68% of Kenyans use mobile technology to make or receive financial payments.[506] The author noticed, while working in the East African region, that many government officials use their mobile phones, sometimes smart phones, to carry out official government business. If archivists and records managers continue to focus their attention on paper records and do not give the preservation of digital records careful consideration, vital government records and evidence held on ICT systems and mobile services – records that demonstrate decisions and transactions – will be lost.

As shown in interviews, archival practitioners are concerned by the expansion of mobile technology and the increasing volume of transactional data kept on these

[505] Interview 17, 18 September 2012.
[506] Pew Research Center., 'Emerging Nations Embrace Internet'.

platforms: '[E]ven within governments and within businesses, people are actually transacting official business using these gadgets [mobiles], without necessarily ensuring that that data is actually being captured somewhere and that this information can be recalled and can be traced if it's needed'.[507] However, as demonstrated by this comment, while the issue is a concern, no solutions have been proposed to try to exert some level of control over mobile technologies in order to protect records.

Academics and practitioners in the region also need to consider the impact of cultural constructs. As discussed earlier, cultural constructs exist in the development, application, and use of technology, meaning that any technology brings with it certain assumptions regarding the ways in which the people using it will work and how they will interact with the tools.[508] However, outside of the academic literature on technology transference, as discussed in Chapter 4, the topic is not widely recognised by African archival practitioners. Only one East African archival practitioner alluded to the fact that most technological applications were designed in the developed world and therefore embodied certain presumptions '[W]hen you think about digital technologies are not necessarily originating in Africa, here, I mean it's all acquired technology, if I can put it that way, being developed in other states' contexts. So I really think that there would be issues'.[509]

While this interviewee demonstrates that there is at least some minimal understanding that technology brings with it cultural constructs, the general lack of awareness of the issue means that technology is deployed without due consideration for

[507] Interview 17, 18 September 2012.

[508] see Lind, 'On the Design'. Arthur Molella, 'Introduction', *Comparative Technology Transfer and Society* 5, no. 2 (August 2007): vii – x. Mundy, 'IT in Developing Countries'. Roche and Blaine, eds., 'Introduction'. Knut Rolland and Eric Monteiro, 'Balancing the Local and the Global in Infrastructural Information Systems', *The Information Society* 18, no. 2 (2002): 87–100. Talukder and Joham, 'A Multi-Perspective Cultural Study'. Westrup, 'What's in Information Technology?.

[509] Interview 19, 17 September,2012.

African culture and work practices (as discussed in Chapter 4), which is one contributing factor in the failure of ICT projects in Africa. As well, it must be recognised that the cultural pretexts that are built into other software applications will likely be also present in digital repository software. Popular digital repository software applications like Preservica and Archivematica were designed and tested in well-resourced countries. As such, they presume certain ways of conducting digital preservation. This finding does not mean that practitioners in the region are not capable of using these technologies; rather, the point is that there has been a failure to examine and question the latent structures in technology and standards, in order to determine if the ways in which those tools operate will be appropriate for regional needs.

A more concerted effort by practitioners and academics in the region is needed to give serious and sustained thought to digital preservation, and to raise awareness of the importance of those issues across government and with the public, a change that will come in part through strong professional leadership. While technology affects records management around the world, managing digital technologies and digital records in places like East Africa is fraught with challenges that most developed nations will never face. African practitioners, equally, need to consider the role of digital records preservation initiatives within the wider developmental agenda so that they may support government more fully and leverage national archives services to create better operating environments. One strategy for achieving this change would be to strengthen educational programmes, expand the discourse on digital records management and encourage stronger leadership within the profession to carry the message forward.

### 6.4 Standards and Usefulness of TDRs in Eastern Africa

The obstacles to success identified so far, such as constraints on infrastructure and lack of capacity, bring into question the assumption that OAIS and RAC are transferable to an Eastern African context. If these standards are not easily transferable, what is their value to practitioners in the region? In order to understand the potential applicability of TDR standards better, this section explores the implementation of archives and records standards in the East African region, in order to bring together the issues addressed earlier in this chapter and consider the potential applicability and relevance of TDR standards in Africa.

Standards are viewed by many as the means to homogenise methods of working with the intent to facilitate production processes and workflows to enable inter-sectoral exchanges regardless of location (e.g. banking transactions).[510] Standards are believed to be context independent: the contention by many standards developers is that the tools have been generalised sufficiently to be applicable to any locale, regardless of socio-economic, political or other influences.

The same convictions are held when discussing archives and records standards, but these contentions are not necessarily correct. As Tough noted in his study of the role of records management standards in facilitating the Good Government agenda in Commonwealth Africa, seven out of eight countries in the East and Southern African region he studied were aware of the existence of and had copies of ISO 15489.[511] It is quite possible that the high level of awareness of ISO 15489 was a direct result of a widespread education and awareness campaign amongst the records and archives

[510] Bada, 'Institutional Intervention'., 170.

[511] All information in this paragraph comes from: Tough, 'Records Management Standards'., 10. ISO 15489 is the standard governing the establishment of records management programmes.

profession in the East and Southern African region. Indeed, Tough's study showed consensus among both National Archives directors and practitioners that international standards were desirable and necessary in order to create benchmarks to promote improvements in the sector.

Nevertheless, some archives and records specialists queried by Tough believed that ISO 15489 was not appropriate in the management of digital records.

> One respondent from The Gambia added: "Standards should be integrated, however a section of the standard must relate specifically to e-records" Asked if they could envisage any obstacles that might hold back the use of standards in their country, two main themes emerged: lack of senior management support and lack of sufficient resources, particularly resources.[512]

According to some practitioners interviewed by Tough, the standards under consideration, including ISO 15489, do not explicitly answer regional needs for digital records management. Moreover, it was noted that institutional shortcomings have prevented the operationalisation of the standards in several institutions.

This level of awareness of ISO 15489 was not comparable for OAIS and RAC. Interviews with the two archival case study institutions showed that neither had even heard of OAIS or RAC. Staff members from RAMD and KNADS were asked if they were aware of any trusted digital repository standards. At one case study national archives the answer was as follows:

> Interviewee 16.2: I am familiar with 154…
> AS: The ISO records management standard?
> Interviewee 16.1: I am familiar with the ISO. This document can be customised or we can find a better solution. There are many applications. We haven't reached any conclusion about what information or software we will need or use to have a digital repository.

[512] Tough, 'Records Management Standards'., 10

In this case, the interviewees were only aware of ISO 15489 and there was no mention of OAIS or RAC by either respondent until the standards were discussed in the context of the interview. A representative from the other institution, when asked if he knew about TDR standards, stated:

> AS: Have you heard of the Open Archival Information System?
> Interviewee 15: Ya, I've heard of it lately of course [following attendance at a seminar on digital preservation taught by the author]. I don't know much about it…

National archives employees in East African case study institutions seem completely unaware of the existence of OAIS and RAC, while some other practitioners in the region had heard of OAIS and RAC.

Those archives and records professionals in East Africa who do know about standards and have access to them have differing views regarding their relevance. As noted by one interviewee, the standards may be too ambitious, offering an unattainable ideal for most archives in the region.

> [L]ike other ISO standards [OAIS and RAC], they are very detailed, they are very demanding […] I mean there are a lot of requirements for you to eventually get ISO certification. I think, therefore, the changes are to be that an ISO standard for institutions to be able to apply and get that sort of certification is likely to be a pipe dream in most of the African institutions here.[513]

According to this professional, it is unlikely that most African institutions would certify against an ISO standard like RAC. The changes needed in systems and operations in order to achieve compliance would be out of the reach of most institutions, in part because the activities fall well outside the current remit of archival institutions, which do not have responsibility for digital recordkeeping.

[513] Interview 19, 17 September 2012.

Other practitioners think the standards are still useful, though implementation is problematic. If the current gap in digital preservation knowledge can be bridged, they suggest, archives and records professionals would be better able to apply the principles and strategies detailed in TDR standards to their own realities.

> I don't think standards are to blame. […] The argument is the standards are fine the way they are. I believe we just don't know what the issues are and how to make them useful in our situation. I wouldn't make the argument that then we need to necessarily simply or modify the standards what could be useful is bridging the gap between the little knowledge we have to the point where we have enough knowledge to understand what the standards provide in terms of benefit.[514]

This argument about bridging the knowledge gap does not specifically address the fact that East Africans had little or no involvement in the development of these standards in the first place, as will be discussed in Chapter 7, resulting in standards that do not take into account the intrinsic problems faced by developing countries in the management of digital information. Bridging this knowledge gap is contingent upon building up regional capacity in digital preservation, which will come in large part once post-secondary curricula and professional development programmes are expanded or reformed.

It is evident, therefore, that the views held by records and archives professionals about the applicability of TDRs are mixed, but it is significant that none of the interviewees questioned the manner in which the standards were developed in the first place or commented on the lack of regional representation during the development process. However, this does not by extension mean that the interviewees feel that the standards are broadly applicable.

[514] Interview 18, June 15, 2012

Even though there is disagreement over the usefulness and relevance of TDR standards amongst interviewees, most agreed that digital repositories are essential to the preservation of digital records.

> So in my view, yes, I think digital repositories are very important. I think there has to be this acknowledgement that digital repositories are not going to be cheap and they're not going to be easy to establish and set up and I think this is where a number of African countries are going to have problems because this requires a collaborative approach between government, the private sector, various institutions and so on to setting up digital repositories. [515]

Collaborative approaches may indeed be the way forward to circumvent infrastructural problems that complicate the establishment of TDRs. But it is still not clear if trusted digital repositories, based on international standards, are necessarily the best solution to help East African countries address their digital records preservation issues.

The limited awareness amongst East African archives and records professionals about the existence of OAIS and RAC is, perhaps because representatives from the region were never drawn into the process of standards development. As mentioned in Chapter 1, in order for organisations and individuals to be able to participate in the ISO standards development process there must be a national standards bureau in place as well as a national technical committee that can deal with the subject matter in question. Both case study national archives had a national standards but neither Tanzania nor Kenya had a national technical committee to address space data standards which would have allowed them to contribute to ISO TC20/SC13.[516] Further, once a technical committee is established, it must be supported by individuals with the expertise to contribute to the process. In regions of the world with a dearth of capacity on digital

[515] Interview 17, 18 September 2012.

[516] Kenya Bureau of Standards, 'Technical Committees', accessed 5 January 2015, http://www.kebs.org/index.php?opt=standards&view=standardstcs. Tanzania Bureau of Standards, 'Technical Committees', accessed 5 January 2015, http://www.tbs.go.tz/index.php/standards/category/technical_commitees

records preservation, there may not be enough qualified practitioners to provide adequate input during the development and review process. As one interviewee noted,

> For instance when we did part of the East African Community research we went to Tanzania and also to Uganda, I don't think the standards bodies there were very actively involved in the standardisation in these areas [archives and records] and so on. And so it would almost be expecting too much, for instance, for those particular bureaus in those countries to be involved in standards development, and so I think this problem varies from country to country. I would expect that countries like South Africa, of course, are quite actively involved in this. Probably much fewer countries from Africa.[517]

If the national bureaus are not active, the input from those countries will inevitably be minimal. This limited input is even more noticeable in the case of standards like OAIS and RAC, since neither of the case study countries even have space data committees and Tanzania had no relevant committees at all.[518]

The establishment of ISO national bureaus requires an investment by government, to cover staffing of bureaus and travel costs to ISO technical committee meetings. East African governments generally have limited resources, reducing the ability of these countries to participate actively in international standards development. Despite some limited support from ISO to allow participants from developing countries to attend various ISO meetings, the additional costs associated with participation – hard and soft – limit the ability of developing countries to offer sustained input.[519]

Jakobs refers specifically to the challenge of lack of finances as a significant impediment to user participation in the standards-development process. As Jakobs

[517] Interview 17, 18 September 2012.

[518] Although the process was 'open' by advertising the request for feedback over email and online for OAIS this presumes that practitioners knew where to look for the call and had access to the internet. The latter will be discussed in the next chapter. There is also the problem that even though Kenya sits on the technical committee for archives and records, there no liaising between the space data committee and TC 46/SC11. Thus, the Kenyan members may not have been aware that this standard was being developed, furthermore given that Kenyan international committee members are from the standards bureau and not archival practitioners they may not have understood the impact that TDR standards might have on the preservation of digital records in their country.

[519] See: International Standards Organisation, 'What does ISO do for developing countries?'

notes, ' [funding] is one of the most prominent explanations for user abstention from standardization.' [520] Lack of finances is a cross-cutting problem in the development of both digital repositories and IT standards.

Although a great deal of the work done on OAIS and RAC took place remotely, thus not requiring participants to travel long distances or attend in-person meetings, many standards developers agreed that the face-to-face meetings were extremely valuable. Much more work was complete during those sessions than during email interchanges or through wiki-based collaboration.[521] Had East African representatives been involved in the development of these standards, they would still have had to travel to participate in face-to-face meetings, and they would have needed reliable and sustained internet access to join in online collaborations. The severe limitation on finances precluded this level of involvement, and so many such representatives were absent from some of the more important interchanges during the standards development process.

There is also a cost to obtaining standards once they are published. The OAIS is freely available online to anyone who is interested, but access to the standard is contingent upon the recipient having the capacity to download the PDF documents. In countries where bandwidth and internet connection are poor, online access can be severely constrained. The only other option is to purchase the standards in print form through the International Standards Organisation, at a current cost of CHF 198.00

[520] Kai Jakobs, 'A Proposal for an Alternative Standards Setting Process', *IEEE Communications Magazine* 40, no. 7 (July 2002): 118–23.., 121

[521] Interview 22, 28 March 2012 and Interview 23, 1 June 2012

(£129.66) for OAIS and CHF172.00 (£112.64) for RAC. This is an expense that cannot be borne by most East African individuals, government or standards agencies. [522]

**6.5 Summary**

This chapter has drawn out from M1 (EAC) and M3 (EAC) interview data the digital preservation realities in the East African region, highlighting the impact of remit and organisational position on the ability of the national archives to engage in digital records management and preservation initiatives. This analysis was followed by a discussion of the barriers to digital records preservation, such as poor infrastructure, availability of technology and trained personnel, as well as a lack of discourse on the topic of digital records preservation. Also examined was the perceived usefulness by East Africans of the TDR standards to address digital preservation realities.

Ultimately, the challenges faced by East African national archives make the viability of implementing a TDR according to the requirements set out in the standards an aspirational goal. In the interim, however, there is a danger that, due to a lack of discourse in the region on digital records preservation, these standards will be implemented without due consideration for the local realities. The more immediate digital records problem, however, is that due to a dearth of personnel trained in the maintenance and care of digital records, there is no one currently working at many EAC national archives that will be able to advise on their management and preservation. As a result, digital records may lack integrity and crucial aspects of the records systems may be missing.

The most surprising finding was the lack of awareness of TDR standards by national archives staff. Very few people interviewed knew about the standards and

[522] CHF is Swiss Francs. Currency conversions were taken July 13, 2014

those who were aware of the standards hardly questioned the approaches recommended or the ways in which the standards were developed. This finding may be attributed to the fact that digital records preservation in the region has not received much attention and consequently practitioners have not begun to consider approaches to managing and preserving digital materials.

The next chapter will examine the development of TDR standards building upon explorations in this chapter and Chapter 5, to ascertain whether the needs identified by standards developers align with East African digital preservation realities. The aim of the next chapter will be to gain an overall understanding of the usefulness and applicability of TDR standards both in a developed world and an East African context.

# CHAPTER 7: PERCEPTIONS, PROCESSES AND THE APPLICABILITY OF TDR STANDARDS

## 7.1 Introduction

As argued throughout this thesis, people's perceptions, ideas and opinions affect the way they view and interact with the world around them, and these different cultural constructs find their way into written texts. These implicit structures may complicate not only the usefulness of but also the understandability of texts. The impact of implied cultural constructs are best exemplified in technology transference and in particular in computer software programmes. As noted in Chapter 4, latent societal structures can have a considerable effect on the deployment of software programmes that presume certain ways of working that may not exist in the recipient place, especially when they are developed in times and spaces separate from the intended implementation location.

Further, the hypothesis underlying this thesis research is that TDR standards contain cultural assumptions that prevent their transferability to an Eastern African context, by virtue of the fact that they are almost entirely devised and tested by practitioners located in the developed world. Just as software programmes assume certain ways of working, TDR standards are also coloured by assumptions on the part of developers, such as the availability of technical and archival expertise and infrastructures that may not be present in times and spaces separate from the development location.

This chapter will seek to build on work from previous chapters to understand the relevance of TDR standards to an East African context. This chapter will begin with a comparative analysis of M1 findings (drawing from M1 (DW) and M1 (EAC)), using the mimetic methodological framework. This analysis will outline the initial impetus behind

the development of TDR standards, in particular the digital records preservation concerns that needed to be addressed by standards developers. This discussion will be followed by an examination of the development and testing of OAIS and RAC, including an examination of the composition of standards committees and the manner in which committee members were selected to determine how inclusive and consensus based the standards development was. This examination will enable an analysis of the potential relevance outside of the developed world of OAIS and RAC, by ascertaining the degree of conceptual concordance between the two environments in terms of digital records preservation concerns.

Following the analysis of M1 findings will be a discussion regarding the usefulness and applicability of OAIS and RAC in developed world digital repositories. The purpose of this examination will be to determine whether digital repositories based in the same social setting as the standards developers are capable of operationalising these standards within their own repositories. This section will expand and draw on the findings in Chapter 5 related to the levels of standards compliance in developed nation digital repositories and will compare these findings with the stated expectations of standards developers in regards to the usefulness of TDR standards.

The final section of the chapter will examine digital preservation programmes in the developed world and in Eastern Africa using the M3 data in order to compare resource allocations and consider the potential for operationalising TDR standards in low-resource environments.

**7.2 The Impact of the TDR Standards Development Process on Transferability**

Some of the problems related to standards applicability may be tied to the impetus behind TDR standards and the needs they seek to address, which may not align with

digital preservation needs in other contexts. These presumptions regarding digital preservation needs may be further reinforced during the development process, perhaps because the composition of committees is not inclusive or because the development process was not consensus based.

This section building on analyses from Chapter 6, which presented the digital preservation realities in East Africa seeks to understand how relevant TDR standards are to the East African context by outlining the impetus of the standards. Equally as part of this examination there is an analysis of the development process and the composition of TDR standards committees to ascertain if specific view points were favoured, thus affecting the usefulness of these standards in an East African context.

### *7.2.1 Impetus Behind the Creation of OAIS and RAC*

To begin to understand the relevance of TDR standards to an East African context we need to examine their origins, in particular the reasons for their creation. Table 7.1 provides an overview of the interview data from standards developers when asked to describe the impetus for OAIS and RAC. Standards developers are generally in agreement about the impetus of TDR standards but there were slightly differing views regarding OAIS.

**TABLE 7.1 OVERVIEW OF DEVELOPED WORLD M1 PERCEPTIONS ON IMPETUS FOR TDR STANDARDS**

| **Open Archival Information System (M1)** | |
|---|---|
| *Space Data Community*[523] | *Archival and Library Community*[524] |
| - Preserve aircraft (space craft) maintenance data.<br>- Create a common terminology | - Create a common terminology for the purposes of advocating to resource allocators the importance of space data. |
| **Repository Audit and Certification (M1)** | |
| | |

[523] All the references for 'space data community' come from Interview 23, 1 June 2012 or Interview 26, 5 October 2012.

[524] Interview 22, 28 March 2012.

| *Space Data Community* | *Archival and Library Community*[525] |
|---|---|
| - Formalise OAIS, while combining elements of all the other audit and certification criteria.<br>- An extension of work previously done in the archival, digital libraries and space data communities but making it into an ISO standards to give it weight. | - Follow on to OAIS as a mechanism to demonstrate that digital repositories are indeed OAIS compliant.<br>- Stem from existing documents and white papers dealing with TDRs namely *Preserving Digital Information* (1996) and *Digital Repositories: Attributes and Responsibilities* (2002).<br>- Better definition of what constitutes quality and the need to measure trustworthiness. |

As introduced in Chapter 3, OAIS was designed to create a common terminology to discuss TDRs and identify major functions related to their operations. Initially, what drove the space data community to develop the OAIS standards was the absence of a preservation framework to guide them in the management of aircraft (i.e. spaceship) maintenance records and data.

> [T]hey [ISO TC20/SC13] were asking about a standard, digital standard and I think the impetus from them was that … I think there were a lot of aircraft maintenance manuals and stuff that they were required by law to maintain […] for a period of time during which the aircraft flew and for a significant period after that and they were looking for ways and standards to guide them on that, I think that was the original impetus.[526]

In addition to space data scientists there was also, a member of the archival community, who was involved in the early development of OAIS. Interestingly, that person has a different perspective on the impetus behind the standards, as this interviewee suggests the motivation was not only to preserve mission data but also to help space data scientists secure funding for digital preservation. Because the scientists were unable to

[525] This represents a combination of interview data from: Interview 20, 9 March 2012; Interview 21, 19 October, 2012; Interview 24, 13 July 2012; Interview 25, 8 October 2012; and Interview 28, 26 March 2012.
[526] Interview 26, 5 October 2012.

adequately explain the importance and value of the data they needed to retain, they were not getting the financial support needed.

> [T]he scientists start off as pure physicists and space scientists [members of CCSDS] and suddenly they're stuck with keeping the data. They have this responsibility now, they step up to the plate to assume that responsibility and […] they're having […] a little bit of an issue in explaining to the resource allocators, to those above them the value, the long-term value, of the data.[527]

Two motivations seem to have existed for the development of OAIS: the need to provide a framework to preserve space mission data for legal reasons and the need to explain to resource allocators the value of data in order to preserve it. It is not uncommon for individuals to have differing accounts regarding a particular event, with different emphases.[528]

According to the developers of RAC, the impetus behind its creation was two fold. In the first instance, RAC was conceived as an extension of recommendations coming from *Preserving Digital Information* (1996)[529] and as a formalisation of other audit and certification initiatives. Secondly, RAC was seen as a concretisation of OAIS principles and a metric for measuring OAIS compliance.

The 1996 white paper was one of the earliest discussion documents on digital preservation to recommend the development of audit and certification standards for ascertaining the integrity of digital archives. Consequently, some standards developers point to this document as the driving force behind the creation of RAC.

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[527] Interview 22, 28 March 2012.

[528] This has been evidenced in psychological studies of eyewitness statements to court proceedings. Most of the literature focuses on techniques for ensuring the accuracy of different witness statements Gary L. Wells and Elizabeth A. Olson, 'Eyewitness Testimony', *Annual Review of Psychology* 54, no. 1 (2003): 277–95, accessed 14 February, 2015 doi:10.1146/annurev.psych.54.101601.145028.Jack Lipton, 'On the Psychology of Eyewitness Testimony', *Journal of Applied Psychology* 62, no. 1 (1977): 90–95.

[529] Task Force on Archiving, 'Preserving Digital Information.' In its recommendations, as discussed in chapter 3, the document recommends the establishment of audit and certification standards for digital archives to ensure that they are properly preserving digital assets.

> I mean the direct line in the community is from the 1996 [*Preserving Digital Information*] document into trusted digital repositories and it was a natural extension of the trusted digital repositories and OAIS with the understanding that we need some way of demonstrating good practice.[530]

RAC was also seen by some as a by-product of *Digital Repositories: Attributes and Responsibilities* (2002) and as a tool developed in tandem with later accreditation initiatives such as TRAC, *nestor*, DRAMBORA and DANS.[531] Thus, RAC has been seen as an extension of previous recommendations and work done by other TDR standards, whilst equally acting as a measure of good practice in digital records preservation. RAC has also been perceived, however, as a way to clarify the concepts of quality and trustworthiness in TDRs. As one interviewee noted,

> [T]he problem of digital repository and their accreditation and their quality and the analysis of their requirements involved in the definition of quality…I think the people involved in the preservation, in the digital preservation realise that it's only a question of technological environment […] it is more a question of trust…[532]

There seems to be less divergence of opinion regarding the basic intent behind RAC which was to serve as a formalisation of OAIS, but the archival community also emphasised the need for it to enable better trust in TDR operations.

As shown in this section, much of the impetus for OAIS seems to be to address the immediate digital preservation needs of the space data community, and the impetus for RAC seems largely to stem from recommendations made in 1996 and the desire for greater trust in the certification and audit of digital repositories. Given the slightly differing motivations within the communities responsible for developing these standards, it is reasonable to assume that certain world views have influenced the contents of those standards.

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[530] Interview 20, 9 March 2012.
[531] Interview 21, 19 October 2012.
[532] Interview 24, 13 July 2012.

### *7.2.2 The Lack of Diversity in CCSDS and Standards Committee Membership*

OAIS and RAC were developed by working groups of CCSDS and, given the reciprocal agreement with TC20/SC13, as explained in Chapter 1, their development should conform to ISO norms. In other words, the standards development process should be inclusive by ensuring the broadest possible representation of industry and international experts on the standards development committee, so that the process is fair, equitable and consensus based.

Initially, in the early stages of the OAIS development process, committee members were chosen from among CCSDS members, who represent major space agencies around the world,[533] most from developed nations. Of the 11 CCSDS member agencies involved in the OAIS development, not one represents a developing nation.[534] Of the 29 observer agencies, only five (17.2%) are classified as developing nations (i.e. Republic of South Africa, Brazil, India, Pakistan and Kazakhstan). With the exception of South Africa, no other African nation had any input into the development of the OAIS standard.

The earliest involvement of agencies outside of the space community came around 1995, when a member of the National Archives and Records Administration joined the committee, in response to a general call for volunteers.

> [I] got into OAIS actually a little late not in the very initial stages. I got in, in October 1995, after the CCSDS folks had decided they had wanted to start the initiative and established a call for public participation […] my bosses decided that there had to be someone from National Archives there […] actually I alerted them to the fact that the meeting was going to be held and suggested others should participate…[535]

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[533] CCSDS, 'CCSDS.org - The Consultative Committee for Space Data Systems (CCSDS)', *The Consultative Committee for Space Data Systems- The Official Web Site*, accessed 18 May 2014, http://public.ccsds.org/default.aspx.
[534] TC20/SC13, 'Open Archival Information System- - A Reference Model'., iv.
[535] Interview 22, 28 March 2012.

The limited reach of this call for volunteers seems to have resulted in the presence of only one archivist in the early stages of the OAIS development. A broader consultation process was initiated by CCSDS in 1997, after committee members realised that the development process needed to be broadened and once members of the cultural heritage community expressed interest in participating.[536] Even then, after several wide-reaching requests for feedback, inputs only came from developed world organisations located in Western Europe and North America.

Even during the process of revising OAIS, starting in in 2006, members of the digital preservation community questioned the process and progress of revisions. The Digital Curation Centre (DCC) submitted proposed revisions in 2006 to CCSDS but it was not until almost two years later that the DCC received a response from CCSDS.[537] Although Chris Rusbridge of the DCC was pleased to see that CCSDS was progressing with the revisions in 2008, he made the following comment on his blog post that year:

> I am very much encouraged that progress is at last being made and that more opportunities to interact with the development of this important standard [OAIS] will be available even if it has not proved possible to find out the venue where the proposed changes have been discussed.[538]

Comments like this reinforce the perception, supported by this research, that, for many reasons, the CCSDS did not receive the most widespread input from the digital preservation community.

The selection process for RAC membership was also limited in scope, even though RAC developers did initiate a wider call for participation amongst the archival, digital library and space data communities. In the end, committee members were drawn

[536] Lee, 'Defining Digital Preservation'., 113.
[537] Chris Rusbridge, 'OAIS Revisions Moving Forward?', *Digital Curation Centre- Digital Curation Blog*, 8 September 2008.
[538] Rusbridge, 'OAIS Revisions'

from an existing pool of CCSDS experts, called the 'birds of a feather' group.[539] Many of them had been involved in the development of OAIS and other related TDR standards (e.g. TRAC). As one interviewee noted, 'In 16363[RAC] most of [the members]… are either TRAC veterans, oh! I should say TRAC also included OAIS veterans…'.[540]

The fact that many committee members who worked on RAC had worked on other TDR standards provided some continuity. One interviewee pointed out that their participation was based on the fact that they worked for the Research Libraries Group, which, along with NARA, had spearheaded the development of TRAC. As such, they felt they had a vested interest in participating in the development of RAC:

> [T]he place where I work is why. […] The Center for Research Libraries took the TRAC document on after RLG was bought out by OCLC and so we kinda became the custodians for it and then when the revisions started to happen we were sort of the people who started jumping on the band wagon…[541]

The issue of vested interest in the standards development process is something that has also been highlighted by several authors writing about the standards process generally and about ISO 15489 specifically.[542] Alan Bell highlights similar problems during the development of ASCII, the programming language for system interchanges. Bell mentions that in the push to create a standard to enable system interchanges: '…cultural nuances can easily be lost or subsumed by a dominant perspective.'[543] It can also be argued, though, that this cross-pollination of participants limited the scope and the

[539] The birds of a feather group comes up as a term in interview 22, 28 March 2012 and interview 20, 9 March 2012 and is something coined mostly by American archival practitioners. It does not come up during any other interviews with European interviewees with the exception of Interview 23, 1 June 2012.

[540] Interview 22, March 28, 2012.

[541] Interview 25, October 8, 2012.

[542] For instance, Jakobs discusses the issue of hidden agendas in the development process. See Jakobs, 'A Proposal for an Alternative Standards', 118 Julie McLeod and Sue Childs, 'Consulting Records Management Oracles- a Delphi in Practice', *Archival Sciences* 7, no. 2 (June 2007): 147–66; see esp. p. .154. Mcleod and Childs discuss the topic of vested interested in the development of ISO 15489, noting that some participants in the development of that standard felt that the process of adapting the original Australian records management standard, AS 4390-1996, which was the basis for ISO 15489, was fraught with difficulties, as there were many different views about the right focus for the standard, based on a variety of different jurisdictional issues and national practices.

[543] Alan Bell, 'Standards and Standards Culture: Understand the Nature and Criticisms of Standardisation', *Comma* 2 (2013): 25–38. 9

content of TDR standards by reinforcing similar perspectives and experiences instead of reaching out for new or different inputs.

### *7.2.3 Limitations of the Testing Process*

Not only was the selection of committee members skewed but the actual testing of standards was also problematic. For instance, test sites were often chosen somewhat arbitrarily. With RAC development, test sites were selected based on the ability of committee members to identify professional and personal contacts, or because they agreed to conduct tests in their parent organisation. The resulting limited sample set did not provide the widest possible test base for understanding the usability or usefulness of RAC. As one interviewee noted,

> [S]o people who were chosen in Europe were people who'd already done the peer review audit and they were all data repositories […] and then in the United States we sort of picked them based on what people here knew […] so two of them were actually repositories that belonged to people who were in the group, […] the Kentucky Archives and Library was recommended […] by [somebody] […] who knew somebody there…[544]

Essentially, the selection of case study repositories was biased by virtue of the fact that institutions were either gleaned from only one repository type (e.g. data repositories), or were selected because standards developers had close ties to them. The interview data indicated that the test sites were chosen based on expediency or because they fulfilled pre-existing conditions (e.g. completion of self-audit). Given the limited sample size, one can argue that the locales used did not represent the full spectrum of situations in which TDR standards could be applied, even though the testing process was intended to measure: '[T]he accuracy, the viability of the checklists and the audit

[544] Interview 25, October 8, 2012.

process'.[545] The research suggests, therefore, that the testing process followed in these examples simply reinforced only one conception of the problematic.

### *7.2.4 Privileging Specific Perspectives*

TDR standards can also be seen as representing the perspectives of specific groups or individuals, whose viewpoints may overwhelm the development process. OAIS and RAC, for instance, are heavily oriented toward the space data community's perception about best practice in digital information preservation.

It is not uncommon for the developers of standards to struggle with addressing different perspectives; as discussed earlier, the final standards tool is often influenced by the vested interests of different participants in the process. To consider this issue of perspective, it is worth looking briefly at research conducted into the development and implementation of ISO 15489, as a comparable example of the level of uptake of a standard across the records and archives community.

In her article examining the development of international records management standards, Gillian Oliver highlights the problems of addressing specific perspectives. In her analysis, Oliver draws particularly on the experiences of Michael Steemson, who observed the ISO 15489 development process. As Oliver states, Steemson described the development process as one where '…other national group leaders resisted being pinned down to Australian procedures […] and he goes on to describe one meeting […] as being characterised by irreconcilable views.'[546]

[545] Interview 22, March 28, 2012.

[546] Gillian Oliver, 'International Records Management Standards: The Challenge of Achieving Consensus', *Records Management Journal* 24, no. 1 (n.d.): 22–31., 23

ISO 15489 was based on the Australian records management standard AS4390, and so the ISO document originally represented that Australian juridical environment.[547] However, as Steemson observed, the Australian perspective embodied in AS4390 proved to be a point of contention for some ISO 15489 committee representatives. Ultimately the development of ISO 15489 was a compromise between various archives and records management traditions and jurisdictions, which, Jakobs noted, is not an uncommon outcome; he suggested that the standards development process is: '…characterized by compromise and hidden agendas.'[548]

Thus, while representatives of the archives and digital library communities did provide inputs into the development of OAIS and RAC, their contributions were minimised in the standards development process. For example, as discussed by Lee in his case study of the development of OAIS, the first working draft of what would eventually become the OAIS standard was written by two space data scientists, Don Sawyer and Lou Reich, who continued to be the primary authors and were also the editors of later versions of the standard.[549] Interviewees confirmed that there was a strong tendency not to want to alter the standard once it had reached its final phases. As one interviewee noted, recounting a meeting between members of the space data and archival communities to discuss the terminology used in OAIS, '[M]y community will never accept the word "ingest"; it's "accession" and the scientists [are] basically saying "accession" will never fly […] it has no meaning or, you know, what does it mean?'.[550] This interviewee also noted that, rather than change the language to meet the wider

[547] Oliver, 'International Records Management Standards.', 23. Susan Healy, 'ISO 15489 Records Management- Its Development and Significance'', *Records Management Journal* 11, no. 3 (2001): 133–42.134.
[548] Oliver, 'International Records Management Standards.' 23. McLeod and Childs, 'Consulting Records Management '.154. Healy, 'ISO 15489 Records Management' 135.
[549] Lee, 'Defining Digital Preservation'., 96.
[550] Interview 22, 28 March 2012.

needs of digital archival preservation, committee members decided to create crosswalks between preferred terms and those used by archivists, again privileging space data language. This interviewee noted that the crosswalks were intended to acknowledge that

> [T]he scientists were aware that the archival community was not completely dead in the water regarding digital preservation, that there were national archives and other data repositories that had been in existence for decades and that had experience with digital preservation.[551]

When any changes were made to the standards based on feedback from the cultural heritage community it only consisted of a re-organisation of the contents, not a manifest change to their meaning or wording. As noted by this interviewee,

> [T]he KB raised the issue then that became the sixth major part of the OAIS reference model the idea of pulling […] everything out that was in the model already and making preservation planning and the technology watch function as a separate and distinct function elevating it…[552]

This same privileging of voices, some of which could be seen as more vocal and insistent, was also evident in the development of TRAC, as shown in this comment from one interviewee. There was, apparently, some disagreement over the inclusion of the 'organisational' function in TRAC, and it appears a certain amount of negotiation was needed to include the function in the final version of the document.

> [T]he organisational section of TRAC nearly got on the cutting room floor, any number of times, during the three years. In fact, even the re-sequencing, which […] I don't understand why it was re-sequenced in ISO […]. The re-sequencing also […] to some extent could be considered diminishing the role of organisational […] but we had to really struggle several times to keep it in because the technology people in the room really wanted to make it all about OAIS and related things.[553]

[551] Interview 22, 28 March 2012.
[552] Interview 22, March 28 2012.
[553] Interview 20, 9 March 2012.

The fact that filtering can occur during the evolution of a standard underscores the argument that biases can be built into standards, as different vested interests press for their preferred interpretations. When discussing the differences between RAC and TRAC, one interviewee noted that one individual greatly influenced the contents of the RAC, as it was felt that it was 'fuzzy.'

> I think it [RAC] changed in two ways [from TRAC], one in articulation of specific points or sub-point within the categories and two in […]phrasing or articulation of the absoluteness of a concept and I think here I would give most credit to[…], my replacement [who] had the clearest vision and the strongest insistence that a point whatever it is[…]should be an absolute.[554]

Essentially this individual influenced the development process to reflect their belief that the requirements should be more precise and substantive. Ultimately, based on the data gathered for this study, the standards development process seems to be inclined towards privileging certain professional discourses and individual views. It can be argued that the privileging of perspectives is not representative solely of OAIS and RAC development but is, in fact, a wider issue with regards to the development of standards in general. Steps can and should be taken to mitigate this potential for biased and limited inputs into standards. Mitigation strategies will be proposed and discussed in the concluding chapter.

### *7.2.5 Inclusion of East African Perspectives*

The composition of standards committees and the TDR standards development process have privileged predominantly developed-world perspectives. However, the questions remain: Were any East African practitioners included in the development process? And if they were not included in the development process, what circumstances led to their exclusion?

[554] Interview 22, March 28 2012.

Those involved in the OAIS development process acknowledge that no East African country was involved either in the initial work on the standard or in its subsequent revision in 2013. When asked specifically during interviews whether anyone from an East African nation was involved in the standards, one interviewee responded, 'Not that I'm aware of […] I have to say no, not directly…'.[555]

Opinions vary about the reasons for a lack of East African involvement. Some argue that the absence of expertise in the region contributed to the dearth in East African representation: 'I think because the standard is very complex, it requires a lot of experience […] at the moment the experience it has to be said is mainly in North America, Australia and Europe'.[556] Others have argued that the lack of African involvement was a question of proximity to the problems of digital preservation. Digital records preservation was not considered to be an immediate issue for East African practitioners and so the perception was that their proximity to the problem was limited, meaning developers did not feel they needed to actively seek out feedback from that community. TDR issues were really only being explored in developed nations in North America, Western Europe and Australasia.

> [I] think part of it was proximity to the problems and so largely that meant, even at that point, you know, North America and Europe, […] we tried really hard […] to include Australia and that was really challenging, it wouldn't have been at the same time challenging to include Africa, but it would have been really hard.[557]

Although there may be a valid argument that there is a shortage of qualified experts in the Eastern African region, it would be incorrect to state that there are no experts in the region able to contribute meaningfully to discussions regarding TDR frameworks and

[555] Interview 22, 28 March 2012, also stated in Interview 20, 9 March 2012; Interview 21, 19 October 2012; Interview 24, 13 July 2012; Interview 25, 8 October 2012; Interview 26, 1 June 2012; and Interview 28, 26 March 2012.
[556] Interview 24, 13 July 2012. This was also echoed in interview 28, 26 March 2012.
[557] Interview 20, 9 March 2012.

certification. Furthermore, the suggestion that digital records preservation issues were not relevant in East Africa ignores the reality that, in that region, as well as other parts of the African continent, there has been widespread ICT implementation at both the regional and national levels, resulting in the production of large volumes of digital records and data. The concerns and constraints of East African practitioners with regard to digital records preservation may be different from those in the developed world, but this fact does not diminish the proximity of East Africans to the issue.

Some participants did not feel that East African practitioners were unduly excluded from the development process. As one interviewee noted, '[T]he process was open as it possibly could be in terms of invitation and announcement of the process, the fact that it is an open website, that it's a web chat […] that, you know, basically all it takes is access to the internet…'.[558] To presume, however, that a general call over the internet is enough of an effort at inclusivity presumes that East African practitioners (1) knew where to look for the invitation and (2) had the ability to access the internet. In reality, access to online resources was almost non-existent in the East African region in 1997 when the TDR standards were first being developed (i.e. OAIS).

Indeed, access continues to be problematic in some parts of the region, as this thesis has shown. One can argue that posting the wider call for participants online did little to ensure greater inclusivity of East African practitioners but, instead, unintentionally privileged the developed-world perspective because those in the developed world could readily access the internet. To mitigate such a problem in future, there should be a pool of experts or at least a professional point of contact – either at the regional or national level – that standards developers can turn to in order to locate

[558] Interview 22, 28 March 2012.

potential participants in standards projects. International associations such as the International Council on Archives could maintain such lists and could also assist technical committees or standards bodies with the task of contacting those individuals.

The situation at TC20/SC13 did not improve the level of inclusivity of East African representatives. Both OAIS and RAC were submitted to TC20/SC13 for review and balloting, a process that did not involve any input from any African country. Most of the P-members of TC20/SC13 come from the developed world. They include members from: China, France, Germany, Israel, Italy, Japan, the Russian Federation, United Kingdom, United States and Ukraine. [559] There are a few developing nations among the P-members and they are Brazil and India, however no African countries are represented on this committee. Furthermore, the Sub-Committee does not seem to have questioned the committee composition at CCSDS or the testing process for the standards. There seems to have been an implied expectation by members of TC20/SC13 that the development process was inclusive and consensus based. As noted by Lee, when discussing the review process of OAIS: '[I]t generally was not "where the action was" in terms of influence and negotiation over the contents, scope and public framing of the Reference Model'.[560]

Both the committee selection and testing processes supported a highly homogenised view of the perceived issues associated with TDRs and the role of standards in addressing these issues. East Africans remained outside the circle of inclusion during the standards development and testing process, not, one might suggest, out of malice but rather out of ignorance.

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[559] International Standards Organisation. 'ISO/TC20/SC13- Space Data and Information Transfer Systems' http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee_participation.htm?commid=46612. There are O-members or observing members but as they are not able to directly influence the development process they were not included in the listing above. However they do include Argentina, Belgium, Finland, Iran, Kazakhstan, Republic of Korea, Poland, Romania and Sweden. See also Lee, 'Defining Digital Preservation'., 137-138.

[560] Lee, 'Defining Digital Preservation Work'., 137.

### *7.2.6 Aligning OAIS and RAC with East African Digital Preservation Needs*

Given the lack of African input into the OAIS and RAC standards the next question to ask is: How transferable are the final TDR standards are from one context to another? To assess transferability we need to compare the impetus behind those standards (M1 (DW)) against the needs of East African practitioners (M1 (EAC)). If the concerns behind the development of TDR standards are similar between these two groups, then one can argue that the standards should be able to assist East African institutions to articulate their own TDR programmes regardless of the level of inclusivity in the standards development process. If, however, the M1 (DW) and M1 (EAC) needs do not align, one must question the transferability and applicability of those standards to contexts outside of their creation.

As shown in table 7.2, an analysis of interview data of the impetuses behind the creation of OAIS and RAC, contrasted against the needs of East African archival community (as discussed in Chapter 6), demonstrates a disconnect between the expectations of TDR standards and the realities faced by East African practitioners.

**TABLE 7.2: CONCEPTUALISATION OF DIGITAL RECORDS ISSUES FROM DEVELOPED WORLD AND EAST AFRICAN PERSPECTIVES**

| **M1 (Developed World)**[561] | **M1(East Africa)**[562] |
|---|---|
| - Preserve aircraft (space craft) maintenance data<br>- Create a common terminology<br>- Follow on to OAIS as a mechanism to demonstrate that digital repositories are indeed OAIS compliant.<br>- Measure good practice<br>- The need to create a measure for | -Ensure the proper capture and preservation of digital government records<br>-Limited access to IT infrastructure (i.e. software and servers) that can support and sustain digital records preservation.<br>- Lack of basic infrastructure, such as consistent flow of electricity, to support |

[561] This is an overview of data from M1(DW) interviews namely: Interview 20, 9 March 2012; Interview 21, 19 October 2012; Interview 22, 28 March 2012; Interview 23, 1 June 2012; Interview 24, 13 July 2012; Interview 25, 8 October 2012; Interview 26, 5 October 2012; and Interview 28, 26 March 2012.

[562] This is an overview of data from M1(EAC) interviews namely; Interview 17, 18 September 2012; Interview 18, 15 June 2012; and Interview 19, 17 September 2012.

| | |
|---|---|
| trustworthiness. | digital preservation initiatives. Also lack of expertise to cohesively tackle digital records preservation<br>- Disconnect between ICT professionals and the archives. |

OAIS and RAC emerged out of a need to create a framework to enable the preservation of digital records and then to measure whether organisations were able to meet the requirements of that framework. The standards are more conceptual than practical because they are based on the assumption that the infrastructure, expertise and systems needed to establish and maintain trusted digital repositories are readily available. The problems identified by African scholars and practitioners in connection to digital records preservation are much more basic: there is a fundamental need for infrastructure to support hardware needed for digital preservation and for qualified personnel to inform digital preservation tasks.

Given that the primary intention behind the standards does not correlate with the reality of archivists of the East African region, the applicability of those standards is in doubt. This concern does not mean that East African archivists should abandon digital preservation but it does challenge the assumption held by standards developers that standards are objective and that they represent the 'best' way to address a problem in this case by the establishment and certification of TDRs. As shown in this section, the selection of committee members, the manner in which standards are tested and the ability of specific actors to influence and control the process demonstrates that the standards development process is not without its shortcomings. The final outcome – the standard itself – is inevitably a representation of this skewed approach.

### 7.3 The Applicability and Usefulness of OAIS and RAC – Perceptions of Standards Developers (M1 (DW)) and Digital Repositories Practitioners (M3 (DW))

The previous section discussed issues in the standards development process that influence the transferability of those standards to an East African context. But one must also ask if the standards – designed and developed primarily by representatives of the developed world – actually address the needs of repositories in the developed world. Expanding on the analysis in Chapter 5, this section considers in greater detail the level of usefulness of TDR standards based on interviews with repository operators. Ultimately, the question to consider is: If standards are not effective in the milieu in which they were developed, can they be useful if transferred to developing world environments such as in East Africa?

To contextualise the discussion we will first begin by examining the perception of standards developers regarding presumptions that may be built into the standards. This analysis will help to determine if it is possible to consider standards to be transferable given the biases incorporated into them. This will be followed by an examination of the perceptions of digital repository operators regarding the usefulness of TDR standards.

#### *7.3.1 Acknowledged Presumptions and Problems in Standards*

Even standards developers acknowledge that certain presumptions have been incorporated into TDR standards, which may have affected their uptake. For instance, there is an expectation that users will familiarise themselves with the language used in standards, as well as an assumption that a pool of experts or qualified practitioners will be available to facilitate the interpretation and use of the standards. OAIS, and by extension RAC, have introduced a new way of speaking about digital records preservation. Indeed, some practitioners in the case study institutions noted their

objection to these standards, expressing concern about the specific orientation implicit in the language used to address digital repositories and digital records.[563]

Even some developers admit that TDR standards presume that users will come to an understanding of the terms and will comprehend how to translate the standard into their particular context. As one interviewee noted, '[T]here's an assumption that you'll come into with some understanding of these terms but then maybe that's an assumption that's borne out of us in the West […] I don't know if those same expectations are legitimate'.[564]

This expectation assumes not only that practitioners will understand this new language but also that there will be enough trained professionals to interpret the terminology in order to establish and evaluate a TDR. As another standards developer points out, these standards demand that users come with a certain knowledge base:

> One thing, one really good thing the big issue of the standard is to have people well trained, it means people will have experience, knowledge and have the capacity to have a specific, not so easy, education, now training. Training, even more than training you need people at high level of quality in the sector and sometimes the transfer of this capacity is not easy at international level.[565]

Access to trained or experienced digital records experts is perhaps a reasonable expectation in the developed world, provided the organisation has the necessary resources to engage such an individual. In East Africa, such an expectation is not realistic given the limited number of digital records professionals, as discussed in Chapter 6. Thus, even standards developers acknowledge, OAIS and RAC contain assumptions that complicate their usefulness, in both the developed world and developing world contexts.

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[563] Interview 10, 12 October 2011.
[564] Interview 28, 26 March 2012.
[565] Interview 24, 13 July 2012. This is also discussed in interview 28, 26 March 2012.

Standards also present problems that frustrate their usability, regardless of context, because they can be too ambiguous, prescriptive, labour intensive or costly to implement. Even standards developers admit to weaknesses in the standards they worked on; one recurring issue was the ambiguity of the standards, a complaint that some developers felt could be used to legitimise non-compliant TDR operations.

> OAIS, could it be used by [a] novice? Well I think you'll probably stick with what seems simplest, which is basically that nice big functional map […] and that's the danger of these things that […] people seeking to legitimize their activity would do so without necessarily thinking about the depth that's required to do so…[566]

Because OAIS presents an extremely general framework, its full application is impractical and the ability to measure compliance is difficult. As the same interviewee noted,

> [I]n the case of OAIS […] is fairly, sort of, broad but at the cost of […] again of specificity and I think it presents a pretty […] detailed but wholly unpractical model […] People looking for a specification on something for a repository obviously wouldn't find that in OAIS and it's conceptually much more detached…[567]

In reality, as discussed in Chapter 5, it seems that the ambiguity of OAIS means that it can serve to legitimise poorly managed digital repositories, while being too general to help guide TDR operations sufficiently.

Similar difficulties exist for RAC. Some standards developers contend that there is not a sufficient degree of detail in RAC to allow an accurate assessment of compliance. As one interviewee noted, 'I think that the standard [ISO 16363] is good but there are […] things that should be developed more […] because the standard is very detailed but there is not metrics how to evaluate…'.[568] The ambiguity in RAC, despite its prescriptive nature, might explain why some consider the RAC certification process so labour

[566] Interview 28, 26 March 2012.
[567] Interview 28, 26 March 2012.
[568] Interview 24, 13 July 2012.

intensive. It is difficult to understand what constitutes compliance for a given requirement.[569]

Practitioners also feel that RAC and its predecessor TRAC are too prescriptive and time consuming to implement, as discussed in Chapter 5.[570] As one interviewee noted, 'I think it's pretty labour intensive […] to do an audit […] on both sides, you know, the people who are doing the auditing and the people who are getting audited'.[571] Even if greater specificity were added to RAC, the workload would not diminish. This burden on time and resources is the primary obstacle for practitioners.

Ultimately, the value of TDR certification comes into question. Merely receiving the designation of being 'trusted' does not by extension mean a repository can save on costs or operate more efficiently. For the resource expended, practitioners see little return for themselves or their institutions, as one interviewee argued. '[O]kay first question: what does it get us? Why would I spend a load of money getting a piece of paper? Who do I have to answer to whether my digital preservation system works? […] Getting a piece of paper that says it's a Trusted…[…] doesn't matter […]to that authority chain'.[572]

One can also question whether the designation of 'trustworthy' or 'trusted' necessarily means that a repository is fit for purpose. One could feasibly tick all the boxes of an audit and certification standard but then find that operating the repository at the level in order to maintain its 'trustworthy' or 'trusted' status is too expensive or the service levels cannot be maintained.

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[569] This issue was brought up in interview 21, 19 October 2012. See also Alliance for Permanent Access to Records of Network Science, 'Report on Peer Review of Digital Repositories (Part B of D33.1)' (APARSEN, 2012), http://www.alliancepermanentaccess.org/wp-content/uploads/downloads/2012/04/APARSEN-REP-D33_1B-01-1_0.pdf.

[570] See chapter 5 for further discussion on this topic.

[571] Interview 25, 8 October 2012.

[572] Interview 10, 12 October 2012.

A similar concern relates to the impact of ISO 15489. As one of the interviewees in the McLeod and Childs study stated that:

> It's possible a records management system ticks all the standards boxes but fails because the business feels that it doesn't align sufficiently with business needs […] some records management programmes which are very effective in business terms would probably no comply with the standard.[573]

Although 15489 is not a compliance standard like RAC, this comment does underscore some of the problems with standards, particularly in relation to the assessment of a programme's viability against the requirements of the standards themselves.

In the end, certification does not help practitioners address the operational problems they may have. Instead certification only tells them whether or not they conform to a prescribed set of criteria. This does not, by extension, improve repository operations or assist in addressing challenges which calls into the question the usability and usefulness of TDR standards even amongst developed world repositories. Whilst there are drawbacks to audit and certification standards,one benefit they can provide is to enable repository operators to advocate for further investment in programmes and systems. Audit and certification standards can also serve as tools for supporting the employment of individuals with more advanced technical skills, as the standards allow an objective assessment of programmes and operations.

### *7.3.2 Inalienability of Standards*

Even though the standards developers interviewed acknowledged the assumptions and shortcomings in TDR standards, they still feel that these standards should be applicable regardless of the context in which are used. Many developers believe that OAIS and RAC are flexible enough to be applied in any context; any limitations stem from the ability of

[573] McLeod and Childs, 'Consulting Records Management '.,154

the agency implementing the standards to interpret and adapt them to local requirements. As one interviewee noted, 'I think that the standards we have now, the only limitation on them in implementation are people's imaginations and ability to use them'.[574] But this assumption obviates the basic premise of standards, which to create homogeneity or greater commonality of practice, since creativity is, by its nature, antithetical to conformity.

Another interviewee suggested that simply studying the terminology used in OAIS would support compliance.

> [I] think it's flexible enough […] to apply. I really think people have to understand the OAIS and what the definitions are there […] I think a lot of times people take the document without looking at the OAIS but I think as long as they understand that a lot of the definitions like Designated Community and Preservation Strategy and Contingency Planning, as long they understand what these things are then I think they can put it all together and create a customised audit for a particular type of class of repository. [575]

As discussed earlier, this presumption that practitioners using TDR standards will take the time to familiarise themselves with the associated terminology privileges professional discourses and cultural contexts, ultimately subverting the assertion that standards are wholly transferable.

In the end, the usability of TDR standards still requires the practitioner to use a specific terminology both to construct their repository and to understand the conceptual frameworks that underlie the tools. Surprisingly, even after admitting that TDR standards have shortcomings, all the developers interviewed still steadfastly believed in the transferability of the standards to any context.

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[574] Interview 20, 9 March 2012. Also stated in: Interview 21, 19 October 2012; Interview 22, 28 March 2012; Interview 23, 1 June 2012; Interview 24, 13 July 2012; Interview 25, 8 October 2012; Interview 26, 5 October 2012; and Interview 28, 26 March 2012

[575] Interview 25, 8 October 2012. Similar comments were made in interview 24, 13 July 2012.

### *7.3.3 Perceived Usefulness of TDR Standards by Digital Repository Operators*

As discussed in Chapter 5, compliance with TDR standards was patchy at best in the developed-world case study repositories. Many were following the specifications set out in OAIS and RAC only moderately, if at all. The major barrier to using the standards seems to be a gap between the realities of operating a digital repository and the (often costly) technical and prescriptive requirements set by the standards, which do not necessarily address operational needs.

The disparity between the impetus behind the standards and their subsequent interpretation by practitioners demonstrates that TDR standards are not answering the actual needs of digital repositories, a finding illustrated in the following figure.

**TABLE 7.3 COMPARISON OF STANDARDS IMPETUS (M1 (DW)) AND ACTUAL PROBLEMS FACED BY DIGITAL REPOSITORIES IN THE DEVELOPED WORLD (M3 (DW))**

| **M1 (DW) Standards Developers**[576] | **M3(DW) Digital Repository Practitioners** [577] |
|---|---|
| - RAC work builds on existing documents and white papers dealing with TDRs namely *Preserving Digital Information* (1995) and *Digital Repositories: Attributes and Responsibilities* (2002).<br>- Measure good practice.<br>- The need to create a measure for trustworthiness and demonstrate what constitutes compliance. | - Scale of digital records preservation and managing digital repository.<br>- Administering ingest workflows and processes in controlled and uncontrolled records production environments.<br>- Acquisition of near contemporaneous records. |

When asked about OAIS compliance case study repositories stated that since their digital repository software was ostensibly OAIS compliant, so was their repository. '[W]e have this system it's based on OAIS model […] because this system this is for long-term preservation purposes […]so it has all the functionalities, it's user […] based on this basic

[576] This is an overview of data from M1(DW) interviews namely: Interview 20, 9 March 2012; Interview 21, 19 October 2012; Interview 22, 28 March 2012; Interview 23, 1 June 2012; Interview 24, 13 July 2012; Interview 25, 8 October 2012; Interview 26, 5 October 2012; and Interview 28, 26 March 2012.

[577] This data is an overview of major issues identified in M3(DW) data which is presented at length in chapter 5.

idea from OAIS model…'.[578] The OAIS reference model was never intended to be an assessment framework for TDR compliance, although it is used in that manner by many repositories. It was merely intended as a guide to provide basic components of TDR operations including a common lexicon. Many interviewees, however, found the level of detail in OAIS impeded rather than aided its usefulness.

> But to be quite honest, other than providing us with [a] very broad framework of language and a broad framework of concepts, we don't find the OAIS model particularly useful […] it's kind of a bit of a distraction. […] the detail kinda gets in the way […] it's too prescriptive. [579]

Thus, the standard is seen by some practitioners as too prescriptive and not useful. One interviewee involved in the translation of OAIS for a national standards committee in Scandinavia stated that they only translated the concepts and functions. He argued that the latter part of the standard was just too prescriptive, detailed and technical; as such it was omitted from the translation.

> [B]asically from the beginning the basic concepts, basic functionalities but in the end of the document there are quite detailed parts about migration, object management and those…those are little bit too technical to talk about in this wider audience so we thought it okay, if somebody is really interested in about those then they can read it detail.[580]

There seems to be a general consensus among the archival profession that OAIS was a good epistemological reference point for digital records preservation and for the functionalities of digital repositories. But its usefulness as a whole was impeded because many felt it was too prescriptive and detailed, which is perhaps why it has only had limited uptake by many of the case study repositories.

Not only did digital repository standards operators have difficulty with OAIS, but the broader digital preservation community questioned some of the underlying

[578] Interview 13, 21 September 2012. A similar sentiment was echoed by Interviewee 10, 12 October 2011.
[579] Interview 10, 12 October 2011.
[580] Interview 13, 21 September 2012.

implications of the standard. Some of the terms used, for instance, could not be applied easily in a cultural heritage repository environment. As Chris Rusbridge noted in his Digital Curation Blog (from 6 July 2007 to 9 March 2009), the term 'Representation Information' was one example of a problematic concept. Representation Information (RI) is defined by OAIS as: 'The information that maps Data Objects into more meaningful concepts.' Data Objects are basically bits or binary code; and a computer needs a standard piece of software or code to be able to represent the data object in an understandable form. For example, a JPEG is simply bits but when the JPEG standard is used it transforms the bits into pixels, making the data object (i.e. JPEG) understandable.[581] In Rusbridge's 6 January 2009 blog post, he documents an email exchange with several of his colleagues, which highlights problems with the definition. For instance, representation information for legacy or older digital formats may be inadequate or non-existent. If, according to OAIS, representation information is essential to the process of rendering digital objects, what happens when a repository does not have or cannot gain access to representation information? How can the digital object be preserved and the repository remain OAIS compliant at the same time? Gaps in the practical application of OAIS are keenly felt in complex digital preservation environments, especially where legacy formats need to be maintained.[582]

Certification standards like RAC have also met with mixed acceptance by practitioners. Some have taken parts of the certification standard and modelled their digital repository operations against it, whereas others have rejected the idea of certification, arguing that it has no tangible benefit for the institution generally or the

[581] CCSDS, 'Reference Model' 1-14 to 1-15

[582] Chris Rusbridge, 'Representation Information: What Is It and Why Is It Important?', 6 July 2007. 'Represenation Information from the Planets?', 14 April 2008. 'Email Discussion Aon the Usefulness of File Format Specifications', 6 January 2009, *Digital Curation Centre- Digital Curation Blog* www.digitalcuration.blogspot.co.uk.

repository specifically. One case study repository only found the technical requirements dealing with object management and system functionalities to be helpful and so drew on those parts of RAC when they constructed their repository. '[S]ection A is about organisational stuff, so we [pfft] got rid of those, so more about the functionalities and the level of details was very convenient for us and in this sense was very useful'.[583]

Sections touching on organisational infrastructure were not deemed as relevant to digital repository operations as sections addressing technical issues, often because policy-related recommendations were not pertinent in some jurisdictions and sometimes because staff felt that requirements in question were either not necessary or were irrelevant to their operations. In some case study repositories, staff felt that the repository had no need to demonstrate to an external authority the validity of its repository operations: 'I mean and that's not to disrespect to the process because other institutions may well for their own purposes need to demonstrate to an external authority, just that I don't perceive that we currently need to…'.[584]

In his 5 August 2014 blog post, David Rosenthal details the long , complex and at times convoluted process for certifying Controlled Lots of Copies Keeps Stuff Safe (CLOCKSS) archives. The process described by Rosenthal for creating, tracking and linking documents to TRAC criteria took up to six month of preparation before the audit process could even begin. Creating wikis to provide auditors with access to compiled documentation also took tremendous time and effort . All in all, Rosenthal noted, the audit process, including preparation time, took a year and a half.[585] The high level of

[583] Interview 13, 21 September 2012.
[584] Interview 10, 12 October 2011. This sentiment was also echoed in Interview 11, 14 September 2012.
[585] David Rosenthal, 'TRAC Audit Process', *DSHR's Blog*, 5 August 2014, www.blog.dshr.org.

financial and staff resources required to apply certification standards such as TRAC may be one reason for their limited uptake by repositories.

Another reason TDR standards may have limited uptake may be that the standards do not address practical needs. Many believe that the realities faced by repositories are inherently different from those that TDR standards are attempting to define, regulate and quantify. This perception is echoed in the sentiment of one interviewee who stated: 'I think the challenges we face are very different really in a way. The challenges we faced are first of all about scale […] Secondly there are problems of security […]Thirdly, there are problems of sensitivity…'.[586]

The applicability of standards to repository operations can be seen as a battle between theory and practice. Theories, like standards, try to provide practitioners and organisations with a homogenised way of applying the best possible practices to ensure quality outcomes: in this instance, the longevity and integrity of digital records. However, the realities of attempting to manage digital records seem far removed from the seemingly idealised environment presented in standards, where resources and technical infrastructures to support complex preservation processes seem to be limitless.

As shown, studies examining impact and usefulness of ISO 15489 have highlighted many of the same problems faced by institutions attempting to implement OAIS and RAC. There has been limited uptake of ISO 15489 by records and archives practitioners, and that standard has had only limited impact on the profession. This finding was underscored in the McLeod and Childs study examining the impact of 15489,

[586] Interview 11, 14 September 2012.

a study conducted ten years after 15489 was endorsed as a standard. After completing two longitudinal surveys, the authors observed the following:

> The findings from the two longitudinal strands showed that the impact of ISO15489 had not been huge and had been varied and particular to specific organisations. The standard has been used in different ways but generally not in great detail, it had some influence on records professionals but little wider influence …[587]

Professionals surveyed in the McLeod and Childs study still felt positive about ISO 15489 but believed that it had limited reach within their organisation, which is much the same sentiment echoed by interviewees in this study when considering the impact of OAIS and RAC.

There seems to be a clear disconnect between the intent of standards and the realities faced by digital repository practitioners. The OAIS and RAC standards seek to create an environment to compare and measure repositories, building on previous initiatives or create metrics to qualify and quantify TDRs, but they do not address the problems faced in the actual operation of digital repositories. This gap might partly explain why the standards are underused by case study digital repositories.

### 7.4 Practicality of Establishing a TDR in East Africa – A Comparison of M3 (DW) and M3 (EAC)

If standards have a limited applicability to developed nation digital repositories, even though standards developers used the developed-world environment as the basis for designing and testing the standards, it is questionable whether the standards would be transferable to a wholly different cultural, social and operational context. One instance where the question of cultural constructs was examined is by archival researchers Wendy Duff of Canada and Verne Harris of South Africa in their 2002 study on

[587] McLeod and Childs, 'Consulting Records Management,' 149.

descriptive standards. They looked particularly at the impact of standards that originated indifferent archival traditions when applied in a new juridical and cultural context.[588] For example, they considered RAD and ISAD(G), which are based on Canadian (RAD) and European (ISAD(G)) archival practices, and found that the standards do not necessarily conform with typical archival practices in other parts of the world, such as, in this instance, South Africa. Thus as with descriptive standards, the exclusion of East African practitioners from the TDR standards development process has meant that their digital preservation needs and realities are not reflected in the final standard. As discussed earlier, TDR standards bring with them certain expectations regarding regulatory frameworks, access to resources and technical and staff capacity. Are those expectations met by reality in resource-poor environments such as East Africa? This next section seeks to synthesise and analyse discussions from previous chapters (e.g. Chapters 5 and 6) regarding the realities of repository operations in the developed world and in East Africa. The analysis focuses on regulatory frameworks on the availability of qualified personnel and on infrastructure and technical capacity. The purpose of the analysis is to ascertain whether it is possible to draw parallels between developed world case study repositories and East African digital preservation programmes, in order to assess the practical applicability of operationalising TDR standards.

The following table compares the realities of M3 (DW) and M3 (EAC), in order to underscore the presumptions underlying TDR standards and the reality in the East African environment.

[588] Wendy Duff and Verne Harris, 'Stories and Names: Archival Description as Narrating Records and Constructing Meanings', *Archival Sciences* 2 (2002): 263–85.

**TABLE 7.4: M3 COMPARATIVE ANALYSIS OF DIGITAL REPOSITORY OPERATIONS AND THE FEASBILITY OF SIMILAR MODELS IN EAST AFRICA**

| **M3 (DW) Digital Repository Practitioners**[589] | **M3 (EAC) National Archive Programmes** [590] |
|---|---|
| - Access to affordable hardware and software applications to support digital records preservation.<br>- Ability to recruit individuals with expertise in digital preservation, information technology, network security and other related fields.<br>- Access to sufficient resources for digital preservation initiatives.<br>- Have basic infrastructure to support TDR functions and activities (i.e. stable electricity supply, affordable internet connections, widespread connectivity of end users) | - Difficulty accessing or procuring hardware to support digital records programmes, all has to be imported.<br>- Absence of or difficulty in attracting qualified IT specialists.<br>- Dearth of trained digital archivists to support and enable digital records programmes and over reliance on external consultants to bridge knowledge gap.<br>- Unstable funding streams to support digital records preservation initiatives.<br>- Inability to access stable electricity supply, affordable internet services and limited accessibility of online resources by end users (i.e. urban rural divide) |

As will be discussed in this section, the practical applicability of operationalising TDR standards in the developing world environment is hampered by deficiencies in the assumptions built into TDR standards, which expect that regulatory frameworks, qualified personnel and infrastructure and technical capacity will all be adequate to the task of TDR implementation. The assumptions found in the standards complicate their effective use in an East African context.

### *7.4.1 Regulatory Frameworks*

Regulatory frameworks are a vital component of any TDR. They provide the repository with a formal scope and remit for their operations. Both OAIS and RAC require the organisation to have a strong mission statement, tasking the repository with oversight for digital preservation.[591] All developed world case study institutions had mission

[589] This data is an overview of major issues identified in M3(DW) data which is presented at length in chapter 5
[590] This data is an overview of major issues identified in M3(EAC) data which is presented at length in chapter 6
[591] TC20/SC13, 'Open Archival Information System - - A Reference Model'., 2-2 and TC20/SC 13, 'Audit and Certification

statements that, in varying degrees, gave them responsibility for managing the preservation and long-term access to digital records. Some of the remits, however, were more clearly articulated – giving these repositories firm responsibility over digital records preservation – whereas other remits were more ambiguous, requiring the institutions to extrapolate their responsibilities.

The ambiguity of remits in some of the case study repositories might result in their failure to qualify as a TDR. Auditors would have to assess their success based on the evidence presented. Neither TDR standard, however, includes a definitive measure of what constitutes an acceptable remit. Further, no guidance is provided to help auditors or others make that assessment. As such, meeting this basic TDR requirement is problematic, even in digital repositories in the developed world. And in the two East African national archives included as case studies, only one has a mission statement that clearly tasks the institution with providing guidance on digital records management and preservation.

Even without an explicit remit, the other East African national archives still felt they had a responsibility to provide advice on the preservation of digital records created by government departments. But even a formal remit, policy or procedure is ineffective unless it is enforced and, as mentioned in Chapter 6, enforcement is an issue in East Africa because policies are often created to placate external funders or to secure funding from international organisations, not to support actual operations.[592] In reality, there can be a serious gap between the existence of a policy and the commitment to execute the function articulated by that policy, particularly in East Africa.

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of Trustworthy Digital Repositories'., 19 and 21.

[592] This finding is also discussed in IRMT, 'Managing Records - Uganda.'

In the developed world some organisations are creating policies and procedures for the sake of conforming to TDR standards requirements. By creating policies simply to 'tick a box' for a self-assessment or audit is not a valid representation of repository operations and there is a risk that as these policies are not borne out of an actual need that they go enforced. As one interviewee noted,

> Many people who have sat down either with DRAMBORA or with TRAC have tried to apply them just themselves for a self-analysis have come away from that saying well I spent … you know, this took me for ever because I got to this point and I don't have that policy, and they're calling for x and I don't have that, so I wrote a policy, so um … I think that's where we are with a lot of these repositories.[593]

Creating a policy or procedure simply to comply with a standard does not necessarily lead to adherence, but at the same time a commitment can exist without explicit documentation to that effect. In the end, the expectations in TDR standards that formal regulatory frameworks exist can be problematic in the East African context, not because regulatory frameworks are not helpful but rather because the frameworks underpinning TDR standards presume certain ways of working that are not necessarily meaningful in East Africa.

### *7.4.2 Availability of Personnel*

Personnel capacity is another significant expectation for TDR operations addressed in OAIS and RAC. In both standards there is a presumption that there is a pool of experts within or accessible to the organisation who will help to design and manage repository operations.

The availability of qualified specialists was not necessarily a problem for digital repository case study sites in the developed world, but it was an issue for national

[593] Interview 21, 19 October 2012.

archives in East Africa. All of the case study repositories had a variety of specialists on hand with skills ranging from XML programming to database administration, network administration, digitisation and digital records management.[594] As well, training programmes in ICT and archival studies courses in the developed world are advanced, ensuring graduates have enough knowledge to make meaningful contributions to the workplace.

Similar programmes are not common in the East African region, creating a dearth of experts in both ICT and archives, particularly with respect to trained digital archivists. In their article on designing a new computer science curriculum in Ethiopia, [595] as discussed in Chapter 6, Heeks and Bass noted that the lecturers in computer science programmes did not have the requisite knowledge base to teach new modules.[596] This lack of capacity underscores the problems faced across the East African region, a reality well illustrated in the words of a national archivist in the region, who stated: 'We are thinking of having a consultant to lead us on how effectively we can do it because as I told you we have a very low capacity. We have low capacity in IT here and we depend on the director of management and information services to direct us, to assist us on specifications'.[597]

OAIS and RAC are built on the assumption that expertise and capacity exist or can be obtained, which appears to be a developed world perception. Indeed, as one standards developer noted, 'I think technical expertise can be imported, exported,

[594] Personnel section in chapter 5 discusses the expertise and capacity of case study digital repositories and in particular their personnel, especially the perception of some employees who do not view themselves as archivists but as XML experts.
[595] Heeks and Bass, 'Changing Computing Curricula'.
[596] Heeks and Bass, 'Changing Computing Curricula'., 18 and 21
[597] Interview 16, 5 August 2011

created any place in the world actually, so I don't think that's the hard part'.[598] This belief in the transportability of expertise does not take into account the complexities associated with fostering technical expertise in the East African region. Importing knowledge through the use of consultants does not erase the knowledge gaps in the region. And as discussed in Chapters 4 and 6, creating technical expertise in country requires curriculum re-development and re-training of existing faculty or the addition of new faculty with expertise in the field. This type of capacity building takes years, a fact not taken into consideration during the standards development process and, thus, is not reflected in either OAIS or RAC.

### *7.4.3 Infrastructure and Technical Capacity*

OAIS and RAC contain fairly detailed technical requirements, in order to measure whether systems have the capacity to maintain authentic and reliable digital records. The usefulness of the technical requirements in the developed world varied across case study repositories. Some, such as repositories in Scandinavia, used the guidelines to model their digital repository functionalities, but other repositories did not draw on the requirements at all.[599] But the standards are silent with regard to actually constructing the technological architectures needed to support digital repository processes. Standards developers indicated that they did not want to be seen endorsing any specific types of hardware or software, instead leaving repositories to develop their own architectures.

Generally speaking, the majority of developed-world repositories had fairly sophisticated IT structures for ingest, preservation and access. They have terabytes, if not petabytes, worth of storage, as well as media servers, tape libraries, database

[598] Interview 21, 19 October 2012
[599] Much of this discussion is detailed in chapter 5.

servers and mirrored architectures.[600] The complex explanation provided by one case study repository network administrator, quoted below, underscores the intricacies involved with building digital repositories and the level of technical expertise required to facilitate operations.

> [W]e used to not serve anything basically from the archive […] all my SAN storage, all my bulk they are 1 terabyte SATA disc at 7200rpms each and that's the archive. We didn't used to pull anything out of there it was just kinda it sat there and so now when people come to the site we're pulling stuff right out of that and then one of the search engines will convert it on-the-fly if you wanted that and then it's going to cache this so if you come back again, this is actually cached up on our media server now. And then some of the things we have are really, really big and so we like, they'll pre-cache the media server with those because it would take a long time for the database to do it.[601]

TDR standards are being held up as the authoritative measure of authentic and reliable digital repository operations, yet in reality it is left to TDR operators to construct the infrastructures required. The standards themselves do not meet the needs of the institutions they were intended to support. One has to question, therefore, how these standards can be transferred to a completely different cultural context, particularly one with serious weaknesses in infrastructure capacity?

As discussed in Chapters 4 and 6, the serious infrastructure and capacity issues in East Africa mean that transferring TDR conceptual and practical models into the region is not realistic. Firstly, the ability to access servers, SATA discs and other hardware is difficult and ordering from overseas can sometimes bring with it high tariffs.[602] Further, many digital repository solutions were entirely designed in the developed world,[603] and as discussed in Chapters 4 and 6 are imbued with their own cultural constructs, affecting

[600] This also is discussed in chapter 5, under the heading of preservation and access, since much of the technological architecture is meant to support these features.
[601] Interview 6, 18 July 2011.
[602] This issue was discussed in chapter 6 based on a conversation I had with a colleague in Ethiopia. Interview 19, 17 September 2012.
[603] Tassela (UK), LOCKSS (US), Archivematica (Canada), DSpace (US) and Fedora (US). There are other digital repository software programmes in use but these have been used in various cultural heritage institutions.

their use in other environments.[604] As well, easy access to basic infrastructure like electricity and broadband service, which is presumed in TDR standards, is not the reality in East Africa, again as discussed in Chapters 4 and 6.

**7.5 Summary**

This chapter has used the methodological framework, building on analyses in Chapter 6 regarding the digital preservation realities in East Africa, to analyse the impetus behind TDR standards (M1 (DW)) and whether they reflect the concerns of East African academics and practitioners (M1 (EAC)). This was done in order to understand whether the standards support regional requirements for the management and care of digital records.

In the examination of the impetus behind standards, there was only a limited relationship between the driving force behind the articulation of the standards and the needs identified by East African interviewees. OAIS and RAC seem to be responses to developed world needs and thus privilege developed world perspectives, albeit without malice. The origins of OAIS in the space data community meant that the priorities of that community took precedence over the inputs of others, including those from the information and archives communities.

The standards development process has, in effect, reinforced the views of standards developers. Both OAIS and RAC committees were populated by individuals from the developed world, and the RAC test sites also came from the developed world. Standards developers involved in both projects readily admitted that there was little or no consultation from East Africa or elsewhere in the developing world. Further it was

[604] Bernard, 'Diversity and Progress', Lind, 'On the Design', Molella, 'Introduction', Mundy, 'IT in Developing Countries', Roche and Blaine, eds., 'Introduction', Rolland and Monteiro, 'Balancing the Local and the Global', Talukder and Joham, 'A Multi-Perspective Cultural Study', Van Ryckeghem, 'Computers and Culture', Westrup, 'What's in Information Technology?'.

discovered that practitioners in case study repositories found that the standards had limited usefulness, in that they did not meet or address the actual demands involved in operating a digital repository. The standards drew on theory to the detriment of practical application.

Furthermore, the ISO committee which reviewed and approved the standards was almost entirely comprised of developed nations and of the developing world representatives on the committee, not one from an African country. Thus not only were East Africans excluded from the development process for the TDR standards but they were also not given the opportunity to participate in the review and balloting process in TC20/SC13.

Surprisingly, even though intrinsic issues prevented the usefulness of standards in both developed nation and the East African context, there was a belief by developers that TDR standards were still sufficiently generalised to be transferable to any context. It could be that many of the developers have invested so much of their time and resources in the development process that they feel unable to acknowledge any shortcomings in the standards they worked on. Some may also have a vested interest in ensuring the widest possible uptake for OAIS and RAC, which would be reduced if it were found that they were not useful in different contexts.

Overall, this chapter has called into question the belief that TDR standards are transferable in any context. The initial impetus behind the standards does not appear to answer the needs of the environments in which they were developed, nor do they seem to suit the requirements identified by digital records experts for the East Africa region. The developing and testing processes used to design these standards fails to acknowledge the very real challenges facing places like the East African Community.

Even the argument that standards should be general enough to suit any situation is called into question by the analysis in this chapter. In both the developed and developing world, the standards are not necessarily meeting the real needs of those trying to develop sustainable and effective digital repositories.

The next chapter will draw together all the findings from the different chapters to answer the research questions and determine whether the hypothesis that underpinned this thesis was accurate.

# CHAPTER 8: TRANSFERABILITY OF TRUSTED DIGITAL REPOSITORY STANDARDS TO AN EAST AFRICAN CONTEXT: SYNTHESIS OF FINDINGS AND RECOMMENDATIONS

## 8.1 Introduction

The goal of this thesis was to understand whether there were presumptions built into TDR standards that would preclude their transferability to other contexts, in particular to low-resource environments such as East Africa. The hypothesis underlying this thesis was that TDR standards make certain assumptions about the environment in which a TDR will be implemented, including that there will be a sufficient number of trained personnel to oversee repository operations and that there will be ready access to infrastructure requirements such electricity, hardware, software and internet connectivity. It was contended that these latent constructs exist in TDR standards as a reflection of the biases of the standards developers in charge of the development process. These specialists came from countries in the developed world, where it is reasonable to expect that an organisation building a TDR would have access to the resources and personnel necessary to ensure that the TDR would conform to any requirements set out in TDR standards. What this study found, however, was not only that TDR standards do not transfer to an East African context but also, and surprisingly, that they have little or no resonance amongst developed world repository operators.

In order to investigate this hypothesis, a methodological framework for data collection and analysis was developed, based on mimesis. Mimesis is the concept that posits that, through our use of language and our communication through texts, we are constantly receiving other people's representations of thoughts and ideas and incorporating them into our own knowledge base. According to philosophers, cultural

linguists and linguists, texts are a reflection of our understandings of the world. How texts are interpreted by readers depends on the particular views and perceptions of those readers. The mimesis approach supports the intention in this study to examine a particular type of text – TDR standards – in order to analyse their creation and interpretation. Thus, the mimesis approach, in particular Ricoeur's threefold mimetic model, was chosen, with adaptations to support an understanding not only of the impetus behind and the development of TDR standards but also of the ways in which standards are interpreted by practitioners in the developed world and in the East African context. This methodology supported a structured analysis of data to determine whether any biases were built into TDR standards and whether these biases affected their transferability to an East African context.

The methodological framework was divided into three groupings: M1, M2 and M3. M1 studied the impetus behind the standards and the relationship between this impetus and the perception by East African practitioners and academics of digital preservation concerns in their region. M1 also identified the presumptions of standards developers, in order to determine (in M2) if any such presumptions were incorporated into the standards. M2 involved a high-level examination of the TDR standards based on interviews with standards developers (M1 (DW)) to ascertain if and how the standards reflected their biases or presumptions. M3 studied the reception of TDR standards by digital repository operators in the developed world and by two East African national archives, in order to study the relevance of these standards in both the developed and East African contexts.

The research conclusions, discussed in this chapter, arose from the mimetic analysis but are presented according to the themes that have emerged from the data

(8.2). Following that discussion are some suggestions for directions to take in the future (8.3), followed by reflections on the mimetic methodological framework (8.4) and suggestions for future research (8.5).

## 8.2 Research Conclusions

This section examines the conclusions emerging from this thesis research, presented according to several major themes. The discussion begins with an analysis of the impetus behind the standards and the process of developing them, in order to understand how these factors have affected the contents of TDR standards (8.2.1). Following this is a discussion of some of the assumptions built into TDR standards (8.2.2), along with a consideration of the perceived usefulness of TDR standards in the developed world and in East African contexts (8.2.3). Finally, insights are presented about the transferability of TDR standards to East Africa and the developed world, based on the findings presented in this chapter, and suggestions are offered for a way to address some of the challenges facing East Africa more effectively. Each of the areas examined includes a review of, and answers to, the original research questions first presented in Chapter 1.

### *8.2.1 Standards Development: Identifying the Impetus and Considering Consensus and Inclusion*

According to ISO, the standards development process is intended to be inclusive and consensus driven, drawing on the views from subject matter experts with different experiences and backgrounds to ensure that standards represent the widest possible views on how best to address a particular problem. The goal of OAIS and RAC is to present an agreed approach to TDRs in order to support the development of sustainable digital repositories and the effective preservation of digital records. However, the data

gathered to answer the research questions related to standards development revealed a different perspective. The first research question related to standards development is:

1. b) What was the initial problematic that spurred the creation of the standards?
3. Was the TDR standards development process inclusive and consensus based? Did it privilege certain perspectives? If so, which ones?

As discussed in Chapters 3 and 7, the development of OAIS was spearheaded by the space data community to bridge a gap they identified, which was the absence of digital records preservation framework to help scientists manage large amounts of research data. RAC was seen as a continuation and formalisation of OAIS as well as an opportunity to build on the recommendations from *Preserving Digital Information* (1996). RAC also provided metrics for assessing the trustworthiness and effectiveness of TDRs.

As both OAIS and RAC are ISO standards, they should be based on the consensus of a wide range of experts, regardless of whether they are developed by a liaison committee or technical committee. The data gathered in this part of the research, however, challenges this expectation on two different fronts: inclusion and consensus. For the purposes of this discussion, inclusion is defined as 'the action or state of including or being included within a group or structure',[605] Consensus is interpreted as drawing on the experience and inputs of a broad range of international experts to arrive at an agreed approach through a standard.

The TDR standards development process, as examined through an analysis of the interview data gathered, demonstrated limits to the levels of inclusion. The process drew on a broad representation of developed world experts and views but did not include significant input representing developing world perspectives, particularly, in this

[605] Oxford English Dictionary, 'Inclusion'.

analysis, from East Africa. As summarised here, the committee selection process for OAIS and RAC indirectly favoured developed world experts and practitioners. As a result the perspectives presented were skewed towards the developed world. As discussed earlier in this study, it was also noted that CCSDS did not communicate effectively with members of the digital preservation community during the revisions to OAIS, limiting the level of engagement in the process and reducing transparency.

OAIS members were drawn initially from CCSDS member space agencies, and a wider call for participation was put out in 1997 via the internet. This call resulted in the inclusion of several developed world cultural heritage organisations but none in East Africa. The presumption by OAIS standards developers was that a wider call over the internet, via a website and list-servers, would reach parties interested in the development of OAIS. Implied in this expectation is that East African practitioners, amongst others, had access to computers with internet connectivity and also that they were members of the archival networks where the call for expressions of interest was distributed, most of which were networks created in, and supporting the interests of, practitioners in the developed world.

Most of the committee members that served on RAC had already served on other TDR standards development committees such as OAIS and TRAC. The data indicate that some of the developers involved in the development of RAC may have had vested interests in ensuring that the contents of the standard reflected not only previous TDR standards work (e.g. OAIS) but also the views of the organisations they represented. This bias ultimately affected the scope and contents of the standard by presenting a homogenised and narrow understanding of what elements constitute a functional and reliable TDR, in turn influencing the interpretation by users. As with OAIS, there was a

wider call for participation in the development of RAC, but there was no interest expressed by East African practitioners; no further attempts were made by standards developers to diversify the membership.

Efforts to include East African nations in TDR development were thus limited, with developers relying on the wider calls for participation to raise awareness of the initiatives among different special interest groups or committees and to invite them to participate in the development process. However, the exclusion of the East African region and other developing countries from TDR development, by virtue of the committee selection process and the process of testing of TDR standards, affects the level of consensus reflected in the standards. Even during the OAIS revisions, it is unclear how much consensus was achieved, especially considering the difficulties that the digital preservation community had in understanding where meetings were being held and otherwise how to participate in the process. In the end, the views and needs of this large part of the world has not been adequately considered in the standard.

Even if East African practitioners had received the call for participation and wished to provide feedback into the development of TDR standards, costs associated with participating in the CCSDS development process would likely also have prevented them from joining. The CCSDS development meetings took place in either North America or Europe, meaning that East African practitioners would have had to pay for travel and accommodation costs, which most cannot afford.

Participating in the ISO vetting process at TC20/SC13 would have also been complicated for two reasons: lack of national space data technical committee and costs. ISO has made advances in the effort to be more inclusive, encouraging the participation of developing nations in standards development and advocating for greater stakeholder

engagement at national standards bureaus. But in order to feed into the vetting process for OAIS and RAC, both Kenya and Tanzania would need to have technical committees on space data in their national standards bureaus, which they do not. Furthermore, participations in the ISO process requires that members pay fees to serve on committees, either as P-members (participants) or O-members (observers), and those costs are prohibitive for most East African experts, who, as mentioned, generally cannot afford the travel costs associated with attending international technical committee meetings. There is also a cost to purchasing the published standard, which can be quite costly. Ultimately, the ISO cost model privileges developed world participation because the National Standard Bureaus and other interested bodies from the developed world can afford to pay the fees and affiliated costs in order to participate in the standards development process, while those in the developing world cannot. Finally there is the issue that TC20/SC13 did not question whether the standard was inclusive or consensus based, even though much of the development took place outside of the purview of the committee.

A surprising research finding was the level of control exerted by the space data community during the development of OAIS. As discussed in Chapter 3, the space data community was responsible for drafting early versions of the standard, drawing on little or no external input. Therefore, early drafts of OAIS were written from the perspective of that community. Even when the CCSDS committee included other interested parties such as representative of archives and libraries the committee was extremely selective in which additions made it into OAIS. The findings indicate that CCSDS did draw from *Preserving Digital Information* (1996) and did include input from the cultural heritage

community, but that input seems to have been tempered by the space data community's understanding of digital preservation processes.

Further, any changes to OAIS were subject to the approval of CCSDS, and it seems that, even though there was a request for external contributions, the only comments accepted were those that aligned with pre-existing understandings of digital records preservation issues or that did not require substantive alterations to the standard. In the end, it must be concluded that OAIS reflects primarily the views of a specific community about the digital records preservation concerns that they felt needed to be addressed within the standard.

As discussed in Chapter 7, the development of RAC was also marked by the influence and control of specific perspectives, skewing the contents of the standard so that it presented only a narrow representation of the views of committee members. The data also show that the selection of test sites for RAC further privileged certain perspectives, given that all the sites were based in the developed world. The sampling of test sites relied on committee member contacts and institutional affiliations. No attempts were made to include other repositories in the testing process such as those in the developing world, limiting the opportunity to assess the applicability of RAC as an audit and certification standard in other contexts. The development process for OAIS and RAC standards continues to be incredibly limited, reducing inclusion and creating a homogenised view of TDR issues and of the role of standards in addressing those issues.

The answers to the research questions asked at the outset of this section, then, are these. To answer the first question, the initial problematic that spurred the creation of the standards was the drive to address digital records preservation needs and problems in the developed world, particularly those of the space data community. To

answer the second question, the TDR standards development process cannot be seen as fair and just, as it did privilege, both knowingly and unknowingly privilege, certain perspectives. Ultimately, two different perspectives are represented in TDR standards, the most obvious being the emphasis on a developed world outlook on the establishment and maintenance of TDRs. But perhaps less apparent is the perspective based on the privileging of specific professional discourses and personal views, a perspective fortified by the standards development process itself. This finding challenges the underlying belief by standards developers that standards are objective, and that they represent the best way to address a particular problem, which in this instance is the need to establish and certify TDRs according to certain criteria in order to support digital preservation. The selection of committee members and the manner in which the development process was influenced or controlled by specific actors, as examined in this thesis research, demonstrates that the process was infused with biases and that the outcome – the standard itself – is an inevitable representation of those biases. The under-representation of the developing world, as shown by the lack of participation by East African practitioners in the standards development process, privileges developed world understandings of digital records preservation needs. This under-representation has embedded biases and presumptions into the standards about the capacity of both institutions and practitioners to establish TDRs, an issue discussed in the next section.

### *8.2.2 TDR Standards: Presumptions and Biases*

The next issue is how well TDR standards align with the needs of East African practitioners (M1 (EAC)) and what biases and presumptions exist in TDR standards. The research questions to be answered in this section are:

1. a) What are the underlying assumptions built into the standards?

1. c) Does the same problematic exist for the East African archival community? If not, how should archivists and archives in the region address their digital records preservation issues?

One of the aims of this research was to understand how closely the impetus for the development of TDR standards matched the needs identified by East African practitioners and scholars (M1 (EAC)). The evidence outlined in Chapter 7 strongly indicates that there is a gap between the expectations of standards developers, and their impetus for standards development, and the actual needs in the East African region. The digital preservation concerns of the East African community (M1 (EAC) and M3 (EAC)) were primarily operational. Major challenges related to the practical realities of digital records preservation includes the disconnect between ICT professionals and the archival community; limitations on IT infrastructures; the lack of digital records expertise in the region; and the difficulty of accessing basic infrastructure such as electricity and computer supplies. The impetus behind the development of TDR standards did not take into account these basic issues. Standards developers assumed that requirements such as reliable electricity supplies, trained personnel and adequate infrastructure all existed, which assumptions in turn have been incorporated into TDR standards. Given the frames of reference and cultural backgrounds of TDR developers, as well as the locales where the standards were developed and tested, these expectations would be reasonable. In East Africa, however, these expectations are not realistic.

As discussed throughout this thesis, TDR standards are built on a range of implicit presumptions. One of the most significant is the presumption of trust. Audit and certification standards like RAC are built around the notion that, in order for users to have faith in digital repository operations and in the ability of TDRs to support the goals

of authenticity and reliability, these TDRs must be externally assessed according to approved criteria. As discussed in Chapter 3, Onora O'Neill contends that audit and certification mechanisms reflect a crisis in confidence, particularly in societies in the developed world, around the notion of trust. It does not necessarily hold, however, that East African society will feel that the same mechanisms are necessary for digital preservation architecture to be effective in that environment. As shown in Chapter 4, given that there is a high level of deference for authority in East Africa and elsewhere on the continent it may mean that such mechanisms will suffice to allow TDRs to function with authority without the need for audit and certification. On the other hand many African citizens tend to be suspicious of their governments because of rampant corruption, as such audit and certification can help create more accountability and transparency in digital repository operations. Nevertheless, the approach in audit and certification standards presumes developed world ways of measuring 'trust', which may be inherently different from how African societies may choose to define and assess that notion.

Finally, TDR standards assume that there is only one approach to creating a trusted preservation environment, just as the UBC-MAS project and UPitt projects, discussed in Chapter 3, assumed that the use of EDRMS was the only way to guarantee the authenticity and reliability of digital records. Some practitioners in the developed world already have difficulty with the methods and concepts endorsed by TDR standards as shown in Chapters 5 and 7. East African practitioners may feel that TDR standards and the practices they endorse, do not address their particular needs. The way to answer that question, and the way forward for East African archives, is to explore digital records preservation issues from the East African perspective, which has not yet happened.

To answer the research questions summarised in this section, there are underlying assumptions built into TDR standards, including assumptions about operating environments, infrastructure and human capacity and notions of trust in relation to digital records preservation. A contributing factor in the incorporation of these assumptions in TDR standards could well be the absence of East African input into the standards development process. The same problematic that spurred the creation of TDR standards in the developed world does not necessarily exist in East Africa in the same way. Ultimately, the assumptions underlying TDR standards make it difficult to create and maintain digital repositories that meet these standards requirements in low-resource environments like East Africa. Other actions are needed to address more basic regional needs, in order to find appropriate solutions for digital preservation issues.

It may be that a modular approach to digital preservation is needed which might involve, identifying which interventions are immediately required to capture and safeguard digital records and to secure the basic infrastructure and tools to accomplish this work. From there the East African archival community could determine interim steps that would enable archival practitioners and institutions to preserve digital records more effectively given according to the constraints in the region. A potential model to guide the process is the *Digital Preservation Capability Model* proposed by Charles Dollar and Lori Ashley.[606] Dollar and Ashley see digital preservation as a modular process whereby organisations can assess their current state of digital records preservation and develop a roadmap towards what is termed 'optimal digital preservation programme.'[607] Essentially, this allows organisations to progressively build their digital preservation

[606] Charles Dollar and Lori Ashley. *Assessing Digital Preservation Capability Using a Maturity Model Process Improvement Approach*. February 2013: 1-10, accessed 16 February 2015. www.nycarchivists.org/Dollar-Ashley_2013_DPCMM White Paper_NAGARA Digital Judicial Records_8Feb2013.pdf

[607] Dollar and Ashley. *Assessing Digital Preservation.*

programmes rather than implementing them all at once. The next issue to consider, then, is the perceived usefulness of TDR standards in both the developed world and in East Africa.

### *8.2.3 Usefulness of Standards and Practical Realities*

This section summarises the findings of research into the perceived usefulness of TDR standards by digital repositories (M3 (DW)) and in the East African context (M1 (EAC) and M3 (EAC)). The research questions addressed in this section are:

2) Are TDR standards being used by operational archival digital repositories in the developed world? If not, why? Further, if they are not being used by developed world repositories, how does this affect their applicability to another context?

4) What are the realities in East Africa that inhibit the operationalisation of TDR standards in the region?

As addressed in Chapters 5 and 7, case study digital repositories felt TDR standards were either minimally relevant, or not relevant at all, to their operations. The reasons for this view varied, but the overall feeling was that standards were too detailed or were not sufficiently useful to the actual operational realities of the case study digital repositories. As a result, those repositories were selective about both the implementation of TDR standards and the ways in which compliance was measured.

On the question of measuring OAIS compliance, respondents argued that because their repository management software was designed based on OAIS requirements, their operations were therefore compliant. On the question of RAC compliance, repository operators focused only on some parts of the standard . When repository operators were asked why they had taken such a selective approach, they argued that the standards reflected a theoretical or high-level understanding of TDR operations to ensure trusted operations. This theoretical approach, they felt, did not respond to the realities of digital

repository operations, including the practical need to manage complicated processes for digital records preparation and ingest and the need to manage large volumes of digital records transfers.

Questions of standards and relevance do not relate readily to TDR standards, as demonstrated in chapter 7, when considering the impact and relevance of ISO 15489 as a point of comparison. The analysis demonstrated that, like OAIS and RAC, 15489 has had little influence on the records and information management profession. What the 15489 examples and this study's findings point to is that there may in fact be something systematically wrong with the standards development process, which results in limited applicability and, thus, limited uptake of standards, even in the developed world.

In both the 15489 and OAIS and RAC scenarios, there seems to be a disconnect between the expectations embedded in the standards and the reality faced by practitioners. Therefore we have to ask, what does standardisation bring to the records and archives community, when we consider the very different juridical contexts and traditions in which records programmes operate? Is homogeneity based on best practice – the goal of these standards seek to achieve – a realistic goal for the archives and records community?

Another significant finding from case study repository interview data related to the amount of time institutions spent preparing digital records for transfer and ingest. This finding is surprising, as it was assumed by the author that preservation, rather than ingest, would take the majority of staff time. As discussed in Chapter 5, the use of direct or indirect current records management approaches often affected the quality of records acquired and the time spent on preparation and transfer. Yet TDR standards

merely referenced the role of records management standards but did not specify the impact of records management processes on the integrity of digital records.

The reasons for this oversight may stem from the fact that TDR standards originate from the space data community, which was primarily concerned with the preservation of space mission data, not with the management of that data prior to ingest. Furthermore, the community responsible for developing TDR standards also seems to have failed to recognise the complexity associated with preserving multiple digital record formats, which are often more difficult to capture and preserve than more straightforward data sets. This complexity makes it all the more difficult for cultural heritage digital repositories to adhere to the requirements of TDR standards. Regardless, unless a link is made between the proper management of digital records and their long-term preservation, records are in danger of losing their authenticity and reliability, or of not having that authenticity or reliability in the first place. Ostensibly, the purpose of a TDR is not only to ensure that the systems in place to manage digital records are trusted but also to ensure that the records themselves have integrity to begin with. Otherwise, there would be no need for a trusted system to manage them.

Altering TDR standards to represent the perspective of cultural heritage repositories would undoubtedly alienate other communities of professional practice concerned with ensuring the longevity and accessibility of their data. That said, given that these standards already largely represent the view of one particular community (i.e. the space data community), as demonstrated in this thesis, one can argue that perspectives from other communities (i.e. the libraries and archives communities) should be given some consideration.

In the end, the purpose of the standards does not seem to align with the needs and realities identified by digital repository operators. Repository operators have opted instead to adhere to the standards only selectively, a decision that has resulted in limited uptake of the standards and a diminished sense of their perceived usefulness. This reality runs counter to the assumption that because TDR standards were elaborated in a developed world context, they would naturally find widespread uptake and prove useful in guiding TDR operations. Furthermore, this finding seems to contradict the belief of many standards developers that TDR standards are useful regardless of the social or cultural context in which they are used, since they do not seem to be fully applicable to the contexts for which they were developed in the first place.

Although the biases identified earlier in this chapter may complicate the transferability of TDR standards to an East African context, the perceived usefulness of the standards by East African practitioners varies. Remarkably, many of the East African respondents interviewed for this thesis, particularly those working in national archives, were unaware of the existence of TDR standards. As discussed in Chapter 6, this lack of awareness could be a consequence of the limited training in digital records preservation in the region; individual practitioners may find it difficult to stay abreast of new issues because there are limited professional networks that enable the acquisition or dissemination of new ideas.

Where respondents were aware of the standards, an interesting divide emerged. Some respondents stated that implementing a TDR was simply not a feasible option, considering the realities faced by national archives in the region. This perception limited any further consideration of TDR standards by those respondents. Others, however, did not question the transferability of TDR standards to their environment, regardless of the

challenges they faced on a daily basis. These interviewees did not seem to feel the difficulties in obtaining electricity, technology or trained personnel affected the usefulness of TDR standards to their context.

In practice operationalising TDR standards is challenging in the East African region, particularly given that the technology needed to begin building a digital repository, such as hardware and software, is expensive and difficult to access. Further, complex IT knowledge and skills are needed to manage digital repositories and there is already a shortage of qualified IT personnel in the region. Only a limited number of archivists in the region are conversant with digital preservation principles and have the technical and professional skills to manage digital records. In the East African institutions surveyed for this study, no one within the organisations had received any training on digital records preservation.

Ultimately, East African archives do not have the capability to begin implementing TDRs. This reality, however, does not mean that they do not need to preserve digital records. The widespread implementation of ICT systems in the region, often as part of donor-funded projects, means that archives will need to manage a significant volume of digital records and data now or in the near future. The approach proposed by TDR standards is not a feasible solution right now, given the gap between the requirements of the standards and the realities of archival repositories – a gap identified in both the developed and developing world.

To answer the research questions posed at the outset of this section, then, TDR standards are only being used selectively by case study digital repositories because operators feel that the standards are too theoretical or do not answer their operational needs. While it is not reasonable to generalise the applicability of TDR standards to

contexts other than those repositories studied, the lack of perceived usefulness suggested by digital repository operators in those institutions does bring into question their wider usefulness, especially given that TDR standards were designed to address developed world needs and the case study repositories examined were themselves in the developed world.

There is perhaps a wider issue with regard both to the relevance of standards and to the way in which the development process may in fact be contributing to their lack of applicability, even in a developed nation context. This issue is the fact that even developed world digital preservation practitioners had only limited input into the articulation of TDR standards. As demonstrated earlier, it seems that only a select group of individuals were involved in the development of TDR standards, and they came from a specific professional background (i.e. space data). This narrow community mitigated contributions made by cultural heritage professionals, which may have contributed to the development of a standard that has limited resonance within the archives and records community.

To answer the question of whether there are realities in East Africa that prevent the operationalisation of TDR standards in the region, the research demonstrated that realities such as rolling blackouts and limits on electrical supplies, along with the difficulty of accessing necessary hardware and software and the absence of trained IT and digital records preservation experts in the region, mean that operationalising TDRs is not likely at this time.

**8.3 Transferability of TDR Standards: The Way Forward and Recommendations**

Ultimately, this thesis aimed to answer an overarching question: Are Trusted Digital Repository (TDR) standards transferable to the East African context? The research

needed to answer that question has driven the detailed analysis presented throughout this thesis. Based on the findings presented here, it has been demonstrated that there are impediments to standards transferability at the present time both in the developed world and in East Africa. Still this finding does not mean that the standards may not be useful in the future. But significant challenges need to be overcome both in the developing world and in East Africa if TDR standards are to become more widely applicable. These challenges, and suggestions for a way forward, are considered here.

### *8.3.1 Improving the Standards Development Process*

The standards development process needs to be more inclusive if consensus is to be achieved and if the standards developed are to represent international needs as fully as possible. Further, standards developers need to acknowledge that there are limitations on the applicability of the standards they develop. One of the striking findings of this study (as discussed particularly in Chapter 7) was that although some developers identified some problems or shortcomings with TDR standards, all the developers interviewed still steadfastly believed in their transferability regardless of context. None of the developers acknowledged the complications faced by East African archival institutions, much less developed world repositories, in attempting to operationalise these standards, arguing instead, in some cases, that East African institutions should not have any difficulty accessing the resources needed to build and operate compliant digital repositories. There seems to be no one reason for this belief in the inalienability of standards, but it is reasonable to wonder whether any admission that the standards contain flaws might be seen as negating the effort and time invested in developing them.

If the TDR standards development process had been more inclusive, developed world experts would very likely have been more aware of the challenges of operationalising a TDR in different environments and the resulting standards might have been more relevant to practitioners in both the developed world and East Africa. In order to address some of these issues, it is suggested that ISO needs to review its current operating model, addressing both inclusivity of standards developed by liaison groups and cost issues, to facilitate more wide-ranging involvement from practitioners outside of the developed world, including from East Africa. To support these changes, the following recommendations are offered to support the standards development process:

- *ISO Secretariat should ensure that Technical Committees or Sub Committees that have liaison committees that develop standards be inclusive and consensus based*: If standards are to be inclusive and consensus based then there needs to be more accountability exerted by ISO secretariat on TCs and SCs to ensure that attempts are made to include members of developing countries. Furthermore, TCs or SCs should ensure that the development process has been inclusive and consensus based especially when they have a reciprocal agreement that allows liaison committees to develop standards.
- *Improve commenting and revision process*: Any time a standard is up for revision there should be more transparent methods for communicating with various stakeholders. Although ISO has established individual technical committee websites, for instance, it only includes information on the standards that have been developed by that committee. These webpages could be used instead to post information on the revision process, such as the dates that standards are

going to be reviewed, progress on the revision process or the date, time and location of regional meetings, widening the potential for stakeholders to provide comments on standards during the revision process.

- *ISO should eliminate membership fees for developing nations*: The current fee structures used by ISO, especially for participants who wish to have P-membership in order to participate fully in the development process, are prohibitively high, meaning most experts in East African countries cannot play a formal role in the development of ISO standards.
- *ISO should allow members from East African countries to comment on the standards development process without the existence of national standards bureaus or national level technical committees*. ISO requires that individuals who wish to comment on a standard must do so through their national standards bureau, in particular through the relevant technical committee at the national level. If the standards development process is to be representative and consensus based, barriers to participation for East African nations should be removed. The existence of a technical committee or national standards bureau should not be a pre-requisite to allow experts to comment on the standards development process, especially if a standard has a wide-reaching effect on a particular community of practice.
- *ISO should make standards freely available to post-secondary institutions in East Africa*. The cost of standards is beyond the reach of experts, practitioners and students in the East African region. ISO should make standards freely available to post-secondary institutions so that subject matter experts, practitioners and students have a way to access and use them. The end result will be an

opportunity for ISO to raise awareness about the existence and importance of standards, as well as a chance that those standards will be more widely adopted in the region.

- *ISO and liaison committees should offer bursaries to subject matter experts in the East African Community.* Many international technical committee or liaison committee meetings take place outside of Africa, but travelling to those meetings and paying for accommodation can be costly – often well beyond the means of experts or their parent organisations in the region. Regional experts would be able to make more valuable contributions to the standards development process if their travel costs were supported.
- *The ISO should establish an African Union or an East African Community standards development board*. It may be that some standards should be developed to address the specific needs in East African region, or on the African continent in general. Establishing a regionally relevant standards development board would support the development of regional standards and also allow for the consolidation of feedback to ISO and other standards bodies regarding pan-African or regional concerns and priorities.

In the end, changes to ISO approaches such as those recommended above may well help support a more inclusive standards development process and enhance the transferability of TDR standards.

### *8.3.2 Increasing the Expertise of Archivists in East Africa*

Several assumptions built into TDR standards complicate their transferability to East Africa. As discussed in Chapters 4 and 6, challenges such as poor electricity provision, the high cost of hardware and software and the lack of trained personnel may be

addressed over time, as foreign donors continue to invest in the region in order to reinforce infrastructures and expand the technology sector. However, interviewees also proposed other options for addressing problems connected to the availability of trained personnel namely, educational reform, information exchange and awareness and sensitisation of the importance of the archival profession.

One of the first actions to address the absence of qualified digital records personnel is to begin reforming higher education. The renewal of archival education will not just produce better qualified students but will also serve as a means for providing leadership in the region on the topic of digital records preservation. Suggested actions should include the following:

- *The East African Community Secretariat should create a centre of digital records excellence in region.* A specialised centre could be established, dedicated to researching and test digital preservation solutions appropriate for the region. It could offer an important platform for research and information sharing in the region,[608] not only bringing together practitioners from the region and across the African continent but also drawing on the input of experts from the developed world who could share lessons learned in their environments and, conversely, learn more about the realities in the East African region. The information gleaned by both parties could be examined and adapted: in East Africa to meet specific regional needs while taking into account the constraints and realities of the region, and in the developed world to increase the value of international initiatives worldwide. Funding for this initiative could be supported by reserving

[608] Interviewee 17 felt information sharing between countries that have more experience in the area of digital records management and preservation would be a way to understand the lessons learned and share knowledge on these topics.

5% of the budgets for donor funded ICT initiatives and apportioning it to the centre. This approach will ensure that digital records output from these systems will be preserved and will enable governments in the region to be able to protect authentic and reliable records, demonstrating accountable and transparency, which are outcomes that dovetail with the aims of donor-funded initiatives in the region.

- *Information studies departments the in EAC should update university curricula on digital records preservation*. To build the capacity of archives and records students in the East African region, universities should update current archives and records curricula to include more, and more, advanced classes and courses in digital records preservation theory and practice including hands on practical experience. This expansion of the curriculum will help to address the lack of trained digital records preservation specialists in the region.
- *Increase opportunities for professional development.* The International Council on Archives (ICA) along with its regional bodies, specifically the East and Southern African Region of the International Council on Archives (ESARBICA) are the ideal organisations to offer basic, intermediate and advanced courses in digital records preservation for the region. This increase in post-appointment and continuing education would help to build capacity in the region, bridging the capacity gap identified in this thesis and in other studies conducted across the region.

### *8.3.3 Increasing the Professional Profile of Archivists in East Africa*

As pointed out in Chapter 6, the archival profession continues to suffer from a poor profile in the civil service, which interviewees identified as a serious impediment to supporting efforts at digital records preservation. Many records professionals in the East

African region consider awareness raising and sensitisation to be valuable ways to address a wide range of problems facing the records and archives community, including difficulties with digital records creation, maintenance and preservation. Unfortunately, one solution proposed by African experts - to raise awareness through such initiatives as stakeholder meetings that bring together senior government officials, records managers, archivists and international experts - has had little effect, as outreach initiatives have either not been delivered or, if delivered, have not had the desired outcome.[609]

Regardless, of the success or failure of previous initiatives, sensitisation and awareness-raising continue to be seen as solutions to the challenge of increasing professional capacity in Eastern Africa. Many interviewees argued that if senior government official understood the work of archivists and records managers they would be more likely to support the work of archival institutions and the goals of the archival profession. In turn, this increase in awareness would create a greater recognition within government of the importance of records, raising the profile of archivists and records managers and of national archival institutions.[610] Interviewees seem to view awareness-raising as a viable strategy but a methodology has not yet been presented for successfully accomplished awareness-raising.

In order to start addressing this problem more concretely, the following recommendations are offered:

- *Repositioning national archives.* National archives in the region should attempt to reposition their programmes into more senior ministries that can support the

[609] Nathan Mnjama, 'Archives and Records Management'., 84. The International Records Management Trust has initiated many stakeholder meetings; two such instances are IRMT, 'Information for Accountability Workshops' (International Records Management Trust, 2000), http://irmt.org/portfolio/information-accountability-workshops-2000. and IRMT, 'Managing Records'. 2010-2011. There appears to have been little impact subsequent to the actual workshops and meetings.

[610] Interview 19, 17 September 2012, Interview 16, 5 August 2011 and Interview 15, 4 July 2013.

role of the national archives to oversee the implementation of recordkeeping controls and safeguarding of government information. Repositioning archival programmes into ministries with greater influence in government such as Office of President, Auditor General's Office or Ministry of Finance will give greater weight to archival recommendations and guidelines within government. This repositioning will also help archives and records programmes to exert greater control over recordkeeping processes to ensure the production of digital records and data with integrity.

- *Advocacy and Risk Management.* ESARBICA should bring together documented instances of the impact of archival programmes in aiding the effective administration of government. This work should be complemented by a risk management report that measures and explains the risks of weak archival programmes and the related impact on government, along with mitigation strategies to improve government information management. Ideally, national archives will be identified as central coordination units for risk management studies and mitigation initiatives.

### *8.3.4 Addressing Digital Records Preservation Readiness*

As examined in Chapter 6, there are two assumptions in TDR standards that preclude their transferability to the East African context. First is the assumption that the approach proposed by TDR standards is the only way forward for building trusted systems. Second is the assumption that the notion of trust, as understood in audit and certification standards, is equally applicable in the developed world and in Africa. This thesis has demonstrated that both assumptions are flawed. Simply dismissing them is not an option, however. Neither issue will be definitively resolved until more concerted thought

is given to identifying the most appropriate approaches to digital records preservation in the region.

As shown in Chapters 4 and 6, the current literature on digital records issues focuses on digital records management, and there has been little research so far on the topic of digital records preservation, especially in Africa. While many interviewees appreciated the need to address significant digital records preservation challenges, the actual way forward seemed overwhelming. Until digital records preservation issues are analysed in depth, however practitioners will never be able to endorse or discount the approaches proposed in TDR standards and base their decisions on authoritative research. To increase knowledge about digital records preservation in the East African region, the following recommendation is offered:

- *ESARBICA in partnership with national archives in the region should carry out a scoping study on digital records preservation readiness in the region*. This scoping study would be comparable to the *Preserving Digital Information* conducted by the developed-world library and archives communities in 1996. The study would include an assessment of the realities of digital preservation in the region, followed by the presentation of a strategic vision and specific recommendations.

It is hoped that if these recommendations, drawn from the findings in this thesis, are considered by the archival community and by standards developers, international donor agencies and other stakeholders, increased capacity for digital records preservation will start to emerge in the East African region. The lessons learned throughout the process can then be shared both within the region and around the world.

### 8.4 Reflections on Mimesis, Confidentiality and Data Analysis

Before concluding this thesis with a discussion of topics for future research, it is necessary to address some issues of methodology that arose during the research process. The mimesis concept, and in particular Ricoeur's threefold mimetic model, were helpful in supporting the process of testing and answering the research hypothesis framing this thesis. The methodological framework developed from Ricoeur's model also helped structure the data collection process as well as being the best method for identifying study respondents and then analysing the data gathered. Also discussed are issues related to confidentiality and research ethics.

The approach chosen allowed the researcher to structure and compare large amounts of data easily, supporting a comparative analysis across mimetic groupings. This process also allowed for the identification of any assumptions built into the standards to be examined, because the methodology enabled the researcher to deconstruct, at a high-level, how these biases were built into TDR standards. Further, the methodology also facilitated an understanding of how the standards were interpreted and their level of usefulness in both the developed world and East African contexts.

This methodology could easily be adapted for use in other studies that seek to understand the development of texts. Another more powerful approach would be to use a linguistic analysis methodology, allowing for the deconstruction of texts in more detail. However the methodology used should allow for an analysis of the entire text development process from inception to interpretation. One of the drawbacks to the linguistic analysis methodologies considered, as part of thesis, was that they focused on certain aspects of the text development process (i.e. conceptualisation or interpretation)

not the entire elaboration process. As explained in Chapter 2, the author's expertise is not in linguistics, and as such she felt it was not possible to use that methodology to conduct this thesis research.

At the time this thesis was begun the data collected through interviews and observations were not considered to need ethical review, whereas now the departmental and university ethics committees would have had to approve this research. As a researcher, confidentiality is essential in order for interviewees or research participants to be as honest and forthcoming as possible. Confidentiality can be challenging when conducting research, especially when the sample set chosen is comprised of experts in a fairly small field of practice. However, as stated at the outset of this thesis in the methodology chapter complete anonymity can not be guaranteed.

NVivo was the qualitative data analysis tool used to interrogate both the interview findings and the observational data collected during site visits. Only the basic functionalities of NVivo were used as part of the analysis. Other functionalities might have been used if training classes in NVivo were easier to find. The author had to train herself in the use of NVivo, learning procedures and techniques from books or online tutorials. Although the author does not believe that her inability to attend formal training classes in NVivo has affected the quality of the analysis, more training opportunities would have allowed the author to learn how to use the system more quickly, supporting use from the start of the analysis and not having to learn and readjust as analysis proceeded. For example, as mentioned Chapter 2, the author began using tree nodes in NVivo because she thought her analysis would be structured and hierarchical. However, she found that free nodes enabled her to conduct her analysis with greater ease and thus more easily identify issues by mimetic grouping. She believes

that more formal training – which was simply not available – would have saved considerable time at the start of data analysis.

A researcher wishing to use NVivo but who has never used a qualitative data analysis tool in the past also needs to consider specific computer requirements. NVivo uses a lot of RAM space when it is running. The author's computer did not meet the minimum specification requirements to run NVivo, so she relied on access to a licensed copy available over the university's remote network. This limitation affected her ability to access and use the software. In order to make best use of their time and resources potential users should examine the basic specifications of their own computers and ensure they can run the program effectively before trying to load it onto their computer. Still, the author believes that both the mimesis concept and the methodology developed from it, and the NVivo software system, were helpful in structuring data collection and in conducting data analysis for this thesis.

**8.5 Topics for Future Research**

As with any PhD thesis, it was necessary to limit the scope of study in order to investigate a manageable number of research issues and answer a specific set of research questions effectively. Still, during the course of this study, the author identified several areas of further research that warrant mention here.

- *Digital records preservation in Africa*: This thesis has highlighted a significant gap in African research and scholarship, specifically about digital records preservation, and that gap needs to be filled through additional research. Digital records preservation is a very broad topic, however, and it would be best to divide research into distinct subsidiary study areas. A first study might provide an overview of digital records preparedness in national archives in a specific region,

such as the East African Community or the Economic Community of West African States. Such a study would not only result in further documentation about the issues faced by national archives but would also result in a more detailed analysis of the problem of digital records preservation, leading – ideally – to consideration of a digital records preservation strategy for the archives community in the region or regions studied.

- *The transferability and applicability of archives and records standards.* An analysis of the standards development process for TDRs has highlighted some issues related to the establishment of standards committees and the development process itself. More research could be conducted on the usefulness of other archives and records standards; on any presumptions built into them; on the nature of those presumptions; and on whether and how those presumptions affect the usefulness of the standards.
- *Digital records university curricula on the African continent*. Only a limited amount of teaching on digital records preservation takes place in the EAC. It would be valuable to know if other digital preservation training and education programmes exist elsewhere in Sub-Saharan Africa and whether they might serve as a model for university programmes. A study of digital records curricula across Africa would provide an overview of the current state of digital records preservation education and training and could support the identification of areas requiring expansion and improvement.
- *The feasibility of TDRs in small- to medium-sized developed world archives*. Many of the challenges faced by national archives in the EAC are similar to those faced by small- to medium-sized repositories in the developed world. Such challenges

include the ability to maintain complex technical infrastructures and the need for staff with training and expertise in digital preservation. Increasingly, archives of all sizes are having to develop preservation strategies for their digital records, but the question must be asked: are TDRs a feasible solution for smaller, less well-resourced institutions? A study of the reality in developed world institutions, where attempts are actively being made now to develop TDRs, would help inform practice in both the developed and developing worlds.

- *Cultural constructs in archival theory and practice*. Just as many TDR standards come from a developed-world perspective so do many archival practices. The question is whether the approaches and techniques are actually applicable to all contexts, and if so what is it about these concepts and practices that lend themselves to universality. If they are not transferable what makes them difficult to transfer from one locale to another. These questions have not been studied within the archival community, most likely because much of the discourse has been dominated by developed world-practitioners, and are drawn from research emerging from a small number of archival training programmes. This is discussed in the Duff and Harris article from 2002 and the development and useful of descriptive standards in Chapter 7.

**8.6 Conclusion**

The intention of this thesis was to explore the transferability of TDR standards to an East African context. The findings from this study indicate that the lack of inclusion has affected the composition of TDR standards committees, with implications not only for the contents of standards but also for their interpretation and use, and transferability.

Important issues have emerged, in particular the finding that standards, like technology, are not culture-neutral and that if they are created in the developed world they will inevitably reflect developed-world perspective. Standards development organisations like ISO need to include more developing countries, such as those in the EAC, and reduce the barriers to international and developing world participation in the standards development process. If the goal of standards is to provide consensus, so that everyone using them is following an agreed way forward on a particular issue, it is essential that the committees responsible for developing those standards be more accountable for demonstrating efforts at inclusivity in the composition of those committees.

The lack of inclusivity and consensus has not only affected the relevance of TDR standards in the East African region but also in the developed world as a whole. When examined in light of problems operationalising ISO 15489, one is left with the question of whether there may be more deep-seated issues with the standards development process. If so, what are the factors that contribute to the developed of a useful and effective standard ? Are there intrinsic issues involved with attempting to homogenise practice through standardisation? Given the multiplicity of different traditions and modes of practice in the archival profession around the world, does standardisation contribute to improvements in overall practice? Is it, in the end, worth creating standards? These questions need to be considered as the archives profession moves forward.

Standards affect every part of our lives, from comparing goods in a grocery store by normalising how food labels are presented to consumers. They protect us from injury by establishing requirements for the safe use of workplace machinery and equipment.

And they allow us to exchange information electronically by ensuring that computer and communications technologies are compatible. In order to be as useful as possible, they should represent the widest possible perspective on how best to address the problems they are designed to mitigate.

Studying the development of standards was important because society fails to see the impact of standards on their lives and while standards may have beneficial effects, as detailed above, they may unintentionally privilege certain views on what standardisation can look like in some instances (i.e. food labels). Furthermore standards, like TDR standards, reflect assumptions from specific parts of the world which often go unnoticed and unquestioned. The problem with the unacknowledged constructs in TDR standards is that they can be used to measure the success or failure of digital preservation initiatives. In places like East Africa, however, the expectations set out in the TDR standards are completely unrealistic, when compared to operational realities. This does not lessen the challenges faced by East African archival practitioners, they still need to preserve digital records and they also need a way forward. The standards development process, however, minimises the capability of East Africans and developing world practitioners from having their voices heard and if the intent of ISO standards is to be consensus based and representative of the views of experts, then it needs to be reflected in that process. This thesis sought to bring to light those issues.

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**APPENDIX A: OAIS AND RAC REQUIRMENTS BASED ON CHAPTER 5 THEMATIC HEADINGS**

| Requirement | OAIS | RAC |
|---|---|---|
| *Remit and Regulatory Framework* | ***2.3.1 Management Interaction*** 'Management provides the OAIS with its charter and scope. The charter may be developed by the archives but it is important that Management formally endorse archive activities.' (2-9)<br><br>Management should also support the OAIS in establishing procedures to regulate the TDR's operation and ensure that the repository is properly used and engaged by Producers as well as Consumers. (2-9)<br><br>**3.2.5 Follows Established Preservation Policies and Procedures** expects a TDR to follow its established policies and procedures for preserving its AIPs. (3-5 to 3-6)<br><br>**4.1.1.5 Administration- Establish Standards and Policies** this subset of the administration function details the types of policies and procedures that should exist such as formats standards, documentations standards, the procedures to be followed during the ingest process and storage management policies. Also provides approved standards and migration goals to Preservation Planning. (4-12 to 4-13) | At a very basic level, the definition of a TDR must start with 'a mission to provide reliable, long-term access to managed digital resources to its Designated Community.'<br><br>3.1.1. The repository shall have a mission statement that reflects a commitment for the preservation of, long term retention of, and access to digital information.<br><br>3.1.2 The repository shall have a Preservation Strategic Plan that defines the approach the repository will take in the long-term support of its mission.<br><br>3.1.2.1 The repository shall have an appropriate succession plan, contingency plan and/or escrow arrangements in place in case the repository ceases to operate or the governing of funding institution substantially changes its scope.<br><br>3.1.2.2 The repository shall monitor its organizational environment to determine when to execute its succession plan, contingency plans and/or escrow arrangements<br><br>3.1.3 The repository shall have a Collection Policy or other document that specifies the type of information it will preserve, retain, manage, and provide access to.<br><br>3.3.1 The repository shall have defined its Designated Community and associated knowledge base(s) and shall have these definitions appropriately accessible.<br><br>3.3.2 The repository shall have Preservation Policies in place to ensure its Preservation Strategic Plan will be met. |

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| | | 3.3.2.1 The repository shall have mechanisms for review, update, and ongoing development of its Preservation Policies as the repository grows and as technology and community practice evolve.<br><br>3.3.3 The repository shall have a documented history of the changes to its operations, procedures, software, and hardware.<br><br>3.3.4 The repository shall commit to transparency and accountability in all actions supporting the operation and management of the repository that affect the preservation of digital content over time.<br><br>3.3.5 The repository shall define, collect, track, and appropriately provide its information integrity measures.<br><br>3.3.6 The repository shall commit to a regular schedule of self-assessment and external certification. |

| **Subject of requirement** | **Open Archival Information System** | **Repository Audit and Certification** |
|---|---|---|
| *Personnel Capacity* | No explicit requirement related to staffing. Standard as a whole implies the existence of qualified staff. | 3.2.1. The repository shall have identified and established the duties that it needs to perform and shall have appointed staff with adequate skills and experience to fulfil these duties.<br><br>3.2.1.1 The repository shall have identified and established the duties that it needs to perform.<br><br>3.2.1.2. The repository shall have the appropriate number of staff to support all functions and services.<br><br>3.2.1.3 The repository shall have in place an active professional development program that provides staff with skills and expertise development opportunities. |

| Subject of requirement | Open Archival Information System | Repository Audit and Certification |
|---|---|---|
| *Finances* | **Establish Standards and Policies** function is responsible for establishing and maintaining archive systems standards and policies. It receives *budget* information and *policies* such as OAIS charter, scope, resource utilization guidelines, pricing policies from Management. (4-12 to 4-13) | 3.4.1 The repository shall have short- and long-term business planning processes in place to sustain the repository over time.<br><br>3.4.2 The repository shall have financial practices and procedures which are transparent, compliant with relevant accounting standards and practices, and audited by third parties in accordance with territorial legal requirements.<br><br>3.4.3 The repository shall have an ongoing commitment to analyze and report on financial risk, benefit, investment and expenditure (including assets, licenses, and liabilities). |

| Subject of requirement | Open Archival Information System | Repository Audit and Certification |
|---|---|---|
| *Contingency Planning* | **Security Services** 'capabilities and mechanisms to protect sensitive information and treatments in the information system. The appropriate level of protection is determined based on the value of the information to the application end-users and the perception of threats to it.' This service includes: identification/authentication services; access control services; data integrity services; data confidentiality services; non-repudiation service. (4-4 to 4-5)<br><br>**Disaster Recovery** function provides a mechanism for duplicating the digital content of the archive collection and storing the duplicate in a physically separate facility. (4-9) | 5.1.1 The repository shall identify and manage the risks to its preservation operations and goals associated with system infrastructure. (65)<br><br>5.1.1.1 The repository shall employ technology watches or other technology monitoring notification systems.<br><br>5.1.1.1.1 The repository shall have hardware technologies appropriate to the services it provides to its designated communities.<br><br>5.1.1.1.2 The repository shall have procedures in place to monitor and receive notifications when hardware technology changes are needed.<br><br>5.1.1.1.3 The repository shall have procedures in place to evaluate when changes are needed to |

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| | | current hardware.<br><br>5.1.1.1.4 The repository shall have procedures, commitment and funding to replace hardware when evaluation indicates the need to do so.<br><br>5.1.1.1.5 The repository shall have software technologies appropriate to the services it provides to its designated community<br>5.1.1.1.6 The repository shall have procedures in place to monitor and receive notifications when software changes are needed<br><br>5.1.1.1.7 The repository shall have procedures in place evaluate when changes are needed to current software.<br><br>5.1.1.1.8 The repository shall have procedures, commitment, and funding to replace software when evaluation indicates the need to do so.<br><br>5.1.1.2 The repository shall have adequate hardware and software support for backup functionality sufficient for preserving the repository content and tracking repository functions. (70-71)<br><br>5.1.1.3 The repository shall have effective mechanisms to detect bit corruption or loss.<br><br>5.1.1.3.1 The repository shall record and report to its administration all incidents of data corruption or loss, and steps shall be taken to repair/replace corrupt or lost data.<br><br>5.1.1.4 The repository shall have a process to records and react to the availability of new security updates based on risk-benefit assessment. |

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| | | 5.1.1.5 The repository shall have defined processes for storage media and/or hardware change (e.g., refreshing, migration).<br><br>5.1.1.6 The repository shall have identified and documented critical processes that affect its ability to comply with its mandatory responsibilities.<br><br>5.1.1.6.1 The repository shall have a documented change management process that identifies changes to critical processes that potentially affect the repository's ability to comply with its mandatory responsibilities.<br><br>5.1.1.6.2 The repository shall have a process for testing and evaluating the effect of changes to the repository's critical processes.<br><br>5.1.2 The repository shall manage the number and location of copies of all digital objects.<br><br>5.1.2.1 The repository shall have mechanisms in place to ensure any/multiple copies of digital objects are synchronized.<br><br>5.2.1 The repository shall maintain a systematic analysis of security risk factors associated with data, systems, personnel and physical plant.<br><br>5.2.2 The repository shall have implemented controls to adequately address each of the defined security risks.<br><br>5.2.3 The repository staff shall have delineated roles, responsibilities, and authorizations related to implementing changes within the system.<br>5.2.4 The repository shall have suitable written disaster |

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| | | preparedness and recovery plan(s), including at least one off-site backup of all preserved information together with an offsite copy of recovery plan(s) |

| Subject of Requirement | Open Archival Information System | Repository Audit and Certification |
|---|---|---|
| *Ingest: Acquisition of Contents* | **2.3.2 Producer Interaction** defines that OAIS and Producers should develop submission agreements to define how information will be submitted to the repository and at what interval. (2-9 to 2-10)<br><br>**3.2.1 Negotiates and Accepts Information** a mandatory responsibility of any TDR, to determine what types of information will be submitted and preserved by the repository. (3-1)<br><br>**3.2.2 Obtains sufficient control for preservation**. This requirement deems that the OAIS must ensure when information is transferred they have legal authority of the digital records and are not infringing any copyright or intellectual property. Rights over digital acquisitions must clearly be granted to the OAIS, as well as any limitations placed by the Producer. (3-2 to 3-3)<br><br>**4.1.1.2 Ingest functional model** details all the requirements related to the ingest function which includes: receiving submission and quality assurance, which is to ensure that file transfer errors have not occurred during transfer of SIP. (4-6 to 4-7)<br><br>**4.1.1.5 Administration** this function is responsible for many aspect of repository operations such as the negotiation of the submission agreement between the records producer and the TDR. The agreement should include a data submission schedule. Included in this component is the expectation that Submission Information Packages (SIP) will conform to the agreed transfer format as | 4.1.1 The repository shall identify Content Information and the Information Properties that the repository will preserve.<br><br>4.1.1.1 The repository shall have a procedure(s) for identifying those Information Properties that it will preserve.<br><br>4.1.1.2 The repository shall have a records of the Content Information and the Information Properties that it will preserve.<br><br>4.1.2 The repository shall clearly specify the information that needs to be associated with specific Content Information at the time of its deposit.<br><br>4.1.3 The repository shall have adequate specifications enabling recognition and parsing of the SIPs.<br><br>4.1.4 The repository shall have mechanisms to appropriately verify the identity of the Producer of all materials.<br><br>4.1.5 The repository shall have an ingest process which verifies each SIP for completeness and correctness.<br><br>4.1.6 The repository shall obtain sufficient control over |

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| | detailed in the submission agreement( 4-12 to 4-13)<br><br>**4.3.1 Data Transformations in the Producer Entity** describes again the negotiation of the submission information agreement and the number of interactions that may be needed to receive a SIP as well as what constitutes a SIP. (4-51 to 4-52)<br><br>**4.3.2 Data Transformation in the Ingest Functional Area** explains that once received the contents of SIP may change to conform to the needs and operation of the digital repository. Further it details some of the iterations from SIP to AIP. (4-52) | the Digital Objects to preserve them.<br><br>4.1.7 The repository shall provide the producer/depositor with appropriate responses at agreed points during the ingest processes.<br><br>4.1.8 The repository shall have contemporaneous records of actions and administration processes that are relevant to content acquisition. |

| **Subject of requirement** | **Open Archival Information System** | **Repository Audit and Certification** |
|---|---|---|
| *Access* | **2.3.3 Consumer Interactions** explains how the OAIS will interact with consumer (e.g. users) and the types of activities this interaction will engender. (2-10 to 2-11)<br><br>**3.2.3 Determines Designated Consumer Community** requires repositories to determine who their users will be in order to ensure that information in the repository will be presented to users in such as way that they will be able to understand and fully utilise it. (3-4)<br><br>**3.2.6 Makes the information available**. Another requirement of an OAIS which is that it will makes its information available via DIP to users, upon request. (3-6)<br><br>**4.1.1.7 Access** explains all the functions for rendering access to users of records contained in the TDR. It details how information queries will be input by users and then presented to them. (4-16 and 4-17)<br><br>**4.3.4 Data Flows and Transformation in the Access Functional Area** details the various transformations that a DIP may undergo in order to be presented to a given user. (4-54 to 4-55) | 4.6.1 The repository shall comply with Access Policies.<br><br>4.6.1.1 The repository shall log and review all access management failures and anomalies.<br><br>4.6.2 The repository shall follow policies and procedures that enable the dissemination of digital objects that are traceable to the originals, with evidence supporting their authenticity.<br><br>4.6.2.1 The repository shall record and act upon problem reports about errors in data or responses from users. |

**APPENDIX B**
**DATA COLLECTION INTERVIEW QUESTIONS**

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# INTERVIEW QUESTIONS FOR STANDARD DEVELOPERS (M1(DW))

*IDENTIFICATION OF NEED*

1) What was the impetus behind the development of the standard that you were involved in?

2) Why do you think it is important to develop digital records preservation standards?

3) Why did you become involved? Why did you think it was important? What were the issues you felt needed to be addressed, that were not currently being dealt with?

*IDENTIFICATION OF STANDARD DEVELOPERS*

1) Who was involved in the development in this standard, aside from yourself?
    a) How were these individuals chosen?
    b) Why were these individuals chosen over others?

2) Was anyone from a developing nation involved in the development of the standard? Why or why not?

3) Why were you identified as a developer for the standard? What unique knowledge did you bring? What were your contributions to the standard development process?

*STANDARD DEVELOPMENT QUESTIONS*

1) How was the standard development process organised?
    a) Did you have quarterly meetings?
    b) How did you vet and edit the standard?
    c) Did you test the standard? Did you do any case studies? If so, where was it tested?

2) Did the standard change much from its initial formulation to the final product? If so how did it change?

3) Were there parts of the standard that were removed during the development process that you would have liked to see remain? If so why?

4) How useful is the standard you worked on? What is it meant to do?

5) Do you believe standards are universally applicable regardless of context? Why or why not?

    a. (For OAIS developers only): How applicable is your standard in an archival context? Do you see any problems in trying to apply the conceptual model in this field?

6) Do you think there are any limitations to the standard you helped in developing? If so what are the limitations?

7) When developing the standard did you think about its applicability to the developing world? Do you think there are specific issues that might limit the transferability of the standard in this context? If so what are they?

8) Do you plan to revise the standard anytime in the near future? Are there any issues that have been identified since the standard was published?

9) Is there any process whereby organisations or individuals can submit suggestions for revisions or matters to be considered in the next version of the standard? If so how would one submit such information and to whom?

10) When the standard received ISO certification, was it revised? Which technical committee reviewed the standard? Was there a liaison from TC 46/SC11 the archives and records management committee at those meetings?

*CONTEXTUAL/CULTURAL QUESTIONS*

1) What do you do?

2) What is your specialisation? What is your background?

3) Have you ever worked in an archival setting? If so what did you do?

4) How did you become involved in digital records preservation? Was there a particular experience that spurred your interest in this topic?

CONCLUDING QUESTION

1) Do you have any other thoughts or comments before we conclude?

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# INTERVIEW QUESTIONS FOR DEVELOPING WORLD DIGITAL RECORDS SPECIALISTS (M1(EAC))

*IDENTIFICATION OF PROBLEM*

1) What do you think is the most pressing problem related to digital records preservation?

2) What do you think is the most effective means of beginning to address these problems?

3) What impact does the current push towards ICT implementation in government have on the ability of archives to preserve digital records? During ICT implementation have there been any issues regarding use and uptake of technology? If so are these issues economic and/or cultural? Other?

4) Does the proliferation of mobile phones affect digital records preservation plans in Eastern Africa? If so how?

5) Do you think the problems you have identified are unique to the East African Community? Or do you think they are wider more universal issues? If so why? If not why?

6) Do you feel digital records preservation is a pressing issue that needs to be addressed in Eastern Africa? Why or why not?
    a) If not, what would you consider a more pressing records and archives issues that needs to be addressed before dealing with digital records preservation?

*APPLICABILITY/USEFULNESS OF STANDARDS*

1) What digital records preservation standards are you familiar with?
    a) Do you know about the *Open Archival Information System*?
    b) Do you know about *Trusted Repositories: Audit and Certification*?

2) Do you find that standards that have primarily emanated from developed countries useful in addressing your archives and records management issues? Say for example do you find ISO 15489 helpful in terms of records management?
    a) If not, what prevented the applicability of the standard? Were there any

presumptions made in the standard that made it difficult to implement?

*TRUSTED DIGITAL REPOSITORY STANDARDS AND EASTERN AFRICA*

1) Do you know of any digital repositories in Africa? If so where? What are they called?

2) How useful do think current trusted digital repository standards are in Eastern Africa?

3) Is there anything in the standards that might prevent their application to an Eastern African context?
    a) If you know and have read the standard are there any presumptions that make it difficult to implement the standard?

*DEVELOPMENT OF STANDARDS*

1) How involved do you feel African nations have been, particularly in Eastern African in the development of standards?

2) Why are so few African nations involved in the development of standards? Or for that matter why do so few have actual standard bureaus?

3) Do you know if any African nations, particularly in the Eastern African Community, were involved in the development of any digital records preservation standards?

4) Do you think the lack of African involvement in standards development has affected their usefulness in this particular context? Why or why not?

*CONTEXTUAL/CULTURAL QUESTIONS*

1) What do you do?

2) What is your background? How did you become involved or interested in digital records preservation?

3) Have you ever worked in an archival setting? If so what did you do?

*CONCLUDING QUESTION*

1) Do you have any other thoughts or comments before we conclude?

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# INTERVIEW QUESTIONS FOR TDR OPERATORS (M3(DW))

*STANDARDS QUESTIONS*

1) Did you use any standards and guidelines when establishing your TDR? If so which did you use?

2) Did you use the *Open Archival Information System* when planning and establishing your TDR?

    a. Did you implement all the recommendations outlined in the standards?
    b. If not why? Did you have any difficulty in using or understanding OAIS? If so how did you deal with this?
    c. What sections of the standard did you find most helpful and which did you find least helpful? Why?
    d. Did you use any other documents, standards, white papers or guidelines to assist you in implementing your TDR? If so what are they? Why did you select them?
    e. Did you find OAIS helpful or useful in establishing your TDR? Why or why not?
    f. If you could make any recommendation to OAIS standard developers what would it be?

3) Have you used the *Trustworthy Repositories: Audit and Certification* (TRAC) to assess the operations of your TDR? Why or why not?
    a. If you used TRAC did your institution self-evaluate? Or did you use a third party evaluator?
    b. Did you find TRAC useful? If so how? If not how?
    c. What were the strengths and weaknesses of the audit and certification document?
    d. If you could make any recommendation to the TRAC developers what would it be? Why?

4) Did you refer or use any other standards in establishing your TDR? If so what were they and why?

*TRUSTED DIGITAL REPOSITORY SET UP*

1) How did the trusted digital repository in your organisation come into being? What prompted its creation?

2) What type of planning was involved in setting up the TDR?
    a) Did you analyse types of formats being created by the organisation?
    b) Did you look at any metadata being created?
    c) Did you look at workflow?
    d) Any other planning you did in preparation for the TDR?

3) What type of records do you acquire? What is your acquisition mandate?

4) Are there file format you do not ingest into the TDR? If so why?

5) Do you normalise records? If so to what format? If not, why?
    a) If you normalise, does the receiving institution do the normalisation or does the parent institution?

6) What type of hardware was purchased for the TDR? How much, approximately, did it cost the institution to make all the necessary purchases?

7) What motivated the selection of particular pieces of hardware?

8) What type of software did you purchase or select for the TDR? Why did you select certain types of software?

9) What type of metadata standards did you use for your TDR?

10) Was the TDR set up solely driven by the archives staff or did it involve individuals from other departments with specific skill sets or knowledge to facilitate the establishment of the repository? Who were the employees and what did they bring to the project?

11) What would you consider the greatest challenge(s) you faced during the planning and implementation of the TDR?

12) What recommendations would make to an organisation that is considering implementing a TDR?

*LEGAL AND LEGISLATIVE ENVIRONMENT*

1) Does your institution have a legal mandate? If so what is the name of the legislation and what responsibilities does it assign to your institution?

2) Where within your organisation does your department fall in the organisational structure? To whom do you report?

3) Do you have any policy and procedures related to the creation, maintenance or preservation of electronic records? Are those policies and procedures followed?

a. How do you ensure that policy and procedures are enforced?
b. Did you develop any policies and procedures specifically related to TDR operation and maintenance? If so what were they?

4) Are ministries, departments, and agencies required to deposit their digital records with your institution? If so is this done at regular intervals?

5) Does your state or government have laws that specify the types of digital records to be maintained and the manner of their maintenance?

*ORGANISATIONAL CULTURE*

1) How would you describe the organisational culture of your institution?

2) Did your institution's organisational culture have an impact on TDR implementation? Why or why not?

3) Did you encounter resistance when you implemented the TDR? If so, what type of resistance did you encounter and how did you deal with it? If not, why do you think there was no resistance?

*CONTEXTUAL/CULTURAL QUESTIONS*

1) How did you become an archivist/records manager?

2) How did you become involved in digital records preservation or in working with trusted digital repositories?

3) What is your current job title? What type of work does that entail?

CONCLUDING QUESTION

1) Do you have any other thoughts or comments before we conclude?

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# INTERVIEW QUESTIONS FOR DEVELOPING WORLD DIGITAL RECORDS SPECIALISTS (M3 (EAC)

*CONTEXTUAL/CULTURAL QUESTIONS*

1) How did you become an archivist/records manager?

2) How did you become involved in digital records preservation or in working with trusted digital repositories?

3) What is your current job title? What type of work does that entail?

*STANDARDS QUESTIONS*

1) Do you know of any digital records preservation standards? If so which ones?

2) What do you know of the *Open Archival Information System* ?

    a. Have you looked at the conceptual model?
    b. If yes, how do you plan to craft a digital repository that will meet this standard?
    c. Are there any limitations which might affect you ability to implement this standard? If so what are they?

3) Do you plan to use the *Trustworthy Repositories: Audit and Certification* (TRAC) or *DRAMBORA* to assess the operations of your TDR? Why or why not?
    a. Have you looked at the TRAC requirements?
    b. If so, do you think you will be able to meet all of the requirements set out in that document?
4) Are there any other standards you are considering using to assist in the implementation of your organisation's digital repository?

*RECORDS QUESTIONS*

1) Have you completed a survey of electronic records being created by your institution? What type of records are created ?

2) Have you examined any of the following:

   a. Did you look at any metadata being created?
   b. Did you look at workflow?
   c. Any other planning you did in preparation for the TDR?

3) Does the Archives have the legislative remit to preserve these records? If not is there any other department that is tasked with the electronic records maintenance and preservation function?

4) Is the Archives accepting electronic records at this time? If not when do you anticipate their transfer?

5) Have you made any preparations either infrastructural (investigating and/or purchasing hardware and software) or regulatory (developing policy and procedures, developing standards) in anticipation of having to preserve electronic records? If so what have you done?
   a. If you have selected hardware and software for the digital repository what motivated their selection?
   b. If you have developed policies which did you develop? And why?

6) Are there file formats you will not ingest into the repository? If so why?

7) Do you plan on normalising records? If so to what format? If not why?
   If you normalise, does the receiving institution do the normalisation or does the parent institution?

8) Do you have a budget item line for the TDR? If so, how much? If not, why not?

9) Do you have a plan for checking metadata quality? If so what is it? What will you do with vital records that have incomplete metadata?

10) What would you consider the greatest challenge(s) you faced during the planning and implementation of the TDR?

*EDUCATION*

1) Do you think the education and/or training you received has prepared you to manage digital records? If so why? If not why?

2) If not, how did you acquire the necessary know-how to prepare you for your task as a digital records professional?

3) Is there a programme in Africa that provides digital records training to enable graduates to work in the field?

4) If the provision of technical training in this area is lacking what would you propose to

amend the situation?

*LEGAL AND LEGISLATIVE ENVIRONMENT*

1) Does your institution have a legal mandate? If so what is the name of the legislation and what responsibilities does it assign to your institution?

2) Where within your organisation does your department fall in the organisational structure? To whom do you report?

3) Do you have any policy and procedures related to the creation, maintenance or preservation of electronic records?
    a. Are those policies and procedures followed?
    b. How do you ensure that policy and procedures are enforced?

4) Did you develop any policies and procedures specifically related to TDR operation and maintenance? If so what were they?

5) Are ministries, departments, and agencies required to deposit their digital records with your institution? If so is this done at regular intervals?

6) Does your state or government have laws that specify the types of digital records to be maintained and the manner of their maintenance?

*ORGANISATIONAL CULTURE*

1) How would you describe the organisational culture of your institution?

2) Did your institution's organisational culture have an impact on TDR implementation? Why or why not?

3) Did you encounter resistance when you discuss proposed TDR implementation? If so, what type of resistance did you encounter and how did you deal with it? If not, why do you think there was no resistance?

CONCLUDING QUESTION

1) Do you have any other thoughts or comments before we conclude?

## APPENDIX C
## LIST OF INTERVIEWEES PSEUDONYMISED

| Interview No | Interviewee description | Date Interviewed |
|---|---|---|
| **1** | Developer, Washington State Digital Archives | 18 July 2011 |
| **2** | Ingest Manager, Washington State Digital Archives | 19 July 2011 |
| **3** | Digital Archivist, Washington State Digital Archives | 18 and 19 July 2011 |
| **4** | State Archivist, Washington State Digital Archives | 19 July 2011 |
| **5** | Database Specialist, Washington State Digital Archives | 18 July 2011 |
| **6** | Network Administrator, Washington State Digital Archives | 18 July 2011 |
| **7** | Database Developer, Washington State Digital Archives | 19 July 2011 |
| **8. i** | Archives Assistant, Washington State Digital Archives | 18 July 2011 |
| **8. ii** | Regional Archivist, Washington State Digital Archives | 18 July 2011 |
| **9** | Head of Applications Development, Washington State Digital Archives | 19 July 2011 |
| **10** | Head of Digital Preservation, The National Archives, UK | 12 October 2011 |
| **11** | Director of Technology, The National Archives, UK | 14 September 2012 |
| **12. i** | Head of the Digital Records Unit, National Archives Service of Finland | 21 September 2012 |
| **12. ii** | Systems Specialist, National Archives Service of Finland | 21 September 2012 |
| **12. iii** | Research Officer, National Archives Service of Finland | 21 September 2012 |
| **13** | Development Manager, National Archives Service of Finland | 21 September 2012 |
| **14** | Assistant Director, Digital Records, National Archives Service of Norway | 17 February 2013 |
| **15** | Chief Archivist, Kenya National Archives and Document Services | 4 July 2013 |
| **16. i** | National Archivist, Records and Archives Management Department, Tanzania | 5 August 2011 |
| **16. ii** | Assistant Director, Digital Records, Records and Archive Management Department Tanzania | 5 August 2011 |
| **17** | Kenyan Professor with 20 years experience and extensive consulting experience in Africa and abroad | 18 September 2012 |
| **18** | East African archivist with 10 years experience working in Africa and abroad | 15 June 2012 |
| **19** | Zimbabwean archivist with 20 years experience working in Africa and internationally | 17 September 2012 |
| **20** | US digital preservation expert that worked on TRAC | 9 March 2012 |

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| | and RAC | |
| **21** | Academic and digital preservation expert that worked on RAC | 19 October 2012 |
| **22** | Archivist that worked on OAIS | 28 March 2012 |
| **23** | Co-chairperson of OAIS, TRAC and RAC | 1 June 2012 |
| **24** | European digital preservation expert that worked on RAC | 13 July 2012 |
| **25** | US digital preservation expert that contributed to TRAC and RAC | 8 October 2012 |
| **26** | Space data professional that worked on OAIS | 5 October 2012 |
| **27** | European digital preservation expert that worked on TRAC and RAC | 16 October 2012 |
| **28** | European digital preservation expert that worked on TRAC | 26 March 2012 |

**APPENDIX D**
**INTERVIEW CONSENT FORM**

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# CONSENT FORM

***TRANSFERABILITY OF TDR STANDARDS IN THE EASTERN AFRICAN COMMUNITY***

The purpose of this thesis is to study the transferability of certain Trusted Digital Repository (TDR) standards such as the *Open Archival Information System* and *Trustworthy Repositories: Audit and Certification* into a developing world context, more specifically within the Eastern African Community. The study seeks to examine the development of TDR standards and the application of standards in archival settings both in the developed and the developing world to assay standards transferability.

The interviews conducted for the purpose of this research will be used and secured in accordance with the stipulations set out in the UK Data Protection Act 1998. The information you provide will be compiled and used only for the purposes of this thesis. Individual names will be not be released but job titles and institutional affiliation may be included in the body of the thesis.

As an interviewee you will be permitted to review a transcript of the interview and correct any omissions, errors or oversights.

By signing this consent form you agree to be interviewed and to have the resulting data used and collated for the purposes of this thesis.

If you have any questions or concerns regarding this research and usage of interview findings please contact Anthea Seles at anthea.seles.10@ucl.ac.uk or phone: +44 (0)7857 783 989, or her supervisor Dr. Elizabeth Shepherd at UCL (e.shepherd@ucl.ac.uk)

**NAME:** _____
**JOB TITLE:** _____
**INSTITUTION:** _____
**DATE:** _____
**SIGNATURE:** _____