Libraries in an Era of Constant Change

Libraries in an Era of Constant Change:

From Yesteryear to the Future

By

Madeleine C. Fombad,
Collence Takaingenhamo Chisita,
Tshepho Mosweu,
Vusi W. Tsabedze,
Rexwhite T. Enakrire
and Godfrey Tsvuura

Cambridge Scholars
Publishing

Libraries in an Era of Constant Change: From Yesteryear to the Future

By Madeleine C. Fombad, Collence Takaingenhamo Chisita,
Tshepho Mosweu, Vusi W. Tsabedze, Rexwhite T. Enakrire
and Godfrey Tsvuura

This book first published 2025

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-0364-4083-1
ISBN (Ebook): 978-1-0364-4084-8

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

Firstly, we would like to thank the almighty God for providing us with life, wisdom, latitude and tenacity to work as a team and put all ideas into a logical and decipherable form. Secondly, gratefulness goes to the the Fombad, Mosweus, Chisita, Tsabedze, Enakrire and Tsvuura families for the caring, supportive and encouragement leading to the realisation of this project. Thirdly, as a team imbued with the spirit of collective workhumanship **"*esprit de corps***" we extend gratitude ***"gratium"*** to the University of South Africa, University of Botswana, Durban University of Technology, University of Eswatini and the Zimbabwe Open University for supporting the authors and enabling time to complete this book. Special mention goes to Regents Professor Suliman Hawamdeh from the Department of Information Science, University of North Texas (USA) and Dr Athulang Mutshewa, Senior Lecturer, Department of Library and Information Studies, University of Botswana for their insightful, captivating, succinct and meaning-laden forewords to the book. Our heartfelt gratitude goes to the families of the co-authors for their steadfast support during the conceptualisation, organising the content, research and development, drafting, editing and ultimate publishing. In the true spirit of ubuntugogy, we would like to conclude with an ancient Ethiopian proverb "*When spiderwebs unite, they can tie down a lion"*[1] and indeed the teamwork help to bring the book into execution through teamwork. Conclusively we appreciate the intellectual gravitas and oomph (positive energy) that characterised this project from commencement to conclusion by galvanising idea exchange for positive outcomes.

[1] Murrey, A. (2018). 'When spider webs unite they can tie up a lion': Anti-racism, decolonial options and theories from the South. In Routledge handbook of South-South relations (pp. 59-75). Routledge.

PREFACE

In a time of rapid technological advancement and shifting expectations, landscapes or architectures, "**Library Services in an Era of Constant Change; The future started Yesteryear**" explores the transformative expedition of libraries and information institutions and professionals as they adapt to the evolving dynamic and complex needs of the society and embrace the challenges of modern innovation. The purpose of the book is to explore various perspectives on how libraries are adapting to change, with insights from different experts in the field of Library and Information Science (LIS). This book provides readers with an all-inclusive comprehension and apprehension of the challenges and opportunities encountered by libraries and related institutions today and offers theoretical and praxis-oriented strategies for managing change effectively. Books by nature are ontologising agents and as such they form global views, serve as vectors for transmitting cultural heritage, conscientizing readers to realise their potential as equals in the global world and provide epistemological and axiological campus moving forward. The book is organised into chapters, each written by a different author but reviewed by the authors and external reviewers highlighting the diversity of perspectives and expertise.

The first chapter of the book delves into the evolving records and archives infrastructures and ecosystems in the context of the Fourth Industrial Revolution. It begins with an overview of the revolution itself and emphasises the critical need to integrate people, infrastructures and technology for effective records and archives management. As we transition into this new era, addressing the infrastructures and ecosystems that support records and archives is crucial to ensuring they remain reliable sources for decision-making. Unlike the traditional, paper-based world where these systems were straightforward, the digital age presents challenges with constantly changing formats. This instability can lead to the loss and inaccessibility of records, thereby hindering effective decision-making.

The second chapter examines the outreach programs of national archival institutions within a post-custodial environment. It explores how the adoption of social media has prompted archival institutions to shift from traditional analogue practices to engage in the post-custodial landscape. The chapter emphasises the need for archival institutions to

develop a social media strategy that aligns with professional and legal standards before fully embracing these platforms.

The third chapter explores the impact of digital technologies on the future of libraries, with a focus on academic libraries in selected developing countries. It examines how LIS professionals are adapting to technological changes within the information landscape and highlights the strategies they have implemented to stay relevant in a rapidly changing environment. The chapter also investigates how these professionals prioritise the needs of people as they navigate these technological advancements.

The fourth chapter examines how public libraries can enhance their services to help eradicate poverty through knowledge-sharing strategies. While libraries have long practiced knowledge-sharing, such as through interlibrary loans, this approach has not been prioritised in addressing social inequality and poverty. The chapter argues that knowledge for sharing for poverty eradication at public libraries should become an integral part of the policies and strategic planning of rural public libraries. It advocates for a shift in the role of public librarians as custodians and disseminators of information to active participants in public community activities that may take the form of partnerships and community outreaches, Community of Practice (CoP) initiatives, prioritising information technology and redesigning the structure of the library. This paper raised awareness of the importance of effective knowledge-sharing as a tool for poverty eradication among policy developers.

The fifth chapter explores knowledge-sharing strategies for climate change education in South African school libraries and proposes a strategy for effectively disseminating this knowledge. Given that climate change is a significant global environmental issue and one of the greatest challenges to South Africa's development, it poses a serious threat to achieving sustainable development goals. The chapter advocated that the level of awareness of sustainable development among library staff, the availability of library human and physical resources and the effectiveness of library programs will enhance climate education. It calls for climate awareness, collaboration, the effective use of ICTs in the library and critical success factors. By integrating climate change education into school libraries, learners can develop critical thinking skills and make informed decisions regarding climate issues.

The sixth chapter explores the challenges and opportunities of documenting oral histories during times of technological revolution and pandemics. It highlights the importance of oral history in African societies while acknowledging obstacles such as reduced funding, limited technological resources and legal issues that hinder the long-term preservation and accessibility of these histories. Despite these challenges, the chapter identifies opportunities that memory institutions can leverage to mitigate the effects of on-going societal changes.

The seventh chapter examines security and privacy concerns in delivering Library and Information Science (LIS) education through an open distance e-learning (ODeL) environment in Eswatini. It aims to conceptualise a model that addresses these concerns in the development and implementation of LIS programs within ODeL. With the proposal to deliver LIS education in Eswatini through ODeL, stakeholders are particularly concerned about ensuring the security and privacy of these programs. The chapter's findings and recommendations will be instrumental in shaping effective and secure LIS programs for ODeL delivery.

The eighth chapter explores digital preservation within the context of e-government in Eswatini's government ministries, offering recommendations to improve the effective and efficient preservation of electronic records. It contributes to the on-going discussion about preservation strategies, challenges and best practices in digital preservation, particularly within e-government frameworks.

The ninth chapter examines how academics in higher education institutions (HEIs) apply their knowledge and skills to support students' career progression. It highlights the importance of both tacit and explicit knowledge and identifies key skills, including cognitive abilities, advanced literacy and writing, intercultural competence, interactive and supervisory skills, online search strategies and digital/ICT skills, as crucial for academics. The chapter recommends incorporating experiential learning activities to enhance the acquisition of these skills by academics, thereby improving their performance in HEIs, regardless of their geographical location.

This book contributes to the ongoing discourse in library and information science, particularly in the context of managing change. The LIS field is intertwined with technological innovation as we have seen libraries evolving from being more repositories of books to becoming centres for digital information, media and technology-driven services. This book is

relevant for LIS professionals who must understand and anticipate these changes to remain relevant and effective in a world of constant change. It provides insights into effective strategies for managing change within library settings, offering practical advice for LIS professionals. The book adds to the academic and professional discourse within the LIS field by bringing together different perspectives on the impact of constant change. It is valuable for scholars, researchers' and students in LIS providing them with a comprehensive understanding of current trends and challenges.

We therefore encourage readers to reflect on the ideas presented in this book and consider how they might apply these insights to their own professional practices. It is our hope that the book will serve as a valuable resource for library professionals and others interested in the future of library services and strategies to supercharge LIS theory and praxis and future-proof the profession for a sustainable future.

Professor Madeline, C. Fombad (University of South Africa, South Africa), Dr Tshepho,Lydia Mosweu (University of Botswana, Botswana), Dr. Collence Takaingenhamo Chisita (University of South Africa / Durban University of Technology, South Africa and the Methods Lab, University of Johannesburg, South Africa), Dr. Vusi Wonderboy Tsabedze (University of Eswatini, Eswatini), Dr. Rexwhite Tega Enakrire (University of Johannesburg, South Africa) and Dr. Godfrey Tsvuura (Zimbabwe Open University, ZOU, Zimbabwe).

FOREWORD

PROFESSOR SULIMAN HAWAMDEH

From the clay tablets of Mesopotamia to the digital libraries of the 21st century, libraries played a key role in the development of the human civilizations and the advancement of knowledge, science of technology. The invention of papers, the printing press, and the computers transformed libraries from a collection of clay tablets to centres for intellectual exchange, community building, and social inclusion. The printing press of the 19th century was a key turning point that helped to shape library functions which was mainly centered around physical books and journals. Today, the Internet and the digital revolution of the 21st century are not only transforming the library functions but also changing the way people access, process, use, and share information.

Much has been written about the relevance of libraries in the age of easily accessible online information discounting the core mission of libraries where libraries are committed to provide equal and equitable access to information. Libraries are not only remained relevance, but increased in importance as their mission has expanded to address many of the challenges created by the advancement in technology and the advent of the digital revolution. Libraries, archives and related institutions are responding to changing landscape of information access by creating safe learning spaces, promoting lifelong learning and helping users to navigate an overwhelming and often unreliable amount of information. They are helping to bridge the digital divide by providing access to computers, high-speed internet, and digital resources. Responding to the proliferation of misinformation and disinformation, libraries are investing in digital literacy education and creating programs to ensure access to trusted, accurate, unbiased sources of information.

In the book, Libraries in an era of constant change, the authors examine the historical evolution of libraries and related institutions and highlighted how Libraries, archives and record management institutions are striving to adopt technology and embrace change to become even more relevant. The first chapter on “record and archives infrastructure and ecosystems in the fourth

industrial revolution" provides an overview of the fourth industrial revolution and the importance of combining people, infrastructure and technology in the management of archives. The chapter drives home the point that in a time of constant change, there is a need for organizations to create and maintain authentic, reliable and useable records and protect the integrity of those records.

The second chapter on "If it is not online it does not exist" explores outreach programs by the Botswana National Archives and Record Services in post custodial environment. The chapter reports on the results of a qualitative study regarding the use of social media platforms by archival institutions. The third chapter on "Seismic shifts in the library and information science infosphere" examine library and information science (LIS) infosphere amidst the rapid technological changes that continue to shape the industry's future. The chapter focuses on academic libraries from a selected developing country concerning how LIS professionals adjust to the technological changes in the LIS infosphere. The fourth chapter on "knowledge sharing strategies for poverty eradication in public libraries in South Africa" examines knowledge sharing strategies for poverty eradication in public libraries in South Africa. Recognizing the role of public libraries in South Africa as agent for the dissemination of information, the chapter discuss ways in which public libraries can provide enhanced innovative and quality services to the community to eradicate poverty. The fifth chapter on "knowledge sharing strategies for climate change education in school libraries in South Africa" discusses the role of school libraries in creating awareness about climate change in South Africa. A systematic literature search and content analysis of the relevant textbooks, articles, policies strategies, frameworks and legislation on knowledge sharing, climate change and school libraries were conducted. The sixth chapter on "Oral traditions/histories in times of technological revolution and pandemics in society: A wake up call for memory institutions" discusses the role of documentation of oral histories in times of technological revolution and pandemics in society. The chapter uses content analysis to collect data by analysing secondary data sources such as internet sources, research articles and books. The study reveals that despite the lack of funding and resource in Africa, there are opportunities for harnessing of modern technologies and wider participation of the public.

The seventh chapter "Towards a model for security and privacy for libraries and information science education in an open distance learning in Eswatini" examines security and privacy for library and information science (LIS) education in an open distance e-learning (ODeL) environment in Eswatini.

The chapter reports on systematic literature review based on 28 articles that the author used as base for more in-depth empirical study. The eighth chapter, on "Digital preservation in the context of e-government in government ministries in Eswatini" examines digital preservation in the context of e-government in government ministries in Eswatini. It highlighted the major issues with the approach to the preservation of government e-records. The author stated that this is the first study about digital preservation in backing e-government in Eswatini. The ninth chapter on "Application of knowledge and skills of academics in higher education institutions" focuses on the knowledge and skills needed for the daily operations of individuals, including academics in higher education institutions (HEIs). The study investigates the application of knowledge and skills by academics in HEIs. The study reveals that both tacit and explicit knowledge has become essential commodities for academics to support students in their future career progression.

The transformation of libraries, archives, and related organization is a key to the advancement of the information and knowledge professions. This book written by experts in the field provide insights in the development of libraries, archives and related institutions taking place in Africa and the rest of the world. The edited book is highly recommended as a reference for students, researcher, and practitioners.

Professor Suliman Hawamdeh, University of North Texas: Denton, TX, US
ORCID https://orcid.org/0000-0001-7018-6945

FOREWORD

DR ATHULANG MUTSHEWA

The 21st century is characterized by an ever-changing information landscape. Consequently, the role of Libraries, archives and related institutions has never been more critical. The institutions not only stand out as providers of Information Services, but key drivers of innovative capabilities of communities and organizations they serve. The technological development, particularly the Internet, have brought about unprecedented access to Information by individuals, and this has introduced new challenges and competition which traditional information services providing institutions must deal with. Thus, it can no longer be "*business as usual*" for them. Their relevance and survival will depend on how they respond to these challenges. They need to ramp up their innovation capabilities, use the current digital technologies to develop and provide services that would compete with whatever users can access through the Internet and other means. This edited book addresses these challenges head on and explores the evolving landscape of Information Services in the current digital era.

Throughout my career, having worked in a library before moving into academia, I have witnessed the struggles that libraries and related institutions go through to prove their relevance to the stakeholders in this era where information is at everybody's fingertips. They are challenged to use the power of the digital technologies to serve the highly sophisticated 21st century users by transforming themselves from being just repositories of knowledge to community hubs that serve as spaces for learning, preservation and conservation of cultural the heritage. By so doing they would affirm their relevance to the stakeholders.

Through a collection of research papers and case studies, this book highlights the strategies and practices that libraries, archives, and related institutions are employing to affirm their relevance in the digital age. The contributors to this book provide a comprehensive overview of the current and innovative ways of information service provision, including: records and archives infrastructures ecosystems in the fourth industrial revolution, outreach programs in post-custodial environment, how digital technologies

will determine the future of libraries, how public libraries can provide enhanced innovative and quality services to the community to eradicate poverty, knowledge sharing strategies for climate change education, documentation of oral histories in times of technological revolution and pandemics, security and privacy , and digital preservation in the context of e-government among others.

What sets this book apart is the focus on practical solutions that information service providers need to adopt in the current digital era. The contributors recognize that the digital era requires an innovative approach to providing information services, using the strengths of both the digital and traditional resources to meet the needs of the current information user. They offer practical insights and forward-thinking solutions that will not only inspire, but guide libraries, archives and related institutions when navigating the complex information landscape.

The privilege of writing this forward and endorsement of such a significant work is my pleasure, and I am grateful to all the authors who worked together and produced such an intellectual work, as evidenced by their contribution to creating a valuable resource that will be used by not only information professionals, but also educators, researchers, and policymakers. Additionally, as we move forward in this digital era, we hope that our libraries, archives, and related institutions will remain innovative in how they use digital technology and provide users with appropriate support.

Dr Athulang Mutshewa, Senior Lecturer, Department of Library and Information Studies, University of Botswana

ABSTRACT

The sound management of records and archives is invaluable for effective organisational or governmental functioning and without this, no organisation whether big or small can survive in this world of constant changes in technology. Records and archives management is that field of management responsible for the efficient and systematic control of the creation, receipt, maintenance, use and disposition of records. Therefore, it is important for organisations, entrepreneurs and business entities to first and foremost understand how records are created in their institutions and where these records are kept so that they know that evidence of their business activities is well maintained for future references. Record management practices and attendant policies and guidelines in institutions should incorporate both electronic and paper-based records. Record management and good recordkeeping are key factors for accountability, transparency and good governance of both public and private entities. To support the continuing conduct of business transactions, satisfy applicable legal requirements and provide necessary accountability, organisations should create and maintain authentic, reliable and useable records and protect the integrity of those records. As the world is grappled with consistent changes due to the advent of computers, information and communication technologies (ICTs), cloud computing and social media innovations, the challenge facing most organisations and governments is to combine records and archives ecosystems with automated systems for better efficiency without tempering with authenticity and admissibility of the records in courts of law. This demands proactiveness of record managers and archivists as they risk losing the resources in obsolete gadgets as technology is tremendously changing. The purpose of this chapter is to explore records and archives infrastructures and ecosystems in the fourth industrial revolution. It provides an overview of the fourth industrial revolution and discusses the importance of combining people, infrastructures and technology in the management of records and archives. As we move into the fourth industrial revolution, it is imperative to address the infrastructures and ecosystems of record and archive management so that they remain effective sources of decision making. Traditionally, records and archives were primarily paper-based and the infrastructures and ecosystems in the paper world were easily determined. However, in the digital world, the formats for records and archives are constantly changing, resulting in

the loss and inaccessibility of the resources, thereby impeding decision making.

Keywords: Records, Archives, infrastructure, ecosystem, Fourth Industrial Revolution, digital world.

INTRODUCTION

The inequivalence between computers which are fast and accurate and people who are incredibly slow and inaccurate have caused an unbalanced recordkeeping ecosystem within the information management environments of record offices, libraries and archival institutions around the world. Despite this inequivalence, individuals, organisations and governments have embraced information technologies as a solution to information management problems. This has been further impounded by the myth that technology is replacing the role of the records manager and archivist as the world moves into the fourth industrial revolution. The fourth industrial revolution trends have made it difficult to preserve the digital records and archives since when a system is being replaced, the process of migrating records is not easy because of different data formats and storage media. The increasing prevalence of information technologies in the fourth industrial revolution has brought about more and more challenges in recordkeeping ecosystems. According to Millar (2009) this prevalence of information technologies is a challenge to good government and accountable recordkeeping precisely because computers are seen as important to business and daily life. Information technologies have been seen to be a solution to information management problems and computers have been installed in many organisations without prior thinking of how the records will be preserved. The traditional paper-based recordkeeping is understood and trusted by even those not in the recordkeeping profession.

However, the challenges of moving from paper-based to electronic-based recordkeeping has brought about some risks and there is a need to understand fundamental aspects of the ever-changing information technologies. The e-recordkeeping environment is unique and the stability of the records is at greater risk as the media in which they are kept is not permanent. Electronic records are not as easy to preserve as paper records. On the one hand, paper is durable and can last for several hundreds of years provided it is kept dry and in suitable storage conditions. On the other hand, e-records are made up of bits of data and can only exist when the different digital components are brought together and are able to be read by a computer system. Such records cannot be accessed without the aid of computer technology and the different digital components brought together in the way the records have been created in the first place. Archivists and record managers are called upon to

actively participate in the development of strategies to facilitate access to digital records and archives for long term use. Due to the changing information technologies, there is a need to come up with recordkeeping strategies for long term accessibility as some records become archival and need to be accessed indefinitely.

Records and archives, whether paper or digital, play a significant role and should be regarded as fully important for administrative functions since they are at the heart of institutions (Seniwoliba, Mahama & Abilla, 2017). Managing a well-organised records and archives system helps institutions to achieve efficiency and effectiveness in doing business as they would be made timely available for decision making in a transparent and accountable manner (Tsvuura, 2021). Appropriate management of records and archives helps governments and institutions to do their work in a more accurate and efficient manner, as staff would be able to create, receive, locate, understand and retrieve the right records at the right time as and when they are required, including their disposal, regardless of format. However, the roles of records managers and archivists in today's digital world face a myriad of challenges that come with Information and Communication Technologies which require them to transform from traditional practices and align themselves with ICT skills and abilities. Asmiyanto (2019:13) argues that the information revolution has significantly changed the face of the world quickly and in a scope never touched before. The revolution has brought in more complex and complicated challenges that require record managers and archivists to adapt to very revolutionary change to catch up with the tremendous changes in ICTs. This fourth industrial revolution has also brought in challenges in the preservation of digital records and archives since when a system is being replaced by a new system, the process of migrating the records is not easy as data formats and storage media changes.

The history of records and archives management

Tsvuura (2021) alludes that the idea of recordkeeping predates the existence of human kind, as Genesis 1 and 2 of the Holy Bible outline that God kept a chronological record of all his creations from day one when he created heaven and earth to the last day, which was the seventh when he rested from all his work. Metaphorically, Lewellen (2015) posits that the ancient Greeks considered the archive as a keystone, in which the 'arch' of government is the crucial piece that keeps the 'arch' from crumbling; thereby underlining the importance of records and archives to society. "The predated task of keeping records can also be traced back to the beginning of civilisation

when the earliest people, the cavemen used to draw pictures on the walls of their caves, depicting events of their past times" (Tsvuura, 2021). Penn et al. (1989) lament that keeping records has evolved over the years and experienced some re-births from the primitive media of the clay tablet around 5000 BC, to papyrus reeds (first re-birth) and then to parchment (second re-birth) which gradually gave way to paper around 105 A.D (third re-birth) and finally paper is giving way to digital or electronic recordkeeping formats (fourth re-birth). "Recordkeeping systems (that) date back as far as mankind developed medium to store the records and much of documented history is based on the records ingested into and retained by archivists in the archives of administrative bodies" (Cohen, 2014). The earliest forms of recordkeeping were also found in the Egyptian hieroglyphics and this has helped archivists, historians and archaeologists to obtain information about the environment and activities of the people of bygone eras. As time passed on from ancient to modern, the introduction of computers and the challenges of keeping digitised records and archives have been widely discussed in archival sciences and the solutions are more difficult to achieve than with paper records (Tsvuura, 2021).

Cohen (2014) outlines that the field of records and archival science emerged overtime as part and parcel of the need to keep reliable public records. He (Cohen, 2014) asserts that public records are generally admissible for the truth of what they self-indicate (that is, reliable, authentic and accurate when properly introduced and marked with appropriate seals, signatures and other special signs). However, these self-indicative features are a matter of concern in the digital world as digital formats can be altered, intentionally or accidentally without traces resulting in their authenticity being at stake and the evidence they provide not trusted. Adam (2008) notes that most public sector organisations worldwide have kept records in paper files and folders for hundreds of years and this had become part of their ingrained culture. This indicates that the continuity of institutions depends on the availability of records of past events and activities.

From the first media of the clay tablet to papyrus, parchment, and then paper, there were traceable and admissible evidence of business transactions (Tsvuura, 2021; Cohen, 2014). However, the digitised records and archives are difficult to keep as they are in bytes and bits invisibly on compact disks, flashes and other electronic media that have a very short life span (Tsvuura, 2021). The transition from paper recordkeeping to digital recordkeeping have fundamentally changed the way records and archives are managed in the fourth industrial revolution. Organisations and governments have long been keeping their records and archives in paper format, but the introduction

of computers has brought in new types of record formats which are difficult to identify and preserve (Chinyemba & Ngulube, 2005). This has demanded appropriate records, management policies and legal and statutory framework for long term preservation. If these frameworks are not present, organisational records and archives would be exposed to high risks, threats and adverse effect on their management. As the world moves into the fourth industrial revolution, there is a need to address recordkeeping problems and concerns to promote transparency, accountability and good governance in the management of digital records and archives. The facet of the transparency, accountability and good governance satisfy the interests of organisations, governments and citizens in terms of human dignity, security and equity.

The Fourth Industrial Revolution

Record Management in the Fourth Industrial Revolution need to ensure long term accessibility and be able to be used by future generations. The principles of good governance such as public accountability, transparency and rule of law become the major tenants of the fourth industrial revolution, and these are anchored on proper organizational record management. Failure by organizations to manage records appropriately would weaken the accountability and impede good governance. In this regard, record management has become an important tool for enhancing good business, governance issues and efficient administration. Guto and Jumba (2021) posit that records have been used to provide information for improved planning and decision-making, evidence for government in terms of accountability, transparency and are often subject to specific legal requirements. The authors lament that records have been used in government bodies to document what is done, why it is done, when it is done and provide evidence of decisions made, communications done and actions taken. With the coming of electronic records management in the fourth industrial revolution, it is important for organisations to ensure that digital records have a long-term accessibility aided with their authenticity, accountability and good governance. Importantly, records require long term accessibility in an authentic manner, failure of which would render the evidence in them being of dubious veracity.

Since 1760, the world development is characterised by industrial revolutions. The first industrial revolution brought about coal as a source of energy which led to the invention of the steam engine and industries such as textile and steel (Tsvuura, Mbawuya and Mutsau, 2021). The first industrial

revolution was quickly replaced by the second industrial revolution which brought about oil and electricity. The third industrial revolution brought about nuclear energy and natural gas with the main achievement of computers and robots coming into play. The fourth industrial revolution is built on a widespread availability of digital technologies which are the facets of the third industrial revolution (Tsvuura, Mbawuya and Mutsau, 2021). The fourth industrial revolution is a term coined by Schwab (2014), an author and official chairman of the World Financial Gathering, depicting a world where people live with technology. Today, in the twenty first century, people are living with technology and their lives depend on modern technologies in all spheres such as political, economic and social (Tsvuura, Mbawuya and Mutsau, 2021). This fourth industrial revolution reflects that most of the time, people both professional and ordinary are using technologies to complete tasks and abilities. As the whole world crumbles into a global village, everything is being digitised and accessed through computers and the internet. The innovations within computers gave birth to information and communication technologies, internet, networks, mobile cell phones, 3D printers and genetic engineering as the driving forces of the spheres of people's lives. This has been largely announced as the internet of things where computers are cutting down the physical boundaries and the world at large is reduced into a global village. Unlike the first two industrial revolutions, the fourth industrial revolution is built on the third industrial revolution which brought about digital revolution that has been occurring since the middle of the last century (Min, Jeanne & Suk, 2018:91). The convergence of these technologies results in the birth of e-commerce, e-banking, e-learning, e-government, e-records management and cloud computing. The concept of e-records came from the paperless office enabled by the computers to create, store and retrieve records electronically. This also leads to e-government strategies, where government business is done electronically (Tsvuura and Ngulube, 2020). This enables governments to conduct Government to Citizens (G2C), Government to Business (G2B), Government to Government (G2G) and other electronic businesses.

Table 1 below shows the developments that took place in the world which are termed industrial revolutions.

Period	Transition Period	Energy Source	Main Technical Achievements	Main Developed Industries	Transport Means
1760-1900	1860-1900	Coal	Steam Engine	Textile, Steel	Trains
1900-1960	1940-1960	Oil, Electricity	Internal Combustion Engines	Metallurgy, Auto, Machines, Buildings	Trains, Cars
1960-2000	1980-2000	Nuclear Energy, Natural Gas	Computers, Robots	Auto, Chemistry	Cars, Planes
2000-	2000-2010	Green Energies	Internet, 3D Printers, Genetic Engineering	High Industries	Tech Electric Cars, Ultra-fast Trains.

Table 1. Development of Industrial Revolutions: Source: Prisecuru, 2016.

There are various similarities between the fourth industrial revolution and the five stages of civilisation, which include the hunter and the gatherer age, the agricultural age, the industrial age, the information worker age and the emerging age of wisdom. According to Min, Jeanne and Suk (2018:91) each subsequent age goes up fifty times over the preceding age. However, each subsequent age resulted in the destruction of many jobs, for example the information worker age is replacing the jobs created by the industrial age. Much of the jobs created in the first three ages of civilization were mainly manual workers producing goods and services with their physical bodies, but in the last two ages, knowledge workers produce most goods and services with their mind (Min, Jeanne and Suk, 2018:91). Today, in this revolution, knowledge workers are the link to development as they provide focus, creativity and innovations with new technologies. The main drivers of the fourth industrial revolution are the knowledge workers with abilities, skills, innovations and human potential (talents). These innovations bring about many opportunities that include reducing barriers between inventors and markets, more active role for artificial intelligence (AI), integration of different techniques and domaining (fusion), improved quality of people's lives (robotics) and the connected life (Internet).

In 2012, Chris Anderson predicts that the fourth industrial revolution is likely to reduce barriers between inventors and markets due to new technologies such as 3D printing for prototyping. These new technologies allow knowledge workers and entrepreneurs with new ideas to innovate and further develop more complex technologies which behave more like human beings. The new innovations are increasing trends in artificial intelligence and help solve complex problems. Apart from the complex problems, there are also new avenues to economic growth, despite the threats posed to many kinds of jobs. Manyika et al. (2017) note that all existing jobs would be automated thereby enabling organisations to save billions of dollars as well as creating other new jobs. It has been noticed that these innovate technologies are integrating different scientific and other disciplines and this fusion of technologies is blurring the divisional lines between physical, digital and biological spheres.

The fourth industrial revolution also brought about robotics that are changing people's lives and improving quality of life at their homes and workplaces. According to Schwab (2015) the key forces of the robotics comes together in a fusion of technologies with the ability to cook food, play music, records show and even run cars. In addition, the internet of things (IoT) that comes with the fourth industrial revolution is improving the quality of people's lives, despite the digital divide, especially in developing countries and the world at large. The internet of things is enabling people to work with physical devices and they have the ability to connect devices, systems and services beyond the machine-to-machine (M2M) communications (Holler, et al., 2014). The interconnection of these devices, systems and services ushers the creation of electronic records in all fields bringing information management, e-record management and knowledge management to the fore as facets of the fourth industrial revolution. This development, which started in 1969 when the first data was transmitted over the internet through two linked mainframe computers, gave the possibilities of more innovations in the field of record and archive management (Tsvuura, Mbawuya and Mutsau, 2021). Today, the internet is connecting personal computers and mobile devices and is removing the physical distance and boundaries among people of the world, thereby bringing the whole world into a global village. Interestingly, Gershenfeld and Vasseur (2014:28) note that by 2010, the number of computers on the internet had surpassed the number of people on earth. The coming of the world into a global village is both exciting and scary at the same time. The abilities of 3D printing, the internet of things and the fusion of new technologies to change people's lives to better levels have also raised high

productivity in organisations. This has also raised income levels and provoked drops in transportation and communications costs.

However, despite these benefits, there are also some challenges experienced and some lie ahead which at times people fail to predict (Tsvuura, Mbawuya and Mutsau, 2021). These include issues of digital divide and some inequalities as the labour market is disrupted through computers, automation and digitisation. The digital divide and inequalities are widening everyday as the gaps between and among those who have and those who don't have are widening, rendering others poor while others become rich. In the fourth industrial revolution, there are calls for talent development, innovation and entrepreneurial skills to remain viable as new technologies require constant updating of skills. The constant changes in the innovative technologies result in low skilled and low wage jobs being replaced by computers and digitisation as organisations cut costs. This increased discrimination among people also lead to social tensions and survival of the fittest. One of the biggest trends which cannot be fought in the fourth industrial revolution is that everything is connected to the internet of things and there is no reversal and backtracking. Today, more and more people are connected to their computer devices, cell phones, cars, security cameras, light switches and smart speakers which have become part of their lives (Tsvuura, Mbawuya and Mutsau, 2021). This is despite the facts of digital divide, inequalities and an increase in vulnerabilities on the Internet of Things and the networks.

Apart from these disruptions, the fourth industrial revolution brought about issues of cyber security, cybercrimes and hacking, threatening the whole information society. There are calls for organisations and people to map their networks and safeguard their information sources as new technologies ravage through old gadgets and render them outdated and information embedded in them inaccessible. There is a need to safeguard information sources from possible threats such as internal lapses of security, disgruntled employees, human error and external sources such as hackers and cyber terrorists.

The forceful advent of the fourth industrial revolution has brought in both positive and negative demands that require organisations and governments to respond to and transform their skills and abilities to benefit society. According to Schwab (2016:1), the fourth industrial revolution is characterised by a fusion of technologies. The fourth industrial revolution is set to disrupt society, business and governments, including how records ad. archives are kept. Manda and Dhaou (2019) posit that the fourth

industrial revolution brought about emerging technologies such as Artificial Intelligence (AI), big data analytics and blockchain in which governments have taken advantage of to improve and transform towards smart societies. Rapid adoption of these new and emerging technologies such as Internet of Things (IoT) has also led to the rise of internet services and eventually the creation of e-records.

Infrastructure for Records and Archives in the fourth industrial revolution

In the fourth industrial revolution, organisations and people depend more and more on digital information. Millar (2009:32) laments that organisations and people are taking action to counter the negative effects of inadequate information technologies and unsuitable e-record practices. As organisations move from paper to digital information ecosystems, many of them have not recognised the relationship between effective records management and the management of information technology architectures in which e-records reside. Literature has shown that new ICT innovations are being introduced regardless of challenges encountered. However, Xi (2014) points out that closer consideration needs to be taken as this has an impact on technology-related infrastructure for adoption of appropriate recordkeeping ecosystems. In this regard, appropriate recordkeeping ecosystems indicators in the fourth industrial revolution can be categorised into infrastructure, organisational and environmental. These three aspects are critical to the management of e-records. The International Telecommunication Union (ITU, 2012) advises organisations that reliable fixed infrastructures and high-speed networks that are supporting technology adoption should be of high quality if effective technology-based government services are to be accessible. The ubiquitous internet access is the most essential factor in enabling technology adoption. According to Mell and Grance (2011) the cloud technology is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources like networks, servers, storage, applications and services. According to Xi (2014) new IT innovations are being introduced regardless of a country's economic developmental level.

One of the technologies is cloud-based records management. Cloud-based records services have become an important topic in many organisations due to the benefits it can provide to businesses and their operations (Duis 2014:2). Organisations started to use the cloud-based services increasingly to offer efficient and cost-effective technology solutions (Duis 2014:6). The

flexibility of the new technologies allows organisations to use cloud-based applications provided by service providers through various networks. According to Kale and Mente (2017), cloud computing is becoming an adoptable concept for the educational area, with dynamic scalability and usage of virtualised resources as a service through the internet. Banerjee (2009) holds that cloud computing provides storage facilities through the network, and data are stored in local storage of service providers who provide online storage space. Kale and Mente (2017) also mention that cloud computing is a type of outsourcing of computer programmes and networks, using the 'cloud,' which means that people do not have to worry about things like storage media and power; they can simply access the end results. In fact, when people talk of cloud computing, they are talking about the internet and networks that can store records that can be accessed at any time via web-connected devices. Creeger (2009) notes that most organisations found shifting to 'the cloud' to be both cost-effective and operationally straightforward. Kale and Mente (2017) state that cloud computing enables users to manage, share and access data through the internet. Scholars such as McAfee (2009) argue that the movement to the cloud is inexorable. Carr (2008) compares this to the shifting from steam power to electrical power during the late nineteenth and early twentieth centuries.

The emergence of cloud computing technology has drastically changed the way information technologies are used in organisations (Tan and Lin, 2012:1). The ability of the technology to store records in the cloud has been embraced by many organisations around the world. According to Hofman, Duranti and How (2017:1) data stored in the cloud computing technology is estimated to be in the range of 10 zettabytes by 2019 including critical records that enable organisations and governments to continue functioning. Organisations around the world including businesses and government are adopting cloud computing services to take advantage of the benefits offered, such as increased operational efficiencies, accessibility, collaboration, security, reliability and opportunities for innovation (Franks, 2015:191). Through this technology, users don't have to manage their own IT resources, but they purchase their IT needs as services over the internet (Khan and Al-Yasiri, 2015:1).

This technology has allowed organisations to reduce the costs they spent on computing infrastructure (Khan and Al-Yasiri, 2015:1). The ability to adopt and store records on the cloud has become an entrenched part of people and organisations (Hofman, Duranti and How, 2017:1). Cloud computing technology has opened huge opportunities for organisations (Leire, et al.,

2012:2). For example, some specific opportunities that may come to organisations when they adopt cloud computing technology include saving the physical storage space for records, easy access to the records in the cloud, less costs for record storage and compliance with the e-government strategy. Adoption to cloud computing technology is important for organisations as it would always keep pace with the progression as records management evolves around technology advancement. Cloud computing technology would help organisations to store their records in the cloud and be able to access them when the need arises.

Cloud technology has become a new computing paradigm which describe the business model of providing services across the internet (Mell & Grance, 2011; Xi, 2014). According to Xi (2014) cloud computing has become popular as infrastructure providers continue to provide more powerful and reliable cloud platforms. In addition, Wyld (2010) states that broadband connectivity enables cloud technology adoption as this sustains access to fast and reliable internet speed and computing power.

Today, many governments and organisations are opting to use web archiving to preserve their valuable records and archives and for long term access to their historical records that are web archived. The concept of web archiving is meant to devote collection of digital records and archives for potential use by future researchers. Anthony et al. (2013) opine that web archiving is the process of collecting valuable content from the World Wide Web (WWW) in an archival format to ensure the information can be managed independently and preserved for the public, historians, researchers and future generations. The web itself has become the largest document centre and according to Peter and Varian (2000) it has contained billions of documents in the deep web. It is now a common fact that more and more of records and archives are in digital format and many organisational functions are on the World Wide Web as websites. However, some organisations are using simple tools and processes to archive their web content (Anthony et al., 2013). There are three major technical approaches to web archiving which include Client-side, transactional-side and server-side archiving. These technical approaches use different techniques as methods of web archiving. These include firstly, for instance, the client-side archiving; the main web acquisition method in use as it adapts to a client-server environment. It uses the HTTP protocol to collect content from the server. Secondly, the transaction-side archiving entails the capturing of client-side transactions and recording user access to website content based on client/server transactions. It also involves the storage and archiving of web content associated with all distinct HTTP request/responses pairs. Its main

function is to record exactly what was seen and when. Thirdly, the server-side archiving copy files directly from the server without using HTTP protocol. The internet archives have become the largest organisation that aims to maintain an archive of the entire WWW. It has been archiving websites and web content with the purpose of keeping everything using a way-back machine. This machine enables users to search and browse specific URL that may have been archived.

However, Xi (2014) notes that customers do not have control of the infrastructure, but can control the operating systems, selected network components, storage units as well as software development applications. However, ITU (2012) also notes that poor quality of internet is often discovered because of insufficient investment in the telecommunication networks. In addition, Xi (2014) discovers that many remote areas in developing countries are still not sufficiently covered with the telecommunication network infrastructures. "As a result of this, the majority of the rural population is unable to gain access to the digital government services" (Xi, 2014).

Availability of electricity supply determines the extent of cloud adoption as it plays a vital role in serving the first step of the cloud technology adoption (Xi, 2014). Biles (2008) argues that developing countries suffer from load-shedding which occurs when it becomes necessary to interrupt the electricity supply, because the demand cannot be met. In addition, the International Telecommunication Union (ITU, 2012) also indicates that unreliable electricity supplies are commonly seen on the African continent. Therefore, the current power infrastructure situation in Zimbabwe might have some impact on the cloud adoption. However, Smith (2012) notes that the Virginia data centre run by Amazon Web Services became unavailable due to the power blackout caused by an electrical storm that swept across the East Coast. As a result, Xi (2014) concludes that a reliable electricity supply serves as the most fundamental prerequisite for the cloud technology adoption. Roper and Millar (1999) argue that many developing countries do not yet have the technical capacity, management infrastructure, in-country hardware and software, support facilities or trained personnel to manage e-records. In addition, the problem with the web content is the constant changes caused by different reasons that range from the personal inclination of the site's owners to the accidental changes that occur during conversion into different formats. According to Anthony et al. (2013), web pages are constantly being updated, relocated or removed and this risks losing valuable content. This results in the web disappearing every day and research sites visited previously may no longer exist. At times, users or