

**BUILDING AN INSTITUTIONAL REPOSITORY AT THE UNIVERSITY
OF HEALTH AND ALLIED SCIENCES IN GHANA**

Mini-dissertation by

Fred Kwaku Hayibor

16384424

Submitted in partial fulfilment of the requirements for the degree of

Magister of Information Technology (B)

(by course work)

in the

**Faculty of Engineering, Built Environment and Information Technology
University of Pretoria**

**Pretoria
South Africa**

Supervisor: Dr. M. J. van Deventer

Co-Supervisor: Dr. H. Pienaar

2017

ACKNOWLEDGEMENTS

My profoundest gratitude goes to Professor Theo Bothma and his team at the Information Science Department of the University of Pretoria for their great vision of training the next generation of African Information Science and Library Professionals and working hard to realise that vision of which I am a beneficiary. I am also highly indebted to the Carnegie Corporation of New York for seeing merit in the vision of the University of Pretoria for African Librarianship and providing every financial assistance to realise it.

Further appreciations go to my supervisor, Dr. Martie van Deventer and co-supervisor, Dr. Heila Pienaar, for their painstaking reviews, guidance and leadership. To my employer, University of Health and Allied Sciences (UHAS) in Ghana, I would like to express my appreciation to management for endorsing my enrolment on the two-year programme and allowing me time to complete my course work and mini-dissertation. Special thanks to my director, the University Librarian (UHAS), Mr. Christian Kofi, for facilitating all my travels abroad and for encouraging me to finish on time. I am also grateful to my colleagues at UHAS who stood in for me when I had to be absent from work.

I could not have completed this project without the firm support and encouragement of my family: my wife, Joan Agbola; my mother, Christine Ansah; my father, John Hayibor; my brother, Prosper Hayibor; and my friends whom I cannot mention individually.

DECLARATION

I, Fred Kwaku Hayibor, hereby declare that this mini-dissertation is my own original work and has never been submitted at any other university for the award of any degree.



Fred Kwaku Hayibor

January 22, 2018

Supervisor:

Dr. Martie van Deventer

Date:

Co-Supervisor:

Dr. Heila Pienaar

Date:

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	i
DECLARATION	ii
TABLE OF CONTENTS	iii
List of Tables	vii
List of Figures	vii
ABSTRACT	viii
CHAPTER 1	1
1.1 Introduction	1
1.2 Background to the study	1
1.3 Research objectives	3
1.4 Research questions	3
1.4.1 Central research question	3
1.4.2 Sub-questions	4
1.5 Scope and limitations of the study	4
1.6 Rationale for the study	4
1.7 Overview of the literature	5
1.8 Research methodology	6
1.8.1 Research paradigm and approach	6
1.8.2 Research design	6
1.8.3 Data collection method	7
1.8.4 Data collection tools	7
1.8.5 Target population	7
1.8.6 Sampling	8
1.9 Value of the study	8
1.10 Clarification of key terms	9
1.10.1 Institutional repository	9
1.10.2 Sustainability	10
1.10.3 Scorecard	10
1.11 Structure of the dissertation	10
1.12 Conclusion	11
CHAPTER 2	12
2.1 Introduction	12
2.2 The open science connection	12

2.3	Open access publishing	13
2.3.1	OA journals (Gold OA)	15
2.3.2	OA repositories (Green OA)	16
2.4	Focus on IRs.....	17
2.4.1	What is an institutional repository?.....	17
2.4.2	IR as the green route to open access publishing.....	18
2.4.3	Attributes/features of an IR: trustworthiness.....	19
2.4.4	The value/benefit/importance of IR	21
2.5	Importance of IRs for Africa	23
2.6	Importance of IRs for Ghana.....	24
2.7	IR implementation critical success factors.....	25
2.7.1	People factors.....	28
2.7.2	Resources factors.....	28
2.7.3	Management factors	29
2.7.4	Services factors	29
2.7.5.	Self-archive practices factors	30
2.7.6	Technology factors	32
2.8	Summary of the IR critical success factors.....	33
2.9	Barriers to IR implementation.....	36
2.10	The IR implementation process.....	37
2.10.1	Learning about the process by reading about and examining other IRs	37
2.10.2	Developing a service definition and service plan.....	37
2.10.3	Assembling a team	44
2.10.4	Technology – choosing and installing software platform	44
2.10.5	Marketing.....	45
2.10.6	Launching the service	46
2.10.7	Running the service	46
2.11	Preservation and persistent access of IR content	46
2.12	Sustainable funding for IRs	47
2.13	Measuring repository impact	48
2.14	Conclusion	48
CHAPTER 3.....		50
3.1	Introduction	50
3.2	Research approach.....	51
3.2.1	Research design.....	54
3.2.2	Research sites	55

3.2.3	Target population and sampling	56
3.2.4	Data collection techniques	61
3.3	Data collection instruments/tools	63
3.4	Data analysis/interpretation.....	64
3.4.1	Making numerical sense of the qualitative findings	66
3.4.2	Criticism of the IPA	68
3.5	Validity and reliability	69
3.5	Limitations of the methodology.....	70
3.6	Delimitations of the methodology	70
3.7	Ethical considerations	70
3.8	Conclusion	71
CHAPTER 4.....		72
4.1	Introduction	72
4.2	Data analysis	72
4.3	Results.....	73
4.3.1	Stakeholder perceptions of an IR	74
4.3.2	Executive support	76
4.3.3	User acceptance and support	76
4.3.4	IR Policy	78
4.3.5	Resources	85
4.3.6	Organizational culture	89
4.3.7	Researcher motivation	94
4.3.8	IR marketing and promotion.....	95
4.3.9	The library as an agent of change.....	97
4.4	Discussion of the results	98
4.4.1	Stakeholder perceptions of an IR.....	99
4.4.2	Researcher motivation	101
4.4.3	The library as an agent of change.....	101
4.4.4	The gold standard themes	102
4.5	Scorecard summary of the results.....	104
4.5.1	Scoring scale	105
4.5.2	Scoring procedure	105
4.5.3	Final scores	105
4.6	Conclusion	110
CHAPTER 5.....		111
5.1	Introduction	111

5.2	Research objectives.....	111
5.3	Main research question.....	111
5.4	Main conclusions reached.....	112
5.4.1	Moderate knowledge of IRs at UHAS.....	112
5.4.2	There is cautious support for IR implementation	112
5.4.3	Mediated deposit and an open access mandate are critical	114
5.4.4	The current resource base of UHAS cannot support an IR.....	115
5.4.5	Low level of policy awareness and compliance	116
5.4.6	Low library visibility	116
5.5	Recommendations	117
5.5.1	Study-specific recommendations.....	117
5.5.2	Recommendations for further research	120
5.6	Conclusion	121
	REFERENCES	122
	Appendix 1: Interview Schedules	144
	Appendix 2: Informed consent.....	150
	Appendix 3: Ethical clearance	153
	Appendix 4: Approval from research site.....	154

List of Tables

Table 1: IR implementation critical success factors: a synthesis of five studies	34
Table 2: Differences between qualitative and quantitative research	53
Table 3: Weights of themes.....	68
Table 4: Status of the IR CSFs at UHAS: A readiness scorecard	106

List of Figures

Figure 1: The Benefits of Open Access.....	23
Figure 2: Stages of the project lifecycle.....	41

ABSTRACT

Institutional repositories (IRs) have become an important element in scholarly communication reform. IRs are seen, by higher education institutions, as an adequate response to the serials crisis and a major academic leap for the open access (OA) movement globally. IRs have become key indicators in world university rankings, and many higher education institutions are adopting IRs for that purpose. However, establishing an IR is a major information technology (IT) project undertaking for any university and requires due diligence for evidence-informed decision regarding implementation.

The University of Health and Allied Sciences (UHAS) library has mooted the establishment of an IR for the university. This study was undertaken to assess the feasibility of doing so by investigating the presence or otherwise of the known critical success factors for IR implementation and the unique case for success at UHAS.

The study approach was qualitative, a case-study design was followed and semi-structured interviews were used to collect the opinions of purposively sampled participants. Data were thematically analysed using QSI International's NVIVO 11 software package and the results were summarised as a scorecard expressed in percentages for quick understanding. Nine (9) themes emerged from the data, six (6) of which perfectly aligned with the critical success factors (CSFs) generally reported in the literature. These factors included executive support, user acceptance and support, IR policy, IR marketing and promotion, resources and organizational culture. Three (3) of the emergent CSFs (themes) that were unique to UHAS included stakeholder perceptions of IR, researcher motivation and the library as an agent of change.

Other findings include that stakeholders have a preference for mediated archiving over self-archiving. An institutional OA mandate needs to be established before researchers would archive their outputs. The library has low visibility in the institution and there are, in general, low levels of policy awareness and compliance among the key stakeholders of an IR at UHAS. Specific recommendations have been made to address identified challenges so that IR implementation success could be ensured.

In conclusion, the study found that there was absolute support for the IR initiative by both senior management (decision makers) and faculty researchers (content providers). However, the study also established that the current infrastructural resource base of UHAS cannot yet support the implementation of an IR.

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter provides an overview of the dissertation by briefly describing the background to the study, the objectives of the study, the central research question and sub-questions. It also describes the scope and limitations of the study. The rationale of the study, an overview of the literature, the research methodology, the value of the study, clarification of key terms and the division of chapters are also presented.

1.2 Background to the study

Universities are unique living organisms in that they are able to replenish themselves through the production of scholarship and research that renew and extend universities in a continuous loop. Central to any institution of higher education is a library from which the university inherits its gene as a living organism. The library, as a growing organism, can be understood not only from the point of expansion in size but, more importantly, from the standpoint of its adaptation to the climates of knowledge production and consumption for its survival and relevance (Ranganathan 1931:382-383).

Many library watchers have looked at Ranganathan's fifth law of library science through the lenses of the digital age and found how extensive and relevant the library as "a growing organism" is to the dramatic changes we are experiencing in today's libraries (Barner 2011; Zabel & Rimland 2011; McMenemy 2007). Increasingly, computers are replacing bookshelves. In other words, libraries are transferring books to offsite storage locations to make more room for digital media, creativity and social interaction. Users are driving this change and they, in turn, are being driven by new technologies that afford anywhere and anytime access to online information resources across multiple platforms. To respond adequately to these changes caused by disruptive technologies, librarians have had to diversify their skills set, as well as their libraries' collections to include electronic information resources and Web 2.0 technologies to sustain patronage. This is also true for the University of Health and Allied Sciences (UHAS) in Ho in the Volta Region of Ghana.

UHAS is a newly established public university in Ghana and it is dedicated to the training of professionals in the health sciences (University of Health and Allied Sciences 2012). UHAS Library was established in 2013 as a hybrid library. The Library was birthed at a time when the academic library world had become awash with digitization, electronic resources sharing and an open access agenda to respond to the multidisciplinary information demands of

students and researchers in formats that are easy to manipulate and which are accessible to users off-campus.

UHAS is executing an ambitious mandate of spreading its presence across the Volta Region of Ghana by establishing campuses across the entire region. These campuses will be coordinated from Ho, the regional capital. The UHAS Library will have branch libraries across all these campuses tailored to specific academic programmes while maintaining collections covering all programmes at the central library. Academic and research libraries in Ghana are also coming together to establish networks to share resources and to offer training to librarians on electronic resources (e-resources) and new skills to navigate the digital space (CARLIGH 2016), especially in the face of dwindling financial support from Government to the public universities. In the context of these developments, it has become imperative for UHAS to take advantage of “technological leapfrogging” (Amankwah-Amoah 2015:17) and embed in various academic and research spaces in order to increase access to its information resources as well and ensure value for money.

This research was aimed at assessing the readiness of UHAS to implement an institutional repository (IR) as a way of increasing research output visibility by promoting open access to scholarly communication. Health science literature is increasingly becoming open access (Tennant, Waldner, Jacques, Masuzzo, Collister & Hartgerink 2016). UHAS library’s reference section is often inundated with requests from patrons for the full-text of e-journal articles, most of which are open access. The library has now made the implementation of IR as a strategic priority. When successfully implemented, the IR will become a pooling site for storing many of these open access information resources for proactive reference services to library patrons.

Many libraries have shared their experiences on the implementation of automated services (Boateng, Agyemang & Dzandu 2014; Thompson & Pwadura 2014; Stilwell & Hoskins 2013; Mudogo Mutula 2012; Kargbo 2009; Bregman & Burger 2002). Lessons from these libraries show that marketing and promotion are indispensable success elements to any automation strategy irrespective of the size of the project as these efforts facilitate securing stakeholder buy-in for project sustainability. This research would, therefore, serve as a marketing tool to raise awareness of open access to scholarly communication within the UHAS community and to provide the quintessential blueprint for a successful implementation of IR at UHAS and in other similar settings.

The UHAS Library currently subscribes to a variety of proprietary online resources, which are used extensively by students and staff. This study was, therefore, undertaken to assess the feasibility of providing an integrative online archiving service that would allow open access digital information resources and institutional artefacts including research outputs of faculty and students to be stored locally and made globally accessible to community members and the world at large. Many UHAS faculty members have disseminated their research through open access scholarly databases such as PubMed and POPLINE, however, an assessment of their willingness to contribute papers and other resources to the repository and orientate students towards resource-based learning (Butler 2012:221) was necessary in predicting IR implementation success.

1.3 Research objectives

The main objective of this research was to assess the feasibility of establishing an institutional repository (IR) at the University of Health and Allied Sciences (UHAS) in Ghana by:

- i. verifying whether decision makers are willing to support the initial set-up and perpetual maintenance of an institutional repository (IR);
- ii. investigating the familiarity of faculty researchers with Open Access (OA) repositories and their willingness to contribute content using the self-archiving model; and
- iii. assessing the presence or otherwise of the critical success factors for establishing an OA IR apart from management support and user participation.

1.4 Research questions

This study was conceived as a result of the library's initiative to establish an IR at UHAS in response to current trends in scholarly communication and adaptation strategies of higher education institutions. It was deemed necessary to establish the right philosophical, theoretical and practical foundations for the implementation of the IR initiative in order to ensure its sustainability. It was thought that the lack of sound theoretical and policy frameworks could have negative consequences for the implementation effort (Thompson & Pwadura 2014:69; Kargbo 2009:46). There was the need, therefore, to formulate a research question to drive the research effort.

1.4.1 Central research question

The main research question that guided the study was: "To what extent is UHAS ready to implement an institutional repository?"

1.4.2 Sub-questions

The central research question was examined in the light of the objectives of the study through exploration of literature (chapter two) and conduct of empirical investigation (chapter four) guided by the following sub-questions:

- i. What determines a trusted digital repository?
- ii. What would be the value of an institutional repository (IR) to UHAS?
- iii. What is the current level of knowledge, awareness and use of institutional repositories among the senior management and faculty of UHAS?
- iv. How willing are the relevant UHAS stakeholders to implement a trusted institutional repository?

1.5 Scope and limitations of the study

The study was carried out at the University of Health and Allied Sciences (UHAS) in the Volta Region of Ghana. It was designed to assess the feasibility of implementing a trusted digital repository for UHAS taking cognizance of resource availability and the commitment of senior management to provide financial and infrastructural support, as well as the willingness of faculty members to contribute content.

Although UHAS is a multi-campus university, the research design could not permit the use of a large sample and, therefore, the study was limited to the main campus where both administrators and senior faculty researchers could be located. The study also left out one key stakeholder – students – due to the aim of assessing the feasibility of implementation based on factors other than use, an area where students do not have much influence. It was also not financially feasible to include satellite campuses because the study used a semi-structured interview technique that required a face-to-face interaction with the study participants and travelling around the satellite facilities would have been too expensive.

Despite limiting the study to the main campus, the results are representative because the central administration is at the main campus, and the faculty researchers sampled were heads of schools and departments and their shared experiences reflected the experiences of other faculty researchers as they share similar characteristics.

1.6 Rationale for the study

Many information technology (IT) projects suffer setbacks due to the lack of adequate preparation prior to their implementation (Thompson & Pwadura 2014; Kargbo 2009). Learning from such mistakes, this study was conducted to assess the feasibility of implementing an IR at UHAS by investigating the prevalence or otherwise, in UHAS, of the

critical success factors for IR implementation in order to inform the decision based on evidence.

Universities are unique in disciplinary focus and resource endowment, two key factors that can promote or frustrate IT projects, however, there are generic factors that promote project success irrespective the unique characteristics of particular institutions. Therefore, this study sought to explore the experiences of IR implementation at universities globally through the IR literature as well as collect the opinions of key stakeholders at UHAS regarding the IR implementation initiative. The adoption of international best practices in IR implementation combined with the idiographic descriptions of experiences and expectations of UHAS stakeholders should result in the development of policies and strategies to meet the unique needs of the UHAS community and gain maximum stakeholder participation in the IR processes.

1.7 Overview of the literature

The study situated IRs within the philosophical context of Open Science (OS), which is “the movement to make scientific research and data accessible to all and includes practices such as publishing open scientific research, campaigning for open access and generally making it easier to publish and communicate scientific knowledge” (UNESCO 2016). Other definitions of OS were explored, including OECD (2016) and Brown (2016) before narrowing down to the domain of academic libraries within the OS movement; that is, open access (OA). Academic libraries often spearheaded universities’ open science practices through the implementation and management of open access institutional repositories (IRs). Various definitions of IRs that distinguished IRs as the green route of OA publishing were also explored (Higher Education Funding Council for England 2016; Shearer 2015; Jain 2011; Lynch 2003; McCord & EDUCAUSE Evolving Technologies Committee 2003; Johnson 2002; Crow 2002).

The study explored the literature on specific aspects of IRs, including general guidelines for their creation (Alfa Network Babel & Library 2007), the step-by-step process of implementation (Barton & Waters 2004), challenges of implementation (Christian 2008; Agyen-Gyasi, Corlety & Frempong 2010), the preservation challenges of born-digital knowledge assets (Li & Banach 2011; Voutssas 2012), and the professional development of librarians to match the skills demand of library technologies (Cooke 2012). The study also explored some case studies that provided practical examples of critical success factors for the implementation of IR and leveraging related technologies to optimise its scalability and relevance (Oak & Patil 2015; Al Harthy 2015; Naiwen & Xin 2012; Mori, Tanaka & Baba 2012; Baba, Hoshiko, Kudo, Yoshimatsu & Ito 2011), the need for a broad based consultation and the factoring in of users

as stakeholders (Zainab Ajab Mohideen & Kaur 2015), and the promotion of IR as a public good (Ferreira & da Silva 2015).

1.8 Research methodology

Research methodology is the spine around which a study or research is woven right from conception to its final findings and conclusions (Singh & Nath 2010); and it is predicated upon the ontological and epistemological assumptions about the phenomenon of study, which motivate the choice of appropriate techniques and tools to provide valid and reliable outcomes (Nieuwenhuis 2016c). A more detailed discussion of the methodology used is presented in chapter 3 of this study.

1.8.1 Research paradigm and approach

A research paradigm, according to McGregor & Murnane (2010:419), “is a set of assumptions, concepts, values, and practices that constitutes a way of viewing reality”. In other words, it is the epistemological orientation of the researcher based on his perception of the best way to arrive at the truth (Krauss 2005). Known alternatively as “typologies of knowledge”, Hislop (2013:21) identifies and classifies researchers epistemological assumptions into “explicit/objective” and “tacit/subjective” knowledge.

This dichotomy in the philosophical grounding of research and/or knowledge has produced two major approaches to the investigation of phenomena in research – quantitative and qualitative. The quantitative approach deals with explicit knowledge and often employs tools of statistical measurements in its study of phenomena while the qualitative approach focuses on unearthing the tacit knowledge of people about a phenomenon by drawing on their idiographic descriptions of subjective experiences.

This research was conducted using the qualitative research approach as the rationale for the study was to assess the willingness of key stakeholders to support an IR initiative at UHAS.

1.8.2 Research design

This research adopted a qualitative approach due to the nature of data collected. The assessment of the feasibility of implementing an IR at UHAS involved gathering opinions, experiences and expectations of key stakeholders about the IR phenomenon within the context of UHAS. Several research designs could be used for a qualitative research approach. However, this study used the case study design because it afforded “opportunities to explore or describe a phenomenon in context using a variety of data sources” (Baxter & Jack 2008:544).

1.8.3 Data collection method

The study employed an interview technique to complement the case-study design (Baškarada 2014:3). The semi-structured interview method allowed the researcher to focus the responses of the participants by pre-formulating the questions, mostly in an open-ended format (Nieuwenhuis 2016d) and using probes and prompts to elicit full information on the phenomenon where necessary (Best 2012).

1.8.4 Data collection tools

Based on the semi-structured interview method used by the study, an interview schedule was used to collect data from the participants. Two separate interview schedules were designed and administered on the study participants based on their perceived stakes in the IR implementation. Two broad stakeholder sub-groups targeted by this study were senior administrators (decision makers) and faculty researchers (content providers) who were considered to be at opposite ends of the same continuum and whose actions and attitudes were thought to directly affect the success of the IR project. Although many questions were the same on both schedules, a few questions were mutually exclusive to the two schedules due to the perceived roles of the stakeholder sub-groups in the IR implementation process. The interview schedules used for this study made use of mostly open-ended questions that elicited participants' true knowledge and experiences about the IR phenomenon.

1.8.5 Target population

The target population, according to Asiamah, Mensah and Oteng-Abayie (2017:1612), is a refined subset of the general population and consists of "individuals or participants with the specific attributes of interest and relevance (that is, containing no attribute that controverts a research assumption, context or goal)". The phenomenon that the study investigated (the implementation of an IR) and the rationale for carrying out the study (to determine the prevalence of critical success factors (CSFs) for the establishment of an IR) generated the participant selection criteria that carved out the target population. Two CSFs that were people-oriented included senior management support (top executives) and user acceptance and support (faculty researchers). Based on these CSFs, the following criteria for selecting participants were developed, namely:

1. The participant must be a senior manager (Director or Deputy Director of an administrative department or senior member, with many years of experience in that position). Participants who fit this category form part of the university decision-making body that has influence over finance or other technical infrastructure and services relevant to the establishment of IR.

2. The participant must be a faculty member or researcher (who are, by their rank, required to publish for tenure and promotion considerations).

Any member who fell into either category was, by default, a member of the target population. By these criteria, the target population extracted from the general population was 294.

1.8.6 Sampling

The study used the stratified purposive sampling technique to recruit participants. Stratified purposive sampling, according to Nieuwenhuis (2016c:86), is a combined non-probability sampling approach that employs participant sub-groups that possess different sets of influence on a phenomenon, allowing results from these sub-groups to be compared. Based on the participant selection criteria (section 1.8.5), two strata: decision makers (senior management) and content providers (faculty researchers) were created and a sample size of ten (10) participants made up of five (5) decision makers and five (5) content providers was decided on.

Sampling the decision makers sub-group was quite straight-forward as it was mainly based on their influence on key resources relevant to the establishment of IR, as decision makers. Therefore, the following directorates, namely: Finance, Human Resources, Library and Information and Communications Technology (ICT), were sampled. Sampling for the faculty sub-group, who are the content providers (user acceptance and support factor), was a very complex one. Faculty profiles on the university website were first analysed to determine the number of publications each had and whether they published in open access journals or repositories. This was followed by personal interactions with other faculty members and non-faculty senior members for their recommendations on the most qualified faculty members to recruit as study participants. The snowball sampling technique was unintended but emerged during the course of interviews when some participants recommended others to be recruited to participate in the study due to the relevance of their professional background and experience to the study.

1.9 Value of the study

This research is invaluable to UHAS as a baseline to inform the university's readiness to implement an IR. Its greatest value lies in the fact that it utilized various case-studies and the views of the main IR stakeholders at UHAS to establish a strong foundation for feasibility assessment. This will allow the university to make an evidence-informed decision on IR implementation. The study also revealed weaknesses in the current IR policy and

implementation approach that will need to be corrected to ensure the success of any implementation effort at UHAS. In addition, the study attempted to establish an assessment tool, a scorecard, for quick evaluation of the institution's readiness for IR implementation, which can be refined and applied to other IT project feasibility assessments. Finally, this study is a ground-breaking work in Ghana and can serve as a blueprint for IR implementation in UHAS and any other university or research institute willing to implement an IR.

1.10 Clarification of key terms

1.10.1 Institutional repository

The most frequently cited definition of IR is Lynch's (2003:2) definition:

A university-based institutional repository is a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. It is most essentially an organizational commitment to the stewardship of these digital materials, including long-term preservation where appropriate, as well as organization and access or distribution.

In the context of this study, IR refers to any OA repository owned by an academic or research institution that provides an online, barrier-free access, to the general public, to its contents, largely composed of research generated by the members of the institution involved, whether as a part of the body of grey literature or peer-reviewed journal publications, and meets RLG-OCLC Digital Archive Attributes Working Group's (2002:5) definition and criteria for a "trusted digital repository" as follows:

1. accept responsibility for the long-term maintenance of digital resources on behalf of its depositors and for the benefit of current and future users;
 2. have an organizational system that supports not only long-term viability of the repository, but also the digital information for which it has responsibility;
 3. demonstrate fiscal responsibility and sustainability;
 4. design its system(s) in accordance with commonly accepted conventions and standards to ensure the ongoing management, access, and security of materials deposited within it;
 5. establish methodologies for system evaluation that meet community expectations of trustworthiness;
 6. could be depended upon to carry out its long-term responsibilities to depositors and users openly and explicitly;
 7. have policies, practices, and performance that can be audited and measured;
- and

8. meet the following high-level organizational and curatorial responsibilities:
 - i. the scope of collections;
 - ii. preservation and lifecycle management;
 - iii. the wide range of stakeholders;
 - iv. ownership of material and other legal issues; and
 - v. cost implications.

1.10.2 Sustainability

Here, sustainability refers to policies and practices that place the IR within the framework of the United Nations' definition of sustainable development; that is, "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations General Assembly 1987:43). In the IR context, the terminology refers to decisions that must be made at the project initiation stage with the future goals of the IR in mind (that is, tackling technical issues of scalability, interoperability, technological obsolescence, among others, as well as the financial, infrastructural and human resource commitments by UHAS IR stakeholders).

1.10.3 Scorecard

The scorecard, or community scorecard, is a highly contextualized framework of qualitative and quantitative indicators that allows a local population to conduct social audits on the performance of institutions (Da Cruz & Marques 2014:167). As a social accountability mechanism and tool, scorecards are best for the extraction of expert opinion and in promoting ownership of the assessment process and the phenomenon that forms the basis of the assessment process (Blake, Annorbah-Sarpei, Bailey, Ismaila, Deganus, Bosomprah, Galli & Clark 2016:372). In this study, the scorecard method is used as a summary tool to predict the feasibility of IR implementation at UHAS based on the opinions of the study participants and general findings of the IR CSF literature.

1.11 Structure of the dissertation

The study is divided into five main chapters. Chapter 1 provides a general background to the study, covering the study objectives, research questions, scope and limitations of the study, rationale for the study and overview of the methodology. It also encompasses the value of the study, clarification of key terms and the division of chapters.

Chapter 2 is the detailed review of the literature, comprising important concepts such as open science, open access, institutional repositories and their value and importance to Africa and Ghana. Critical success factors for institutional repository implementation, barriers to

institutional repository implementation, sustainable funding for institutional repositories and impact measurement are additional topics tackled under this chapter.

Chapter 3 gives a comprehensive description of the research methodology and methods used and a justification of the choice of research paradigm. The chapter also provides details of the study population, sampling techniques and sample size, validity and reliability, limitations and delimitations of the methodology, and ethical considerations.

Chapter 4 consists of the analysis and discussions of the empirical findings of the study. Textual data from interview transcripts are presented to address the research questions and objectives. Interpretations and discussions of the data are also done and a scorecard is used to present a numerical summary of the final results in percentages in a table form.

Chapter 5 comprises the major conclusions reached by the study based on the empirical findings. It also consists of recommendations of the study based on the major conclusions reached.

1.12 Conclusion

Academic institutions generate massive volumes of scientific research annually. Most of these works, unfortunately, do not benefit the parent institution because the traditional means of scholarly communication through proprietary journals restricts access to knowledge, even to the authors themselves. Institutional repositories, also known as Green OA, are considered to have the potential to change this unfortunate trend. This chapter gave a general introduction to the study, which sought to assess the feasibility of implementing IR in UHAS by investigating the presence of critical success factors for IR establishment. The chapter presented the objectives of the study, the central research question as well as the sub-questions that guided the study. It also highlighted key concepts and the methodology adopted by the study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Institutional repositories (IRs) have received a lot of attention in scholarly communication due to their strategic value as open access alternatives to traditional scholarly publishing (Marsh 2015; Koler-Povh, Mikoš & Turk 2014; Koutras & Bottis 2013a; Kim 2007). There is an increasing uptake of IRs by higher education institutions based on their perceived benefits as providing immediate and unrestricted access to research output and data (Buehler 2014; Paul 2012). The IR revolution is the academic library's expression of support for the bigger open science revolution, which seeks to remove all access barriers to scientific research throughout the research lifecycle and, by doing so, make research participatory and relevant to society and ensure integrity and reusability of data (European Commission 2016).

Despite the obvious benefits of IRs, their implementation in academic institutions have not gone without challenges, neither has there been a significant reduction in academics' patronage of proprietary journals (Cullen & Chawner 2011; Davis & Connolly 2007). OpenDOAR (2017a), for instance, reports 64 (1.9%) and 20 (0.6%) of its listed open access repositories as broken; that is, "technically malfunctioning" and closed, respectively. This calls for a careful study of the timeliness of IR adoption taking cognizance of the elements of success (Serrano-Vicente, Merelo & Abadal 2016; Little 2012; Buehler 2014; Fortier & Laws 2014; Burns, Lana & Budd 2013; Mercer, Rosenblum & Emmett 2007).

2.2 The open science connection

IRs fall within the larger context of open access (OA). Open access is the philosophy and practice of making available knowledge generated through scientific research online for anytime access by any information seeker at no cost (Koutras & Bottis 2013a). The OA movement is a response to the ever rising costs of peer-reviewed journals, a phenomenon that is putting researchers and research at the risk of redundancy due to restricted access to already existing scientific knowledge (Zhong & Jiang 2016). OA derives its impetus from the sustained fervour and growing support of institutions and individuals since the Budapest initiative of 2002 (Jones, Andrew & MacColl 2006; Rossini 2012; Higgins 2012; Budapest Open Access Initiative 2002).

The OA initiative is further driven by the more encompassing shift in scholarly paradigm to open science/research, which has gained international political acceptance spearheaded by the European Commission (OECD 2016; UNESCO 2016). The European Commission

(2016:33) describes open science as “a systemic change to the way science and research have been carried out for the last fifty years: shifting from the standard practices of publishing research results in scientific publications towards sharing and using all available knowledge at an earlier stage in the research process”. Open science (OS) can be best understood in terms of its four thematic areas, namely:

- i. “Transparency in experimental methodology, observation, and collection of data”;
- ii. “Public availability and reusability of scientific data”;
- iii. “Public accessibility and transparency of scientific communication”; and
- iv. “Using web-based tools to facilitate scientific collaboration”

(Vrana 2015:886).

OS is simply a commitment among scientific researchers and research funders to bridge the gap between science and society by making science participatory and accessible - and therefore, relevant to societal needs (Tennant et al. 2016). There is an added benefit, as Jong and Slavova (2014) proved, in that there is a correlation between open science and improved innovation in the firm.

2.3 Open access publishing

“Publish or perish”, a well-known cliché among academics, serves as a guiding phrase to scholars about their fate in academia. Echoed by Tzarnas and Tzarnas (2015), the publishing process is a key vulnerability utilized by the OA movement to promote the openness initiative (Budapest Open Access Initiative 2002). Koler-Povh, Mikoš and Turk (2014), Bonilla-Calero (2014) and Cullen and Chawner (2011) concur on the three principles of scholarly communication, namely: generation of knowledge through the conduct of scientific research; submission of research findings for publication; and dissemination of published research for public consumption. Publishing, however, is a long and costly process. It often means that an institution needs to pay to gain access to the scholarly works of its own employees.

OA is variously defined. However, a more radical and terse definition is: “immediate, permanent, toll-free online access to the full-texts of peer-reviewed research journal articles” (Harnad 2005 cited in Noruzi 2007:341). In a more elaborate definition, Masrek and Yaakub (2015:3420-3421) refer to Budapest Open Access Initiative (2002) and describe OA as:

free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself.

Several other authors, including McGrory (2015), Campbell (2015) and Koutras and Bottis (2013b), agree on the ingredients of OA as comprising immediate publishing, online availability and unhindered access to anyone anywhere in the world. Simply, OA and OS are concerned with demystifying the “production, dissemination and access” of scientific knowledge (Da Costa & Lima Leite 2016:34).

Whichever way it is looked at, the producers and consumers of scientific knowledge are enthusiastic about the immediate publication and ubiquitous access of research, respectively. However, the traditional distributors of scientific research, which are the proprietary journals, have raised an economic barrier between the producers of research and the information seeking public. The open access initiative is aimed at tearing down this barrier. The OA concept is also receiving attention in other fields, including business (Sun, Peng, Lee & Tan 2015) and medicine (Ghaoui, Ramdass, Fridericis & Desilets 2016; Chandrasekhara, Eloubeidi, Bruining, Chathadi, Faulx, Fonkalsrud, Khashab, Lightdale, Muthusammy, Pasha, Saltzman, Shaukat, Wang, Cash & DeWitt 2015). In academia, however, several studies have revealed a reluctance among researchers to participate in OA practically though they support the OA initiative in principle (Cullen & Chawner 2011; Jantz & Wilson 2008). Several reasons have been advanced for the low participation of researchers and faculty in OA publishing ranging from the lack of awareness about OA publishing options, particularly institutional repositories (Dutta & Paul 2014; Creaser, Fry, Greenwood, Oppenheim, Proberts, Spezi & White 2010), fear of plagiarism (Bonilla-Calero 2014; Singeh, Abrizah & Karim 2013) and lack of skills to navigate the deposit processes (Serrano-Vicente, Merelo & Abadal 2016; Bonilla-Calero 2014), to copyright concerns (Shukla & Khan 2014) and perception of no value to contributors’ promotion and tenure considerations at their institution (Shuva & Taisir 2016; Yang & Li 2015; Xia 2010).

Furthermore, there is the emergence of “predatory open access” journals (Vinny, Vishnu & Lal 2016; McGrory 2015; Shen & Björk 2015; Beall 2015; Buehler 2014; Beall 2013), which are described as “a controversial publishing business model that exploits the open-access system by charging publication fees in the absence of transparent editorial services” (Manca, Martinez, Cugusi, Dragone, Dvir & Deriu 2017:166). The unscrupulous business models of these predatory publishers further demotivate scholars about OA publishing as they perceive OA journals as having a reduced quality and, therefore, attributing a low reputation to authors who publish in them (Madalli 2015; Monson, Highby & Rathe 2014; Butler 2013). The slow uptake of open access among researchers is also largely discipline-related. Participation is

higher among the health and life sciences researchers than any other discipline (Chan & Cheung 2017).

Two forms of OA publishing are identified by the majority of the literature: OA Journals, also known as the Gold route; and Institutional Repositories (IRs), often referred to as the Green route (RCSI 2017; HEFCE 2017; JISC 2016; Peekhaus & Proferes 2016). Björk (2017) suggests using the term “Black OA” to denote recent entrants in the OA field such as Sci-Hub, which offer end users free access to toll-access based articles illegally. This phenomenon has not yet received keen attention in the OA literature, and the proposed terminology has not gained acceptance. Moreover, such illegal OA practice is beyond the scope of this research.

2.3.1 OA journals (Gold OA)

The Gold route, also referred to as the “author pays” (Yang & Li 2015) model, comprises journals that strictly adhere to the full rigour of peer review and editorial processes followed by the traditional commercial journals but make their output absolutely free to the final consumer (Ennas & Di Guardo 2015). “Author pays” implies that these fully OA journals require the author, the author’s institution or the research funder to pay article processing charges (APCs) to secure immediate open access to users (Björk & Solomon 2012). Another form of the gold route allows an author to pay an APC for a free electronic copy of his article in a purely subscription-based journal, thus unlocking his individual article for free user-access whilst the rest of the journal remains under a “user-pays” or subscription arrangement (Laakso & Björk 2016).

Another form of open access practised by proprietary peer-reviewed journals is described as delayed OA. Here, a publisher makes available for free user access, peer-reviewed articles only after a specific timeframe from the date of publication, known as an embargo period. This type of OA is defined by Laakso and Björk (2013:1323) as “scholarly articles in subscription journals made available openly on the web directly through the publisher at the expiry of a set embargo period”. Quite a number of studies have identified that the hybrid (delayed) OA is the option that appears to appeal to academics, mostly because it gives them the confidence of the traditional scholarly peer-review process and journal repute while allowing them to fulfil institutional OA mandates simultaneously (Jahn & Tullney 2016; Laakso & Björk 2016). The Gold OA is favoured by the majority of OA participants who are in the medical and life sciences (Zhu 2017; Lwoga & Questier 2015).

2.3.2 OA repositories (Green OA)

Known as the Green route or self-archiving model, OA repositories are mainly archives of the full-text of research articles, institutional artefacts, theses and dissertations, conference presentations and other grey literature, in a variety of digital media formats as the institution may choose, deposited or made available for deposit by the authors themselves (Zhu 2017). OA repositories may be thematic, that is, subject-based, or institutional (Koler-Povh, Mikoš & Turk 2014). The self-archiving of scientific research can also be done by the author through the author's own website or the website of the author's institution (Hansen 2012). Studies on this model of OA publishing have reported contrasting results and generated debates among scholars. While some studies present a very positive outlook of IRs, indicating their contribution to research discoverability and increased citation impact (Buehler 2014; Linde, Eriksson, Kullman, Fathli, Karlsson, Sikström, Sköld & Tång 2011; Miguel, Chinchilla-Rodríguez & De Moya-Anegón 2011), many others report authors' reluctance towards their adoption (Creaser et al. 2010; Jantz & Wilson 2008) due to several reasons including the lack of incentives to self-archive (Oguz & Assefa 2014). The diversity of content types (Paul 2012; Creaser et al. 2010) and, more technically, the metadata schemas deployed by IRs, which makes them difficult to index by scholarly search engines (Arlitsch & O'Brien 2012), are also among the reasons for the slow uptake of IRs among scholars.

The above challenges notwithstanding, the immense contribution of IRs to increased visibility, access and long-term preservation of research output continues to demonstrate positive social and economic impacts that deserve to be promoted (Tennant et al. 2016; Koler-Povh, Mikoš & Turk 2014; Paul 2012). For this reason, many academic institutions and research funders are developing policies known as OA mandates to compel researchers and faculty to deposit a peer-reviewed copy of their articles in the institution's designated OA repository (Carvalho, Laranjeira, Vaz & Moreira 2017; Pinfield 2015; Singeh, Abrizah & Karim 2013). National Institutes of Health (2009) and Research Councils UK (2013) have played leading roles in OA mandate policies that have led to the rapid uptake of Green OA. According to ROARMAP (2017a), there were, as of June, 2017, over 700 OA mandate policies, including funder and institutional mandates of which the latter, made up of universities and research organizations, account for 646. These figures show the increasing importance and adoption of IRs and the creation of a global system of Green OA. This development requires attention and learning on the parts of institutions yet to adopt Green OA in order to adopt best practices to efficiently participate in the new worldwide system of scholarly communication. This aspect is discussed in more detail in section 2.7.5 as part of the 'self-archive practices factors'.

2.4 Focus on IRs

ROARMAP statistics (ROARMAP 2017) show that IRs constitute the majority of Green OA pushing forward the alternative scholarly communication agenda. The potential of IRs to promote collaboration and resource sharing in order to bridge the research gap between the developed and the developing worlds is a compelling rationale for the institutionalization of Green OA by higher education institutions and research agencies. The examples of the Research4Life programmes that have given developing and low-income countries access to top-tier peer-reviewed journals and electronic books and databases for free or for a low fee (Research4Life 2017) are pointers to the potential of Green OA and IRs, in particular to build synergies and reduce the research gap between the developed and the developing worlds.

2.4.1 What is an institutional repository?

In the context of this research, the term institutional repository (IR) is used to refer to any OA repository owned by an academic or research institution that provides a barrier-free online access of its contents to the general public. IR contents are largely composed of institutional memory and research generated by the members of the institution involved, whether as a part of the body of grey literature or published in a scientific journal.

There are many definitions for an institutional repository (IR) but all of them hinge on persistent access, long-term preservation and free online availability of scholarly output of a knowledge-based organization (Reilly 2013; Little 2012; Bundy 2011).

The Scholarly Publishing and Academic Resources Coalition (SPARC) defines IR as:

- “institutionally defined”;
- “scholarly”;
- “cumulative and permanent” and
- “open and interoperable”.

Barton and Waters (2004:10)

The most cited definition of IR, however, is Lynch's (2003:2) definition:

A university-based institutional repository is a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. It is most essentially an organizational commitment to the stewardship of these digital materials, including long-term preservation where appropriate, as well as organization and access or distribution.

As noted by Lynch, his definition is technically short of one big potential of IRs, which is scholarly publishing (Lynch 2003). Already, many scientific publications are done via one OA publishing model or the other and many commercial publishers are increasingly adopting OA publishing models using a combination of author pays and embargo periods to provide open access to scientific research. Biomed Central is often cited as one big success story of OA publishing (Bundy 2011) and academic libraries are envisaged to expand their stewardship roles in IR services provision to incorporate OA publishing (Riddle 2015). At the minimum, however, as is the practice of the majority of academic and research libraries, it will be sufficient for IRs to perform the principal role of disseminating scholarly communication.

2.4.2 IR as the green route to open access publishing

Advancing the debate for cutting edge technological solutions to the practice of scholarly communication with a focus on the huge potential offered by the interoperability of OA IRs, Van de Sompel and Davis (2015) contextualize the digital reform of scholarly communication within the reflective framework of Roosendaal and Geurts' (1997) model of the core functions of the scholarly communication system which, according to Jones, Andrew and MacColl (2006), consist of registration, certification, awareness, archiving and rewarding.

The traditional scholarly communication system that uses tolled peer-reviewed journals, gives the first-two processes/stages to commercial publishers. However, this monopoly is collapsing under the current OA initiatives, particularly with the increasing adoption of IRs by institutions of higher education and research, and the increasing involvement of academic libraries in research publishing (Callicott 2016; Bussert 2012). This function of the IR is, however, fiercely debated by scholars. Some scholars insist on a complementary role for the IR, restricted to the dissemination of scholarly communication output without assuming the roles of registration and certification (Davis & Connolly 2007). This view was buttressed by the Finch Report on expanding access to scientific research (Working Group on Expanding Access to Published Research Findings 2012), which attracted diverse reactions from OA advocates (Harnad 2012). According to the Finch report, "it is unlikely that either institutional or subject-based repositories could *by themselves* provide a satisfactory model for a research communications system that involves the effective publication and dissemination of quality-assured research findings" (Working Group on Expanding Access to Published Research Findings 2012:95) [emphasis is in the original].

The current situation depicts the two systems, which are commercial publishing and IRs, as working in sync to fulfil the core functions of scholarly communication (Callicott 2016). According to statistics from the Directory of Open Access Repositories Website, IRs dominate

the list of repositories globally, numbering 2,889 out of the total 3,377 representing 85.5 per cent of repositories worldwide (OpenDOAR 2017b). This fact puts IRs in a potential position to influence scholarly publishing. However, few studies show that many IRs are poorly populated and dysfunctional due to faculty apathy motivated by the non-acceptance, by universities, of IRs as credible channels of scholarly communication for tenure and promotion or scholarly repute (Burns, Lana & Budd 2013; Cullen & Chawner 2011). This is further corroborated by the findings of Lagzian, Abrizah and Wee (2015a) that the perceived importance of drivers of IR implementation such as top management support and self-archiving are not matched by their actual performance in practice. Other drawbacks include the high rates of citation of undergraduate research in IRs by graduate and undergraduate students prompting concerns for stepping up information literacy skills instruction (Stone & Lowe 2014), and librarians' own lack of trust for IRs as credible information resources for students, particularly those in the sciences, leading to their non-promotion (Dorner & Revell 2012). It is, therefore, necessary to plan effectively for the lifecycle management of digital objects backed by sound policies before embarking on an IR implementation effort.

2.4.3 Attributes/features of an IR: trustworthiness

According to the joint Research Libraries Group and Online Computer Library Centre (RLG-OCLC) Working Group on Digital Archive Attributes, "a trusted digital repository is one whose mission is to provide reliable, long-term access to managed digital resources to its designated community, now and in the future" (RLG-OCLC Digital Archive Attributes Working Group 2002:5). The group defines the multi-pronged checklist of attributes that a repository infrastructure must meet to qualify for trustworthiness as follows:

1. accept responsibility for the long-term maintenance of digital resources on behalf of its depositors and for the benefit of current and future users;
 2. have an organizational system that supports not only long-term viability of the repository, but also the digital information for which it has responsibility;
 3. demonstrate fiscal responsibility and sustainability;
 4. design its system(s) in accordance with commonly accepted conventions and standards to ensure the ongoing management, access, and security of materials deposited within it;
 5. establish methodologies for system evaluation that meet community expectations of trustworthiness;
 6. could be depended upon to carry out its long-term responsibilities to depositors and users openly and explicitly;
 7. have policies, practices, and performance that can be audited and measured;
- and

8. meet the following high-level organizational and curatorial responsibilities:
 - i. the scope of collections;
 - ii. preservation and lifecycle management;
 - iii. the wide range of stakeholders;
 - iv. ownership of material and other legal issues; and
 - v. cost implications.

The above indicators, combined with other standardization frameworks such as “the Reference Model for an Open Archival Information System (OAIS)” (ISO 14721:2012) (Consultative Committee for Space Data Systems 2012), the recommendations for “Audit and Certification of Trustworthy Digital Repositories” (ISO 16363:2012) (Consultative Committee for Space Data Systems 2011), the nestor criteria (Network of Expertise in long-term STORage (nestor) Working Group 2009), the Open Archives Initiative-Protocol for Metadata Harvesting (OAI-PMH) (Jones, Andrew & MacColl 2006; JISC 2008) and OAIster (Patra 2013) ensure that the IR has gained global repute for sustainable long-term preservation and access, and increased visibility and interoperability with other networked resources to bolster user confidence.

IR scalability is high, and integration with other institutional knowledge management systems such as the Current Research Information System (CRIS) is being implemented in many universities and research institutions (De Castro, Shearer & Summann 2014; Siciliano, Schmidt & Kinzler 2014). This holistic system of trustworthiness is also what is believed to bring about the IR’s strength as a tool and mechanism for accomplishing scholarly publishing as indicated by Jones, Andrew and MacColl (2006:20) thus:

the repository, working in concert with other compliant repositories across the Web, becomes an ‘interoperable grid’ supplying in itself all of the elements of the system – registration, certification, awareness, archiving and rewarding.

However, without disputing the requisite technological and standards compliance for trustworthiness of institutional repositories, Prieto (2009) is of the view that such mechanistic criteria are insufficient to qualify a digital repository as trustworthy, without due consideration to the perception of the end users for whom these infrastructures are built and maintained. This view is also shared by St. Jean, Rieh, Yakel and Markey (2011). The over-emphasis of technology without due regard to the human elements of information technology (IT) projects leads to the counterproductive attitude of “if you build it, they will come”, which is a well-known pitfall for IR implementation (Wesolek & Royster 2016:59). The assumption that the thrill of

technology would entice users to participate has not been proven to positively impact the success of technology projects.

2.4.4 The value/benefit/importance of IR

The need for institutional repositories is well articulated in the literature. Some of the benefits outlined by Foster and Gibbons (2005) are discussed below:

2.4.4.1 Stewardship

This is one of the foremost motivations for establishing an IR. Here, responsibility for the preservation of digital content and ensuring its continued access is transferred to the institution by the individual author (Marsh 2015). This ensures that an author continues to be known without the burden of marketing and holding content for exploration resting on himself/herself. Technical challenges such as hardware failures, media obsolescence and ensuring content integrity with persistent access and use over time all become the responsibility of the institution, which has a bigger capacity for safeguarding the knowledge resource(s).

2.4.4.2 Efficiencies

Universities, research institutions and generally all organizations generate countless documents as part of their regular workflow that are of perpetual value to them and require preservation. Documents thus generated at various business units within the same institution are managed disparately by these units resulting in repetition of effort and multiplication of cost in staffing, hardware and software procurement. It also leads to duplication and convolution of retrieval efforts by information seekers. IRs, by centralizing the activities of document gathering, description, preservation and storage, bring a high level of efficiency to the organization through the economies of scale while simplifying retrieval processes and procedures for information seekers by providing persistent uniform resource locators (URLs) to each document and a common platform for tapping into the organization's knowledge base.

2.4.4.3 Showcase

Another strong point made by IR proponents is the value of the IR as a showcase of the scholarly output of a university, which aids in the increased visibility and wider distribution of research output than could be afforded by an individual author (Paul 2012; Russell & Day 2010). This function of the IR also renders it as a potent tool for research output evaluation (Bonilla-Calero 2014), and has become a key factor to consider in most university rankings (Akpokodje & Akpokodje 2015; Moahi 2009) due to its OAI-PMH compliance and other interoperable functions allowing its contents to be more widely distributed on the Web.

Jain, Bentley and Oladiran (2009) categorize the benefits of an IR into institutional, individual/authorial and societal benefits. The institutional benefits as re-echoed by Jain (2011) include the following:

2.4.4.4 Support for learning, teaching and research

The scalability and interoperability of IRs allow for extending their usefulness through Application Programming Interfaces (APIs) and embedding in other university systems environments such as virtual learning environments, and virtual research environments, as well as integrating with Current Research Information System (CRIS) and Online Public Access Catalogue (OPAC).

2.4.4.5 Standardization of institutional records

Similar to its efficiency value, the centralization of document curation and preservation functions by the IR will ensure an institutionalized standard of records management. Left alone, the various university business units or departments would implement their own filing systems and document referencing models specific to subject discipline. By applying institutionally approved policies on metadata creation and document formatting, IRs bring sanity to the university's records and enhances its knowledge management practices while removing access barriers.

2.4.4.6 Breaking down of publishers' costs and permissions barriers

As IRs are established on open architecture with an OA philosophy, they promote increased accessibility of research output to a global audience without the financial barriers that restrict access to scientific research in traditional journal publishing.

2.4.4.7 Alleviation of requirement to trust publishers to maintain information in the long term, without any commercial benefit to the authors

Commercial publishers are in business for profit and do not necessarily support the philosophy of open access for wider communication and impact of scholarship. Publishers can pull out an article that brings them no economic returns at any time. IRs, however, are designed to maintain digital objects in perpetuity for wider reach of research impact among audiences worldwide.

The following infographic by Danny Kingsley and Sarah Brown of the Australian Open Access Strategy Group summarizes the benefits of OA, which are the philosophical underpinnings of IRs.

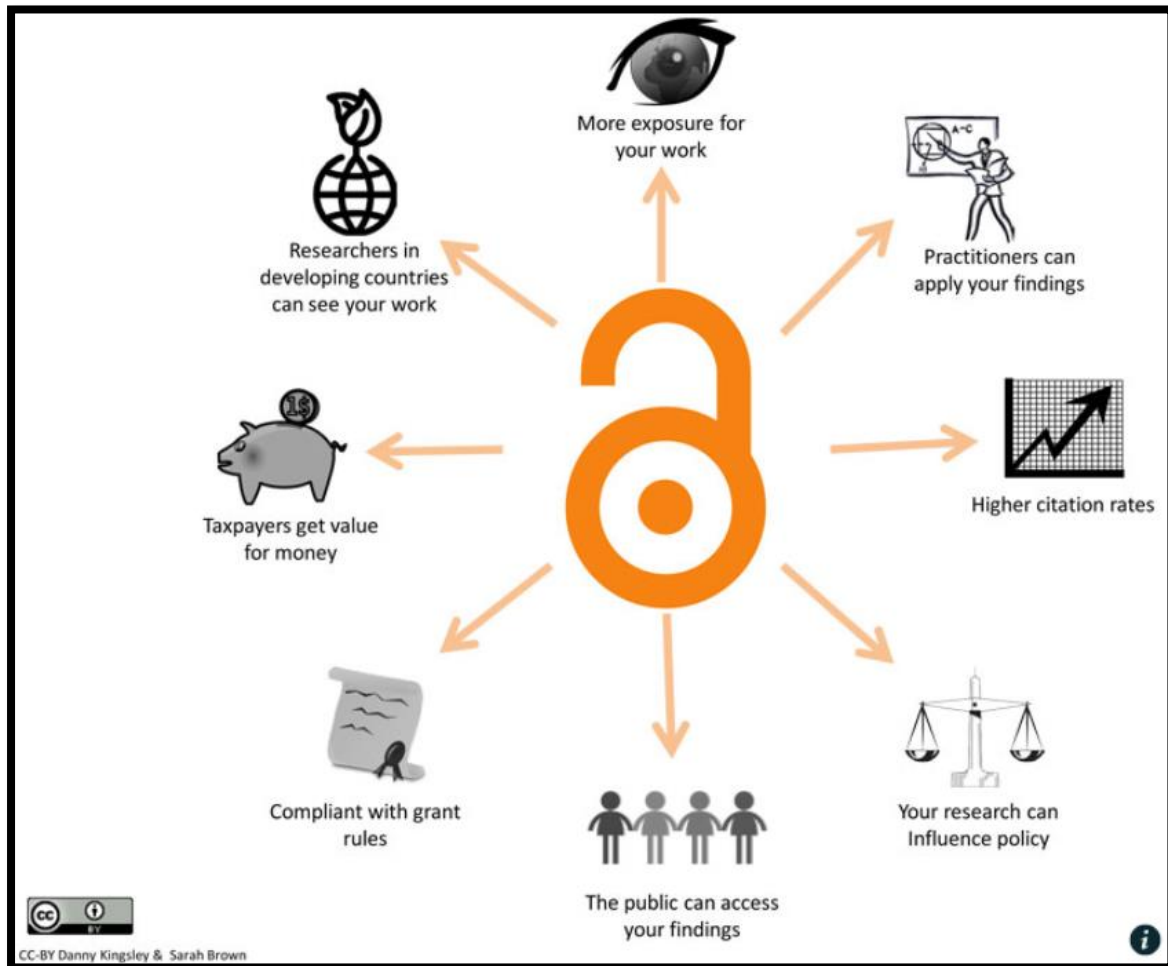


Figure 1: The Benefits of Open Access

Image source: (JISC 2016).

2.5 Importance of IRs for Africa

IRs are an offshoot of OA. Among the key drivers of OA initiatives are the ever increasing costs of toll access to journal publications, continuing shrinking of library budgets, authors' demand for free access to scientific research for wider dissemination of scholarship and evidence of higher citation impact for research published through OA (Boselli & Galindo-Rueda 2016; JISC 2016). Africa is a developing continent and has severe economic challenges that hinder access to the scientific research outputs of the West, which are made available through toll access. IRs are seen as the true essence of openness that can drive the OA initiative in Africa. According to Moahi (2009), most research funded in Africa end up

in expensive journals inaccessible to Africans. Therefore, African universities perceive IRs as “a vehicle for enhancing visibility, access and impact because research outputs will be visible on the Internet and WWW” (Moahi 2009:4). Another view is that many Africa researches remain in the grey literature due to the high costs of commercial publishing. OA publishing, and IRs in particular are, therefore, seen as niche avenues for African researchers to make their research output accessible to a global audience (Okendo & Elliah 2014).

The more striking feature of IRs as cheaper alternatives for research communication is their interoperability with other research management platforms and with each other, which, for example, made the building of a Portuguese national network of repositories integrated with a current research information system (CRIS) possible (Moreira, Laranjeira, Carvalho, Ribeiro, Lopes & Graça 2017). Such a capability can further be extended to union cataloguing and resource sharing to reduce the national burden of multiple funding of access to research publications. It will also minimize shopping by information seekers by providing a national gateway for accessing research content in most African countries. Further, such interoperable networks can reduce unnecessary duplication of networks worldwide; for example, instead of Research4Life programmes giving several institutions in one developing country multiple access to its gateways such as HINARI, AGORA, OARE and ARDI, a single instance of each can be run on the national network of interconnected repositories.

2.6 Importance of IRs for Ghana

Several developments in the public sector of Ghana show how important the establishment of IRs is to the country's burgeoning knowledge economy. In a study conducted into the digital preservation practices in Government departments by Adu and Ngulube (2016), the authors found that trustworthiness in digital repositories was among the top-tier digital preservation strategies of Ministries, Departments and Agencies. The rapid penetration and usage of the Internet in Ghana have also added to the justification for establishing credible repositories to disseminate research for societal consumption. Ghana recorded a leap in Internet penetration from 8.4% at an estimated population of 24,791,073 in 2011 (Quarshie & Ami-Narh 2012) to 19.6% at the estimated population of 26,327,649 in 2015 (Internet World Stats 2016), a rate of more than double within just four years. This indicates how the Ghanaian public are increasingly turning towards digital sources of information. There is, therefore, the need to respond to this demand shift by providing well-marketed trustworthy national archives to develop an informed digitally savvy citizenry. The third and biggest development showing the crucial role of IRs to Ghana's knowledge economy is the growing development of the national network of academic and research institutions for resource sharing known as the Consortium of Academic and Research Libraries in Ghana (CARLIGH). Drawing assistance from the

International Network for Availability of Scientific Publication (INASP), CARLIGH is not only negotiating free access to scientific publications to its members but is also leading the development and adoption of institutional repositories in Ghana's universities and building the capacities of library and research staff in the management of the research ecosystem (Corleley 2011).

2.7 IR implementation critical success factors

IR is an information technology (IT) project and its implementation must align with sound principles of IT project implementation. Olson (2004) analysed the project management literature and found that many projects failed due to lack of attention to some key elements that were indispensable to the project. These key elements, known as project critical success factors (CSFs), are conditions that must be met for a project to succeed. According to him, project CSFs vary across disciplines in terms of priority, however, there are three that come top of all considerations irrespective of discipline, namely:

- i. Clear project objectives statement;
- ii. Top management support; and
- iii. User involvement or client acceptance.

Also, in several of their CHAOS reports, the Standish Group analysed IT project implementations and categorized projects as successful, challenged or impaired based on how they meet the triple constraint triangle of time, cost and scope/target (The Standish Group 2015a; The Standish Group 2015b; The Standish Group 2014a; The Standish Group 2014b). According to them, a project is successful when it is delivered on the frame of time, budget and functionality requirements or scope specified at the initiation stage of the project. The time (schedule), cost (budget) and scope (quality/functionality) specifications dimensions of IT project implementation are termed the triple constraints (Eduardo Yamasaki Sato & de Freitas Chagas Jr 2014; Haughey 2011). These are the key elements in project management generally considered as capable of promoting or derailing the project depending on how well they are managed.

The Standish Group conducted further research into why IT projects fail by interviewing several IT project managers and came up with the finding that project success or failure did not depend solely on the triple constraints, but other cultural and environmental factors that can influence the triple constraints were far more pronounced. A ranking of these critical success factors placed **user involvement** first, followed by **executive management support** and thirdly, **clear statement of requirements** (The Standish Group 2014b) [researcher's emphasis]. In their 2009 CHAOS report, The Standish Group summarised their top-10 IT

project success factors (Gingnell, Franke, Lagerström, Ericsson & Lilliesköld 2014; The Standish Group 2009) as follows:

1. User involvement
2. Executive support
3. Clear business objectives
4. Emotional maturity
5. Optimization
6. Agile process
7. Project management expertise
8. Skilled resources
9. Execution
10. Tools and infrastructure

Umble EJ, Haft and Umble MM (2003) also conducted a study into the critical success factors for the implementation of Enterprise Resource Planning (ERP) systems and identified nine conditions that must be met to have a successful project done, namely:

1. Clear understanding of strategic goals;
2. Commitment by top management;
3. Excellent project management;
4. Organizational change management;
5. A great implementation team;
6. Data accuracy;
7. Extensive education and training;
8. Focused performance measures; and
9. Controlling multi-site issues.

Several other studies on IT project success factors list “top management support” among the top-tier factors (Mahmood, Asghar & Naoreen 2014; Alias, Zawawi, Yusof & Aris 2014; Marchewka 2010; Finney & Corbett 2007; Nah, Zuckweiler & Lee-Shang Lau 2003). Some studies single out “top management support” not only as “the most frequently cited CSF” (Ngai, Law & Wat 2008:556) in the IT project success literature, but as the single most important factor among all the CSFs (Young & Jordan 2008:720). Other studies also conclude that just getting the hardware and software together and making them function as required does not ensure repository success; but factoring in the end-users, particularly faculty members who will be providing the content for the repository, as their buy-in is critical to success (Bamigbola 2014; Moahi 2009; Jantz & Wilson 2008).

Apart from the generic frame for IT project success, IR-specific critical success factors are well documented in the literature (Moreira et al. 2017; McKiernan, Bourne, Brown, Buck, Kenall, Lin, McDougall, Nosek, Ram, Soderberg, Spies, Thaney, Updegrave, Woo & Yarkoni 2016; Lagzian, Abrizah & Wee 2015b; Armstrong 2014; De Castro, Shearer & Summann 2014; Siciliano, Schmidt & Kinzler 2014; Burns, Lana & Budd 2013; Little 2012; Sawant 2012; Jain 2011; Creaser et al. 2010; Ramirez & Parham 2010; Jantz & Wilson 2008)

Jain (2011), for example, summarized the IR CSFs in a recommendation for sustainable IR implementation as follows:

1. a comprehensive promotion and publicity of the benefits of IR to the faculty and all other stakeholders;
2. provision of clear policies on ownership, IR contents, quality standards, copyright issues, etc.;
3. adoption of a strict institutional implementation policy to mandatory deposit of all staff research outputs and students' dissertation and thesis;
4. consider IRs as ongoing projects not once done and dusted;
5. a clear articulation of vision, strategy and tactics whether it is has a [sic] institution-centred, researcher-centred or a general public-centered vision;
6. provision of a full range of academic and research support services including e-mail e-print request, and closed access deposit through IRs to serve academia and researchers;
7. sustainable support from the senior management and academia;
8. adequate provision of resources (finance, space, human and technology); and
9. introduction of incentives to encourage academia to publish through IRs.

Lagzian, Abrizah and Wee (2015b) also conducted a study on CSFs for IR implementation worldwide and came up with six major success factors as reported by experienced IR staff. The CSFs were reported in priority order based on the mean value of responses as follows:

1. People
2. Resources
3. Management
4. Services
5. Self-archive practices
6. Technology

Each of these is discussed in more detail below.

2.7.1 People factors

This category of IR CSF encapsulates all the human elements or stakeholders and the interactions that matter in the set up and continuing maintenance of the infrastructure and its contents for persistent access. It comprises top management support, user satisfaction, the skills-set of the repository staff and the organizational culture (Lagzian, Abrizah & Wee 2015b). Top management support is essential in securing the financial and policy backing of the IR project in perpetuity. User satisfaction is critical because it determines whether the IR is achieving its mission and offering the university value for its money. As noted by Sawant (2012:120), “users are one of the important factors of the long-term survival of IRs”. User dissatisfaction with IR services can lead to total abandonment and financial loss to the institution. Repository management requires more than traditional library skills. Library Science professionals who mostly spearhead IR projects in universities require sound IT skills, project management skills, team building and dissolution skills, and negotiation skills to successfully implement an IR (Little 2012). Organizational culture is an all-encompassing phenomenon that reflects the current practice that any technology adoption is likely to disrupt. Naturally, people prefer their tried and tested conventional way of doing things to new technologies. This is usually because they cannot immediately predict results or they perceive the technology as too complicated for them to immediately grasp and put to effective use. If not well handled, clicks of opposition soon emerge and crystalize into staunch resistance to change that can spell doom for the system. From the above it is clear that change management would need attention once the decision is made to implement the IR.

2.7.2 Resources factors

This refers to the collections or content, the infrastructure and funding support upon which the entire OA IR initiative depends (Lagzian, Abrizah & Wee 2015b). There is currently no rule of thumb regarding what an IR must contain as it is institutionally defined, and this has an impact on how users perceive the value of the IR. Some faculty do not see the IR as a place to deposit copies of published articles while some IRs also contain diverse contents ranging from pre-prints, post-prints, working papers and published versions of peer-reviewed articles to students' theses and dissertations and other institutional memory in a variety of formats such as images, audio files, video files and text files (Burns, Lana & Budd 2013; Creaser et al. 2010). This factor is affected rather negatively, mostly by the people factor as the levels of awareness, skill and perception of value of IR based on the quality of its collection can influence content recruitment, particularly self-archiving, and use. This factor perfectly aligns with Umble EJ, Haft and Umble MM's (2003) data accuracy factor and it is supported by the argument of Mao and Wang (2009:333) that a good digital library should pass the collection

quality benchmark indicators of “scope, authority, accuracy, completeness, currency and copyright”.

IR infrastructure is the technological environment within which the IR flourishes, and includes the university network and Internet systems, available Internet Protocols (IPs) and bandwidth, the hardware and software elements of the IR itself, and all other technical and technological platforms that will serve the IR installations. More details are given under the technology factors.

Resources usually also refer to funding and financial management of a project. Finance is one critical aspect of the resources factor that has a huge implication for the current success and future sustainability of the IR. The technologies, human resources, and ongoing maintenance of the IR all depend on the availability funds. The collections and finance resources can actually dictate the choice of implementation approach

2.7.3 Management factors

IR management is about how the infrastructure will be administered and includes the policy framework for its establishment and the alignment of this policy and the IR implementation strategy with the overall institutional strategic and ICT governance policies. It affects how the various modules and services of the IR are delivered on the day-to-day running of the infrastructure. Key aspects of the IR workflow such as digital preservation and rights management are catered to by policy. Moreira et al. (2017) point out that policy guidelines facilitate smooth implementation as they provide total control of the change process, defining all the technical and operational nuances such as data interoperability, metadata schema, unique identifiers, data synchronization and privacy protection, which help to co-ordinate macro-level activities such as IR integration into existing enterprise resource planning systems (ERPs). The policy framework will also deal with service level issues including research discoverability, academic social networking and institutional mandate, as well as IR marketing and promotional issues.

2.7.4 Services factors

IR services are the values delivered to and enjoyed by the user community as a result of defined workflows. The types of services defined by the IR policy become the focus of the repository upon which user-judgments are premised. Ramirez and Parham (2010) suggest that to be successful, IRs should provide “value-added services that actively support the scholarly communication process, including:

1. registering the intellectual idea,

2. certifying the quality and validity of findings,
3. disseminating research to users, and
4. preserving the scholarly record for the future”.

Ramirez and Parham's (2010) view of the IR service scope is reflective of the school of thought that IRs can become fully-fledged OA publishing alternatives to commercial journal publishing (Harnad, Brody, Vallières, Carr, Hitchcock, Gingras, Oppenheim, Hajjem & Hilf 2008; Crow 2002). However, Clifford Lynch, who defines an IR as a “service”, supports the opposing school of thought projected by the Finch report (Working Group on Expanding Access to Published Research Findings 2012) and “views IRs as *supplements*, not primary venues for scholarly publishing, and warns against assuming the role of certification in the scholarly publishing process” (Davis & Connolly 2007:2) [emphasis is in the original]. Plutchak and Moore (2017) also support the Lynch/Finch position. Armstrong (2014:49), however, notes some new emerging services being offered on IRs including “copyright and publishing consultation”, “library-based publishing” and “publication and usage data services”.

Obviously, the services factor can be utilized to motivate faculty self-archiving practices to encourage content recruitment and use. Integration with existing ERPs for enhanced capabilities such as providing a single platform to manage the research lifecycle through integration with the current research information system (CRIS) (De Castro, Shearer & Summann 2014; Siciliano et al. 2014), courseware and other learning management platforms, referencing support and automatic notifications of user statistics to depositing faculty will create a win-win situation for all IR stakeholders and promote the full exploitation and use of the infrastructure.

2.7.5. Self-archive practices factors

Getting the information resources deposited in the IR archives is about the most daunting task of the IR implementation process. Assessing the IRs of the Canadian Association of Research Libraries (CARL) member institutions, Jantz and Wilson (2008:189) conclude that “content recruitment thus remains the biggest barrier to the implementation of IRs at CARL libraries”.

Raju, Smith, Talliard and Gibson (2012:7) define self-archiving as “the electronic posting, without publisher mediation, of author-supplied research”. Singeh, Abrizah and Karim (2013) find that, although self-archiving is a key CSF for IR sustainability, faculty researchers were mostly apathetic toward it. Lagzian, Abrizah and Wee (2015b), in presenting their recommendations for IR implementation success, also singled out self-archiving and management as the first-two most important CSFs to consider.

Self-archiving may also mean an author depositing his or her work through an assigned representative (Lagzian, Abrizah & Wee 2015b), and Xia (2007:647) observed that a successful self-archiving is achieved through “a liaison system and a mandate policy”. There is ample evidence that OA policy mandated by institutions and research funding organizations positively impact author participation in IRs (McKiernan et al. 2016) and ROARMAP statistics show a steady increase in OA mandate and policy adoption by research funders and academic institutions quarterly worldwide.

As at August 17, 2017, the total registered mandates with ROARMAP were 796, comprising 83 in the funder category, 56 in the funder and research organization category, 10 in the multiple research organizations category, 657 in the research organization (that is, university or research institution) category and 73 in the sub-unit of research organization (that is, department, faculty or school) category. Very significant to note is the dramatic increase in the number of registered OA mandates and policies between June 2017 (as captured under section 2.3.2) and mid-August 2017 in the institutional mandate category from 646 to 657.

Despite the growth of these OA mandates and policies on the institutional landscape, several studies have also shown low participation of faculty in self-archiving (Oladokun 2015) due to reasons including fear of copyright breaches (Kim 2011) and their perception that self-archiving is time-consuming (Singeh, Abrizah & Karim 2013). There is also the fear that such compulsory enforcements will rather worsen the already fragile author attitude toward the IR self-deposit concept (Marsh 2015), hence the concern about lack of author commitment to self-archive as a key threat to IR sustainability.

Self-archiving is, however, not the only means of recruiting content into an IR. Mediated archiving, which is the practice whereby library IR staff collect works from faculty and perform the deposit function on their behalf (Lagzian, Abrizah & Wee 2015b) is seen as a more sustainable approach to content recruitment for the IR as it not only frees faculty who are engaged with other academic functions from the technical work of describing content, determining item eligibility and copyright clearance and navigating their way around the collections, but also enables the library to ensure the standardization of resource description and formatting, copyright compliance and other quality standards in the IR value chain management (Armstrong 2014).

2.7.6 Technology factors

Perhaps the reason why the technology factors are seen as the lowest on the CSF scale is due to the fact that there is little human influence on its functionality and operational value at the institutional level. IR technology, as a computer-based system, comprises hardware and software components. The hardware is mainly the IR server that stores the digital objects to be delivered on a Web platform. Stellenbosch University, for example, in 2016 reported using a DELL R730 server with the following specifications:

- ✓ 1x Intel E5-2630 = 8 cores and 32 virtual CPU's
- ✓ 125GB RAM
- ✓ 5TB RAID6 disk array
- ✓ 4x 1GB Ethernet ports

(Stellenbosch University 2016a)

Software platforms for an IR comprise the operating system that runs the hardware, and the repository software for digital object management. There are broadly two categories of software – proprietary and open-source. Proprietary software is off-the-shelf/commercial and the institutions that intend to use proprietary software must buy and install the package and continue the subscription to upgrades and new releases and also system maintenance (Simons & Richardson 2013b). Open-source software is free, highly customizable and built on open architecture that supports scalability and the OA philosophy of IRs. It allows the institution to develop its own bespoke system, implementing modules in phases as necessary and expanding functionality as the archive grows and the service charter gets updated (McGill n.d.). However, the institution does need qualified human capacity to install and maintain the open source software.

The choice of technology is not only limited to selecting hardware and software for in-house installation and maintenance but also extends to hosting options. Cloud hosting, also known as offsite hosting, is another means by which the IR technology can be procured or managed (Simons & Richardson 2013b). In terms of procurement, an institution may choose the cloud hosting option in which it purchases the repository software as a service and does not need to worry about hardware and staffing requirements. However, Stellenbosch University (2016b) cautions against glossing over the fine print in such agreements, particularly those relating to ownership of data files.

When it comes to choosing and implementing the technology, several guides are available online and the experience of other institutions can be enlisted. There is also an option to

outsource the development or installation process where repository service providers are available.

It is important to note that none of the CSFs discussed above works in isolation. There is an interplay of all the factors that put synergistic pressure on the repository's success. It is, therefore, necessary to approach IR from the strategic systems perspective making room for extensive consultation and collaboration by all (key) stakeholders.

2.8 Summary of the IR critical success factors

From the various authors, it is worth noting that the factors that promote IR success are similar but context-specific. There is, therefore, no universally accepted order of priority for these factors. All the five authors cited on IR CSF also vary in levels of detail and aggregation of nuanced findings to describe their suggested categorization of the CSF. It is, therefore, important to conduct a meta-aggregative synthesis of the CSF of all the authors to arrive at generic, representative CSF for the purposes of this study. Table 1 presents the meta-aggregative synthesis of the relevant findings of five (5) sampled studies on IR CSF. In the table, the results of the various studies explored on IR CSF have been summarized. The studies, which have their own superordinate level themes, are analysed into the categories they encapsulate and these were compared with all the other studies. Superordinate themes that represent the views of all the studies cited are retained while those that combine categories that could stand on their own were skipped and the appropriate category selected. A total of six (6) themes, which constitute the synthesized results of all the five documents cited on IR CSF, were derived, namely:

1. Executive support;
2. User acceptance and support;
3. Organizational culture;
4. Resources;
5. IR policy; and
6. IR marketing and promotion.

These six (6) themes formed the a priori themes against which the empirical data was compared to describe the presence and nature of the IR CSF at UHAS.

Table 1: IR implementation critical success factors: a synthesis of five studies

Literature Findings	Codes	Categories	Themes
Lagzian, F., Abrizah, A. & Wee, M.C., 2015. Critical success factors for institutional repositories implementation			
People factor			
<i>Top management support</i>	1	Executive Support	
<i>User satisfaction</i>	2	User Acceptance	
<i>Repository staff (relevant skills set)</i>	3	Resources	
<i>Organizational culture</i>	4	Organizational Culture	Organizational Culture
Resources factor	3	Resources	
<i>Collections (repository content)</i>			
<i>Infrastructure (Internet bandwidth, space, IP, etc.)</i>			
<i>Funding</i>			
Management factor	5	IR Policy	
<i>Policies on recruitment, data security, preservation, etc.</i>			
Services factor	5	IR Policy	
<i>IR service scope; values offered to users/contributors</i>			
Self-archiving factor	5	IR Policy	
<i>Deposits made by authors themselves.</i>			
Technology	3	Resources	
<i>IR hardware and software</i>			
The Standish Group International Inc., 2014. Project Smart			
User involvement	2	User Acceptance	
Executive management support	1	Resources	
Clear statement of requirements	5	IR Policy	

Jain, P., 2011. New trends and future applications/directions of institutional repositories in academic institutions				
Comprehensive promotion and publicity of the benefits of IR to stakeholders	6	IR Marketing and Promotion	IR Marketing and Promotion	
Provision of clear policies on ownership, IR contents, quality standards, copyright issues, etc.	5	IR Policy	IR Policy	
Adoption of strict institutional implementation policy to mandatory deposit	5	IR Policy		
Consider IRs as ongoing projects, not once done and dusted	5	IR Policy		
Clear articulation of vision, strategy and tactics	5	IR Policy		
Provision of a full range of academic and research support services	5	IR Policy		
Sustainable support from senior management and academia	1	Executive Support		
Adequate provision of resources (finance, space, human and technology)	3	Resources	Resources	
Introduction of incentives to encourage academia to publish through IRs	5	IR Policy		
Olson, D. L., 2004. Introduction to information systems project management				
Clear project objectives statement	5	IR Policy		
Top management support	1	Executive Support	User Involvement and Acceptance	
User involvement/client acceptance	2	User Involvement and Acceptance		
Umble, E.J., Haft, R.R. & Umble, M.M., 2003. Enterprise resource planning: Implementation procedures and critical success factors				
Clear understanding of strategic goals	5	IR Policy		
Commitment by top management	1	Executive Support		Executive Support
Excellent project management	3	Resources		
Organizational change management	4	Organizational Culture		
A great implementation team	3	Resources		
Data accuracy	5	IR Policy		
Extensive education and training	6	IR Marketing and Promotion		
Focused performance measures	5	IR Policy		
Controlling multi-site issues	3	Resources		

2.9 Barriers to IR implementation

Although failure to meet any of the CSF for IR implementation constitutes a barrier to success, several challenges that drive the CSF as the “irreducible minimum” can be more explicitly listed (Makori, Njiraine & Talam 2015:617). Jain (2011) lists a number of barriers, which are also highlighted by Makori et al. (2015), Moahi (2009) and Jain et al. (2009), namely: cost, difficulties in generating content, problems in gaining sustainable support and commitment, copyright management issues, working culture and policy issues, lack of incentives, lack of respectability, time consuming and labour intensive, lack of marketing and promotion of IR benefits, and technical and promotional challenges.

Lack of awareness is cited rather frequently in the literature as one of the challenges of IR implementation. Often, institutions fail to market the IR to their stakeholders from the initial stages of the project. The assumption that researchers will be compelled by institutional mandates to deposit their works in the IR has also misled many universities. It is necessary to sensitize community members on the benefits of the IR to them and to the university. It is also necessary to take their inputs to frame a policy that delivers the institutional goals and stakeholders' expectations.

It is also the case that those who often lead the IR initiative in universities (the university libraries) vaguely understand the concept and often lack the requisite skills to execute the project. Project management knowledge and skills, change management, ethical and legal issues in research such as copyright, service marketing and promotion, cost modelling and advanced IT skills are among the competencies necessary to successfully implement an IR project. These, unfortunately, are lacking in most libraries.

Also, lack of consultation with stakeholders to define the service scope, and inadequate support from top executives for ongoing maintenance result in failure. Faculty apathy toward IR is among the leading causes of IR failure. This is because most libraries treat the IR project in isolation instead of fitting it into the academic and research ecosystem of their institution. Many faculty researchers express the fear of plagiarism and lack of time to self-archive. Libraries need to pay attention to such issues and make the necessary investments in ensuring ethical use of information resources, as well as embedding in faculty researchers' environments to learn about their needs and tailor services to those needs.

If the CSFs are factored into the IR planning process and given the necessary attention, most of these known barriers can easily be overcome.

2.10 The IR implementation process

Barton and Waters (2004) describe seven (7) stages necessary to establish an IR as follows:

1. Learning about the process by reading about and examining other institutional repositories.
2. Developing a service definition and service plan:
 - a. Conduct a needs assessment of your university.
 - b. Develop a cost model based on this plan.
 - c. Create a schedule and timeline.
 - d. Develop policies that govern content acquisition, distribution, and maintenance.
3. Assembling a team
4. Choosing the appropriate technology – selecting and installing the software platform
5. Marketing
6. Launching the service
7. Running/Maintaining the service

The seven stages represent major undertakings or milestones in the IR implementation process, and a brief description of each is given below.

2.10.1 Learning about the process by reading about and examining other IRs

Universities and research institutions do not operate in utter exclusivity. Establishing IRs in the present time is simply a case of technology adoption rather than a completely new system development. It is necessary, therefore, to learn from the experience of those who have implemented IRs previously in order to fast track learning curves. Some of the important facts to address will include the reasons for the choice of technology, staffing and operational costs (Giesecke 2011). In Ghana, all the public universities that have deployed IRs have done so with assistance from CARLIGH using the open-source software DSpace. They received technical support from INASP (Lampsey & Corleley 2011).

2.10.2 Developing a service definition and service plan

This is about the most important stage in the IR development process as it spells out specifically what is to be done by whom and by when. It is the project implementation plan. The four main components of the service definition and plan are discussed below.

2.10.2.1 Needs assessment

This is a kind of feasibility study from which the project specification including the mission and technical requirements will be developed. Described as the “scope” by (McGill n.d.), the needs assessment stage takes into consideration the current situation that is driving the establishment of the IR, as well as its future capabilities. Also at this scoping stage, the type of content to be curated, the prevailing practice of scholarly communication, who the key stakeholders are, their needs and expectations, and what the costs and benefits are, need to be determined in order to form the business case for the IR proposal (Makori et al. 2015). According to McGill (n.d.) identifying key stakeholders at the needs assessment stage is important for two reasons – promotion (making the business case and getting their buy-in) and consultation (to determine needs and expectations to shape service definition). He goes further to suggest the following key stakeholders within an academic institution:

- i. University administrators, senior management and policy makers;
- ii. Academics as authors and researchers;
- iii. Library staff;
- iv. Technical support staff; and
- v. Other support staff.

2.10.2.2 Cost model

A cost model or budget for an IR is determined by the scope of services and the choice of implementation option, which is also determined by the IR objective and available resources such as staff technical expertise (Barton & Waters 2004). The Repositories Support Project (RSP) outlines three (3) main options for the technical implementation of an IR, namely:

- i. You programme it yourself in-house - the DIY [Do It Yourself] approach
- ii. You can install a standard package in-house
- iii. You can host the repository with an external service provider

(Repositories Support Project 2013).

The choice of approach obviously determines the resource requirements and, therefore, the cost model. Building the repository in-house requires staff technical expertise (which if unavailable will mean hiring new staff), hardware, Internet bandwidth and ongoing maintenance costs such as hardware replacements and software upgrades, among others. One option, when it comes to a shortage of skills, is to enlist the help of external service providers (Tzoc 2016) who also have their own cost package for the initial set-up and customization and any subsequent maintenance and training needs. These aspects are usually spelt out in a service agreement.

Standard packages are proprietary software that have been pre-packaged leaving the institution with limited rights of customization and administrative control. System upgrades and continuing maintenance are done by the commercial provider. As indicated by Repositories Support Project (2013), choosing commercial software for in-house hosting also requires a budget for the appropriate hardware and operating system environments in which the package would run. It will also require technical expertise for the maintenance of the infrastructure in-house.

The external hosting option, also known as cloud hosting or software as a service, is an outsourcing option where an institution contracts out the provision of server space, software platform and ongoing maintenance of its digital assets to an external commercial service provider (Sharif 2013).

A fourth approach is the collaborative implementation approach where libraries and research institutions form a consortium to implement a shared IR through centralized infrastructure (Barton & Waters 2004). The advantage of this federated approach is that no one institution carries the entire financial burden of implementing an in-house system. Moreover, users get to benefit from a variety of resources pooled together by the diverse consortium partners, which they could not have accessed using a single instance or their own institution's exclusive infrastructure.

Examples of cost for in-house hosting and cloud hosting or outsourcing can be given. No two institutions can have the same cost structure as institutions vary in size and resources, as well as in focus and scope of IR projects. There are, however, primary cost elements that can serve as guides when embarking on any implementation approach.

The Stellenbosch University, in its "self-hosting value proposition" (that is, in-house IR implementation using an open-source platform), outlined the following cost items:

1. Hardware

- Production server hardware
- Back-up server hardware

2. Personnel

- Operational
 - One scholarly communications director
 - One scholarly communications operational manager
 - Four scholarly communications librarians
- Technical

- One scholarly publications systems technical manager
- One scholarly publications systems web programmer
- One scholarly publications systems technology administrator

(Stellenbosch University 2016c)

Apparent from the Stellenbosch University proposition is that the baseline is drawn from a mature IR and, therefore, other focal areas of cost for start-ups such as strategic planning, marketing and promotion, policy development and user training (Barton & Waters 2004; McGill n.d.) have gone unmentioned.

For in-house hosting of off-the-shelf proprietary systems, Barton and Waters (2004) indicate that the following cost items will apply:

1. System support and maintenance
2. System equipment
3. Software systems
4. Technical training for library staff and content submitters
5. Batch ingest and bulk loading
6. Metadata creation
7. Technical support
8. Strategic planning
9. Marketing:
 - a. Developing marketing materials
 - b. Marketing activities, in house and external
 - c. Public relations and communications
10. Policy Development

Leading OA publisher Biomed Central (BMC) (Albert 2006) developed Open Repository, a DSpace-based cloud-hosting solution, which was acquired in July 2016 by Atmire NV, a DSpace repository service provider (Atmire NV 2016). DuraSpace also offers a hosted service of the DSpace repository known as DSpaceDirect for institutions and a look at their price quotation request form reveals the following cost elements:

1. **Subscription plan/options**
 - a. Small
 - b. Medium
 - c. Large
2. **Storage space (limited to 250GB except for the Large subscription plan)**
3. **Add-on packages**
 - a. Content migration

- b. Custom URL
- c. Enhanced submission process
- d. Location-based authentication
- e. Extended support

2.10.2.3 Schedule and timeline

As a project management rule of thumb, a work plan or implementation schedule is indispensable in ensuring accurate monitoring and evaluation of project performance. To better explain the IR implementation scheduling and timeline, it is important to orient the IR as an information system under development, and the IR implementation process as a project management task. This will help in drawing the necessary linkages between the systems development lifecycle (SDLC) and the project lifecycle based on expected deliverables at the various stages for which a proper work breakdown structure (WBS) is required (Schwalbe 2014).

A project, according to Project Management Institute (2017:4), is “a temporary endeavor undertaken to create a unique product, service or result”. This definition of a project introduces the time dimension to the project management task. The five broad stages of project management, also known as the project lifecycle, identified by the Project Management Institute (PMI) comprise initiation, planning, executing, monitoring and controlling, and closing as illustrated by Figure 2.

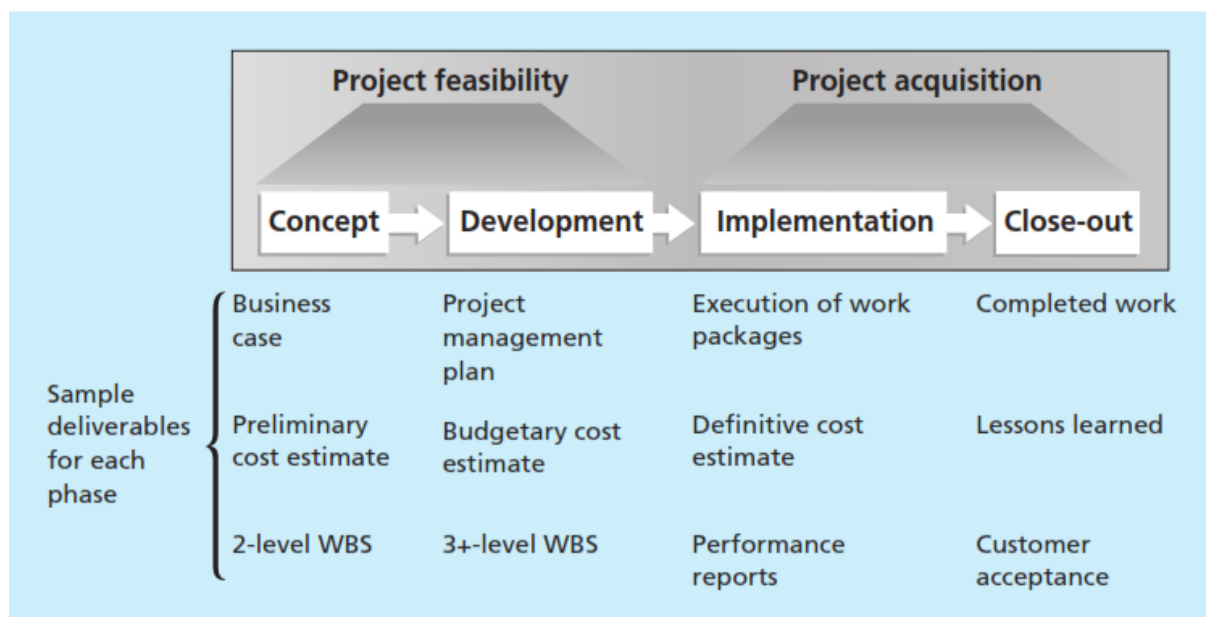


Figure 2: Stages of the project lifecycle

Image source: (Schwalbe 2014:58)

Following the traditional project lifecycle helps time scheduling. In Figure 2, the traditional five stages, which are the operational phases of a project, have been categorized into two at management (superordinate) level, namely: project feasibility and project acquisition. Thus, for senior management of any organization, deciding on acquiring or implementing a project is based solely on its feasibility in terms of finance, resource commitment required and the strategic alignment of the project objectives with the vision and mission of the organization.

The first-two stages of the project life – project initiation (concept) and planning (development) – constitute the feasibility category. At the initiation phase, a project concept is developed that gives a general proposal justifying the need and the cost-benefit analysis. A value proposition is made to present a strong business case. This proposal will contain cost estimates and a summary work schedule. At the planning or development phase, detailed execution plans including timelines, budgets and a work breakdown structure (WBS) or specific tasks and performance indicators are drawn. This phase of the project provides the blueprint for execution and it is very detailed and specific in estimation. In organizations, such as universities, this phase of the project life will be executed by a committee.

The project implementation or execution and close-out stages constitute project acquisition. At the execution stage, the plans are translated into products, while costs are realistically applied, and adjustments are made to plans where necessary. Work at this level is executed in pragmatic epochs. Units are tested for conformity and functionality, and performance is measured and reported against benchmarks. Project close-out is the final stage where all work is done and the completed project is handed over. User training and technical support may continue to sustain the project.

Conspicuously missing from Figure 2 is the fifth element of the project lifecycle: monitoring and controlling/evaluation. Monitoring and evaluation (M&E) are control measures to ensure that the project meets the triple constraint triangle of time, budget and scope (requirement specifications). These controls are applied throughout the project lifecycle, from conception to closure and cannot be fixed permanently as an exclusive phase on the linear process diagram. This is why it is not given a fixed location on the diagram in Figure 2.

The project deliverables are tangible outcomes or outputs that must be achieved if a specific task is successfully completed. The project tasks or phases are developed from the project goal and specific objectives that inform the WBS or project schedule. Several project management tools exist for scheduling and timeline development. However, the Gantt Chart

is a preference for projects such as an IR that demonstrate a lot of task dependencies (Project Management Institute 2017:217; Schwalbe 2014:100).

2.10.2.4 Developing the IR policy

The IR policy forms a critical aspect of the service definition as it regulates what actions, contents and processes are allowed and what are disallowed or what range of services it will offer its community and what the responsibilities of its stakeholders are (Riddle 2015). The policy is a working guideline carved within the legal framework and governance structure of the institution involved, and extensive consultation and collaboration with the university administration and legal counsel is required to craft the service policy.

Most IR policies start by defining their mission and goals in which their support for open access is affirmed. According to Barton and Waters (2004), the three broad thematic areas that an IR service policy must cover are content, collection and copyright. The content level policies address what types of material to accept into the collection and in what format. The collection level policies address the rubrics of content recruitment and architecture of collections; while copyright policies deal with intellectual property rights, document licensing issues and other rights management procedures in line with industry best practices (Koulouris, Kyriaki-Manessi, Giannakopoulos & Zervos 2013). Other elements of critical importance in the IR policy are the metadata and preservation for long-term persistent access, discovery services, interoperability standards, user privacy and authentication issues and trustworthiness (Da Silva & Borges 2017; Robertson & Borchert 2014; Nagra 2012).

The policy for a new start-up like UHAS should seek to address the known problems of low faculty participation due to mistrust for the quality of content, fear of breach of publisher copyright and complex submission procedures (Dawson & Yang 2016; Armstrong 2014; Giesecke 2011). Clear statements regarding how the repository will deal with publisher and funder policies regarding OA and their right of content distribution must be made. A subscription to Rights METadata for Open archiving (ROME) and JULLIET of Securing a Hybrid Environment for Research Preservation and Access (SHERPA) through API integration (Repanovici & Barsan 2015), for example, will be reassuring to reluctant faculty researchers.

2.10.3 Assembling a team

Critical to the IR success is the calibre of the implementation planning team (IPT). The IR IPT, like any other IT project team, will be made up of persons with diverse backgrounds and expertise – a possible source of conflict (Schwalbe 2014). It is important to carefully select the IPT representatively but also based on competence towards the project at hand. The IPT is the first to be put in place as their functions span the entire planning and implementation process. According to Barton and Waters (2004), the IPT members should have expertise in and responsibility for the following tasks:

- ✓ Administering academic and staff surveys or interviews
- ✓ Conducting a needs assessment
- ✓ Synthesizing the results of surveys
- ✓ Developing your service model
- ✓ Developing a cost model
- ✓ Conducting resource assessments
 - Performing gap analysis
 - Developing requirements document
- ✓ Developing presentations for staff, academics and potential funders

The strength and accuracy of the IPT has a direct impact on the success and respectability of the IR. This is because they have responsibility for staffing, securing senior management support, cost modelling, stakeholder identification and involvement and all the technical details for making the business case and laying down the blueprint for the development of the project.

2.10.4 Technology – choosing and installing software platform

This stage of the IR implementation process is very important because a wrong decision or choice can lead to user apathy and IR failure. The choice of technology depends entirely on the institutional needs that the IR seeks to address as expressed in the repository goal and service scope. In a comparative study of two universities – Virginia Commonwealth University (VCU), which migrated from open-source to a proprietary platform, and Northeastern University, which migrated from a proprietary to open-source platform – by Corbett, Ghaphery, Work and Byrd (2016). The authors found that the decision to migrate to their respective choices of a new repository platform was motivated by local needs; that is, while VCU lacked the skill set to continue maintenance and upgrade of their DSpace instance and therefore chose the quickest way by farming out the responsibility to a commercial vendor, Northeastern University migrated from Innovative Interfaces' Symposia to Digital Commons (a hosted service of Bepress) and finally to their own set-up of Fedora, an open-source platform in order to take absolute control over their digital assets and customization.

For a fresh starter like UHAS, not only should the current community needs be considered in choosing a platform, but also it is important to fully articulate the future goals of the UHAS IR, consider the influence of CARLIGH on member libraries' OA policies and practices, and weigh the financial options for start-up and ongoing support before making a choice. Concerns about interoperability, user-friendly interface and staff skills for implementation and ongoing support must be fully addressed (Makori et al. 2015). A wider environmental scan of academic libraries already running IRs and assessment of available platforms against defined service scope is necessary in the selection of a platform – open-source, proprietary or cloud-hosting. Tzoc's (2016) survey of IR software platforms in undergraduate libraries in the United States identified DSpace as the leading open-source platform with high scalability and having over 1,000 installations worldwide whilst the leading commercial hosted IR platform was Bepress's Digital Commons with more than 300 subscriptions globally as of 2013. Works such as Crow's (2004) comparative analysis of repository software is a good source of knowledge on the features and functionality of the various software platforms available for a selection decision. Simons and Richardson (2013b) also provide details of features and functionality to consider in deciding on the choice of IR software.

2.10.5 Marketing

The main reasons for the identification of stakeholders are for consultation and promotional purposes. Marketing the IR involves consistent communication mechanisms to present the benefits of the IR to the various stakeholder groups: senior management for financial and administrative support, faculty and researchers for content contribution and use, students and other users for their exploitation of the IR as an information resource. Thompson, Akeriwe and Aikins (2016) outline the multiplicity of channels used to market the benefits of the University for Development Studies' IR, UDSspace to their academic community including promotional workshops, flyers, personal visits to faculty, presentations at academic board meetings and the engagement of the Executive Committee and Deans of faculties and schools, circulation of articles on the benefits of UDSspace through the university's mailing system and notice boards, among others. Bossaller and Atiso's (2015) findings on the current IR landscape in Ghana, which shows a lack of understanding of copyright even by librarians, erratic Internet and power supply and scientists' fear of plagiarism present useful insights for UHAS in crafting an IR marketing strategy. Hixson and Cracknell (2007:47) suggest that one sure strategy is to make the IR market itself by populating it with "a critical mass of interesting and attractive content" that, according to Russell and Day (2010), is achieved through early adopters of IR among faculty researchers.

2.10.6 Launching the service

The service launch is an official ceremony and is used as a great opportunity for marketing and promoting the IR through the unveiling of its mission, features, functionality and celebrating key achievements (Barton & Waters 2004). Weenink, Waaijers and Godtsenhoven (2008:86) cite examples of ceremonial launches of IR including conferences at which contributing authors were present. These early adopters are key to the success of IR promotion efforts.

As a marketing tool, the service launch is usually used to demonstrate the benefits and value of the IR as an information resource. Features and functionalities such as registration with OpenDOAR and indexing by Google Scholar for visibility, user-friendly interface, SHERPA/RoMEO API integration for copyright verification, self-archiving procedure, content updates and measures of metrics must be demonstrated to encourage faculty buy-in and participation (Bonilla-Calero 2013). It is also the venue to unveil the name and URL of the IR and introduce the project team to the stakeholders for operational consultations.

2.10.7 Running the service

Running or roll-out of the IR service is going live with contributors and users accessing the IR to deposit and retrieve content. It is the operationalization of the IR and involves the management of the service around its long-term goals of preservation and persistent access. This requires user support services such as help with creating metadata, copyright verification and submission processes (Barton & Waters 2004). The service roll-out must also take cognisance of sustainability issues that require the adoption of a sound business model. The Massachusetts Institute of Technology (MIT) case of DSpace deployment is a good example of establishing a business model for sustainably funding the operations of an IR. In the MIT example, the IR services were divided into core services and premium services where the latter comprised “digitization of print materials, file conversion, and metadata services” for which fees were charged (Baudoin & Branschofsky 2003:40).

2.11 Preservation and persistent access of IR content

Hixson and Cracknell (2007:41) define digital preservation as “a series of managed activities necessary for ensuring both the long-term maintenance of the files and continued accessibility of their contents”. Digital information is stored as strings of binary digit (bit) that are humanly unintelligible. The aim of digital preservation is to make digital objects accessible in the long term and this requires accurate descriptions of the nature and format of these objects for retrievability in the long-term. The descriptive values that are embedded in the digital objects

to aid retrieval are called metadata and Groenewald and Breytenbach (2011) identify six categories of metadata information comprising the traditional categories of preservation and rights management, and the OAIS' further categories of reference information, provenance information, context information and fixity information in compliance with ISO 14721 (Consultative Committee for Space Data Systems 2012). Dublin Core (DC) is the most widely used metadata standard in OA IRs due to its adoption by OAI-PMH protocol (Riley 2017), however, Arlitsch and O'Brien (2012) note that Google Scholar is unable to adequately index repositories that use DC, thus negatively affecting their discoverability on the Web. Chapman, Reynolds and Shreeves (2009) also suggests the integration of other metadata schemas such as Library of Congress' (LC) Metadata Object Description Schema (MODS) and the Visual Resources Association (VRA) Core to overcome the limitations of DC in a multidisciplinary IR environment.

In a study conducted by Boamah, Dorner and Oliver (2012) on the digital preservation of cultural heritage (DPCH) in Ghana, the authors identified a general lack of interest due to negative stakeholder attitudes such as lack of interest in information management, and political interference. The authors also pointed out the conflict of interest between professional bodies such as the Ghana Library Board (GLB) and the Ghana Library Association (GLA), which has resulted in the non-establishment of a national library. Academic libraries in Ghana are, however, self-distinguished. The degree of collaboration between academic and research libraries in Ghana, fostered by CARLIGH, and their commitment to OA looks promising.

2.12 Sustainable funding for IRs

IRs, like other IT infrastructures in public institutions in Ghana, are generally funded by the host institution (Bossaller & Atiso 2015; Amekuedee 2005) or from external sources. Lamptey and Corletey (2011) enumerate the challenges of setting up a repository in Ghana, foremost among which is the lack of funding support to start and maintain the IR. It is clear from the literature on IRs in Ghana that the intervention of CARLIGH and INASP were purely in technical support with setting up IRs and did not extend to real challenges of funding, Internet supply and administrative or policy issues that are critical to IR success (Corletey 2011). The result was that some of these IRs died at birth. It is important, therefore, that a great deal of attention is paid to financial and infrastructural sustainability in deciding on implementing IR in UHAS.

There is a clear need to factor in modalities for the running of IR services into the future at the planning stages for sustainability. Kitchin, Collins and Frost (2015) propose a number of funding sources for the long-term management of OA repositories, including philanthropy and

provision of fee-based value-added services based on the Digital Repository of Ireland (DRI) initiative.

2.13 Measuring repository impact

Statistical reports or metrics are important in providing stakeholders proof that the IR is fulfilling its mission and is worth the investment and continued support. Just like the traditional measures of scholarly impact such as the h-index and journal impact factor in the traditional scholarly communication system (Simons & Richardson 2013a), IRs also have built-in mechanisms for collecting and displaying statistics about their content and usage such as download counts, views and citation. Apart from these platform-specific metrics, other third-party Web-analytics statistical tools exist that report on user behaviour in the repository environment. Google Analytics and Alternative metrics (Altmetrics) are in this category (Bruns & Inefuku 2016). Holmberg (2016) cites two definitions of altmetrics:

“the study and use of scholarly impact measures based on activity in online tools and environment” (Priem 2014:266); and

“web-based metrics for the impact of scholarly material, with an emphasis on social media outlets as sources of data” (Shema, Bar-Ilan & Thelwall 2014:1019).

The above definitions encapsulate all Web 2.0 technologies used to make mention or refer to any scientific research in any online forum and may include common social networks sites such as Facebook and Twitter or academic social network sites like ResearchGate and Mendeley. IR-social media integration is considered relevant to boosting professional collaboration among researchers on the IR platform (Asunka, Chae & Natriello 2011) but Greene (2016) is of the view that repository statistics may not be wholly accurate due to infiltration of Web robots. It is necessary, therefore, to undertake extensive professional consultation and learning around IRs before deciding on which feedback mechanisms to implement as false statistics can also kill researcher interest.

2.14 Conclusion

IRs are central to institutions of higher education and research; and developing economies, in particular, have welcomed them as an avenue to participate in the global OA movement to get their research across to the rest of the world and to benefit from research output and data emanating from the developed world without financial restrictions. Academic libraries globally are spearheading this renaissance in scholarly communication. Even so, without the commensurate shifts in university administration and governance particularly relating to tenure

and promotion issues, faculty participation in IRs will not experience a dramatic boost. Lack of funding, lack of local expertise, erratic power supply and disruptive Internet are well-noted challenges that hinder the establishment of IRs in Ghana and the rest of the developing world. Fortunately, there is a plethora of literature on IRs globally and the experiences of many early adopters provide guidelines to avoid known pitfalls. Access to the Internet is fast becoming a basic human right in Africa and Internet penetration is on a steady increase in Ghana. For IRs to flourish and impact society in more innovative ways, social media tools could be utilized to increase their discoverability and use. This will promote wider communication and access of scientific research by the general citizenry and lay the necessary foundations for economic growth and life improvement through innovation.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Research is about investigating phenomena with the purpose of giving information about what they are, how they are, why they are the way they are and what can be done to alter or improve their state for greater utility. The procedure followed in capturing information consistently on the subject of study, to draw valid and verifiable conclusions is what is known as the research methodology. Singh and Nath (2010:156-7) define research methodology as follows:

- i. “the systematic procedures by which the researcher starts from the initial identification of the problem to its final conclusions”
- ii. “consists of procedures and techniques for conducting a study”
- iii. “involves such general activities as identifying problems, reviewing the literature, formulating hypotheses, procedure for testing hypotheses, measurement, data collection, analysis of data, interpreting results and drawing conclusions”

In other words, research methodology refers to “why a research study has been undertaken, how the research problem has been defined, in what way and why the hypothesis has been formulated, what data have been collected and what particular method has been adopted, why a particular technique of analysing data has been used and a host of similar other questions” (Kothari 2004b:8).

Several authors do recognize the challenge that most researchers have in distinguishing between research methods and research methodology and attempt to define the latter by contrasting it against the former. Clough and Nutbrown (2012:25) suggest looking at “*methods* as being some of the ingredients of research, whilst *methodology* provides the reasons for using a particular research recipe” [emphasis in the original]. According to them, research as a series of activities, theoretical and empirical, is a convoluted mix of constant choices to find concord with the stated problem and field of enquiry in order to produce a claim for significance, and methodology is the indiscrete, invisible factor that holds this network of concordance together:

At the heart of all these interwoven research activities are endless processes of selection; and in constantly justifying this selection, a ‘good methodology’ is more

a *critical design attitude* to be found always at work throughout a study, rather than confined within a brief chapter called 'Methodology'.
(Clough & Nutbrown 2012:39)

Similarly, Perri 6 and Bellamy (2012:9) define method as “the set of techniques recognised by most social scientists as being appropriate for the creation, collection, coding, organisation and analysis of data”. Methodology, according to Perri 6 and Bellamy (2012:1), is “the understanding of how to proceed from the findings of empirical research to make inferences about the truth – or at least the adequacy – of theories”.

It seems, from the literature, that experts vary in their attributions about research methodology, however, each description of the term and concept relates to the choice of a systematic approach for doing research as a whole, and the justification of this choice as it pervades the entire research process. Research methodology, therefore, encapsulates the entire approach and philosophical underpinnings of the choices of tools and techniques in conducting a study. It also includes the researcher’s perspective on the findings. The methodology used by this research is described briefly in this chapter, and can also be traced throughout the research report.

3.2 Research approach

According to Creswell (2014:390), “research approaches are plans and the procedures for research that span the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation.” Several authors indicate that the choice of an approach depends upon the philosophical assumption or worldview of the researcher and the design and methods that fit such assumption (Perri 6 & Bellamy 2012; Creswell 2014; Nieuwenhuis 2016b). However, Burkhardt (2012) and Perri 6 and Bellamy (2012) argue that the philosophical assumption brought to the research should not be an individual’s creed. Rather, it should be determined by the problem at hand. This is similar to Creswell's (2014:36) view that qualitative and quantitative methods should not be regarded as mutually exclusive but instead as “different ends on a continuum”.

According to Creswell (2014) and Ivankova, Creswell and Clark (2016), there are three main approaches to conducting research, namely, qualitative, quantitative and mixed methods approaches, with the qualitative and quantitative methods being the dominant approaches of research practice, each having its own strengths and weaknesses. Qualitative approaches are subjective in nature and are people-focused, attempting to understand the meanings that individuals attach to the phenomena being investigated. This may result in collecting diverse

opinions on the same subject matter. Qualitative approaches are as “naturalistic” and complex as people are and so aligns with the constructivist philosophical worldview (Nieuwenhuis 2016b:53). Constructivism is the assumption that individuals create their own meanings based on experience and that context and culture are intrinsic to these ideational constructs and hence the construction of an abstract position or definition in representing a phenomenon will be impossible (Creswell 2014:42). Quantitative research, on the other hand, aligns with post-positivism, which construes knowledge as consisting of discrete units of facts that are measurable against objective constructs in reality and so begins with established theories and performs tests on field data (variables) to determine patterns that support or prove the chosen theory wrong (Creswell 2014:40).

Perhaps the simplest distinction often made between qualitative and quantitative research methods is the data types each utilizes and the extent to which results can be generalized to the wider spectrum of the population. Qualitative research often thrives on textual data and it is focused on idiographic descriptions of phenomena that cannot be generalized to an entire population whereas quantitative research thrives on numerical data drawn from measurable variables that can be generalized to an entire population providing that the sample is large enough (Flick, Kvale, Angrosino, Barbour, Banks, Gibbs & Rapley 2007; Nieuwenhuis 2016c). Table 2 provides granular details of differences between qualitative and quantitative research. The comparison also reveals the strengths and weaknesses of each approach. Yilmaz's (2013:314) comparison is analysed based on what he describes as the “four essential elements of the research process: epistemology, theoretical perspectives, methodology, and methods”. According to him, qualitative research operates within the “naturalistic paradigm” whilst quantitative research is addressed to the positivist “paradigm” (Yilmaz 2013:323).

Table 2 combines the comparisons of Yilmaz (2013) and Braun and Clarke (2013) for a more enhanced understanding of the variables of comparison. Braun and Clarke's (2013) are matched against Yilmaz's (2013) statements and appended to the latter in square brackets with superscript numbering. Consequently, Braun and Clarke's (2013) variables (statements) are used to extend the meanings of Yilmaz's (2013) variables (statements). The superscript numbering is used to avoid repeated use of full textual descriptions where the meanings are recurrent.

Table 2: Differences between qualitative and quantitative research

Assumption	
Reality is single, tangible, and fragmentable. Social facts have an objective reality. ⁶	Realities are multiple, constructed, and holistic. Reality is socially constructed. ⁶
Knower and known are independent, a dualism. ⁶	Knower and known are interactive, inseparable. ⁶
Primacy of method. ⁷	Primacy of subject matter. ⁷
Variables can be identified and relationships measured. ²	Variables are complex, interwoven, and difficult to measure. ²
Inquiry is objective, value-free. ⁶	Inquiry is subjective, value-bound. ⁶
Purposes	
Generalisability (Time and context free generalisations through nomothetic or generalised statements) [Seeks to identify relationships between variables, to explain or predict – with the aim of generalising the findings to a wider population ²]	Contextualisation (Only time and context bound working hypotheses through idiographic statements) [Seeks to understand and interpret more local meanings; recognises data as gathered in a context; <i>sometimes</i> produces knowledge that contributes to more general understandings ²]
Prediction. ²	Interpretation. ²
Causal explanations. ²	Understanding actors' perspectives. ²
Approach	
Begins with hypotheses and theories [Has a fixed method (harder to change focus once data collection has begun) ⁷].	Ends with hypotheses or grounded theory [Method is less fixed (can accommodate a shift in focus in the same study) ⁷].
Manipulation and control. ⁷	Emergence and portrayal. ⁷
Uses formal, structured instruments [Can be completed quickly ⁸].	Researcher as the instrument [Tends to take longer to complete because it is interpretative and there is no formula].
Experimentation and intervention [Tends to be theory-testing, and deductive ⁵].	Naturalistic or non-intervention [Tends to be theory generating, and inductive (working <i>up</i> from the data) ⁵].
Deductive. ⁵	Inductive. ⁵
Component analysis. ⁴	Searches for patterns. ⁴
Seeks consensus, the norm [Seeks consensus, norms, or general patterns; often aims to reduce diversity of responses to an average response ⁴].	Seeks pluralism, complexity [Tends to seek patterns, but accommodates and explores difference and divergence within data ⁴].
Reduces data to numerical indices [Numbers used as data ¹].	Makes minor use of numerical indices [Words – written and spoken language – (and images) used as data ¹].
Abstract language in write-up [Generates 'shallow' but broad data – not a lot of complex detail obtained from each participant, but lots of participants take part (to generate the necessary statistical power) ³].	Descriptive write-up [Generates 'narrow' but rich data , ' thick descriptions ' – detailed and complex accounts from each participant; not many take part ³].
Researcher Role	
Detachment and impartiality [Values detachment and impartiality (objectivity) ⁶].	Personal involvement and partiality [Values personal involvement and partiality (subjectivity, reflexivity) ⁶].
Objective portrayal. ⁶	Empathic understanding ⁶ .
Etic (outsider's point of view) ⁶ .	Emic (insider's point of view) ⁶ .

Source: (Yilmaz 2013; Braun & Clarke 2013) [All emphases are in the original]

Each line of comparison in the table demonstrates the shortcoming of one approach where the other has a strength. These have been worked into what Rahman (2017) labels as advantages and disadvantages of each approach. It shows how knowledge is created through

the fusion of the world views and their strategies for recognizing and verifying truth. This buttresses the argument of Creswell (2014:36) that both qualitative and quantitative approaches are necessary for understanding the world and should not be regarded as polar opposites, but as “different ends on a continuum”. This further crystalizes the argument for neutrality advanced by Perri 6 and Bellamy (2012) as articulated by Burkhardt (2012) that, in order to conduct trustworthy research, researchers must avoid seeing themselves as epitomes of a particular philosophical worldview but determine which research approach – combination of worldview, methodology or design and method – best accomplishes the task at hand.

The mixed methods approach is the combination of qualitative and quantitative worldviews and data collection techniques with the expectation that the synergized results will lead to a more holistic knowledge or understanding of the problem being studied (Creswell 2014; Ivankova et al. 2016).

Considering the plethora of definitions of the research approaches in terms of features and purposes, this study fits a qualitative research, that is to say that it is oriented towards understanding complex semantic constructs of individuals’ experiences with the phenomenon of study (Ivankova et al. 2016:309). This is because the research is aimed at extracting the opinions and perspectives of people (administrators and faculty) in their own environment (the cultural setting of UHAS) on a phenomenon (an IR) in order to determine, based on their experiences and meanings attributed to the IR, the feasibility of establishing an IR. Qualitative research, again, is considered,

“an emergent, inductive, interpretive and naturalistic approach to the study of people, cases, phenomena, social situations and processes in their natural settings in order to reveal in descriptive terms the meanings that people attach to their experiences of the world” (Yilmaz 2013:312).

As previously noted, each approach to research comes with its own appropriate methods or research design and techniques to allow the researcher to arrive at dependable conclusions. Therefore, to conduct sound research, the choice of approach should entirely be based on appropriateness to the problem being studied (Silverman 2013).

3.2.1 Research design

According to Nieuwenhuis (2016c:72), “a research design is a plan or strategy that moves from the underlying philosophical assumptions to specifying the selection of participants, the data-gathering methods to be used and the data-analysis to be done”. Similar to the research approach, which is the parent framework for the research design, the selection of a research

design must be based on its suitability to the purposes of the study, which are framed by the problem of the study. It must also be contingent upon the type of data to be extracted and the level of credibility of results envisaged. Nieuwenhuis (2016c:72-74) advances a five-prong model for planning the choice of research design that includes (1) the research questions, (2) the goals or aims of the study, (3) the conceptual framework of the study, (4) the methods, and (5) the validity of the study.

This study utilizes the case study design. A case study is an “empirical inquiry about a contemporary phenomenon, set within its real-world context – especially when the boundaries between phenomenon and context are not clearly evident” (Yin 2009:18 as cited in Nieuwenhuis 2016c:81). According to Shoaib and Mujtaba (2016:84), a case study “emphasizes on thick descriptions, which means not just describing people, events, and places, but also interpretations of those who are most knowledgeable”. This study sought to elicit the views of key stakeholders of a proposed IR within the institutional landscape of UHAS. Their attitudes and value judgment were deemed central to the success and sustainability of an IR initiative due to their influence over resources, and extensive research publication knowledge and practice.

The case study design is consistent with the research approach and objectives. The study was contextualized and took cognizance of organizational culture and other ideas and factors that may influence the adoption and use of an IR at UHAS. The study harmonized the idiosyncratic perspectives of its participants to draw conclusions on the feasibility of establishing a trustworthy IR at UHAS.

3.2.2 Research sites

A research site is the physical geographical precincts within which the study is carried out (Maree 2016). The site for this study was the University of Health and Allied Sciences (UHAS), located at Sokode near Ho with satellite campuses in Ho and Hohoe municipalities in the Volta Region of the Republic of Ghana. UHAS is a public university established by an Act of Parliament (Act 828, 2011) to provide professional training in the medical and allied health sciences to Ghanaian and international citizens with a focus on community service (University of Health and Allied Sciences 2012). The university currently has six schools, one institute, and seven administrative directorates. The schools comprise the schools of:

1. Medicine;
2. Basic and Biomedical Sciences;
3. Allied Health Sciences;
4. Nursing and Midwifery;

5. Pharmacy; and
6. Public Health.

The only institute at the moment is the Institute of Health Research. The directorates consist of:

1. Academic Affairs;
2. Finance;
3. Library;
4. Information and Communications Technology (ICT);
5. Internal Audit;
6. International Programmes; and
7. Works and Physical Development.

3.2.3 Target population and sampling

Asiamah, Mensah and Oteng-Abayie (2017:1607) define population as a “group of individuals having one or more characteristics of interest” (Asiamah, Mensah & Oteng-Abayie 2017:1607) and differentiate general, target and accessible populations. The general population is the “largest group of potential participants of a qualitative study” drawn based on the essential elements of the study that include the phenomenon being studied, study purpose, context or research site and study design, and the potential participants’ connection to these (Asiamah, Mensah & Oteng-Abayie 2017:1610). The target population, according to Asiamah, Mensah and Oteng-Abayie (2017:1612), is a refined subset of the general population and consists of “individuals or participants with the specific attributes of interest and relevance (i.e. containing no attribute that controverts a research assumption, context or goal)”. The accessible population is a further refinement of the target population by the elimination of members who are either unwilling or unavailable to participate. Otherwise known as the sampling frame, it is the “final group of participants from which data is collected by surveying either all its members or a sample drawn from it” (Asiamah, Mensah & Oteng-Abayie 2017:1613). Critical to the determination of the target and accessible populations, however, is a clear definition of the criteria for participant selection.

3.2.3.1 General population

The general population of the study is the entire membership of the UHAS community consisting of all 660 employees (staff) and 3,072 students. These make up a total of 3,732 people.

3.2.3.2 Target population

The phenomenon being studied (the implementation of an IR) and the rationale for carrying out the study (to determine the prevalence of critical success factors (CSF) for the establishment of an IR) would not permit all 3,732 members of the UHAS community to participate. This is because many, including the janitorial staff, security personnel, administrative and technical support staff, by their job descriptions, have no direct role or influence over any aspect of the IR process. It is necessary at this point to recapitulate the CSF for IR implementation and also state the participant selection criteria to assist in extracting the target population from the general population.

The CSF for IR implementation as presented in section 2.8 include:

1. **Executive support:** the support of senior management of the university who control the allocation of resources. Their acceptance of the project initiative and financial support for the initial set up and continuing maintenance of the IR is critical for its success and sustainability.
2. **User acceptance and support:** this is a broad category that includes faculty researchers who would contribute content as well as other community members who would use the contents of the IR. The support of faculty as authors or as users is necessary for a strong business case and for successful implementation. Acceptance and use are necessary to ensure value for money.
3. **Organizational culture:** managing the process of change is a critical area for IR success. As an IT project, the IR will impose new requirements for learning and digital participation on faculty. It will also alter the current practice of research dissemination at UHAS. Current practices that members of the UHAS community, particularly faculty, are used to can affect the success of the IR.
4. **Resources:** financial, human and infrastructural support are key to the success of the IR. Technical infrastructure, including Internet and IR-specific technologies (hardware/software) such as servers, repository software and staff skills set to set up and maintain the IR, and the availability of these resources or otherwise has a huge impact on implementation success.
5. **IR policy:** as the regulatory framework for all IR processes, the IR must be institutionally defined and, as a service, it must encompass activities that provide tangible benefits to all stakeholders and the institution. The IR policy, therefore, must be an embodiment of the aspirations of the UHAS community. In addition, the policy provides the roadmap for ensuring integrity and trustworthiness of the IR.

6. **IR marketing and promotion:** awareness creation and sensitization efforts must pervade the entire IR implementation process. It is the only strategy by which stakeholder buy-in can be secured.

Based on the above CSF, two key criteria for target population selection were developed, namely:

1. The participant must be a member of senior management (Director or Deputy Director of a Department or senior member with many years of experience in that position) who forms part of the university decision-making body and one who has influence over finance or other technical infrastructure and services relevant to the establishment of IR.
2. The participant must be a faculty member or researcher (who are, by their rank, required to publish for tenure and promotion considerations).

Any member who falls into either category was, by default, a member of the target population. For this reason, all students and staff who are neither decision makers nor potential content contributors were eliminated. This left the target population at the total of 327 people.

3.2.3.3 Accessible population

Determining the accessible population for this study was not based entirely on the willingness or availability of participants in the target group as suggested by Asiamah, Mensah and Oteng-Abayie (2017:1613) but on the expected outcomes of the interaction with them. As a qualitative case-study, the aim was to elicit the most accurate and in-depth responses to the questions about the phenomenon by interviewing fewer yet most qualified participants who could provide extensive and accurate data based on their knowledge and experience with the phenomenon (Baškarada 2014; Nieuwenhuis 2016c). The focus, therefore, was on traditional business units of the university whose job functions and interactions within the cultural space of the organization were perceived to directly affect the IR, and on participants who were perceived to have an influence on other members of the sub-unit. This was done to ensure representativeness (Silverman 2013). For that purpose, all units that were not directly relevant to the IR implementation decision such as the Works and Physical Development Directorate, and faculty members who do not have extensive publishing experience and involvement with OA repositories were skipped, thus reducing the sample size to 35 potential participants. It is critical to note here that determining the sample space or accessible population in this case was not mutually exclusive of the sampling procedure as the criteria for participant selection were intertwined.

3.2.3.4 Sampling procedure and sample

Sampling, according to Laake, Benestad and Olsen (2015:334), “refers to processes aiming to identify and recruit study participants who are representative of a larger population in a statistical sense”. The Australian Bureau of Statistics (2013) defines a sample as “a subset of units in a population, selected to represent all units in a population of interest”. Representativeness, as implied in these definitions, presupposes that sampling is aimed at generalizing results to an entire population. This skews the definition in favour of quantitative inquiry. However, holding that generalization of qualitative research findings is to theory rather than population, Silverman (2013) posits that sampling in qualitative research is theoretical or purposive rather than random or statistical. Theoretical sampling, according to Baškarada (2014) and Shoaib and Mujtaba (2016), is guided by the need to gain deeper insight from a case to check the congruity or otherwise of empirical findings with the underlying research theory, rather than to build statistical evidence. Rahman (2017) argues that pursuing statistically large samples might trap researchers into losing sight of the contextual impact of the individual’s rich experiences. Probabilistic sampling techniques are, therefore, not suitable for qualitative studies.

Cherry (2017) defines qualitative (non-probabilistic) sampling as “selecting participants using methods that do not give every individual in a population an equal chance of being chosen”, and identifies three main types of qualitative sampling, namely convenience, purposive and quota sampling. Etikan, Musa and Alkassim (2016:2) define convenience sampling as “a type of non-probability or non-random sampling where members of the target population that meet certain practical criteria, such as easy accessibility, geographical proximity, availability at a given time, or the willingness to participate are included for the purpose of the study”. Purposive sampling is defined as “the deliberate choice of a participant due to the qualities the participant possesses” (Etikan et al. 2016:2). Quota sampling, on the other hand, is the qualitative counterpart of stratified random sampling and involves dividing the target population into sub-groups and allocating to each sub-group a percentage or proportion of subjects to be interviewed based on the purpose of the inquiry (Battaglia 2011). Snowball sampling is also mentioned by Best (2012) and Trotter (2012), and which Rosenthal (2016) classifies as a sub-category under purposive sampling. It involves selecting a few reachable subjects that fit the purpose of the qualitative inquiry and then enlisting their support to locate other subjects of equal or similar potential or experience who would otherwise be unreachable by the researcher or anyone outside the particular network of those individuals.

The value that qualitative approaches introduce to research is their ability to unearth subjects' deep feelings about a phenomenon and rely on a multiplicity of views from such adept individuals to draw conclusions about the relationships among subjects and the phenomenon. In terms of surface area, therefore, qualitative research is concerned with depth and so it is narrow in scope of coverage whereas quantitative research deals with breadth and only excavates shallow generic facts that cut across the wider spectrum of the subject population, which may not reflect the true meanings or values that individual units attribute to the phenomenon.

The qualitative research literature almost unanimously supports the choice of purposive sampling as the most suitable strategy for case-study designs using the interview technique for data collection (Creswell 2009; Onwuegbuzie & Leech 2007; Wanjohi 2012; Best 2012; Creswell 2014; Silverman 2013; Nieuwenhuis 2016c). This is because it allows the researcher to use his knowledge of the phenomenon being studied and the purpose of the research in order to judge or decide whom to include in a small sample size that would produce information-rich responses due to their extensive knowledge and experience of the phenomenon (Yilmaz 2013). This study is purely qualitative and was guided by the central research question, which sought to establish the factors critical for the implementation of a trusted digital repository in UHAS.

Curtis, Gesler, Smith and Washburn's (2000:1003) six purposive sampling criteria as cited in Nieuwenhuis (2016c:85) were dutifully followed in selecting the sample for this study. The criteria included:

1. The sampling strategy should be relevant to the conceptual framework and the research questions addressed by the research.
2. The sample should be likely to generate rich information on the type of phenomena which needs to be studied.
3. The sample should enhance the transferability of the findings.
4. The sample should produce credible descriptions/explanations (in the sense of being true to real life).
5. The sample should take ethical preconditions (such as vulnerability, informed consent, etc.) into consideration.
6. The sampling should be feasible in terms of money and time, and practical issues of accessibility have to be considered.

Having first established the conceptual frame of IR CSF during the literature review (sections 2.7 and 2.8), it became obvious that this study could only use the stratified purposive sampling technique to recruit participants. Stratified purposive sampling, according to Nieuwenhuis

(2016c:86), is a combined non-probability sampling approach that employs participant sub-groups that possess different sets of influence on a phenomenon allowing results from these sub-groups to be compared.

In determining the sample size (accessible population), therefore, consideration was given to members of the target population (section 3.2.3.2) that reflected the key CSF. Accordingly, two strata - decision makers (senior management) and content providers (faculty researchers) - were created and a sample size of ten (10) participants made up of five (5) decision makers and five (5) content providers was decided on.

The sample size for this study was a culmination of the interplay of many factors that included the research objectives, the theoretical options for qualitative sample size determination and the qualitative data interpretation approach adopted. Creswell (2014:319) recommends a sample size of three to ten for phenomenology and four to five for a case-study. This study employs the case study design and the interpretative phenomenological analysis for data interpretation, which, combined with the “criterion of inclusion (criterion-i)” (Palinkas, Horwitz, Green, Wisdom, Duan & Hoagwood 2015:537) adopted, made the sample size of ten (10) appropriate and sufficient to achieve “data saturation” (Nieuwenhuis 2016c:84) in the context of UHAS.

Sampling the decision makers sub-group was quite straight-forward as it was mainly based on their influence on key resources, relevant to the establishment of IR. The resources factor (section 3.2.3.2) pointed to which directorates to include, that is, Finance, Human Resource, Library and ICT. Sampling for the faculty sub-group, who are the content providers (user acceptance and support factor), was, however, complex. Faculty profiles on the university website were first analysed to determine the number of publications each had and whether they published in OA journals or repositories. This was followed by personal interactions with other faculty members and non-faculty senior members for their recommendations on the most qualified faculty members to be recruited as the study participants. The snowball sampling technique was unintended but emerged during the course of interviews when some participants recommended others to be recruited to participate in the study due to the relevance of their professional background and experience to the study.

3.2.4 Data collection techniques

There are many data collection methods available to the qualitative research approach. Nieuwenhuis (2016c:88-95) identifies four major data collection techniques that are frequently used by qualitative researchers. These include document review (text data), observation,

interview and focus groups. Document review is basically the consultation and analysis of documentary evidence on the phenomenon under investigation in a way similar to interrogating human subjects about the phenomenon in its context. When using the observation technique, the researcher assumes full responsibility for recording and assigning meaning to apparent patterns of behaviour without directly interrogating the primary subjects of his/her research setting. Interviews are conversational and entail questions by the researcher/investigator and responses to those questions by the participant. Probes and prompts are often used in certain types of interview to guide responses as well as elicit deeper meanings and value judgment from participants. Focus groups are similar to interviews but are administered in a group setting. Unlike interviews, however, the researcher moderates discussions and arguments that are generated amongst participants on topics raised and participants do not address the researcher/moderator in a direct answer to any question.

These techniques have their comparative strengths and weaknesses, and the choice of a technique depends on the type of data the researcher seeks to gather from participants as well as its suitability to the research design implemented. Creswell (2014:320) presents an overview of the strengths and weaknesses of some of these qualitative data collection methods.

With its case-study design, “focused on a contemporary phenomenon [such as an IR] within a real-life context [such as UHAS]” (Baškarada 2014:3), this study used the semi-structured interview technique to extract data from its purposively sampled subjects. The semi-structured interview method allowed the researcher to focus the responses of the participants by pre-formulating the questions that are mostly in an open-ended format (Nieuwenhuis 2016d) and to use probes and prompts to elicit full information on the phenomenon (Best 2012).

Other forms of interviewing are available for qualitative data collection, namely unstructured and structured interviews. Described by Best (2012) based on Kvale and Brinkmann's (2009) metaphors as traveller and miner interviews respectively, the unstructured interview is iterative and in-depth, making use of open-ended questions and is paradigmatically constructivist whilst the structured interview, similar to a survey, is positivist in paradigm and utilizes closed ended questions, giving respondents strict options to choose among predetermined answers. Neither the unstructured interview, which is discursive, participant-led, iterative and ethnographic in nature (Nieuwenhuis 2016c:93), nor the structured interview, which is interviewer-controlled and focused on confirmatory a priori theory testing (Laake et al. 2015:342) was deemed appropriate for this study.

3.3 Data collection instruments/tools

The research literature makes little distinction between data collection techniques and data collection instruments or tools. The difficulty in distinguishing between the two becomes more apparent in qualitative research. For example, whilst Zohrabi (2013) uses the term instruments to refer to questionnaires, observations and interviews, Nieuwenhuis (2016c) uses the term methods to refer collectively to them. Perry's (2005) "Green Curry Chicken" analogy is a masterpiece of an attempt to distinguish the confusing terminologies. Also, Best (2012), in trying to distinguish in-depth interviews, inadvertently sheds light on the nuanced differences between interview techniques and instruments/tools for qualitative data collection. According to him, the in-depth interview uses an interview guide rather than an interview schedule. An interview schedule is defined as "a list of questions formulated and presented with the specific purpose of testing an assumption or hypothesis" (Pandey & Pandey 2015:62). An interview guide, on the other hand, is any written code intelligible to the interviewer, which is meant to assist him or her to "direct the conversation toward the topics and issues they want to learn about" (Kennedy 2006). Implicit in this definition is that the interview guide is only a memory device to assist the interviewer in keeping track of a rather loose conversation intended to unearth the interviewee's deep feelings and it is not a list of pre-formulated questions directly asked to the participant for their answers to be recorded by the interviewer. This way, the two can clearly be distinguished as tools for the interview technique of qualitative data collection. The interview schedule is more suitable for structured and semi-structured interviews whilst the interview guide is fit for the unstructured interview.

This study, which used the semi-structured interview technique, therefore deployed the interview schedule instrument for data gathering. Unlike the structured interview, however, the interview schedules used for this study made use of mostly open-ended questions that elicited participants' true knowledge and experiences about the IR phenomenon. Two separate interview schedules (Appendix 1) were designed and administered to the study participants based on their perceived stakes in the IR implementation. Two broad stakeholder sub-groups targeted by this study were senior administrators (decision makers) and faculty researchers (content providers) who were considered as opposite ends of the same continuum and whose actions and attitudes were thought to directly impact the success of the IR project. Although many questions were the same on both schedules, a few questions were mutually exclusive to the two schedules due to the perceived roles of the stakeholder sub-groups in the IR implementation process.

3.4 Data analysis/interpretation

Analysing qualitative data can take various forms against the backdrop that “the intent is to allow information to be collected to emerge from participants in the project” (Creswell 2014:53). Some general approaches to qualitative data analysis that resonate across the qualitative research literature include content analysis, constant comparative analysis, narrative analysis, discourse analysis, phenomenological analysis, ethnographic analysis and grounded theory (Nieuwenhuis 2016b; Petty, Thomson & Stew 2012; Schutt 2012; Thorne 2000). These different approaches to data analysis share many characteristics in common and sometimes overlap or are used collaboratively rather than in mutual exclusivity to arrive at dependable conclusions. This is because qualitative data tend to be fluid, iterative and intertwined with the analysis processes and can influence and be influenced by the choice of data analysis strategy (Nieuwenhuis 2016b; Thorne 2000).

As a case-study research, the focus of this study is on contextualized idiographic meanings of the phenomenon to the participants, and it is aimed at extracting details of personal experience (Biggerstaff & Thompson 2008; Kavoura & Bitsani 2014). The main data analysis strategy adopted, therefore, was the interpretative phenomenological approach. The choice of interpretative phenomenological analysis (IPA) is based on the research questions and objectives, the study design and expected outcomes of exploring the meanings that individual stakeholders in the UHAS community attach to their experience of IRs, based upon which the data collection instrument of semi-structured interview schedules have also been designed (Thompson & Larkin 2012). Petty et al. (2012) identify two types of phenomenological analysis, namely hermeneutical (explanatory) phenomenology and transcendental (descriptive) phenomenology. Interpretative phenomenological analysis (IPA) combines the strengths of hermeneutics and transcendence in phenomenology (lived experiences) to produce vivid descriptions; and it is the researcher’s interpretations of these descriptions that shape the insight of the research consumer into the phenomenon of study through immersion (Pietkiewicz & Smith 2012).

A set of six (6) a priori themes on the critical success factors (CSF) for institutional repository (IR) implementation, which were generated from the results of five (5) studies during literature review (section 2.8), were set aside as the gold standard to guide data extraction from interview transcripts. A structural coding method was used to develop themes that were aligned to the research questions and objectives. The structural coding method was deemed most suitable for the semi-structured interview technique employed in this study (Saldaña 2013). The researcher used open coding techniques to establish the thematic structure of emergent codes. Open coding involves meticulously reading each interview transcript and

assigning phrases that most accurately capture the salient ideas expressed in the participants' shared opinions (Nieuwenhuis 2016b:116). This meticulous and iterative process often resulted in simultaneous coding, "the application of two or more different codes to a single qualitative datum" (Saldaña 2013:80). This was naturally expected as qualitative data are usually complex, indiscrete and cross-cutting.

Content analysis was carried out on interview transcripts using colour codes (Best 2012). This was done to map out emerging unique concepts and trends from interviewees' responses in order to create general themes portrayed by the units of analysis. A theme is "a statement of meaning that runs through all or most of the pertinent data or one in the minority that carries heavy emotional or factual impact" (Kavoura & Bitsani 2014:546). The themes are drawn upon and discussed after the detailed idiographic descriptions of personal knowledge and experiences of the phenomenon of interest by the study participants. This thematic analysis is enhanced by the author's interpretation of responses in the light of the study's goal and research questions to draw valid and relevant conclusions. The IPA process of combining depth of description and interpretation of lived experiences using a small sample to explore complex phenomena (Smith & Osborn 2015; Pietkiewicz & Smith 2012) made it most suitable for a single case-study research (Thompson & Larkin 2012) such as this one.

The following 8-prong analytical strategy by Smith, Flowers and Larkin (2009:79-80) as described with emphasis by Thompson and Larkin (2012:105) was followed in doing the analysis of data:

1. Close, line-by-line analysis (i.e., *coding*) of the experiential claims, concerns and understandings of each participant (see e.g., Larkin et al., 2006).
2. Identification of the emergent patterns (i.e., *themes*) within this experiential material emphasizing both convergence and divergence, commonality and nuance (see e.g., Eatough & Smith, 2008); usually first for single cases, and then subsequently across multiple cases.
3. Development of a 'dialogue' between the researchers, their coded data and their psychological knowledge, about what it might mean for participants to have these concerns in this context (see e.g., Larkin et al., 2006; Smith, 2004), leading in turn to the development of a more *interpretative account*.
4. Development of a *structure*, frame or *gestalt* which illustrates the relationships between themes.
5. *Organization* of all of this material in a format that allows for coded data to be traced right through the analysis – from initial codes on the transcript, through initial clustering and thematic development, into the final structure of themes.

6. Use of *supervision or collaboration, to audit*, to help test and develop the coherence and plausibility of the interpretation and explore reflexivity.
7. Development of a *narrative*, evidenced by detailed commentary on data extracts, which takes the reader through this interpretation, usually theme-by-theme, and often supported by some form of *visual guide* (simple heuristic diagram or table).
8. *Reflection* on one's own perceptions, conceptions and processes should occur throughout the process and is usually captured in a systematic fashion by keeping a reflexive journal (see e.g., Smith, 2007).

[All emphases and citations are in the original]

After an iterative application of the above strategy using the open coding technique, nine (9) major themes emerged from this study of which six (6) perfectly aligned with the a priori themes, the gold standard (see section 2.8) and three (3) were surprise themes. The themes are as below:

1. Executive support;
2. User acceptance and support;
3. IR policy;
4. Resources;
5. IR marketing and promotion;
6. Organizational culture;
7. Stakeholder perceptions of an IR;
8. Researcher motivation; and
9. The Library as an agent of change.

3.4.1 Making numerical sense of the qualitative findings

The general prosaic nature of qualitative data often leaves research audiences lost in the massive amounts of primary data. This makes the understanding of the findings a task as readers have to memorise storylines and struggle to embed in the researcher's worldview to appreciate the results. It is thought that the quantification of qualitative data at meta-aggregative levels has the capability of providing deeper insight into qualitative phenomena. Such an approach often thrives on multidisciplinary learning in order to provide richer understanding (Robertson, O'Grady, Barton, Galloway, Emmanuel-Yusuf, Leach, Hammond, Thomson & Foxon 2017:294). It was necessary, therefore, to adapt tools and strategies that could bridge the quality-quantity gap so as to provide an easy-to-grasp numerical summary of the findings of this qualitative research. The role of the numerical summary in this study is purely complementary (Maxwell 2010) and it is not meant to be construed as an application of quantitative methods or as qualifying this study as a mixed methods research.

3.4.1.1 The community scorecard approach

The community scorecard, or simply scorecard, is one common assessment tool applied to measure local government performance. It is a highly contextualized framework of qualitative and quantitative indicators that allow a local population to conduct social audits on the performance of its duty-bearers (Da Cruz & Marques 2014:167). As a social accountability mechanism and tool, scorecards are best for the extraction of expert opinion and in promoting ownership of the assessment process and the phenomenon that forms the basis of the assessment process (Blake et al. 2016:372). This study adopted the social accountability mechanism of the community scorecard to summarize its findings numerically due to its capability of use in quantifying qualitative data. Its highly contextualized nature also makes it suitable for use with the case study research design adopted by this study. In this study, the IR implementation critical success factors (CSF) that emerged from the interview data are used as the qualitative indicators and the opinions expressed by the study participants on each of these IR CSF inspire the score (numerical value) assigned to each indicator. The adoption of the scorecard approach in this study was intended to assess the prevalence of the critical success factor for IR implementation as a measure of feasibility.

3.4.1.2 Scoring scale

The major themes and sub-themes that constituted the qualitative indicators or assessment areas have been listed in detail and scored 0 – 1, where 0 (0%) means the scored item is lacking in UHAS, 0.5 (50%) means there is a presence of the CSF to a certain degree but not sufficient enough to predict IR implementation success, and 1 (100%) denotes the scored item has adequate presence in UHAS and will lead to IR implementation success. A column of remarks was also created to give the motivation for each score.

3.4.1.3 Scoring procedure

The 0 – 1 scale was applied at the primary level, that is, only to the most basic elements under each of the nine (9) themes. Scores of superordinate themes are averages of their primary sub-category scores. Described as the overall readiness score, the measure of success of future IR implementation at UHAS was to be the average of the scores of the nine (9) theme constructs. However, to ensure accuracy of the numerical representation of the qualitative findings, reference was made to the literature on IR CSF to confirm the level of importance accorded each factor that emerged from the empirical data. From the literature, it became apparent that a weighted mean would most appropriately represent the findings numerically.

3.4.1.4 Assigning numerical weights to the themes

Weights were assigned to the themes based on the levels of importance or priority accorded them in the IR CSF literature, as well as the emphasis of their relevance by participants as observed from the interview data. These were expressed as percentages. The distribution of weights was, therefore, done in consonance with the generally reported priorities of IT/IR project CSF in the literature (see section 2.7), which places executive support first in order of importance, followed by faculty attitudes or user acceptance and support, among others. These, combined with the emphasis placed on the CSF by the study participants as deducible from the interview data were considered in determining the allocation of weights to the CSF indicators. The weights are displayed in Table 3 below.

Table 3: Weights of themes

THEME	WEIGHT IN PERCENTAGE	WEIGHT ON 0 – 1 SCALE
Executive support	30%	0.30
IR policy	5%	0.05
Organizational culture	10%	0.10
Researcher motivation	20%	0.20
Resources	5%	0.05
Stakeholder perceptions of an IR	5%	0.05
IR marketing and promotion	5%	0.05
User acceptance and support	15%	0.15
The Library as an agent of change	5%	0.05
	100%	1.00

3.4.2 Criticism of the IPA

One major criticism against the IPA is that, as a hermeneutical approach in which the researcher's knowledge and experience of the cultural contexts of participants are paramount in the interpretation of ideographical meanings and themes, bracketing (Petty et al. 2012), which is the researcher's neutrality, cannot be achieved. The concept of the researcher as an instrument for data collection, which is a major suspect of bias, however, is a general concern

for all forms of qualitative research (Atieno 2009; Schutt 2012). Clear guidelines of ensuring data validity and reliability are given in the qualitative literature. Creswell (2014) and Kavoura and Bitsani (2014) suggest reflexivity. This means documenting the role of the researcher in data collection and analysis, as well as ensuring a full disclosure of the researcher's interaction with participants on the field and his/her immersion in data to reflect the honest opinions of participants (Schutt 2012).

3.5 Validity and reliability

The validity and reliability of research findings from data analysis are measures of how representative research findings are of real world truths about the phenomenon studied, and how consistent the chosen design and method are with the research question to produce a trustworthy conclusion (Zohrabi 2013). According to Nieuwenhuis (2016b:123-124), qualitative researchers prefer the terminologies credibility and dependability for validity and reliability respectively. According to Creswell (2014:331), validity is the convergence of the researcher, the study participants and the research consumers about the accuracy or congruence of findings with the truth in the world. In other words, all these stakeholders must find the research findings reflective of their own experiential knowledge about the phenomenon to hold the findings as valid. Reliability means that the research design and methods used are appropriate to the research question and objectives such that other researchers can replicate the study in their exclusive contexts and expect consistent results (Nieuwenhuis 2016b; Creswell 2014).

To ensure the trustworthiness of the findings of this research, three of Creswell's (2014:331) strategies were adopted, namely: "use of member checking", "use of rich, thick description" and "reflexivity". Verbatim interview transcripts were taken back to participants for correction to ensure that data captured was accurately transcribed and represented the exact responses of the participants. Data analysis also involved thick descriptions of individual responses to draw deep insights into the particular meanings ascribed to the phenomenon by the participants based on their lived experiences within the university culture in Ghana. These descriptions gave equal coverage to minor issues that emerged beyond the general themes that aligned with the IR literature (Creswell 2014). Finally, the researcher gave an honest account of the influence of his personal experience and knowledge about IRs in university contexts and the UHAS sub-culture on his interpretations of the idiographic descriptions of the participants' experiences.

The purpose of taking these measures to ensure the trustworthiness of results was to ensure their transferability (Nieuwenhuis 2016b:124) and replicability (Creswell 2014:332) as the aim

of qualitative research is not to generalize to a larger population of individuals but to explore rich context-specific meanings of individual experiences (Petty et al. 2012).

3.5 Limitations of the methodology

The constraints experienced during this research confirmed the limitations of qualitative study documented in the general research literature: time-consuming data collection processes and a labour-intensive iterative data analysis process (Sudeshna & Datt 2016). These methodological limitations had a severe impact on this study. The study was constrained both by time and by finances. Financial constraints resulted in the restriction of data collection efforts to the main campus of UHAS at Sokode, and the Ho satellite campus only. Time constraints also led to the researcher abandoning the remaining three (3) faculty researchers who were too busy to make time to be interviewed and relying on the seven (7) accessible samples for evidence gathering.

3.6 Delimitations of the methodology

Sampling and instrument design were the key mechanisms used to minimize the constraints of time and money on this study. Being a staff member of UHAS, the researcher applied professional and work relations to consult extensively during the purposive sampling process. The extensive consultation with colleagues led to the selection of very experienced and resourceful participants whose in-depth responses resulted in data saturation by the time the fifth interview transcript was analysed. This showed the representativeness of the participants' views on the readiness of UHAS for IR implementation. The instruments were also revised severally throughout its design and development stages and pilot-tested after obtaining ethical clearance. The several revisions and testing also gave the researcher mastery of the instruments, which resulted in the effectiveness of their administration.

3.7 Ethical considerations

As a qualitative case-study research, this study was prone to many of the criticisms of the methodology and design with regard to ethical risks associated with the researcher as these risks were particularly germane to data collection and interpretation. Coupled with the choice of IPA as data analysis mechanism, the researcher's use of the semi-structured interview technique for data collection exposed the study to several ethical considerations such as the need for confidentiality, anonymity and informed consent (Lichtman 2013; Peter 2015; Sanjari, Bahramnezhad, Fomani, Shoghi & Cheraghi 2015). Full disclosure of the scope of interview was made on the interview schedule and an informed consent form was designed that detailed the purpose and potential use of data collected and means of recording responses, which the study participants were free to accept or reject. These were given to the participants well

ahead of the interview and interview times were scheduled at a time most suitable to each of the respondents. A copy of the endorsed informed consent form was given to each participant and interview transcripts were given back to the respective participants for their verification of the accuracy and completeness of information they had given during the interview.

Several other steps were taken to ensure the ethical and legal validity of the study. These included obtaining ethical approval from University of Pretoria's Research Ethics Committee (REC) and an institutional approval for carrying out the research at the UHAS site from the university management. Data were anonymized by the researcher prior to analysis to avoid linking responses to participants. The researcher also made a full disclosure of his involvement with the study participants and data for the avoidance of any suspicion of bias in the interpretation of data.

3.8 Conclusion

Research methodology encompasses all the processes involved in studying a phenomenon, from the conception of the research idea to the findings and conclusions. The choice of a research approach and method is not automatic but relies on the research question(s) or problem(s), and the purpose of research. Qualitative research is most appropriate for the study of social phenomena in which the aim is to seek reasons and structures of processes from the perspectives of participants. Strategies for making sense of data collected must also fit the study design and anticipated results. The choice of IPA for this study's analysis helped to unearth the deep feelings of major stakeholders about the implementation of an IR at UHAS. The supporting questions of the research problem, which were orientated toward the critical success factors (CSF) for IR implementation helped to form a conceptual framework for the study. It also aided the data extraction and assessment of the level of readiness of UHAS for an IR project. The methods applied in this research were strategically sound and theoretically congruent with empirical qualitative approaches. However, findings from this methodology cannot be over-generalized or borrowed blindly by other institutions without proper evaluation and cultural adjustments to fit the needs of the borrowing institution. This study remains specific to UHAS, but can be replicated in any higher education institution in so far as the institution is able to test the feasibility of implementing an IR project.

CHAPTER 4

RESEARCH FINDINGS

4.1 Introduction

This chapter presents the results of data analysis. A structural coding method was used to develop themes that were aligned to the research questions and objectives (section 3.4). The structural coding method was deemed most suitable for the semi-structured interview technique employed in this study (Saldaña 2013). NVivo 11 software package from QSR International was used to generate the codes and themes, as well as aid further analysis of the interview data. Interview data were anonymized using hyphenated alpha-numeric codes that represented the participants' stakeholder sub-group and order of interview. Decision makers (senior management) who participated in the interview were labelled **DM**. **DM-1**, for example, implies the first decision maker interviewed, **DM-2**, the second decision maker interviewed, in that order. Similarly, the content providers (faculty researchers) were labelled **CP-1** and **CP-2**, reflecting their order of interview. A total of seven (7) participants actually took part in the study, made up of five (5) top management executives (decision makers) and two (2) senior faculty members (content providers) of which five (5) agreed to be audio-recorded while two (2) declined.

The establishment of an institutional repository (IR) at UHAS is a special initiative of the UHAS Library. Various steps are being taken by the library to implement the IR project, including the drafting of an IR policy and setting up an implementation committee. The researcher is a Senior Library Assistant at UHAS and would ultimately want to see an IR established for UHAS because he believes that the IR will add tremendous value to the institution and its cognate constituents. The researcher, however, put in his best efforts to remain neutral in this study and simply report the pure opinions of the study participants. To ensure neutrality, the researcher recruited a co-interviewer to chaperon the interviews with participants through strict adherence to the interview schedules.

4.2 Data analysis

A priori themes on the Critical Success Factors (CSF) for Institutional Repository (IR) implementation were first generated from the study objectives, research questions, as well as the literature review of this study (section 2.8). These were used as the gold standard in developing emergent themes from the interview transcripts. The a priori themes comprised:

1. Executive support;
2. User acceptance and support;
3. IR policy;

4. Resources;
5. IR marketing and promotion; and
6. Organizational culture.

Open coding (section 3.4) was used to categorize data for each case iteratively until a saturating point was reached at fifty-four (54) emergent codes of which twenty-eight (28) were drawn from content providers (faculty researchers) and twenty-six (26) were drawn from decision makers (senior management). These were further synthesized into nine (9) superordinate themes upon which the empirical findings are presented, namely:

1. Executive support;
2. User acceptance and support;
3. IR policy;
4. Resources;
5. IR marketing and promotion;
6. Organizational culture;
7. Stakeholder perceptions of an IR;
8. Researcher motivation; and
9. The Library as an agent of change.

The themes highlight the prevailing beliefs, concerns and expectations about the UHAS IR among key stakeholders.

The use of two separate interview schedules, but with nearly the same questions (section 3.3), also led to simultaneous coding (section 3.4). In few cases, statements about the IR as an indicator of the quality of higher education institutions were placed under both executive support and user acceptance, showing a convergence of thought between the decision makers (senior management) and content providers and users (faculty researchers). In the data extracts, the ellipsis (three dots) represents a long pause or break in syntactic expression by the participant as a pattern of thought that could not be represented by text in the transcript. It also represents a blurred section of the audio recording that could not be transcribed or omitted text in the transcript to focus the extract on the theme being presented.

4.3 Results

The results of this study are similar to many findings presented in the literature review. Areas of variance can be explained as being due to the stage of development of the IR project at UHAS compared to many exploratory studies reported by the literature surveyed. Whereas most of the literature reviewed focused on actual projects that were already implemented in

various settings, the current study examines the possibilities of implementing an IR for UHAS by leveraging on the experiences of its employees. Nine (9) major themes emerged from the interview data, six (6) of which perfectly aligned with the critical success factors (CSF) reported in the information technology (IT) and institutional repository (IR) project literature (section 2.8). The main findings are presented below based upon the nine (9) themes. Two separate interview schedules (see sections 3.3 and 4.2) were used to elicit the opinions of either sub-group of study participants – decision makers (senior management) and content providers (faculty researchers). The interview schedule for content providers contained nine (9) main questions. Five (5) out of the nine (9) questions overlapped with the questions that the decision makers had responded to. The interview schedule for decision makers contained six (6) questions. The questions that overlapped were those that explored their understanding of what an IR is; whether they would support the establishment of an IR at UHAS; their suggestion of content recruitment model; their awareness of UHAS research policy (if any); and an open option for them to say anything else they would like to share about the IR that the interviewer did not ask. The results are presented below on the themes that emerged from the interview data from the broad perspectives (overlapping questions) to the specific outcomes (exclusive questions).

4.3.1 Stakeholder perceptions of an IR

This theme represents the views of participants on what an IR is. The participants were asked to describe what comes to their mind when they hear the term institutional repository. The question sought to test the knowledge of stakeholders on the phenomenon as a way of assessing their willingness to accept its deployment in UHAS. The views of the participants varied between a simple database of active records and archival materials to a complete suite of online learning platforms. Below were some thoughts expressed by the participants on IR:

CP-1:

A database of resources that one can have access to as a researcher... Now, if we talk about Institutional Repository, in any institution which I am affiliated with, do I have a database in terms of journals? How is the Internet connectivity like so that I can access the journals that I need to facilitate my work? What are the search engines that we have within the institution such that I wouldn't have to go elsewhere to struggle and get that information? ... If we have challenge with the Internet, then we need to have a software or eGranary which gives us access to certain electronic resources that we can use for our teaching and for research, but uhh... most certainly we need journals both electronic and physical journal for sure... I need desperately to see the current journals that uhh... I can have access to, whether I'm in London or in the US.

CP-2:

For me, what comes to mind is a system whereby the institution has some academic materials, be it textbooks as well as other tertiary materials like journal articles, commentaries and other documents which are of academic relevance... My former university, we have the Edinburgh Research Explorer which is the Institutional Repository. So, umm, research activities ongoing, updates, abstracts as well as papers we publish, as soon as you submit a paper [to a journal] and it's accepted, you have to submit to the repository. So, there is the ERA, the Edinburgh Research Archive which contains everything, which serves as the Institutional Repository. So, my understanding of Institutional Repository goes there.

DM-1:

A collection of digital objects; historical documents, any material of inherent archival value, securely stored and made available to only authorized users whenever wanted; persons known and authorized to access.

DM-2:

I think what comes to mind easily is records management [long pause] even the point where these things are kept and handled and those who handle them.

DM-3:

It's a database for storing records that have future value. At Legon the entire basement of the Great Hall was divided into two one given to Finance and the other to Academic Affairs for maintaining their archives. This is because such documents are very vital in the life of the institution and hold many legal implications.

DM-4:

Essentially, it has to do with capturing the institutional memory including documentations generated by the university in terms of teaching materials, policies, statutes as well as research output of faculty.

DM-5:

What comes to mind can be from two angles, either the real meaning of repository as we look at it from books from the point of view of academia, or the layman's point of view of a repository being a point or bank where you can see items packed, maybe, for reference purposes. In academia, ... these are documents... of late we're moving from the real paper to combining paper and digital.

From the above descriptions of an IR by the participants, it is obvious that perception gaps exist, not only between what an IR really is and what the UHAS stakeholders expect of such a project, but also between the divergent stakeholder groups as to the role of the IR in assisting their workflows. While faculty researchers take a purely academic view of the IR, senior management views it from the perspective of the traditional paper-based archives, which served to manage administrative records and other institutional memory. CP-1, for example, has an ambitious expectation of the IR, viewing it as providing capabilities to promote online resource-based learning, with full access to electronic library resources and research assistance. These expectations by the two major stakeholder groups involved in this study provide insights into what the UHAS library should note as user needs as the IR must serve the needs of the user community. It also indicates the need for a broader stakeholder consultation and needs assessment in order to prepare an adequate service definition so as to make a business case for the IR.

4.3.2 Executive support

Support for the IR initiative was one of the questions common to both interviewee sub-groups. This theme encompasses all the views expressed by senior management participants in their responses to the question of whether or not they would support the establishment of an IR in UHAS.

All five respondents fully supported the initiative. The decision makers provided very rich information that brings out key elements of input to the IR value proposition and business case. Providing their reasons for supporting the IR initiative, senior management see the project as an essential part of the knowledge management system, a records management tool and a strategic legacy. These views need to be harmonized through effective community sensitization and education on the IR as a service to the university community.

4.3.3 User acceptance and support

This was regarded as the opposite end of executive support. A question was directed to participating faculty about their support for the project. Their responses showed that they were in absolute support of the initiative and believed that it would benefit both the university and the individual faculty and staff who would participate in it. Therefore, they called for its implementation as a matter of policy irrespective of resource challenges.

CP-1:

It's a win-win, a win-win in the sense that not only does it benefit the university, it benefits the researcher... I can also tell you that in the Western world, they've run out of place to do their research, so they're now coming to Africa for primary data. So, if they know that they can collaborate with me, they'll come... We also need recognition. So, if somebody comes from the London School of Hygiene or Tropical Medicine, he knows that he can work with me, and then together, when he gets his Professorship, I also get my Professorship. That is the way it works. And when I get my Professorship, because of the collaboration, this institution also moves up, you see, but you [referring to the institution] facilitate that process and by you doing that, you also get known... It [IR] becomes a white elephant without a good Internet system but it also doesn't mean that we should sit down and fold our arms and say that we don't have Internet. Get whatever we can, send a proposal and let the Senior Management make an informed decision based on what is possible, and the potential... I'll be very supportive of your work. I like what you're doing. You're progressive.

CP-2:

I wouldn't necessarily look at it as supporting the initiative. I think, it should be a policy.

Faculty members think that the implementation of an IR for UHAS is long overdue as it is core to the UHAS business of providing research-driven higher education. Both faculty and management agree that the IR has the potential of giving the university a favourable rating in terms of quality by facilitating research discoverability and collaboration. The availability of strong support from the management and researcher levels mean that the IR will succeed at UHAS if the project is managed well. However, it is important to also note qualitative differences in the support for the initiative from the two sub-groups. Senior management participants may not have fully appreciated the IR concept because most of the references made to steps already being taken in that direction related to a paper-based archive to help them free up physical space in their offices and not wholly a futuristic concept of facilitating open access to scholarly communication as the faculty researchers deem it. The point made by DM-1 concerning his experiences with IR project implementation at UHAS should also not be glossed over. It may suffice at this point, therefore, to conclude that all stakeholders support the IR initiative in principle, but the library must take a cue from these nuanced incongruences to update its stakeholder engagement strategy and also step up training and promotional efforts to elicit evidence-informed support from all.

4.3.4 IR Policy

Other questions common to both decision makers and content providers related to aspects of IR policies. Various issues emerged from the interview data, raising concerns that can be addressed to the IR policy. Some of these issues included content recruitment, governance, data security, implementation approach, institutional OA mandate, IR content, IR value proposition, rights management, strategic alignment of the IR initiative and altmetrics. The researcher wanted to know from the participants what was the best approach for content recruitment within the UHAS IR context. The responses from both senior managers and faculty researchers indicated a flare for the mediated deposit model.

CP-1 recounted the practice from his former university:

Once I submit my publications, they do the rest of the work... we had the resource personnel who know exactly how to publicise that.

Therefore, for **CP-1** content uploads need to be treated with professionalism and the responsibility should be given to repository or library staff. He, however, alludes to another reason besides standardization, which is the lack of time by faculty researchers:

Self-archiving is very important. Yes, we need training on that but also give the job to the people who are good at it and encourage them to do it. And I couldn't overemphasize that we are very busy researchers; I teach, I'm involved in administrative capacities and so I may not have the time to do that so I rely on the journals, I rely on my university library experts who can take it up and shoot it to the global platform. And so, self-archiving is important but we may forget; we may not find the time...

CP-2 makes similar suggestions. Mediated archiving appears to receive greater favour among participants mainly due to their past experiences with IRs. **CP-2** recollects:

Okay, there is an office. There is somebody responsible you submit to and they will put it online. You don't put it online. You submit to the office, to the team, and then the team will upload it. So, it's fairly straightforward, just sending them an e-mail with attachment saying that I submitted this article, it's been accepted, this is it, then it's accepted.

A deeper insight on why mediated archiving was preferred was also shared by **CP-2** on the faculty's attitude toward self-archiving:

As head of department, I'd expect the works of my department members to be out there, and I know that it's not everyone who is in a habit of wanting to do self-

archiving, so, the mediated one, of course, should be there and then if people can do self-archiving, that is also there as well as the automatic one. But then, if there is a university policy, then, I think, the mediated one may be the best way to go ... I personally wouldn't have any problems with self-archiving, but for an institution, I think, the mediated and the automatic one too to add on will be the best.

CP-2 recalled his experience at the University of Edinburgh that his participation in the IR was compelled by an OA mandate:

For the University of Ghana one, I didn't submit it. I'm not sure how the system works or how they get it, but my best guess has been that when people submit profiles for the university, they pool the papers, as well as when you're submitting for promotion and other things... but for Edinburgh, it's the university policy... For the University of Edinburgh, it's the policy that it has to be there.

As a result, **CP-2** proposes the adoption of a mandate by UHAS to facilitate content recruitment for the IR:

Yea, I think that's what I said, that there has to be a policy. If it's not a policy, it's not going to benefit all of us because it is only a few people who would want to go to that extent to have anything there. So there has to be a policy.

Senior management participants also made some interesting revelations about the prevailing culture of faculty participation in online environments and suggested adopting a hybrid approach of self-archiving and mediated archiving with preference for the latter:

DM-1:

Lecturers have been trained several times on how to upload student results on the SOIS [Student Online Information System]. But, my brother, the experience has been interesting. Because this is not something they do on a daily basis, they always forget and come again seeking help ... It appears some of our faculty jitter at interfacing technologies, but there are few of them who since the initial training have never returned for any assistance but are able to do their own independent uploads and even help their colleagues, eh... this SONAM [School of Nursing and Midwifery] lecturer, what's his name, eh ... Felix, Felix Nyande or so... yes, he just picked it once and that's all, and few others. But majority keep coming back ... It depends on the individual so I propose a hybrid system of recruiting content. ... You know, these are academics and they are usually busy about other concerns than to sit behind a PC to fill out detailed forms and go through all the authentication procedures for content submission. The technology and the process alone might scare most of them away if we insist on self-archiving.

DM-2:

I think we can use both [referring to self-archiving and mediated deposit]. We can use both; looking at even the keying in of results [SOIS]... What is happening, we can start from the two angles: empower the faculty to also take charge of the uploading of their own research, and then where the person is not eager to do it, then we ask the other staff to support... At Legon [referring to University of Ghana] they had kept the records unattended to for a long time before they finally decided to create the archives. And so, all the records were lying down there, and even the active records were so many that it wasn't difficult getting content for the archives at all. Here [referring to UHAS], because we are young and we have graduated only two batches, ... so we can start from there, we can start from there... the little that we have, we can start with those ones and as we go on. Whatever that will come can be added on. The university is young, so I think that is the only way that we can do it, and, the ease of getting records should not be a problem.

To drive content submission **DM-2** also suggested a policy to compel researchers to provide their works to feed the IR:

It must even be in the statutes. I'm sure that will enforce it. I don't see the need to do a research and then keep it on your chest and refuse to release it for others to use. We are supposed to help in developing a particular area so if it is not open, how will others get access and build on what you have done?

DM-4, however, showed an "if you build it, they will come" attitude (section 2.4.3):

You know, if it comes to any work that you have done, be it a publication, when you see it online you are excited, and so if the initial demonstration is done, the publications of a few of the lecturers are uploaded, and then this is projected to the Senior Management, and for that matter the university community, I'm sure everybody who has done some research work of some sort will be happy to see his or her work in the Institutional Repository and therefore online. This is enough motivation to encourage researchers to bring their publications.

DM-5, expressed similar sentiments as DM-2 about the scantiness of documents to feed the IR but was of the view that student research could serve as one core area to rapidly and consistently build the IR collections:

It means these projects [student theses] are lying on a table somewhere and at least, documentation for this area is good because it's part of the requirements for graduation so it should be available at the schools. This is where this project should be beneficial because no one knows what they have done so far. I don't think we

have done any publication so far ... So, we only heard that some projects are very good, they are publishable materials at that level and so on.

Involving content contributors right from the initiation stages of the project is, therefore, seen by **DM-5** as key to sustaining the fervour of content submission throughout the life of the project. **DM-5** also hinted at an institutional mandate but believes that the best approach is to make the researchers see the relevance and benefits of disseminating their works through the IR:

Content, will not come up in one day. Those who give us the content should be involved to understand how the system works because the system is supposed to be a system where they are also going to benefit, ... So, for me, the producers of the information or the authors should also be involved to understand this system, that it's not a one-day affair. It's something that must be running. So long as you remain a partner in the institution you must try as much as possible to make sure the system runs. It's not a matter of choice as such, but it should also be a matter of choice to the person to see how beneficial the thing is to him or herself.

Although there was no specific question on the management of content and data security in the IR, some participants raised concerns about these either during probes on content recruitment or as additional information they volunteered to the interviewers. For example, **CP-2** made the following observations when asked if there was anything he wished to say that the interviewer could not ask:

Okay, so one key thing is that when there's an institutional repository, the security is very important, as to who can access what. So, in as much as you have the full-text there, for copyright issues and all that, I would expect that there will be an authentication system whereby people will log in with their credentials to be able access the full-texts which have been put in the Institutional Repository so that we don't find ourselves violating any copyright issues and all that as well as unauthorized leakage or spread of some of all that ... As I said, it [Edinburgh Research Archives (ERA)] has the security features there. You can access an abstract if you're an ordinary person, not part of the university community, but for you to access full-texts you need your credentials, and even if you [a community member] are off-campus, you can't just access it from any computer. At least, you need a VPN so you're connected to the university network before you log in with the credentials to access it. The university of Ghana one, I don't think there is the full-text over there, it's just the abstracts.

DM-1 also suggested an authentication system to verify the identity of persons before allowing them access to the repository contents:

I mean, we cannot leave our archives too open for just anyone to explore without proper authentication ... I support open access, but as a security-conscious person, I think that proper authentication systems to verify the identity of persons using our system should be implemented.

DM-2 who had more experience with the manual archives also cites an example of the access procedure to archival content to suggest implementing measures to authenticate users:

What happened was that if you needed anything, you applied to the Archives and get it. I don't know whether you can be in your office and access them from the archives... I don't know whether that open access is there.

DM-3 believes that some archival documents are confidential and must be maintained as such even in the IR:

There are documents that I keep in my office here which none of my staff have access to.

DM-4 suggested that some documents, particularly the full-text of published research could be suppressed while all abstracts are made freely accessible through the IR:

Well, I think, maybe the ideal thing to do is to ... we can upload the two but display the abstract alone and if there is a request for the full-text, then maybe, that one we can request and provide it ... The most important thing is to see that this university is alive through its publications, so that when people visit the site they are able to see what the staff have been doing.

Further to ensuring secure access and ethical use, **DM-4** also made a critical observation about responsibility for the management of the IR infrastructure and content when established:

It is my thinking that the IR will be hosted by the library in the library and supported by the staff of the library who are IT-savvy. The IT department is just there, maybe, to look at some of the technical challenges that may arise, but in terms of the management of the IR's contents, I think the library has the capacity to do that.

Drawing on a real example of another public university in Ghana, **DM-4** expressed the need to let the IR remain under the auspices of the university library when established:

In other places where the project was hijacked by the ICT department, I think, the rating of the university went down. Because it didn't originate from them, they chose to do whatever they liked but when it was hosted by the library, the university received a favourable rating. KNUST [Kwame Nkrumah University of Science and Technology] is a good example. The former librarian lamented a lot when the IR was taken away from the library.

The participants also shared their views on the types of documents they considered eligible for curation on the IR. The type of content for the IR was a direct question to the content providers but a probing question for decision makers based on how they responded to the question on content recruitment. The participants were asked: “What types of materials should the UHAS IR contain when established?”

CP-1:

As usual, the e-books. It's very crucial. I travel around the world and I bring various types of input to my students. The beginning of every year, I give them a chunk, in fact, a whole folder of e-books on the particular course that I'm teaching. If we had an effective, efficient IR, all I'd tell them is go that way ... Students' dissertations are quite important for us to have locally and even internationally depending on the level of the dissertation or thesis, uh..., my thesis is online so you can grab it in the West, but what is also important is ways of catching people when they try to plagiarize.

CP-2:

Any material that members of the institutional community need to have access to, I think, should be within the Institutional Repository. Ummm... other things like Teaching and Learning Materials, if available, can also be in the Institutional Repository. So, for example course manuals and all that.

DM-1:

It is an archive, right? And will contain very important documentations on the university which will guide future actions or tell the history of the university, even teaching materials and research papers and all that students and lecturers need to accomplish their academic tasks can be hosted on the IR which is accessible globally.

DM-2 refers to the practice at University of Ghana to suggest curating research output, and also suggested standardization of administrative records to promote good archiving practice:

Legon [referring to University of Ghana], they are charting a new course now emphasizing on research instead of just teaching undergraduates and so there's a lot of focus on submissions of project works, research works for colleagues to review, especially those in the same discipline, so I don't think if we do a similar thing here it will be difficult... One thing we must also do is to ensure that the schools and departments are also keeping the records the way it should be done...

DM-3 also believes that good record keeping practices at departmental level would facilitate content recruitment and that records have an intrinsic value that determines whether they will make it onto the IR or not:

All the files you see in the cabinet here, I personally created them because I know the importance of each of these documents and I so organized them that I can tell which file contains what. For example, when the Management was looking for a sample resolution to open an account, I simply referred to my records and pulled out a copy of a 2012 resolution that was used to open the first account for the university during its establishment. No one asked me at that time to file that single document but knowing its value, I took the initiative to keep it and it became useful many years after.

DM-4:

The policy captures what should be included and what should not be included and this will be done by the staff of the library ... Well, em, you know, initially [paused a bit], I was coming from a university which is quite different from this one. This university is purely professional, churns out professionals. So initially, I was against ... I would have preferred the situation where only post-graduate work in addition to what the faculty produces will be part of the Institutional Repository, but since this is a professional institution, consideration could be given to undergraduate work. Ideally, I would have preferred only post-graduate work because what it means is that serious research work is done at that level unlike the undergraduate level.

DM-5:

Most people would start by saying institutional memory, but that is the short documentation on the history of the institution. That should be one of the areas. Then as an academic institution, we should be looking at academic publications that are coming, not only from the faculty, but from the university as a whole – faculty, students, non-faculty staff – should all be part ... If things are in photography, because they are not seen as materials, most people will not even recognize or regard them but they are all part of the documents ... I have kept a photograph by me. I purposely said I need a copy. One day I'll bring it to you [referring to the library]: the first matriculation and induction of the first Vice Chancellor. There's a photograph in the conference room, I have the same copy at home, I'll bring it... that was when I decided to start understanding some of these issues... those are some of the things we should definitely hold there, somebody looks at it and says, oh, this was where they started...

As can be seen from the discussions of key issues regarding content recruitment and the management of the IR as a whole, senior management and faculty who participated in the study raised various issues of policy. Although self-archiving is seen as a practice that promotes IR success, participants were of the view that self-archiving would lead to failure of the IR within the UHAS context. Institutional mandate, mediated and user authentication were among key expectations of the participants. Issues of copyright management and data governance also emerged. All these can be addressed in the IR policy. One participant, DM-4, mentioned that there is an IR policy but it appears many actors among the stakeholder groups are unaware of its existence. Awareness creation and expanded engagement with stakeholders on the IR initiative will help update the IR policy and address community needs adequately and effectively.

4.3.5 Resources

This theme encapsulates all references made to the human, technical and financial components of the IR. The researcher sought to find out the feasibility of the IR project from the perspectives of senior management based on the current resource base of UHAS as they knew it. The interviewees discussed with the decision makers the requirements for staff, finances, space, hardware and Internet infrastructure among others, and sought their opinion on the feasibility of the IR project at the present time in UHAS. This question was not put directly to faculty participants but CP-1 made very detailed submissions on what his thoughts and reflections were concerning the IR project, which the researcher considers very relevant to the question of feasibility.

CP-1 expressed his frustrations about the poor network infrastructure and unreliable Internet service provision at UHAS and its effect on teaching, learning and research:

How is the Internet connectivity like so that I can access the journals that I need to facilitate my work? ... it's all about training and an effective Internet system., without a good Internet system we cannot have any repository ... So, we come down to the basic challenge: Internet. Why should you have all these materials, pay for these materials and nobody can have access to them? My students cannot, and I cannot ... Since I came into this university I've always used my modem because I cannot rely on the university's Internet; I can afford it but can my junior colleagues afford it? Can my students afford it? No. So, whereas I can publish ten, twelve papers in a year, sadly my heart bleeds for my colleagues. It's not that they don't have the potential. It's not that I am more sophisticated or more intelligent than they, but they don't have the wherewithal, they don't have what it takes because of lack of access to the Internet, and that is a challenge ... If we had an efficient Internet system, rather than I downloading and sharing it to them, they just have access to it ... You [referring

to the library] have excellent materials here, but lack of access to the Internet is preventing us from effectively exploiting these resources. It's sad. Please, tell IT to beef up our Internet so that we can begin to benefit from what you have on the repository, whatever you put there, then we can even do online teaching.

He used an example of University of Ghana to buttress his point on the negative impact of erratic Internet provision on teaching and learning at UHAS:

I have colleagues in University of Ghana who are in Canada and they are still able to maintain contact with their students, teach their students. This lady is expecting. She's been there for over two months now, she still has classes with her students. I've got a busy schedule, why can I not be in Argentina, as I'll be on Saturday, and still be able to teach my students in Hohoe? If we have an efficient Internet system, if we have an efficient IT support, I should be able to teach my students.

Thus, according to **CP-1**, lack of effective Internet is making UHAS fail to deliver on one of its strategic goals of being a community-focused and practically-oriented university:

The other important thing that I want to emphasize is that, University of Health and Allied Sciences, we need to move away from lecturers sitting in the classroom or in their air-conditioned room I should be out there in the field, in Nkwanta [one of the deprived districts of the Volta Region of Ghana with many hard-to-reach poverty-endemic populations]. Once in Nkwanta and helping to address the problems in Nkwanta, I should still be able to have access to my students wherever, you see, but because we don't have the technology, I'm stuck. That shouldn't be the case. I'm meant to be out there in the field, so sixty to seventy percent of my time should be addressing community problems, and using the rest of the time, I upload my lecture materials and then students can access it, and then we have an interaction, you see, anywhere in the world.

Human resource availability was also of concern to **CP-1**, and he expressed the expectation that the library would lead the process by providing resourceful personnel to give professional guidance:

Do we also have the expertise in terms of the resource personnel that I can approach when I need some help, for guidance, for training? ...a lot of this is also dependent on the library resource that we have and I cannot overemphasize the importance of getting personnel within the library who would be able to bring our research to the fore. So, we need very efficient library personnel who are highly educated in archiving or bringing to the fore this information.

But CP-1 insisted that, despite the myriads of challenges UHAS currently faces, the IR is a project that must happen, and, therefore, suggested ways of facilitating the IR process:

It [IR] becomes a white elephant without a good Internet system but it also doesn't mean that we should sit down and fold our arms and say that we don't have Internet. Get whatever we can, send a proposal and let the Senior Management make an informed decision based on what is possible, and the potential. Every institution wants to get up there and be recognized, and I believe the Vice Chancellor and the Senior Management will similarly want to do that... Some of these things, it's just talking to people... talking to Vodafone, talking to MTN, get a competitive person to see what you're capable of doing and the potential, you see, these things don't cost much. It is something said that some people can sell ice to an Eskimo. Be innovative, think outside the box. Get Vodafone to want so much to have an edge over their competitors to come and set up a mast here and make Internet possible. With that, there's nothing that we cannot do.

DM-1:

No. The university is not ready, not at the moment; financially, technical infrastructure, no-no. The kind of server for an IR ... with this bad network that we have here ... look, even switches to route Internet we don't have. See, tools for Webmasters, such as laptops are not provided, no datacentre, not to talk of back-up systems... In terms of human resource, yes, we have enough staff who can accomplish the setting up and all that... Some Chinese monetary support was promised, well, if it happens, we'll be about 70% ready because that was earmarked for infrastructural development and I know they will come to do the work themselves, but as to when that will come, no one knows. Outside that hope, I don't think IR for UHAS now is practicable.

DM-2 shared his experience on establishing the paper-based archives for University of Ghana and underscored the importance of recruiting experts to undertake such a project:

Most of the people we got at that time were from **the National Archives** [speaker's emphasis]. The present head, I think, was, at that time, the Deputy Head at the National Archives. So, those were the people we recruited for the Archives at the library or for the university ... If we decide to establish an IR, we will need people to manage that particular office, and this comes with special requirements. It's not just anybody who would be posted there. You must have professional staff who would handle the documents there ... I don't think we need a lot of people to manage it. Two to three people can undertake this during its establishment or during the establishment to maintaining the place.

DM-3 believes that the feasibility of the IR project depends on the business case presented by the library to senior management:

You [referring to the library team and directorate] need to bring to the attention of Management the cost implications in the form of a proposal. Management will look at sources of funding other than the Government. There must be a budget for the project. GETFund [Ghana Education Trust Fund] supports infrastructure and equipment acquisition. Can we take it as a special project through GETFund, IGF, or donor agencies? Everything is possible with good planning; knowing the cost implications. It's better to know the cost before making the decision.

DM-4 also conceded to the unsupportive infrastructural resource base of UHAS currently for the IR project but believes that it needs to be implemented anyway:

I am aware that establishing an Institutional Repository involves a lot of costs but I am hopeful that once the university management has accepted the idea, the resources will also come even if they do not come, maybe, as I would have wished... maybe where we find it difficult to get some of these resources, we can solicit; we can identify an organization which can come in to assist... As for personnel, I think we can train one or two of the library staff, or if it becomes necessary, we identify and recruit somebody specifically for the project... I know attempts are being made to increase the bandwidth. Even if we are not able to buy a server for the purpose, I think the university has a server or servers; we can rely on one of them in the interim until maybe such time that management thinks that we need a dedicated server, as other institutions.

DM-5 shared an extensive experience with regard to implementation:

It is [feasible]. It depends on the angle from which you are looking at it. With your explanation, we have cost implications and it also depends on where you want to host it. I may say that from the angle of those who have already gone into this project, looking at the volume of your materials will determine where you would like to start from – whether you want to go in for a complete structure or whether you want to be part of another system and move on to develop yours in future. It can also be possible in terms of finance, if funds are solicited from international organizations purposely for this project. The possibility is there. And we should also be looking at how we will be maintaining it. Should we look at five years first? Is it ten years? Is it twenty years for a start, and within the twenty years, will we be able to move on to the next level? We should be looking at all that. So, whether the project is feasible or not? It is feasible, and it is important for the growth of our institution, an institution that looks at IT as one of its pillars, the repository is necessary. And because it is not only for the use of the university, it is supposed to be globalized so that all people will have

access to it and utilize it... When we come to our system [UHAS], I think, we must be looking at developing it along as we grow. We've come a long way and, this is ripe time for us to now ... if we have not yet put it in plans, it should develop along with us... these things always develop with institutions. The institutions start, the idea may be there, but it develops with the institution... Where there is an advanced system of planning in an institution, the idea will be a part of, a major part of this strategy, planning and all the other things... It will be a great advantage if we put these measures in place to get the repository done because we're growing and, eh, output in terms of faculty is also growing and, eh, our growth will not be noted... we must be seen globally. So, it's something that must be embraced seriously.

Concerns for creating the enabling environment for the IR project to thrive were well articulated by the decision makers and faculty. All the participants who responded to this question agreed that UHAS currently faces serious infrastructural and financial constraints. However, the IR initiative is unanimously endorsed as a project aligned to the university's own strategic goals: implementation, therefore, is imperative. A few suggestions were made concerning how to improve the network and Internet infrastructure as well as how to approach the implementation effort successfully. These recommendations, which include public-private partnerships and a systems strategic approach to implementation based on learnings from experienced universities and a pragmatic business case with cost models, need to be taken seriously by the library, the principal advocate of the initiative.

4.3.6 Organizational culture

Several comments made by the participants pointed to existing experiences and practices that can affect the success of the IR initiative. These comments, which ranged from their previous experiences with content submission to subject repositories, the culture of documentation and human-computer interaction, show that the library needs to plan to manage change as the IR may be seen as a disruptive technology that, if not well marketed, can attract opposition. Different sets of questions were addressed to the sub-groups of participants to gain a sense of prevailing policies, practices and attitudes.

The researcher tested the participants' awareness of the policies regulating research activities at the university by asking: "What is the current policy and/or practice of research production and dissemination at UHAS?" This was one question common to both senior management and faculty. All the respondents pointed to the newly established Institute of Health Research (IHR) as responsible for developing policies to regulate research, but could not confirm their knowledge of a research policy yet, nor adequately describe what has been happening in the research arena over the past few years.

CP-1:

Well the IHR has a policy and I think that we all subscribe to the IHR policy and guidelines and I believe that they are clear on that and so we follow their policy guidelines and we will not flout that. I think that that is what all the schools are adopting.

CP-2:

I have come across e-mails that were requesting for some papers to be sent to the library, but I don't think I've seen them as a policy, as something which is obligatory. I think I have sent once or twice to the librarian but apart from those ones, I am not aware of any policy per se. What I've known is more of information circulating that it will be good we have it, so send it to us and all that and because it's not really a binding thing, that has not been an active practice... With student work, I've supervised some student research work. All I know is, after they do their final copies, they give out copies to the supervisors as well as to the departments and the university. I have no idea when they give to the university where it goes, whether it goes to the library or it goes elsewhere, I have no idea... We have not graduated our first batch, so as a department, we have not yet had any of these but one of the things we are looking forward to is we will have electronic copies, pdfs of these theses. Even if there is not an Institutional Repository by then, we will have it on our website, on our department's website, yea.

DM-1:

I haven't sighted a policy document in relation to student research.

DM-2:

Mmm... I haven't gone that far with UHAS, but with Legon, this is done. Students submit copies of their research work to the departments, so departmental library, it's there, sometimes it enters the main library... ahaa... lecturers too, they submit first to the departments but when the work is finally done it goes to the main library, into the university publications, the university publications not the lecturers' individual works. In these university publications you'll see most of what the lecturers are doing. When it is completed, this is submitted to the university so the university takes charge of it and handles it the way it should so it means that it goes to the IR... But UHAS, I haven't... I don't know how it is done, because I haven't seen any project work, completed student project work at the library or at the department, so I don't know whether they ask students to drop copies at the departments or at the library, and even for lecturers too, what we have is what they submit for assessment; when it's

done we keep a copy. [After a long pause] They don't have any clear-cut policy, but I think they are also following the convention that exists.

DM-3: This question was not answered.

DM-4:

Well, I don't remember the university having a policy to that effect, but I know they will follow the international conventions which surround research work.

DM-5:

For student projects or work, it was meant just to satisfy the requirement for graduation. Currently, what I think I know about is, students do projects and are graduated, so it ends there. The newly established Institute of Health Research is now coming out to look at issues of policy regarding research in the general environment... For now, I haven't come across any major policy on what should be done after the graduation. It's in stages, the first stage is requirement for graduation, and after that do we have the policy of qualification? And the next one is what happens to the material? I haven't come across that. But the Institute of Health Research, with the background that they have given us that they are looking at most research issues, I think, they'll be taking up some of those issues.

Other questions not directly aimed at extracting findings on relationships and attitudes that constituted the cultural milieu of UHAS also brought forth opinions that give relevant insight into the current tempo and tone of the university environment. For example, DM-1 and DM-2 (section 4.3.4) cited the attitude of faculty toward the existing online records management system as a reason why a mediated deposit rather than self-archiving would work for IR content recruitment at UHAS.

The laxity in verification of ethical use of information by students and the culture of poor documentation by administrative staff were also mentioned by some participants during discussions with them about how to recruit content for the IR:

CP-1:

Do you [referring to the library] have an anti-plagiarism software? That is very, very critical for an institution such as ours and we have to invest in that, all the software that will be use to catch our students. They are becoming so sophisticated. People can sit in their homes and write a whole thesis without doing the work... It will be to our shame that our university will not have or invest in those types of software

because, constantly, students are cutting and pasting and presenting dissertation as if it's their work; it's things that they've taken off the Internet.

DM-2:

One thing we must also do is to ensure that the schools and departments are also keeping the records the way it should be done because when we came at first even there were no student files, there were no files on students. We had to start gradually building data for students, I think DM-3 was part of that system; they helped in opening files for the students.

DM-5:

...So, when we bring our views to the UHAS system, repositories don't just come about because you generate data, but there should be a planned system that whatever is done, whatever document is produced fits into that system.

One question that was uniquely asked to the content providers (faculty researchers) regarding organizational culture was their experiences with IRs of other institutions. The researchers asked: "What is your experience with disseminating research output through IR or other open access (OA) repositories?"

The faculty participants expressed various degrees of experience with participation in IRs and subject repositories but indicated that they were not very much involved in self-archiving practices to get their research onto those repositories.

CP-1:

Yes, uh, the good thing is that I try to publish in high impact factor journals – I still haven't gotten much publication in Lancet or Nature [humorous comment] – If you Google my name you'll find quite a number of my publications in PubMed and other search engines and that is because the journals that I publish with have those high-quality search engines that they would publicise my work, ... In the UK, there was a research that I conducted in my area of expertise. As soon as it was published, I got a call from South Asia. They wanted information on that publication and to collaborate with us; WFP came on board; they so much wanted information. It wasn't because I just published it, but the university and the journal were able to bring my publication to the fore that overnight, WFP sent an e-mail, I got something from South Asia and, it's on and on... so it is going to underscore the importance of an online repository in an institution such as this so that we can bring to the fore or celebrate the work that our researchers are doing. It's very important, and I will champion that.

CP-2:

At least, I'm familiar with the ones for University of Ghana and the University of Edinburgh. So, these are two repositories where we have papers and other things. There is also the theses repository which the University of Ghana started recently but Edinburgh has always had the theses repository. I have used the one at Edinburgh considerably well but the University of Ghana one, I've not really, really used it... I have deposited research in the University of Edinburgh repository, I submitted for, and I also have some of my recent materials deposited in the University of Ghana repository because I worked there... I do self-archiving on ResearchGate, I do self-archive on Claim Page, I do some self-archiving on Academia.edu, the other ones not so much, I do self-archiving on Mendeley and then on Google Scholar, but Google Scholar, umm... I've only done self-archiving, I think, once. Most of the time, it picks up automatically. So, Google Scholar picks them up most of the time automatically; ResearchGate also sometimes picks things up automatically, eeh... Scopus, picks automatically, ORCID, sometimes I have to add one as well, so these are some of the ones that I'm familiar with.

Change management (section 2.7.1) is critical for the success of the IR project at UHAS. The records keeping practices of administrative staff have to change, student assignments and theses as well as papers by faculty have to be submitted through plagiarism detection software and library staff require capacity enhancements in digital curation and copyright management. These areas of critical importance to the participants means that extra investment in the library is required as well as behaviour change for community members. These cannot be achieved in a single event, and can only be realised through a process of sustained engagement and

continuing professional development. Based on the shared experiences of the content providers, it is obvious that the settings in which IRs succeed practice mediated deposit model of content recruitment contrary, to Lagzian, Abrizah and Wee's (2015b) assertion that self-archiving practices are important for the sustenance of the IR (section 2.7.5).

Another important issue to note about faculty's attitude toward open access is the fact that they do not see Green OA as an alternative publishing avenue, but rather as a means of facilitating wider circulation of their research and fostering research collaboration. This finding confirms earlier findings by Lwoga and Questier (2015) and Zhu (2017) that there is a higher propensity of medical and health science researchers who are the highest OA subscribers to opt for Gold OA (journals) rather than Green OA (self-archive repositories) (section 2.3.1). It also supports the recommendations by the Finch report on expanding access to scientific research (Working Group on Expanding Access to Published Research Findings 2012) that OA IRs are not substitutes for traditional journal publishing but play the complementary role of furthering the dissemination of scholarly output (section 2.4.2). The university also needs to reconsider its approaches to policy education and communication as well as fast-track the development of parent policies such as the university-wide research policy that affect the IR policy and processes.

4.3.7 Researcher motivation

Following the exclusive question to the content providers on their past experiences with IRs was another question to them on what inspired them to participate in those IR processes by submitting their research outputs to them:

CP-1:

It's very important that we put dissertations and theses out there so that people can access and the citation levels for our university will also go up... There are people [referring to faculty] here who don't, they have just about two or three citations because their work is not known, you see? We could do better if our materials were getting out there in the public domain... When I get invited, next week I'll be on the global stage promoting nutrition... before the very best in the world, how can I do that? It's because I collaborate with people who know my worth. UHAS may not know my worth, but people internationally know my worth. So why should UHAS not celebrate me? Why should I rather be celebrated by my international peers? ... We also need recognition. So, if somebody comes from the London School of Hygiene or Tropical Medicine, he knows that he can work with me, and then together, when he gets his Professorship, I also get my Professorship. That is the way it works. And when I get my Professorship, because of the collaboration, this institution also moves

up, you see, but you [referring to the institution] facilitate that process and by you doing that, you also get known... And you see, the other important thing is that, uh..., a great work is done here in Hohoe, in Ho, in Ghana; people must know the work that has been done so that they don't reinvent the wheel or repeat the thing...

CP-2:

Basically, as a scientist, it's all about you doing your research and sharing findings with others who will potentially benefit from whatever you do. And so, for me, if you do research and it's not out there where people can access it then you should as well not do it at all... the motivation is, as much as possible, get it out there, let others see it so that they benefit from it and as well cite your research. So, one of the things that I normally do, for example, I check, even though I get automatic updates from Google Scholar whenever there are citations to my articles, or ResearchGate, I usually would go there to check and I don't just check for myself, I also check for that of my colleagues...

Increased citation, research collaboration, enhanced researcher and institutional repute, and wider circulation of research were captured as keystones of motivation for UHAS faculty researchers to participate in OA IRs. This shows that UHAS faculty have embraced the open access philosophy and dream of making scientific knowledge widely accessible to global citizens without restriction, as a way of promoting the use of research knowledge in solving societal problems (section 2.2). As a university wholly dedicated to medicine and the allied health sciences, the results from faculty confirm the assertion in the literature that there is a higher uptake of open access among researchers in the health and life sciences (section 2.3). Faculty's familiarity with OA repositories may be attributed to the fact that, by virtue of their career disciplines in medicine and life sciences, they have been exposed to OA repositories and initiatives such as PubMed, PubMed Central (PMC), Health InterNetwork Access to Research Initiative (HINARI) and many more leading OA journals and databases in those fields as users. The benefits derived by them through toll-free access to these resources obviously adds to their motivation to participate in OA IRs.

4.3.8 IR marketing and promotion

This theme emerged from the data that described the participants' attitude toward efforts to encourage stakeholder participation in the establishment of the IR. The researcher also sought to test the preparedness of faculty to support marketing and promotional efforts for the IR by specifically asking faculty participants: "Would you recommend the IR as an information resource to your students?" The respondents were positive and gave examples of materials they would direct students to in the IR:

CP-1:

Most definitely. I mean, uh..., once I know, and I cover different types of students, uh, I would definitely sell the IR to them in any form, in any way possible. I'll plan and do that... As usual, the e-books. It's very crucial. I travel round the world and I bring various types of input to my students. The beginning of every year, I give them a chunk, in fact, a whole folder of e-books on the particular course that I'm teaching. If we had an effective, efficient IR, all I'd tell them is go that way. If we had an eGranary, for example, which our colleagues actually advocated for, then I don't need to do all this. I'll just refer them to it. If we had an efficient Internet system, rather than I downloading and sharing it to them, they just have access to it. It [IR] becomes a white elephant without a good Internet system but it also doesn't mean that we should sit down and fold our arms and say that we don't have Internet. Get whatever we can, send a proposal and let the Senior Management make an informed decision based on what is possible, and the potential. Every institution wants to get up there and be recognized, and I believe the Vice Chancellor and the Senior Management will similarly want to do that... I'll be very supportive of your work, I like what you're doing, you're progressive.

CP-2:

Faculty research, ... theses. These are two main things that I would ask students to go in and get. When it comes to reports, those ones, most of the time, are not things that benefit students directly, so those ones I will not necessarily recommend for students, but theses, articles and other publications in that direction.

DM-4:

So, if we are able to do the initial demonstration, upload the publications of a few of the lecturers, and then this is projected to the Senior Management, and for that matter the university community, I'm sure everybody who has done some research work of some sort will be happy to see his or her work in the Institutional Repository and therefore online.

DM-5:

Content, will not come up in one day. Those who give us the content should be involved to understand how the system works because the system is supposed to be a system where they are also going to benefit, ... So, for me, the producers of the information or the authors should also be involved to understand this system, that it's not a one-day affair, it's something that must be running. So long as you remain a partner in the institution you must try as much as possible to make sure the system

runs. It's not a matter of choice as such, but it should also be a matter of choice to the person to see how beneficial the thing is to him or herself.

From views expressed by the faculty participants, they will fully support any IR marketing and promotion effort by referring students to relevant academic resources contained in the IR. Other comments from participating senior management crystalize the fact that no sensitization or marketing efforts have yet been made by the UHAS library. As rightly pointed out by DM-5, there is the need to engage content contributors from the early stages of the implementation effort in order to incorporate their perceived benefits into the service definition of the IR policy for sustainability.

4.3.9 The library as an agent of change

This was the most unique theme that emerged from the interview data. There was no precise question to any of the participant sub-groups regarding the library's role but various issues raised by the participants portray the UHAS Library as underperforming in its mission of supporting intellectual development and research. The participants expected more effort from the library at marketing its resources and engaging more meaningfully with stakeholders in promoting its programmes and initiatives:

CP-1:

I may have the knowledge, but what of people that I'm mentoring? Can they come to the library and get the training that they require, for ongoing training? ... Create training opportunities because there are a lot of people who do not know the facilities ... you [referring to the Library] become the facilitators, making yourselves useful and become the, uh..., the agents for change in UHAS so they see your relevance, the Senior Management will see your relevance in pushing researchers to the fore... because, things are improving all the time, we are in advanced technological age, we need constant training to catch up with the times... So constantly, we've got to put our faculty members on their toes because they also need the training to get better. You don't just leave them assuming they know, and you see, people must always be on their feet to be competitive... There are a lot of things that a lot of researchers don't know about. Some come and they are immersed only in teaching. They do not know how to even use a search engine. You [Library] create that enabling environment for them to learn.

DM-3:

You [referring to the library] need to bring to the attention of Management the cost implications in the form of a proposal... There must be a budget for the project...

Everything is possible with good planning; knowing the cost implications. It's better to know the cost before making the decision.

DM-5:

I think, we must be looking at developing it along as we grow... it should develop along with us... Content, will not come up in one day. Those who give us the content should be involved to understand how the system works because the system is supposed to be a system where they are also going to benefit, ... So, for me, the producers of the information or the authors should also be involved to understand this system, that it's not a one-day affair, it's something that must be running. So long as you remain a partner in the institution you must try as much as possible to make sure the system runs.

The university library does not appear to appeal very much to faculty in terms of its role in providing opportunities for continuing professional development and information literacy to staff. Senior management also appears not very confident in the library's approach to the IR project in terms of due process. The library needs to pay attention to the key issues raised by these stakeholders in order to secure their support for the IR project. Furthermore, the library needs to design programmes to embed in faculty's teaching and research spaces and develop a programmed system of capacity building for staff to earn their trust. That way, staff will eagerly support subsequent library initiatives.

4.4 Discussion of the results

The empirical findings of this research have demonstrated a fair standardization of the critical success factors for the implementation of an IR. The research aimed at determining the feasibility of an IR project at UHAS by testing the prevalence or otherwise of the gold standard critical success factors widely reported in the repository literature. The results show that UHAS has a good opportunity for the establishment of an IR but attention needs to be paid to infrastructure, marketing and promotional issues and change management.

A synthesis of IR CSF literature aligned with the research objective and research questions was constructed to constitute the a priori themes (section 2.8), namely:

1. Executive support;
2. User acceptance;
3. IR policy;
4. Resources;
5. IR marketing and promotion; and
6. Organizational culture.

Nine (9) broad themes emerged from the interview data through open coding, which aligned with all the above six a priori themes with the three (3) extra themes reflecting further unique characteristics of UHAS. These extra themes include:

1. Stakeholder perceptions of an IR;
2. Researcher motivation; and
3. The Library as an agent of change.

These themes have been shown to have far reaching consequences for the other themes and therefore for the successful implementation of an IR at UHAS and are discussed before the gold standard themes.

4.4.1 Stakeholder perceptions of an IR

The diversity of views among the participants (see section 4.3.1) shows a lack of common understanding among UHAS community members regarding what exactly an IR is, and what purposes it serves. Whilst the decision makers (senior management) understand it from a purely manual archives and records management perspective, the content contributors (faculty researchers) envision an integrative platform that provides access to electronic library resources and online learning while serving as an archive of research output at the same time. These views influenced their expectations and ultimate acceptance of the IR. For example, CP-1 indicates:

I need desperately to see the current journals that uhh... I can have access to, whether I'm in London or the US.

Stakeholders' perception of the IR also has an impact on the IR policy, particularly on content types to be included in the IR. The IR policy theme received the highest number of references from the interview data because of the library's failure to educate stakeholders on the IR and its benefits. Many of the concerns raised relative to the IR policy included content recruitment, governance, data security, implementation approach, content types, IR value proposition, rights management and strategic alignment. One participant claimed there was an IR policy in existence:

The policy captures what should be included and what should not be included and this will be done by the staff of the library... (DM-4)

This came as a big surprise as the main stakeholders, including decision makers and content providers who participated in this study appeared unaware of such a policy, and instead were contributing their own thoughts and expectations about what the IR should be.

These revelations, however, led the researcher to seek more information from documentary sources to triangulate the data. A hard copy of an attachment sent to the Pro-Vice Chancellor of UHAS and received on 26th November, 2015 was obtained from DM-4. This draft IR policy document covered most of the concerns raised by the participants quite extensively. It even covered issues of trustworthiness of the repository by including mention of its registration with OAlster, OpenDOAR, ROAR and Scirus among others (Library Board 2015), which addresses part of the main research question on the requirements to implement a trusted IR (see section 2.4.3). However, the superfluity of data on IR policy-related concerns by the participants confirms the concerns expressed that the library failed to involve key stakeholders in the repository planning process, as this policy, obviously, has not been communicated to any of these parties of interest since its adoption.

Furthermore, some issues emerged under the IR policy theme based on the stakeholders' perception of an IR that will affect the contents of the existing policy document. For example, sections 2.2.4 and 2.6 of the draft UHAS IR policy, which deal with content submission, favours self-archiving. The empirical evidence from this research, however, showed a prevailing cultural acceptance of mediated deposit among the key stakeholders, particularly content providers (see section 4.3.4).

The draft IR policy document sighted by the researcher makes no reference to an institutional OA mandate to enforce content submission, but the study participants proposed such a mandate for the repository's success, a point well-articulated by Jain (2011) (see section 2.7). Similarly, section 2.2.7 of the draft UHAS IR policy lists "e-resources" among the acceptable content types, but this has not been defined anywhere within the policy; whether it encapsulates CP-1's expectation of a database of subscribed journals or not remains unknown. The policy also lacks a definition of service scope, contrary to Lynch's (2003) definition of an IR (see section 2.4.1) and Barton and Waters' (2004) second step in creating an IR (see section 2.9). These gaps can be attributed to the non-involvement of stakeholders in drafting the policy in the first place, and further, by the non-communication of the approved policy to community members.

IR marketing and promotion activities can help correct misconceptions about the IR and also serve as a springboard to collect feedback from stakeholders to put into the project execution strategies to ensure success.

4.4.2 Researcher motivation

Interview data revealed that the motivation levels of faculty are high regarding submission to the IR based on the expected benefits of achieving an increased citation count to their articles, research collaboration, enhanced researcher and institutional repute, and wider circulation of research. These are captured under the “services” factor (see section 2.7.4) noted by Lagzian, Abrizah and Wee (2015b) as critical to the success of the IR. Thus, UHAS faculty expect that they can receive automatic feedback on citations to their articles as well as reach a wider global audience with their research through the IR and forge collaborations with peers. They also expect the capability to host courseware and deliver other online learning and research models through the IR, which is supported by the literature on advances in IR operationalization (De Castro, Shearer & Summann 2014; Siciliano et al. 2014) (see section 2.7.4). These expectations need to be captured and integrated into the service scope of the IR and documented in the policy.

4.4.3 The library as an agent of change

It is obvious, from the study results, that the IR implementation will introduce changes to the status quo at UHAS, particularly with the likelihood of introducing OA mandates and author self-archiving, which are regarded as critical elements of success. As noted by CP-1, the IR phenomenon will be seen as putting extra burden on faculty who are already hard pressed for time (section 4.3.4):

Self-archiving is very important. Yes, we need training on that, but also give the job to the people who are good at it and encourage them to do it. And I couldn't overemphasize that we are very busy researchers; I teach, I'm involved in administrative capacities and so I may not have the time to do that so I rely on the journals, I rely on my university library experts who can take it up and shoot it to the global platform. And so, self-archiving is important but we may forget; we may not find the time.

If the UHAS IR is implemented to satisfy the expectation of key academic stakeholders (which must be the case), the ripple effect on other areas of academic and research practice and resource allocation must be taken cognizance of. For example, top management will be faced with the decision to invest in the project and continue to make funds available for its maintenance in perpetuity; faculty and students will be required to deposit their research in the

repository, which was not previously the case; submissions of assignments, papers and research output by students and faculty will have to now be scrutinized by plagiarism detection software; library staff and faculty must obtain mastery of copyright issues; documentation by non-academic staff will need to be systematized, which requires further training; and collaborations with ICT and IHR will be required of the library itself for the smooth implementation of the inevitable changes to be brought on by the IR implementation. All these new values will disrupt the existing organizational culture. To be successful with the IR project, therefore, organizational change management must be given critical strategic attention (section 2.7.1).

It can be inferred from the interview data that the library currently suffers an image challenge due largely to technology failure, particularly poor Internet provision, which limits access to its electronic resources, as well as a lack of systematic education and training for staff on access and exploitation of these resources and other information literacy issues. CP-1 makes an elaborate statement on this failed expectation, thus:

Yes, and you [referring to the Library] create training opportunities because there are a lot of people who do not know the facilities ... You become the facilitators, making yourselves useful and become the, uh..., the agents for change in UHAS so they see your relevance. The Senior Management will see your relevance in pushing researchers to the fore... Can they come to the library and get the training that they require, for ongoing training?

Negative perceptions about the library's capacity to satisfy the academic and research needs of the university community can have serious consequences for all library initiatives. The UHAS Library needs to make conscious efforts to address this image problem so as to win the trust of faculty. Library marketing and branding strategies must be put in place. The IR initiative offers an opportunity for the library to market itself while promoting the IR concept. Training in electronic resources, reference management, the use of the OAIster database and other relevant programmes will help in shaping user perception about the library and earn patrons' support in its implementation of programmes and projects.

4.4.4 The gold standard themes

The remaining six (6) emergent themes: executive support, user acceptance and support, IR policy, resources, IR marketing and promotion, and organizational culture, which fell in perfect alignment with the gold standard, the a priori themes, are not mutually exclusive of each other nor of the extra three (3) addressed above.

Again, the research goal was to assess whether these CSF, in their positive sense, are present at UHAS for the implementation of an IR. As put forward in the discussion of stakeholder perceptions, the IR policy does exist, but needs further review and marketing to the major stakeholders to elicit their informed support for the project. Executive support and user acceptance are two ends to the same rope. As presented under sections 4.3.2 and 4.3.3, the sampled senior management personnel and faculty researchers of UHAS highly support the immediate implementation of the IR but expressed concerns about pertinent issues that stand in the way of its realization. These issues were answered under the resources theme where nearly all the participants affirmed that the university is resource-constrained in terms of finance and infrastructure and suggested alternative financing and public-private partnership to address the infrastructural challenges. Below are some excerpts:

CP-1:

It [IR] becomes a white elephant without a good Internet system but it also doesn't mean that we should sit down and fold our arms and say that we don't have Internet. Get whatever we can, send a proposal and let the Senior Management make an informed decision based on what is possible, and the potential.

DM-1:

No. The university is not ready, not at the moment; financially, technical infrastructure, no-no. The kind of server for an IR... with this bad network that we have here ... look, even switches to route Internet we don't have. See, tools for Webmasters, such as laptops are not provided, no datacentre, not to talk of back-up systems... Some Chinese monetary support was promised, well, if it happens, we'll be about 70% ready because that was earmarked for infrastructural development and I know they will come to do the work themselves, but as to when that will come, no one knows. Outside that hope, I don't think IR for UHAS now is practicable.

DM-3:

The need [to establish the IR] is already known and appreciated... Yes [implementation is feasible], with planning. You [the Library] need to bring to the attention of Management the cost implications in the form of a proposal. Management will look at sources of funding other than the Government. There must be a budget for the project. GETFund [Ghana Education Trust Fund] supports in infrastructure and equipment acquisition. Can we take it as a special project through GETFund, IGF, or donor agencies? Everything is possible with good planning; knowing the cost implications. It's better to know the cost before making the decision.

DM-4:

I know attempts are being made to increase the bandwidth. Even if we are not able to buy a server for the purpose, I think the university has a server or servers; we can rely on one of them in the interim until maybe such time that management thinks that we need a dedicated server, as other institutions.

The excerpts from the participants' data show that a lot more input is required for consensus building around the library-led UHAS IR initiative. The sharp contrast of the opinions by DM-1 and DM-4 on availability of resources to support the IR initiative highlights the gap in communication among the relevant stakeholders regarding the approach to implementation of the IR. While both agreed that there are resource constraints, DM-4 thinks that the IR can have a shared space on the university server whilst DM-1 claims that the university IT lacks requisite basic tools and servers to run its own affairs. The data are replete with similar trends of lack of baseline information regarding the feasibility of the IR. The IR for UHAS is seen as a necessity by all, but the approach to implementation seems to follow needless learning curves. There appears to be a lack of consultation on the vision and direction for this project, which if not checked, can lead to a big failure.

DM-5 made a very useful suggestion in his submissions regarding the approach to implementing the IR, which the library must take seriously:

We have cost implications and it also depends on where you want to host it. I may say that, from the angle of those who have already gone into this project, looking at the volume of your materials will determine where you would like to start from – whether you want to go in for a complete structure or whether you want to be part of another system and move on to develop yours in future ... the institution or UHAS must also be looking at how others got there and also get there.

This view is in agreement with Barton and Waters' (2004:11) first stage of the IR implementation process: "Learning about the process by reading about and examining other institutional repositories". The library and IR implementation committee obviously need to slow down and get a lot of these issues raised by the participants addressed in order to succeed with the IR implementation. This research will serve as a valuable baseline resource and blueprint to inform the library's approach to implementation of the IR.

4.5 Scorecard summary of the results

Table 4 below presents a scorecard of the status of the IR CSF at UHAS based on data collated from interviews with decision makers (senior management) and content providers (faculty). The scorecard is used to provide a numerical insight into the qualitative data and give a quick

overview of the prevailing circumstances concerning the feasibility of IR establishment at UHAS (see sections 3.4.1 and 3.4.1.1).

4.5.1 Scoring scale

The themes and sub-themes are listed in detail and scored 0 – 1, where 0 (0%) means the scored item is lacking in UHAS, 0.5 (50%) means there is a semblance of the CSF but not sufficient enough to predict IR implementation success, and 1 (100%) denotes that the scored item has a positive presence in UHAS and will lead to IR implementation success. The remarks column gives the motivation for each score (see section 3.4.1.2).

4.5.2 Scoring procedure

The 0 – 1 scale is applied at primary level, that is, only to the most basic elements under each of the nine (9) themes. Any superordinate score is an average of its primary sub-category scores. This means that themes that have only first-level sub-categories (example, 1.1, 1.2, 2.1...) are scored between 0 and 1 at the first-level., However, themes that have second-level sub-categories (example, 2.2.1, 2.2.2, 3.5.1...) are scored 0 – 1 at second-level and averaged at first-level. We are therefore likely to see a score other than the three defined scores of 0, 0.5 and 1 at first-level sub-categories and the major themes. For example, a score of 0.33 at theme 3 (Organizational Culture) sub-category 5 (3.5 IR Policy) level is the average of the second-level primary scores of 0.00, 1.00 and 0.00 for the second-level sub-categories of 3.5.1 (Awareness and practice), 3.5.2 (Institute of Health Research) and 3.5.3 (Student research), respectively (see section 3.4.1.3).

4.5.3 Final scores

The unweighted mean of all the nine (9) major theme scores constituted the overall score of 0.44, which on the 0 – 1 scale is a below average performance ($0.44 < 0.5$). However, the literature on IR CSF places greater emphasis on some factors than others (see sections 2.7 and 3.4.1.4), therefore, a weighted score was deemed more appropriate. The weights assigned to the themes are based on the levels of importance or priority accorded them in the IR CSF literature, and are expressed as percentages. Each final (weighted) score, which is also expressed as a percentage, is the product of the average score of the theme and its corresponding weight, whilst the overall readiness (final) score is the sum of all the weighted theme scores. The overall readiness score of UHAS based on the weighted mean is therefore, 55% or 0.55, which on the 0 – 1 scale is a little above-average performance ($0.5 < 0.55 < 1$) indicative of the readiness of UHAS for the implementation of an institutional repository but with caution to pay attention to some critical elements of success. Table 4 provides the details.

Table 4: Status of the IR CSF at UHAS: A readiness scorecard

S/N	THEMES AND SUB-THEMES	RAW SCORE	WEIGHT (%)	FINAL SCORE (%)	REMARKS
OVERALL READINESS SCORE		0.44	100%	55%	A little above average. UHAS can successfully implement an IR if attention is paid to the themes that scored less than half of their weight.
1	EXECUTIVE SUPPORT	0.50	30%	15%	
1.1	Willingness	1.00			Senior management supports the proposition and has also approved the policy.
1.2	Management priority	0.00			Some participants feel that due to well-known resource constraints, the IR will not come top of management's scale of preference.
2	IR POLICY	0.63	5%	3%	
2.1	Altmetrics	0.00			There is no mention of altmetrics or author alerts in the UHAS IR policy.
2.2	Content recruitment	0.20			
2.2.1	<i>Critical mass of content</i>	<i>0.00</i>			The UHAS IR policy does not indicate how it will be obtained.
2.2.2	<i>Automatic ingest</i>	<i>0.00</i>			This is not mentioned at all in the UHAS IR policy.
2.2.3	<i>Institutional OA mandate</i>	<i>0.00</i>			This is not captured in the UHAS IR policy.
2.2.4	<i>Mediated archiving</i>	<i>0.00</i>			This is also not stated in the UHAS IR policy.
2.2.5	<i>Self-archiving</i>	<i>1.00</i>			Sections 2.2.4 and 2.6 respectively mention self-archiving.
2.3	IR content	1.00			The UHAS IR policy adequately specifies the types of digital objects and formats that will be acceptable (sections 2.2.5 and 2.2.7).
2.4	Rights management	1.00			The UHAS IR policy states the use of authentication systems (section 2.9) to grant access to some categories of documents, and how copyright and intellectual property rights will be protected (section 2.3).

2.5	Data security	1.00			The UHAS IR policy covers preservation of digital objects (section 2.4) and system backup issues (section 2.10).
2.6	Governance	1.00			Section 2.11 establishes that the IR management committee is a sub-committee of the Library Board and has the University Librarian as its Chairman.
2.7	Implementation approach	0.00			The UHAS IR policy does not spell out exactly how the IR will be established: hosting options, timeline, etc. nor make reference to any document on the choice of approach.
2.8	IR value proposition	0.50			The UHAS IR policy makes lists of some benefits of an IR to the university and to the researchers under section 1.2.1 but does not demonstrate the return on investment for a decision to be made on an informed basis with sustainability in mind, nor refers to any document in which these have been adequately captured.
2.9	Strategic alignment	1.00			The UHAS IR policy demonstrates that the proposal for an IR is in tune with the mission and goals of the university; it cites university documentation to prove this in sections 1.2.2, 1.2.3, 1.2.4 and 1.2.5.
3	ORGANIZATIONAL CULTURE	0.47	10%	5%	
3.1	Open access awareness and participation	1.00			Faculty are much aware and support open access.
3.2	Documentation	0.00			Participants indicated that there is poor record-keeping behaviour among staff generally and systems are yet to be developed to streamline the practice (DM-2 & DM-5).
3.3	Plagiarism and copyright issues	0.00			There is currently no means of detecting plagiarism and most student works are found to be highly plagiarized.
3.4	Publishing preference for high impact factor journals	1.00			Faculty still prefer to publish in proprietary journals with a high impact factor.

3.5	Research policy	0.33			
3.5.1	<i>Awareness and practice</i>	<i>0.00</i>			Participants were not aware of any policies guiding research at UHAS.
3.5.2	<i>Institute of Health Research</i>	<i>1.00</i>			Newly set up to address research issues by formulating and enforcing appropriate policies.
3.5.3	<i>Student research</i>	<i>0.00</i>			The library does not have custody of student research, and none of the participants knows where the university's copies of students' research end up.
4	RESEARCHER MOTIVATION	1.00	20%	20%	
4.1	Increased citation count	1.00			All these factors that were buttressed by the participants as their core motivation for accepting the proposal to set up an IR for UHAS, have also been captured in the UHAS IR policy under section 1.2.1.
4.2	Collaboration	1.00			
4.3	Researcher repute	1.00			
4.4	Wider circulation of research	1.00			
5	RESOURCES	0.17	5%	1%	
5.1	Infrastructure (Internet, server, etc.)	0.00			Participants lamented the unreliability of university Internet and the unsupportive infrastructural base for the IR includes non-availability of a server.
5.2	Human resource (IR expertise)	0.50			Personnel from the IT department can help with initial set-up and basic technical issues, but recruitment of a repository manager or training for existing library staff is required to sustain the repository.
5.3	Finance	0.00			The library has not developed any cost model to inform management decision. No positive statement could be made about financing.

6	STAKEHOLDER PERCEPTIONS OF AN IR	0.17	5%	1%	
6.1	Database of research outputs	0.50			Participants had mixed views of what an IR is. Stakeholders need to be educated about the nature and potential of the IR.
6.2	IR facilitating e-learning by hosting relevant course materials and e-books	0.00			The UHAS IR policy does not define the service scope for the IR beyond describing the type of content to host.
6.3	Other library e-resources	0.00			The UHAS IR policy mentions "E-resources" under section 2.2.7 but fails to define what it encapsulates.
7	IR MARKETING AND PROMOTION	0.00	5%	0%	
7.1	The central role of the library in IR marketing	0.00			The library has not taken any steps to promote the IR to stakeholders. It also does not have a marketing plan in place.
8	USER ACCEPTANCE AND SUPPORT	0.50	15%	8%	
8.1	Willingness	1.00			Faculty participants expressed absolute support for the IR but cautioned that there be an OA mandate to enforce compliance.
8.2	User involvement	0.00			Trends in the data show that the library has not involved key stakeholders, particularly content contributors, in the project initiative since its inception.
9	THE LIBRARY AS AN AGENT OF CHANGE	0.50	5%	3%	
9.1	Library marketing and promotion through CPD programming	0.50			Faculty find efforts by the university library to strengthen clients' capacities to access and use its resources and master current technologies inadequate.
9.2	Library-ICT and Library-IHR collaboration for cultural change	0.50			This is captured in one paragraph under section 1.2.1 of the IR policy document as a potential. Some level of Library-ICT collaboration does exist currently.

The scorecard above gives the readiness score for UHAS regarding the implementation of an IR as 55%. The little above-average performance indicates that an IR is possible for UHAS. Even so, some pertinent issues need to be fixed first. Important result areas to note are the themes that scored below 50% of their weight, such as resources, stakeholder perceptions of IR and IR marketing and promotion. However, key result areas such as Executive support (50%) and Researcher motivation (100%) show that there is a good chance that the initiative could be implemented with success. Adequate attention should be directed to the failed themes to ensure the establishment of a trusted digital repository.

4.6 Conclusion

This chapter presented the data analysis, results and major findings of the empirical study. The procedures for organizing data and presenting the results were all discussed in detail. The thematic approach to analysing data and presenting and discussing results enabled the empirical findings to be compared with a priori themes drawn from the literature review to establish congruence and variation. The novelty of this study, in the field of IR CSF, is the adoption of the scorecard principles for encoding the CSF in numerical terms using weighted means. This approach enabled results of the empirical research to be viewed and understood at a glance. It gave UHAS an overall readiness score of 55%. This is easy to interpret at first sight before moving into the qualitative details to ascertain the numerical impression. The chapter, ultimately, provided the basis for the major conclusions and recommendations in chapter 5.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the main conclusions reached by the study based on the analyses of empirical data collected from the field through interviews. Based on the conclusions, some recommendations are also made to guide future research and IR implementation efforts. The collection of field data and the entire research effort were guided by the research objective and research questions.

5.2 Research objectives

The main objective of this research (section 1.3) was to assess the feasibility of establishing an institutional repository (IR) at the University of Health and Allied Sciences (UHAS) by:

- i. verifying whether decision makers are willing to support the initial set-up and perpetual maintenance of an IR;
- ii. investigating the familiarity of faculty researchers with Open Access (OA) repositories and their willingness to contribute content using the self-archiving model; and
- iii. assessing the presence or otherwise of the critical success factors for establishing an OA IR apart from management support and user participation.

5.3 Main research question

The main research question that guided the study was: “To what extent is UHAS ready to implement an institutional repository?”. This question was examined in the light of the objective of the study through exploration of literature (chapter two) and an empirical investigation (chapter four) guided by the following sub-questions:

- i. What determines a trusted digital repository? This question was answered in section 2.4.3.
- ii. What would be the value of an IR to UHAS? This question was addressed in section 2.4.4. In brief the value is the global showcase of scholarship through research outputs as a quality indicator, and the long-term availability and accessibility of institutional artefacts.
- iii. What is the current level of knowledge, awareness and use of institutional repositories among the senior management and faculty of UHAS? Section 4.4.1 extensively reports on the outcome of research conducted. It appears that respondents were not fully aware of the benefits of an IR. This is discussed in more detail in section 5.4.1 below.

- iv. How willing are the relevant UHAS stakeholders to implement a trusted institutional repository? Again, the results of the research are reported in full in sections 4.3.2 and 4.3.3. In brief, it is possible to report that stakeholders fully support the implementation of an IR but they are cautious about the implementation approach. More details are provided in section 5.4.2 below.

5.4 Main conclusions reached

The conclusions reached based on the major findings of the study are presented below with commensurate recommendations.

5.4.1 Moderate knowledge of IRs at UHAS

The researcher sought to establish the level of awareness and participation of major academic stakeholders (senior management and faculty researchers) in open access repositories as a baseline to predict the success or failure of an IR project at UHAS. Results from data analysis showed that IR stakeholders at UHAS have diverse, and fragmented knowledge of an IR (see section 4.3.1). This is discussed in section 4.4.1. It portrays a lack of understanding among members of the UHAS community about what exactly an IR is. Faculty participants had a clearer understanding of an IR than senior management participants. Although both groups agreed that the IR would capture and showcase research output, the perceptions of senior management and faculty differ pertaining to content types and functionality of an IR. While senior management participants viewed the IR mainly as a facility for records management, faculty researchers perceived the IR as an integrative platform performing the functions of a current research information system, digital archives and an e-learning platform. This appears to be a result of the library's failure to market and promote the IR, both as a concept and initiative, to the key stakeholders. In terms of use, the senior management participants, who were mainly administrators, were more experienced with paper-based archives whereas the faculty participants had a fair knowledge and contribution to IRs albeit not by self-archiving. According to the Scholarly Publishing and Academic Resources Coalition (SPARC), IR is "institutionally defined" (Barton & Waters 2004:10) (section 2.4.1). UHAS Library must therefore work at harmonizing the various views of stakeholders into a unique definition of the UHAS IR based on stakeholder expectations and definition of needs and requirements. This will earn strong support for the IR.

5.4.2 There is cautious support for IR implementation

All participants expressed their total support for the IR project and called for its immediate implementation. However, the choice of implementation approach was a matter of concern. Some of the participants were of the view that implementation should be systematic, strategic

and evidence-based by knowing the full financial commitment before making the decision. Others, suggested giving consideration to being part of a federated repository to start with before evolving into a full-blown institutional repository; while others felt that the need was long overdue and whatever resources were available should be put to use for immediate implementation (section 4.3.5):

Looking at the volume of your materials will determine where you would like to start from – whether you want to go in for a complete structure or whether you want to be part of another system and move on to develop yours in future... (DM-5)

Everything is possible with good planning; knowing the cost implications. It's better to know the cost before making the decision... (DM-3)

Versus

Even if we are not able to buy a server for the purpose, I think the university has a server or servers; we can rely on one of them in the interim until maybe such time that management thinks that we need a dedicated server, as other institutions... (DM-4)

The latter view of pursuing the agenda without fully appreciating the long-term cost implications may lead to ad hoc decisions that would frustrate the success of the project. It also falls short of the requirements for trustworthiness as outlined in section 2.4.3. To strike a balance between the urgency expressed and the need to establish a trustworthy IR, some of the participants suggested presenting a business case or proposal to senior management (sections 4.3.3 and 4.3.5):

It [IR] becomes a white elephant without a good Internet system but it also doesn't mean that we should sit down and fold our arms and say that we don't have Internet. Get whatever we can, send a proposal and let the Senior Management make an informed decision based on what is possible, and the potential... (CP-1)

You [the Library] need to bring to the attention of Management the cost implications in the form of a proposal. Management will look at sources of funding other than the Government. There must be a budget for the project... (DM-3)

These views are excellent and the library needs to prioritise a feasibility assessment over rushing into the project because urgency was expressed. Without a proper cost analysis, the

decision to establish an IR may become costlier and result in failure or abandonment of the project.

5.4.3 Mediated deposit and an open access mandate are critical

One of the surprise sub-themes that emerged from the empirical data collected was the sharp contrast of the field evidence to what is generally reported in the repository literature regarding self-archiving. Existing literature as well as the draft UHAS IR policy on content recruitment lists self-archiving as a critical success factor; however, the participants in this study think that mediated deposit would be the best way of recruiting content into the UHAS IR (see section 4.3.4). In addition to the previous negative experiences with un-mediated IR deposits, faculty members are also of the opinion that the submission process is time-consuming and technical, which they would not be willing to engage in (section 4.3.4):

We [faculty] are very busy researchers; I teach, I'm [also] involved in administrative capacities and so I may not have the time to do that [deposit articles]. So I rely on the journals, [and] I rely on my university library experts who can take it up and shoot it [deposit] to the global platform. And so, self-archiving is important but we may forget; we may not find the time... (CP-1)

This finding about faculty's attitude toward self-archiving confirms similar findings by Singeh, Abrizah and Karim (2013) as cited in section 2.7.5.

Further to this, participants are also of the opinion that contribution to the UHAS IR should be enforced by an institutional OA mandate (see sections 4.3.3 and 4.3.4):

I wouldn't necessarily look at it as supporting the initiative. I think, it should be a policy ... There has to be a policy. If it's not a policy, it's not going to benefit all of us because it is only a few people who would want to go to that extent to have anything there., So there has to be a policy... (CP-2)

It must even be in the statutes. I'm sure that will enforce it [deposits in the IR]. I don't see the need to do a research and then keep it on your chest [keep the results to yourself] and refuse to release it for others to use... (DM-2)

The essential role of institutional mandates, as mooted by the participants, is amply documented in the literature, and as shown in section 2.7.5, 675 out of 796 OA mandates registered with ROAMAP are institutional mandates.

The complementary relationship between mediated deposit and institutional OA mandate is crystalized in this statement by a faculty participant (CP-2):

But then, if there is a university policy, then, I think, the mediated one may be the best way to go...

This finding also accentuates Xia's (2007:647) position that successful self-archiving is achieved through "a liaison system and a mandate policy" (see section 2.4.7). Thus, if UHAS IR policy insists on self-archiving, which it currently advances, then it must make provision for an institutional OA mandate, which it currently does not mention, and must support a liaison system of self-archiving either through embedded librarianship or capacity building for faculty's administrative staff. The participants' overwhelming support for mediated archiving also confirms Lagzian, Abrizah and Wee's (2015b) finding that mediated archiving is a more sustainable content recruitment model for IRs as it solves the challenge of faculty non-participation due to the time factor (see section 2.7.5). The consistency of these empirical findings with the literature consulted on CSF cautions against the "if you build it, they will come" (Wesolek & Royster 2016:59) (sections 2.4.3 and 4.3.4) attitude that sometimes characterises the implementation of IT projects in organizations. Such projects often result in costly learning curves. It is therefore important for the UHAS library, if it intends to succeed, to pay attention to its implementation approach and to engage stakeholders extensively in a needs assessment effort in order to clarify the scope of IR services to the community.

5.4.4 The current resource base of UHAS cannot support an IR

One of the lowest-scoring success indicators on the UHAS IR-readiness scorecard (see section 4.5.3) is "resources", which comprises Internet and repository infrastructure, personnel and finance. Scoring as low as 0.17 of the 0 – 1 scale and 1% against its weight of 5%, all the participants believed that the current infrastructural base, if not improved, cannot support an IR project. The library also has not yet presented any business case or IR value proposition and cost model to senior management so that senior management could make evidence-informed decisions. The general belief among the participants is that, if the IR could be financed at all, it will have to be through special arrangements, mostly from donor support rather than university funding.

The library seems unprepared as it currently does not have an initiative to collect research output from faculty and students due to the lack of a clear-cut policy on research for UHAS. The library has also not yet considered recruiting a repository manager or training some of its staff to manage the IR. This has contributed to the low levels of awareness among stakeholders as no staff have been appointed with the responsibility of marketing and promoting the IR to the UHAS community. Another aspect of the institutional resource base that threatens the success of the IR, is the lack of anti-plagiarism software. This is a cause for

concern for faculty researchers (as reported in sections 4.3.4 and 4.3.6). The fear of plagiarism detection was also reported in literature as a reason for non-participation of faculty in IRs (see section 2.3).

The reality of a lack of appropriate resources at UHAS is a mismatch against the success factors indicators identified in section 2.7.2. This shows that the IR project will be severely challenged under the prevailing circumstances at UHAS if there are no prior improvements in infrastructure.

5.4.5 Low level of policy awareness and compliance

There is, generally, a low level of awareness of policies among UHAS community members (section 4.3.6). This research brought to the fore a weakness in policy communication and adoption within the UHAS community. The situation with other university policies is beyond the scope of this research, but there appears to be a common trend. The university may have to take another look at how it communicates its policies and enforces compliance among staff and other stakeholders. Several gaps in the UHAS IR policy portray a lack of stakeholder consultation at the drafting stage, and non-circulation of the approved policy among stakeholders for comments and further inputs before commencing implementation efforts. Many insights have emerged from this study concerning stakeholder expectations and service scope, which will instigate a review of the current UHAS IR policy to reflect the true aspirations of community members.

5.4.6 Low library visibility

More is expected of the library in terms of its contribution to promoting access to knowledge resources to support teaching, learning and research. The IR initiative is seen by both the library (UHAS IR policy section 1.2.1) and the study participants (section 4.3.5) as an opportunity for the library to build the requisite synergies with the ICT Directorate so as to facilitate access and exploitation of its resources, particularly those in electronic formats. Faculty participants do not see the library as a hub for the training and development of staff, nor leading continuing professional development. This is exemplified by the following quote from CP-1 in section 4.3.9:

I may have the knowledge, but what of people that I'm mentoring? Can they come to the library and get the training that they require, for ongoing training? ... Create training opportunities because there are a lot of people who do not know the facilities ... You [referring to the Library] become the facilitators, making yourselves useful and become the, uh..., the agents for change in UHAS so they see your relevance, the Senior Management will see your relevance in pushing researchers to the fore...

because, things are improving all the time, we are in an advanced technological age, we need constant training to catch up with the times... so constantly, we've got to put our faculty members on their toes because they also need the training to get better. You don't just leave them assuming they know, and you see, people must always be on their feet to be competitive... There are a lot of things that a lot of researchers don't know about. Some come and they are immersed only in teaching, they do not know how to even use a search engine. You [Library] create that enabling environment for them to learn.

A weak image of the library among stakeholders can have a negative impact on library-led projects like the IR. It is therefore important for UHAS library to commence efforts at building up its image through proactive client-focused and demand-driven library marketing and promotion activities. Such activities are necessary to earn the confidence and trust of community members.

5.5 Recommendations

Based on the research findings and major conclusions reached in this study, the researcher makes a number of recommendations specific to the UHAS but which are also relevant to other settings where this study could be replicated. The study recommendations add to the literature on CSF for IR implementation by provoking a more diversified investigation of the CSF in various other contexts.

5.5.1 Study-specific recommendations

Based on the empirical results of this study, the following recommendations are made for the UHAS case. These recommendations may also be suitable for any similar settings where this study may be replicated.

5.5.1.1 IR Marketing and promotion

IR marketing and promotion are ongoing activities aimed at capturing and sustaining the interest and support of identified stakeholders. The UHAS library must learn from the examples of successful IRs in Ghana and adopt a marketing and promotional strategy to sensitize the UHAS community on the IR, its objectives and benefits to community members. Thompson et al. (2016) enumerate several means and avenues used by the library of University for Development Studies in Ghana to market and promote its IR, UDSspace, to its various stakeholders (refer to section 2.9.5). UHAS library should get to work immediately to collect as many research articles and other organizational artefacts as possible for the initial population of the IR when it is established. Such a critical mass of content, according to Hixson

and Cracknell (2007) and Russell and Day (2010) will attract the interests of faculty and researchers to submit to and use the contents of the IR, which can be achieved through early adopters (see section 2.9.5).

A well-crafted marketing and promotion plan will help the library to communicate efficiently and effectively by leveraging on existing channels, such as the corporate e-mailing system, university website, and the library website, that are highly subscribed to in the university and through other formal and informal meetings including Business and Executive Committee (BEC) meetings, lectures and special information sessions such as project demonstrations. Posters, flyers, take-away bookmarkers and forms at the reference desks will not only serve promotional purposes but also provide a feedback mechanism to shape and improve policy and service definition. IR marketing should commence right at the conception stage and the momentum be sustained through innovations throughout the project life. A good marketing and promotional effort, which involves policy communication, will create a unified concept of the IR among stakeholders and make early adopters quintessential reference points, thus extending the marketing effort beyond the library to peer-to-peer levels with maximum success for the IR.

5.5.1.2 Review of IR policy and implementation approach

The UHAS IR policy must be reviewed to reflect the UHAS situation. The results of this research show many areas of disparity between the current policy and expectations of stakeholders. A proper needs assessment through broader stakeholder consultation must be conducted to form the basis of the UHAS IR policy in order to serve the needs and aspirations of the UHAS community. Such an exercise will enable the library to fill all the gaps in the current policy and make the project succeed. It will also help the library to adapt its implementation approach to the prevailing circumstances in order to make the project pragmatic. For example, whereas the library is currently taking steps without consulting faculty researchers, with the presumption that these content providers will be excited to see their research online and therefore upload the items, faculty researchers who participated in this study raised pertinent concerns about copyright, plagiarism, system security, lack of time to self-archive and an OA policy to make it mandatory for all community members to deposit their research in the IR. Other concerns raised by the participants included the unreliable university Internet and the small number of intellectual outputs due to the youth of the university. All these emerging issues must shape the IR policy and implementation approach in order to achieve success. An institutional OA mandate should be crafted and registered with ROAMAP as a fulfilment of trust (see section 2.7.5).

5.5.1.3 IR business case

Communicating the IR value and cost to management for evidence-informed decision making is key to implementation success (refer to section 2.4.4). Costs in the form of a financial proposal that take into account the current and future financial burden of maintaining an IR need to be clearly communicated to senior management (see section 2.9.2). Senior management will make a decision based on the financial health of the university and the availability of alternative funding sources taking into account their future responsibility for the IR as opined by DM-5 (section 4.3.5):

We have cost implications and it also depends on where you want to host it [the IR]. I may say that, from the angle of those who have already gone into this project, looking at the volume of your materials will determine where you would like to start from – whether you want to go in for a complete structure or whether you want to be part of another system and move on to develop yours in future... these things always develop with institutions. The institutions start, the idea may be there, but it develops with the institution. Where there is an advanced system of planning in an institution, the idea will be a part of, a major part of this strategy, planning and all the other things.

This view from a senior management participant is worth considering. IR strategic planning and budgeting are important for resource mobilization. The university, as a business, has its own strategic priorities and it is important for the library to ensure that senior management sees the IR as a strategic project for the university. Senior management will then make a decision based on available resources. As can be observed from the data analysis, the IR requires other resource adjustments including infrastructure and personnel (section 4.3.5), which are cost items. These need to be detailed to management for a decision regarding the real commitment to be made.

5.5.1.4 Boosting the resource base

The IR business case must take cognizance of the widely lamented unsupportive Internet system and other platform resources necessary to sustain the IR. In addition, the library cannot proceed with any implementation effort without first preparing its staff and collecting research output to contribute to the critical mass of content to be added before the formal launch of the IR. The library's engagement with the ICT directorate must not only be restricted to device and software installations or troubleshooting activities. Instead, there must be extensive collaborations between the two business units of the university right from the needs assessment stage and throughout the project lifecycle. The purpose would be to make sure that the suitability and adequacy of infrastructure including Internet Protocols (IPs) and

bandwidth, among others, are discussed timeously. The reported current state of Internet provision at UHAS is a major cause for concern to the IR project. These background resources need overhauling to contribute to the IR project's success.

5.5.1.5 Promoting the Library

The failure of the UHAS library to market and promote the IR initiative to key stakeholders emanates from an organizational culture of non-marketing of library resources. The library has to change this trend. The study participants argued that the library needs to lead the process of change in the research dissemination and documentation culture. The human-computer interactions also need to change through a programme of systematic training for faculty (see sections 4.3.1 and 4.3.9). This is true, but what is even more true is that the library itself needs change from within in order to lead change in the wider community. Conscious efforts must be put into library marketing to promote the discovery and use of information resources, which the university continues to invest in heavily. Library guides, short training courses in research data management, access and use of e-resources, research assistance, reference management, personal information management and embedding in faculty, research and administrative environments to deliver tailored information literacy instruction, are among the means by which the library can actively engage with stakeholders to prove its resourcefulness as a reference point for information and knowledge.

5.5.2 Recommendations for further research

There remain several research gaps when considering IR success in Ghana and the developing world.

- Cost models for resource-constrained institutions in Africa need to be developed. IRs have become the norm for increasing free access to research, as well as for showcasing the contributions that higher education institutions make to knowledge and quality of life in human society.
- Common examples of cost, such as the Stellenbosch University model (see section 2.9.2), are huge investments for resource-rich institutions. Such institutions are rare in West Africa and other deprived regions. Young universities in struggling economies like Ghana, which are challenged with resource mobilization, cannot realize the proposed ideals for heavy-traffic repositories of bigger and better-resourced universities and libraries, on their own. Research needs to be conducted into West African library collaboration to share costs and resources.
- As an in-depth qualitative study, which cannot be generalized to the entire study population, this study requires furtherance using quantitative approaches to measure

the breadth of the reported findings. The scorecard developed from the findings of this research (section 4.5) can be standardized and used as a survey instrument to collect responses from several participants to determine how wide-spread the opinions expressed in this qualitative study are at UHAS and any other university where this study may be replicated.

5.6 Conclusion

This chapter summarized the main conclusions reached, based upon the results of data analysis. It also made two broad recommendations based on the main conclusions arrived at. The study-specific recommendations related to the UHAS context and included suggestions to address the lack of uniform understanding of an IR among stakeholders. It also included a suggestion to pay attention to some sentiments expressed by the majority of IR stakeholders. There are concerns regarding IR practices such as self-archiving, the inadequacy of the infrastructural resource base for IR implementation at UHAS, and the absence of an institutional open access mandate. Other recommendations included support for mediated archiving and for raising the level of awareness and adherence to policies. The low level of library visibility was among the concerns mentioned by participants and which this chapter recommended paying attention to. An appropriate Library and IR marketing and promotion plan is seen as a major step in correcting the inappropriate perceptions about the library and the IR.

The recommendations for further research also included suggestions for further study of the IR implementation critical success factors in other contexts in order to develop standard benchmarks as a scorecard for the quick assessment of feasibility of IR projects in implementing institutions.

REFERENCES

- Adu, K.K. & Ngulube, P., 2016. Preserving the digital heritage of public institutions in Ghana in the wake of electronic government. *Library Hi Tech*, 34(4), pp.748–763.
- Agyen-Gyasi, K., Corleley, A. & Frempong, A.T., 2010. Open Access Institutional Repositories: Issues and Challenges. Available at: [http://ir.knust.edu.gh/bitstream/123456789/1439/1/Open Access Institutional Repositories I.pdf](http://ir.knust.edu.gh/bitstream/123456789/1439/1/Open%20Access%20Institutional%20Repositories%20I.pdf) [Accessed July 28, 2017].
- Akpokodje, V.N. & Akpokodje, E.T., 2015. Availability and Utilization of Institutional Repositories as Indicators to Institutional Web Ranking. *European Journal of Computer Science and Information Technology*, 3(2), pp.29–40.
- Albert, K.M., 2006. Open access: implications for scholarly publishing and medical libraries. *Journal of the Medical Library Association*, 94(3), pp.253–262.
- Alfa Network Babel & Library., 2007. *Guidelines for the Creation of Institutional Repositories at Universities and Higher Education Organisations*, Columbus: Alfa Network Babel Library. Available at: http://eprints.rclis.org/13512/2/Guidelines_IR_english.pdf [Accessed October 31, 2016].
- Al Harthy, M., 2015. Digital repositories: Critical analytical study. In *2015 IEEE Seventh International Conference on Intelligent Computing and Information Systems (ICICIS)*. IEEE, pp. 179–182.
- Alias, Z., Zawawi, E.M.A., Yusof, K. & Aris, N.M., 2014. Determining Critical Success Factors of Project Management Practice: A Conceptual Framework. *Procedia - Social and Behavioral Sciences*, 153, pp.61–69.
- Amankwah-Amoah, J., 2015. Solar Energy in Sub-Saharan Africa: The Challenges and Opportunities of Technological Leapfrogging. *Thunderbird International Business Review*, 57(1), pp.15–31.
- Amekuedee, J.O., 2005. An evaluation of library automation in some Ghanaian university libraries. *The Electronic Library*, 23(4), pp.442–452.
- Arlitsch, K. & O'Brien, P.S., 2012. Invisible institutional repositories: Addressing the low indexing ratios of IRs in Google Scholar. *Library Hi Tech*, 30(1), pp.60–81.
- Armstrong, M., 2014. Institutional repository management models that support faculty research dissemination. *OCLC Systems & Services: International digital library perspectives*, 30(1), pp.43–51.
- Asiamah, N., Mensah, H.K. & Oteng-Abayie, E.F., 2017. General, Target, and Accessible Population: Demystifying the Concepts for Effective Sampling. *The Qualitative Report*, 22(6), pp.1607–1621.
- Asunka, S., Chae, H.S. & Natriello, G., 2011. Towards an understanding of the use of an

- institutional repository with integrated social networking tools: A case study of PocketKnowledge. *Library & Information Science Research*, 33(1), pp.80–88.
- Atieno, O.P., 2009. An Analysis of the Strengths and Limitation of Qualitative and Quantitative Research Paradigms. *Problems of Education in the 21st Century*, 13, pp.13–18.
- Atmire NV, 2016. Open Repository. Available at: <http://www.openrepository.com/> [Accessed August 19, 2017].
- Australian Bureau of Statistics, 2013. Statistical Language - Census and Sample. Available at: <http://www.abs.gov.au/websitedbs/a3121120.nsf/home/statistical+language+-+census+and+sample> [Accessed September 5, 2017].
- Baba, K., Hoshiko, N., Kudo, E., Yoshimatsu, N. & Ito, E., 2011. Semi-automated paper-registration system for institutional repository. In *2011 3rd International Conference on Awareness Science and Technology (iCAST)*. IEEE, pp. 418–421.
- Bamigbola, A.A., 2014. Surveying Attitude and Use of Institutional Repositories (IRs) by Faculty in Agriculture Disciplines: A Case Study. *Procedia - Social and Behavioral Sciences*, 147, pp.505 – 509.
- Barner, K., 2011. The Library is a Growing Organism: Ranganathan's Fifth Law of Library Science and the Academic Library in the Digital Era. *Library Philosophy and Practice*, ((e-journal)), p.Paper 548.
- Barton, M.R. & Waters, M.M., 2004. *Creating an Institutional Repository: LEADIRS Workbook*, MIT Libraries.
- Baškarada, S., 2014. Qualitative Case Study Guidelines. *The Qualitative Report*, 19(40), pp.1–18.
- Battaglia, M.P., 2011. Quota Sampling P. J. Lavrakas, ed. *Encyclopedia of Survey Research Methods*. Available at: <http://methods.sagepub.com/reference/encyclopedia-of-survey-research-methods> [Accessed September 6, 2017].
- Baudoin, P. & Branschofsky, M., 2003. Implementing an Institutional Repository. *Science & Technology Libraries*, 24(1–2), pp.31–45.
- Baxter, P. & Jack, S., 2008. Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. *The Qualitative Report*, 13(4), pp.544–559.
- Beall, J., 2015. Predatory journals and the breakdown of research cultures. *Information Development*, 31(5), pp.473–476. Available at: <http://journals.sagepub.com/doi/10.1177/0266666915601421> [Accessed June 2, 2017].
- Beall, J., 2013. Predatory Publishers Threaten to Erode Scholarly Communication. *Science Editor*, 36(1), pp.18–19.
- Best, S., 2012. *Understanding and doing successful research: data collection and analysis for the social sciences*, Harlow: Pearson.

- Biggerstaff, D. & Thompson, A.R., 2008. Interpretative Phenomenological Analysis (IPA): A Qualitative Methodology of Choice in Healthcare Research. *Qualitative Research in Psychology*, 5(3), pp.214–224. Available at: <http://www.tandfonline.com/doi/full/10.1080/14780880802314304> [Accessed September 22, 2017].
- Björk, B.C., 2017. Gold, green, and black open access. *Learned Publishing*, 30(2), pp.173–175.
- Björk, B.C. & Solomon, D., 2012. Open access versus subscription journals: a comparison of scientific impact. *BMC Medicine*, 10(1). Available at: <http://bmcmmedicine.biomedcentral.com/articles/10.1186/1741-7015-10-73> [Accessed June 2, 2017].
- Blake, C., Annorbah-Sarpei, N.A., Bailey, C., Ismaila, Y., Deganus, S., Bosomprah, S., Galli, F. & Clark, S., 2016. Scorecards and social accountability for improved maternal and newborn health services: A pilot in the Ashanti and Volta regions of Ghana. *International Journal of Gynecology & Obstetrics*, 135(3), pp.372–379.
- Boamah, E., Dorner, D.G. & Oliver, G., 2012. Stakeholders' Attitudes Towards the Management and Preservation of Digital Cultural Heritage Resources in Ghana. *Australian Academic & Research Libraries*, 43(4), pp.300–317.
- Boateng, H., Agyemang, F.G. & Dzandu, M.D., 2014. The Pros and Cons of Library Automation in a Resource Challenged Environment: A Case Study of KNUST Library. *Library Philosophy and Practice (e-journal)*, Paper 1061. Available at: <http://digitalcommons.unl.edu/libphilprac/1061> [Accessed February 12, 2017].
- Bonilla-calero, A., 2014. Institutional repositories as complementary tools to evaluate the quantity and quality of research outputs. *Library Review*, 63(1/2), pp.46–59.
- Bonilla-Calero, A., 2013. Good practice in an institutional repository service: case study of Strathprints. *Library Review*, 62(6/7), pp.429–436.
- Boselli, B. & Galindo-Rueda, F., 2016. *Drivers and Implications of Scientific Open Access Publishing: Findings from a Pilot OECD International Survey of Scientific Authors*, Paris. Available at: <http://dx.doi.org/10.1787/5jlr2z70k0bx-en> [Accessed February 13, 2017].
- Bossaller, J. & Atiso, K., 2015. Sharing science: The state of institutional repositories in Ghana. *IFLA Journal*, 41(1), pp.25–39.
- Braun, V. & Clarke, V., 2013. *Successful qualitative research: a practical guide for beginners*, Los Angeles: SAGE.
- Bregman, A. & Burger, R.H., 2002. Library automation at the University of Illinois at Urbana-Champaign, 1965-2000. *IEEE Annals of the History of Computing*, 24(2), pp.71–85.
- Brown, C.T., 2016. What is Open Science? *Living in an Ivory Basement: Stochastic thoughts*

- on science, testing, and programming*. Available at: <http://ivory.idyll.org/blog/2016-what-is-open-science.html> [Accessed October 10, 2016].
- Bruns, T. & Inefuku, H.W., 2016. Purposeful Metrics: Matching Institutional Repository Metrics to Purpose and Audience. In B. B. Callicott, D. Scherer, & A. Wesolek, eds. *Making institutional repositories work*. Charleston insights in library, archival, and information sciences. West Lafayette, Indiana: Purdue University Press, pp. 213–234.
- Budapest Open Access Initiative, 2002. Budapest Open Access Initiative. *Budapest Open Access Initiative*. Available at: <http://www.budapestopenaccessinitiative.org/> [Accessed June 20, 2017].
- Buehler, M.A., 2014. *Demystifying the institutional repository for success*, Philadelphia, PA: Chandos Pub., an imprint of Woodhead Pub.
- Bundy, C., 2011. Developing a Repository: A Library's Journey. In A. Katsirikou, ed. *Open Access to STM Information: Trends, Models and Strategies for Libraries*. Berlin/Munich: De Gruyter Saur, p. 207.
- Burkhardt, J.T., 2012. Principles of Methodology: Research Design in Social Science. *Journal of MultiDisciplinary Evaluation*, 8(18), pp.62–64.
- Burns, C.S., Lana, A. & Budd, J.M., 2013. Institutional Repositories: Exploration of Costs and Value. *D-Lib Magazine*, 19(1/2). Available at: <http://www.dlib.org/dlib/january13/burns/01burns.html> [Accessed January 18, 2017].
- Bussert, L., 2012. Several Factors of Library Publishing Services Facilitate Scholarly Communication Functions. *Evidence Based Library and Information Practice*, 7(4), pp.108–110. Available at: <https://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/17225> [Accessed June 3, 2017].
- Butler, D., 2013. Investigating journals: The dark side of publishing. *Nature*, 495(7442), pp.433–435. Available at: <http://www.nature.com/news/investigating-journals-the-dark-side-of-publishing-1.12666> [Accessed February 12, 2017].
- Butler, M., 2012. Resource-Based Learning and Course Design: A Brief Theoretical Overview and Practical Suggestions. *Law Library Journal*, 104(2), pp.219–244.
- Callicott, B., 2016. Peer Review and Institutional Repositories. In B. B. Callicott, D. Scherer, & A. Wesolek, eds. *Making institutional repositories work*. Charleston insights in library, archival, and information sciences. West Lafayette, Indiana: Purdue University Press, pp. 249–260.
- Campbell, J.D., 2015. Ownership and pricing of information: A model and application to open access. *Information Economics and Policy*, 33, pp.29–42. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S0167624515000475> [Accessed June 2, 2017].

- CARLIGH, 2016. Consortium of Academic and Research Libraries in Ghana. *Website*. Available at: <http://www.carligh.info/> [Accessed September 25, 2016].
- Carvalho, J., Laranjeira, C., Vaz, V. & Moreira, J.M., 2017. Monitoring a National Open Access Funder Mandate. *Procedia Computer Science*, 106, pp.283–290.
- Chan, G.R. & Cheung, A.S.C., 2017. The transition toward open access: the University of Hong Kong experience. *Library Management*, 38(8/9), pp.488–496.
- Chandrasekhara, V., Eloubeidi, M.A., Bruining, D.H., Chathadi, K., Faulx, A.L., Fonkalsrud, L., Khashab, M.A., Lightdale, J.R., Muthusamy, V.R., Pasha, S., Saltzman, J.R., Shaukat, A., Wang, A., Cash, B. & DeWitt, J.M., 2015. Open-access endoscopy. *Gastrointestinal Endoscopy*, 81(6), pp.1326–1329.
- Chapman, J.W., Reynolds, D. & Shreeves, S.A., 2009. Repository Metadata: Approaches and Challenges. *Cataloging & Classification Quarterly*, 47(3–4), pp.309–325.
- Cherry, K., 2017. What Is a Sample? *Verywell*. Available at: <https://www.verywell.com/what-is-a-sample-2795877> [Accessed July 21, 2017].
- Christian, G.E., 2008. *Issues and challenges to the development of open access institutional repositories in academic and research institutions in Nigeria*, Ottawa. Available at: <https://idl-bnc.idrc.ca/dspace/bitstream/10625/36986/1/127792.pdf> [Accessed June 1, 2017].
- Clough, P. & Nutbrown, C., 2012. *A student's guide to methodology: justifying enquiry* 3rd ed., London: SAGE.
- Consultative Committee for Space Data Systems, 2011. *Audit and Certification of Trustworthy Digital Repositories: Recommended Practice*, Washington DC. Available at: <https://public.ccsds.org/Pubs/652x0m1.pdf> [Accessed May 13, 2017].
- Consultative Committee for Space Data Systems, 2012. *Reference Model for an Open Archival Information System (OAIS): Recommended Practice*, Washington, DC, USA. Available at: <https://public.ccsds.org/pubs/650x0m2.pdf> [Accessed May 13, 2017].
- Cooke, N.A., 2012. Professional development 2.0 for librarians: developing an online personal learning network (PLN). *Library Hi Tech News*, 29(3), pp.1–9.
- Corbett, H., Ghaphery, J., Work, L. & Byrd, S., 2016. Choosing a Repository Platform: Open Source vs. Hosted Solutions. In B. B. Callicott, D. Scherer, & A. Wesolek, eds. *Making Institutional Repositories Work*. Purdue University Press. Available at: <http://www.thepress.purdue.edu/titles/making-institutional-repositories-work> [Accessed June 3, 2017].
- Corleley, A., 2011. Institutional Repositories for Open Access; The Ghanaian Experience. In *14th International Symposium on Electronic Theses and Dissertations*. Cape Town: University of Cape Town. Available at: http://dl.cs.uct.ac.za/conferences/etd2011/papers/etd2011_corleley.pdf [Accessed June

11, 2017].

- Creaser, C., Fry, J., Greenwood, H., Oppenheim, C., Probets, S., Spezi, V. & White, S., 2010. Authors' Awareness and Attitudes Toward Open Access Repositories. *New Review of Academic Librarianship*, 16(sup1), pp.145–161. Available at: <http://www.tandfonline.com/doi/abs/10.1080/13614533.2010.518851> [Accessed April 15, 2017].
- Creswell, J.W., 2014. *Research design: qualitative, quantitative, and mixed methods approaches* 4th ed., Thousand Oaks: SAGE Publications.
- Creswell, J.W., 2009. *Research design: qualitative, quantitative, and mixed methods approaches* 3rd ed., Thousand Oaks, Calif: Sage Publications.
- Crow, R., 2004. *Open Society Institute: A Guide to Institutional Repository Software* 3rd ed., New York, NY: Open Society Institute.
- Crow, R., 2002. *The Case for Institutional Repositories: A SPARC Position Paper*, Available at: www.arl.org/newsltr/223/instrepo.html [Accessed February 13, 2017].
- Cullen, R. & Chawner, B., 2011. Institutional Repositories, Open Access, and Scholarly Communication: A Study of Conflicting Paradigms. *The Journal of Academic Librarianship*, 37(6), pp.460–470.
- Curtis, S., Gesler, W., Smith, G. & Washburn, S., 2000. Approaches to sampling and case selection in qualitative research: examples in the geography of health. *Social Science & Medicine*, 50, pp.1001–1014.
- Da Costa, M.P. & Lima Leite, F.C., 2016. Open access in the world and Latin America: A review since the Budapest Open Access Initiative. *TransInformação, Campinas*, 28(1), pp.33–46. Available at: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-37862016000100033&lng=en&tlng=en [Accessed February 13, 2017].
- Da Cruz, N.F. & Marques, R.C., 2014. Scorecards for Sustainable Local Governments. *Cities*, 39, pp.165–170
- Da Silva, L.P.J. & Borges, M.M., 2017. Digital preservation policies of the institutional repositories at Brazilian Federal Universities. *The Electronic Library*, 35(2), pp.311–321. Available at: <https://doi.org/10.1108/EL-09-2015-0170> [Accessed June 3, 2017].
- Davis, P.M. & Connolly, M.J.L., 2007. Institutional Repositories: Evaluating the reasons for non-use of Cornell University's installation of DSpace. *D-Lib Magazine*, 13(3/4).
- Dawson, P.H. & Yang, S.Q., 2016. Institutional Repositories, Open Access and Copyright: What Are the Practices and Implications? *Science & Technology Libraries*, 35(4), pp.279–294.
- De Castro, P., Shearer, K. & Summann, F., 2014. The gradual merging of repository and CRIS solutions to meet institutional research information management requirements. *Procedia Computer Science*, 33, pp.39–46.

- Dorner, D.G. & Revell, J., 2012. Subject librarians' perceptions of institutional repositories as an information resource. *Online Information Review*, 36(2), pp.261–277.
- Dutta, G. & Paul, D., 2014. Awareness on Institutional Repositories-related Issues by Faculty of University of Calcutta. *DESIDOC Journal of Library & Information Technology*, 34(4), pp.293–297.
- Eduardo Yamasaki Sato, C. & de Freitas Chagas Jr, M., 2014. When do megaprojects start and finish? Redefining project lead time for megaproject success P. Ralf Müller, ed. *International Journal of Managing Projects in Business*, 7(4), pp.624–637.
- Ennas, G. & Di Guardo, M.C., 2015. Features of top-rated gold open access journals: An analysis of the scopus database. *Journal of Informetrics*, 9(1), pp.79–89. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S1751157714001096> [Accessed July 31, 2017].
- Etikan, I., Musa, S.A. & Alkassim, R.S., 2016. Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), p.1. Available at: <http://www.sciencepublishinggroup.com/journal/paperinfo?journalid=146&doi=10.11648/j.ajtas.20160501.11> [Accessed September 10, 2017].
- European Commission, 2016. *Open innovation, open science, open to the world: a vision for Europe*, Luxembourg: Publications Office of the European Union.
- Ferreira, A.F. & da Silva, A.L.S., 2015. Institutional Repositories: Accessibility to academic research - public property. In *2015 International Symposium on Computers in Education (SIIE)*. IEEE, pp. 172–175.
- Finney, S. & Corbett, M., 2007. ERP implementation: a compilation and analysis of critical success factors. *Business Process Management Journal*, 13(3), pp.329–347.
- Flick, U., Kvale, S., Angrosino, M.V., Barbour, R.S., Banks, M., Gibbs, G. & Rapley, T., 2007. *Designing Qualitative Research* U. Flick, ed., London: SAGE.
- Fortier, R. & Laws, E., 2014. Marketing an established institutional repository: Marquette Libraries' research stewardship survey. *Library Hi Tech News*, 31(6), pp.12–15. Available at: <http://www.emeraldinsight.com/doi/10.1108/LHTN-05-2014-0038> [Accessed June 20, 2017].
- Foster, N.F. & Gibbons, S., 2005. Understanding Faculty to Improve Content Recruitment for Institutional Repositories. *D-Lib Magazine*, 11(1).
- Gezelter, D., 2009. What, exactly, is Open Science? *The OpenScience Project*. Available at: <http://openscience.org/what-exactly-is-open-science/> [Accessed June 20, 2017].
- Ghaoui, R., Ramdass, S., Friderici, J. & Desilets, D.J., 2016. Open access colonoscopy: Critical appraisal of indications, quality metrics and outcomes. *Digestive and Liver Disease*, 48(8), pp.940–944.

- Giesecke, J., 2011. Institutional Repositories: Keys to Success. *Faculty Publications, UNL Libraries*, 255, pp.529–542.
- Gingnell, L., Franke, U., Lagerström, R., Ericsson, E. & Lilliesköld, J., 2014. Quantifying Success Factors for IT Projects—An Expert-Based Bayesian Model. *Information Systems Management*, 31(1), pp.21–36.
- Greene, J.W., 2016. Web robot detection in scholarly Open Access institutional repositories. *Library Hi Tech*, 34(3), pp.500–520.
- Groenewald, R. & Breytenbach, A., 2011. The use of metadata and preservation methods for continuous access to digital data. *The Electronic Library*, 29(2), pp.236–248.
- Hansen, D., 2012. Understanding and Making Use of Academic Authors' Open Access Rights. *Journal of Librarianship and Scholarly Communication*, 1(2), p.eP1050.
- Harnad, S., 2005. Re: Proposed update of BOAI definition of OA Immediate and Permanent. *American-Scientist-Open-Access-Forum*.
- Harnad, S., Brody, T., Vallières, F., Carr, L., Hitchcock, S., Gingras, Y., Oppenheim, C., Hajjem, C. & Hilf, E.R., 2008. The Access/Impact Problem and the Green and Gold Roads to Open Access: An Update. *Serials Review*, 34(1), pp.36–40.
- Harnad, S., 2012. Why the UK should not heed the Finch Report. *Impact of Social Sciences Blog*. Available at: <http://blogs.lse.ac.uk/impactofsocialsciences/2012/07/04/why-the-uk-should-not-heed-the-finch-report/> [Accessed August 5, 2017].
- Haughey, D., 2011. Understanding the Project Management Triple Constraint. Available at: <https://www.projectsmart.co.uk/understanding-the-project-management-triple-constraint.php> [Accessed January 2, 2018].
- HEFCE, 2017. What is open access? *Higher Education Funding Council for England*. Available at: <http://www.hefce.ac.uk/rsrch/oa/whatis/> [Accessed June 23, 2017].
- Higgins, P., 2012. A Decade of Open Access (And the Challenges Ahead). *Electronic Frontier Foundation*. Available at: <https://www.eff.org/deeplinks/2012/02/decade-open-access-and-challenges-ahead> [Accessed June 20, 2017].
- Higher Education Funding Council for England, 2016. What is open access? *Open Access Research*. Available at: <http://www.hefce.ac.uk/rsrch/oa/whatis/> [Accessed October 11, 2016].
- Hislop, D., 2013. *Knowledge Management in Organizations: A Critical Introduction* 3rd ed., Oxford: Oxford University Press.
- Hixson, C. & Cracknell, L., 2007. How to Implement an Institutional Repository. *The Serials Librarian*, 52(1–2), pp.37–54.
- Holmberg, K., 2016. *Altmetrics for information professionals: past, present and future*, Waltham, MA: Chandos Publishing.
- Internet World Stats, 2016. Ghana: Internet Usage Stats and Market Reports. *Usage and*

- Population Statistics*. Available at: <http://www.internetworldstats.com/af/gh.htm> [Accessed August 16, 2017].
- Ivankova, nataliya V., Creswell, J.W. & Clark, V.L.P., 2016. Foundations and Approaches to Mixed Methods Research. In K. Maree, ed. *First Steps in Research*. Pretoria: Van Schaik Publishers, pp. 305–336.
- Jahn, N. & Tullney, M., 2016. A study of institutional spending on open access publication fees in Germany. *PeerJ*, 4, p.e2323. Available at: <https://peerj.com/articles/2323> [Accessed July 11, 2017].
- Jain, P., 2011. New trends and future applications/directions of institutional repositories in academic institutions. *Library Review*, 60(2), pp.125–141. Available at: <http://www.emeraldinsight.com/doi/10.1108/00242531111113078> [Accessed January 11, 2017].
- Jain, P., Bentley, G. & Oladiran, M.T., 2009. The role of institutional repository in digital scholarly communications. In *African Digital Scholarship and Curation Conference*. Pretoria: University of Pretoria.
- Jantz, R.C. & Wilson, M.C., 2008. Institutional Repositories: Faculty Deposits, Marketing, and the Reform of Scholarly Communication. *The Journal of Academic Librarianship*, 34(3), pp.186–195.
- St. Jean, B., Rieh, S.Y., Yakel, E. & Markey, K., 2011. Unheard Voices: Institutional Repository End-Users. *College & Research Libraries*, 72(1), pp.21–42.
- JISC, 2016. An introduction to open access. *Jisc*. Available at: <https://www.jisc.ac.uk/guides/an-introduction-to-open-access> [Accessed June 23, 2017].
- JISC, 2008. Open Archives Initiative-Protocol for Metadata. Available at: http://www.rsp.ac.uk/documents/briefing-papers/technical-OAI_PMH.pdf [Accessed June 20, 2017].
- Johnson, R.K., 2002. Institutional Repositories: Partnering with Faculty to Enhance Scholarly Communication. *D-Lib Magazine*.
- Jones, R., Andrew, T. & MacColl, J., 2006. *The institutional repository*, Oxford, England: Elsevier.
- Jong, S. & Slavova, K., 2014. When publications lead to products: The open science conundrum in new product development. *Research Policy*, 43(4), pp.645–654.
- Kargbo, J.A.A., 2009. Automation: Whither academic libraries? *Information Technology for Development*, 15(1), pp.43–51.
- Kavoura, A. & Bitsani, E., 2014. Methodological Considerations for Qualitative Communication Research. *Procedia - Social and Behavioral Sciences*, 147, pp.544–549. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S1877042814040750>

- [Accessed September 22, 2017].
- Kennedy, M., 2006. Interview Guides. Available at:
<https://msu.edu/user/mkennedy/digitaladvisor/Research/interviewing.htm> [Accessed September 20, 2017].
- Kim, J., 2007. Motivating and Impeding Factors Affecting Faculty Contribution to Institutional Repositories. *Journal of Digital Information*, 8(2). Available at:
<https://journals.tdl.org/jodi/index.php/jodi/article/viewArticle/193/177> [Accessed March 30, 2017].
- Kim, J., 2011. Motivations of Faculty Self-archiving in Institutional Repositories. *The Journal of Academic Librarianship*, 37(3), pp.246–254.
- Kitchin, R., Collins, S. & Frost, D., 2015. Funding models for Open Access digital data repositories P. G.E. Gorman and Professor Jennifer, ed. *Online Information Review*, 39(5), pp.664–681.
- Koler-Povh, T., Mikoš, M. & Turk, G., 2014. Institutional repository as an important part of scholarly communication. *Library Hi Tech*, 32(3), pp.423–434.
- Kothari, C.R., 2004. *Research Methodology: Methods and Techniques* 2nd ed., Daryaganj: New Age International Pvt. Ltd., Publishers.
- Koulouris, A., Kyriaki-Manessi, D., Giannakopoulos, G. & Zervos, S., 2013. Institutional repository policies: best practices for encouraging self-archiving. *Procedia - Social and Behavioral Sciences*, 73, pp.769 – 776.
- Koutras, N. & Bottis, M., 2013a. Institutional Repositories of Open Access: A Paradigm of Innovation and Changing in Educational Politics. *Procedia - Social and Behavioral Sciences*, 106, pp.1499–1504.
- Koutras, N. & Bottis, M., 2013b. Institutional Repositories of Open Access: A Paradigm of Innovation and Changing in Educational Politics. *Procedia - Social and Behavioral Sciences*, 106, pp.1499–1504.
- Krauss, S.E., 2005. Research Paradigms and Meaning Making: A Primer. *The Qualitative Report*, 10(4), pp.758–770.
- Kvale, S. & Brinkmann, S., 2009. *InterViews: learning the craft of qualitative research interviewing* 2nd ed., Los Angeles: Sage Publications.
- Laake, P., Benestad, H.B. & Olsen, B.R. eds., 2015. *Research in medical and biological sciences: from planning and preparation to grant application and publication*, Amsterdam ; Boston: Elsevier/Academic Press.
- Laakso, M. & Björk, B.-C., 2013. Delayed open access: An overlooked high-impact category of openly available scientific literature. *Journal of the American Society for Information Science and Technology*, 64(7), pp.1323–1329.
- Laakso, M. & Björk, B.-C., 2016. Hybrid open access - A longitudinal study. *Journal of*

- Informetrics*, 10(4), pp.919–932.
- Lagzian, F., Abrizah, A. & Wee, M.-C., 2015. Measuring the gap between perceived importance and actual performance of institutional repositories. *Library & Information Science Research*, 37, pp.147–155.
- Lagzian, F., Abrizah, A. & Wee, M.C., 2015. Critical success factors for institutional repositories implementation. *The Electronic Library*, 33(2), pp.196–209.
- Lamprey, R.B. & Corletoy, A., 2011. Enhancing Institutional Repositories (IR) in Ghana. In A. Katsirikou, ed. *Open access to STM information: trends, models and strategies for libraries*. {IFLA} publications. Berlin ; Boston: De Gruyter Saur, pp. 105–111.
- Li, Y. & Banach, M., 2011. Institutional Repositories and Digital Preservation: Assessing Current Practices at Research Libraries. *D-Lib Magazine*, 17(5/6). Available at: <http://www.dlib.org/dlib/may11/yuanli/05yuanli.html> [Accessed March 30, 2017].
- Library Board, 2015. *University of Health and Allied Sciences Institutional Repository (UHASSPACE) Policy: Draft*, Ho.
- Lichtman, M., 2013. *Qualitative research for the social sciences*, Available at: https://nls.idls.org.uk/welcome.html?ark:/81055/vdc_100025421711.0x000001 [Accessed September 28, 2017].
- Linde, P., Eriksson, J., Kullman, L., Fathli, M., Karlsson, K., Sikström, M., Sköld, Y. & Tång, I., 2011. Accessibility and self-archiving of conference articles: A study on a selection of Swedish institutional repositories. *Information Services and Use*, 31(3–4), pp.259–269. Available at: <http://www.medra.org/servlet/aliasResolver?alias=iospress&genre=article&issn=0167-5265&volume=31&issue=3&spage=259&doi=10.3233/ISU-2012-0656> [Accessed June 27, 2017].
- Little, G., 2012. Managing Technology: Solutions in Search of Problems? The Challenges and Opportunities of Institutional Repositories. *The Journal of Academic Librarianship*, 38(1), pp.65–67.
- Lwoga, E.T. & Questier, F., 2015. Open access behaviours and perceptions of health sciences faculty and roles of information professionals. *Health Information & Libraries Journal*, 32(1), pp.37–49.
- Lynch, C.A., 2003. Institutional repositories: essential infrastructure for scholarship in the digital age. *ARL Bimonthly Report*, Vol. 226. Available at: www.arl.org/newsltr/226/ir.html [Accessed March 22, 2016].
- Madalli, D.P., 2015. *Concepts of openness and open access* J. Sharma & S. Mishra, eds., Paris: United Nations Educational, Scientific, and Cultural Organization.
- Mahmood, A., Asghar, F. & Naoreen, B., 2014. “Success Factors on Research Projects at University” An Exploratory Study. *Procedia - Social and Behavioral Sciences*, 116,

pp.2779–2783.

- Makori, E.O., Njiraine, D. & Talam, P., 2015. Practical aspects of implementation of institutional repositories in Africa with reference to the University of Nairobi. *New Library World*, 116(9/10), pp.610–640.
- Manca, A., Martinez, G., Cugusi, L., Dragone, D., Dvir, Z. & Deriu, F., 2017. The surge of predatory open-access in neurosciences and neurology. *Neuroscience*, 353, pp.166–173.
- Mao, Y. & Wang, J., 2009. What is a good digital library in undeveloped regions. In *2009 IEEE International Symposium on IT in Medicine & Education*. IEEE, pp. 332–336.
- Marchewka, J.T., 2010. A Framework for Identifying and Understanding Risks in Information Technology Projects. *Journal of International Technology and Information Management*, 19(1), pp.61–74.
- Maree, K. ed., 2016a. *First steps in research* 2nd ed., Available at: <https://www.overdrive.com/search?q=72F4A142-05CB-4E59-A8F7-C12C06D7B583> [Accessed August 29, 2017].
- Maree, K., 2016b. Planning a Research Proposal. In K. Maree, ed. *First Steps in Research*. Pretoria: Van Schaik Publishers, pp. 25–47.
- Marsh, R.M., 2015. The role of institutional repositories in developing the communication of scholarly research. *OCLC Systems & Services: International digital library perspectives*, 31(4), pp.163–195.
- Masrek, M.N. & Yaakub, M.S., 2015. Intention to Publish in Open Access Journal: The Case of Multimedia University Malaysia. *Procedia - Social and Behavioral Sciences*, 174, pp.3420–3427.
- Maxwell, J.A., 2010. Using Numbers in Qualitative Research. *Qualitative Inquiry*, 16(6), pp.475–482.
- McCord, A. & EDUCAUSE Evolving Technologies Committee, 2003. *Institutional Repositories: Enhancing Teaching, Learning, and Research*, MICHIGAN.
- McGill, L., Digital Repositories infoKit. Available at: <http://tools.jiscinfonet.ac.uk/downloads/repositories/digital-repositories.pdf> [Accessed June 3, 2017].
- McGregor, S.L.T. & Murnane, J.A., 2010. Paradigm, methodology and method: Intellectual integrity in consumer scholarship. *International Journal of Consumer Studies*, 34(4), pp.419–427.
- McGrory, B.J., 2015. The case for open access. *Arthroplasty Today*, 1(2), pp.19–20.
- McKiernan, E.C., Bourne, P.E., Brown, C.T., Buck, S., Kenall, A., Lin, J., McDougall, D., Nosek, B.A., Ram, K., Soderberg, C.K., Spies, J.R., Thaney, K., Updegrove, A., Woo, K.H. & Yarkoni, T., 2016. How open science helps researchers succeed. *eLife*, 5.

- Available at: <http://elifesciences.org/lookup/doi/10.7554/eLife.16800> [Accessed January 19, 2017].
- McMenemy, D., 2007. Ranganathan's relevance in the 21st century. *Library Review*, 56(2), pp.97–101.
- Mercer, H., Rosenblum, B. & Emmett, A., 2007. A multifaceted approach to promote a university repository: The University of Kansas' experience. *OCLC Systems & Services: International digital library perspectives*, 23(2), pp.190–203. Available at: <http://www.emeraldinsight.com/doi/10.1108/10650750710748496> [Accessed June 20, 2017].
- Miguel, S., Chinchilla-Rodríguez, Z. & De Moya-Anegón, F., 2011. Open access and Scopus: A new approach to scientific visibility from the standpoint of access. *Journal of the American Society for Information Science and Technology*, 62(6), pp.1130–1145.
- Moahi, K.H., 2009. Institutional Repositories: towards harnessing knowledge for African development. In *First International Conference on African Digital Libraries and Archives (ICADLA-1)*. Addis Ababa. Available at: [http://wiredspace.wits.ac.za/jspui/bitstream/10539/8950/1/35 Moahi.pdf](http://wiredspace.wits.ac.za/jspui/bitstream/10539/8950/1/35%20Moahi.pdf) [Accessed June 2, 2017].
- Monson, J., Highby, W. & Rathe, B., 2014. Library Involvement in Faculty Publication Funds. *College & Undergraduate Libraries*, 21(3–4), pp.308–329.
- Moreira, J.M., Laranjeira, C., Carvalho, J., Ribeiro, F., Lopes, P. & Graça, P., 2017. Integrating a national network of institutional repositories into the national/international research management ecosystem. *Procedia Computer Science*, 106, pp.146 – 152.
- Mori, M., Tanaka, T. & Baba, K., 2012. Connecting an Institutional Repository with a Researcher Database. In *2012 IIAI International Conference on Advanced Applied Informatics*. IEEE, pp. 190–192.
- Mudogo Mutula, S., 2012. Library automation in sub Saharan Africa: case study of the University of Botswana. *Program*, 46(3), pp.292–307.
- Nagra, K.A., 2012. Building Institutional Repositories in the Academic Libraries. *Community & Junior College Libraries*, 18(3–4), pp.137–150.
- Nah, F.F.-H., Zuckweiler, K.M. & Lee-Shang Lau, J., 2003. ERP Implementation: Chief Information Officers' Perceptions of Critical Success Factors. *International Journal of Human-Computer Interaction*, 16(1), pp.5–22.
- Naiwen, L. & Xin, Z., 2012. The Study on Constructing Institutional Repository of University. In *2012 Fourth International Conference on Multimedia Information Networking and Security*. IEEE, pp. 689–692.
- National Institutes of Health, 2009. NIH Public Access Policy Details. *NIH Public Access Policy*.

- Network of Expertise in long-term STORAge (nestor) Working Group, 2009. *Trusted Repositories – Certification: nestor criteria: Catalogue of Criteria for Trusted Digital Repositories, Version 2*, Frankfurt am Main. Available at: http://files.dnb.de/nestor/materialien/nestor_mat_08-eng.pdf [Accessed June 2, 2017].
- Ngai, E.W.T., Law, C.C.H. & Wat, F.K.T., 2008. Examining the critical success factors in the adoption of enterprise resource planning. *Computers in Industry*, 59(6), pp.548–564.
- Nieuwenhuis, J., 2016a. Analysing qualitative data. In K. Maree, ed. *First steps in research*. Van Schaik Publishers, pp. 103–132.
- Nieuwenhuis, J., 2016b. Analysing Qualitative Data. In K. Maree, ed. *First Steps in Research*. Pretoria: Van Schaik Publishers, pp. 103–131.
- Nieuwenhuis, J., 2016c. Introducing Qualitative Research. In K. Maree, ed. *First Steps in Research*. Pretoria: Van Schaik Publishers, pp. 49–70.
- Nieuwenhuis, J., 2016d. Qualitative Research Designs and Data-Gathering Techniques. In K. Maree, ed. *First Steps in Research*. Pretoria: Van Schaik Publishers, pp. 71–102.
- Noruzi, A., 2007. Open Access Journals: A Pathway to Scientific Information in Iran. In *Proceedings ELPUB2007 Conference on Electronic Publishing*. Vienna, Austria, pp. 341–347.
- Oak, M. & Patil, S.K., 2015. Planning and Implimentation of Institutional Repository: A case study of IMCC. In *4th International Symposium on Emerging Trends and Technologies in Libraries and Information Services*. IEEE Conference Publications, pp. 253–256.
- OECD, 2016. Open science: Rationale and Objectives. *STI e-Outlook*. Available at: <https://www.oecd.org/sti/outlook/e-outlook/stipolicyprofiles/interactionsforinnovation/openscience.htm> [Accessed October 10, 2016].
- Oguz, F. & Assefa, S., 2014. Faculty members' perceptions towards institutional repository at a medium-sized university: Application of a binary logistic regression model. *Library Review*, 63(3), pp.189–202.
- Okendo, E.O. & Elliah, E.. M., 2014. Assessment of Levels of Open Access Awareness and Its Usage in Relation to Scholarly Communication in Tanzanian Universities. *International Journal of Community and Cooperative Studies*, 1(2), pp.1–11.
- Oladokun, O., 2015. Scholarly Communication in a Digital Environment: Populating the Institutional Repository of the University of Botswana. *Libri*, 65(1). Available at: <https://www.degruyter.com/view/j/libr.2015.65.issue-1/libri-2014-0117/libri-2014-0117.xml> [Accessed February 12, 2017].
- Olson, D.L., 2004. *Introduction to information systems project management* 2nd ed., Boston: McGraw-Hill.
- Onwuegbuzie, A.J. & Leech, N.L., 2007. A Call for Qualitative Power Analyses. *Quality &*

Quantity, 41(1), pp.105–121.

OpenDOAR, 2017a. Open Access Repository Operational Statuses - Worldwide. *Directory of Open Access Repositories*. Available at:

<http://www.opendoar.org/onechart.php?cID=&ctID=&rtID=&clID=&IID=&potID=&rSoftWareName=&search=&groupby=os.osHeading&orderby=TallyDESC&charttype=pie&width=600&height=300&caption=Open Access Repository Operational Statuses - Worldwide> [Accessed June 20, 2017].

OpenDOAR, 2017b. Open Access Repository Types - Worldwide. Available at:

<http://www.opendoar.org/onechart.php?cID=&ctID=&rtID=&clID=&IID=&potID=&rSoftWareName=&search=&groupby=rt.rtHeading&orderby=TallyDESC&charttype=pie&width=600&height=300&caption=Open Access Repository Types - Worldwide> [Accessed August 5, 2017].

Palinkas, L.A., Horwitz, S.M., Green, C.A., Wisdom, J.P., Duan, N. & Hoagwood, K., 2015. Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), pp.533–544.

Pandey, P. & Pandey, M.M., 2015. *Research Methodology: Tools and Techniques*, Romania: Bridge Center.

Patra, N.K., 2013. *Progressive Trends in Electronic Resource Management in Libraries*, IGI Global. Available at: <https://books.google.com.gh/books?id=KOmWBQAAQBAJ> [Accessed June 3, 2017].

Paul, S., 2012. Institutional Repositories: Benefits and incentives. *The International Information & Library Review*, 44(4), pp.194–201.

Peekhaus, W. & Proferes, N., 2016. An examination of North American Library and Information Studies faculty perceptions of and experience with open-access scholarly publishing. *Library & Information Science Research*, 38(1), pp.18–29.

Perri 6 & Bellamy, C., 2012. *Principles of methodology: research design in social science*, Los Angeles: SAGE.

Perry, M.P., 2005. Describe the differences between methodology, techniques and tools. *ProjectManagement.com*. Available at: <https://www.projectmanagement.com/discussion-topic/6392/describe-the-differences-between-methodology--techniques-and-tools> [Accessed September 19, 2017].

Peter, E., 2015. The ethics in qualitative health research: special considerations. *Ciência & Saúde Coletiva*, 20(9), pp.2625–2630. Available at: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232015000902625&lng=en&tlng=en [Accessed September 29, 2017].

Petty, N.J., Thomson, O.P. & Stew, G., 2012. Ready for a paradigm shift? Part 2: Introducing

- qualitative research methodologies and methods. *Manual Therapy*, 17(5), pp.378–384. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S1356689X12000549> [Accessed September 22, 2017].
- Pietkiewicz, I. & Smith, J.A., 2012. A practical guide to using Interpretative Phenomenological Analysis in qualitative research psychology. *Czasopismo Psychologiczne*, 18(2), pp.361–369.
- Pinfield, S., 2015. Making Open Access work: The “state-of-the-art” in providing Open Access to scholarly literature. *Online Information Review*, 39(5), pp.604–636.
- Plutchak, T.S. & Moore, K.B., 2017. Dialectic: The Aims of Institutional Repositories. *The Serials Librarian*, 72(1–4), pp.27–35.
- Priem, J., 2014. Altmetrics. In B. Cronin & C. R. Sugimoto, eds. *Beyond Bibliometrics: Harnessing Multidimensional Indicators of Scholarly Impact*. Cambridge: MIT Press, pp. 263–288.
- Prieto, A.G., 2009. From conceptual to perceptual reality: trust in digital repositories. *Library Review*, 58(8), pp.593–606.
- Project Management Institute, 2017. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* 6th ed., Newtown Square, Pennsylvania: Project Management Institute.
- Quarshie, H.O. & Ami-Narh, J., 2012. The Growth and Usage of Internet in Ghana. *Journal of Emerging Trends in Computing and Information Sciences*, 3(9), pp.1302–1308.
- Queens University Library, Benefits of Resource-Based Learning. *Libguides*. Available at: <http://library.queensu.ca/webedu/guides/subject/rbl/benefits.htm> [Accessed September 25, 2016].
- Rahman, M.S., 2017. The Advantages and Disadvantages of Using Qualitative and Quantitative Approaches and Methods in Language “Testing and Assessment” Research: A Literature Review. *Journal of Education and Learning*, 6(1), pp.102–112. Available at: <http://www.ccsenet.org/journal/index.php/jel/article/view/64330> [Accessed August 30, 2017].
- Raju, R., Smith, I., Talliard, P. & Gibson, H., 2012. Open access: are we there yet? - the case of Stellenbosch University, South Africa. *South African Journal of Libraries and Information Science*, (Special launch issue), pp.1–19.
- Ramirez, M. & Parham, S.W., 2010. From education to preservation: Emerging institutional repository services in the scholarship lifecycle. *Proceedings of the American Society for Information Science and Technology*, 47, pp.1–2.
- Ranganathan, S.R., 1931. *The Five Laws of Library Science*, London: Edward Goldston Ltd.
- RCSI, 2017. Open Access Publishing. *Royal College of Surgeons in Ireland*. Available at: http://www.rcsi.ie/research_openaccess [Accessed June 23, 2017].

- Reilly, B.F.J., 2013. Ties That Bind: Non-Technological Measures for Promoting Persistent Access to Knowledge Resources. In S. H. Lee, ed. *Improved Access to Information: Portals, Content Selection, and Digital Information*. Routledge, p. 170.
- Repanovici, A. & Barsan, I.M., 2015. Integration of SHERPA/RoMEO in institutional digital repositories to address the uncertainty of copyright. *Malaysian Journal of Library & Information Science*, 20(1), pp.29–45.
- Repositories Support Project, 2013. Setting Up a Repository - Technical Approaches. Available at: <http://www.rsp.ac.uk/start/setting-up-a-repository/technical-approaches/> [Accessed August 19, 2017].
- Research4Life, 2017. About Research4Life. *Research4Life*.
- Research Councils UK, 2013. RCUK Policy on Open Access - Research Councils UK. *Research Councils UK*.
- Riddle, K., 2015. Creating policies for library publishing in an institutional repository. *OCLC Systems & Services: International digital library perspectives*, 31(2), pp.59–68.
- Riley, J., 2017. *Understanding Metadata: What Is Metadata, and What Is It for?*, Baltimore: National Information Standards Organization (NISO).
- RLG-OCLC Digital Archive Attributes Working Group, 2002. *Trusted Digital Repositories: Attributes and Responsibilities. An RLG-OCLC Report*, Mountain View, CA. Available at: <http://www.rlg.org/legacy/longterm/repositories.pdf> [Accessed October 31, 2016].
- ROARMAP, 2017. Registry of Open Access Repository Mandates and Policies. *ROARMAP*.
- Robertson, E., O'Grady, Á., Barton, J., Galloway, S., Emmanuel-Yusuf, D., Leach, M., Hammond, G., Thomson, M. & Foxon, T., 2017. Reconciling qualitative storylines and quantitative descriptions: An iterative approach. *Technological Forecasting and Social Change*, 118, pp.293–306.
- Robertson, W.C. & Borchert, C.A., 2014. Preserving Content from Your Institutional Repository. *The Serials Librarian*, 66(1–4), pp.278–288.
- Roosendaal, H.E. & Geurts, P.A.T.M., 1997. Forces and functions in scientific communication: An analysis of their interplay. In M. Karttunen, K. Holmlund, & E.R.Hilf, eds. *First International Workshop on Cooperative Research Information Systems in Physics*. Oldenburg, Germany: CRISP.
- Rosenthal, M., 2016. Qualitative research methods: Why, when, and how to conduct interviews and focus groups in pharmacy research. *Currents in Pharmacy Teaching and Learning*, 8(4), pp.509–516. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S1877129715301970> [Accessed September 6, 2017].
- Rossini, C., 2012. Budapest Open Access Initiative Launches New Recommendations for the Next 10 Years of Open Access. *Electronic Frontier Foundation*. Available at:

<https://www.eff.org/deeplinks/2012/09/BOAI-10th-anniversary-new-recommendations>
[Accessed June 20, 2017].

- Russell, R. & Day, M., 2010. Institutional Repository Interaction With Research Users: A Review of Current Practice. *New Review of Academic Librarianship*, 16(sup1), pp.116–131.
- Saldaña, J., 2013. *The coding manual for qualitative researchers* 2nd ed. J. Seaman, ed., London: Sage.
- Sanjari, M., Bahramnezhad, F., Fomani, F.K., Shoghi, M. & Cheraghi, M.A., 2015. Ethical challenges of researchers in qualitative studies: the necessity to develop a specific guideline. *Journal of Medical Ethics and History of Medicine*, 7(1), p.14. Available at: <http://jmehm.tums.ac.ir/index.php/jmehm/article/view/106> [Accessed September 29, 2017].
- Sawant, S., 2012. Indian institutional repositories: a study of user's perspective. *Program*, 46(1), pp.92–122.
- Schutt, R.K., 2012. *Investigating the social world: the process and practice of research* 7th ed., Thousand Oaks, Calif: Sage Publications.
- Schwalbe, K., 2014. *Information technology project management* Revised Se., Australia: Cengage Learning.
- Serrano-Vicente, R., Melero, R. & Abadal, E., 2016. Open Access Awareness and Perceptions in an Institutional Landscape. *The Journal of Academic Librarianship*, 42(5), pp.595–603.
- Sharif, A., 2013. Implementing Institutional Repository (IR) system in a multi-campus international university: Nuts and bolts. In M. Ramzan, S. Soroya, & M. Zeeshan, eds. *Champions of Libraries: Proceedings of the PLA International Conference*. Lahore: Pakistan Library Association, pp. 131–141.
- Shearer, K., 2015. *Promoting Open Knowledge and Open Science: Report of the Current State of Repositories*. Available at: <https://www.coar-repositories.org/files/COAR-State-of-Repositories-May-2015-final.pdf> [Accessed January 18, 2017].
- Shema, H., Bar-Ilan, J. & Thelwall, M., 2014. Do blog citations correlate with a higher number of future citations?: Research blogs as a potential source for alternative metrics. *Journal of the Association for Information Science and Technology*, 65(5), pp.1018–1027.
- Shen, C. & Björk, B.-C., 2015. "Predatory" open access: a longitudinal study of article volumes and market characteristics. *BMC Medicine*, 13(230). Available at: <http://bmcmmedicine.biomedcentral.com/articles/10.1186/s12916-015-0469-2> [Accessed May 8, 2017].
- Shoaib, S. & Mujtaba, B.G., 2016. Use It or Lose It: Prudently Using Case Study as a

- Research and Educational Strategy. *American Journal of Education and Learning*, 1(12), pp.83–93.
- Shukla, P. & Khan, A.M., 2014. Implications of Institutional Repositories on Contributors' Professional and Publishing Practices: A Survey. *International Information & Library Review*, 46(3–4), pp.125–136.
- Shuva, N.Z. & Taisir, R., 2016. Faculty members' perceptions and use of open access journals. *IFLA Journal*, 42(1), pp.36–48.
- Siciliano, L., Schmidt, S. & Kinzler, M., 2014. BoRIS and BIA: CRIS and Institutional Repository integration at the Free University of Bozen-Bolzano. *Procedia Computer Science*, 33, pp.68–73.
- Silverman, D., 2013. *Doing qualitative research* Fourth edi., London ; Thousand Oaks, California ; New Delhi ; Singapore: SAGE Publications Ltd.
- Simons, N. & Richardson, J., 2013a. Repository statistics and altmetrics. In *New content in digital repositories: the changing research landscape*. Chandos information professional series. Witney, Oxford: Chandos Pub, pp. 189–199.
- Simons, N. & Richardson, J., 2013b. Selecting repository software. In *New content in digital repositories: the changing research landscape*. Chandos information professional series. Witney, Oxford: Chandos Pub, p. 252.
- Singeh, F.W., Abrizah, A. & Karim, N.H.A., 2013. What inhibits authors to self-archive in Open Access repositories? A Malaysian case. *Information Development*, 29(1), pp.24–35. Available at: <http://journals.sagepub.com/doi/10.1177/0266666912450450> [Accessed May 13, 2017].
- Singh, Y.K. & Nath, R., 2010. *Research methodology*, New Delhi: A.P.H. Publishing Corporation.
- Smith, J.A., Flowers, P. & Larkin, M., 2009. *Interpretative phenomenological analysis: theory, method and research*, Los Angeles: SAGE.
- Smith, J.A. & Osborn, M., 2015. Interpretative phenomenological analysis as a useful methodology for research on the lived experience of pain. *British Journal of Pain*, 9(1), pp.41–42. Available at: <http://journals.sagepub.com/doi/10.1177/2049463714541642> [Accessed September 23, 2017].
- Stellenbosch University, 2016a. SUNScholar/{Install Ubuntu/S01. *Libopedia*. Available at: http://wiki.lib.sun.ac.za/index.php?title=SUNScholar/Install_Ubuntu/S01#Hardware [Accessed August 18, 2017].
- Stellenbosch University, 2016b. SUNScholar/Repository Information. *Libopedia*. Available at: http://wiki.lib.sun.ac.za/index.php?title=SUNScholar/Repository_Information [Accessed August 18, 2017].
- Stellenbosch University, 2016c. SUNScholar/Self-Hosting Value Proposition. *Libopedia*.

- Available at: http://wiki.lib.sun.ac.za/index.php?title=SUNScholar/Self-Hosting_Value_Proposition [Accessed August 19, 2017].
- Stilwell, C. & Hoskins, R., 2013. Integrated library management systems: a review of choices made and their sustainability in South Africa. *Information Development*, 29(2), pp.154–171.
- Stone, S.M. & Lowe, M.S., 2014. Who is Citing Undergraduate Theses in Institutional Digital Repositories? Implications for Scholarship and Information Literacy. *College & Undergraduate Libraries*, 21(3–4), pp.345–359.
- Sudeshna & Datt, S., 2016. Limitations and weakness of qualitative research methods. *Knowledge Tank*. Available at: <https://www.projectguru.in/publications/limitations-qualitative-research/> [Accessed September 28, 2017].
- Sun, S.L., Peng, M.W., Lee, R.P. & Tan, W., 2015. Institutional open access at home and outward internationalization. *Journal of World Business*, 50, pp.234–246.
- Tennant, J.P., Waldner, F., Jacques, D.C., Masuzzo, P., Collister, L.B. & Hartgerink, C.H.J., 2016. The academic, economic and societal impacts of Open Access: an evidence-based review. *F1000Research*, 5, p.632. Available at: <http://f1000research.com/articles/5-632/v2> [Accessed March 30, 2017].
- The Standish Group, 2014a. *Big Bang Boom*,
- The Standish Group, 2009. *CHAOS Summary 2009*,
- The Standish Group, 2015a. *Haze*,
- The Standish Group, 2014b. *Project Smart*,
- The Standish Group, 2015b. *Resolution Benchmark for IBEX*,
- Thompson, A.R. & Larkin, M., 2012. Interpretative Phenomenological Analysis in Mental Health and Psychotherapy Research. In D. Harper & A. R. Thompson, eds. *Qualitative Research Methods} in Mental Health and Psychotherapy: A Guide for Students and Practitioners*. Chichester, UK: John Wiley & Sons, Ltd. Available at: <http://doi.wiley.com/10.1002/9781119973249> [Accessed September 27, 2017].
- Thompson, E.S., Akeriwe, M.L. & Aikins, A.A., 2016. Communicating the Value of an Institutional Repository: Experiences at Ghana's University for Development Studies. *New Review of Academic Librarianship*, 22(2–3), pp.325–336.
- Thompson, E.S. & Pwadura, J., 2014. Library Automation at The University for Development Studies: Challenges and Prospects. *New Review of Academic Librarianship*, 20(1), pp.66–77.
- Thorne, S., 2000. Data analysis in qualitative research. *Evidence-Based Nursing*, 3(3), pp.68–70. Available at: <http://ebn.bmj.com/cgi/doi/10.1136/ebn.3.3.68> [Accessed September 20, 2017].
- Trotter, R.T., 2012. Qualitative research sample design and sample size: Resolving and

- unresolved issues and inferential imperatives. *Preventive Medicine*, 55(5), pp.398–400. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S0091743512003131> [Accessed September 6, 2017].
- Tzarnas, S. & Tzarnas, C.D., 2015. Publish or Perish, and Pay—The New Paradigm of Open-Access Journals. *Journal of Surgical Education*, 72(283–285).
- Tzoc, E., 2016. Institutional repository software platforms at undergraduate libraries in the United States. *College & Undergraduate Libraries*, 23(2), pp.184–192.
- Umble, E.J., Haft, R.R. & Umble, M.M., 2003. Enterprise resource planning: Implementation procedures and critical success factors. *European Journal of Operational Research*, 146, pp.241–257.
- UNESCO, 2016. Open Science Movement. *Global Open Access Portal (GOAP)*. Available at: <http://www.unesco.org/new/en/communication-and-information/portals-and-platforms/goap/open-science-movement/> [Accessed October 12, 2016].
- United Nations General Assembly, 1987. *Report of the world commission on environment and development: Our common future*, Oslo, Norway.
- University of Health and Allied Sciences, 2012. Establishment of UHAS. Available at: <https://www.uhas.edu.gh/en/about-us/establishment-of-uhas> [Accessed August 31, 2017].
- Van de Sompel, H. & Davis, S., 2015. From a System of Journals to a Web of Objects. *The Serials Librarian*, 68(1–4), pp.51–63.
- Vinny, P.W., Vishnu, V.Y. & Lal, V., 2016. Trends in scientific publishing: Dark clouds loom large. *Journal of the Neurological Sciences*, 363, pp.119–120.
- Voutssas, J., 2012. Long-term digital information preservation: challenges in Latin America. *Aslib Proceedings*, 64(1), pp.83–96.
- Vrana, R., 2015. Open science, open access and open educational resources: Challenges and opportunities. In *I, 2015 38th International Convention on (pp.). IEEE*. Opatija, Croatia: Information and Communication Technology, Electronics and Microelectronics (MIPRO), pp. 886–890.
- Wanjohi, A.M., 2012. Sampling Procedures. *Kenya Projects Organization*.
- Weenink, K., Waaijers, L.J.M. & Godtsenhoven, K. van eds., 2008. *A DRIVER's Guide to European Repositories*, Amsterdam: Amsterdam University Press.
- Wesolek, A. & Royster, P., 2016. Open Access Policies: Basics and Impact on Content Recruitment. In B. B. Callicott, D. Scherer, & A. Wesolek, eds. *Making institutional repositories work*. West Lafayette, Indiana: Purdue University Press, p. 360.
- Working Group on Expanding Access to Published Research Findings, 2012. Accessibility, sustainability, excellence: how to expand access to research publications. *Finch Report*. Available at: <https://www.acu.ac.uk/research-information-network/finch-report->

- final [Accessed August 5, 2017].
- Xia, J., 2010. A longitudinal study of scholars attitudes and behaviors toward open-access journal publishing. *Journal of the American Society for Information Science and Technology*, 61(3), pp.615–624.
- Xia, J., 2007. Assessment of Self-archiving in Institutional Repositories: Across Disciplines. *The Journal of Academic Librarianship*, 33(6), pp.647–654.
- Yang, Z.Y. (Lan) & Li, Y., 2015. University Faculty Awareness and Attitudes towards Open Access Publishing and the Institutional Repository: A Case Study. *Journal of Librarianship and Scholarly Communication*, 3(1), p.eP1210. Available at: <http://jisc-pub.org/articles/10.7710/2162-3309.1210> [Accessed May 8, 2017].
- Yilmaz, K., 2013. Comparison of Quantitative and Qualitative Research Traditions: epistemological, theoretical, and methodological differences. *European Journal of Education*, 48(2), pp.311–325.
- Yin, R.K., 2009. *Case Study Research: Design and Methods* 2nd ed., Newbury Park: Sage Publications.
- Young, R. & Jordan, E., 2008. Top management support: Mantra or necessity? *International Journal of Project Management*, 26(7), pp.713–725.
- Zabel, D. & Rimland, E., 2011. Ranganathan's Relevant Rules. *Reference & User Services Quarterly*, 46(4), pp.24–26.
- Zainab Ajab Mohideen & Kaur, K., 2015. Digital Library: Demands and expectations. In *4th International Symposium on Emerging Trends and Technologies in Libraries and Information Services*. IEEE, pp. 17–21.
- Zhong, J. & Jiang, S., 2016. Institutional Repositories in Chinese Open Access Development: Status, Progress, and Challenges. *The Journal of Academic Librarianship*, 42(6), pp.739–744.
- Zhu, Y., 2017. Who support open access publishing? Gender, discipline, seniority and other factors associated with academics' OA practice. *Scientometrics*, 111(2), pp.557–579.
- Zohrabi, M., 2013. Mixed Method Research: Instruments, Validity, Reliability and Reporting Findings. *Theory and Practice in Language Studies*, 3(2), pp.254–262. Available at: <http://www.academypublication.com/issues/past/tpls/vol03/02/06.pdf> [Accessed September 19, 2017].

Appendix 1: Interview Schedules

Semi-structured Interview Schedule 1: Senior Faculty Researchers (Content Providers)

Introduction

I am Fred Kwaku Hayibor, a final year graduate student of the University of Pretoria.

I am undertaking a study on the topic: **“Building an Institutional Repository at the University of Health and Allied Sciences in Ghana.”** The main objective of this study is to establish the readiness of UHAS for an institutional repository (commonly known as an IR) by assessing the prevalence or otherwise of critical success factors for IR implementation. The main purpose of an IR is to make the university’s intellectual output visible and accessible to the international community.

The opinions expressed in this interview will be treated as confidential. All information gathered will be anonymised and you are free to withdraw from the interview at any point during the process. No part of this study will be linked to you personally either directly or indirectly.

The outcome of this study is currently for academic purposes with the possibility of publishing in a scientific journal. Ultimately, I would like to see an institutional repository established at our institution.

If you will permit it, this interview will be recorded to aid in accurately and completely capturing data. The recording will be destroyed after transcription.

~~~~~

Reference #: .....

#### Background

This interview, which will last for 30 minutes, seeks your opinion on the motivation for establishing an institutional repository in UHAS. The questions are focused on the critical issues of support for the long-term viability and sustainability of an institutional repository at UHAS. Text in blue font colour denote probes.

1. When I use the term Institutional Repository what comes to mind?

*If they do know the term – listen and record the response – check for correctness and that it is not just a repetition of the sentence provided in the introduction.*

*If they do not explain what it is, provide details regarding the content types and emphasize the value proposition*

2. What is your experience with disseminating research output through IR or other open access (OA) repository?

*If they do have an experience – record the response and clarify their involvement, i.e. ask them to name the repository(ies) in which they published their research; did they upload the content themselves or through an agent or did they submit articles to the library/repository staff for uploading? If they have no experience, proceed to Q4.*

3. Why did you publish in this (the named) repository?

*Probe their motivation for participating in IRs; do they voluntarily submit their articles for wider research dissemination or do they merely comply with institutional or funder mandates?*

4. With our discussion in mind – to what extent do you support the idea of establishing an institutional repository for UHAS?

*If NO support, proceed to Q7*

*If POSITIVE probe for a motivation if it is not given.*

5. How would you like to have your publications deposited in the IR?

*Explain the content recruitment models: self-archiving, mediated deposit, and automatic ingest using APIs (for those whose publications are already in OA repositories)*

6. What types of material (digital objects), in your opinion, should the UHAS IR, when established, contain?

*Use  to indicate **applicable** and  to indicate **not applicable** in the following non-exhaustive list of examples of content reported in the literature as international best practice. Give further examples of content that they are not able to mention by themselves and record their approval or otherwise thereof.*

- Electronic Theses and Dissertations (ETDs)
- Pre-prints/e-prints
- Peer-reviewed journal articles
- Datasets
- E-books/book chapters
- University publications
- University events and exhibitions (digitized photos)
- Conference papers
- Enduring teaching materials (lecture notes, video tutorials, lab notes, class recordings, syllabi, etc.)
- Grey literature (unpublished university records of enduring value, e.g. committee reports, technical reports/working papers, academic calendar, workshops, Vice Chancellor's Occasional Lectures, Speeches, etc.)
- Maps, plans/blueprints
- Interview transcripts

7. What is the current policy and/or practice of research production and dissemination at UHAS?

*Who owns the copyright of student research; are students allowed to publish their research outcomes in journals; does the library accept copies of student research and make them available for consultation by continuing students; in what format(s); what is the procedure for submission of theses?*

8. Would you recommend the IR as an information resource to your students?

*What kinds of information in an IR would you refer students to?*

9. Is there anything more you would like me to record?

**Thanks for your time. Your contributions are sincerely appreciated.**

## Semi-structured Interview Schedule 2: Senior Management (Decision makers)

### Introduction

I am Fred Kwaku Hayibor, a final year graduate student of the University of Pretoria.

I am undertaking a study on the topic: **“Building an Institutional Repository at the University of Health and Allied Sciences in Ghana.”** The main objective of this study is to establish the readiness of UHAS for an institutional repository (commonly known as an IR) by assessing the prevalence or otherwise of critical success factors for IR implementation. The main purpose of an IR is to make the university’s intellectual output visible and accessible to the international community.

The opinions expressed in this interview will be treated as confidential. All information gathered will be anonymised and you are free to withdraw from the interview at any point during the process. No part of this study will be linked to you personally either directly or indirectly.

The outcome of this study is currently for academic purposes with the possibility of publishing in a scientific journal. Ultimately, I would like to see an institutional repository established at our institution.

If you will permit it, this interview will be recorded to aid in accurately and completely capturing data. The recording will be destroyed after transcription.

~~~~~

Reference #:

Background

This interview, which will last for 30 minutes, seeks your opinion on the motivation for establishing an institutional repository in UHAS. The questions are focused on the critical issues of support for the long-term viability and sustainability of an institutional repository at UHAS. Text in blue font colour denote probes.

1. When I use the term Institutional Repository what comes to mind?

If they do know the term – listen and record the response – check for correctness and that it is not just a repetition of the sentence provided in the introduction.

If they do not explain what it is, provide details regarding the content types and emphasize the value proposition.

2. With our discussion in mind – to what extent do you support the idea of establishing an institutional repository for UHAS?

If NO support, proceed to Q5

If POSITIVE probe for a motivation if it is not given.

3. The following are some of the resources necessary to support IR development and management?

*Finance: Tell them what the financial implications are and ask if they are willing to/whether the university is in a position to fund it. (Use to indicate **applicable** and to indicate **not applicable**).*

Human Resources: Tell them about the staffing requirement.

Infrastructure: Tell them about the infrastructural requirements.

Policies/Governance: Tell them which policies will have to be developed.

a) Finance

- Start-up costs (including DOI/Handle registration)
- Annual continuation fees
- New staff/redeployed staff – training fees & salaries

b) Staff resources (skills set)

- Repository manager (experience with open-source software)
- Database administrator (experience with PostgreSQL)
- Web developer
- Programmer (application developer/API integration specialist)
- Preservation specialist (archivist)
- Project manager

c) Infrastructure

- Server
- Dedicated server room
- Software (Open-source or proprietary?)
- Public IPs
- Strong Internet connectivity/bandwidth
- Digitization equipment

d) Policies / Governance

- Collections
- Content submission
- Digital preservation
- Research data management
- Copyright and other intellectual property rights
- Publisher permissions
- OAI-PMH compliance and other trustworthy certification

4. How would you suggest that we obtain the critical mass of content - growing the collections of the IR?

Explain the content recruitment models: self-archiving, mediated deposit, and automatic ingest using APIs (for those whose publications are already in OA repositories)

5. What is the current policy and/or practice of research production and dissemination at UHAS?

Probe further: Who owns the copyright of student research; are students allowed to publish their research outcomes in journals; does the library accept copies of student research and make them available for consultation by continuing students; in what format(s)?

6. Is there anything more you would like me to record?

Thanks for your time. Your contributions are sincerely appreciated.

Appendix 2: Informed consent

INFORMED CONSENT FORM FOR STUDY PARTICIPANTS

STUDY TITLE: Building an Institutional Repository at The University of Health and Allied Sciences in Ghana.

PART I: INTRODUCTION AND OBJECTIVES OF THE STUDY

I am Fred Kwaku Hayibor, a Senior Library Assistant in charge of electronic resources at the University of Health and Allied Sciences (UHAS) Library and final-year graduate student of the University of Pretoria. I am undertaking this study to test the readiness of UHAS for an institutional repository (an open-access digital archive of a university's research output and other records of institutional memory maintained online in perpetuity) by exploring the prevalence or otherwise of the critical success factors for IR implementation. The main purpose of an IR is to make a university's intellectual output visible and accessible to the international community. If you accept to participate in this study, you will be interviewed for about 30 minutes. You will be required to answer a series of question pertaining to your past and present experiences with institutional repositories or your knowledge and expectations about such a project and its benefits to UHAS and how you will support such an initiative. Your responses will be descriptively analysed using thematic approaches to generate findings, which shall be shared with you.

CONFIDENTIALITY

The opinions expressed in your interview with me will be treated as confidential information. All information gathered will be anonymized before analysis. No part of this study will be linked to you personally either directly or indirectly. If you will permit it, the interview will be digitally recorded to ensure the completeness and accuracy of data captured. The recording will be destroyed after transcription.

POSSIBLE RISKS AND BENEFITS

This study poses no physical or emotional harm to you as far as can be envisaged. There are also no rewards, cash or kind, to you for your role in this study. The outcome of this study, however, apart from fulfilling the academic requirements for award of a Master's Degree in Information Technology to me, will serve as a definitive blueprint for IR implementation in UHAS. There are notable cases of failure in other universities in Ghana due to the absence of

feasibility studies prior to the major undertakings of such IT projects. This study will help UHAS avoid such pitfalls.

VOLUNTARINESS

Participation in this study is wholly voluntary and you are free to withdraw from the interview at any point during the process or to decline to respond to particular questions with which you may feel uncomfortable. For credibility, the transcript of my interview with you will be brought again to you to validate your responses before data are analysed. You are also encouraged to ask any question you may have about the study before the interview. To indicate your agreement to take part in this study after all the above information and other clarifications sought, you will kindly endorse the informed consent section. A copy of this form will be given to you as evidence of your participation.

CONTACTS

The Research Committee of the Department of Information Science has reviewed and approved the application for conduct of this study by Mr. Fred K. Hayibor in compliance with the standard requirements for ethical clearance as set out by the University of Pretoria's Faculty of Engineering, Built Environment and Information Technology (EBIT). For any concerns about your rights as a participant in this study, you may contact Dr. Marlene Holmner via e-mail: marlene.holmner@up.ac.za. If you have questions regarding the study itself, kindly contact the study leaders Dr. Martie van Deventer, via e-mail: mvandev2017@gmail.com and Dr. Heila Pienaar, via email: heila.pienaar@up.ac.za.

PART II: INFORMED CONSENT

I have read and understood (or I have been sufficiently informed about) the purpose, procedures, potential risks and benefits of this study and have had opportunities to ask questions about it. Anything I am curious about has been explained to me to my satisfaction. I understand my right to choose whether to participate in the study and that the information furnished will be handled confidentially. I am aware that the results of the investigation may be used for the purposes of publication. I freely agree to participate in the study and/but I agree/do not agree to have the interview recorded. I also understand that upon signature of this form, I will be provided with a copy.

Name of Participant:

Signature:

Date:

Name of Witness:

Signature:

Date:

I have sufficiently informed the participant about the purpose, procedures, potential risks and benefits of this study. I have answered all questions to the best of my ability and to the satisfaction of the participant.

Name of Researcher:

Signature:

Date:

Appendix 3: Ethical clearance



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Enquiries : Dr Marlene Holmner
Tel. nr. : +27 (0)12 420-5215
Fax nr. : +27 (0)12 362-5181
E-mail : marlene.holmner@up.ac.za
Office : IT 6-43

Faculty of Engineering, Built Environment
and Information Technology
School of Information Technology
2017-09-12

ETHICAL CLEARANCE FOR MR F. HAYIBOR

**Dissertation Title: Building an Institutional Repository at The University of Health
and Allied Sciences in Ghana.**

This is to confirm that the Research Committee of the Department of Information Science approved the application by Mr F. Hayibor for ethical clearance. Mr Hayibor complied with the standard requirements for ethical clearance as set out by the University of Pretoria's Faculty of Engineering, Built Environment and Information Technology (EBIT), as follows:

- He signed and submitted all the application forms required for ethical clearance;
- He submitted his data collection instruments for vetting by both the Research and Ethics Committees; and
- He implemented all corrections recommended by the above-mentioned committees.

The Research Committee of the Department of Information Science therefore requests permission for Mr Hayibor to collect the data he needs in order to complete and submit his mini-dissertation for examination. The Committee further appreciates any effort by appropriate authorities to expedite this process, and expresses its gratitude in anticipation.

Yours sincerely,


Prof. Archie L Dick

Chairperson: Research & Ethics Committee

HOD: Dept. of Information Science

Chairperson: School of Information Technology

Appendix 4: Approval from research site

University Library
University of Health and Allied Sciences
PMB 31
Ho

25th July, 2017.

The Registrar
University of Health and Allied Sciences
PMB 31
Ho



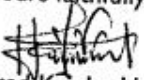
Dear Madam,

**APPLICATION FOR PERMISSION TO CONDUCT A STUDY ON THE TOPIC:
“ESTABLISHING AN INSTITUTIONAL REPOSITORY AT THE UNIVERSITY
OF HEALTH AND ALLIED SCIENCES IN GHANA” IN THE UNIVERSITY.**

As part of my Master of Information Technology (M.IT) degree programme at the University of Pretoria, South Africa, I am required to submit a mini-dissertation on an approved topic of choice. The above topic has been approved for my essay, however, as part of ethical clearance processes, I am further required to obtain a written permission from UHAS allowing me to carry out the study in the institution since it will involve a survey and interview of members of the UHAS community.

Please, find attached a copy of my ethical clearance application (which I must submit together with the permission being requested) for further details about my research.

Thank you for your kind consideration and permission.

Yours faithfully,

Fred Kwaku Hayibor
Snr. Library Assistant

① approved pl.
w.
28/7