Barriers and Enablers to Open Access Repository (OAR) Development and Management in African HLIs: Research from the LIBSENSE OAR Workshops in the UA, WACREN and ASREN Regions

Pamela Abbott[1], Kokui Appiah[2], Omo Oaiya[3]

[1]Senior Lecturer, Information Systems, Information School, University of Sheffield, UK

[2] Lead Consultant & Managing Partner at iQ Consult/Research Associate, seconded to WACREN for the LIBSENSE initiative, GHANA

[3]Chief Strategy Officer (CSO), WACREN, GHANA

Table of Contents

List of Figures

List of Tables

List of Abbreviations

AfLIA	African Library and Information Associations and Institutions
AFREN	African Research and Education Network
ASREN	Arab States Research and Education Network
COAR	Confederation of Open Access Repositories
CPD	Continuing professional development
EIFL	Electronic Information for Libraries)
HLI	Higher learning institution
LIBSENSE	Library Support for Embedded NREN Services and E-infrastructure
NGO	Non-governmental organisation
NREN	National Research and Education Network
OAR	Open Access Repository
REN	Research and Education Network
RREN	Regional Research and Education Network
TANDEM	TransAfrican Network Development
TUOS	The University of Sheffield
UA	Ubuntunet Alliance
WACREN	West and Central African Research and Education Network

Abstract

Purpose: This paper reports on the results of a three-region survey and complementary focus group discussions held amongst the AfREN community of regional research and education networks (RRENs) in the three main regions overseen by these RENs, i.e., West and Central, Eastern and Southern, and Northern Africa.

Design/Methodology/Approach: The research was led by the Information School, University of Sheffield, UK, working in collaboration with WACREN and chief partners, COAR and EIFL. Higher learning institution (HLI) librarians in the West and Central region also participated in the initial design of the survey. A total of 1,425 questionnaires were distributed electronically to a select group of information professionals in all three regions, out of which 323 responses were used for analysis. Four focus group discussions with 22 participants overall were held in conjunction with LIBSENSE workshops in the three regions.

Findings: The findings point clearly to five main areas of concern to HLI librarians regarding their capabilities to develop and maintain OAR services, the majority of which were evident at the institutional level: Funding, Human Capacity, Infrastructure/Technical Capacity, Training and Institutional Support.

Practical Implications: Analysis of these issues using a change management framework, including institutional strategising and policy-making, demonstrates that a roadmap to improving this situation is possible through an extended LIBSENSE agenda covering skills and capacity building, policymaking at the strategic level and infrastructure issues all aligned to the continuing development of open science in the three regions.

Originality/Value: The paper gives a holistic view from the experience of information practitioners in these three regions in an accessible format and presents their vision of how to address the ongoing challenges of digitalisation to their profession.

Keywords: Open Access Repositories, LIBSENSE, African Higher Learning Institutions, Academic Librarians, Digitalisation

Introduction

The LIBSENSE initiative[1] was launched in the latter part of 2016, in part, as a result of a post-TANDEM[2] initiative to set up institutional focal points among the Higher Learning Institution (HLI) librarian communities in West and Central Africa, who form part of the WACREN[3] region. Due to their key institutional roles as information specialists in this region, and the existence of organised HLI librarian consortia, these groups were seen as legitimate candidates for continuing the advocacy and uptake of NREN services (Foley, 2016) [4] in the region. Anecdotally, however, HLI librarians reported institutional barriers to developing their (digital) information management capability to undertake this role. With the assistance of the University of Sheffield (TUOS) Information School, UK, a pilot survey was launched among the WACREN librarian communities in the summer of 2017 (Abbott & Oaiya, 2017)[5]. This also revealed similar issues and pointed to a weakness particularly in the support for librarians' involvement in open movement[6] initiatives.

These initial findings provided the basis for seeking further funding sources for a larger, more comprehensive pan-African study. Thus, in October 2018, with funding from AfricaConnect2[7], and support from COAR[8] and EIFL[9], 3 workshops on Open Access Repository (OAR) development and management were held in the three AFREN[10] regions: Ubuntunet Alliance[11] (UA) in Southern and Eastern Africa, WACREN in the West and Central region and ASREN[12] in the North. Due to its early involvement, TUOS Information School continued to lead the research-based activities of these workshops, which consisted of a large-scale, 3-region survey of institutional barriers and enablers of information management practices in these regions vis-à-vis OAR management and development as reported by the regional HLI librarian communities. Four focus groups were also held in

[1] For more details, see: https://spaces.wacren.net/display/LIBSENSE/Home
[2] TANDEM was an EU-sponsored project around advocacy of NREN services in higher learning institutions in West and Central Africa. For more details, see: https://www.tandem-wacren.eu
[3] The West and Central African Regional Education Network organisation. For more details, see: https://www.wacren.net/
[4] Foley, M. (2016). *The Role and Status of National Research and Education Networks (NRENs) in Africa*.
[5] Abbott, P. & Oaiya, O. (2017). A Pilot Survey on Institutional Enablers and Barriers Affecting the Evolving Role of Librarians in African Higher Educational Institutions.
[6] Chalmers, R. (2012, October 29). Explainer: What is the open movement?
[7] AfricaConnect is a pan-African EU/African collaborative project to build up research and education network infrastructure within the African HLI community. For further details see: https://www.africaconnect3.net/
[8] Confederation of Open Access Repositories – see: https://www.coar-repositories.org/
[9] Electronic Information for Libraries – see: https://www.eifl.net/
[10] For more details, see: https://www.aau.org/current-projects/afren/
[11] For more details, see: https://ubuntunet.net/
[12] For more details, see: http://asrenorg.net/

conjunction with the surveys to gather more in-depth data on these issues. The surveys/focus groups served two main purposes: (1) to gather systematically more data related to barriers and enablers of information management capability thought relevant by the HLI librarian communities in these three regions and (2) to establish ongoing dialogue between the librarian communities of practice and stakeholders related to OAR development in the three regions, including NRENs, academics, regional HLI associations and NGOs working in this space.

This paper reports on the results of these wide-ranging research activities related to the LIBSENSE OAR workshops. It will do so by highlighting three areas of interest:

(1) the overarching structure of the research design and methods used, which were inclusive and participatory;
(2) key findings from the 3-region survey and focus groups (particularly, those which were corroborated in both methods); and
(3) a discussion on how these results feed into ongoing LIBSENSE initiative plans under AfricaConnect3[13].

Regarding item (1), we will discuss the thinking behind the structure of the research and why various communities were identified as key players in the development and management of OARs in African HLI settings. We will also discuss the participatory approaches to research that were used and the outcomes of these for the research process. For item (2), we will discuss key findings under 3 interrelated areas: (i) *institutional barriers/enablers for OAR development and management*; (ii) *evolving roles of librarians in relation to ongoing digitalisation in African HLIs*; and (iii) *HLI librarians' skills profiles to support OAR development and management*. For item (3), we will discuss the planned activities for further research into open scholarship initiatives in the WACREN region informed by the results obtained from these workshops. In conclusion, we will highlight how the findings from this research can continue to contribute to research agendas around the feasibility of open scholarship in combination with NREN service provision to influence ongoing change in the HLI sector.

Methods

In this section, we describe the design of the research approach used for the project, which involved both a wide-ranging survey and supplementary focus groups. The construction of

[13] For more details see: https://www.africa-eu-partnership.org/en/projects/africaconnect3

the sample of participants who were recruited to take part in the project and the way in which the survey was distributed are described. Details of the survey design, its analysis and the processes used in presenting the results are also described. The design, analysis and presentation of results for the focus group are also described.

Research Approach

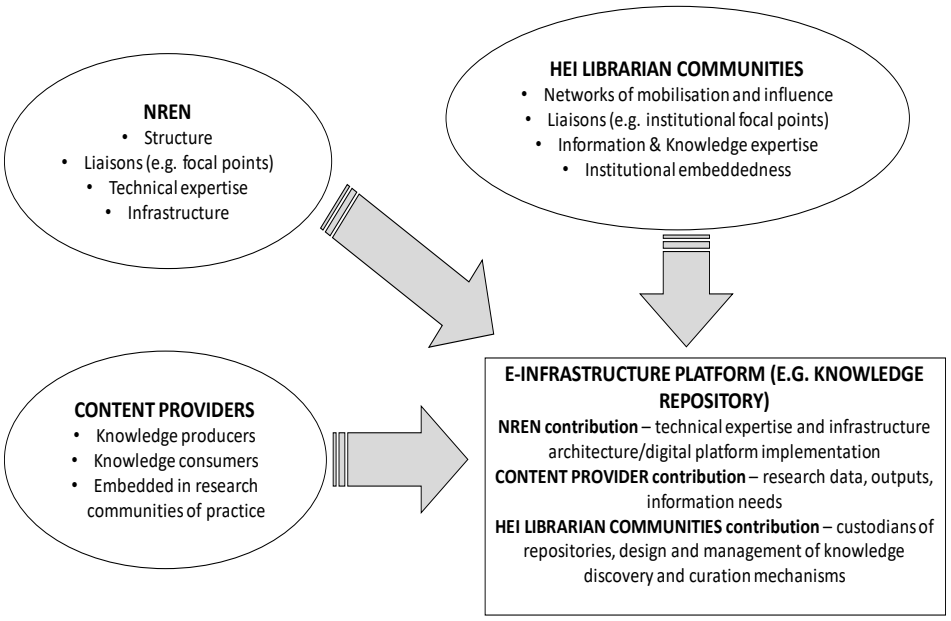


Figure 1. Diagram of the 3 communities contributing to the development of e-Infrastructures, like OARs

The research was designed around the three LIBSENSE OAR workshops that were held in the UA, WACREN and ASREN regions. These were meant to bring together the main stakeholders who would play a role in the development and maintenance of OARs in African HLIs. The 3 main stakeholder communities were identified as HLI librarians, NRENs and content providers. Broadly, these 3 communities would represent respectively, the three aspects of: information and knowledge specialisms (increasingly data management is also relevant); technical and networking infrastructure competence; and producers/consumers of digital content. All three were deemed necessary for stable and sustainable development of OARs. Figure 1 depicts these 3 communities and the relationships between them.

It was thought that librarian communities, especially those who were already organised into consortia and associations, could leverage their collective influence and mobilise their networks to support further advocacy for e-infrastructure development in their HLIs. Their institutional role was seen as being focal since they were embedded within their institutional structures and central to the support for information and knowledge assets. NRENs would contribute to this effort mainly through technical expertise on research and

education infrastructure and in liaising with other HLI technical support staff. Content providers would be the key user community both producing and consuming digital content. Each user community would be embedded within a particular research area, e.g. computer science or health sciences.

In advance of the workshops, the librarian communities in each region were sent a survey to fill in, a description of which is given below. Four complementary focus groups were also held, as described below. The surveys were meant to raise awareness and capture data related to enablers and barriers of OAR development and maintenance. As such, the data were representative of the perceptions of these librarians of their current information management capability. The focus groups were meant to elaborate on issues captured through the surveys and workshop discussions.

Participatory approaches to the research were adopted at the very start of the collaboration with the TUOS Information School. The initial pilot survey instrument was developed in collaboration with a community of HLI librarians who were part of a WACREN email mailing list[14] set up to build linkages and foster communication amongst the information professionals in that region. The pilot survey was reframed into the final survey instrument to be used in the 3-region survey with further input from EIFL, COAR and WACREN representatives. A further refinement of the survey instrument was undertaken after the UA workshop as a result of feedback from the workshop participants.

A research associate and data analysts based in Ghana and Nigeria, respectively, assisted in the analysis of the collected data. The exercise of collecting, analysing and presenting the data was therefore a collaborative, capacity-building exercise between the research lead expertise in Sheffield, UK, and the associate/analysts operating out of Ghana and Nigeria. All of these activities were coordinated by WACREN.

Sample, Participants & Distribution

Three surveys were launched in the 3 regions identified above with the numbers distributed and response rates indicated in Table 1 below. Participants in the survey were sourced from library consortia contacts and open access country representatives in West and Central Africa and Southern and Eastern Africa who were part of EIFL's network of contacts in these areas. Additional sources of contacts came from the African Library and Information Associations and Institutions[15] (AfLIA) filtered for the specific region and other librarians

[14] At that point the mailing list was: : https://lists.wacren.net/mailman/listinfo/libraries
[15] For more information see: https://web.aflia.net/

known to WACREN through the WACREN Libraries mailing list. In the ASREN region, librarians, library consortia and data repository sites were invited to participate. Emails were used to distribute the surveys and follow-ups were made with phone calls and automatic reminders. Ethical considerations were followed in consultation with TUOS Information School and WACREN.

Table 1. Overview of Distribution of Surveys with Response Rates in Three Regions

Region	Total Questionnaires Distributed	Total Responses Returned	Total Usable Responses	Response Rate
UA	338	178	95	28%
WACREN	675	277	165	24%
ASREN	412	120	63	15%
Overall	**1,425**	**575**	**323**	**23%**

Survey Design

There were two versions of the survey, one distributed in the UA region containing 54 Questions (see Appendix - Survey Instrument Used for the UA Region), the other an updated version, in the WACREN and ASREN regions, containing 55 questions (see Appendix - Survey Instrument Used for the WACREN and ASREN Regions). Both questionnaires consisted of a mixture of closed and open question types, split into 6 sections, A to F. Table 2 below explains the purpose of each of the questionnaire sections.

Table 2. Questionnaire Structure

Question Section	Section Focus	Description of Section Focus
A	Management Function	Questions targeting those with responsibility for any of the following: budgeting, staffing, policy development, planning, training, supervision, resource management, and similar roles.
B	Operational Function	Questions targeting those with responsibility for carrying out librarian functions such as providing support services for staff, procurement, building library collections and similar activities.
C	Subject Specialist Function	Questions targeting those with responsibility for developing library collections in a specific subject area, providing support services and liaising with research and teaching staff in that specific subject area.

Question Section	Section Focus	Description of Section Focus
D	Technical Function	Questions targeting those with responsibility for operating, maintaining and securing the infrastructure and applications supporting technical library services such as computer networks, storage, communication channels, information systems, digital collections, etc.
E	Skills Development	Questions to individual librarians about the librarian's digital skills sets and their opinions about the evolving roles of the library and librarian.
F	Demographics	Questions to individual librarians about age range, gender, educational level, years' experience in the field, job designation, and country of origin of their institution,

Survey Analysis and Presentation of Results

The data were analysed by teams of data analysts from the University of Lagos, under the direction of the research associate. The data were mostly categorical, consisting mainly of "Yes", "No", "Don't' Know" and "N/A" response types, together with some open-ended textual responses. Descriptive statistics, including basic bivariate analyses, where necessary, were performed on the data by the data analysts and submitted to the research associate for further processing for accurate presentation.

The qualitative data were evaluated using a thematic analysis approach in which preliminary codes were assigned to facilitate understanding the content of the data. These codes were then clustered into common themes. In some cases, these themes were then charted according to the frequency of their occurrence. This frequency data was used only for the purpose of presentation, and were not representative of the underlying meaning of the qualitative data. The charts were based on frequency percentages and included themes with values of three percent and above where those themes were numerous. In instances where the themes generated were minimal, all themes were charted out regardless of their percentage value. The research associate was mainly responsible for the qualitative analysis.

Focus Group Design, Analysis and Presentation

Based on the discussions raised at the first LIBSENSE workshop in the UA region, focus group discussions (FGDs) were designed for the remaining workshops. One of these was held online while the others were held co-located with the remaining workshops. The questions posed in the online FGD were related to the evolving role of the HLI librarian, digital resource management, and a deeper focus on OARs. The other FGDs focused on

questions related to how the evolving librarian could network with other stakeholders for sustainable development and management of OARs (both FGD question protocols are presented in the Appendix). Table 3 illustrates how the FGDs were structured and organised.

Table 3. Structure and Organisation of Focus Groups

FGD ID	Venue	Language	Duration	No. of Participants
1	Online	English	1.66 hours	4
2	LIBSENSE Workshop II	English	1.5 hours	7
3	LIBSENSE Workshop II	French	1 hour	5
4	LIBSENSE Workshop III	English and French	1 hour	6

The focus groups discussions were audio-recorded and notes were taken as part of the activity. Additionally, the online focus group was video-recorded. The recordings were analysed and themes extracted by the research associate and discussed with the research lead. The resulting themes were agreed upon.

Results

We now report on the various responses from the different functional areas regarding institutional barriers/enablers to OAR development and management. The proportional representation from each functional area can be seen in Table 4.

Table 4. Responses per Function per Region and Overall Totals

Responses	Management	Operational	Subject Specialist	Technical
Total UA Region /95	72 (76%)	44 (46%)	24 (25%)	48 (51%)
Total WACREN Region /165	95 (58%)	87 (53%)	67 (41%)	67 (41%)
Total ASREN Region /63	31 (49%)	27 (43%)	26 (41%)	25 (40%)
Overall total /323	**198 (61%)**	**158 (49%)**	**117 (36%)**	**140 (43%)**

Institutional Barriers/Enablers for OAR Development and Management

Across the 3 regions surveyed, there was a collective perception of weak support at the national level for policies regarding the management of research outputs, e.g. how and where they should be published, especially where national funds are used or where the research is done in the national interest. The overall results showed a negative disposition among as many as 73% of the respondents regarding national policies, made up of 38% who do not believe a national policy exists and 35% who do not know whether such a policy even exists. These results were fairly uniform in the individual regional responses as can be seen in Figure 2. Of the 3 regions, the largest proportion of responses in the "Don't Know" category

was recorded in the WACREN region, while the UA region recorded the largest proportion of "No" national policy responses. The ASREN region showed an encouraging 32% thought national policies did exist.

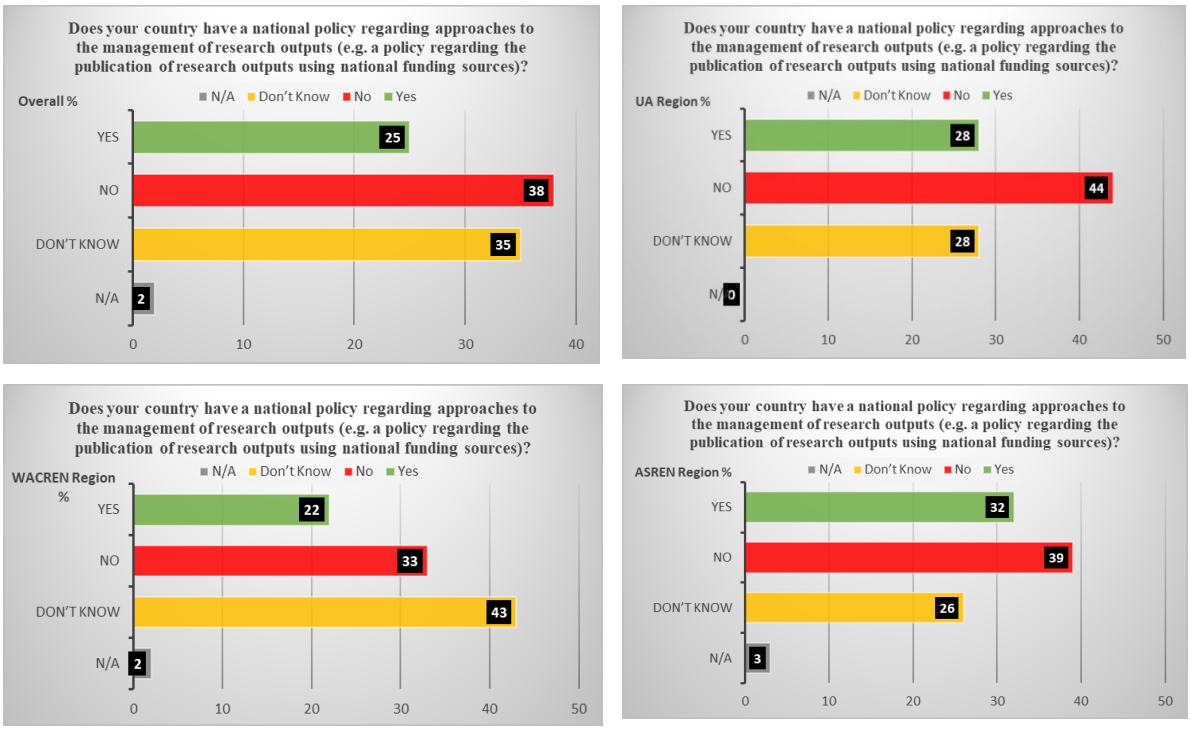
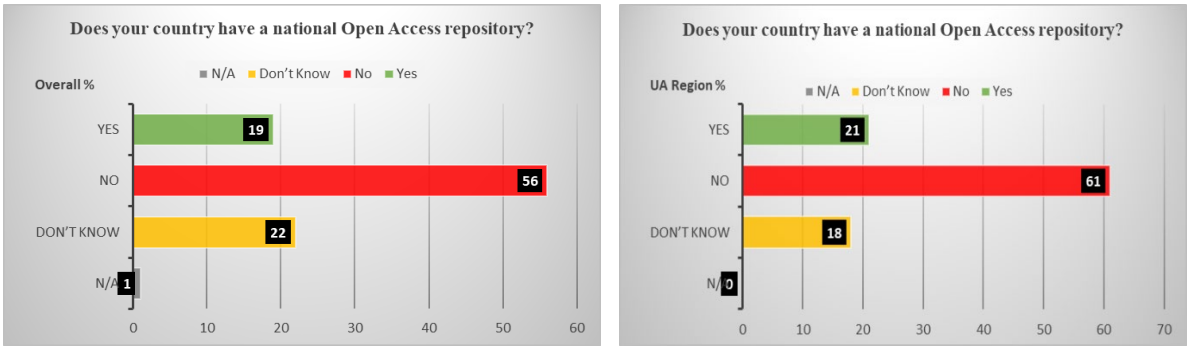


Figure 2. Management Function Respondents' Perceptions Regarding National Policies for Research Outputs

This apparent lack of national support is echoed in the responses related to OARs at the national level. Overall, the majority of responses (56%) indicate no national OAR, as far as these respondents are aware. There is a very similar distribution of responses at each regional level, as well. Unfortunately, there are still a great number of "Don't Know" responses at the regional level too. The best representation of OARs at the national level appears to exist in the ASREN region. Figure 3 illustrates.



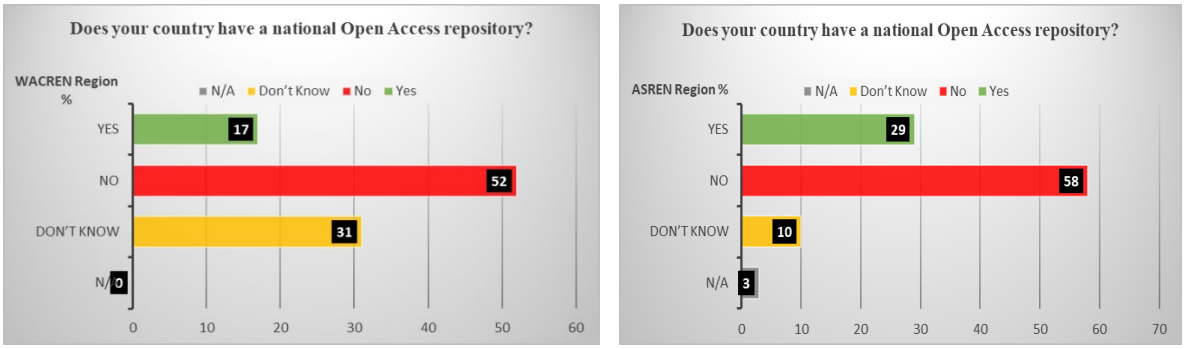


Figure 3. Management Function Respondents' Perceptions Regarding Existence of National OARs

The situation at the HLI level concerning policy and support for implementation of OARs is also not too encouraging as seen by the responses below (Figures 4 to 6 and Table 6). At the institutional level, less than half of the respondents (48%) in the 3 regions acknowledge the existence of an institutional policy (see Figure 4). The situation is more noticeable in the WACREN and ASREN regions, in each of which a larger proportion of respondents (51% and 45% respectively) state that no OAR policies exist at the institutional level (see Figure 5).

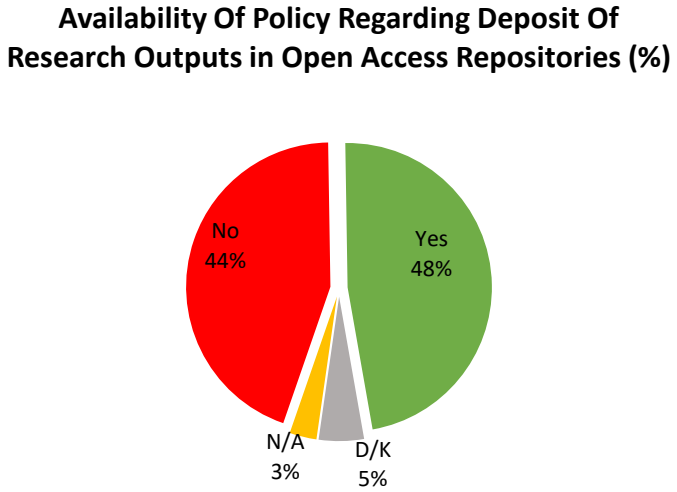
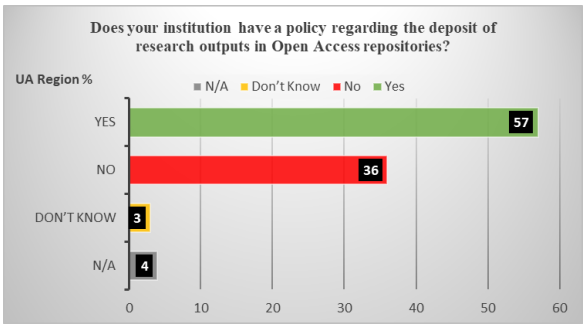


Figure 4. Management Function Responses Regarding Institutional-level OAR Policies across Regions



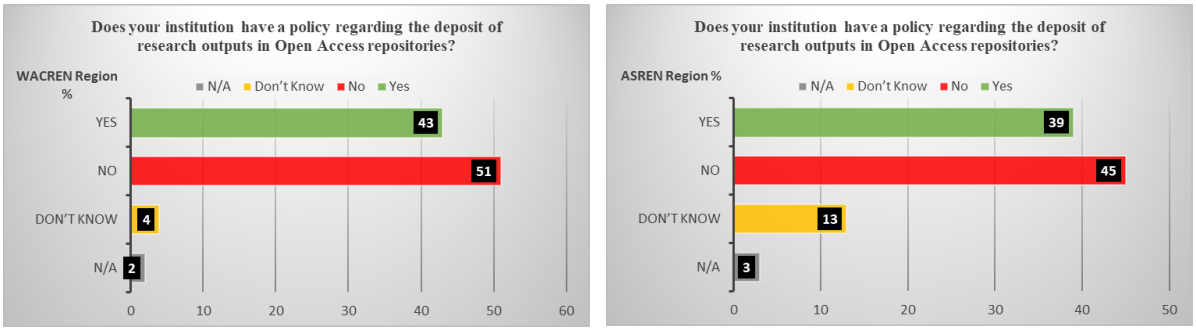


Figure 5. Management Function Responses Regarding Institutional-level OAR Policies per Region

Where such a policy exists, a range of responses demonstrated how the policy was implemented within HLIs in all 3 regions, the top 4 being *Staff Monitoring (39% of responses), Staff Management and End User Engagement (27% each) and Mandatory Submission to Library (14%).* Figure 6 illustrates. Some examples of the top 4 of these policy implementations follow in Table 5.

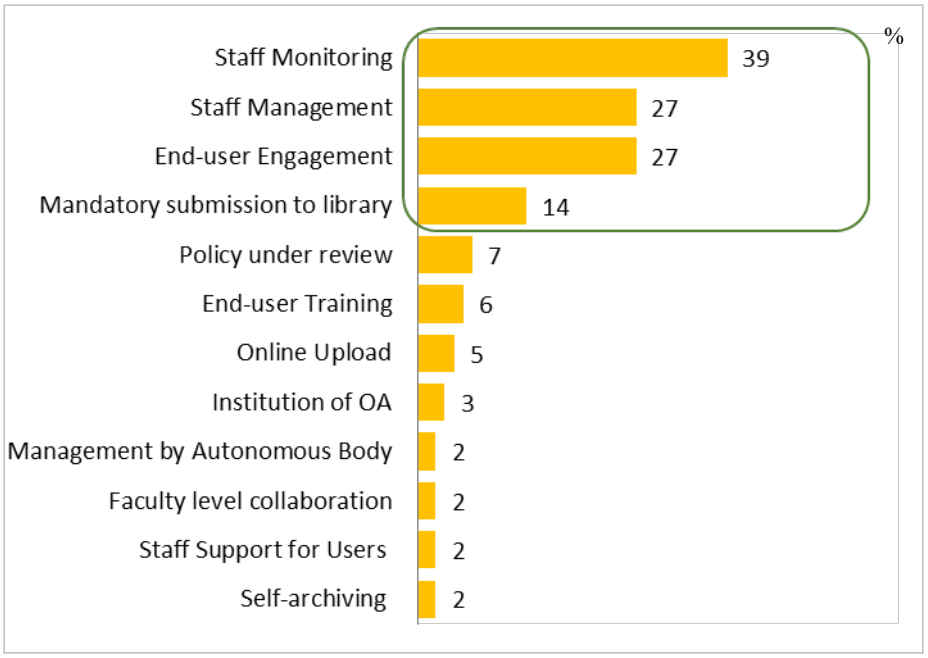


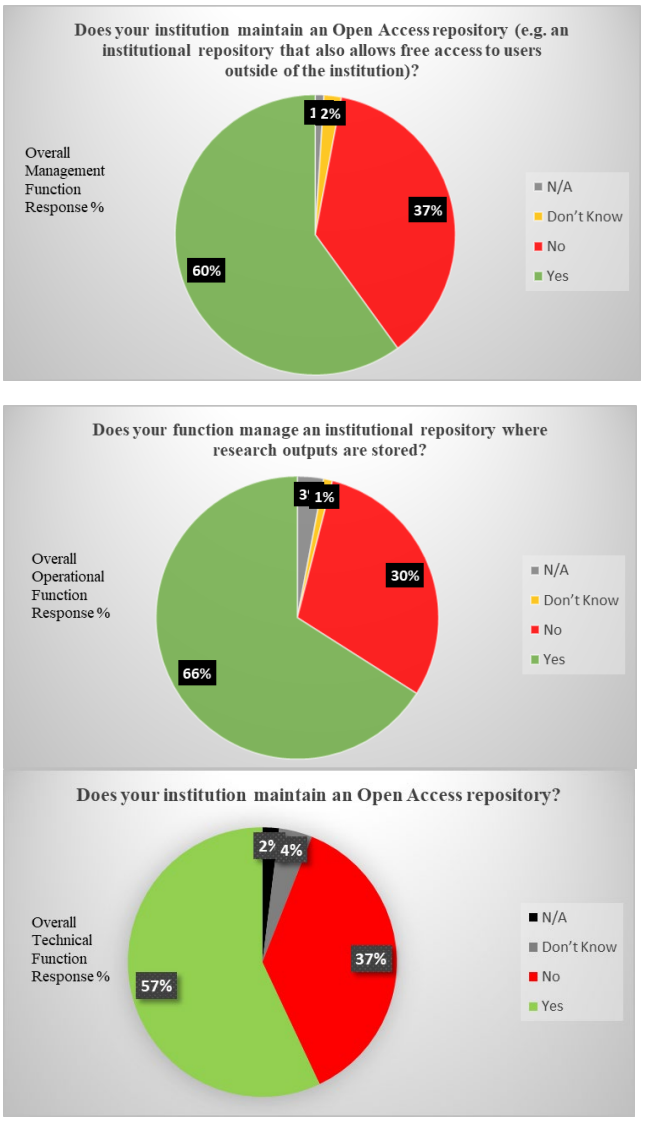
Figure 6. Management Function Responses as to How OAR Policies Implemented across Regions

Table 5. Examples of Implementation of Policy within HLIs Reported by Management Function across Regions

Ranking	Category of Policy Implementation (Top 4)	Examples Quotes from the Survey
1	Staff Monitoring (monitoring and controlling how and what staff upload to the OAR)	– *"Monitoring and engagement of qualified staff in the right Unit of the library"* – *"Research outputs are not just uploaded at once. They go through processes of vetting by specific librarians trained for such. After these processes, they can finally upload it to the open cloud for general purposes"*
2	Staff Management (setting up controls to manage and report on the OAR activity)	– *"…to activate help-desk services to support OAR management and self-archiving practice; plan repository activity workflow; coordinate and manage human resources and team work; plan a budget; plan fund-raising strategies; collect, harmonize and validate data and statistics about repository activities; plan and carry out qualitative surveys and to evaluate findings"* – *"Overseeing management of the repository by ensuring appropriate deposit of content. Reviewing content to ensure copyright adherence, quality control for bibliographic details"*
3	End User Engagement (reaching out to staff to actively engage them in upload activity to the OAR)	– *"As … head Librarian, I ensure I communicate to the researchers in the Agricultural complex the need to deposit their research outputs in the repository. It's my duty to represent the University librarian and see to it that the policy is not bridged in the process also"* – *"Liaise with faculty and staff who are working on research or writing a paper. Inform them about the need to have their work deposited at the library."*
4	Mandatory Submission to Library (imposing a mandatory upload policy on certain items)	– *"All the postgraduate theses and dissertations, both soft and hard copies are mandatorily deposited in the university library. All inaugural lectures are sent also to the library. Journals produced by the university, faculties and Departments and other publications of the University are equally housed at the IR of University Library"* – *"…it is compulsory that all research output emanating from my institution must be uploaded to the institutional repository"*

Institutional support for OAR development and maintenance also includes specific mechanisms at the management, operational and technical levels that ensure that these

activities can be carried out efficiently. In the survey, we queried these different functional levels in an effort to compare and contrast the levels of support apparent to the respondents. These three perspectives are represented in Figure 7. Across these three functional areas, we can infer that between 57% to 66% of respondents acknowledge local OARs within their institutions. This is fairly consistent across the regions; hence, we can assume that there is agreement that at least two-thirds of the respondent institutions potentially do manage/operate/maintain an OAR.



From the Management Function, qualitative data provides additional clarity to the effect that issues relative to the existence of OARs are linked to the need to manage the OAR within the institution, i.e. to have enough information management capability to ensure that OAR development and maintenance is efficient and sustainable.

From the operational level, the issues are related to the day-to-day operational management of the OAR, such as ensuring policy is carried out.

From the Technical viewpoint the issues are related to how OARs can be technically supported.

Figure 7. Perspectives from the 3 Functional Areas on OAR Functioning within the HLI across Regions

In attempting to form a picture of the level of institutional support that the Management Function may have over the management of institutional OARs, we wanted to obtain perspectives about the level of autonomy that the Management Function has over digital infrastructure and the degree to which the Management Function has authority over

various aspects of information governance. The overall picture from the Management function respondents to the survey is that they have some autonomy over decisions related to digital infrastructure (42%) and even more decision-making power when it comes to information governance issues such as security, privacy, information policy etc. (60%). Figures 8 and 9 illustrate.

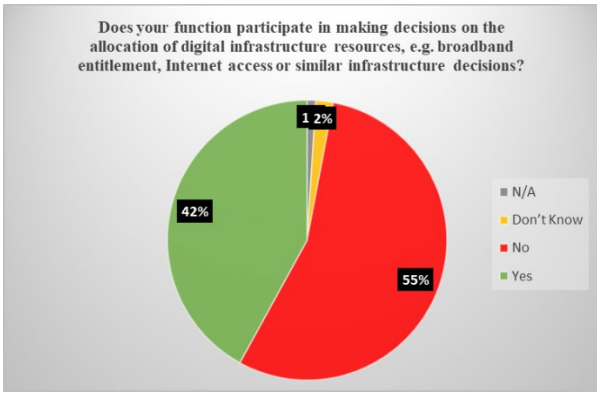


Figure 8. Overall Responses from Management Function Indicating Level of Decision-making on Digital Infrastructure Issues

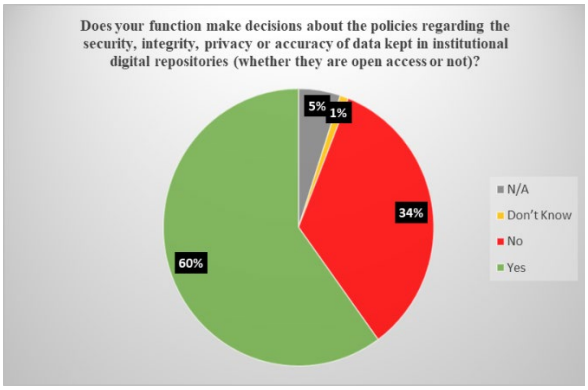


Figure 9. Overall Responses from Management Function Indicating Level of Decision-making on Governance Issues

From the overall perspective of the Operational Function, the two key support areas most lacking from their institutions were: *Experts/Consultants on Digital Skills* (38%), and *Funding for Digital Repositories* (42%), as illustrated in Figure 10. Both of these areas would be critical for sustainable OAR development and maintenance. Additionally, when questioned about the institutional support available for Open Access initiatives specifically, respondents indicated overall that the least supported areas were: *Training on Copyright and Related Issues* (43%) and *Specific Policy on Open Access* (44%), as illustrated in Figure 11. These proportions were quite consistent across all regions.

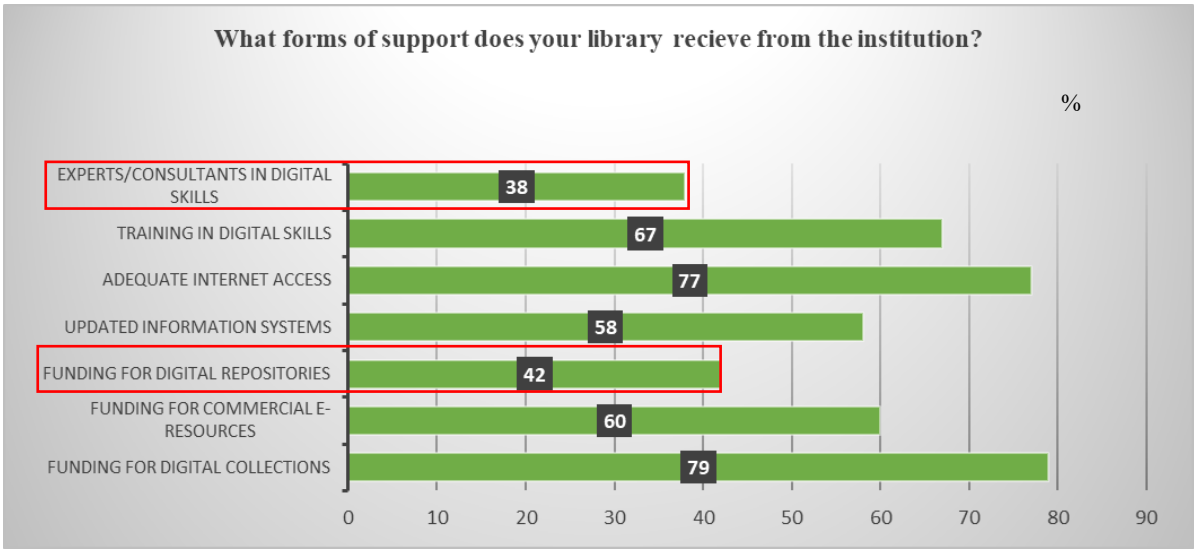


Figure 10. Percentage of Respondents from Operational Function Indicating Categories of Support for Digital Services Received from their Institution across Regions

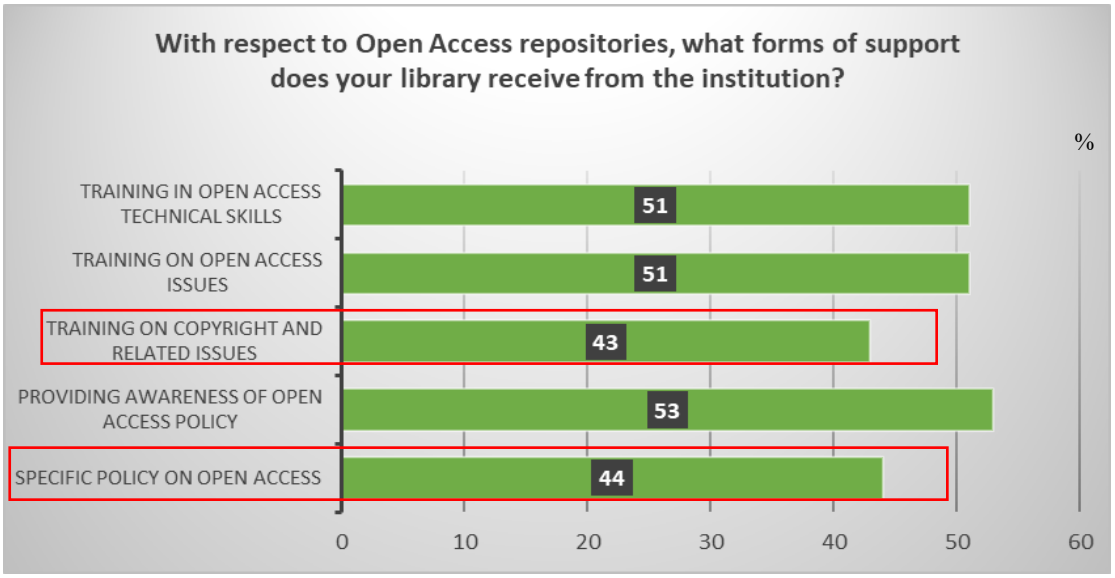


Figure 11. Percentage of Respondents from Operational Function Indicating Categories of Support for Open Access Received from their Institution across Regions

From the viewpoint of the Technical Function, the least technically supported areas were *Technical Experts/Consultants* (38%) and *Information Experts/Consultants* (48%), as shown in Figure 12 below. This tallies with a similar result from the Operational Function.

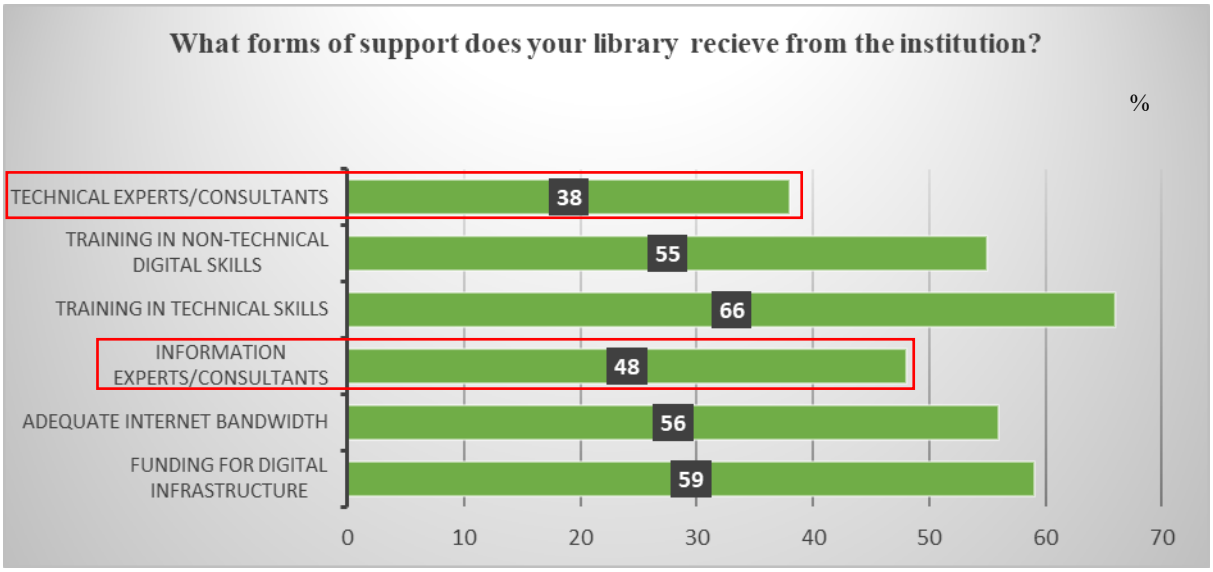


Figure 12. Percentage of Respondents Indicating Categories of Technical Support Received from their Institution across Regions

In one of the FGDs, respondents also spoke about how they worked together collaboratively with technical experts external to their HLIs to help build OARs in their institutions. Beyond collaboration, some other factors which helped with these efforts were:

- ***Sensitization of key stakeholders*** or communities on the relevance of OARs through workshops
- ***Commitment of (executive leadership of) HLIs*** to 'Digitization' and 'Open Access Initiatives'
- Sourcing ***external funding***
- Sourcing help from both ***internal*** (ICT unit mainly) and ***external experts/consultants*** particularly for technical support
- ***Training*** users
- ***Customizing open source repository software*** packages like DSpace
- Existence and implementation of ***approved institutional policies*** to guide the operation and management of OAs.

Evolving Roles of Librarians in Relation to Ongoing Digitalisation in African HLIs

Globally, academic libraries are undergoing some degree of transformation due to a number of factors, including the effect of ongoing digitalisation and changes to the higher

education sector[16]. These changes are inevitably leading to the reframing of job roles to meet new demands[17]. With this in mind, the HLI librarians who participated in this survey were asked to comment on how they saw their roles and that of the academic library evolving.

The first issue was related to how the librarians viewed the evolving role of the library in terms of its position within HLIs, i.e., whether they perceived the library to have a central, and therefore influential, role within the HLI or whether that role was peripheral, i.e. relegated to some marginal activities within the structures of the HLI. From the overall results, nearly two-thirds of respondents (64%) believed that the library's role is still central (see Figure 15). In the qualitative responses accompanying this statistic, the librarians' reasons for this are varied, with the highest percentage (89%) asserting that the library remains *central to academic activities* (Figure 15). Some of the qualitative comments given illustrate what this means more clearly:

Central to Academic Activities

> *"Library regarded as backbone of the University regarding research uptake - collection, organization, preservation, and dissemination. Training on research tools and analytical tools done by the library"*
>
> *"Notre bibliothèque est considérée comme central car elle a une rôle importante et essentiel sur les pratiques de recherche et l'apprentissage et l'enseignement"*
>
> *[Translation: Our library is considered central because it has an important and essential role on research practices and learning and teaching]*

The more negative responses that viewed the library's role as peripheral (32%) tended to centre around a *lack of prioritisation of the library* within the HLI (66%) and *minimal support from their institutions* (38%) (see Figure 15). Qualitative responses from the survey give more clarity to these themes:

Library Not Prioritised

> *"Les structures documentaires de mon institution d'origine ne parviennent même pas à jouer leur véritables rôle d'appui à la recherche. Tous les professionnels se plaignent du fait que les 1ers responsables n'accordent pas de l'importance à la documentation. Ils ne cherchent même pas à savoir ce que c'est que le travail d'un documentaliste, croyant qu'il suffit de rassembler et de garder des documents sans chercher à améliorer les services dans le but de satisfaire la clientele".*

[16] Gwyer, R. (2015). Identifying and Exploring Future Trends Impacting on Academic Libraries: A Mixed Methodology Using Journal Content Analysis, Focus Groups, and Trend Reports.
[17] Cox, A.M. and Corral, S. (2013). Advances in Information Science: Evolving Academic Library Specialities.

> *[Translation: The documentary structures of my home institution do not even manage to play their real role in supporting research. All professionals complain that those with primary responsibility do not attach importance to documentation. They do not even try to find out what the job of a librarian is, believing that it is enough to collect and keep documents without seeking to improve services in order to satisfy the clientele.]*
>
> *"I think it stems from the Institution's statutes. The library does not seem to feature much in the affairs - the librarian is a member of the highest decision-making body of the University; is seen as administrative staff but in reality an academic staff. The library is not seen as under-girding teaching, learning and research."*
>
> ***Minimal institutional support***
>
> *"Views the library and its functions as processing acquired resources and making it available for use especially prints. Do not understand the changing roles and responsibilities of library. Do not believe that the training of librarian is deep enough to make for effective contributions in research activities. Views librarians as people with low level education that have nothing to offer in research process but expected to give any document requested for"*

The second issue concerned the perception of the library as mostly a service innovator/designer or a service provider. The academic library is traditionally viewed as a *service provider*, supporting the teaching, learning and research activities of the HLI's staff and students[18]. The role of a *service innovator* is more proactive however, and suggests that libraries would be at the forefront of introducing new products and services that would change the way in which information and knowledge would be managed/disseminated within the organisation[19]. It is conceivable, for example, that the design, development and maintenance of OARs would fall under the category of service innovation. A *service designer* would be the specific role of designing new services, which falls under the category of service innovator. The results are split over the regions; the UA region were asked to choose between service provider and designer categories while the other two regions were asked to choose between service provider and innovator categories. Overall, a large proportion of respondents (69%) in all regions viewed the library as primarily a service provider in line with how they are traditionally viewed, hence demonstrating there is some way to go to change this perception (Figure 13). Together, the innovator and designer categories only made up about a quarter of the responses.

[18] Ross, L., & Sennyey, P. (2008). The Library is Dead, Long Live the Library! The Practice of Academic Librarianship and the Digital Revolution.
[19] Brindley, L. (2006). Re-defining the library.

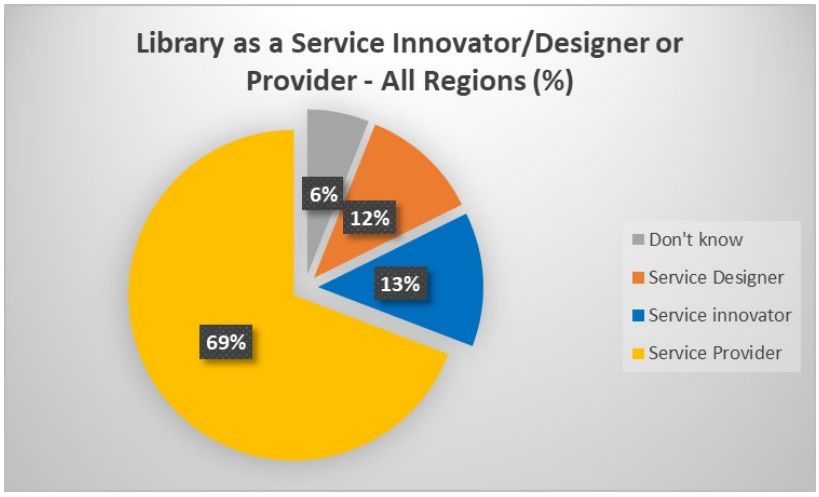


Figure 13. Responses from All Regions – Library as a Service Provider or Innovator/Designer

A more in-depth look at the WACREN/ASREN results show that 73% of those respondents also saw the library mainly as a service provider (see Figure 16). The reasons for this predominant view were given in the qualitative responses and the chart in Figure 16 reveals the top 4 to be due to: the library's *Traditional Role (85%)*, the fact that the library *Provides content access services (39%),* its lack of *Human Capacity (28%)* and *Infrastructural Challenges (20%)*. A few illustrative quotes demonstrate these reasons:

Traditional Role; Provides Content Access Services

"The library provides support for access and use of all formats of information resources for both students and staff".

Human Capacity

"la bibliothèque n'a pas encore d'autonomie financière ou un choix de ses personnel lors du recrutement. ceux sont la les véritables raisons"

[Translation: the library does not yet have financial autonomy or a choice of its staff during recruitment. those are the real reasons]

Infrastructural Challenges

"It is only when they need information to support accreditation requirements that they pay attention to the library. Although the head librarian has put in a lot of innovation to transform the library, some staff from the IT Department do not understand why the library needs internet access. It is very difficult using the library bandwidth to access data and information online. We are thus compelled to use our smartphones as hotspots to use in accessing the Internet and online journals and learning resources"

Conversely, the more forward-looking comments as to how the library could be a service innovator (an encouraging 35% chose this option) included at the top end these

innovative services: *Institution of IR (institutional repository)* (88%), *Initiate other VAS (value-added services)* (23%), and *Digital Library Management* (23%). Some illustrative quotes follow:

Institution of IR; Initiate other VAS

"1. Have lead in implementation of IR.

2. Have developed new online journal publishing service (OJS)"

"It was the library's idea to create a database of the intellectual output in the Institute that can act as a clearing house for all research in Institute".

Institution of IR; Digital Library Management

"The library took the lead in the developing and maintaining the IR, and many other important projects such as the institution Electronic, Document and Records management System

When these two role categories are plotted together, i.e., the proportion of respondents claiming that the library is central or peripheral against those claiming it is service provider versus a service innovator/designer, the result is depicted in Figure 14. The majority of responses (45%) seem to view the library as central but within mainly a service provider role. A more influential and potentially transformative role would be one that is central but also innovative. Fewer respondents currently perceive the library to assume this position (23%). A far more negative view was that of the library being peripheral but a service provider (29%). Under this view, the library could never aspire to being an institutional change agent. The last category of peripheral but innovative attracted only a few responses (3%) and suggests a very cutting-edge type, potentially research-oriented unit within the HLI. There seems to be little appetite for this kind of model within the sample of librarians that we surveyed.

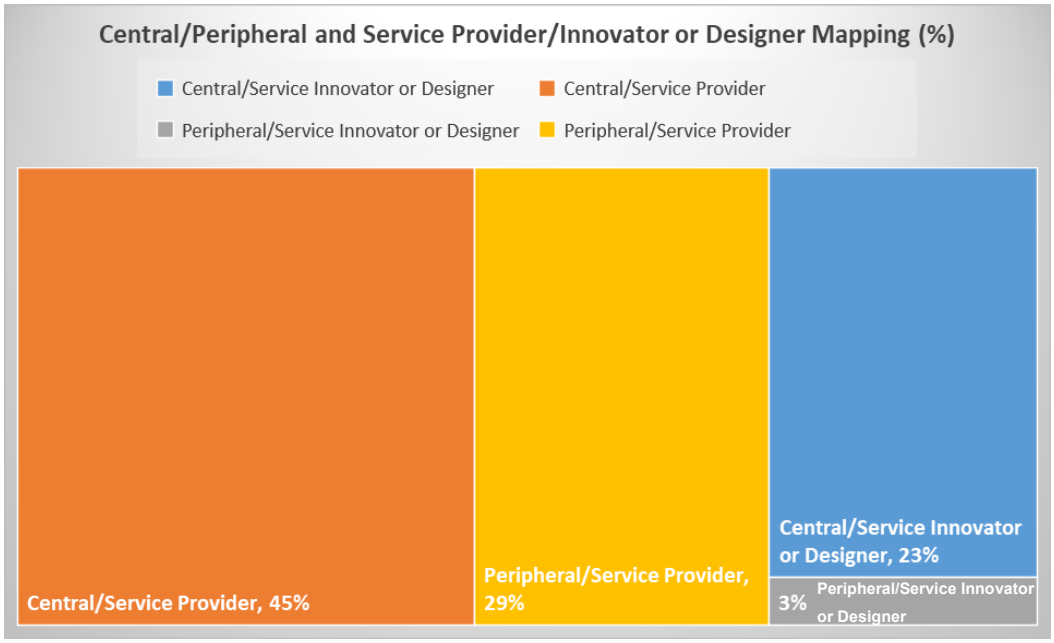


Figure 14. Proportion of Responses Graphed as Central or Peripheral vs. Service Provider or Service Innovator/Designer

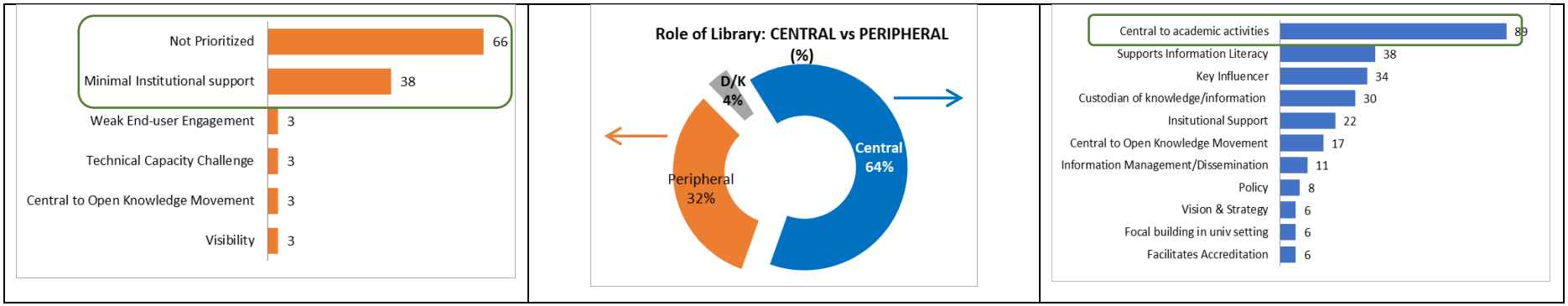


Figure 15. Participants' Responses to Perceptions of the Evolving Role of the Library (as Central or Peripheral) within African HLIs and Reasons for this Evolving Role across Regions

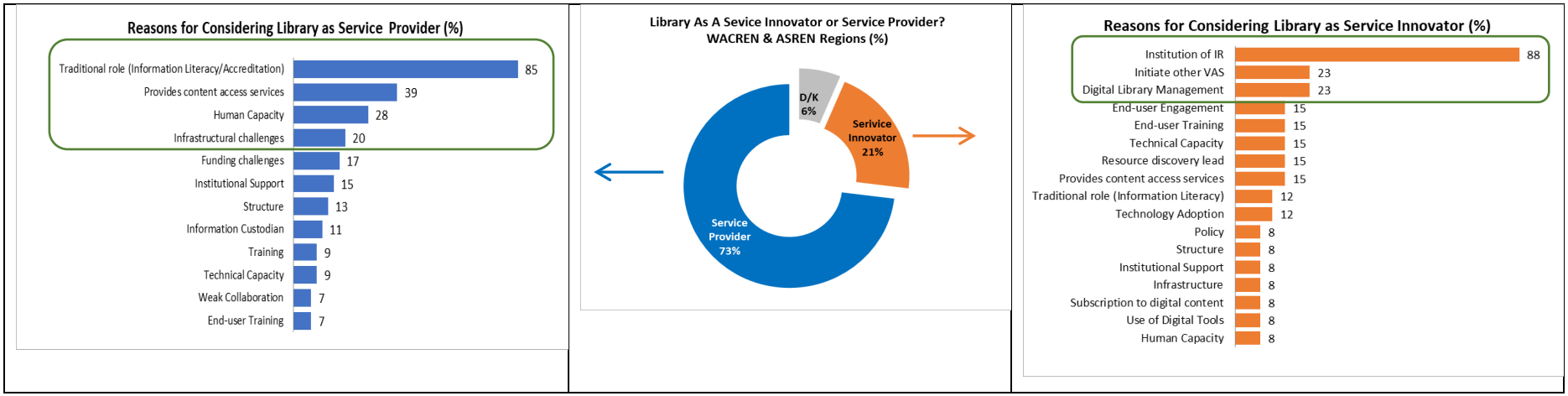


Figure 16. Participants' Responses to Perceptions of the Extent to which Libraries in African HLIs are Service Innovators or Service Providers and Reasons for this in WACREN/ASREN Regions

Respondents were also asked about the evolving role of the library in the future. A number of themes emerged from these responses, mostly centring around the potential for new digital services provision. *Digital Library Management* (44%) and *Open Knowledge Management* (37%), for example, emerged as top categories from the respondents (see Figure 17). Other clear emerging areas seemed to be around specialist information services and training e.g. *Information Management & Dissemination* (15%) and *End-User Training* (11%).

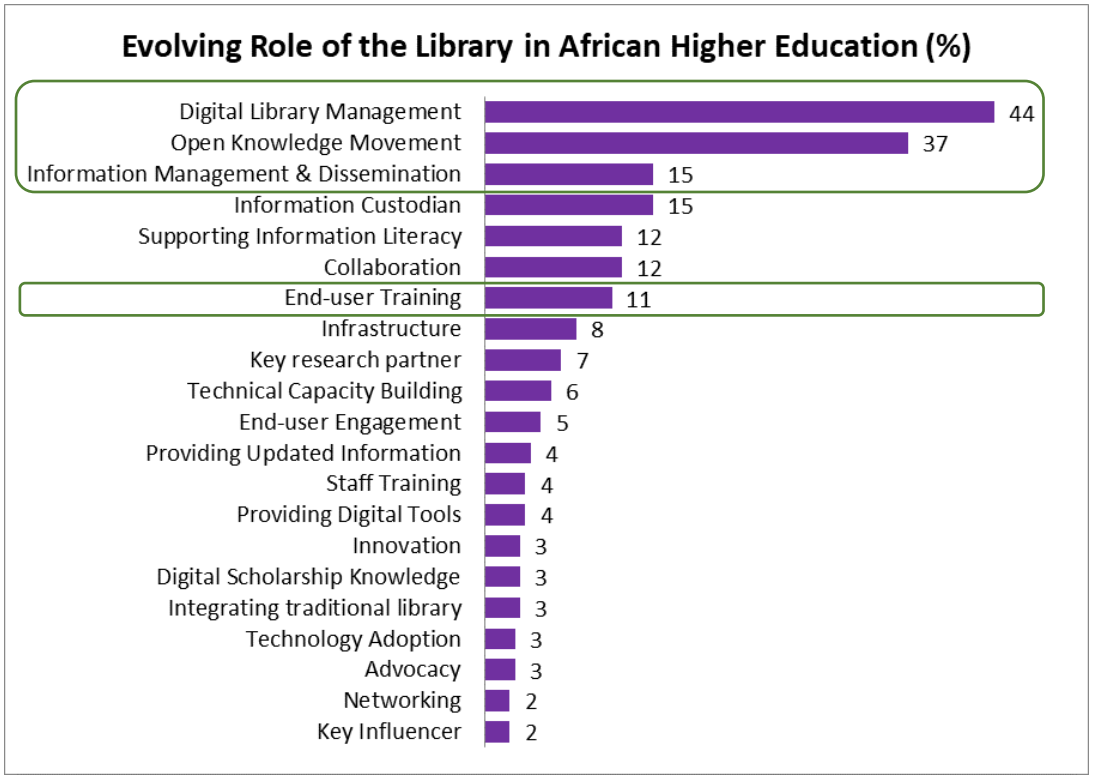


Figure 17. Respondents' Categories of New Evolving Roles for HLI Libraries across Regions

Further inquiries of the librarians into their evolving roles led to a more fine-grained set of themes around how the librarians themselves envisage their new roles in the changing landscape of African HLIs. Table 6 below explains these derived themes.

Table 6. Themes Emerging from Inquiries about the Evolving Role of the Future Librarian in an African HLI Context across Regions

Theme	Sub-themes
General aspects of the evolution of the role *(Librarians mentioned under this theme ways in which they see their role as a whole changing and evolving)*	• Translating the traditional role of the librarian into a "digital" form • Playing the role of intermediary, boundary spanner, focal point, community builder • Adopting leadership or influential roles within the institution or externally • Being technically competent and able to train others in such competencies • Having multiple roles or blended roles • Strong training and education role • Strong research support role • Being knowledgeable on open platforms and services • Understanding the HLI context, the scholarly communications process • Having an advocacy and promotional role
General characteristics of the evolving librarian *(Librarians mentioned under this theme the kinds of characteristics an evolving librarian should develop)*	• Adaptability and versatility • Good at collaboration • Good at communication • Continuously learning • Highly experienced • Possessing critical thinking skills
Specific new/adapted roles *(Librarians mentioned under this theme the new job roles they could be reskilled or upskilled into)*	• Archivist • Lobbyist • Trainer/educator • Marketer • Digital marketer • Technician • Social media expert • Educator • Embedded librarian • Blended librarian • Curator • Information platform designer • Innovator • Mediator • Advocate • Digitization experts • Open Access Expert • Digital repository expert • Value-added service provider • Financial expert • Collection developer • Procurement expert • Knowledge manager • Content manager • Information manager • Curriculum developer • Facilitator • Research Data Manager • Metadata services librarian • Researcher • Publisher • E-research librarian • Meta researcher
Barriers to evolution *(Librarians mentioned under this theme the potential barriers to achieving these changes)*	• Role not respected • Role not valued • Role not influential • Lack of support to develop professional skills

From one of the FGDs, participants also broadly agreed that the role of the librarian in an evolving HLI sector in Africa could be under threat. They spoke of "pseudo-librarians" who, in acquiring some of the traditional librarian's skills could make the latter's role irrelevant. They commented that digitalisation seems to be phasing out this traditional librarian role and new skills such as research data management, repository management and IT skills help to create digital platforms for dissemination of research outputs which do not involve the intervention of a librarian. This FGD led to speculation on the potential roles that the traditional librarian could undertake and one of the roles mentioned was the "*traffic controller*" of information, facilitating users' navigation through information sources rather than telling them their needs. Additionally, the acquisition of new and more skills was emphasized as a way of meeting the needs of the modern library or information consumer in order to remain relevant. In reaching out to their user community, the FGD participants therefore mentioned *marketing* as a new skill to develop (proactively marketing their services to their user community) and *end user engagement* (training sessions, workshops, collaborations) to demonstrate and entrench the relevance of librarians.

HLI Librarians' Skills Profiles to Support OAR Development and Management

The previous section revealed that respondents emphasised the need for the evolving librarian to become more proactive with training, facilitation and engagement with their user communities as well as develop technical competence in new digital skills. In the following sections we look at the activities carried out by the Operational, Subject Specialist and Technical functions, the challenges associated with this work and a review of the needs assessment for desired skillsets.

Operational, Subject Specialist and Technical Functions

Figures 18 and 19 demonstrate some involvement of Operational Function librarians in their institutions with information literacy training (86%) and delivering e-learning (49%). Information literacy has been mentioned often as a key area to upskill in the evolving librarian role, therefore this response is quite promising, however skills in delivering e-learning are much lower (only 49% responding positively to this activity in their institutions).

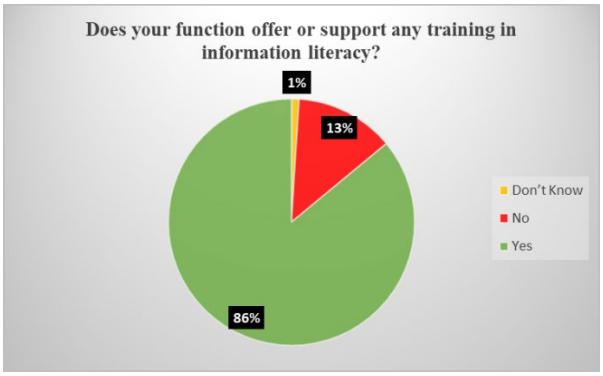


Figure 18. Responses from the Operational Function on Information Literacy Training in their Institutions across Regions

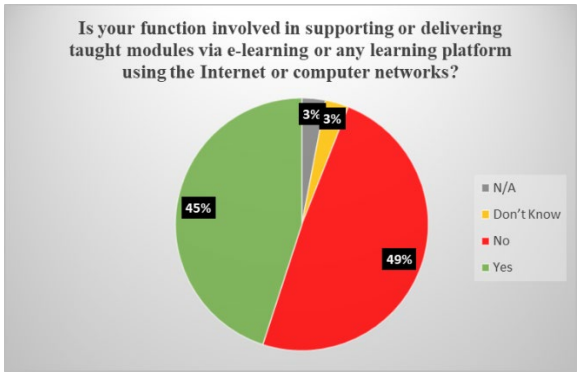


Figure 19. Responses from the Operational Function on Delivery of E-Learning across Regions

When queried about the ongoing challenges faced by the Operational Function in delivering on Open Access management, their top five responses demonstrated lack of support for fundamental capabilities in this area: Training (37%); Funding (35%); Infrastructure (25%); Human Capacity (12%); and Institutional Support (11%). Figure 20 illustrates. These issues would make it difficult to implement Open Access initiatives across HLI libraries.

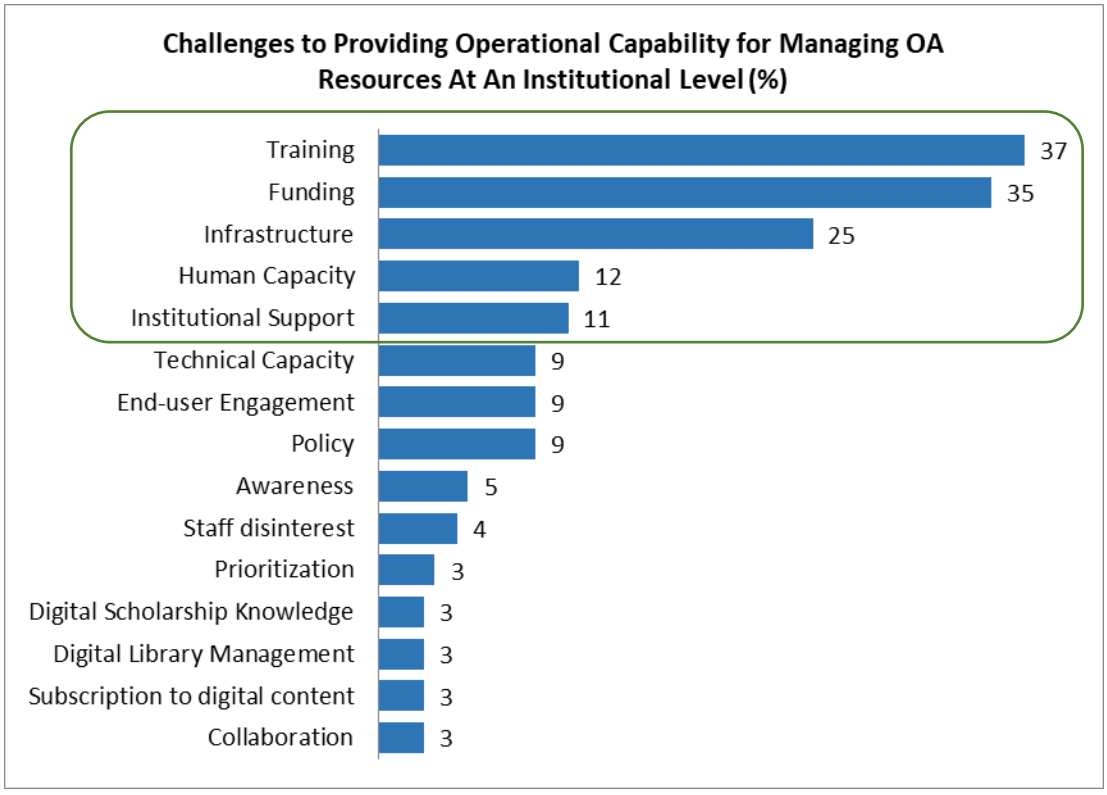


Figure 20. Reasons Given by Subject Specialist Function Librarians for Challenges Related to Developing Services for Open Access across Regions

In terms of engaging end user communities, Subject Specialist librarians across the 3 regions indicated by a high proportion (90%) their involvement in providing services to research and academic staff in their institutions (see Figure 21). With respect to creating or

developing such services, however, the proportion responding positively was much lower (75%) and this percentage was relevant only to the WACREN and ASREN regions where that question was posed (see Figure 22). When specifically questioned about the challenges they faced in developing such services especially for open access, their responses indicated that chief among the barriers were Training and Infrastructure (41% of respondents reported both of these issues equally), Funding (32%), Human Capacity (25%) and Institutional Support (19%). This list, unfortunately, mirrors many of the same issues highlighted in the previous paragraph concerning Open Access management issues at the operational level. Figure 23 lists other highly ranked reasons for these challenges.

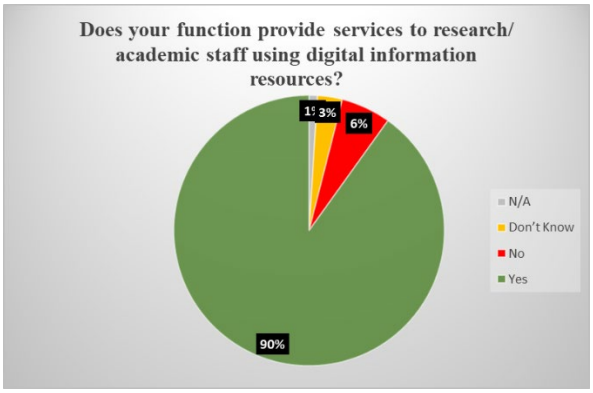


Figure 21. Responses from the Subject Specialist Function on Service Provision to Staff in their Institutions (across Regions)

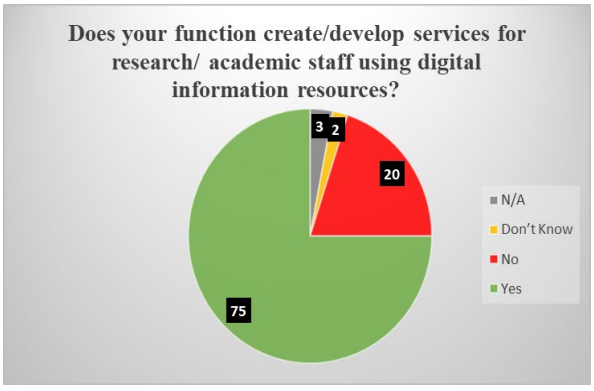


Figure 22. Responses from the Subject Specialist Function on Service Creation/Development for Staff in their Institutions (WACREN/ASREN regions)

A full range of technical services were supported by the technical staff who were surveyed as shown in Figure 24. The top three most well-supported services reported were integrated library systems (80% of responses), search engines and computer literacy (each at 79%). Digital repository support was not far behind at 72% of the responses. Not so well supported were some quite technical functions such as information architecture and network/telecoms management (each reported at 31%). These proportions were fairly consistent across all three regions.

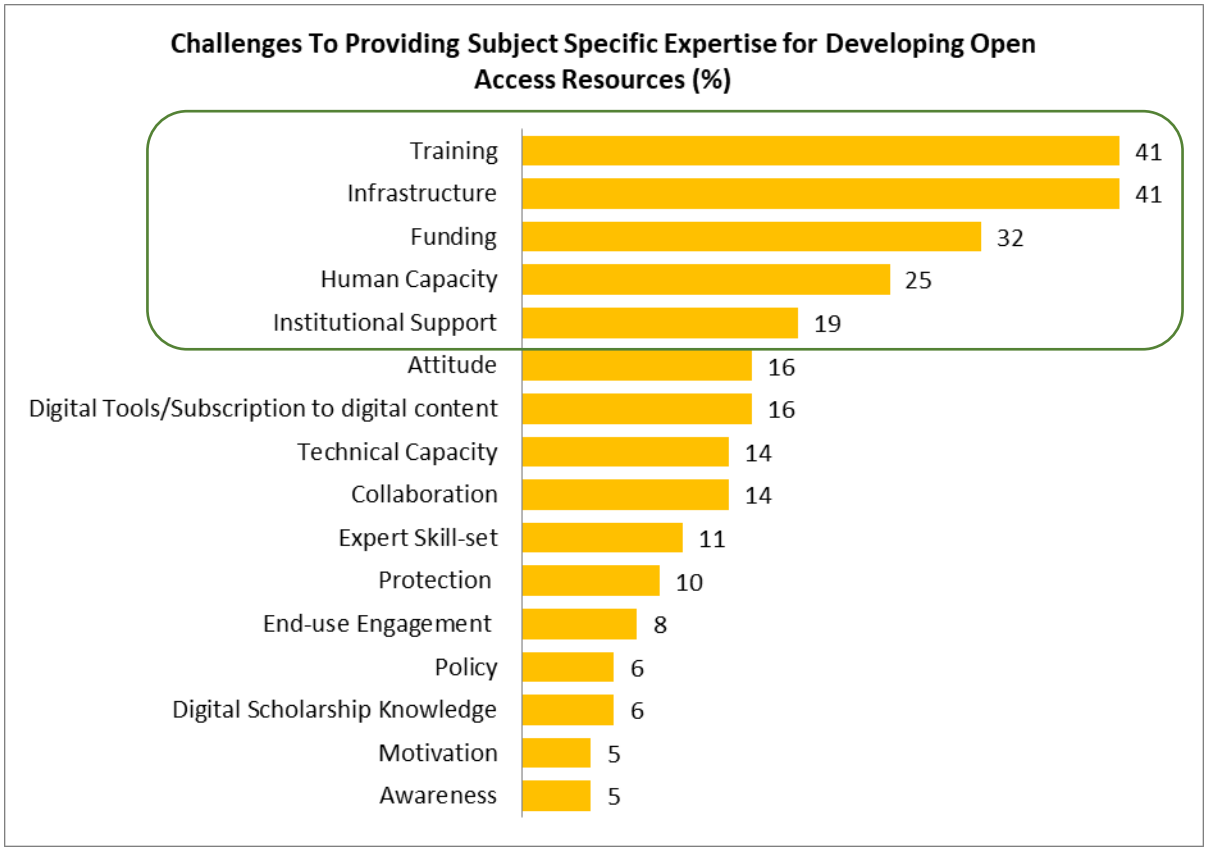


Figure 23. Reasons Given by Subject Specialist Function Librarians for Challenges Related to Developing Services for Open Access across Regions

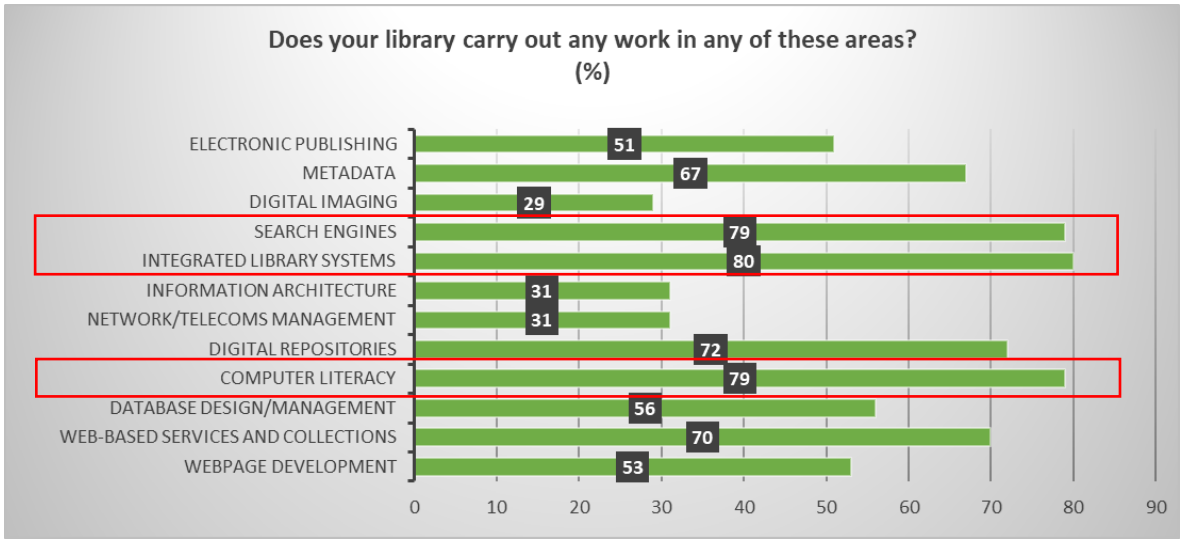


Figure 24. Services Reported to be Supported by the Technical Function across Regions

Across the three regions, the most widely-used OAR software application reported by respondents (65%) was DSpace (see Table 7). Its dominance was more apparent in the UA region than the other two. Additionally, the software was mostly managed and customised locally across the three regions with some integration with local systems (see Figure 25).

Table 7. Most Frequent Reponses to OAR Software Used by Respondents across Regions

Software	No. of Respondents	%
DSpace	49	65%
EPrints	4	5%
PMB	3	4%
Invenio	2	3%
Koha	2	3%
Internet/Web	2	3%

OAR development and management is primarily a technical function, therefore, it was important to ascertain also how decisions were made regarding the provision of digital infrastructure within the respective institutions. The responses indicated that this was mostly done at the level of the HLI executive/senior management level (executive – 37%, senior management – 27%), as shown in Figure 26. It was encouraging to see that the next level was that of library management (at 25% of the respondents).

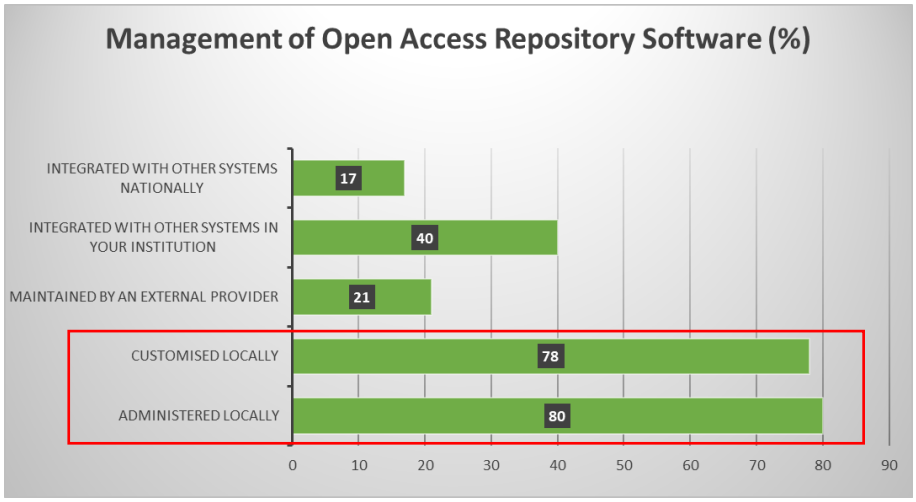


Figure 25. Responses from the Technical Function Regarding Management of OAR Software across Regions

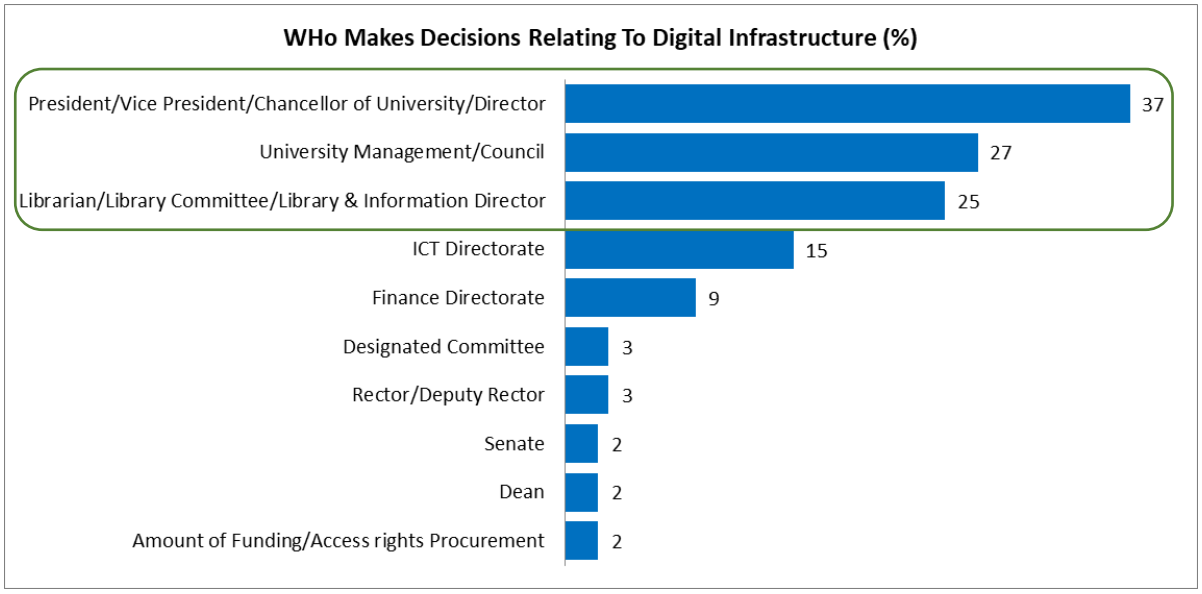


Figure 26. Responses Indicating Roles Responsible for Decision-Making for Digital Infrastructure across Regions

Skills, Skillsets and Staff Development

Many of the responses so far have stressed issues with human capacity and training, while highlighting the evident need for maintaining a quite high digital skills profile to support the technical function and OAR development. In order to determine current capabilities and a training needs assessment, several questions were posed to the respondents around general digital skills as well as those related to OAR development. The respondents were split roughly equally in terms of those having access to continuing professional development in digital skills such as OAR development and those without (see Figure 27). Furthermore, responses related to training in any Open movement initiatives showed an even lower proportion of access (39% positive responses as opposed to 58% negative).

A listing of current and required digital skillsets can be found in the Appendix in Table 9 and Table 10 representing a wide range from the very technical levels, (such as coding, database management and website development) to skills that are operational but enabled by technology (e.g. digitization, digital collection management, search engine optimisation), i.e. at the application level. Many of the required digital skillsets revolved around repository creation and management and Open Access. With regard to the latter, specific desired skills are charted in Figure 29. The three top themes relate to obtaining skillsets related to Open Access/Open Science (50%), developing related data analytics skills (42%) and training specific to repository development (24%).

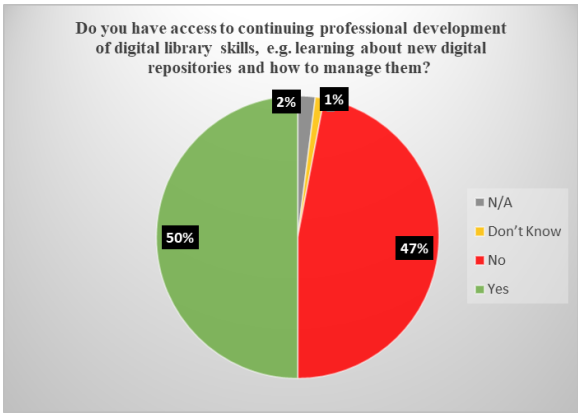


Figure 27. Proportion of Respondents with Access to Digital Skills CPD across Regions

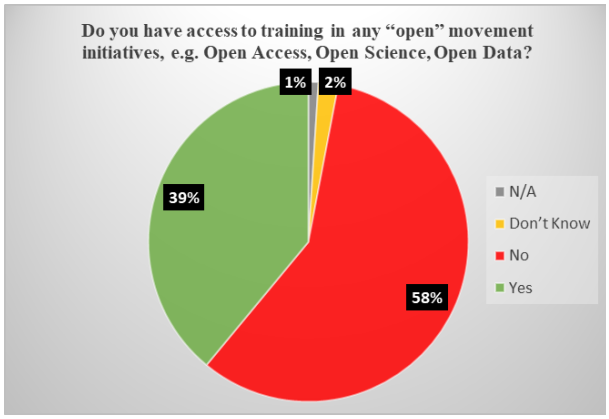


Figure 28. Proportion of Respondents with Access to Training in Open Movement Initiatives across Regions

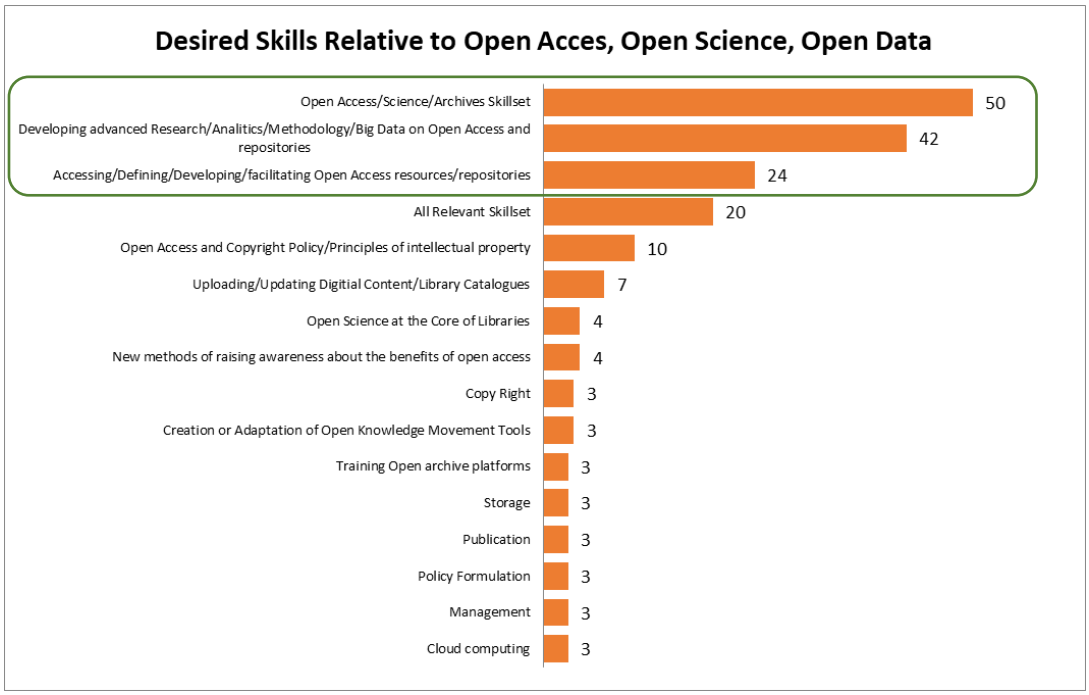


Figure 29. Desired Digital Skillsets Related to Open Movement Initiatives across Regions

Finally, in response to the question concerning challenges faced by HLI librarians, the top 5 responses aligned quite closely with the general thrust of the concerns expressed so far: training (33%), funding (33%), infrastructure (25%), technical capacity (15%) and human capacity (15%) as shown in Figure 30. Table 8 illustrates some of the actual concerns behind these themes with direct quotes from the respondents.

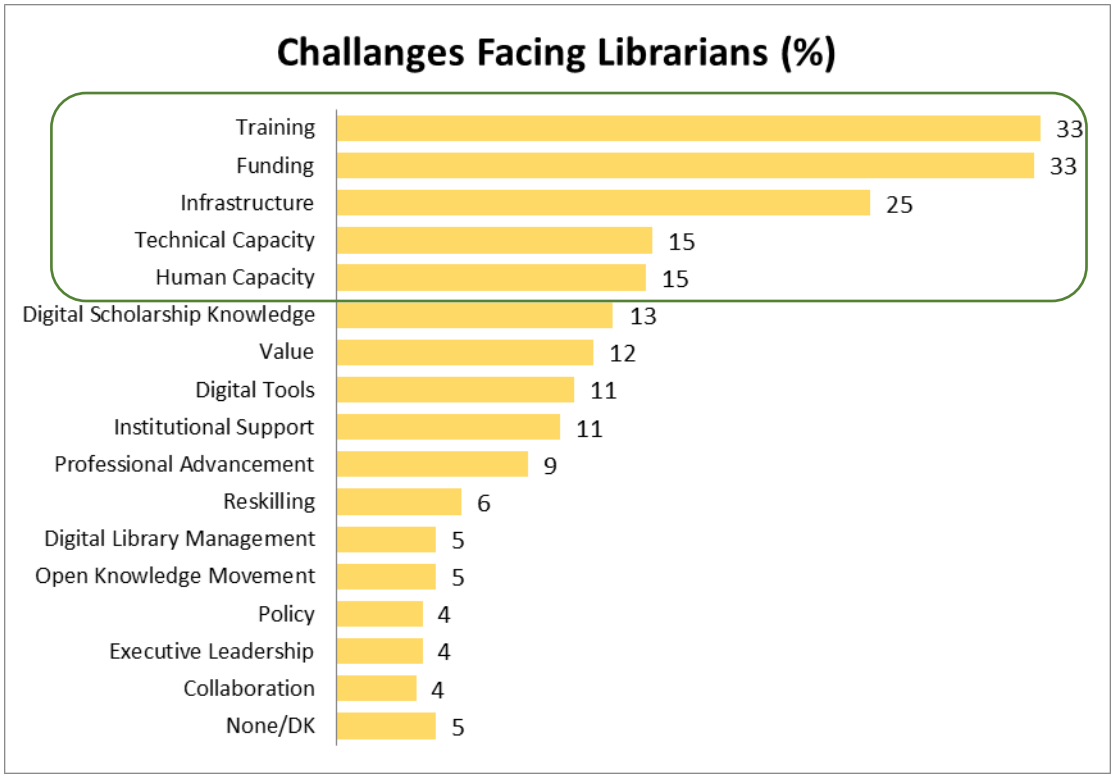


Figure 30. Top Challenges Facing HLI Librarians as Reported by Respondents across Regions

Table 8. Sample Respondent Quotes Related to Top 5 Reported Challenges across Regions

Ranking	Challenge Theme	Example Quotes from the Survey
1	Training	– *"capacity development and training - skills and knowledge"* – *"Inadequate support for training and workshops"* – *"International exposure is lacking"* – *"Capacity building to equip them to function optimally in the technology driven Information landscape. Re-skilling to be knowledge engineers, data analysts, data managers, (knowledgeable in) Digital literacy, Information management, web site development and maintenance, Contribute to the discipline of knowledge through quality publications."*
2	Funding	– *"Funding for development of qualified librarians with much years of work experience"* – *"Funding to attend conferences and workshops on Open Scholarship"* – *"The major issue is funding which is the problem of all developing nations"*

Ranking	Challenge Theme	Example Quotes from the Survey
3	Infrastructure	– *"Manque de moyens: outils et Equipements et plateformes informatiques [Lack of resources: IT tools and equipment]"* – *"Les bibliothèques manquent de connexion internet et les bibliothécaires de l'enseignement supérieur continuent de travailler de façon isolée.* [*Libraries lack internet connection and higher education librarians continue to work in isolation.]"* – *"My library still operates manually"*
4	Technical Capacity	– *"We need to experiment with new technologies and try new ways of providing services that meets the demands of the continent."* – *"manque des formation techniques dans les nouveaux métiers documentaires ou des missions; surcharge des taches d'exécution [lack of technical training in new documentary professions or missions; overload of performance tasks]"*
5	Human Capacity	– *"- Inadequate staffing leading to the few being overworked"* – *"Understaffing is a major issue after underfunding. Even with the skills and exposure, there is a little that can be achieved when staff are overworked. We could have had an institutional repository by now if I am not the only one in the Systems Department of the Library."*

Discussion

Participants in the survey repeatedly drew attention to five main issues as major barriers to advancing African HLI libraries towards developing greater capacity and capability in OAR development and management. The five areas were Funding, Human Capacity, Infrastructure/Technical Capacity, Training and Institutional Support. Using a systems perspective to represent these issues, we propose how they may be addressed through further initiatives and change programmes. The systems perspective, adapted from management literature and referred to as Leavitt's Diamond[20] is used to represent an organisation as a system and is helpful in recognising how all the interacting components of an organisation influence each other during technology-enabled organisational change.

As illustrated in Figure 31, the four parts of the Diamond are *Structure*, *Task*, *People* and *Technology*. *Structure* refers to how the organisation is set up, in terms of communication, reporting lines, control and so forth. *Task* refers to the services and

[20] Leavitt, H. J., & March, J. G. (1962). Applied Organizational Change in Industry: Structural, Technological and Humanistic Approaches; Smith, C., Norton, B., & Ellis, D. (1992). Leavitt's Diamond and the Flatter Library: A Case Study in Organizational Change.

operations of the organisation. *People* refers to human resources, skillsets, attitudes, behaviour, and so forth. Finally, *Technology* refers to equipment, software, infrastructure, processes, tools and so on. In Figure 31, two additional factors are added outside of the organisational system: *Strategy* and *Policy*. *Strategy* encapsulates the vision and direction of the organisation while *Policy* refers to guidelines and regulations with which the organisation needs to comply. They both influence each other and also the organisational system. Within the organisational system (the Diamond) all the points of the Diamond, i.e. *Structure*, *Task*, *People* and *Technology* also influence each other, with change in any one aspect leading to change in any of the others. From the responses given in the survey, we have mapped the main issues highlighted at the four points of the Diamond and demonstrated how *Strategy* and *Policy* are also involved.

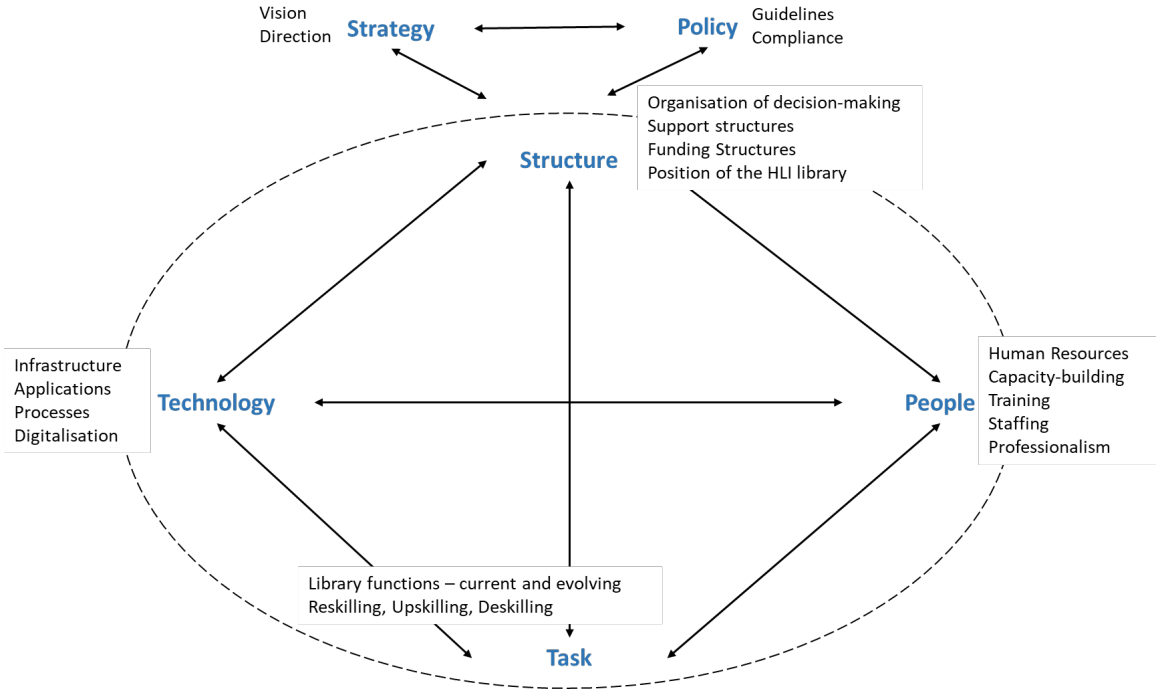


Figure 31. Schematic Outlining the Main Issues facing HLIs as Identified in the Project

Strategy, Policy and Structure

Strategy is usually formulated at the executive or senior management level of an organisation and the same holds true for African HLIs. Although there is no direct information concerning development of strategy, results from the survey suggest that some librarians believe that the library is not included at this level of decision-making and thus not in an appropriate position to influence strategy. Results also indicate poor representation for the existence of policies

regarding OAR at the national and institutional levels. Having such policies has been seen to be critical for supporting an open approach to scholarship and the practice of science in lower income countries[21]. Developing policies around OARs at the institutional level can also lead to greater visibility of scholars' work especially in the global South[22]. Where policies do exist, the survey results point to four areas dominating actual practice: *monitoring and controlling (quality control)*, *repository management and reporting*; *user engagement and facilitation*; and *imposing mandatory upload* (Figure 6 and Table 5). The efficacy of these procedures though is open to question as discussed in one of the FGDs, in which the following issues were noted regarding lack of uptake of open scholarship:

- ***lack of awareness about the need and relevance*** of open scholarship
- ***gross retardation in the rate of technological advancement*** and hence, inhibiting its adaptation to facilitate the uptake of open scholarship
- general reluctance or ***unwillingness to share data and or information*** in an open space without some form of incentivisation
- ***retarded role of HLIs in adequately preparing library professionals*** for the evolving role of libraries/librarians (curricula non-adaptive to evolving digital trends).

On a positive note, the following were also suggested as potential ways forward and could, of course, be considered for future policy inclusion:

- ***librarians leading awareness creation*** on open scholarship among other librarians as well as end-users
- ***getting potential contributors to own a stake*** in the open scholarship paradigm, for instance, offering publishing support for journals in open access to contributors
- ***formally integrating the concept of open scholarship into the curricula*** of academic librarianship (Library Schools) as a way of getting librarians in training to appreciate and adapt to it early on.

Two points can be made here regarding strategy and policy. First, any policy on HLIs' involvement in open scholarship needs to include the bottom-up views of the librarians on the ground and second, what happens in practice with the usage and uptake of OARs is directly related to strategy and policy, thus implying that library issues need to be taken into account at the highest level of decision-making.

[21] icml9. (2005). Salvador Declaration on Open Access: The Developing World Perspective; Kirsop, B. (2006, November 29). Open and Shut?: Creating a National Open Access Policy for Developing Countries.
[22] Ezema, I. J. (2013). Local contents and the development of open access institutional repositories in Nigeria University libraries: Challenges, strategies and scholarly implications.

This would have implications for how the HLI decision-making mechanisms operate to support the growth of libraries, to strengthen their position and enable their transformation into more agile, technologically adept structures. The overall impression of the respondents is still that the HLI library exists to serve and not to innovate, and that decision-making power is only partially in the hands of the library as far as provision for the digital is concerned (seen both at the managerial and technical function responses in Figures 8 and 26 respectively). Institutional support is also seen as patchy by the respondents, with various responses pointing to lack of external expertise for consultancy and training, lack of funding for digital resources, lack of OA policy and insufficient prioritisation of the library as some of the key weaknesses. The lack of respect, too, for librarianship as a profession was noted (e.g. Table 6). Nevertheless, there was considerable support for the library still holding a major, central position within the university, at least nominally. Its continuing relevance was questioned however, with digitalisation seen as a double-edged sword, on one side considered as a viable tool for accelerating and facilitating information literacy among end users (a core role of libraries) but on the other side, regarded by some librarians to potentially render the librarian redundant (see comments on "pseudo-librarians").

Infrastructure and Technical Capacity

Infrastructure and technical capacity were mentioned many times as key institutional weaknesses. From the infrastructure perspective, there was broad agreement that a majority of the respondents managed or supported institutional repositories in some format and had available bandwidth, internet connectivity and access to training, although this was less adequate where open access was specifically indicated and these positive responses were not uniform across all participants responding from different institutions. In some institutions, the qualitative responses indicated a lack of adequate infrastructure. Figure 24 gives a wide range of the most supported infrastructure-related categories as reported by the participants responding to the survey. The less technical and more applied end of this spectrum had more responses proportionally than the more technical aspects like *information architecture*. This points to another area of concern from the participants, that is, the inadequacy of technical capacity. Even though the resources exist, and people have been trained, the actual capacity to support these digital services is limited. One of the objectives of the project was to explore the feasibility of collaborations between NRENs and HLI librarians in boosting this technical capacity. Some evidence from one of the FGDs suggests how this might be possible with the

example of the development of a national OAR in Sierra Leone as a collaboration between HLIs and the NREN there.

Human Capacity and Training

The main issues related to capacity building of the HLI librarian functions were training and a focus on new skills development. These themes were repeated many times in responses to the survey. Participants were also aware of the potential obsolescence of their current skillsets and the erosion that digitalisation could cause both to their professional standing and to their ongoing positions within the institution. Figures 27 and 28 illustrated inadequacy of current continuing professional development (CPD) in digital skills and a lack of access to training related to open movement initiatives. Figure 29 indicated desired skillsets mainly around skills related to OARs and open science, e.g. OAR analytics, OAR archiving, OAR management, OAR policy development, open science issues, copyright and intellectual property issues, which in many ways already correlates well with training already on offer in institutions, although reported to be at low levels as shown in Figure 11. A key area missing from Figure 11 is data management or data analytics skills. Table 10 corroborates the desire for more skills around these 'data' specific areas. Additionally, the information gathered relating to the HLI library's and librarian's evolving roles revealed more about desired skills sets and competencies. Examples include the librarian needing to adopt bridging or blended roles with more emphasis on the digital and embracing a wide range of new positions many of which are digital in nature (more information can be found in Table 6 on the evolving HLI librarian's role). This trend is also reflected in Figure 17 on the evolving role of the library where many digital and information-specific functions have been proposed by the participants.

This latter figure highlights another issue and that is the re-orientating of the function of the HLI library towards facilitating and innovating. Currently, participants see service provision as key and still see themselves as a core function of a university, i.e., supporting teaching and learning and research. The prevailing image, however, of this role is on the more apparent aspects of the job, e.g. collecting documents and affording access to resources, sometimes seen as operational and mundane, thus demonstrating a poor understanding of the role of a librarian. The image of the library and the librarian therefore is pedestrian. Roles that are more innovative, such as those being discussed in the survey, like data management and analytics, research embeddedness, advocacy and end-user engagement would also not be associated with traditional librarianship and support for training in such roles may not be

forthcoming due to this image issue. These responses regarding future roles should become the basis for developing training and capacity building. Digitalisation should also be addressed as both a potential threat and potential opportunity to determine the best ways in which to increase visibility and capability of the library.

Future LIBSENSE Work Agenda

Given the discussion above and the data presented, we see the further work of LIBSENSE under AfricaConnect3 to take a three-fold approach:

1. Skills/issues related to human and technical capacity building
2. Institutional support related to executive management strategising and policymaking
3. Infrastructure issues related to developing, maintaining and evaluating open access platforms

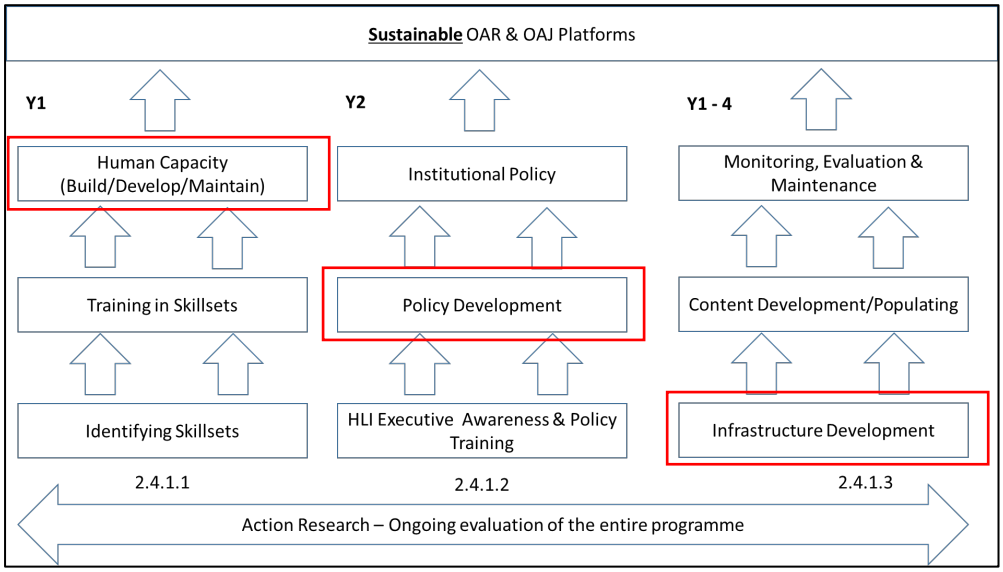


Figure 32. Outline of the LIBSENSE Programme for AfricaConnect3

The rationale for this approach is that each of the three identified work packages will address, over the period of the project, the main issues identified in this paper. First, the issues around the HLI librarian's profession, the image of the library, the evolving roles of both, access to relevant digital skills, especially in open science, staffing levels, professional qualifications of the staff and so on, will be addressed by the 2.4.1.1 task. This task will involve workshops targeting the identification of relevant future-oriented skillsets using information gathered from this project and librarians' experiential knowledge. This will be coupled with training programmes targeting these skillsets so as to build up the relevant capacity required to ensure the evolution of the new HLI library function. In the maintenance phase, these training programmes will be rolled out as part of the regular CPD activity of on the job training.

Second, the 2.4.1.2 will engage senior management, whom we have identified as key actors in creating strategy and policy to guide how the HLI library function is supported and strengthened in the future to adjust to digitalisation and create innovative capacity. This task will include awareness and policy training workshops around open science/access and digitalisation in the HE sector in general. Issues presented at these workshops will lead to co-created policy briefs to identify how best to develop OAR policy at the institutional level. The developed policy should not only deal with OAR development but also how infrastructure is deployed across the HLI to support library functions and the governance of information and research data in these institutions, which can be seen to have strategic value. It is also hoped that, given the seniority of this target group, they may be able to influence policy development at the national level as well.

Third, open access platforms will be developed at demonstrator sites to test and develop the operational capability needed to enact the policies and deploy the new skillsets. Standards, protocols and collaborative approaches developed and discussed in LIBSENSE workshops will be trialled and a process of monitoring and evaluation will measure the uptake of these. A role can also be developed for ensuring that NRENs are involved in technical capacity development throughout this process.

We see this three-pronged approach as addressing some key systemic weaknesses as outlined in the Diamond schema in Figure 31. Executive management buy-in to address structural, strategic and policy issues will be addressed through the engagement of the senior executives. Human capacity issues and reskilling related to the task and people components of the Diamond can be addressed through the training and skills development aspects of the project. Finally, infrastructure and technical capacity issues can be addressed through technology developments in that part of the Diamond. In this way, a systemic approach can be taken to dealing with a complex set of interrelated human and technical issues.

Conclusion

The LIBENSE workshops were meant to bring together three main stakeholder communities, viz., HLI librarians, NRENs and content providers in order to establish a way of working together to develop the capability and capacity for ongoing OAR development and maintenance in the three identified AfREN regions. With the help of the three-region survey and complementary workshops, a picture has emerged that delineates the main issues faced by HLI librarians in these regions regarding their current and desired capabilities. The main findings echo those of many other studies and are fairly consistent across the regions.

We have mapped these main concerns of Funding, Human Capacity, Infrastructure/Technical Capacity, Training and Institutional Support onto a change management framework to demonstrate how addressing all of the social and technical aspects of this systemic problem could provide a roadmap for future development. This roadmap has been identified as a new programme of activities under the LIBSENSE initiative, which broadly address skills and capacity building, policymaking at the strategic level and infrastructure issues all aligned to the continuing development of open science in the three regions. We envision that this programme will be supported by AfricaConnect3 and will continue to attract key NGOs working in the information space in Africa.

References

Abbott, P. & Oaiya, O. (2017). A Pilot Survey on Institutional Enablers and Barriers Affecting the Evolving Role of Librarians in African Higher Educational Institutions. Proceedings of the Ubuntunet Alliance Conference 2017, Addis Ababa, Ethiopia.

Brindley, L. (2006). Re-defining the library. *Library Hi Tech*, *24*(4), 484–495. https://doi.org/10.1108/07378830610715356

Chalmers, R. (2012, October 29). *Explainer: What is the open movement?* The Conversation. http://theconversation.com/explainer-what-is-the-open-movement-10308

Cox, A.M. and Corral, S. (2013). Advances in Information Science: Evolving Academic Library Specialities. Journal of the American Society for Information Science and Technology, 64(8), p. 1526-1542.

Ezema, I. J. (2013). Local contents and the development of open access institutional repositories in Nigeria University libraries: Challenges, strategies and scholarly implications. *Library Hi Tech*, *31*(2), 323–340. https://doi.org/10.1108/07378831311329086

Foley, M. (2016). *The Role and Status of National Research and Education Networks (NRENs) in Africa*. Washington, DC: The World Bank. Retrieved from http://saber.worldbank.org

Gwyer, R. (2015). Identifying and Exploring Future Trends Impacting on Academic Libraries: A Mixed Methodology Using Journal Content Analysis, Focus Groups, and Trend Reports. *New Review of Academic Librarianship*, *21*(3), 269–285. https://doi.org/10.1080/13614533.2015.1026452

icml9. (2005). *Salvador Declaration on Open Access: The Developing World Perspective*. http://www.icml9.org/meetings/openaccess/public/documents/declaration.htm

Kirsop, B. (2006, November 29). Open and Shut?: Creating a National Open Access Policy for Developing Countries. *Open and Shut?* https://poynder.blogspot.com/2006/11/creating-national-open-access-policy.html

Leavitt, H. J., & March, J. G. (1962). *Applied Organizational Change in Industry: Structural, Technological and Humanistic Approaches*. Carnegie Institute of Technology, Graduate School of Industrial Administration. https://books.google.co.uk/books?id=P_KZNQAACAAJ

Ross, L., & Sennyey, P. (2008). The Library is Dead, Long Live the Library! The Practice of Academic Librarianship and the Digital Revolution. *The Journal of Academic Librarianship*, *34*(2), 145–152. https://doi.org/10.1016/j.acalib.2007.12.006

Smith, C., Norton, B., & Ellis, D. (1992). Leavitt's Diamond and the Flatter Library: A Case Study in Organizational Change. *Library Management*, *13*(5), 18–22. https://doi.org/10.1108/01435129210020352

Appendix

The appendix contains the following: 2 tables representing digital skills both currently held and desired as reported by the survey participants; the 2 different survey instruments used in the UA and the WACREN/ASREN regions; and the 2 focus group discussion protocols used in both the online and face-to-face fora.

Tabulated Survey Responses on Digital Skills Currently Held and Desired

Table 9 presents a list of the digital skills that participants claimed they currently held, while Table 10 shows which skills they believe they would benefit from acquiring.

Table 9. List of Digital Skills Currently Held by Respondents across Regions

ID	Listing of Current Digital Skills
1.	Digitization of Materials
2.	Downloading
3.	Populating Repository; Uploading
4.	Populating Repository; Digitization of Materials; Digital Library Management; Repository Management
5.	Digitisation Skills; Metadata/Keywording; Cropping; Merging; Uploading; Archiving; Publishing
6.	e-Books Management; Online Publishing
7.	Management of Institutional Repositories; Digitization of Materials; Archiving; Dissemination
8.	Fair Competence in Microsoft office + Office 365; Emailing; Fair Competence with Koha; Fair Competence with AIR (Administrative side of repository); Social Media
9.	Web browsing; Use of Search Engines; Emailing; Texting; Wiki; Blogging; Microsoft Office; Library Integrated Software; Social Media; Digital and Information Literacy; Uploading; Downloading

10.	Using Open Access Data; Online Training; Using different databases; Social Media
11.	Web surfing; Basic coding; Blogging
12.	Manage the day-to-day running of the repository including any mediated-deposit service or self-archiving by authors; Relevant metadata standards Dublin Core, MARC; Develop content policy for repository; Answer queries and provides advice as appropriate
13.	Data Management; Metadata Creation; Copyright; Conducting searches in Open Access
14.	Teach and conduct bibliographic research seminars online; Train librarians and documentalists; Technical Support
15.	Creation of web pages; Use of the Library Management software
16.	Processing and Searching for books with PMB software
17.	Locating information; Content Creation
18.	Management and Creation of Digital Collections
19.	Digitization (Software & Process); OFFICE Suite: Windows and Open Office; CMS Software: Wordpress, Drupal, Joomla!; Digital Library Software: Invenio, DSpace, Greenstone; Metadata Norms & Standards: Dublin Core, MODs, MARC21, MARCXML; Markup languages: HTML, XML
20.	Designing and populating web pages; Navigation; Resource Discovery; Metadata Vocabulary and Assignment
21.	Computer skills (Using computer applications, hardware and software); Online searching skills (Browsing the web, searching online databases)
22.	Microsoft; Web Design; Digitization
23.	Identification of various digital resources; Subscription; Mastery over use of passwords and usernames
24.	Scanning; Uploading; Archiving
25.	Development of Reference Database
26.	Management of Integrated Library System

27.	Digital Information Management (ownership, rights, archiving, communication and dissemination); E-booking Writing; Operating systems and software applications (Word, Excel, PowerPoint); PC Trouble Shooting; Online research skills (i.e. information retrieval); Learning Management System (LMS)
28.	Digitization of theses and dissertations; Capturing Metadata
29.	Email; Internet Search; Bureautique; Installation of Digital Library Software
30.	Word processing skills; Presentation skills; Use of library management systems; Installation and setting up of open access repositories using DSPACE; Digital reference skills; Online search and retrieval; Cloud storage and services
31.	Social Media; E-mailing
32.	Dspace
33.	Creation and management of a database under the pmb software; Finding documents in online databases
34.	Management
35.	Data Creation; Configuration
36.	Conversion of information from hard to soft medium; Working on documents in the cloud; Creating and Sharing links for user access; Managing Institutional Open Access Repository
37.	Mastery over Implementation & Use of Online databases (Research4life), Open Access (DOAJ), Dublin Core metadata etc.
38.	Bookin
39.	Good Computer Skills
40.	Database Management
41.	Search for info on documentary platforms; Use of Zotero
42.	Creation of database with some documentary software (winisis, PMB, Invenio) ; Documentary Research in free online engines and databases

43.	Word; Excel; PowerPoint; PmB software; CAIRN
44.	Guide to accessing online information contained on a small server 'Koombouk' and some open access resources; Use a digital tool or service to communicate
45.	Management, Metadat Curation
46.	Use of WINISIS Management Software; Notions of PMB
47.	Populating digital platforms
48.	Digitization; Processing; Research
49.	Setting up a digital library; Establishment of an Institutional Filing or Archiving System
50.	Digitization; Definition & Management of Metadata
51.	None
52.	Digitization; Electronic Management of Documents; Database Management (WINISIS, PMB)
53.	Use of R4Life
54.	Information Literacy Skills; Change Management; Valuing Skills
55.	Data curation; Online Search; Use of some Digital Technology
56.	Ability to Identify, Organize, Understand, Evaluate, Create and Disseminate information through digital technology; Knowledge & Use of Current Communications Technologies
57.	Constitution of Files; Digitization
58.	Word
59.	Metadata; Uploading
60.	Web and Database Search; Database Management; Emailing; Social Media; E-Publishing; Information Content Management
61.	Searching / Retrieval (information literacy skill); Use of major computer applications

62.	Online Searching
63.	Use of LMS to catalogue library materials
64.	Uploading
65.	Social media skills; Marketing; Content Creation
66.	Digitization; Social Media; Search Engine Marketing; Content Marketing; OneDrive
67.	Electronic Organization of Resources using Library Software
68.	Electronic Resources Management System; Digital programme
69.	Digitization; Digitalization
70.	Social MediaManagement
71.	Accessing Information Resources via the Internet
72.	Search Engine Marketing
73.	Library Management Software (Alice, Millenium and Alexandra); Web Management
74.	Library Management software
75.	Computer Literacy skills; How to use the computer basics
76.	gestion numérique des thèses et mémoire
77.	Uploading
78.	Resource Organisation through Data Keying in; Facilitating User Accessthrough OPAC.
79.	Computer Application
80.	Search Engines
81.	Internet Surfing; Navigating; Use of Online databases Use of library software for organising library resourcea

82.	Integrated Technical System
83.	Word; Excel; PowerPoint
84.	Social Media; Content Marketing; Emailing
85.	Digital Cataloguing
86.	Repository Management; Web Development; eLearning Deployment; Digitization; Virtual Research
87.	Uploading
88.	Indexing of Journal Articles using the Library Integrated Software package
89.	Social Media; Social Networking; Emailing; Mobile
90.	Emailing; Social Media; Research; Search Skills; Reproducing and Manipulating different types of Digital Information
91.	Scanning; Uploading content to IR
92.	Software Management of Databases; Online Search Assistance
93.	REEL
94.	Word; Excel; Populating Databases with INVENIO Software
95.	REEL
96.	Searching
97.	Online Catalog Design; Digitization; Computerized Search; Bureaucratique; Social Networks
98.	Scanning; Digitization
99.	Use of bibliographic data management software
100.	Surfing the net; Creating Databases
101.	Exploitation and enrichment of collections with resources of various types (texts, video, photo, sites)
102.	Creating Databases; Content Creation; Content Management

103.	Negotiations of Digital Resources; Digital Resources Reporting; Digital Resources Mediation
104.	Digital Resource Management; Creation and Management of Digital Libraries with PMB; Digital Marketing
105.	Digitization of documents; Integrated document management across the PMB; Techniques of Digital Preservation of Documents
106.	Documentary software
107.	Use of Computers and the Internet; Online documentary research
108.	Administrator of documentary information system and archiving
109.	Find full-text information retrieval sites; Perform advanced information searches
110.	TEEAL Agricultural Digital Library; AGORA database; Encyclopedic Digital Library CULTURE BOX; WINISIS software; PMB software
111.	Electronic Resource Management; Social Media; Digital Literacy
112.	Microsoft; Library Management Software; Social Media; Emailing; Digital Archiving
113.	Computer programming
114.	Rel
115.	Cloud Computing; Microsoft Office; Social Media
116.	Search for information in Databases
117.	Saving and Editing Data
118.	Scanning; Use of ADOBE ACROBAT software
119.	Use of Integrated Library Management System, PMB (PHP My Bibli)
120.	Digitization of theses and dissertations; Entering metadata
121.	Use of Library Management Software; Information Search from e-Resources; Web development
122.	Data Processing; Electronic Document Management; Research and Research Assistance

123.	Digital Management Software; Scanning
124.	Use of Online Databases
125.	Archiving; Cataloguing
126.	Scanning
127.	Creation and Management of digital databases with WINISIS
128.	Web search
129.	Digital Resource Management (Sourcing; Organisation; Storage; Dissemination)
130.	Electronic Management of Documents (Basics); Management of Bibliographic Databases
131.	Searching; Evaluation; Sharing; Usage; Creating
132.	Library Management Software (Basics)
133.	Management of Institutional Repository (Basics)
134.	Digital Resources Management
135.	Computer Software; Mobile Application; Technology skills in Library User Services
136.	Computer Skills; Internet Skills
137.	Digitization of Documents; Notions of Open Access
138.	Commercial e-Resources
139.	Data mining; Archiving; Internet Search; Development and Use of OPAC
140.	Typing; Browsing; Research
141.	Typing; Browsing; Downloading
142.	Computer
143.	Typing; Browsing

144.	Typing; Browsing; Downloading
145.	Typing; Browsing; Downloading
146.	Computer programming
147.	Online Cataloguing and Classification; Browsing
148.	Scanning
149.	IT Skills; Scanning; Digitization
150.	Management of Digital Resources (Classification, Cataloging using MARC standards & AACR2); Linking such resources with the Library Management System to make searchable and retrievable by end users
151.	MARC; Digital Archiving; Classification of e-Resources
152.	Office Programs/Photoshop/Basic Programming
153.	la gestion des système intégré de gestion de bibliothèque (pmb,koha..)
154.	weak digital skill
155.	Browse, search and sort data and information
156.	External Communication via Internet
157.	Searching databases;Saving; Monitoring; Emailing
158.	Uploading on MOODL as SVUPEDIA
159.	Administration and Management of several Open Source Data Management Software; Information Mapping
160.	Windows; Office; Use of the web (database, research, social networks, Emailing); ILS
161.	Electronic Archiving; Integrated Library Management
162.	Project use between Biruni University Libraries (virtua)
163.	Data Processing; Content creation; Communication; Security and Problem Solving in Relation to Uses of Digital Technologies

164.	BA in Information Studies
165.	Database Management; Typing; Scanning; Indexing
166.	Web search
167.	DSpace
168.	Methodology
169.	Documentary Research in digital databases such as Sciencedirect, Willey, Springer, Pubmed; Bibliographic reference software; Publication of digital articles
170.	Management of bibliographic databases; Access to databases and journals in full texts, paid and open access; Scanning
171.	Deploy and manage Dspace; Design and Develop Dspace interface and tools; Customize Dspace; Develop some services to Dspace; Analyze and Solve some problems related to Dspace (Basics)
172.	Computing; Digitization
173.	Systems Analysis and Analysis; Project Management and Monitoring; Elaboration of the specifications; Python development; LPIC1 Linux Certification Id: LPI000368564; Database administration (MySQL, Oracle); Migration and Data Exchange: OAI-PMH, Z3950, XML, TXT; Digital library; Integrated Documentary Database Management System; Open Archive; Documentation and Documentation Standards (Afnor, marc21, Unimarc, Dublin Core); Internet governance; Statistics and Data Analysis
174.	Archiving; Information Security
175.	Search in Digital Repositories
176.	Open Access Policies; Copyright; Management
177.	Use of Research Engines; Citation
178.	Search; Library management System
179.	Search; Documentation; Policy Development

180.	Internet Search; Database Search
181.	Search
182.	Data Access
183.	Digital Libraries
184.	Search in Ddigital Repositories
185.	Search; Database Management
186.	Mobile Programming
187.	Encryption
188.	Scholarly papers; Thesis; Articles; Projects; Books; Digital Learning Content; SMART courses
189.	Virtua
190.	Use of Softwares
191.	Use of Integrated Database Management Systems; Research in engines and meta-engines
192.	Use of Library of Congress Subject Headings in Digital Collections; Cataloging in Digital Libraries
193.	MS Office (Word, Excel, Outlook, Powerpoint, OneNote, Access);Academic Library System (HORIZON); Library Discovery Tools (SUMMON, EDS); Library Portals (DeepKnowledge Portal, EZ-Proxy); Anti-plagiarism Tools (Turnitin, Copyleaks)
194.	Creating Databases; Digital Library Maps; Use of Electronic JournalEditing and Publishing System
195.	Management of University Library Databases
196.	Management of BIRUNI Databases
197.	Online Programming such as JavaScript; Privacy & Data; Metadata Schema; Content Development for online platforms
198.	Internet; Search
199.	Uploading

200.	Search; Communication; Evaluation of online information using various technologies
201.	Electronic and Digital Resource Management
202.	Digital Literacy; Web Harvesting; Forensic Bibliographic Reconstruction; Tracking Digital Citation
203.	IT Engineering
204.	Management of Digital Library
205.	Social Media; Emailing
206.	Research Data Management; Cyber Security; Data Curation
207.	Learning Management System; Library Management System; OA/OS Repository; OCLC; Dublin Core; ILL; SharePoint; OneNote; Turnitin; SafeAssign
208.	Management and maintanance of the repository; Uploading; Reviewing documents in repository
209.	Management of repositories and LMS; Linux Server Administration
210.	Technical eg Installation
211.	Setting up and Managing Digital Repositories; Promoting digital repositories
212.	Web Development; Web Management; Repository Management
213.	Using ICT tools in providing e-Resources
214.	Digitization
215.	Computer Literacy; Media Literacy
216.	Use of Scholar Vox Books
217.	Managing digital materials (Indexing, Preserving, Processing)
218.	Metadata submission into Institutional Repository/Dspace; Backing up and upgrading of the system; Installation and customization of a library system/Koha; Linux (Basics); e-Resources

219.	Running Library Automated Services through Koha ILS; Installation of Operating systems through Windows and Linux platforms; Basic Photoshop editing
220.	Operating online catafalque; Classification of registered new members; Online Service Provision
221.	Installing Digital Repository Software; Customizing Digital Repository Software; Administering Digital Repository Software; Metadata Management; Electronic Publishing; Open Research Data Management
222.	Information Literacy
223.	Use of e-Resources
224.	Uploading Metadata
225.	Creating Content; Finding Content
226.	Accessing Library Electronic Databases; Utilizing Library Electronic Databases
227.	Management of LMS
228.	Software installation and management, navigation and customization skills, cloud computing skills, database management skills, web design and maintenance skills etc
229.	Management of Digital Repositories (Dspace); Management of Open Journal Systems (OJS); Management of Subject Guides (Subjectsplus)
230.	Building Digital Repositories; Digital Subject Guides; Use of Databases
231.	Browsing; Database Management
232.	Metadata Management (Description of Digital Content); Archiving; Online Cataloguing; Search; Retrieval on Web-based information
233.	e-Searching (e-Literacy); Uploading files
234.	Management of Institutional Repositories

235.	Managing Digital databases; Web development (Basics) - Google sites; Library Management System Development (Koha); Repository Management (D-Space); Search; Use of different OA gadgets(QR code reader development)
236.	Creating Digital Repository; Management of Digital Repository; Scanning; Metadata; OCRIng
237.	Use of Scholarly databases; Search; Retrieval of information from the web; Discussion Groups; Google Forms; Blackboard for Teaching; Turnitin; Refworks; Online formation searches; Information Literacy
238.	Management of Institutional Repository
239.	Web Design; Network Management; Repository Management using Dspace; Library e-Resources; Integrated Library Management System (KOHA & Vsma@t)
240.	IR Management; Data Curation; Online Publishing; Web Management; Digitization
241.	Integration of Social Media in library activities
242.	Search; Digital Content Skills; Customization for Digital Collections
243.	Programming using PHP, HTML, JAVA; Supporting Library specific software and hardware i.e. Koha, ABCD, EZproxy, Libki; Supporting web based Content Management software (Drupal/Joomla); Image-based or Text based digital repositories (Dspace); Marc/Non-Marc Metadata standards, Dublin core metadata standards; Database Management Systems (MySQL/Maria dB); Network Set-Up and Configuration; Windows; Linux Operating Systems; Microsoft Office environment
244.	Cleaning data; Uploading content
245.	RSS; Citation and Referencing; Institutional Repository Installation and Management; Proficiency in Ubuntu systems; Metadata Harvesting; Big Data Cleaning using OpenRefine
246.	Online Search
247.	Providing Access to Electronic Resources

248.	Research Data Management; Digital Scholarship; IR hosting services; Metadata; Publications Online; Copyright; Open Access and OER
249.	Uploading
250.	MARC; Dublin Core
251.	Accessing Electronic Information; Dissemination of Electronic Information
252.	Installation of Digital Repository; Management of Digital Repository (DSpace); Installation of Library Management System (Koha)
253.	Online Search; Use of Integrated Library Systems and Customization (as administrator); Computer Skills; E-Resources Browsing; Database Development; Web development
254.	Installation of Digital Libraries; Management of Digital Libraries
255.	Installation and Customization of DSpace
256.	Institutional Repository Population
257.	Customisation of Institutional repositories eg Dspace, Greenstone; Uploading of information content to repositories; Creation of user account and communities
258.	Management of Digital Repository; Use of Digital Repository; Installation; Customisation
259.	Institutional Repositories; Electronic Resources
260.	Collection Management; Operational Tasks
261.	Search (Basics); Navigation
262.	Basic ICT Skills
263.	Database Management (Basics); Linux Administration
264.	E-Resource Management

265.	Library MIS; Dspace; Social Media; Access and Dissemination of Electronic Resources; Searching; Use of Analytical Tools; Use Plagiarism Systems
266.	Management of Digital Repositories
267.	Downloading; Saving; Emailing
268.	Digital Information Literacy; Digital Library; Library Automation; Use of Web 2.0 applications
269.	Data Entry; Scanning; Data and Image Manipulation; Project Management; Social Media
270.	Maagement of OPAC; Management of Dspace
271.	Providing Access to Digital information
272.	Digital Repositories
273.	Repository Management; Digitisation; Data Analysis
274.	Management of Electronic Resources; KOHA Administration; Authentication; ezproxy
275.	Library Management Information System; Digital Collection Management; Online Information Processing; Information Literacy Skills (Searching skills)
276.	Web development; System Design and Management; Learning Design; Graphics Design; Photography; Videography
277.	Data input; Application Download; Search
278.	Navigation & Utilization of Digital platforms
279.	Accessing different databases; Operating Dspace as Institutional Repository

Table 10. List of Digital Skills Required by Respondents across Regions

ID	Listing of Digital Skills Required

1.	Uploading Published Journals in OA
2.	Advocacy; Repository Management; Collaboration with other Repositories
3.	Development of Digital Repository; Webpage Design; Database Management System Design; Management of Digital Data Repository Access and security management of digital repository Attribution using creative common Identify management
4.	Digitisation
5.	Online Learning Management; Setting Up Online Library & Repositories
6.	Technical Skills
7.	Webpage Development; Website Development; Use of SubjectsPlus (Open Source Version of LibraryGuides); Preparation of Digital Media; Designing
8.	Web Design; Content Development; Photoshop
9.	Using Webinar; Video Conferencing; Metadata
10.	Open Source Software Management (Installation & Customization); Website Development; Database Management; Database Administration
11.	Development of workflows to manage the capture, description and preservation etc. of Repository Outputs; Monitoring deposits; Downloading; Evaluation; Metadata Standards (Dublin Core, MARC, METS, MODS, OAI-PMH)
12.	Creation of Institutional Repository; Creation of Digital Information Center
13.	All Relevant Skillset
14.	Database Management
15.	Digitization, Use of Open Access Platforms

16.	Creation of Digital Information; Collection f Digital Information; Management of Digital Information
17.	Digital Development
18.	Data Management (Big data, Data mining); Software; Protocols; Cataloguing; Indexing; Analysis
19.	Web design; Electronic Resources Harvesting; Data Sharing; Big Data Management
20.	Advanced Computer Skills; Skills to use modern technology to enhance work
21.	Repository Customization
22.	Management of Repositories
23.	All Relevant Skillset
24.	Website Development; Digital Information Management; Research Data Management; Semantic Web Resources Skills for creating e learning modules
25.	Management of Repositories; Digitization
26.	Installation of Institutional Repository; Software
27.	CRIS (Current Research Information Systems); Emerging funding models; Bibliometrics and Research Impact; Data Science Skills (Engineering, Analytics and Big Data); Citizen Science Skills; Legal skills
28.	Master new Digital Directories; New methods of Managing Digital Directories
29.	Management of Digital Libraries; Management of Digital Research Data
30.	Online Tutorial Development; Library Guide Development
31.	Search Engine Marketing; Analytics; Content Marketing; Automation; Technical
32.	Data Mining; Data Management
33.	Online Information Management; Document Watch
34.	Management of Computerized Funds via PMB software

35.	Web Page Creation; Blog Creation
36.	Enhanced Search Skills
37.	Mastery of Open Data; Mastery of Big Data; Mastery of Formats
38.	Digital Data Management; Research
39.	Open Access; Open Science; Open Data
40.	Library Software
41.	Digital Library Creation ; Documentary Language of DEWEY
42.	Mastery of Specific Document Management Software; Establishment of Institutional Repository
43.	Digitization; OCR processing of Digital Documents
44.	Library Management Software such as KOHA, PMB, GREENSTONE; Digitization
45.	Microsoft Office (Mastery of Word, Excel); Mastery of Social Media (Twitter, Facebook, WhatsApp); Emailing; Use of Softwares like PMB
46.	Electronic Document Management
47.	Information and Data Management (Advanced Search)
48.	Installation of Repository; Configuration of Repository Softwares
49.	New Digital Competencies
50.	Uploading Metadata Digital Resources online
51.	Mastery of Softwares for Management of Digital Document (eg DSpace)
52.	Creation and Integration of Open Educational Resources in University Libraries
53.	Setting Up Digital Repositories; Managing Digital Repositories

54.	Development of the documentary policy in the digital domain; Digital Documentary Monitoring; Mastery of Specialized Platforms in Free Access
55.	Digital Database Management
56.	GENISIS; AGORA; Other Data Management Softwares
57.	Use of Open Access Digital Databases
58.	Digital Information Management
59.	Installation of Open Source software; Maintenance of Open Source software; Use of Open Source software; Digital Archiving; Digitization
60.	Advanced Computer Skills; Database Set-Up; Maintenance
61.	Establishment of Digital Databases for Documents and Archives; Uploading Documentary Databases Online; Networking Documentation Centers; Scanning
62.	Microsoft Access; PowerPoint
63.	Digital Libraries
64.	Web Design; Web Development
65.	Database Management; Web Development
66.	Network Infrastructure
67.	Web Development
68.	Digital Imaging
69.	Scientometrics; Bibliometrics; Research Impact
70.	Digital Publishing; Digital Pedagogy; Digital Research Methods; Media Literacy Skills; Digital Leadership Skills; Web Literacy
71.	Web Design

72.	Software Management; Digitization of Operations; Programming
73.	Web Server Management
74.	Database Management
75.	Computer Application Skills
76.	Analytics; Content Marketing; Strategy & Planning
77.	Social Media; Library Management
78.	HTML; CSS; Research Data Management
79.	Digitization
80.	Advance Digital skills
81.	Management of Institutional Repository
82.	Web Design
83.	Management of Digital Resources; Hardware and Software Maintenance
84.	Digital Information Management
85.	Web Design
86.	Search
87.	Creation of Insitutional Repositoy
88.	Information Processing; Information Management
89.	Content Marketing
90.	Database Creation; Online Cataloguing; Uploading
91.	Analytics; Content Marketing
92.	Maintenance of Institutional Repository; Maintenance of Reader Services

93.	Digital Information Management; Integrating electronic information resources in one place for access; Library Technology Applications
94.	All Relevant Skillset
95.	Database Management
96.	Uploading onto Repository
97.	Search Engine Marketing; Analytics; Content Marketing; Strategy and Planning; Social Selling
98.	Digital Information Management
99.	IR Management
100.	Website Creation; Documentary Monitoring; Collaborative work with colleagues on Online platforms
101.	Processing Digital Thesis; Creation of Documentary Portal; Dissemination of Digital Information; Use and Mastery of the PMB Documentary software
102.	Database Design
103.	Mastery of ZOTEROS and EXCELS Software
104.	Database Management
105.	All Relevant Skillset
106.	Database Administration; Webpage Design; Digital Content Production (ePub)
107.	All Relevant Skillset
108.	Use of Advanced Bibliographic Data Management software; Bibliometrics; Securing Digital Resources; Digital Resource Management; Accessing Bibliographic Databases; Use of Bibliographic Databases; Management of Bibliographic Databases
109.	Digital Curation
110.	Mastery over Use of Softwares; Creating Platforms

111.	Integrating various Apps into Library Operations
112.	Obtain the C2I
113.	Development of Open Access Repositories; Creation of Digital Libraries; Management of Digital Libraries; Digital Mediation
114.	Mastery Open Access Repositories
115.	Use of Consultation Tools; Dissemination of Resources; Know the platforms with Open Access Resources
116.	All Relevant Skillset
117.	Advances Online Documentary Research
118.	Mastery in Database Development; Web Development
119.	Creation of Digital Database; Exploitation of Digital Database
120.	ABCD Softwares; ePub Library; Genisis; Greenstone; Icaatom; Koha; Calibre; Endnote; Omeka; Zotero
121.	Marketing; Blogging; Microblogging
122.	Advanced Programming
123.	All Relevant Skillset
124.	All Relevant Skillset
125.	Information Security; Information Literacy; Data Preservation; Data Curation; Advanced Web skills
126.	Scanning
127.	Design of Management software; Mastery of Management software
128.	GED; Electronic Publishing
129.	New digitization techniques New Techniques for Digital Document Management
130.	Programming; Creation of Personalised Databases
131.	Dnew Skills in Digitization

132.	Management of Institutional Repository; Web Application Development; Electronic publishing
133.	All Relevant Skillset
134.	Mastery of Computer Tools; Creation of Platform; Scanning; Creation of a Digitization Studio
135.	Management of Repository
136.	Systems Management
137.	Preservation og Online Catalogue; Development of Online Catalogue
138.	Creation of Digital Database with local softeware document; Management of Digital Database with local softeware document; Controlling Access to Database
139.	Search; Development of Digital Library
140.	Design; Packaging; Re-Packaging, Cloud Sourcing; Computing; Programing; Coding; Database Design
141.	Digitization; Creation of Digital Database Management softwares; Access to Digital Database Management softwares
142.	Content Creation; Content Sharing
143.	Advanced Digital Skills
144.	All Relevant Skillset
145.	Digital Conversion Skills
146.	Web Technologies; Web Designs; Management
147.	Protection of Digital Content
148.	Digital Space Skills (EPN for Meetings, Debates, Collective workshops of Initiation or Production, Individual Mediation, Free Consultation, etc. & ENT to access secure online access to resources, tools and digital services from institutions)
149.	Digitization; Management of Electronic Documents
150.	All Relevant Skillset

151.	Cloud Computing
152.	All Relevant Skillset
153.	Mastery over Use of Internet
154.	Typing
155.	All Relevant Skillset
156.	Computer Technology; Computer Programming
157.	All Relevant Skillset
158.	Maintenance; Repairs
159.	Online Publishing; Metadata; Institutional Repository; Database Design
160.	Production of Digital Resources; Management of Digital Resources; Information Communication; Information Handling; Content and Problem Solving
161.	Systems Integration (eg how to make systems compatible by creating different interfaces)
162.	Innovation of Digital Resources; Management of Digital Resources; Development of Digital Resources; Designing, developing and Interactive Web-based Access Point to Digital Resources; Use of Digital Open Access Repositories
163.	Open Access software Management
164.	Library Developing tools
165.	Digitization of Documentary Databases; Uploading online for free access
166.	All Relevant Skillset
167.	Browsing; Search; Sorting data and information
168.	Search
169.	Intranet; Internet

170.	Digitization
171.	Open Source Resources Management; Storage of Digital Information; Facilitating Access to Digital Information
172.	Data Analysis
173.	All Relevant Skillset
174.	Mastery of Open Access Trends and Platforms; Open Source LIS; Repository Management System
175.	Web Communication; Data Security; Data Integrity
176.	Database Management
177.	Anti-Theft software
178.	Data Science; Business Intelligence; Big Data; A.I.; Change Management
179.	Digital Library Management
180.	Author Lists; Use of MARC 21 and similar others; Impact Factor
181.	New Digital Directory; Management of New Digital Directory
182.	Dspace
183.	Big Data
184.	Advanced Digital Skills
185.	All Relevant Skillset
186.	Use of Knowledge Sharing tools in a digital environment
187.	Deploy OAIR software; Manage OAIR software; Evaluate new version of Repository Software; Develop Repository Interface and Tools; Customize Repository software; Develop Value Added Services to Repository software (download statistics, citation index, rankings, bibliographies and so on); Analyze and solve problems related to repository software; Communication; Perform Software Upgrades; Implement software patches and bug fixes; Develop web 2.0 functionalities and tools (alerts, RSS, wikis, blogs and so on);

	Implement Digital Preservation Procedures; Batch Import (get data from a different system and deposit in a repository); rest API; Write codes to make use of important web services such as crossref, Scopus API, ORCID API; COAR requirements, DSpace-Cris, DSPACE-CKAN, or CKAN; Integration into DSpace Repository
188.	Management of Digital Documents
189.	All Relevant Skillset
190.	Big Dat; Advanced Dta Analysis; Open Data Platform
191.	Data Mining; Photography (Images & Sounds)
192.	Creation of Open Source Repositories
193.	All Relevant Skillset
194.	Use of Online Open Access Resources; Visibility & Usability of Institutional Repository
195.	Fundamentals of Indexes; Using Open Source Libraries; Management of Resources; Metadata using previous dataset(metadata)
196.	Library Management
197.	Accessing Reliable Sources and accounts are always open to these sources
198.	create. save, restore, publish
199.	Digital Information management such as: Issues of information ownership, rights management, curation, preservation, communication and dissemination of digital information.
200.	Electronic Databases
201.	Creation of Digital Repository
202.	All Relevant Skillset
203.	Renewals

204.	Cloud Computing
205.	Electronic Archiving
206.	Information Retreieval
207.	Digital Archiving; Digital Document Proccessing
208.	Database Creation
209.	Document Monitoring Tools; Use of Bibliometric Tools
210.	Acquisition of Digital & Electronic Resources; Management of Digital & Electronic Resources
211.	BIBFRAME (Bibliographic Framework)
212.	Open Resources Management; e-Publishing
213.	All Relevant Skillset
214.	All Relevant Skillset
215.	Digital Library Management
216.	All Relevant Skillset
217.	Data Analysis; xml; rdf; Higher Level Database Management
218.	Scanning
219.	Digital Curatorship; Research Data Management; All Relevant Skillset
220.	Digital Skills involving Online Identity
221.	Cloud Library System
222.	Use of Hypermedia Technologies; Folsonomies; Semantic Web
223.	Advanced Digital Library Management; New Digital Repositories; Librarianship
224.	Management; Maintenance

225.	Open Data Management; Curation; Analytics; Data Harvesting; Creating Mobile Websites; Content Marketing; Creating Blogs; Creating Podcasts; Creating Videos; Creating Inforgraphics; Designing Websites; Designing Relational Databases of Information
226.	RDA; Database Construction; ISO Standards; IT Skills
227.	Research Management Systems (REM); Research Data Management; HTML; Adobe; Website Development; Coding
228.	Data Migration to Upgraded Version of Dspace and Related Software wihout loosing Content
229.	Installation of different Digital Software; Customization of different Digital Software
230.	Advanced IR Integration; Advanced IR Management; Open Data; Open Science
231.	Software Management
232.	Migrating Digital Repository from one Software to another
233.	Digital Management
234.	Web Apps
235.	Collecting statistics for e-Resource Usage
236.	Digitization of Grey Literature
237.	Advanced System Management; Computer and Information Security
238.	Creation of Open Access Repository; OAR Policy Development
239.	Web Analytics
240.	All Relevant Skillset
241.	Library Software Development (eg ILS); Enriching Institutional Repositories (IREP); Open Source Utilization
242.	All Relevant Skillset
243.	Linux; Recovering Broken Systems; Restoring Broken System; Backing-Up Dspace; Networking a System
244.	Advanced Imaging; Repository Maintenance

245.	All Relevant Skillset
246.	Copyright; Licensing; Federated Search for different Digital Library Systems; Open Data Repositories
247.	ePrints; Fedora Commons; Digital Commons
248.	National Policy Document for Open Access Repository; Governance; Copyright; Networking and Partnerships; Create Online Course (MOOC)
249.	Upload into Open Access Repositories
250.	Digitization of Video Tapes and cassettes
251.	Digital Curation; Data Mining; Metadata; Digital Content Softwares
252.	Utilization; Evaluation; Sharing Content
253.	Creation of Institutional Repositories; Management of Institutional Repositories
254.	Management of Institutional Repository
255.	All Relevant Skillset
256.	Data Management
257.	Coding; Programming; Website Development
258.	Management of Institutional Repositories; Integration of Repository with other Library Systems
259.	Copyright; Management of Institutional Repositories; Harvesting
260.	Software Development
261.	Repository Development; Repository Management Web development Research Data Management (Open Data/Big Data)
262.	Developing Relevant Policies; Open Access Movement; Online/Electronic Publishing

263.	Website Development; Website Management; App Development; Digital Design; Digital Marketing; Big Data
264.	Programming; Creating Links to International Network of Open Access Libraries
265.	Big Data; Open Science Solutions; Knowledge Management; Web Development
266.	Programming; Data Curation; Database Development
267.	Digital Information Management data mining
268.	Digital Web Content Management; LIS; Metadata
269.	All Relevant Skillset
270.	Advance Linux Administration; Information Security
271.	Configurations; Installation; Customization; Website Updates
272.	Metadata Harvesting; Database Management; Securing Library Systems and Data; DSpace Institutional Repository & Alternatives; Open Access, Open Science, Open Data and How to leverage on them; Open Source Technologies
273.	Development of Institutional Repositories; Maintenance of Institutional Repositories; e-Resource Management
274.	Creating a Repository
275.	e-Publishing
276.	Taking Statistics from the Repository Upgrading and Updating the repository
277.	Standard Web-based Software; Linux; SQL Server; MSQL; JAVA; PERL Metadata standards- METS, MODS and OAI
278.	Conversion of Hard Copy to Digital; Open Systems for Management of Electronic Resources; Back-up, Restoration and Updating of KOHA - DSpace; Setting Off-site Access to e-Resources (alternative to Ezproxy)

279.	Advanced Integrated Library Systems Management; Open Access Repository Use and Development; Information Architecture; Metadata Structure Development; Advanced Digital Literacy
280.	Advanced Management/Maintenance of Digital Libraries
281.	DSpace Upgrades; DSpace Back-Up Maintenance; Intergration of DSpace with other Library Systems; Open Source Softwares for Library Systems; Document Management Systems (Open Source)
282.	Digitization
283.	Digital Library Softwares
284.	Digital Repository Management
285.	New Version of Repositories
286.	Back-End Skills in Installation, Customization and Troubleshooting
287.	Internet; Open Access Computer Programs; Application of Open Access Computer Programs in Librarianship
288.	Digital Library Skills
289.	Creating Digital Platforms
290.	Creating Open Access Institutional Repositories; Designing Open Access Institutional Repositories; Management of Digital Information Resources; Publishing Institutional Research Output
291.	Web Development; Advance Linux Operating System
292.	Management of Library Systems
293.	Digital Marketing of Research via Social Media (Altmetrics); Management of Open Data and Open Science; Use of Collaboration Tools
294.	Management of Big Data
295.	Development of Institutional Repository

296.	Management of Institutional Repository
297.	App Development; Big Data; Research Data Management
298.	Building Digital Systems
299.	Technical Skills; Programming
300.	Setting-Up a Digital Library; Acquisition of Digital Resources
301.	OER (Curation of Open Educational Resources)
302.	Advanced Linux Server Administration; Advanced Data Curation
303.	Database Development; Database Management; Development of Open Access Repository; Management of Open Access Repository; Digital Librarianship; Social Media; Marketing; Dissemination; Open Data; Data Mining; Data Curation
304.	Digital Marketing; Big Data; Open Science
305.	Management of Open Sources Software; Upgrading IR; Promoting of IR
306.	Programming; Web Development; App Development
307.	Open Access Software (DSpace, KOHA)
308.	Digitization

Survey Instrument Used for the UA Region

LIBSENSE SURVEY – HEI LIBRARIAN CAPABILITY FOR OPEN ACCESS REPOSITORY DEVELOPMENT

Introduction:

This survey is part of a project that aims to support the development of sustainable information management capability in African higher education institutions (HEIs) supported by REN services. The survey will be deployed in the Eastern/Southern, Northern and West and Central African regions. The survey is expected to identify institutional issues that, if resolved, would support ongoing efforts in establishing the scientific communities of practice that support "Open" initiatives such as Open Access Repositories.

Currently, according to Electronic Information for Libraries (EIFL), there are 255 existing Open Access repositories in Africa. To address a project of federating Open Access repositories across the multiple African regions in which they operate, the identification of key capabilities and training needs for African HEI librarians is needed.

The survey seeks to accomplish the following objectives:

1. **Understand the evolving role of the library function** in contemporary African higher education institutions (HEIs). This will especially mean understanding the role of librarians vis-à-vis digital resources, especially open access repositories (OARs).
2. **Understand how institutions affecting the higher education sector support or constrain** the roles of librarians, especially where these are concerned with digital resource management and implementation. These institutions could include national librarian consortia/organisations within the sector directly supporting capacity-building initiatives etc.

3. **Determine how NRENs can work with librarians to support their roles. This includes eliciting service requirements that librarians need** to support their roles and other ways in which NRENs can support librarian groups.
4. **Gather demographic information** that would be useful in categorizing the librarian communities of practice in African regions so as to understand this evolving field better.

Overall aim:

The survey should produce a rounded picture of how higher education sector librarians view the enabling and constraining factors of their practice as information resource managers especially regarding the development, implementation and maintenance of OARs.

Please follow the instructions given for each question.

XO.

Which of the following **library functions** do you identify with (in your role as a librarian)? Tick **all** that apply.

- □ **Management** (e.g. with responsibility for any of the following - budgeting, staffing, policy development, planning, training, supervision, resource management, etc.)
- □ **Operational** (e.g. with responsibility for carrying out librarian functions such as providing support services for staff, procurement, building library collections etc.)
- □ **Subject Specialist** (e.g. with responsibility for developing library collections in a specific subject area, providing support services for staff in that specific subject area and liaising with research and teaching staff in that specific subject area)

□ **Technical** (e.g. with responsibility for operating, maintaining and securing the infrastructure and applications supporting technical library services such as computer networks, storage, communication channels, information systems, digital collections etc.)

Fill in the relevant sections below, depending on the answers you gave above. If you ticked any of the above categories, then please fill in the relevant section for that function. Each question should be answered with one of the following: **Yes, No, Don't Know, Not Applicable – N/A.**

ANSWER THIS SECTION **IF ONLY YOU TICKED '*MANAGEMENT'*** AS A FUNCTION IN QUESTION 'XO' ABOVE

A. Questions related to the ***management*** level of the **library function** in your institution.

A.1. Does your function manage a budget for the acquisition/purchase of or subscription etc. to library collections (both traditional and digital)? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

A.2. Is your function responsible for deciding what information resources are acquired for the use of the library for both students and teaching/research staff? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

A.3. Does your function make decisions about who is responsible for the management of digital information resources? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

A.4. Does your function make decisions on who is allowed to access digital information resources? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

A.5. Does your country have a national Open Access repository?

Yes □ No □ Don't Know □ N/A □

A.6. Does your country have a national policy regarding approaches to the management of research outputs?

Yes □ No □ Don't Know □ N/A □

A.7. Does your institution maintain an Open Access repository?

Yes □ No □ Don't Know □ N/A □

A.8. Does your institution have a policy regarding the deposit of research outputs in Open Access repositories?

Yes □ No □ Don't Know □ N/A □

If so, how does your function implement this policy?

A.9. Is your function responsible for managing an Open Access repository within your institution?

Yes □ No □ Don't Know □ N/A □

A.10. Does your function make decisions about the policies regarding the security, integrity, privacy or accuracy of data kept in institutional digital repositories? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

A.11. Does your function participate in making decisions on the allocation of digital infrastructure resources, e.g. broadband entitlement, Internet access or similar infrastructure decisions? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

A.12. Is there adequate funding for the management of digital information resources in your institution? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

A.13. Within the institution as a whole, is the role of the library considered central or peripheral? By 'Central', we mean, is the library considered an important influence on your institution's research, learning or teaching policies. And by 'Peripheral', we mean is the role of the library mainly informational? Tick one of the following:

Central □ Peripheral □ Don't Know □

Why is this the case?

A.14. Is the library considered a service provider (support role) or a service designer (transformational role) in your institution? An example of a service provider role would be providing access to resources through a search engine. A service designer role would be creating and developing an institutional repository as an example. Tick one of the following:

Service provider □ Service designer □ Don't Know □

Why is this the case?

ANSWER THIS SECTION **IF ONLY YOU TICKED '*OPERATION*'** AS A FUNCTION IN QUESTION 'XO' ABOVE

B. Questions related to the ***operational*** level of the **library function** in your institution.

B.1. Does the work of your function involve managing any digital resources? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

B.1.a.

If you answered 'Yes' to Question B.1. above, please select those you manage from the list below:

Digital collections □

Commercial e-resources □

Scientific datasets □

Image data □

Digital media, e.g. CD-ROMs □

Digital audio, video, films □

B.2. Does your function use an integrated library automation system that includes catalogue, authority control, circulation etc.? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

B.3. Does your function manage a digital repository where publications and/or data are stored? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

B.4. Does your library offer or support any training in information literacy? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

B.5. Is your function involved in supporting or delivering taught modules via distance learning, e-learning or any learning platform using the Internet or computer networks? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

B.6. What forms of support does your library receive from the institution? Tick **all** that apply.

Funding for digital collections Yes □ No □ Don't Know □ N/A □

Funding for digital repositories Yes □ No □ Don't Know □ N/A □

Updated Information systems Yes □ No □ Don't Know □ N/A □

Adequate Internet access Yes □ No □ Don't Know □ N/A □

Training in digital skills Yes □ No □ Don't Know □ N/A □

Experts/consultants in digital areas Yes □ No □ Don't Know □ N/A □

B.7. With respect to Open Access repositories, what forms of support does your library receive from the institution? Tick **all** that apply.

Specific policy on Open Access Yes □ No □ Don't Know □ N/A □

Providing awareness of Open Access policy

Yes □ No □ Don't Know □ N/A □

Training on copyright and related issues

Yes □ No □ Don't Know □ N/A □

Training on Open Access issues Yes □ No □ Don't Know □ N/A □

B.8. What would you consider to be the biggest challenge to providing operational capability for managing Open Access resources in your institution?

ANSWER THIS SECTION **IF ONLY YOU TICKED '*SUBJECT SPECIALIST*'** AS A FUNCTION IN QUESTION 'XO' ABOVE

C. Questions related to the ***subject specialist*** level of the **library function** in your institution.

C.1. Does your function provide services to *research staff* involving internet resources or computer networks? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

C.2. Does your function provide services to *academic staff* using Internet resources or computer networks? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

C.3. What would you consider to be the biggest challenge to providing subject specific expertise for developing Open Access resources in your institution?

ANSWER THIS SECTION **IF ONLY YOU TICKED '*TECHNICAL'*** AS A FUNCTION IN QUESTION 'XO' ABOVE

D. Questions related to the ***technical*** level of the **library function** in your institution.

D.1. Does your library carry out any work in any of these technical areas:

Webpage development	Yes	□	No	□	Don't Know	□	N/A	□
Web-based services and collections	Yes	□	No	□	Don't Know	□	N/A	□
Database design/management	Yes	□	No	□	Don't Know	□	N/A	□
Computer literacy	Yes	□	No	□	Don't Know	□	N/A	□
Digital repositories	Yes	□	No	□	Don't Know	□	N/A	□
Network/telecoms management	Yes	□	No	□	Don't Know	□	N/A	□
Information architecture	Yes	□	No	□	Don't Know	□	N/A	□
Integrated library systems	Yes	□	No	□	Don't Know	□	N/A	□
Search Engines	Yes	□	No	□	Don't Know	□	N/A	□
Digital imaging	Yes	□	No	□	Don't Know	□	N/A	□

Metadata	Yes	□	No	□	Don't Know	□	N/A	□
Electronic publishing	Yes	□	No	□	Don't Know	□	N/A	□

D.2. What forms of support does your library receive from the institution? Tick **all** that apply.

Funding for digital infrastructure	Yes	□	No	□	Don't Know	□	N/A	□
Adequate Internet bandwidth	Yes	□	No	□	Don't Know	□	N/A	□
Information experts/consultants	Yes	□	No	□	Don't Know	□	N/A	□
Training in technical skills	Yes	□	No	□	Don't Know	□	N/A	□
Training in non-technical digital skills	Yes	□	No	□	Don't Know	□	N/A	□
Technical experts/consultants	Yes	□	No	□	Don't Know	□	N/A	□

D.3. With respect to Open Access repositories, please indicate the following:

Repository URL:

Software used:

D.3.a. Is the software:

Administered locally? Yes □ No □ Don't Know □ N/A □

Customised locally? Yes □ No □ Don't Know □ N/A □

Maintained by an external provider?

Yes □ No □ Don't Know □ N/A □

Integrated with other systems in your institution?

Yes □ No □ Don't Know □ N/A □

Integrated with other systems nationally?

Yes □ No □ Don't Know □ N/A □

D.4. Who makes decisions about digital infrastructure in your institution? E.g. amount of funding, access rights, procurement, etc.

E. Questions related to ***librarian skills development***.

E.1. Does your institution teach librarianship as a formal subject area? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

E.2. Do you have access to continuing professional development in your skill area? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

E.3. Do you have access to continuing professional development of digital library skills, e.g. learning about new digital repositories and how to manage them? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

E.4. What digital skills do you currently have?

E.5. What digital skills would you like to acquire?

E.6. Are you aware of the "open" movement, e.g. Open Access, Open Science, Open Data? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

E.7. Do you use any Open Science platforms, other than a repository? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

E.8. Do you have access to training in any "open" movement initiatives, e.g. Open Access, Open Science, Open Data? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

E.9. Do you use any Open Data repositories? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

E.10. What would you consider to be **the evolving role of the library** in the African higher education context?

E.11. Now about the **librarian** himself/herself. What would you consider to be **the evolving role of the librarian** in the African higher education context?

E.12. Are there any ***issues/challenges*** facing librarians in your institution? Please use the box below to make any comments on this:

F. Your **demographic** characteristics:

F.1. Please indicate your age range:

18-25 □ 26-35 □ 36-45 □ 46-55 □ >55 □

F.2. Please indicate your gender:

Female□ Male □

F.3. Please indicate your educational level:

Bachelors □ Masters □ Doctoral □ Other Tertiary □

Other (please specify) □ _____

F.4. Please indicate how many years' experience you have in the field:

Less than 2 □ Between 2 and 5 □ Between 6 and 10 □ More than 10 □

F.5. What is your job designation or job title?

F.6. In which country is your institution located?

<<Computerised list of countries in the REN area to be provided>>

Survey Instrument Used for the WACREN and ASREN Regions

LIBSENSE SURVEY – HEI LIBRARIAN CAPABILITY FOR OPEN ACCESS REPOSITORY DEVELOPMENT

Introduction:

This survey is part of a project that aims to support the development of sustainable information management capability in African higher education institutions (HEIs) supported by REN services. The survey will be deployed in the Eastern/Southern, Northern and West and Central African regions. The survey is expected to identify institutional issues that, if resolved, would support ongoing efforts in establishing the scientific communities of practice that support "Open" initiatives such as Open Access Repositories.

Currently, according to Electronic Information for Libraries (EIFL), there are 255 existing Open Access repositories in Africa. To address a project of federating Open Access repositories across the multiple African regions in which they operate, the identification of key capabilities and training needs for African HEI librarians is needed.

The survey seeks to accomplish the following objectives:

1. **Understand the evolving role of the library function** in contemporary African higher education institutions (HEIs). This will especially mean understanding the role of librarians vis-à-vis digital resources, especially open access repositories (OARs).
2. **Understand how institutions affecting the higher education sector support or constrain** the roles of librarians, especially where these are concerned with digital resource management and implementation. These institutions could include national librarian consortia/organisations within the sector directly supporting capacity-building initiatives etc.
3. **Determine how NRENs can work with librarians to support their roles. This includes eliciting service requirements that librarians need** to support their roles and other ways in which NRENs can support librarian groups.

4. **Gather demographic information** that would be useful in categorizing the librarian communities of practice in African regions so as to understand this evolving field better.

Overall aim:

The survey should produce a rounded picture of how higher education sector librarians view the enabling and constraining factors of their practice as information resource managers especially regarding the development, implementation and maintenance of OARs.

Please follow the instructions given for each question.

XO.

Which of the following **library functions** do you identify with (in your role as a librarian)? Tick **all** that apply.

- □ **Management** (e.g. with responsibility for any of the following - budgeting, staffing, policy development, planning, training, supervision, resource management, etc.)
- □ **Operational** (e.g. with responsibility for carrying out librarian functions such as providing support services for staff, procurement, building library collections etc.)
- □ **Subject Specialist** (e.g. with responsibility for developing library collections in a specific subject area, providing support services for staff in that specific subject area and liaising with research and teaching staff in that specific subject area)
- □ **Technical** (e.g. with responsibility for operating, maintaining and securing the infrastructure and applications supporting technical library services such as computer networks, storage, communication channels, information systems, digital collections etc.)

Fill in the relevant sections below, depending on the answers you gave above. If you ticked any of the above categories, then please fill in the relevant section for that function. Each question should be answered with one of the following: **Yes, No, Don't Know, Not Applicable – N/A.**

ANSWER THIS SECTION **IF ONLY YOU TICKED '*MANAGEMENT'*** AS A FUNCTION IN QUESTION 'XO' ABOVE

A. Questions related to the ***management*** level of the **library function** in your institution.

About the capacity/effectiveness of the management function to manage digital information resources:

A.1. Does your function manage a budget for the acquisition/purchase of or subscription etc. to *digital* library collections? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

A.2. Is your function responsible for deciding what *digital* information resources are acquired for the use of the library for both students and teaching/research staff? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

A.3. Does your function make decisions about who is responsible for the management of *digital* information resources? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

A.4. Does your function make decisions on who is allowed to access *digital* information resources? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

A.5. Does your function participate in making decisions on the allocation of digital infrastructure resources, e.g. broadband entitlement, Internet access or similar infrastructure decisions? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

A.6. Is there adequate funding for the management of digital information resources in your institution? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

About the capacity/effectiveness of the management function to pursue Open Access initiatives:

A.7. Does your country have a national policy regarding approaches to the management of research outputs (e.g. a policy regarding the publication of research outputs using national funding sources)?

Yes □ No □ Don't Know □ N/A □

A.8. Does your country have a national Open Access repository?

Yes □ No □ Don't Know □ N/A □

A.9. Does your institution have a policy regarding the deposit of research outputs in Open Access repositories?

Yes □ No □ Don't Know □ N/A □

If so, how does your function implement this policy?

A.10. Does your institution maintain an Open Access repository (e.g. an institutional repository that also allows free access to users outside of the institution)?

Yes □ No □ Don't Know □ N/A □

A.11. Is your function responsible for managing an Open Access repository within your institution?

Yes □ No □ Don't Know □ N/A □

A.12. Does your function make decisions about the policies regarding the security, integrity, privacy or accuracy of data kept in institutional digital repositories (whether they are open access or not)? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

About the management function's view of the role and innovative capacity of the library within the institution:

A.13. Within the institution as a whole, is the role of the library considered central or peripheral? By 'Central', we mean, is the library considered an important influence on your institution's research, learning and/or teaching policies/practices. And by 'Peripheral', we mean is the role of the library mainly informational, i.e. provides useful but not critical inputs into research, learning and/or teaching policies/practices? Tick one of the following:

Central □ Peripheral □ Don't Know □

Why is this the case?

A.14. Is the library considered a service provider (support role) or a service innovator (transformational role) in your institution? An example of a service provider role would be providing access to digital resources through a search engine or integrated library information system. A service innovator role would be, e.g., creating and developing a platform to enable knowledge discovery from an institutional repository. While in some cases, the library in your institution may be considered as playing both roles, please tell us which of the 2 roles is the more dominant one. Tick **only one** of the following:

Service provider □ Service innovator □ Don't Know □

Why is this the case?

ANSWER THIS SECTION **IF ONLY YOU TICKED '*OPERATIONAL'*** AS A FUNCTION IN QUESTION 'XO' ABOVE

B. Questions related to the ***operational*** level of the **library function** in your institution.

About establishing the capability to manage and operate digital information resources:

B.1. Does the work of your function involve managing any *digital* information resources? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

B.1.a.

If you answered 'Yes' to Question B.1. above, please select those you manage from the list below:

Digital repositories □

Digital archives □

Commercial e-resources □

Scientific datasets □

Image data □

Digital audio/video □

B.2. Does your function manage an integrated library automation system that includes catalogue, authority control, circulation etc.? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

B.3. Does your function manage an institutional repository where research outputs are stored? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

B.3.a.

If you answered 'Yes' to Question B.3. above, please state whether this institutional repository supports open access:

Yes □ No □ Don't Know □ N/A □

B.4. Does your function offer or support any training in information literacy? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

B.5. Is your function involved in supporting or delivering taught modules via e-learning or any learning platform using the Internet or computer networks? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

About establishing institutional support for digital information resource management, especially for Open Access:

B.6. What forms of support does your library receive from the institution? Tick **all** that apply.

Funding for commercial e-resources Yes □ No □ Don't Know □ N/A □

Funding for digital repositories Yes □ No □ Don't Know □ N/A □

Updated Information systems Yes □ No □ Don't Know □ N/A □

Adequate Internet access Yes □ No □ Don't Know □ N/A □

Training in digital skills Yes □ No □ Don't Know □ N/A □

Experts/consultants in digital skills Yes □ No □ Don't Know □ N/A □

B.7. With respect to Open Access repositories, what forms of support does your library receive from the institution? Tick **all** that apply.

Specific policy on Open Access Yes □ No □ Don't Know □ N/A □

Providing awareness of Open Access policy

Yes □ No □ Don't Know □ N/A □

Training on copyright and related issues

Yes □ No □ Don't Know □ N/A □

Training on Open Access issues Yes □ No □ Don't Know □ N/A □

Training in Open Access technical skills

Yes □ No □ Don't Know □ N/A □

B.8. What would you consider to be the biggest challenge to providing operational capability for managing Open Access resources in your institution?

ANSWER THIS SECTION **IF ONLY YOU TICKED '*SUBJECT SPECIALIST*'** AS A FUNCTION IN QUESTION 'XO' ABOVE

C. Questions related to the ***subject specialist*** level of the **library function** in your institution.

C.1. Does your function *provide services to* research/ academic staff using *digital* information resources? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

C.2. Does your function *create/develop services for* research/ academic staff using *digital* information resources? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

C.3. What would you consider to be the biggest challenge to providing subject specific expertise for developing Open Access resources in your institution?

ANSWER THIS SECTION **IF ONLY YOU TICKED '*TECHNICAL'*** AS A FUNCTION IN QUESTION 'XO' ABOVE

D. Questions related to the ***technical*** level of the **library function** in your institution.

D.1. Does your library carry out any work in any of these technical areas:

Webpage development	Yes	□	No	□	Don't Know	□	N/A	□
Web-based services and collections	Yes	□	No	□	Don't Know	□	N/A	□
Database design/management	Yes	□	No	□	Don't Know	□	N/A	□
Computer literacy	Yes	□	No	□	Don't Know	□	N/A	□
Digital repositories	Yes	□	No	□	Don't Know	□	N/A	□
Network/telecoms management	Yes	□	No	□	Don't Know	□	N/A	□
Information architecture	Yes	□	No	□	Don't Know	□	N/A	□
Integrated library systems	Yes	□	No	□	Don't Know	□	N/A	□
Search Engines	Yes	□	No	□	Don't Know	□	N/A	□
Digital imaging	Yes	□	No	□	Don't Know	□	N/A	□
Metadata	Yes	□	No	□	Don't Know	□	N/A	□
Electronic publishing	Yes	□	No	□	Don't Know	□	N/A	□

D.2. What forms of support does your library receive from the institution? Tick **all** that apply.

Funding for digital infrastructure	Yes	□	No	□	Don't Know	□	N/A	□
Adequate Internet bandwidth	Yes	□	No	□	Don't Know	□	N/A	□

Information experts/consultants	Yes	□	No	□	Don't Know	□	N/A	□
Training in technical skills	Yes	□	No	□	Don't Know	□	N/A	□
Training in non-technical digital skills	Yes	□	No	□	Don't Know	□	N/A	□
Technical experts/consultants	Yes	□	No	□	Don't Know	□	N/A	□

D.3. With respect to Open Access repositories, please indicate the following:

Repository URL:

Software used:

D.3.a. Is the software:

Administered locally?	Yes	□	No	□	Don't Know	□	N/A	□
Customised locally?	Yes	□	No	□	Don't Know	□	N/A	□
Maintained by an external provider?								
	Yes	□	No	□	Don't Know	□	N/A	□

Integrated with other systems in your institution?

Yes □ No □ Don't Know □ N/A □

Integrated with other systems nationally?

Yes □ No □ Don't Know □ N/A □

D.4. Who makes decisions about digital infrastructure in your institution? E.g. amount of funding, access rights, procurement, etc.

E. Questions related to ***librarian professional skills development***.

E.1. Does your institution teach librarianship as a formal subject area? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

E.2. Do you have access to continuing professional development in your skill area? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

E.3. Do you have access to continuing professional development of digital library skills, e.g. learning about new digital repositories and how to manage them? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

E.4. What digital skills do you currently have?

E.5. What digital skills would you like to acquire?

E.6. Are you aware of the "open" movement, e.g. Open Access, Open Science, Open Data? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

E.7. Do you have access to training in any "open" movement initiatives, e.g. Open Access, Open Science, Open Data? Tick one of the following:

Yes □ No □ Don't Know □ N/A □

E.8. What skills related to Open Access, Open Science, Open Data would you like to acquire?

E.9. Outside of your institution, what Open Access, Open Science or Open Data platforms are you aware of?

E.10. What would you consider to be **the evolving role of the library** in the African higher education context?

E.11. Now about the **librarian** himself/herself. What would you consider to be **the evolving role of the librarian** in the African higher education context?

E.12. Are there any ***issues/challenges*** facing librarians in your institution? Please use the box below to make any comments on this:

F. Your **demographic** characteristics:

F.1. Please indicate your age range:

18-25 □ 26-35 □ 36-45 □ 46-55 □ >55 □

F.2. Please indicate your gender:

Female □ Male □ Prefer not to say □

F.3. Please indicate your educational level:

Bachelors □ Masters □ Doctoral □ Honours □

Other Tertiary (please specify) □

_____

F.4. Please indicate how many years' experience you have in the field:

Less than 2 □ Between 2 and 5 □ Between 6 and 10 □ More than 10 □

F.5. What is your job designation or job title?

F.6. In which country is your institution located?

<<Computerised list of countries in the REN area to be provided>>

Focus Group Discussion Protocol – Online Version

ASSESSING HEI LIBRARIAN CAPABILITY FOR OPEN ACCESS REPOSITORY DEVELOPMENT IN AFRICA

DISCUSSION GUIDE – 1.5 HOURS

Objectives:

1. Understand the evolving role of the library function in contemporary African higher education institutions (HEIs).
2. Understand how institutions affecting the higher education sector support or constrain the roles of librarians, especially where these are concerned with digital resource management and implementation
3. Determine how NRENs can work with librarians to support their roles

INTRODUCTION – 10mins

MOD: Introduce self and any other participating team members (eg. co-moderator) to the group and explain the following:

- **Session objectives**
- **Group duration**
- **Mobile phones to silence**
- **Confidentiality**
- **Audio recording**
- **No wrong answers**
- **Need for honesty and openness**

WARM UP – 15 mins

- Ask respondents to introduce themselves and tell the group any secret or casual passions that they (may) have
- Let's talk about occupations. What do you currently do?
- What is your specific role? Tell us what it entails very briefly?

- What has been the peak of your creer? How about the lowest point?

ASSESSING THE EVOLVING ROLE OF LIBRARIES/LIBRARIANS IN CONTEMPORARY AFRICAN HIGHER EDUCATION INSTITUTIONS – 15 mins

- So you all work in academia in higher education in different parts of Africa. In your view, would you say that higher education or scholarship in this part of the world has evolved in the last 5 – 10 years? How so?
- What issues do you think or see that librarians face in promoting African Scholarship?

EVALUATING DIGITAL RESOURCE MANAGEMENT AND ITS IMPLEMENTATION IN HEIs IN AFRICA, WITH PARTICULAR REFERENCE TO OA – 30 MINS

- There has been heightened talk around Open Access over the last couple of years.
    - What/ How much do you know about Open Access?
    - What are your own views on Open Access, in particular?
    - In your view, what does Open Access offer African Scholarship?
- Is OA a good thing for African Scholarship?
- How visible does OA make African Scholarship?
- How supportive is your own institution of the Open Access concept?
- Is this the same at the national level? How is Open Access 'embraced' at the national level in your respective countries?
- What policies are in place to support OA in your countries and institutions both at a national and institutional level? Do you know?
    - Let's start at the national level? What policies are in place at this level to support OAs?
    - How about the institutional level?
- **If Polices Absent At Any Level, Ask:**
    - So how important do you think policies are, with respect to supporting OA development?

  - **If Important, Ask:** What policies do you think should be developed to support OA?
- So, in your view, how are the terms Open Science, Open Data and Open Access related, do you think?

DEEP DIVE ON OPEN ACCESS REPOSITORIES (OARs) – 30 MINS

- Let's turn specifically to OARs. What are your thoughts on OARs?
- How integrated are OARs in your various institutions? How so?
- Who are the main users of OARs?
- What type of activity/data should repositories focus on? And who should make those decisions?
- Are OARs currently established in your institutions/libraries?
- **If Yes,**
  - What issues have you encountered in implementing OARs?
  - What workarounds and improvisations have your libraries used to get OAR implementation to work?
- Currently, within your institutions, whose responsibility is it to oversee the establishment of OARs in your libraries?
- Ideally, whose responsibility do you think it should be? In other words, do you think the responsibilities of ensuring the establishment of OARs in your libraries are in the right hands? This may vary from one institution to the other considering that *'one size may not fit all'*
- How does development and management of OARs fit into the librarian's role?
- Is this kind of work upskilling or deskilling the librarian?
- What do you think is the role of NRENs in helping to establish OARs in your libraries?
- What is your opinion on an integrated African OAR framework of interoperability?

Focus Group Discussion Protocol – WACREN/ASREN

ASSESSING HEI LIBRARIAN CAPABILITY FOR OPEN ACCESS REPOSITORY DEVELOPMENT IN AFRICA

DISCUSSION GUIDE – 1 HOUR [5 to 8 participants]

Objectives:

4. Understand the evolving role of the library function in contemporary African higher education institutions (HEIs).
5. Understand how institutions affecting the higher education sector support or constrain the roles of librarians, especially where these are concerned with digital resource management and implementation
6. Determine how NRENs can work with librarians to support their roles

INTRODUCTION & WARM-UP– 5 mins

(Needs to be short especially as participants may already know each other and the moderators)

[2 mins] MOD: Introduce self and any other participating team members (e.g. co-moderator) to the group and explain the following:

- **Session objectives**
- **Group duration**
- **Mobile phones to silence**
- **Confidentiality**
- **Audio recording**
- **No wrong answers**
- **Need for honesty and openness**

- [3 mins] Ask respondents to introduce themselves (name, institution, position/role in institution)

ASSESSING THE EVOLVING ROLE OF LIBRARIES/LIBRARIANS IN CONTEMPORARY AFRICAN HIGHER EDUCATION INSTITUTIONS – 20 mins

- [10 mins] Specific to the ASREN region, what is the role played by librarians in the development and management of open access repositories (OARs)?
    - [If OAR development is not common/prevalent, then the question can be reframed to include national repositories or institutional repositories as needed.]
- [10 mins] Who are the other stakeholders involved in OAR development and management and what are their roles?
    - [If OAR development is not common/prevalent, then the question can be reframed to include national repositories or institutional repositories as needed.]

ASSESSING THE DEVELOPMENT OF COLLABORATIVE AND SUSTAINABLE NETWORKS OF STAKEHOLDERS TO DELIVER OAR CAPABILITY – 25 mins

- [10 mins] How should the scholarly contributions of researchers, academics and students in the ASREN region be incorporated into repositories in general, whether open access or not? What should be the role of the librarian in ensuring this occurs?
- [15 mins] What do you think should be the role and contributions of the NRENs in helping to establish repositories in general, whether open access or not? How best should the expected role and contributions of NRENs in such a collaboration be implemented?

ASSESSING THE FEASIBILITY OF COLLABORATIVE AND SUSTAINABLE NETWORKS OF STAKEHOLDERS TO DELIVER OAR CAPABILITY – 10 mins

- [10 mins] What is your opinion on an integrated African OAR framework of interoperability?
    - How can different forms of research knowledge be captured at the institutional level, especially where languages, traditions, etc. are different and may be organized and curated in different ways?
    - How should these different forms of knowledge like this be encoded in an overarching interoperable OAR framework?