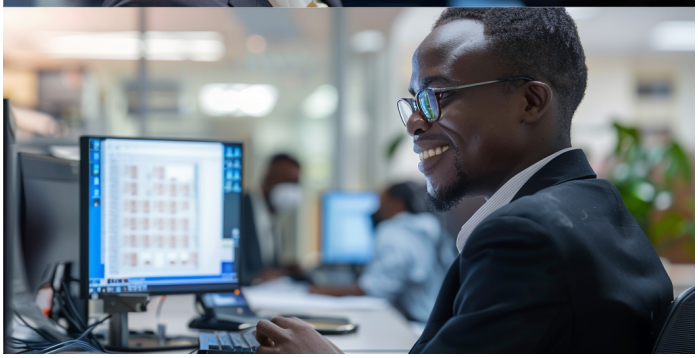
Zambia Evaluation and Research Repository

Needs Assessment



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I. Executive Summary

The Ministry of Finance and National Planning (supported by UNICEF) has commissioned a project to establish a Zambia Research and Evaluation Repository (ZaRR). The main goal is to establish an internationally compliant national research repository that houses coordinated research products for social, economic, scientific, and technological development. A needs assessment was to be conducted as part of the project.

This needs assessment report provides the necessary information and details to facilitate the effective holistic implementation of the ZaRR.

The assessment includes 22 stakeholders and their needs and ability to play a central or contributory role in a ZaRR. The selected methodology was to conduct a qualitative assessment using a desk review, key-informant interviews (KIIs), and a focus group discussion(FGD). The interviews were conducted in early April, and the report was drafted in April-May 2024.

Currently, there are three organizations that host a fully functioning research repository in Zambia: the University of Zambia – Library (UNZA), the Jesuit Centre for Theological Reflection (JCTR); and National Institute for Scientific and Industrial Research (NISIR). There are also three institutions that are at different stages of establishing their own repositories: The National Health Research Authority (NHRA); The Examinations Council of Zambia (ECZ); and Zambia Statistics Agency (ZamStats).

There are also institutions that have a strong infrastructure for the purpose of the repository, and two were referred to in many of the KIIs//FGD. **The Zambia Research and Education Network (**ZAMREN) is privately funded and has extensive ICT infrastructure that could potentially support a research repository. **Smart Zambia** is a government initiative aimed at harnessing information and communication technologies (ICTs) to enhance public service delivery, promote digital transformation, and improve efficiency in government operations.

The institutions included in the assessment specified a number of needs to be addressed in implementing the Zambia Research and Evaluation Repository. The specific needs varied depending on their existing infrastructure, mandate, functions, prior development work, administration and support, and legal and ethical compliance. These needs can be categorized as follows:

- Legal Framework (develop or amend an appropriate legal framework for ZaRR)
- Capacity Building and Institutional Strengthening (Human Capital; Infrastructure; Dissemination of existing laws, guidelines etc.)
- Digitization Assistance (transitioning from physical to digital formats)
- Financial Support (sustainable funding sources)
- Stakeholder Collaboration and Role Definition (roles and relationships)
- Development of Standard Operating Procedures and Guidelines (Creation of SOPs; Guidelines for Data Management; User Access and Security Protocols; Quality Assurance Mechanisms)
- Technology and Infrastructure Specifications (Hosting; Backup Procedures; Software Selection; Maintenance and Updates; Security Protocols)
- Definition of Repository Content and the Role of Administrative Data (types of outputs; Inclusion Criteria; Role of Administrative Data; Data Integration)

The Ministry of Finance and National Planning (MOFNP) is central to the development and implementation of the Zambia Research Repository (ZaRR). As the coordinating body, MOFNP is responsible for overseeing and managing ZaRR's implementation. While MOFNP can use the initial implementation model, it also has the flexibility to partner with existing

repositories or modify the model to enhance outcomes. The needs assessment report identifies partner strengths, allowing for refined partnership structures during implementation.

Implementation Modality:
MOFNP: Manages ZaRR, leveraging its funding capacity and overseeing the Technical Reference Group (TRG).
ZIPAR: Provides content management through its research structures.
ZAMREN or Smart Zambia: Advise on or supply the necessary infrastructure.

Significant ***synergies exist with institutions developing their own repositories***, allowing them to adopt ZaRR's standards and use it as a central repository for public content exchange, while restricting sensitive data to internal use. A joint governance document should be developed to detail partnership issues, ensuring sustainability and guiding stakeholders in fulfilling their roles.

ZaRR's ***implementation will be carried out by Fjelltopp,*** an international consulting firm funded by UNICEF, with technical steps and coordination mechanisms outlined in the needs assessment report. Key elements include:

TRG: Coordinates inputs and participation from national stakeholders.

Operational Group: Includes MOFNP, technical leads from existing/planned repositories (e.g., UNZA, ZAMSTATS), and Fjelltopp, providing day-to-day support to MOFNP.

MOFNP will ensure the creation of governance and other necessary documents, some of which are included in the Fjelltopp contract, to facilitate effective implementation. Progress will be monitored through TRG updates, and success will be measured by ZaRR's usage statistics.

Securing operational financing for ZaRR's first three years is crucial. The needs assessment did not include international partner interviews or indicate available national funding. Demonstrating ZaRR's utility in the first phase will help secure funding from local donors and government budget allocations, which MOFNP can best assess.

With strong national and international partnerships and MOFNP's leadership, ZaRR has a high potential for success, positioning itself as a key reference point for cross-sectoral innovation and development, and serving as a model for others.

II. Introduction

A. Establishing the Zambia Evaluation and Research Repository

In 2022 the Ministry of Finance and National Planning (supported by UNICEF) hosted a 5-day preparatory workshop, which triggered a process to establish a Zambia Evaluation and Research Repository (ZaRR) (1). The meeting set clear goals for a repository. All stakeholders agreed that the main goal was to establish an internationally compliant national research repository that houses coordinated research products for social, economic, scientific, and technological development. Overall, this will strengthen national data and information systems to:

a. Build capacities in research data management, analysis, and dissemination of research products to improve evidence-based decision-making by 2026;
b. Promote the use of evidence in policymaking through existing information management systems by 2026.

In December of 2023, UNICEF contracted Fjelltopp to implement the ZaRR using open-source software called CKAN, which was compliant with Zambia's requirements (as defined in the project implementation plan of 2022(2)). A full needs assessment was to be conducted as part of the project.

This needs assessment report thus provides the necessary information and details to facilitate the effective holistic implementation of the Zambia Evaluation and Research Repository.

B. The objectives of the needs assessment

In the ZaRR implementation plan in 2022 (2), the following overall objectives were set for the needs assessment:

- …take stock of existing institutional repositories of national interest, noting which require additional support to digitise;
- …take stock of legal frameworks regarding access to information and institutional policies on what is shared and how;
- …document the needs and institutional requirements of a national repository;
- …document existing skills in the national research ecosystem as determined by key stakeholders.

C. Lessons learned and recommendations from existing research repositories

The Zambia Research Portal workshop (2022) included many presentations from national and international institutions that have experience in research repositories(1). Similarly, the Electronic Information for Libraries (EiFL)(3) and Confederation of Open Access Repositories (COAR)(4) have documented many lessons learned and recommendations that are important to note and can further inform and guide this needs assessment. A repository survey was conducted in Europe in 2023(5), which also documented and exposed a number of important areas where the current repository landscape could be strengthened.

Drawing on all these sources, we can summarise some key **lessons learned** which are relevant to the Zambian context:

1. **Stakeholder engagement** is crucial for the success of a national research repository. It is important to involve all relevant stakeholders, such as researchers,

research institutions, funding bodies, and publishers, in the design and implementation process.

2. **Sustainability** is a key consideration when developing a national research repository. Adequate **funding, technical support, and governance structures** are necessary to ensure its long-term viability.

3. **Interoperability with other systems and platforms** is important to maximise the research repository's impact and reach. Compatibility with existing research infrastructure, such as institutional repositories and academic search engines, can enhance the repository's visibility and accessibility.

4. **Data management and quality control** are essential for maintaining the repository's integrity and credibility. Robust metadata standards, data curation processes, and quality assurance mechanisms are necessary to ensure that the research outputs stored in the repository are accurate and reliable.

5. **Open access policies and licensing agreements** can help facilitate the sharing and reuse of research outputs stored in the repository. By implementing open access principles, national research repositories can promote collaboration, innovation, and knowledge dissemination among the research community.

The lessons learned can be turned into concrete **recommendations** (drawing on the above literature) for implementing national research repositories:

1. **Developing a clear governance structure** with defined roles and responsibilities for managing the repository.

2. **Establishing partnerships** with key stakeholders, such as universities, research institutions, government agencies, and funding bodies, to support the development and operation of the repository.

3. **Investing in technical infrastructure**, including storage capacity, data management systems, and user interfaces, to ensure the effective storage and retrieval of research outputs.

4. **Implementing data management and quality control processes** to maintain the accuracy and reliability of the research outputs stored in the repository.

5. **Promoting open access policies and licensing agreements** to facilitate the sharing and reuse of research outputs stored in the repository.

6. **Monitoring and evaluating the impact and usage** of the repository to identify areas for improvement and ensure its long-term sustainability.

The tasks in managing a research repository were listed in the initial workshop documentation, and can be further elaborated on using the COAR web-site guidance materials[1] (reference 4).

[1] Confederation of Open Access Repositories, https://coar-repositories.org/

In conducting such an analysis it is important to note that operating a research repository requires **a) the technical ability to manage/govern the platform and related processes** to sustain the repository, as well as b) **the systems setup,** i.e. the technology and hardware to operate it.

D. Managing a research repository

Managing a research repository involves various tasks and responsibilities to ensure that the repository operates effectively, provides value to users, and maintains the integrity and accessibility of research outputs. Using the COAR-guidance materials, these responsibilities can be further expanded as follows:

- **Content Acquisition:** Acquiring research outputs such as articles, reports, datasets, and other scholarly materials from researchers, academic institutions, funding bodies, and other contributors.
- **Metadata Creation and Enhancement:** Creating descriptive metadata for each item in the repository to facilitate search, discovery, and retrieval. This includes metadata elements such as titles, authors, abstracts, keywords, publication dates, and subject classifications.
- **Quality Control and Curation:** Ensuring the quality and relevance of content through peer review, editorial oversight, and curation processes. This may involve screening submissions for compliance with repository policies, formatting standards, and ethical guidelines.
- **Digital Preservation:** Implementing strategies and technologies to preserve and maintain the long-term integrity and accessibility of digital content stored in the repository. This includes backup and redundancy measures, file format migration, and periodic integrity checks.
- **Access Control and Security:** Managing access permissions and security settings to control who can view, download, and modify content in the repository. This may involve implementing user authentication mechanisms, access levels, and usage policies to protect sensitive or copyrighted materials.
- **User Support and Training:** Providing assistance and training to repository users, including researchers, students, librarians, and other stakeholders. This may involve offering user guides, tutorials, workshops, and helpdesk support to facilitate effective use of the repository.
- **Promotion and Outreach:** Promoting the repository to increase visibility, usage, and contributions. This may involve marketing activities such as website optimization, social media engagement, email newsletters, and collaboration with relevant communities and organisations.
- **Metrics and Evaluation:** Monitoring and evaluating the performance and impact of the repository through usage statistics, citation analysis, user feedback, and other metrics. This information can inform decision-making and continuous improvement efforts.
- **Policy Development and Compliance:** Developing and implementing policies and procedures governing the operation of the repository, including copyright policies, data management policies, and preservation policies. Ensuring compliance with legal and regulatory requirements, as well as industry standards and best practices.
- **Interoperability and Integration:** Enhancing interoperability and integration with other systems, platforms, and services to facilitate seamless access and sharing of research

outputs. This may involve adopting standard protocols, metadata schemas, and interoperability frameworks.

- **Collaboration and Networking:** Collaborating with other repositories, academic institutions, research organisations, and stakeholders to share resources, expertise, and best practices. Building networks and partnerships to support interoperability, resource sharing, and collaborative initiatives.
- **Continuous Improvement and Innovation:** Continuously monitoring developments in repository technologies, scholarly communication practices, and user needs. Identifying opportunities for innovation, enhancement, and adaptation to ensure that the repository remains relevant and effective in serving the evolving needs of the research community.

It is acknowledged that the scope of this assessment does not allow an institutional assessment of all the stakeholders using each of these criteria and a measurement matrix. Therefore the chosen methodology has been a qualitative assessment using key informant interviews/focus group discussion, which enables identifying the needs of the institutions for a research repository, as well as helps in identifying the institutions which have different strengths in managing and contributing to it.

E. Limitations of the assessment

This assessment includes 22 stakeholders and their needs and ability to play a central or contributory role in a Zambian evaluation and research repository. Due to time and resource constraints, the most purposeful methodology was to conduct a qualitative assessment, using a desk review, key-informant interviews (KIIs) and a focus group discussion(FGD). Therefore the assessment could not be conducted as a matrix type of assessment, with a numeric rating of each institution on their ability to perform the tasks laid out for managing a repository. The lack of numeric ratings against each required dimension can be considered as a limitation. However, the qualitative approach enriched the assessment, enabling hearing the views of each institution on the broader landscape and how they positioned themselves on it.

We acknowledge a set of other factors that may have affected the interpretability and generalisability of the results of this assessment, notably:

1. **Timing:** Despite the broad set of stakeholders, the interviews and discussions had to be conducted in early April over a short period of time. This may have affected and limited the participation of some key informants (staff with expert knowledge of research repositories).
2. **Sample size:** The number of key informants and participants in KIIs and FGD had to be limited, which could have affected the overall generalizability of some findings in the broader context.
3. **Bias and subjectivity:** Key informants and participants may have provided biased or subjective information based on their own experiences and perspectives, which could potentially skew the assessment's results.
4. **Depth:** Due to time constraints and the structure of interviews and the focus group discussion, the depth of some information may at times be limited, affecting the interpretation of some of the underlying issues. Some of the detailed technical questions listed in the interview guides were not answered by the interviewees and are better placed in the SOPs for the technical staff in question.
5. **Participant diversity:** The key informants and participants in the focus group discussion may not represent the full range of perspectives or experiences of each

institution on the research repositories. This may have affected the breadth of insights collected.

6. **Lack of control over information:** Key informants and participants may have withheld or provided incomplete information during interviews and discussions, leading to gaps in the assessment and reporting.

The above limitations have been noted to be critical in generalising all the findings and conclusions. However, acknowledging these potential limitations does not remove the value of the needs assessment. The needs assessment utilises prior documentation on the research repositories, the Zambian contextual references, and findings, and makes recommendations to facilitate next steps.

The oversight body (currently a technical advisory group) in charge of implementing the repository can address potential limitations through continuous self-assessment, be reflective and, when required, use course correction for successful and sustainable impact.

III. Methodology

A. Data collection methods

The Zambia Evaluation and Research Repository needs assessment study was conducted using multiple methods: a desk review, key informant interviews (KIIs), and a focus group discussion (FGD). The Technical Reference Group considered and agreed upon this. It also made inputs to the discussion guides for the KIIs and the FGD. The KIIs covered 19 institutions, and the FGD was attended by 3 (MTS declined).

KIIs	FGD
The National Health Research Authority (NHRA) The Policy Monitoring and Research Centre(PMRC) The Zambia Institute of Policy and Research (ZIPAR) The University of Zambia – Library The Zambia Research and Education Network (ZAMREN) The National Health Insurance Management Authority (NHIMA) The Institute for Economic and Social Research (INESOR) The Jesuit Centre for Theological Reflection(JCTR) Ministry of Community Development National Institute for Scientific and Industrial Research (NISIR) Southern African Institute for Policy and Research (SAIPAR) The Zambia Agriculture Research Institute (ZARI) Ministry of Agriculture The Examinations Council of Zambia (ECZ) Ministry of Health Ministry of Education Ministry of Technology and Science Indaba Agricultural Policy Research Institute (IAPRI) Zambia Academy of Sciences	Ministry of Finance and National Planning The Smart Zambia Institute Zambia Statistics Agency (ZamStats) Ministry of Technology and Science

1. Desk Review: The desk review was initiated in January 2024 and continued until the finalisation of the needs assessment. It consisted of a thorough review of existing

literature, reports, documents, and other relevant sources related to the research repository. This has helped in understanding the current landscape, identifying gaps in existing research repositories and initiatives, and informing the subsequent data collection. The documentation has included academic journals, government publications, other articles, and public web-sites to compile relevant information for the desk review.

2. Key Informant Interviews: The selection of institutions to the key informant interviews (KIIs) was based on the recommendations of the Technical Reference Group. KIIs included 19 institutions and were conducted from 26.3.2024 to 11.4.2024, each lasting about 1 hour. The KIIs were one-on-one interviews with individuals selected by their institution. The interviews were semi-structured, allowing for a flexible conversation that delved into the key issues and different perspectives related to research and knowledge management. An interview guide was developed in close collaboration with ZaRR Technical Reference Group . Notes from the interviews were shared afterward with the interviewees for validation.

3. Focus Group Discussion: One focus group discussion was organised with 4 agencies (of which one declined) whose work is highly relevant to the research repository (Ministry of Finance and National Planning, The Smart Zambia Institute, Zambia Statistics Agency). The invitees were selected on the recommendation of the Technical Reference Group. The focus group allowed for an interactive and in-depth conversation among participants, enabling the exploration of different viewpoints and collective insights. Similarly to KIIs, a discussion guide with key questions and prompts was used to ensure that important topics were covered. A moderator facilitated the conversation, encouraging participation from all group members and ensuring that diverse perspectives were heard.

Overall, this mixed-method approach incorporating desk review, key informant interviews, and a focus group discussion has provided an adequate understanding of the research landscape, uncovered diverse perspectives, and generated a good qualitative understanding for analysis and interpretation.

B. Analytical framework

This needs assessment produces an organisational and landscape analysis, which will lead to the establishment of the Zambia Evaluation and Research Repository.

The analytical framework consists of the analysis and the recommendations structured as follows:

1. The desk review, key informant	**Goals and objectives** of the national research and evaluation repository; Using inputs of the national key constituents

interviews, and focus group discussion contribute to the **overall analysis of the repository.**	**Assessment** of - the current administrative and data landscape (including elements of ADaMM) - key stakeholders and their data and knowledge management needs
	Adaptation of the repository as a knowledge management system to meet these needs

2. The analysis and its findings **inform the recommendations for defining, establishing, and sustaining a repository.**	**Governance structure**; recommended potential candidates who can host the national research repository and the roles and responsibilities of key stakeholders
	Terms and conditions of use (who can deposit, copyright considerations, and access levels)
	Based on findings and best practice, recommend a **research management plan that builds on local institutional repositories, with recommendations for staffing and budget**
	Identify **staffing requirements** for the repository and identify **responsible institutions**
	Type of **content** (what can be deposited, metadata convention, data file formats, structure, and hierarchy for storing and presenting files) *a. access and reuse (access, use, and re-use of data objects and metadata; b. removal (procedure for removing or withdrawing content, procedure for copyright violation); c. longevity (versions, replicas, and retention period); d. data security and privacy; e. technology and infrastructure.*

C. Use of knowledge management concept

Addressing knowledge management needs is part of this assessment and landscape analysis. In one of the foundational papers, Karl M. Wiiged defined knowledge management as "the systematic process of finding, selecting, organising, distilling and presenting information in a way that improves an employee's comprehension in a specific area of interest" (1993).

In the Zambia Research and Evaluation Repository context, knowledge management is considered as a multifaceted organisational attempt to collect, organise, share, and analyse information in a way that improves efficiency and decision-making. As in many countries, the

public sector has been actively working to integrate knowledge management practices into their operations to ensure that valuable knowledge is not lost and is used effectively.

When reviewing the 2022 research repository workshop document (1), the following issues surfaced and outline the general approaches and challenges in implementing knowledge management in the Zambian setting:

1. Policy Development: Zambia has been working toward developing policies that encourage the systematic management of knowledge. Such policies are designed to ensure that important information is captured and made accessible to all relevant parties (ZIPAR, Ministry of education, academic and research institutions).

2. Technology Integration: Information Communication Technologies (ICT) play an important role in knowledge management. Government institutions may use various platforms such as intranets, databases, and collaborative tools to aid in the storage and sharing of information.

3. Capacity Building: Training and capacity building are crucial for knowledge management. Zambia's institutions often focus on developing the skills of their employees to manage and use knowledge assets effectively.

4. Information Sharing Culture: Cultivating a culture that promotes knowledge sharing can be challenging as it involves altering long standing institutional habits and norms. Initiatives aim to encourage knowledge sharing among employees and departments.

5. Challenges: Despite efforts, challenges such as a lack of resources, limited technical expertise, infrastructure gaps, and resistance to change impede the effective implementation of knowledge management practices.

6. Local and International Cooperation: Collaborations with local and international bodies can help in the exchange of best practices and the application of knowledge management strategies. Zambia is a member of several international bodies where knowledge exchange is a key component.

These observations have been used in this needs assessment and are considered as part of the discussion on needs and knowledge management.

D. Stakeholder engagement process

The ZaRR stakeholders were initially defined in the preparatory phase in 2022 and have continued to be engaged through their participation in the Technical Advisory Group. 22 institutions were involved in the KIIs/FGD and have contributed with their views and suggestions in implementing the ZaRR.

The Technical Reference Group will remain as the core group for sharing updates on progress and ensuring further inputs from the key institutions. Once the repository is live, regular user statistics data will be made available, and online surveys can be conducted to get user perspectives and feedback to guide the next steps. This will ensure continuous stakeholder inputs from both the governing bodies as well as the end users of the repository.

E. Validation of needs

The needs of the different stakeholders have been documented in the desk review, the KIIs, and the FDG. After the KIIs and FGD, the reports have been shared with the participants to validate their views.
The needs assessment report includes analysis and conclusions of the views. Once drafted, the needs assessment report will be shared with the constituents to offer another opportunity to voice their views and validate or amend the report's findings.

IV. Analysis of current Research Repositories and stakeholder views on ZaRR

In this chapter we assess the views and information from the stakeholders, contributing to the first part of the analytical framework: overall analysis of the repository.

A. Purpose of the Repository

The respondents shared their views on the goals and objectives of the ZaRR in the initial workshop in 2022:
…the goal of the repository is to establish an internationally compliant national research repository that houses coordinated research products for social, economic, scientific, and technological development. Overall, this will strengthen national data and information systems and will:
a. Build capacities in research data management, analysis, and dissemination of research products to improve evidence-based decision-making by 2026;
b. Promote the use of evidence in policymaking through existing information management systems by 2026…

In addition, the KIIs/FGD brought up views of the needs of the key institutions that closely relates to how the repository can match its purpose: ***The repository is to ensure broad access and interoperability, facilitate efficient data provision, consolidate and disseminate data from various institutions, and enhance research accessibility and utilisation across Zambia***. It is important to **promote easy interoperability** with other solutions and facilitate **in-house capacity building** and **knowledge transfer** for effective management and development of the repository. The repository is also intended to act as a **backup for important information** in case of security breaches or technological failures.

B. Existing infrastructure and resources

Five (5) stakeholders stated that they have an existing repository, namely

- The Zambia Institute of Policy and Research (ZIPAR) (can only be considered partial repository considering the content and functionality)
- **The University of Zambia – Library (UNZA)**
- **The Jesuit Centre for Theological Reflection (JCTR)**
- **National Institute for Scientific and Industrial Research (NISIR)**
- The Zambia Agriculture Research Authority (ZARI) (functionality more of a research tracking tool rather than a complete functional repository)

Only three of the above (**in bold**) can be considered having a repository that matches the definition used in this needs assessment.

Three (3) institutions shared that they are at different stages of establishing their own repositories, including:

- The National Health Research Authority (NHRA)
- The Examinations Council of Zambia (ECZ)
- Zambia Statistics Agency (ZamStats)

The other institutions (14) included in this assessment responded that they are not developing a repository. Some stated that they might also want to have their own repository, feeding into the national one, if it would be resourced (i.e. Ministry of Education, PMRC). The Institute for Economic and Social Research (INESOR) shares all its research on the UNZA repository platform without having its own repository.

There are few institutions that have a strong infrastructure to offer for the purpose of the repository, and these were referred to in many of the KIIs//FGD. Even with the existing infrastructure, there may be areas that would require additional resourcing to serve the purpose of a national research repository. These include (in no particular order):

1. **The Zambia Research and Education Network (**ZAMREN): is privately funded and has extensive ICT infrastructure that could potentially support a research repository. Its objectives include securing cost-effective broadband connectivity for its member institutions, sharing educational and research resources through its dedicated infrastructure, and providing advanced ICT services, including in places without broadband internet.
2. **University of Zambia** (UNZA): UNZA is the country's oldest and largest university, with established research capabilities. The institution **has the infrastructure to evolve into a national research repository, such as library services and digital platforms**. However, it was also noted that the infrastructure would need to be enhanced and invested into for it to be able to provide sustained quality access to the repository.
3. **Smart Zambia**: as a government initiative, it is aimed at harnessing information and communication technologies (ICTs) to enhance public service delivery, promote digital transformation, and improve efficiency in government operations. Its services are designed to leverage ICTs for sustainable development, governance improvement, and digital transformation in Zambia. While it does not have a repository itself, it can be **a technical partner** to an institution that would operate the technical content of the repository.
4. **The Zambia Statistics Agency** (Zamstats): has the potential to operate a national research repository that could serve as a centralised platform for storing and accessing research data and reports related to statistics and socio-economic indicators in Zambia.

C. Current Policies and Procedures

Zambia has established specific acts that directly impact how a national research repository will be governed. Those include the Access to Information Act, Data Protection Act, and

Cyber Security and Cyber Crimes Act. These three separate pieces of legislation work together to promote transparency, safeguard personal data, and protect against cyber threats in Zambia and are highly relevant to the repository and its governance.

- **Access to Information Act (2023):** This legislation provides citizens with the right to access information held by public bodies, thereby promoting transparency and accountability in government operations. It ensures that individuals can request and obtain information about government decisions, policies, and actions. It provides a basis for the different stakeholders to commit to sharing their information products through the ZaRR.

- **Data Protection Act (2021):** The Data Protection Act establishes rules and regulations for how personal data should be collected, processed, stored, and transferred. It aims to protect individuals' privacy and prevent unauthorised access or misuse of personal data by organisations and individuals. This will affect the governance decisions on what data is included in the ZaRR and how it should be processed in order to be compliant with the requirements of the Data Protection Act.

- **Cyber Security and Cyber Crimes Act (2021):** This legislation focuses on combating cyber threats, such as hacking, malware, phishing, and other cybercrimes. It outlines measures to strengthen the country's cybersecurity framework, prevent cyberattacks, and prosecute offenders who engage in illegal activities online. This affects the technical setup of the ZaRR and how it should be maintained to ensure its secure operation over time.

Together, these laws create a comprehensive legal framework that governs access to information, protects personal data, and enhances cybersecurity in Zambia. They aim to promote a secure and transparent digital environment that upholds individuals' rights and safeguards against potential cyber threats by working in conjunction.

More specifically, they have various impacts on the work of public institutions and their work:

1. **Data Protection and Privacy:** Cyber security law includes provisions for data protection and privacy. Public institutions, which handle sensitive citizen data, are required to comply with these regulations. They need to implement measures to secure personal information, such as encryption, access controls, and regular security audits.

2. **Cybercrime Prevention and Prosecution:** Cyber security law includes provisions to combat cybercrime, such as hacking, identity theft, and fraud. Public institutions may collaborate with law enforcement agencies to investigate cybercrime cases and prosecute offenders. Additionally, they may need to educate employees about cyber threats and enforce policies to prevent unauthorised access to systems and data.

3. **Regulatory Compliance:** Public institutions are subject to regulatory compliance requirements outlined in cyber security law. They must ensure that their cyber security practices align with legal mandates and industry standards. Compliance may involve regular assessments, audits, and reporting to demonstrate adherence to cyber security regulations.

4. **Capacity Building and Collaboration:** Cyber security laws make reference to capacity building and collaboration among public institutions, private sector entities, academia, and civil society organisations. Public institutions may participate in training programs,

information-sharing initiatives, and public-private partnerships to enhance cybersecurity capabilities and address shared challenges.

Overall, Zambia's cyber security laws are structured to create a legal framework that promotes cyber resilience, safeguards citizen data, and fosters collaboration across sectors.

Key observations:

In the KIIs/FGD most of the interviewees acknowledged and are aware of the laws and policies and the regulatory environment. In the COAR lessons learned and recommendations (page 6) one of the key sustainability considerations was to establish and document clear governance practices utilising existing institutional and legal context. In the process of establishing the Zambia Research and Evaluation Repository, developing a ***governance document*** and a ***memorandum of understanding*** among the stakeholders will need to make reference to the legal environment and institutional positioning, which is dependent on final decisions to be taken on the institutional roles, responsibilities and the setup.

In the assessment, the only institution which was clearly stated to have a regulatory role was the National Health Research Authority (NHRA). Considering its role and extensive prior experience and technical knowledge, it has the potential to serve an institutional advisory role in the governance structures of the ZaRR.

D. Technical Capabilities

As part of the assessment, the different stakeholders were interviewed on their technical capabilities, such as those related to data management, accessibility (sustained connectivity), metadata standards, data storage, collaboration and partnerships, user training and support, monitoring and evaluation, and sustainability (funding and governance). In this assessment, the focus will be on identifying institutions that have the ability to play a central role in managing the ZaRR (governing it and administering the content) as well as a contributory role, using its comparative advantage(s).

The institutions considered in this assessment can be categorised into five (5) groups:

1. Government entities: Institutions directly affiliated with government ministries, operating under their oversight and authority.
2. Statutory bodies and government departments: Entities closely associated with ministries or mandated to support their functions, albeit with some degree of independence in operations.
3. Academia: Entities that operate independently with their focus on education and research, with some governmental influence related to funding, with distinct missions and objectives guided by their organisational charters.
4. Civil society organisations: Organisations with specific mandates serving civil society initiatives, often acting cross-sectorally.
5. Private sector entities: institutions defined as private sector entities receiving funding from varied sources.

This categorization has been used as the basis in the following illustration, showing the distance/closeness to a specific institution (such as those to the Ministry of Health) and those serving many governmental institutions (e.g. UNZA, ZAMSTATS, SmartZambia). Those with an existing research repository are marked in red, and those currently developing

a repository are in green. This illustration is not accurate in establishing all linkages between institutions but serves as a mind-map in understanding the landscape of different institutions (22) considered in the needs assessment.

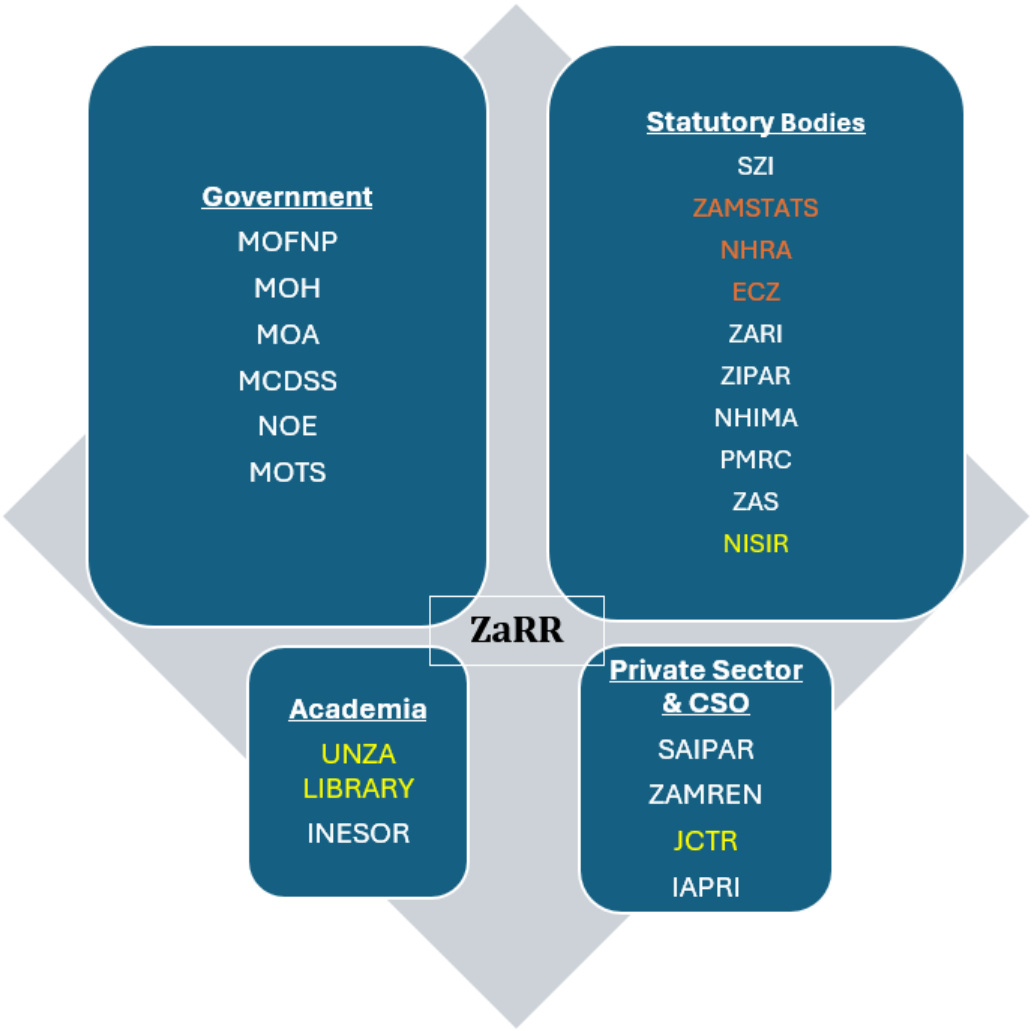

Figure 1: Different institutions with existing repositories (in red), repositories in progress (green), and all other national institutions partnering in the ZaRR.

The following is a summary of the different stakeholder institutions' current technical capabilities and potential, using the above groupings.

Government:

1. The **Ministry of Finance and National Planning (MOFNP)** has a coordinating role in facilitating training for evaluators and researchers within government institutions. While it does not conduct research directly, it funds two institutions to conduct research on its behalf: the Policy Monitoring and Research Centre (PMRC) and the Zambia Institute for Policy Analysis and Research (ZIPAR). The ministry also has an Evaluation and Research Unit within its Monitoring and Evaluation Department, staffed by two officers. However, there are concerns about the ministry's current

capacity to manage a research and evaluation repository effectively, given its current setup, which would need strengthening(such as establishing a dedicated unit and hiring specialist staff dedicated to the research repository). A lack of an underlying legal framework for such a national repository under the ministry is a key concern to the other stakeholders interviewed. However, there may be an opportunity to review this as a provision in the National Planning and Budgeting Act under revision. ***Strengths: financing, coordination.***

2. The **Ministry of Education** conducts research internally and also commissions research from external partners. The Research Coordinating Committee is responsible for coordinating the ministry's internal research activities and ensuring that research findings are shared among partners. The ministry's website is managed through SmartZambia, and they can access reports from the Examination Council of Zambia upon request. However, most of the ministry's research is driven by partners, and securing funding for internally commissioned research can be challenging. ***Strengths: education sector research.***

3. **The Ministry of Health's** ICT function supports service delivery by implementing platforms aligned with its digital health strategy, which uses technology to address healthcare challenges through improved data management, storage, and visualisation, enhancing the efficiency and effectiveness of healthcare services. It has a data warehouse, a team of approximately 19-20 staff members at the head office, and 60-70 staff members distributed across the country. It has funding from various sources, including the U.S. government, the World Bank, and the Ministry of Health itself. They also have a partnership with the National Health Research Authority for managing and overseeing health-related research. They have an ICT function that facilitates the platform for systems that support service delivery, and they also have a digital health technical working group that oversees data management practices in the health sector. They use data quality procedures and have a forthcoming system to track research conducted through the ministry. ***Strengths: strong health information system infrastructure and staffing, ICT functions and capacity for the health sector, and health sector research linkages.***

4. The **Ministry of Technology and Science** (**MoTS**) has a research strategy that is currently under review. They do not operate a research repository. The ministry does not require researchers to obtain ethics approval directly from them but rather leaves all such procedures to organisations they fund, such as NISIR and NSTC[2](see the details of NISIR in point 21, p.24). They have a small staff in their Evaluation and Research Unit and do not have a central repository for evaluation reports. The ministry follows guidelines set by the Smart Zambia Institute and operates under the regulations of the Planning and Budgeting Act. They also work with the Smart

[2] National Science and Technology Council (NSTC) serves as a regulatory body that oversees the development and implementation of science and technology policies in Zambia. One of its key roles is to ensure that research proposals, especially those involving human and animal subjects, comply with ethical guidelines. The NSTC works closely with institutional review boards and ethics committees to review and approve research protocols, ensuring they meet ethical standards before any research is conducted. The council also provides guidance and frameworks for ethical research practices across the country (UNIDO Hub).

Zambia Institute to coordinate technology and procure software licenses. MoTS is a major funder of research through NISIR and the NSTC, which are the main bodies through which these funds are channeled, as well as research oversight and activities are carried out. It also carries out such research through TEVET institutions that it supports. **Strengths: major research funder, coordinates research in technology and science**

5. The **Ministry of Community Development and Social Services (MCDSS)** has various programs in operation, such as the Social Cash Transfer Program, the Food Security Pack, the Saving Women's Livelihoods Program, and the 1000 Days Program, which provides support to the most vulnerable in society. The implementation of these programs depends on the availability of funding from donors. The ministry also has an M&E department and an IT department, which are sometimes involved in managing data for evaluations done for programs. However, there is no central repository for these evaluation reports at the ministry. The ministry also relies on various meetings and forums for the dissemination of research, as there is no online research repository. In the recent past, the ministry has conducted research on topics such as continuity of learning during the COVID-19 pandemic, community development fund expenditure, free education policy implementation, and school fees. ***Strengths: research and evaluation of social protection programmes***

6. **The Ministry of Agriculture** in Zambia has a wealth of agricultural research data, reports, and publications generated by the ministry and its affiliated research institutions. The ministry also has access to a network of experts, researchers, and scientists contributing to its research activities. MoA's primary focus is in research and policymaking in the agricultural sector.The Ministry manages its data through the Zambia Integrated Agricultural Management Information System (ZIAMIS), implemented to support various departmental functions, especially within the Monitoring & Development (M&D) function. ZIAMIS is pivotal for the administration of the Farmer Input Support Program (FISP), particularly through its Farmers Module, which registers and aids vulnerable farmers based on specific eligibility criteria. The system, operational since 2017, is primarily used at the community level where extension officers gather data. This data is then digitized at the district level, progressively moving up to the national level, ensuring a structured data flow. Although ZIAMIS is effective in managing input distribution, it does not currently monitor the outcomes of the support, such as agricultural yields, highlighting a gap in tracking the effectiveness of the program. Additionally, the Ministry is developing a new Marketing Information System to enhance monitoring and evaluation capabilities within the Agri-Business & Marketing Department. This system aims to track marketing information and is still in the preliminary stages with a consultant engaged to assist in its development. ***Strengths: data related to the agricultural sector***

Statutory bodies:

7. **Smart Zambia Institute (SZI),** also known as the Electronic Government (e-Gov) Division, is under the Office of the President and plays a critical role in managing and promoting electronic government services and processes. This division is tasked with facilitating access to e-government services to enhance service delivery, thereby improving citizen access to government services. It coordinates e-government and

information and communication technology matters across public bodies. The division's operations are governed by the Electronic Government Act No. 41 of 2021, which was signed into law by the President of the Republic of Zambia, His Excellency Mr. Hakainde Hichilema, on January 7, 2022. This act specifically supports the improvement of service delivery through access to electronic government services.

The division's responsibilities include disseminating research through their institutional website and SharePoint platform, ensuring the optimal placement of digital technologies to enhance the efficiency and accessibility of public sector services, and developing a national data archive in collaboration with ZAMSTATS. The Smart Zambia Institute ensures adherence to the Data Protection Act and the E-Governance Act, managing contracts and overseeing technology deployment within government sectors to avoid duplication of systems and to encourage system sharing. The institute also promotes the use of open-source software and oversees the development of systems to ensure compatibility and communication between them. Additionally, the institute operates a data centre that centralises hosting for public institution websites, emails, and other digital services, facilitating the digital operations of various government bodies.

SZI has a small team of developers who coordinate system development for public sector entities. They also regulate the distribution of systems and centrally purchase software licenses. They advocate for the use of open-source software and facilitate the integration of developing systems. They also utilise cloud services for non-sensitive data and host a data centre for various government bodies.In collaboration with ZAMSTATS, the institute is developing a national data archive for public use, emphasizing adherence to the Data Protection Act in coordination with the Office of the Data Protection Commissioner. ***Strengths: coordination of internet connectivity in public spaces, e-government services, capacity building and digital inclusion, policy and strategy leadership.***

8. **Zambia Statistics Agency (ZAMSTATS)** is a statutory body formed through the Statistics Act of 2018 and is responsible for collecting, compiling, analysing, and publishing statistical information from surveys and censuses. They also compile administrative data from line ministries. ZAMSTATS sets standards for the production and authentication of statistics and provides guidance on unofficial statistics. They publish statistical reports on their website and share entire datasets for surveys. ZAMSTATS is collaborating with Smart Zambia Institute to develop a national data archive and is planning a national repository for administrative data in collaboration with SZI with funding from the World Bank. At the time of this assessment a workshop was being held to work out the operational details of this repository and thus not much more information could be given as it was still work in progress. Concerns about legal frameworks and capacity have been raised, but ZAMSTATS is considered well-positioned to manage a national research repository. Quality measures, including reliability, replicability, completeness, and timeliness, are emphasised. ***Strengths: legal framework largely in place, data management, metadata and quality standards, developing a repository.***

9. The **National Health Research Authority (NHRA**) is a statutory body under the Ministry of Health, formed by Act No. 2 of 2013, which outlines the framework for the development, promotion, regulation, and training in health research. While regulation of health research is NHRA's main focus, it also emphasises promoting health research, setting research priorities, and establishing a trust fund for grants. NHRA is funded primarily by the government and has a trust fund that is awaiting official approval for disbursement. They manage the National Institute for Research Ethics Boards for ethics approvals. The National Institute for Research Ethics Boards (NIREB), which operates at the national level under NHRA, has the authority to delegate its functions of ethics approval to those ethics bodies registered with it. While NHRA has not yet established a data or research repository, it is in the process of approving two statutory instruments crucial for such development: the Central Repository Statutory Instrument and the Data Dissemination Statutory Instrument. The National Health Research Authority (NHRA) of Zambia possesses significant strengths in its foundational structure and operational focus, predominantly revolving around its stringent adherence to Good Clinical Practice (GCP) and research ethics principles. These principles, which are tailored to fit the Zambian context, are central to the NHRA's legislative framework and guide all its activities, emphasising compliance with international standards.

   NHRA has developed a range of statutory instruments that are essential for its function, enhancing its regulatory framework. Some of these instruments, such as those governing Biobank, Material Transfer, Regulation of Ethics, Clinical Trials, Data Dissemination, and Central Repository, have already been developed and approved. Others, including Trust Fund, Misconduct, Data Sharing, and Traditional Medicines, are awaiting approval at the Ministry of Justice.

   Further strengthening its capabilities, NHRA's development of these statutory instruments and guidelines has been supported significantly by grants from the European & Developing Countries Clinical Trials Partnership (EDCTP). This support has extended beyond document creation to include comprehensive training for NHRA staff in research ethics, GCP, and pharmacovigilance, with some personnel even receiving advanced training and diplomas from international institutions like the Vienna School of Clinical Research. This training ensures that NHRA personnel are not only well-versed in international research standards but are also proficient in applying these standards effectively within the Zambian healthcare and research environment. **Strengths: Strong regulation of health-related research, a strong foundation of SIs, and guidelines for its functioning.**

10. The resources of the **Examinations Council of Zambia (ECZ)** include a paper-based data collection system, a research repository hosted on a local server, a physical library, and a website hosted by ZAMREN. The Examinations Council of Zambia (ECZ) is enhancing its capacity as a knowledge-intensive organisation by developing a research repository, expected to launch in 2024. The repository is built on the DSpace platform, utilising the Dublin Core metadata framework, and will include features like RSS feed updates and journal access through RemoteX provided by the Zambia Library Consortium (ZALICO). The research repository is structured into different communities and contains various types of documents in

PDF format. Access to the repository is restricted, with some materials being publicly available and others requiring login credentials. The repository is primarily for the use of ECZ personnel but may be extended to other stakeholders in the future.
Strengths: technological integration and management in examinations, professional standards and ethical conduct in examinations, capacity building and staff development.

11. The **Zambia Agriculture Research Institute (ZARI)** is a pivotal department within the Ministry of Agriculture, and has been a cornerstone of agricultural research in Zambia since its establishment in 1956. ZARI's primary mission is to conduct public good research focused on soils and crops, encompassing the development of relevant technologies to achieve its research objectives. ZARI is organised into two main divisions: Research Services and Technical Services. The Technical Services Division includes four units: Crop Improvement and Agronomy, Soil and Water Management, Plant Protection, and Farming Systems and Social Sciences. These units are dedicated to generating research that is directly applicable and beneficial to community needs, particularly in the areas of soil and crop management. The Research Services Division oversees ten research stations distributed across nine provinces, facilitating a broad scope of agricultural research activities. ZARI also manages a gene bank, housing over 4,000 pieces of genetic material, and maintains between 200 and 300 live crops. Notably, some of ZARI's research outputs, especially new crop varieties, reach the commercial market through partnerships with private seed companies. These companies distribute the seeds to farmers under a non-exclusive licensing scheme, thereby extending the impact of ZARI's research.

    ZARI has cultivated a rich history of significant contributions to agricultural research, not only benefiting Zambia but also having regional and global implications. Its partners include major international and regional organisations such as USAID, GIZ, Crop Trust, CIMMYT, JICA, IITA, ICRISAT, IFDC, FAO, Alliance Bioversity International (CIAT), CABI, and AGRA, reflecting its extensive collaborative network and its role in advancing agricultural innovation and sustainability. The Research Services Division at the Zambia Agriculture Research Institute (ZARI) is responsible for managing the data generated from its research activities, primarily through the Central Services Unit, which utilises both electronic platforms and a physical library. The key electronic tool used is INFORM-R (Information for Research Managers), funded in 2000 by ISNA and operating on Microsoft DBase software. This platform is designed to track research projects from inception to completion but is underutilised due to the lack of a clear policy for information sharing and management, with access restricted to internal users and not functioning as a comprehensive research repository.

    ZARI faces challenges in data management due to the decentralised storage of research outputs on personal staff computers and the absence of a formal data-sharing policy, although it does have an intellectual property policy. This situation is complicated by high staff turnover, risking data loss. The institute's research outputs include crop varieties, peer-reviewed articles, conference papers, and scientific and technical reports, but much of this work does not reach peer-reviewed journals. ZARI

is also developing a comprehensive Zambia soil information system, expected to be completed by 2028, to enhance the usability and sharing of its extensive soil data. ***Strengths: extensive research network, agricultural productivity and sustainability, climate resilience initiatives.***

12. **The Zambia Institute of Policy and Research (ZIPAR)** partners with the government, UN agencies, and the World Bank. It has six research units reflecting its research focus: the Trade and Investment Unit, the Macroeconomics Unit, the Transport and Infrastructure Development Unit, the Energy Unit, the Public Finance Unit, and the Human Development Unit. It uses Kobo Collect for data collection, exports it to Excel, and conducts analyses within Excel as well as Stata. Although it has an open website for dissemination and plans for a podcast, the data remains for internal use only. ZIPAR also notes that as an organisation with significant research capacity and being under the Ministry of Finance and National Planning—the ministry initiating this project—they too would be well-positioned to host the repository. ***Strengths: research excellence, policy dialogue facilitation, capacity building, diverse research areas.***

13. The **National Health Insurance Management Authority (NHIMA)** is responsible for managing the National Health Insurance scheme in Zambia under the National Health Insurance Act No. 2 of 2018. They have a large biometric database and engage in evaluations and modeling for decision-making processes. Access to data is primarily for internal use, but researchers with ethical approval can request anonymized data. NHIMA is committed to expanding coverage and ensuring inclusivity in its services. They estimate that 20% of Zambia's population are members, but not all are accessing services. They follow data protection laws and have strict access rights and non-disclosure agreements in place to protect the privacy of their data. ***Strengths: comprehensive health coverage, governance and strategic planning, innovative health financing.***

14. The **Policy Monitoring and Research Centre (PMRC)** is primarily funded through a government grant provided by the Ministry of Finance. It also collaborates with other stakeholders, such as UN agencies and the World Bank, for specific projects. The organisation has two main units, the Research and Analysis Unit, and the Monitoring and Development Unit, led by a head and supported by senior researchers and researchers. PMRC also hires additional expertise as needed for research projects. The organisation lacks specific IT expertise and data protection measures but adheres to ethical guidelines in its research processes. They also have a partnership with the University of Zambia for ethical approval of certain studies. ***Strengths: Diverse Thematic Focus, Publications and Policy, Policy monitoring.***

15. The **Zambia Academy of Sciences** The Zambia Academy of Sciences (ZAS), established by an Act of Parliament in 2020 and operational approximately a year ago, serves as a unique entity rather than a typical research institution. It functions as a collaborative assembly of distinguished professionals from diverse fields such as medicine, engineering, natural sciences, law, and social sciences. ZAS leverages both local and international data to guide government and other entities on policy directions, emphasising interdisciplinary approaches to address a wide range of

issues. ZAS's research endeavours include significant projects like studying the impacts of climate change on agriculture in partnership with the African Union and other international bodies. This reflects its role in tackling global challenges and its capacity to lead initiatives that extend beyond local concerns. The Academy enhances its research and public outreach through collaborations with various local institutions and the media, although it currently underutilises its website for disseminating research findings. Legally and ethically, ZAS adheres to stringent standards, especially in health-related research, complying with guidelines from the National Health Research Authority. While the Academy's funding primarily came from a one-off government grant, it aims to secure future sustainability through grantsmanship and better organisational frameworks. ***Strengths: multidisciplinary membership with research expertise.***

16. The **National Institute for Scientific and Industrial Research (NISIR)**, established in 1988, operates seven specialised research centres: Water and Environment, Energy Development, Material and Environment, Plant Science, Animal Science, Digital Transformation, and Food Science Research Centres. These centres, primarily located at the head office in Lusaka, conduct focused research and provide analytical services in their respective fields, with substantial support from government grants and partners like the International Atomic Energy Agency. The institute emphasises the practical and commercial applicability of its research, often resulting in the development of prototypes. However, NISIR faces challenges in publishing its findings externally, mainly due to intellectual property rights and the necessity of obtaining permissions from involved scientists. As a result, much of their work is classified as grey literature or remains unpublished, with only a few publications to date.

    Research outputs at NISIR are managed in both hard and soft copies, overseen by the Deputy Director and the ICT department, and are not publicly accessible, stored internally on external drives and computers. These are well-organised and indexed, containing a significant amount of past work, though not all completed projects are digitised or stored in this manner.

    To enhance the accessibility and management of its research outputs, NISIR is developing an Open Knowledge Management Software platform. This platform, still in the development phase, aims to host all future research outputs but will initially restrict access to NISIR staff only. The institution recognizes the need for additional server capacity to support this new portal, which will include research reports, policies, and other institutional documents. Currently, about 40% of NISIR’s research output has been catalogued in this local database.

    The institute collaborates with national and international partners to undertake research projects, facilitate technology transfer, and provide technical assistance to industries and government agencies. NISIR also offers training programs, consultancy services, and testing and certification services to support innovation and industrial growth in Zambia. ***Strengths: Major implementer and funder of research projects in various areas, rich knowledge base****.*

Academia:

17. The **University of Zambia (UNZA)** has a main campus library, a veterinary school library, and a library at the School of Medicine, all unified under the UNZA banner. These libraries have extensive and varied resources, serving the diverse needs of their user base. UNZA Library also extends its services to the public, with individuals outside of the university able to access resources for a fee. The library also has an institutional repository, which currently houses about 10% of the research outputs from the university's staff and postgraduate students. The library follows UNZA policies and various copyright policies to manage its functions and adhere to ethical and legal frameworks. Technologically, the library faces challenges with occasional downtime, and it is acknowledged that capacity building would be necessary to effectively manage the research repository. ***Strengths: existing repository, metadata and quality standards, human resources (librarians).***

18. The **Institute of Economic and Social Research (INESOR)** has a variety of resources, including collaborations with the government, funders, and donors, as well as research fellows from different schools and departments at the University of Zambia. They also produce various outputs such as reports, published papers, newsletters, and policy briefs. Additionally, they have undergone significant evolution over the years and have integrated their six research programs with corresponding units at the university. ***Strengths: interdisciplinary research, capacity building research dissemination, advisory and consultancy services.***

Private sector and CSOs:

19. The **Southern African Institute for Policy and Research (SAIPAR)** in Zambia is a think tank that conducts research and provides policy analysis and recommendations in various areas such as governance, economics, social development, and public policy. SAIPAR has resources that include a team of experienced researchers, experts, and scholars who conduct research, publish reports, and engage in policy dialogue. The institute also has partnerships with government agencies, academic institutions, and international organisations to support its research initiatives. SAIPAR organises conferences, workshops, and training programs to promote knowledge sharing and capacity building in Zambia and the Southern African region. Additionally, the institute publishes research findings, policy briefs, and academic journals to contribute to evidence-based policy-making and socio-economic development in Zambia. ***Strengths: interdisciplinary research focus, publications and open access data, capacity building and education, policy dialogue.***

20. **The Zambia Research and Education Network (ZAMREN)** is a specialised non-profit Internet Service Provider formed in 2007 to provide cost-effective broadband and advanced ICT services to Zambia's research and education sectors, enhancing inter-institutional connectivity nationally and across Africa through partnerships with regional and global networks. It has a range of resources, including a learning management system, a high-performance computing system, hosting services, internet connectivity platforms, and Zoom licenses. It is privately funded and has extensive ICT infrastructure that could potentially support a research repository. Its objectives include securing cost-effective broadband connectivity for its member

institutions, sharing educational and research resources through its dedicated infrastructure, and providing advanced ICT services. ***Strengths: ICT services, connectivity, storage.***

21. The **Jesuit Centre for Theological Reflection (JCTR)** has a dedicated Social and Economic Development Program and a Faith and Justice Program that conducts research on various areas such as the cost of living, public finance management, social accountability, climate action, injustice, and value leadership. The organisation also collaborates with other agencies and participates in committees at both national and subnational levels. They disseminate their findings through reports, policy briefs, and quarterly bulletins, as well as press briefings and social media platforms. However, they do not publish in academic journals. The JCTR also has a strong focus on ethical considerations and ensures compliance with legal frameworks and local legislation. They are registered with the Registrar of Societies and governed by a board. ***Strengths: faith-based approach, public engagement and education, research and advocacy***

22. **The Indaba Agricultural Policy Research Institute (IAPRI)** has a wide range of resources, including research findings, reports, presentations, outreach activities, white papers, and policy briefs, which are disseminated through various channels to engage stakeholders in the agricultural sector. They also have a locally hosted website and collaborate with various government sectors, parliamentarians, the private sector, grain traders, millers, academia, and other key stakeholders to extend the reach and impact of their work. They are also open to contributing to the Zambia Research and Evaluation Repository, pending internal approvals and with support from IT personnel. ***Strengths: Research and analysis in agriculture, capacity building, policy influence.***

E. Content Management, Metadata Standards and Access

While three (3) institutions are currently operating a research repository and three (3) are developing one, they all have experience with content management and are using some metadata standards. In this chapter we focus on their work in this area.

The ***Dublin Core metadata standard*** is the most commonly used standard in digital libraries, making it compatible in use with others, and a logical and sustainable choice for Zambia.

The Dublin Core standards help describe and organize research materials within the repository, making it easier for users to discover, access, and retrieve relevant content. Dublin Core standards typically include information such as author, title, publication date, abstract, subject keywords, and other descriptive elements that provide context and facilitate the retrieval of research materials. Having the standards in operation is important for an institution to take a role in the management or governance of the ZaRR.

Other metadata standards include such as:

- MODS (Metadata Object Description Schema, developed by the Library of Congress, MODS is a bibliographic description schema offering a more complex metadata format compared to Dublin Core),

- MARC (Machine-Readable Cataloging, a standard for the representation and communication of bibliographic and related information in machine-readable form);
- EAD (Encoded Archival Description, a standard for encoding archival finding aids using XML);
- Schema.org(collaborative community activity with a mission to create, maintain, and promote schemas for structured data on the internet);
- DataCite Metadata Schema (Developed by DataCite, this standard is specifically designed for the citation of research data).

In order to understand how different institutions currently organise the management of their repositories, the following illustrates the key functions required to efficiently manage a research repository.

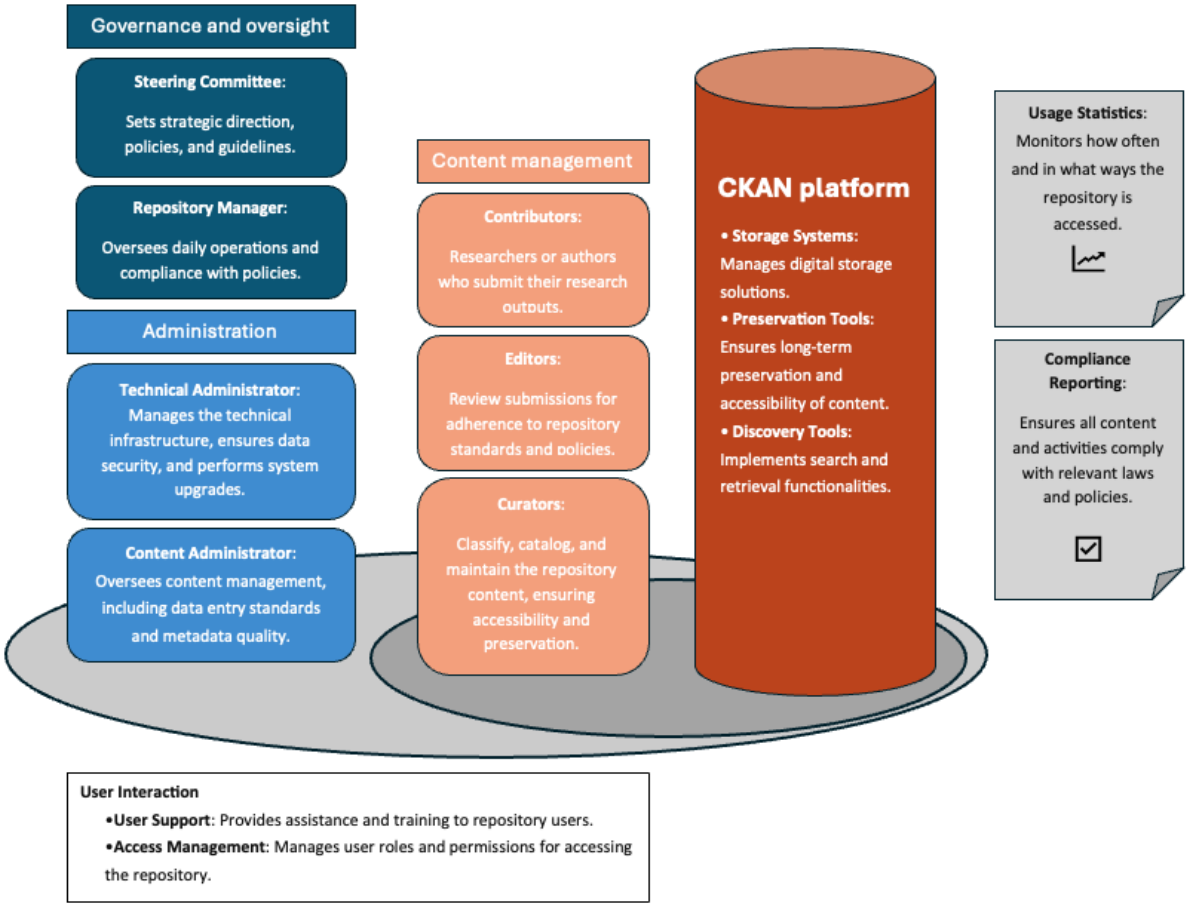

Figure 2: Key functions in managing a research repository, using the example of the planned Zambia Research Repository.

In the interviews the organizations with a repository, or developing a repository, were able to provide only generic information on the functions and their distribution between individuals responsible for them. The following is an overview of each, focusing on issues related to content management, metadata standards and access.

Institutions with operational repository:

University of Zambia - Library

The University of Zambia's Repository uses the Dublin Core metadata standard. The repository manager checks all details required by the standard before approving materials for inclusion. The University of Zambia Research and Evaluation Repository is primarily managed by librarians with expertise in information management. For an individual to add their research, they have to be registered to the site (open registration for anyone), and enter the details of their reserach to be addedd to the repository. The request goes to the librarian who manages the entries using their own protocol, and it either gets published, or the librarian may require further details, or decline the request. The repository has a strict review process in place, where only library staff have the authority to approve, add, or remove content from the repository. This process ensures that all necessary information, particularly metadata, is complete and accurate before the content is included in the repository. Additionally, there is a need for a backup system to be put in place to mitigate the risk of data compromise due to technical failures or security breaches.

The repository receives support from donor institutions for training and other needs relating to software support, travel for staff to attend meetings and workshops, and other diverse specific activities they may apply for grants for.

The Jesuit Centre for Theological Reflection (JCTR)

The Jesuit Centre for Theological Reflection (JCTR) operates an online repository accessible via its website, with documents dating back to 1990 available for free downloads. Usage stats are monitored, and staff with different access levels do internal content maintenance. Generally, all staff are able to upload reports and other outputs, but the M&E office has our final approval. . The repository and website use *DAMS* [3]infrastructure as a networking platform and are hosted by a UK consultant. JCTR does not currently have the capacity to manage the platform fully, although some staff have been trained in how to manage it. Plans include migrating to a local server once capacity and equipment are in place. The JCTR repository maintains a collection of metadata for all uploaded content. This metadata includes details such as the author's name, publication year, publication date, abstract, article/report links, classification, keywords, and tags. Additionally, each item is linked to relevant programs or projects, and includes information on the report's version.

The Zambia Agriculture Research Institute (ZARI)

The Zambia Agriculture Research Institute (ZARI) follows the Dublin Core metadata standard for its Institutional Repository. ZARI also adheres to quality measures, such as reliability, replicability, completeness, and timeliness. Additionally, they follow Creative

[3] The DAMS framework used by the Jesuit Centre for Theological Reflection (JCTR) stands for Debt, Aid, and More Social Services. This framework is utilized by the JCTR as a tool for analyzing and evaluating economic policies in Zambia. The Debt component focuses on the country's debt management and the implications it has on the economy. The Aid component examines the effectiveness of external aid received by Zambia and its impact on development. The More Social Services aspect assesses government provision of education, healthcare, and other essential services to the population. The DAMS framework allows the JCTR to holistically assess economic policies and advocate for policies that promote sustainable development and social justice in Zambia.

Commons licensing, and contributors must consent to their material being shared under these terms. However, it is important to note that the repository is more of a research tracking tool, to show and guide the actual research process, than a repository for final research outputs. It is currently not very functional as it is not up to date with the latest software, and support for it has ceased from the organisation that used to provide it. Consequently, staff are not really engaged with it or using it effectively.

Institutions developing a repository:

The National Health Research Authority (NHRA)

The National Health Research Authority (NHRA) has strict access rights and confidentiality measures in place for its biometric database, which is the largest in the country. The NHRA also requires individuals with access to comprehensive information within their data systems to sign non-disclosure agreements to prevent misuse of the data. In the interview the NHRA representaive stated a ministry view that existing provisions and guidelines are adequate for the establishment of a research repository for health-related data. The Ministry of Health also has a data warehouse that consolidates data from various information systems, but access to this data is primarily for internal use. The researchers within the NHRA or its collaborating organizations, are assigned to conduct research on specific topics (as per the strategy of the ministry of health, or as tasked separately by the ministry). External organizations can request anonymized data sets, by filling in a form and describing the purpose of their use, subject to approval using the sharing criteria setup by the NHRA(data sharing protocol). The Ministry of Health is currently developing a system to track research and establish a data access portal and repository. The digital health technical working group oversees data management practices within the health sector to ensure adherence to data privacy and security standards.

The Examinations Council of Zambia (ECZ)

The data quality and metadata standards related to The Examinations Council of Zambia include adherence to internal records and ICT policies, as well as plans to develop a comprehensive information management policy. The ECZ also follows specific policy frameworks at the national level for its assessment activities. The ECZ charter outlines the research functions and overall mandate of the institution. The research repository being developed by the ECZ operates on the DSpace platform, which incorporates Dublin Core as its built-in metadata framework. The system captures essential metadata elements, including the classification of the information resource, author, publication date, abstract, year, and title. Additionally, the repository is equipped to provide an RSS feed, allowing for the regular and automated distribution of updates from the database to its users.

Zambia Statistics Agency (ZamStats)

The data quality and metadata standards related to ZamStats include reliability, replicability, completeness, timeliness, and adherence to an advance release calendar. These standards are used to ensure that all documents published are of high quality and that the data shared through the repository is transparent, credible, and accessible to all stakeholders at the same time. Additionally, ZamStats sets standards for the production of statistics within nine ministries and authenticates statistics as official at the national level. ZamStats adheres to national and international standards (annex Y) which are used in collaboration with the line ministries to ensure the accuracy, reliability, and comparability of national statistics.

They also provide guidance on unofficial statistics and maintain a data portal and develop a national repository in collaboration with the World Bank.

ZAMSTATS uses different mechanisms to ensure that statistical activities are well-coordinated, data quality is maintained, and the information produced is useful for evidence-based decision-making across all sectors of government. These include:

1. Inter-Ministerial Committees and Working Groups:

National Statistics System (NSS) Coordination Committee

- Purpose: Oversee the overall coordination of statistical activities across ministries.
- Composition: Representatives from Zamstats and key ministries.
- Functions: Develop and review statistical policies, set priorities for data collection, and ensure harmonization of statistical standards.

Sectoral Working Groups

- Purpose: Focus on specific sectors such as health, education, agriculture, etc.
- Composition: Statisticians and subject matter experts from Zamstats and relevant ministries.
- Functions: Plan and coordinate sector-specific surveys and censuses, analyze sectoral data, and provide technical support.

2. Memoranda of Understanding (MoUs)
   - Purpose: Formalize the collaboration and data-sharing agreements between Zamstats and other ministries.
   - Content: Specify roles, responsibilities, data sharing protocols, and confidentiality agreements.
   - Benefits: Ensure legal and institutional backing for data collection and sharing.
3. Joint Surveys and Censuses
   - Purpose: Conduct comprehensive and multi-sectoral data collection efforts.
   - Implementation: Collaborative planning, funding, and execution of national surveys and censuses.
   - Examples: Demographic and Health Surveys (DHS), Agriculture Censuses, Labour Force Surveys.
4. Data Sharing and Integration Platforms
   - Purpose: Facilitate the seamless exchange of data between Zamstats and other ministries.
   - Mechanisms:
   - Integrated Data Management Systems: Centralized databases accessible by various ministries.
   - Statistical Data and Metadata Exchange (SDMX): Standardized formats for data exchange.
   - Data Portals and Dashboards: Online platforms for data access and visualization.
5. Capacity Building and Training Programs
   - Purpose: Enhance the statistical capabilities of personnel in ministries.
   - Methods:
   - Workshops and Seminars: Regular training sessions on data collection, analysis, and management.
   - Technical Assistance: On-site support from Zamstats experts.
   - Study Tours and Exchange Programs: Opportunities for ministry staff to learn from best practices in other countries.
6. Regular Meetings and Communication Channels
   - Purpose: Maintain continuous and effective communication between Zamstats and ministries.
   - Mechanisms:

- Monthly/Quarterly Coordination Meetings: Review progress, address challenges, and plan upcoming activities.
- Dedicated Liaison Officers: Appointed contacts within each ministry for smooth coordination.
- Electronic Communication: Use of emails, shared online platforms, and teleconferences for timely updates.

7. Quality Assurance and Standardization
   - Purpose: Ensure the accuracy, reliability, and consistency of statistical data.
   - Methods:
   - Adherence to International Standards: Implementation of guidelines from organizations like the United Nations and World Bank.
   - Internal Audits and Reviews: Regular checks on data collection and processing methods.
   - Feedback Mechanisms: Soliciting input from data users and stakeholders to improve data quality.
8. Policy and Strategic Frameworks
   - Purpose: Provide a clear strategic direction for the national statistical system.
   - Frameworks:
   - National Strategy for the Development of Statistics (NSDS): A comprehensive plan outlining statistical priorities and resource allocation.
   - Sector-Specific Statistical Plans: Detailed plans tailored to the data needs of each ministry.
9. Resource Mobilization and Funding Coordination
   - Purpose: Secure adequate funding for statistical activities.
   - Methods:
   - Joint Proposals: Collaborative efforts to secure funding from national budgets and international donors.
   - Pooling of Resources: Sharing financial and technical resources between Zamstats and ministries for specific projects.

Key observations:

- *UNZA Library, ZARI and ECZ (existing repositories) follow Dublin Core metadata standard*, and it is anticipated that the *ZamStats* (which is currently developing a repository) will adopt the same. Therefore their staff will have the experience and capacity in managing the repository data process, and training other institutions which may follow the same approach later.
- JCTR has a repository and a web-site which are operated by a consultant in UK. They currently do not have the capacity to manage and operate it independently JCTR uses its own metadata standards, focusing on its own research materials.
- NHRA is a regulatory body, under MOH, which is developing a repository. The repository will use internal servers and staff, and focus on its regulatory functions. NHRA has experience on MOUs between different organizations and their collaboration.
- ZIPAR has research capacity, but it does not currently implement specific metadata standards or prepare to implement its own repository.
- Many of the institutions view the Zambian Research Repository conceptually as a governmental hub, facilitating the consolidation and dissemination of data from various government entities and other institutions. The ideal operation model suggests that individual institutions continue managing their own research repositories while also

granting access to the National Repository. Many view the datasets remaining on the different institutional repositories/servers for safety and security.

F. Summary of administrative data landscape

Of the institutions interviewed, only the government ministries and the National Health Insurance Management Authority (NHIMA) collected administrative data. The systems being used and their strengths and weaknesses are summarised below. The information highlighted here emphasizes the expansive use and the potential of administrative data within Zambia, delineating its application and the associated challenges and limitations. This discourse arises from the broader context of how administrative data is currently managed and utilized in the country. It is indicated that the Zambia Statistics Agency, with the support of the World Bank and in collaboration with the Smart Zambia Institute, is actively working to consolidate this administrative data into a centralized repository. This decision underscores the selective use and targeted application of data in varying Zambian data management initiatives, shaping how information is curated and made accessible for different purposes and audiences.

Ministry of Community Development and Social Services

The Ministry of Community Development and Social Services in Zambia manages various programs each with its own dedicated information system designed to meet the specific needs of the program. Examples include the Food Security Pack program which uses the Food Security Pack Management Information System (FSPIS), the 1,000 Days program which uses the 1,000 Days Management Information System, and the Saving Women's Livelihoods program which utilizes the Saving Women's Livelihoods Management Information System (SWLMIS). These systems are distinct for each program and do not integrate into a single overarching system.

These information systems are essential for generating transactional data about the support provided to beneficiaries. The process starts by identifying vulnerable populations through targeting or enumeration, and recording their details into the respective system. Individuals are then selected based on predefined criteria to receive support.

Additionally, the Zambia Integrated Social Protection Information System supports the facilitation of social cash transfer payments and is developed with contributions from the government and international partners like the World Bank. However, not all programs have their own management information systems; those that do typically receive development assistance from cooperating partners for reporting purposes.

The systems operate at various administrative levels, mainly up to the district level, with access at the national level mostly for reporting. They continue to track and manage beneficiary transactions for the duration of their program participation. For example, beneficiaries of the Social Cash Transfer program remain in the system until they either pass away or move, while beneficiaries of the Food Security Pack program participate for two years.

Importantly, none of the data managed by these systems is publicly accessible, and the systems generally use KOBO Collect tools for management, with some data collection applications developed for Android systems.

Ministry of Agriculture

The Zambia Integrated Agricultural Management Information System (ZIAMIS), operational since 2017, primarily supports Zambia's Farmer Input Support Program (FISP) through its extensively utilized Farmers Module. This module serves as a registry for eligible farmers, determined by specific criteria aimed at assisting the most vulnerable, including small-scale farmers who are not in formal employment. The Farmers Module helps in tracking the distribution of agricultural inputs like seeds and fertilizers but does not monitor the subsequent agricultural output, highlighting a gap in the system's capabilities.

Other modules[4] within ZIAMIS remain underutilized compared to the Farmers component. The system facilitates data flow from community-level extension officers up to the national level through structured data management practices.

The Ministry of Agriculture is also developing a new Marketing Information System to enhance tracking of marketing information, with completion targeted within the year. Challenges include limited report-generation capabilities at the district level and high staff turnover, which impacts the continuity of system use. The data collection and farmer registration process, known as tagging, is conducted seasonally at various administrative levels to identify farmers eligible for support.

Ministry of Education

The Ministry of Education currently manages its data using the Education Management Information System (EMIS), which is updated annually through a school census. However, the EMIS has been reliant on paper-based data collection and has not been updated since 2020. Efforts are underway to transition EMIS to an electronic format to enable more frequent updates—quarterly or at least every school term—and to extend access to the data down to the sub-national levels, specifically at the district level. This shift aims to address the current system's limitations, including its inability to be regularly updated and accessed by most staff without special permission. The electronic system is still in the planning stages, with ongoing discussions about its design and the software to be used. The goal is to streamline operations, reduce the costs associated with paper-based surveys, and improve data accessibility and sharing within the Ministry.

Ministry of Health

The Ministry of Health in Zambia utilizes various specialized platforms within its Health Management Information System (HMIS) to enhance data management and service delivery:

1. **DHIS2 Platform:** Serves as the backbone for routine data capture, primarily tracking aggregated data from health services across the country.

[4] Other modules include: Farmer Registration Module (Register and maintain a database of farmers in Zambia); Production Monitoring Module (track and monitor agricultural production activities and outputs); Market Information Module (provide market-related information to farmers and stakeholders) Extension Services Module (facilitate agricultural extension services to farmers); Financial Services Module (enhance access to financial services for farmers); Weather and Climate Information Module (provide real-time weather and climate information to farmers); Land Management Module (manage information related to land use and ownership); Research and Development Module (support agricultural research and development activities); Policy and Planning Module (aid in policy formulation and agricultural planning); Data Management and Analytics Module (centralize and manage all agricultural data); Monitoring and Evaluation (M&E) Module (monitor and evaluate agricultural programs and initiatives); Communication and Outreach Module (enhance communication and outreach to farmers and stakeholders).

2. **SmartCare:** Focuses on capturing detailed patient-level data, facilitating comprehensive tracking of individual patient interactions and treatments, predominantly used for HIV-related services.
3. **OpenLDR:** A dedicated laboratory data repository that not only automates the capture of test results directly from equipment but also requires manual data entry from paper records.
4. **ELMIS (Electronic Logistics Management Information System):** Manages and tracks the logistics of drug distribution across health facilities, ensuring proper inventory management and drug dispensation.
5. **COVID-19 Specific Systems:** Includes platforms for tracking COVID-19 immunization and certification, although their deployment is more limited compared to other systems.

Each system is designed to address specific aspects of health data management. For instance, DHIS2 aggregates service data, SmartCare provides detailed patient care records, and ELMIS ensures efficient management of medical supplies. These systems operate at various levels within the health infrastructure, from local up to national levels, but they face challenges such as limited deployment, resistance to new technologies, and the need for enhanced system interoperability.

The ongoing developments aim to expand these systems to more health facilities and include upgrading SmartCare to a more robust point-of-care system. Efforts to improve interoperability among these platforms are also underway, which will enhance data communication and usage across different health services.

Government and partner support play crucial roles in the advancement and funding of these technological upgrades, aiming to create a more integrated and efficient health information system that not only addresses current gaps but also prepares the system for future health challenges.

Ministry of Technology and Science

The routine data of interest to the Ministry of Science and Technology primarily pertains to the educational institutions it oversees, particularly the Technical Education, Vocational and Entrepreneurship Training (TEVET) institutions. However, this data is not currently being collected systematically or organized effectively. The development and completion of the new database are anticipated to address this issue, improving the availability and organization of routine data related to these institutions. The Ministry of Science and Technology collaborates with and supports more than 29 institutions, encompassing a broad network of entities within its operational scope**.**

National Health Insurance Management Authority

The National Health Insurance Management Authority (NHIMA) manages significant amounts of sensitive data related to its operations, focusing primarily on two key aspects: revenue collection and healthcare payments. NHIMA's data management involves tracking the contributions from members and ensuring that the healthcare services accessed by these members are appropriately charged based on their health conditions.

Given the sensitivity of the data, which includes information on health conditions, income, and contributions of its members, NHIMA implements stringent security measures[5] to protect this data. Access to the data is tightly controlled to maintain confidentiality and security.

NHIMA also uses its data for internal evaluations and modelling to aid decision-making processes. While this data is generally not shared externally, exceptions are made for researchers who have obtained the necessary ethical approvals, allowing them access to anonymized data for their studies.

Access to NHIMA's systems is centrally managed, and employees across various locations are provided with login credentials to register or enroll members. Healthcare providers use the system to verify the membership status of individuals to determine their eligibility for services, without accessing personal information.

NHIMA also holds the country's largest biometric database, containing extensive member information, treated with the highest degree of confidentiality. Strict protocols and non-disclosure agreements are enforced to prevent data misuse and ensure that only authorized individuals can access detailed data within the system.

V. Needs and recommendations

The institutions included in the assessment have specified a number of needs that must be addressed in the course of implementing the Zambia Research and Evaluation Repository. The specific needs of different institutions vary depending on their existing infrastructure, mandate, functions, prior development work, administration and support, and legal and ethical compliance.

Some institutions described a model where each would manage its own repository (or its content) and have its own infrastructure for it. Some acknowledged that they would not have

[5] 1. Data Encryption (At Rest: Encrypting data stored in databases, servers, and backups to prevent unauthorized access; In Transit: Using secure protocols like HTTPS, SSL/TLS to encrypt data transmitted over networks)
2. Access Control (Role-Based Access Control (RBAC): Granting access permissions based on the user's role within the organization, ensuring that individuals can only access data relevant to their job functions; Multi-Factor Authentication (MFA): Requiring multiple forms of verification to authenticate users accessing the system; User Authentication and Authorization: Strong password policies and regular review of user permissions.)
3. Network Security: (Firewalls: Implementing firewalls to control incoming and outgoing network traffic based on security rules; Intrusion Detection and Prevention Systems (IDPS): Monitoring network traffic for suspicious activities and responding to potential threats;
Virtual Private Networks (VPNs): Securing remote access to NHIMA systems through encrypted VPN connections)
4. Data Integrity (Checksums and Hashing: Using cryptographic hash functions to ensure data integrity and detect any unauthorized modifications; Audit Logs: Maintaining detailed logs of data access and changes to detect and investigate any unauthorized activities.)
5. Physical Security (Secure Data Centers: Ensuring data centers have controlled access, surveillance, and environmental controls to protect physical hardware and data; Access Controls: Using biometric scanners, ID cards, and security personnel to restrict physical access to sensitive areas)
6. Data Backup and Recovery (Regular Backups: Performing regular data backups to secure locations to prevent data loss; Disaster Recovery Plan: Implementing a comprehensive disaster recovery plan to ensure data can be quickly restored in case of a breach or other disaster)

the capacity or need to sustain their own separate repository but rather contribute directly to the ZaRR (through the required mechanism).

Addressing the different needs will improve the ability of the institutions to contribute to the ZaRR. This section describes the needs and recommendations that would need to be partially or fully addressed in the implementation of the ZaRR.

- **Legal Framework**: Develop an appropriate legal framework, or adjust existing (with a provision in the National Planning and Budgeting Act that is under revision) for ZaRR to govern data handling, access, and intellectual property rights, ensuring alignment with national and international standards.

- **Capacity Building and Institutional Strengthening**:
    - **Human Capital**: Enhance the skills and knowledge of researchers and administrative personnel through targeted training programs and professional development opportunities.
    - **Infrastructure**: Upgrade technological and physical infrastructure to support effective research activities and data management across organisations.
    - **Dissemination of existing laws, guidelines etc.**

- **Digitization Assistance**: Support organisations such as the Zambia Agricultural Research Institute (ZARI) and the National Institute for Scientific and Industrial Research (NISIR) in transitioning from physical to digital formats, ensuring the preservation and accessibility of valuable research data.

- **Financial Support**: Secure sustainable funding sources to cover operational costs, technological upgrades, and special projects, ensuring the long-term viability of research institutions.

- **Stakeholder Collaboration and Role Definition**: Clearly define the relationships and roles of key entities involved in ZaRR, particularly around institutions that already have similar or complementary roles, such as ZAMSTATS, SZI, and NHRA.

- **Development of Standard Operating Procedures and Guidelines**:
    - **Creation of SOPs**: Develop comprehensive SOPs for all ZaRR-related processes, including data submission, review, access, and use. This will ensure that all activities are performed consistently and meet high standards.
    - **Guidelines for Data Management**: Establish guidelines that detail data management throughout its lifecycle, including collection, storage, processing, and sharing, to protect data integrity and confidentiality.
    - **User Access and Security Protocols**: Define clear protocols for user access and data security to prevent unauthorised access and ensure data is used ethically and legally.
    - **Quality Assurance Mechanisms**: Implement mechanisms to regularly assess the quality of the data and the effectiveness of ZaRR operations, allowing for continual improvement.

- **Technology and Infrastructure Specifications**:
    - **Hosting**: Determine the physical or cloud-based hosting solutions for ZaRR, including selecting the hosting entity, whether it be an internal government server or a third-party cloud service.

    - **Backup Procedures**: Establish robust data backup procedures to safeguard against data loss. This includes regular backups, off-site storage, and disaster recovery plans.
    - **Software Selection**: Identify and procure software solutions that meet the specific needs of ZaRR, such as database management systems, data analysis tools, and user interface platforms.
    - **Maintenance and Updates**: Outline procedures for regular maintenance and updates to the technology infrastructure to ensure ongoing reliability and security.
    - **Security Protocols**: Implement robust security protocols to protect data integrity and confidentiality, including encryption, access controls, and regular security audits.

- **Definition of Repository Content and the Role of Administrative Data**:
    - **Types of Outputs**: Clearly define the types of research outputs included in ZaRR, such as peer-reviewed articles, white papers, conference presentations, data sets, and grey literature. Specify any field-specific documents or outputs pertinent to key Zambian sectors like health, agriculture, and technology.
    - **Inclusion Criteria**: Establish criteria for what makes research and evaluation outputs eligible for inclusion in ZaRR, focusing on aspects like relevance, quality standards, and impact.
    - **Role of Administrative Data**: Define the inclusion and use of administrative data in the repository. Clarify how this data will complement research outputs, support data-driven decision-making, and enhance the repository's comprehensiveness.
    - **Data Integration**: Develop strategies for integrating administrative data with research outputs to provide a holistic view of related subjects, enhancing both accessibility and utility for users.

These needs are explained in more detail below, with further insights gathered from key informant interviews and the focus group discussion.

A. Legal Framework

Stakeholder Support: Key informant interviews indicate strong support among stakeholders for the establishment of ZaRR. This support spans various institutions, both in the public and private sectors, highlighting a widespread recognition of the repository's potential to fill critical gaps in data and information needs across the country.

Legal Gaps: There is a notable lack of an adequate legal framework within the Ministry of Finance to support its establishment. This contrasts with other entities such as the National Health Research Authority, which is currently progressing with statutory instruments to establish a health sector-specific research repository. Similarly, the Zambia Statistics Agency is legally mandated under the Statistics Act to establish such a repository. These examples underscore the necessity of a robust legal backbone for such initiatives, which is currently absent under the Ministry of Finance's purview.

To successfully implement ZaRR under the Ministry of Finance, ensuring sustainability, it is imperative to develop a tailored legal framework, or amend existing legal provisions to

addresses these gaps. This legal foundation is essential not only for the operationalization of the repository but also for its legitimacy and effectiveness in meeting the data needs of Zambia's diverse sectors.

It is crucial to develop a legal framework that governs data handling, access, and intellectual property rights associated with ZaRR. This framework should ensure alignment with both national and international standards, providing a robust basis for its operations. Without such a framework, there is little incentive for organisations, whether public or private, to contribute their research outputs to the repository.

Enforcement and Accountability: The legal framework must not only compel organisations to contribute their research outputs but also enforce accountability regarding the operations of ZaRR. By mandating data contribution, the framework would guarantee a consistent influx of data and research outputs, which is essential for the repository's success and relevance. Additionally, clear legal provisions for data sharing would enhance collaborative efforts and transparency among contributing organisations.

Integration with Existing Legal Frameworks: It's important to integrate or reference other relevant legal frameworks to strengthen ZaRR's foundation. Examples include:

- The ongoing statutory instruments under the National Health Research Authority, could provide a model for health-related research data management.
- Data protection laws to ensure the privacy and security of the data housed within the repository.
- The ZAMSTATS Act, could offer guidelines for maintaining data integrity and ensuring public access.

B. Capacity building and institutional strengthening

Human Capital: Although stakeholders have considerable enthusiasm for the establishment of the Research and Evaluation Repository, concerns remain about their capacity to contribute effectively to such a repository. Human capital is a significant concern, as revealed by key informant interviews. Many organisations lack dedicated IT staff, and some do not have specialised monitoring and evaluation or research staff. Even organisations that do have these staff members may find them insufficient in number to meet the demands of effectively contributing to the Research and Evaluation Repository. This issue should be addressed by:

- **Role and Responsibility Definition**: Refine job descriptions to include specific responsibilities related to contributing to the repository. Ensure that these roles are clearly defined and integrated into the organisational structure to facilitate accountability and efficiency.
- **Training and Development**: Implement targeted training programs to build the required skills in existing staff. This could include training in data management, research methodology, IT security, and M&E practices. The training revolves around the key functions in managing a research repository, as illustrated in the figure 2.
- **Recruitment and Staff Expansion**: For organisations where the need is acute, assist in the recruitment of additional specialised staff. This may involve funding support for new positions that are crucial for the effective contribution to ZaRR.

Infrastructure: Infrastructure needs vary significantly across different organisations. Many government entities potentially benefit from robust support provided by the Smart Zambia Institute, which is mandated to supply IT infrastructure and software. If the specific needs of these entities are clearly identified, the Institute can ensure they are adequately met.

However, gaps are more pronounced among civil society organisations, statutory bodies linked to the government, and the private sector, where the capacity for IT infrastructure varies widely. For instance, while some organisations operate with dedicated local servers, others lack such resources. The structure and functionality of the Zambia Research and Evaluation Repository will be crucial in determining if these organisations can effectively store and transmit their data. Depending on the repository's requirements, certain organisations may need targeted support to enhance their infrastructure capabilities.

Furthermore, operational issues such as the use of organisational versus personal emails need to be addressed. The development of Standard Operating Procedures (SOPs) for the ZaRR could provide guidance on these and other matters, facilitating smoother operations without infringing on the organisations' independence.

Dissemination of existing laws, guidelines etc.

Key informant interviews have revealed that knowledge and application of existing laws and guidelines related to research, evaluation, and dissemination in the country are not universally available nor understood. There are notable gaps, particularly in awareness of specific legal frameworks such as the Access to Information Act, Cyber Security and Cyber Crimes Act, Electronic Communication and Transition Act and so on. It is essential to more widely disseminate these legal frameworks to stakeholders involved in contributing to the ZaRR. This dissemination will help ensure that organisations can structure their operations appropriately to align with the repository's needs. Additionally, there may be a need for orientation sessions on these legal frameworks and guidelines to bridge any gaps in understanding, ensuring that organisations can fully meet their obligations. This is particularly critical if new legal frameworks are established specifically for the ZaRR.

C. **Digitisation Assistance**:

Several organisations, such as NISIR, ZARI and UNZA Library, possess vast collections of research outputs and data in hard copy or physical formats. Notably, the ZARI Library houses extensive archives that span back decades, from as far back as the 1950s, and are at risk of damage due to ageing. The institution already has a proposal for such digitisation amounting to under a million kwacha initially, for which it is seeking support. These institutions may require support for digitising this valuable data to preserve it and make it accessible in electronic format for inclusion in initiatives like the ZaRR. However, the extent of data inclusion should be carefully considered in alignment with the repository's scope and objectives. This consideration is crucial to determine how comprehensive the repository aims to be and what specific types of data it will encompass and spanning what period.

D. **Financial Support**:

While the specific financial support needs were not extensively detailed across the various organisations interviewed, it became apparent that many would require support depending on their contributions to the ZaRR. For example, organisations that need to build human capital or enhance infrastructure would benefit from financial assistance. Tailoring this

financial support to meet the specific needs of these organisations is feasible once they provide more detailed descriptions of their requirements. This step is crucial after defining the repository's ideal functions and operational methods. Once these parameters are established, organisations can be prompted to specify where they need particular support to contribute effectively to the repository.

It is important to note that financial support for these organisations does not necessarily have to come directly from the Ministry of Finance. Many organisations have access to alternative funding sources that could be utilised for this purpose. For instance, CSOs and the private sector often havepartners and donors whom they could approach for such support, particularly if their needs are clearly defined and endorsed by the government and the Ministry of Finance. Similarly, statutory bodies, such as ZARI, PMRC, NHRA, SZI, Zamstats, etc, could request additional support from their respective ministries, especially if such requests are explicitly linked to supporting the functions of the research repository.

In addition to supporting the institutions contributing to the ZaRR, it's important to consider the support needed for the repository itself, particularly in terms of its operational functions within the Ministry of Finance. The Ministry of Finance and National Planning has indicated a need for enhanced human resources and infrastructure support.

Several potential funding models could meet these needs:

- A paid service model where users of the repository contribute financially
- Fixed contributions from the budgets of institutional and external partners
- Central budget allocation directly from the government

However, it is evident that the ZaRR will require substantial financial support. During the focus group discussion, it was suggested that operational costs could be covered through central budgetary support, Ministry of Finance and National Development. Meanwhile, more specific expenses related to the repository might need funding from additional sources. This dual approach could ensure that while the repository is sustainably financed, it also receives the necessary targeted funds to address specific needs.

E. Stakeholder Collaboration and Role Definition

In discussions with key informants and focus group participants, varied opinions emerged regarding how existing organisations' current mandates align with the ZaRR. For instance, ZAMSTATS was frequently mentioned as the national custodian of official statistics, and it is noted that ZAMSTATS is already developing repositories that includes administrative data. It is essential to clarify the roles of ZAMSTATS and the ZaRR, which is to be established under the Ministry of Finance and National Planning, to avoid any potential conflict or duplication of efforts.

Similarly, the National Health Research Authority is in the process of setting up its own sector-specific repository, with statutory instruments nearing finalisation. The relationship between this body's work and the ZaRR needs to be explicitly defined to ensure clarity in their respective roles. There is also potential here to directly link to the NHRA repository once it is operational, for example, which would make gathering health-related research outputs more efficient.

The Smart Zambia Institute, tasked with managing infrastructure and software for government entities, must also play a significant role in the development of the ZaRR. Its

involvement is crucial to align technical capabilities and infrastructure needs across government entities contributing to the repository.

These examples underscore the necessity of clearly delineating roles and responsibilities for all institutions involved with the ZaRR. Such clarity will help prevent overlap and conflict, thereby enhancing efficiency and effectiveness in the repository's operations

There is significant potential to leverage the existing strengths, mandates, legal frameworks, and guidelines of various organisations in the operation of the ZaRR. By doing so, duplication can be avoided, and efficiency can be enhanced. It is critical to thoroughly explore and capitalise on these alignments to ensure that the repository becomes operational swiftly and garners support from a broad spectrum of stakeholders. This strategic integration will not only expedite the implementation of ZaRR but also strengthen its foundation through widespread institutional backing.

F. Development of Standard Operating Procedures and Guidelines

The development of standard operating procedures (SOPs) and guidelines is essential for the Zambia Research and Evaluation Repository (ZaRR) to effectively guide both its internal operations and the contributions of stakeholders who will be providing data and other research outputs. Key informants emphasised the critical need for such SOPs, noting that many of the organisations interviewed lack clearly defined procedures themselves. Therefore, the SOPs for ZaRR could also serve as a model to help these organisations enhance their capacities and improve the management of their research activities and output sharing.

These guidelines should be explicitly clear in terms of data management, user access, security protocols, and quality assurance mechanisms. Given the diverse range of processes and the variety of research outputs produced by different organisations, it is especially crucial to establish SOPs that ensure consistency, security, and quality across all activities associated with the repository. This approach will not only streamline operations but also bolster the overall integrity and effectiveness of the ZaRR.

G. Technology and Infrastructure Specifications

Technology and infrastructure are crucial components in the development of the ZaRR. Based on insights from key informant interviews and focus group discussion, several important considerations have been identified.

Firstly, it is essential that the technology and infrastructure align with the requirements set by the SZI, as this will be a government-led initiative. This alignment involves careful consideration of hosting, software selection, and security protocols to ensure compliance with the Institute's standards. During the discussions, it was noted that the Institute would need to approve any proposed technological infrastructure. This approval process is critical to guarantee that the chosen infrastructure and software adhere to all the Institute's guidelines, particularly concerning security, code availability, and interoperability with existing systems. Additionally, the preference for open-source software should be considered to enhance accessibility and integration.

Furthermore, the need for robust backup procedures was emphasised, especially given that many institutions have been identified as weak in this area. Secure backup systems are vital to ensure that any data transferred to the ZaRR is preserved and protected against loss in the event of emergencies or adverse incidents. These technology and infrastructure

specifications not only support the operational needs of the ZaRR but also contribute to building a resilient and reliable repository.

H. Definition of Repository Content and the Role of Administrative Data

Key Informant Interviews and Focus Group discussions have highlighted the diverse range of outputs and data available from various institutions, encompassing both administrative data from government institutions and some civil society organisations, as well as varying research outputs. There is a significant variation in these outputs; some have undergone ethical approval processes, while others have not, and their academic rigor also varies, with some being peer-reviewed and others more akin to in-house reports.

This diversity underscores the need to clearly define the scope of content that should be included in the ZaRR. Critical questions need to be addressed: Should the repository exclusively include research that adheres to strict academic definitions, having undergone peer review? Or should it also encompass administrative data and other forms of data that have not been peer-reviewed?

Defining these parameters is crucial for ensuring that ZaRR hosts a comprehensive range of outputs. Relying solely on strictly defined research outputs could limit the repository's scope, as many organisations interviewed do not have such outputs or have them to a very limited degree. Additionally, many significant studies are often published in journals which may restrict further sharing due to copyright rules. Expanding the criteria to include a broader array of outputs could enhance the utility and inclusiveness of the repository, making it a more valuable resource for a wide array of stakeholders. ***Key informants suggested a grading system or classification to the research outputs*** (see example from University of Hull in annex 5) and data available on the ZaRR, which would help users identify the strengths and weaknesses of these outputs and thus better decide how to use them.

VIII. Implementation Plan

The needs and recommendations are turned into action planning. For the actions where several different needs/recommendations were documented, alternative scenarios may be presented for discussion and decision.

A. Implementation of the technical platform

- **Fjelltop to start implementing the technology and building the infrastructure**
    - **Software**: Implement an open-source repository software/platform (CKAN has been identified as a technical solution that matches the needs for ZaRR)
    - **Hosting**: MOFNP facilitates the discussion of the details of options for local physical or cloud-based (e.g. AWS or Azure) hosting solutions (SmartZambia, UNZA, ZamStats, ZAMREN). If a cloud-based option is chosen, the following issues can also be covered cost-effectively (local deployments will require further discussions with the hosting institute):
        - **Backup Procedures**: enables automated regular backups, off-site storage, and disaster recovery planning.

- **Maintenance and Updates**: enables regular maintenance and update planning to ensure reliability and security.
- **Security Protocols**: enables robust security protocols to protect data integrity and confidentiality, including encryption, access controls, and regular security audits.

- **MOFNP to oversee the development of Standard Operating Procedures and Guidelines**:
  - **Creation of SOPs**: Develop comprehensive SOPs for all ZaRR-related processes, including data submission, review, access, and use. This will ensure that all activities are performed consistently and meet high standards.
  - **Guidelines for Data Management**: Establish guidelines that detail data management throughout its lifecycle, including collection, storage, processing, and sharing, to protect data integrity and confidentiality.
  - **User Access and Security Protocols**: Define clear protocols for user access and data security to prevent unauthorized access and ensure data is used ethically and legally.
  - **Quality Assurance Mechanisms**: Define mechanisms to regularly assess the quality of the data and the effectiveness of ZaRR operations, allowing for continual improvement.

B. Governance and sustainability

- **MOFNP will lead the development of a governance document** (draft outline as annex 1) that is aligned with the legal framework document that constitutes the repository's legal setup.
- **MOFNP to prepare MOUs** between the stakeholders of the ZaRR
- **MOFNP to prepare a legal framework document to present to the Technical reference group for discussion**:
  - Secure sustainable funding sources to cover operational costs, technological upgrades, and special projects, ensuring the long-term viability of the repository.
  - Align with the governance document, including issues such as data handling, access, and intellectual property rights, ensuring alignment with national and international standards.

C. Institutional support

Establish a working group among the technical reference group stakeholders to document a 1-3 year plan for capacity building and institutional strengthening, including (but not limited to)

- **Selecting an institution** to manage/organise the training resources for the repository
- **Human Capital**: identify and document minimum training requirements to ensure effective management and use of the ZaRR.
- **Infrastructure**: specify minimum technological and physical infrastructure to support the ZaRR activities and data management across organizations.

- **Digitization assistance:** document support to organizations transitioning from physical to digital formats, ensuring the preservation and accessibility of valuable research data
- **Define and secure the funding** for the ZaRR for the next 5 years.

D. Scenarios for organisational setup

Based on the needs assessment, and the capacities expressed by the organisations, three potential scenarios (in no particular order) are presented for discussion. The actual implementable model could also be a combination of modalities presented here.

- **MOFNP to manage the ZaRR:**
  - MOFNP to lead due to their ability to contribute to the funding and managing the technical reference group;
  - Utilize ZIPAR and its research structures for the content management;
  - Leverage ZAMREN and/or Smart Zambia as infrastructure provider and manager.

- **MOFNP to lead, but technical content assigned to ZAMSTATS/ZAMREN:**
  - MOFNP to lead the the funding and the technical reference group;
  - Utilize ZAMSTATS for the technical oversight, standards and content management;
  - Leverage ZAMREN and/or Smart Zambia as infrastructure provider and manager.
- **Divide the sectoral responsibilities with the oversight at ZAMSTATS**
  - Assign overall management responsibility to ZAMSTATS for their technical coordination and capacity;
  - Assign sectoral responsibilities to individual institutions (E.g. NHRA etc.) and invest in capacitating sectoral repositories which contribute to the ZaRR;
  - Leverage ZAMREN and/or Smart Zambia as infrastructure provider and manager.

The branding of the repository can follow generic Government of Zambia branding, such as of the ZamPortal (https://zamportal.gov.zm/).

E. Financial model

In the needs assessment conducted, some stakeholders provided funding mechanism options to support the establishment and ongoing operation of the research repository. Below is a summary of these funding alternatives.

1. Paid Service Model:
This model suggests implementing a subscription fee or pay-per-use system for accessing the research repository. Institutions or individual users would contribute financially in exchange for access to the repository's services. The model would require a tiered pricing strategy that accommodates diverse user groups, from academic institutions to individual researchers. One potential challenge to consider is balancing revenue generation with the broadest possible access to the repository's resources. A more detailed example of tiered pricing model options is described in annex 6.

2. Fixed Contributions from Institutional Budgets and External Partners:
Another option proposed is securing funds through fixed contributions from the budgets of participating institutions. This collaborative funding approach would involve establishing agreements with institutions that would benefit from the repository, thereby distributing operational costs among these stakeholders. Moreover, potential partnerships with external entities, such as the World Bank, could augment this funding stream. The World Bank's involvement could be especially beneficial given its experience with global information projects and its potential to provide not just monetary support but also technical assistance and capacity building.

3. Central Budget Allocation from the Ministry of Finance and National Planning (MOFNP), with Additional Support from the World Bank (WB): This funding avenue looks toward the national government's central budget as the primary source of funding for the repository, potentially overseen or administered by the Ministry of Finance and National Planning (MOFNP). The central budget allocation would ensure a sustainable funding model supported by national policy commitment. Additional financial resources could be mobilized from international development agencies like the World Bank to enhance the adequacy and stability of the central budget funding. The confluence of domestic funding and international support could create a more robust and consistent financial base for the repository's operations.

XI. Budget and Financial Considerations

The figure 2 presented the key functions in managing a research repository. Below budget example uses these functions as a template for a budget for the ZaRR.

	Per month		**Per year**	
Staffing (*) paid in ZMW	Low	High	Low	High
Repository manager	8,000	13,000	96,000	156,000
Technical administrator	7,000	12,000	84,000	144,000
Content administrator	7,000	12,000	84,000	144,000
TOTAL (Range) in ZMW			**264,000**	**444,000**
(*) using available national salary range estimates, to be refined				
	USD	**USD**		
Technology costs	**Low**	**High**		
License fees, domains etc.	$2,000	$4,000		
Cloud infrastructure hosting of the platform (600/mth)	$7,200	$7,200		
Outsourcing of any development work				

(6 weeks of development work (8 hours per day * 5 days per week * 6 weeks * 100 USD/hour = 24,000 USD)	$24,000	$24,000		
Support and maintenance (security updates, patches)				
(estimated at 1-2 days per month)	9600	$19,200		
TOTAL	**$42,800**	**$54,400**		

In the short term the agreed budget dictates that the system will be hosted by an industry leading cloud infrastructure provider; Amazon Web Services (AWS) is recommended. Choosing where to host the system over the long term is a decision of critical importance to the project's long term sustainability. Using an industry leading cloud service provider such as AWS offers the following benefits:

- Service Stability - The underlying infrastructure is set up, maintained and updated around the clock by world leading experts who will respond immediately to outages.
- Scalability - Adding more storage space or compute power to the project takes a matter of seconds to minutes, instead of the weeks to months it can take to navigate costly procurement processes.
- Security - World leading cybersecurity expertise works round the clock to protect your infrastructure and the data held within.
- Sustainability - Using an industry standard service provider greatly reduces the complexity (and therefore the cost) of using external expertise to support the project. There is an entire industry of cloud infrastructure consultants to draw upon who hold specific expertise in working with AWS or Azure services.
- Cost - Infrastructure maintenance benefits greatly from the economy of scale, meaning that the cost to the government of Zambia will be orders of magnitude lower over both the short and the long term (after factoring in all salary and equipment costs).

There may be political factors to consider when choosing where the repository is to be hosted over the long term. It is important to determine whether such factors justify the significant extra cost to hosting the platform elsewhere. A proper assessment of expected costs for different hosting solutions could be undertaken as a further programme of work once the current contractual arrangement is finalised. It is understood that the project will hold principally public domain data and research outputs, so should not carry a particularly high cybersecurity classification. Even so, wherever the platform is hosted, we would likely recommend that a copy of all the data be kept within government premises as part of the platform's disaster recovery plan.

XII. Conclusion

This needs assessment report has described the current state of research repositories in Zambia, enabling an overview of the landscape in which the Zambia Research and Evaluation Repository (ZaRR) will be established.

It is evident that the MOFNP plays a central role in the development of ZaRR, and it has the opportunity to coordinate and manage its implementation. While it can carry out the implementation using the first offered implementation model (summary below for easy reference) it can utilize its partnership with other existing repositories or modify its implementation model or modality to whatever combination of models serves the purpose best. The needs assessment report has described the strengths of those partners, and the shape of the partnerships can be refined during the implementation of ZaRR.

Modality: MOFNP to manage the ZaRR

- MOFNP to lead due to their ability to contribute to the funding and managing the technical reference group;
- Utilize ZIPAR and its research structures for the content management;
- Leverage ZAMREN and/or Smart Zambia as infrastructure provider and manager.

There are other significant implementation synergies with those institutions that are currently implementing or developing their own (sector) specific repositories. This offers an enormous opportunity for them to implement the same standards that ZaRR is implementing and make ZaRR the central repository with which they can exchange their public content directly. It is important to note that they will need to restrict some of their internal content and datasets (non-public, sensitive, or identifiable data) to their internal use. ***It will be important to document all the partnership issues in a joint governance document document, which should be developed alongside with the implementation of the ZaRR.*** This is essential for the sustainability of the initiative and serves as a practical implementation guide to commit the stakeholders to fulfilling their roles and responsibilities in the ZaRR implementation.

ZaRR will be implemented by an international consulting company Fjelltopp (contract funded by UNICEF), and its technical implementation steps are outlined in the contract. This is complemented by ***the coordination mechanisms led by MOFNP*** and described in this needs assessment report. These include ***the Technical Reference Group (TRG) (***coordinating the inputs and participation of national key stakeholders); ***an operational group*** formed by MOFNP, with technical leads from existing or planned other repositories (e.g. UNZA, ZAMSTATS, etc.), and Fjelltopp, all of which will provide technical day to day support to MOFNP. ***The MOFNP will have the oversight and ensure the development of the governance document, and the necessary other documentation*** (some of which have been incorporated into the contract with Fjelltopp), which will enable effective implementation of ZaRR.

Monitoring and evaluation of progress can be done through the implementation updates with the TRG, and the success will be measured through the uptake and use of the ZaRR (Google analytics and user statistics).

For the sustainability of the initiative, it is essential to secure the operational financing (human and technical resources) for the ZaRR for its first 3 years. The needs assessment did not include interviewing international partners present in Zambia, nor did the national counterparts indicate that there would be unallocated funding for this purpose. Successful first phase implementation of the repository will demonstrate the utility of the ZaRR, and enable fundraising (full or partial funding) from the local donor community. Another important consideration is the direct government budget allotment, which MOFNP is best placed to assess.

With the strong national and international partnerships and the leadership and support of the MOFNP, the ZaRR initiative has every opportunity to succeed. Through its implementation, it can become an important national and international reference point for cross-sectoral innovation and development and serve as a model for others to follow.

References:

1. Zambia Research Portal Workshop report, 21 September 2022
2. Zambia Research Portal Implementation Plan 2023-2025, October 2022
3. Commission Recommendation to member states on access to scientific information (2012)
4. Confederation of Open Access Repositories (COAR) - Community Framework for Best Practices in Repositories https://coar-repositories.org/news-updates/coar-community-framework-for-best-practices-in-repositories/ (as of 15 April 2024)
5. Shearer, K., Nakano Koga, S. M., Rodrigues, E., Manola, N., Pronk, . martine ., & Proudman, V. (2023). Current State and Future Directions for Open Repositories in Europe. Zenodo. https://doi.org/10.5281/zenodo.10255559, p.3
6. ADaMM: Administrative Data maturity Model Ver 1.0, UNICEF, New York, October 2021
7. "What is Knowledge Management?" Karl M. Wiig, Journal of Knowledge Management, 1993

Referenced source web-sites:

Grading system or classification of the research outputs, example of University of Hull (https://www.hull.ac.uk/choose-hull/study-at-hull/library/resources/theses-and-dissertations)

Adaptation of tiered pricing model (from subscription flow): https://www.subscriptionflow.com

Referenced laws and policies:

The Access to information act, 2023 (Act Number: N.A.B.No 24 of 2023)

An Act to provide for the right to access information and its limitations; provide for procedures for processing requests for information; give effect to the right to access information as guaranteed in the United Nations Convention against Corruption and the African Charter on Human and Peoples Rights; and provide for matters connected with, or incidental to, the foregoing.

Data protection act, 2021 (Act Number: N.A.B.No 3 of 2021)

An Act to provide an effective system for the use and protection of personal data; regulate the collection, use, transmission, storage and otherwise processing of personal data; establish the Office of the Data Protection Commissioner and provide for its functions; the registration of data controllers and licencing of data auditors; provide for the duties of data controllers and data processors; provide for the rights of data subjects; and provide for matters connected with, or incidental to, the foregoing.

The Cyber Security and Cyber Crimes Act, 2021 (Act Number: N.A.B.No 2 of 2021)

An Act to provide for cyber security in the Republic; provide for the constitution of the Zambia Computer Incidence Response Team and provide for its functions; provide for the constitution of the National Cyber Security Advisory and Coordinating Council and provide for its functions; provide for the continuation of the Central Monitoring and Coordination Centre; provide for the protection of persons against cyber crime; provide for child online protection; facilitate identification, declaration and protection of critical information infrastructure;

provide for the collection of and preservation of evidence of computer and network related crime; provide for the admission; in criminal matters, of electronic evidence; provide for registration of cyber security service providers; and provide for matters connected with, or incidental to, the foregoing.

Copyrights Act, Cap 406 of the Laws of Zambia (Chapter 406, amended up to Act No. 13 of 1994)

The purpose of the act is to protect the rights of creators and owners of original creative works, such as literary, musical, and artistic works, by granting them exclusive rights to reproduce, distribute, and display their works. This law also aims to promote creativity and the dissemination of knowledge by providing a legal framework for the protection and enforcement of copyright. Additionally, the Copyrights Act seeks to balance the interests of creators, users, and the public by providing exceptions and limitations to copyright protection, such as fair use provisions.

Research policy and intellectual property rights; Directorate of Research and graduate studies, The University of Zambia, June 2009.

Annex 1: Needs assessment interview schedule

No.	INSTITUTION	DATE OF INTERVIEW
1	The National Health Research Authority (NHRA)	26th March,2024
2	The Policy Monitoring and Research Centre(PMRC)	
3	The Zambia Institute of Policy and Research (ZIPAR)	
4	The University of Zambia – Library	27th March 2024
5	The Zambia Research and Education Network (ZAMREN)	
6	The National Health Insurance Management Authority (NHIMA)	28th March 2024
7	The Institute for Economic and Social Research (INESOR)	
8	The Jesuit Centre for Theological Reflection(JCTR)	1st April, 2024
9	Ministry of Community Development	
10	National Institute for Scientific and Industrial Research (NISIR)	2nd April 2024
11	Southern African Institute for Policy and Research (SAIPAR)	
12	The Zambia Agriculture Research Institute (ZARI)	3rd April 2024
13	Ministry of Agriculture	
14	The Examinations Council of Zambia (ECZ)	4th April 2024
15	Ministry of Health	
16	Ministry of Education	5th April 2024
17	Ministry of Technology and Science	
18	Indaba Agricultural Policy Research Institute (IAPRI)	8th April 2024
19	Zambia Academy of Sciences	9th April 2024
20	Ministry of Finance and National Planning	12th April 2024
21	The Smart Zambia Institute	
22	Zambia Statistics Agency (ZamStats)	
23	Ministry of Technology and Science	

Annex 2: Draft - Outline Governance for the ZaRR

1. Introduction
   A. Background of the National Research Repository
   B. Purpose and Objectives of the Governance Document

2. Governance Structure
   A. Roles and Responsibilities
      1. Repository Committee
      2. Repository Manager
      3. User Community
   B. Decision-Making Processes
      1. Policy Formulation and Implementation
      2. Conflict Resolution Mechanisms

3. Data Management
   A. Data Collection and Ingest
   B. Data Storage and Security
   C. Data Preservation and Backup
   D. Data Sharing and Access
   E. Data Quality Assurance

4. Metadata Standards and Protocols
   A. Metadata Creation and Management
   B. Standardized Metadata Elements
   C. Metadata Governance

5. Access Control and User Policies
   A. Access Levels and Permissions
   B. Authentication and Authorization
   C. User Guidelines and Code of Conduct

6. Intellectual Property Rights and Copyright
   A. Ownership of Repository Content
   B. Licensing and Usage Rights
   C. Copyright Compliance

7. Monitoring, Evaluation, and Reporting
   A. Usage Metrics and Analytics
   B. Impact Assessment
   C. Reporting Mechanisms

8. Funding and Sustainability
   A. Financial Responsibilities
   B. Resource Allocation and Budgeting
   C. Sustainability Planning

9. Collaboration and Partnerships
   A. Engagement with Stakeholders
   B. Collaborative Projects and Initiatives
   C. Memoranda of Understanding

10. Compliance and Legal Considerations
   A. Data Protection and Privacy Regulations
   B. Compliance with Ethical Standards
   C. Legal Framework and Policies

11. Policies and Procedures
   A. Repository Policies
   B. Procedures for Content Submission and Review
   C. Documentation and Training

12. Appendices
   A. Repository Organizational Chart
   B. Glossary of Terms
   C. References and Resources

Annex 3: Technical Specifications for Repository Software/Hardware

The following table represents a list of technical specifications that have been compiled from this need assessment activity (desk review, KIIs and DFGs) and the COAR guidelines (as introduced above). These requirements are focussed on the technical delivery of ZaRR and do not include other governance requirements that are discussed elsewhere in this document.

ID	Category	Description	Size	Priority
ZaRR-D3-001	Setup	An appropriate data lake will be set up in the cloud provider chosen.	Medium	High
ZaRR-D3-002	Setup	Each file uploaded to the data catalogue will be stored in the data lake.	Medium	High
ZaRR-D3-003	Setup	A ZaRR data security policy document will be written and agreed with key stakeholders.	Medium	High
ZaRR-D3-004	Migration	A migration plan will be developed indicating the scope of any existing and future data to be stored in the lake and how the data should be uploaded.	Medium	Medium
ZaRR-D3-005	Catalogue	The metadata management platform and data catalogue will be built with the open-source CKAN project.	Large	High
ZaRR-D3-006	Catalogue	The CKAN user interface will be branded according to branding guidelines agreed with key stakeholders.	Small	High
ZaRR-D3-007	Catalogue	The platform will clearly indicate the project name upon all pages: "Zambia Evaluation and Research Repository".	Small	High
ZaRR-D3-008	Catalogue	The home page will communicate the purpose of the platform, who might use the platform, and how.	Small	Medium
ZaRR-D3-009	Discoverability	The repository enables users to apply basic Dublin Core metadata to its records, as well as more granular elements (e.g. to support multilingualism, FAIR-compliance,discipline-based, and regional metadata schemas)	Small	High
ZaRR-D3-010	Discoverability	The repository supports harvesting of metadata using OAI-PMH	Large	High
ZaRR-D3-011	Discoverability	In cases where the resource has been withdrawn, the repository provides a tombstone page and the metadata record remains publicly available	Small	High
ZaRR-D3-012	Discoverability	The repository assigns persistent identifiers (PIDs) that point to the landing page of the resource	Small	High
ZaRR-D3-013	Discoverability	The repository offers a search facility	Small	High
ZaRR-D3-014	Discoverability	The metadata in the repository are indexed by external academic discovery services and aggregators	Medium	High
ZaRR-D3-015	Discoverability	The repository is included in one or more disciplinary or general registry of repositories	Medium	High

ZaRR-D3-016	Discoverability	The metadata in the repository are available in human-readable and machine-readable formats	Small	High
ZaRR-D3-017	Discoverability	The repository facilitates linking in the metadata record between related contents such as preprints, published articles, data,and software (e.g. including PIDs for related resources held elsewhere)	Large	Low
ZaRR-D3-018	Discoverability	The repository supports PIDs for authors, funders, institutions, funding programmes and grants, and other relevant entities	Small	Medium
ZaRR-D3-019	Discoverability	The metadata in the repository are made available under a Creative Commons public domain dedication / waiver (CC0)	Medium	Medium
ZaRR-D3-020	Discoverability	In the case of research data, the repository supports identifiers for data at multiple levels of granularity, where appropriate (for example, if there there is research using a subset of the full dataset and a citation of the data subset is needed)	Large	Low
ZaRR-D3-021	Discoverability	The repository facilitates the use of controlled vocabularies in its metadata records	Medium	Medium
ZaRR-D3-022	Discoverability	The metadata in the repository are available for download in a standard bibliographic format at no cost to the user	Medium	Medium
ZaRR-D3-023	Access	The resources in the repository are available at no cost to the user	Small	High
ZaRR-D3-024	Access	The landing page for each resource in the repository includes a link to the resource	Small	High
ZaRR-D3-025	Access	The repository supports access to its documentation and metadata for persons with disabilities.	Medium	High
ZaRR-D3-026	Access	In cases where the repository is collecting sensitive research data, there are mechanisms that allow data owners to limit access to authorized users only	Medium	High
ZaRR-D3-027	Access	The repository supports a responsive, mobile-friendly user interface	Small	High
ZaRR-D3-028	Access	The repository provides a mechanism to make very large files available to users outside of the normal user interface (incases where the size of the file becomes unwieldy for the user)	Large	Low
ZaRR-D3-029	Access	In cases where there is restricted access to a resource, the repository facilitates an indirect way to access this resource (e.g. by contacting the author)	Medium	Medium
ZaRR-D3-030	Access	In cases where the repository collects sensitive data, it will recommend tools to anonymise them to enable data sharing	Medium	Medium
ZaRR-D3-031	Access	The repository adheres to the most recent version of the W3C Web Content Accessibility Guidelines	Medium	Medium

ZaRR-D3-032	Reuse	The repository includes licensing information in the metadata record which stipulates reuse conditions for the resource	Small	High
ZaRR-D3-033	Reuse	The landing pages in the repository include metadata required for citation of the resources and are in machine-readable format	Medium	Medium
ZaRR-D3-034	Reuse	The repository adopts Signposting to support machine access to the resources	Small	Medium
ZaRR-D3-035	Reuse	The resources are stored in machine-readable, non-proprietary formats	Small	Medium
ZaRR-D3-036	Reuse	When resources are received in proprietary or non-machine-readable formats, the repository attempts to create versions in open, standards-compliant and machine-readable formats.	Large	Low
ZaRR-D3-037	Reuse	The repository provides terms of use for the resources that do not have a standard reuse licence, including any reuse terms agreed to at the time of deposit	Medium	Medium
ZaRR-D3-038	Integrity and authenticity	The repository applies security practices to prevent unauthorised manipulation of resources	Small	High
ZaRR-D3-039	Integrity and authenticity	The repository supports revision of the metadata and versioning of the resources by depositor or administrator	Small	High
ZaRR-D3-040	Integrity and authenticity	The repository performs integrity checks of the resources on a regular basis, in order to detect unauthorised changes or accidental damage	Large	High
ZaRR-D3-041	Quality assurance	The repository undertakes lightweight review (and enhancement if needed) of basic metadata upon submission of the resource	Small	High
ZaRR-D3-042	Quality assurance	The repository provides documentation or has a policy outlining what curation processes are applied to the resources and the metadata	Medium	High
ZaRR-D3-043	Preservation	The repository has a digital preservation plan that states the duration of time the resources will be managed, identifies roles, and documents procedures for the preservation of different resource formats	Medium	High
ZaRR-D3-044	Preservation	The repository records the checksum when a resource is submitted or modified	Small	High
ZaRR-D3-045	Preservation	The repository collects basic preservation metadata including provenance, date of upload, and file format	Small	High
ZaRR-D3-046	Preservation	The agreement between depositor and repository provides for all actions necessary to meet preservation responsibilities – e.g. rights to copy, transform, and store the items	Medium	High
ZaRR-D3-047	Preservation	The metadata and the resources in the repository can be copied or migrated to other systems	Small	High

ZaRR-D3-048	Preservation	At least one copy of the repository contents is stored in a different location than the original repository	Small	High
ZaRR-D3-049	Preservation	The repository has a business continuity plan that details the response and procedures in case of natural disasters or cyber-attacks	Medium	High
ZaRR-D3-050	Preservation	The repository collects preservation metadata that complies with an appropriate metadata schema (e.g. PREMIS)	Large	Low
ZaRR-D3-051	Sustainability and Governance	The repository clearly indicates what organization is responsible for its management and the nature of its governance	Small	High
ZaRR-D3-052	Sustainability and Governance	The repository has a contact point to assist users and at least one staff member with the explicit responsibility of managing the services	Medium	High
ZaRR-D3-053	Sustainability and Governance	The repository responds to queries within a reasonable time frame	Medium	High
ZaRR-D3-054	Sustainability and Governance	The repository has a publicly available policy stating what will happen to resources if operations cease	Medium	High
ZaRR-D3-055	Sustainability and Governance	The repository (or organization that manages the repository) has a long term plan for managing and funding the repository	Medium	High
ZaRR-D3-056	Other Characteristics	The repository provides public documentation that outlines the scope of the resources accepted in the repository	Medium	High
ZaRR-D3-057	Other Characteristics	The repository supports mediated submission using standardised protocols such as SWORD	Large	Low
ZaRR-D3-058	Other Characteristics	The repository's submission system supports both individual uploads and bulk uploads.	Small	Medium
ZaRR-D3-059	Other Characteristics	The repository collects and shares usage information using a standard methodology (e.g. number of views, downloads)	Medium	Medium
ZaRR-D3-060	Other Characteristics	The repository is built on well-supported, open source software	Small	Medium
ZaRR-D3-061	Data	A "Resource" in the platform will represent a file (e.g. CSV, XLSX, JSON, PDF, DOC, etc...) stored in the data lake, a structured data table stored in PostgreSQL (for stream data), or a URL to an external third party source. This will be stored with associated metadata for the purposes of cataloguing.	Small	High
ZaRR-D3-062	Data	User-provided metadata associated with each resource, for the purpose of data cataloguing, will be: name, notes, format.	Small	High
ZaRR-D3-063	Data	Multiple "Resources" can be grouped together in a "Dataset", with further associated metadata for the purposes of cataloguing.	Small	High

ZaRR-D3-064	Data	User-provided metadata associated with each dataset, for the purpose of data cataloguing, will be in line with Dublin Core standars including: title, unique name, notes, maintainer name, maintainer email, Office/Cluster/Subunit, and free tags.	Small	High
ZaRR-D3-065	Data	The "Catalogue" will be formed of a flat list of "Datasets", which can be filtered and searched using the datasets' metadata.	Small	High
ZaRR-D3-066	Access	Each user of the system shall have their own individual user account	Small	High
ZaRR-D3-067	Access	New users should be able to request an account to access the hub. The creation of these accounts must be approved by a system administrator at the host institute.	Large	High
ZaRR-D3-068	Access	There will be three different access levels that a user may hold over a dataset: "members", "editors" and "administrators". A "member" may read the dataset, an "editor" may write/update the dataset, and an "admin" may grant/manage user access to the dataset.	Small	High
ZaRR-D3-069	Access	Datasets can be public or private. All registered and unregistered users of the system will have read access to a public dataset. Only registered users with "member" access will be able to read a private dataset.	Small	Medium
ZaRR-D3-070	Access	An "Organisation" represents a group of users each with a specified access level over a group of datasets. Organisation's will have associated metadata including the organisation name, unique identifier, description and picture.	Small	High
ZaRR-D3-071	Access	A small designated team under the host institute will be able to edit the entire data catalogue.	Small	High
ZaRR-D3-072	Access	Each partner insitution can have an Organization and assign it's own data editors, with rights to edit only the data uploaded under that cluster.		
ZaRR-D3-073	Access	It must be possible to grant a user access over an individual dataset (as well as an organisation's datasets).	Medium	High
ZaRR-D3-074	API	API requests shall be made by HTTPS, using a JSON formatted body. Response bodies shall also be in JSON.	Small	Medium
ZaRR-D3-075	API	It will be possible to publicly access the API. A CKAN API Token must be generated and used to authenticate any restricted requests.	Small	Medium
ZaRR-D3-076	API	All features available through the web user interface must also be available through the API.	Small	Low
ZaRR-D3-077	Audit	All changes to CKAN entities (users, datasets, organisations, groups, etc...) will be logged. The log will record who made what change and when.	Small	High

ZaRR-D3-078	Audit	It will be possible to browse and download each historical revision of all files uploaded to CKAN and stored in the data lake.	Medium	Medium
ZaRR-D3-079	Audit	It will be possible to tag revisions of datasets	Medium	Low
ZaRR-D3-080	Content	A Proof of Concept centralised data dictionary/business catalogue will be published through CKAN, showing how metadata can be published through the catalogue in both a human and machine readable manner.	Medium	Low
ZaRR-D3-081	Content	A limited selection of data will be uploaded to the platform in order to demonstrate the platform's value and how the platform should be used. Complete population of the platform with data remains the task of the host institute and partner institutes, supported by Fjelltopp in future sprints of the work.	Medium	Low
ZaRR-D3-082	Infrastructure	All infrastructure required will be hosted in the cloud, depending on the arrangements agreed with the host institute.	Large	High
ZaRR-D3-083	Infrastructure	All infrastructure will be generated using Infrastructure as code, with Ansible technology.	Large	High
ZaRR-D3-084	Infrastructure	Kubernetes will be used for container orchestration in the cloud deployments and also on local development environments.	Medium	Medium
ZaRR-D3-085	Infrastructure	A "production" system will be created and heavily protected to minimise downtime. This is the system that will be used publicly.	Medium	High
ZaRR-D3-086	Infrastructure	A "staging" replica system will also be created to trial and demo newly develop features in the hosting environment before their deployment to production.	Medium	Low
ZaRR-D3-087	Infrastructure	A "development" replica system will also be created to be hosted by developers locally on their own laptops for the purposes of developing new features.	Medium	High
ZaRR-D3-088	Infrastructure	Fake demo data will be created for the staging and development systems, so that live data never needs to leave the production system.	Medium	Low
ZaRR-D3-089	Infrastructure	A no-downtime deployment pipeline will be created, allowing the release of new features for the metadata management platform and data catalogue on an ad-hoc basis (a continuous integration model).	Medium	High
ZaRR-D3-090	Infrastructure	An automated testing harness will test any custom changes or code, prior to those changes being deployed to staging/production.	Large	Medium
ZaRR-D3-091	Infrastructure	Non-sensitive code will be stored in open-source Github repositories under the Fjelltopp organisation.	Small	High

ZaRR-D3-092	System	System should not tolerate more than 4 working hours of down time. Working hours is 8am - 6pm UK time Monday - Friday.	Small	High
ZaRR-D3-093	System	The system will be hosted at either a host institute data centre, or in a third-party datacentre that has ISO/IEC 27001 certification or the equivalent.	Moderate	High
ZaRR-D3-094	Access Control	The system will enforce multi-factor authentication (MFA) for all users.	Small	High
ZaRR-D3-095	Access Control	Host and partner institutes will exclusively use secondary accounts for situations requiring elevating privileges. Secondary accounts must be removed when no longer required.	Moderate	High
ZaRR-D3-096	Access Control	Host and partner institutes will ensure that login credentials (usernames/passwords) are not shared with anyone. If security delegation is required then this must be done by a traceable, auditable mechanism.	Small	High
ZaRR-D3-097	Access Control	The host institute will ensure that all access permissions are reviewed periodically to determine that only the correct people have access to given roles and resources in order to avoid a scenario of toxic combinations.	Small	High
ZaRR-D3-098	Operations Security	The application will generate log files about all activities happening within application (e.g., logon/logoff events, access right modification, permissions modification, business critical transactions)	Moderate	High
ZaRR-D3-099	Operations Security	The host institute will monitor all critical application event logs, administrator, and system operator activities, recording user activities, exceptions, faults, and information security events.	Moderate	High
ZaRR-D3-100	Operations Security	The host institute will ensure that operating procedures are documented and available to all users that require them. (Administration manual and SOPs for users)	Moderate	High
ZaRR-D3-101	Operations Security	All uploaded files will be scanned for viruses and malware (See OWASP recommendations).	Large	High
ZaRR-D3-102	Operations Security	File types will be restricted to only those that are necessary for business functionality.	Small	High
ZaRR-D3-103	Communications Security	The system will not use insecure TCP/UDP protocols such as (but not limitied to) HTTP, FTP, Telnet or TFTP to transfer data over all wired and wireless networks. Only encrypted traffic is allowed.	Small	High
ZaRR-D3-104	Communications Security	The system will be deployed in logically segregated networks protected by a firewall and deployed with the appropriate security level or zone.	Moderate	High
ZaRR-D3-105	Communications Security	Secret encryption keys will be kept safe. Accessibility to the keys will be controlled and audited. A minimum of 2 and	Small	High

		maximum of 3 authorized users should have access to the secret encryption keys.		
ZaRR-D3-106	System Acquisition, Development and Maintenance	Communication paths between participating parties will be encrypted.	Moderate	High
ZaRR-D3-107	System Acquisition, Development and Maintenance	Developers will follow secure coding best practices in order to mitigate common software security vulnerabilities. Developers will follow the control categories and techniques documented within The Top Ten OWASP Proactive Controls.	Small	High
ZaRR-D3-108	System Acquisition, Development and Maintenance	Developers will enforce HTTP secure response headers in line with the OWASP secure headers recommendations.	Moderate	High
ZaRR-D3-109	System Acquisition, Development and Maintenance	The host institute will ensure that confidential or sensitive data is only stored in the production environment. Copies of this data must not be stored in a non production environment. Any environment containing production data is by definition production.	Moderate	High
ZaRR-D3-110	Incident Management	This host institute should, with Fjelltopp support, document a procedure for responding to incidents and ensuring there is a decision point for determining if the incident is a cybersecurity breach.	Small	High
ZaRR-D3-111	Business Continuity	Backup methods will be identified and deployed based on the chosen hosting options, required recovery time and point objectives. (e.g. hot/cold backup, tape backup).	Moderate	High

Annex 4: International and national standards used by ZamStats

Zamstats (Zambia Statistics Agency) adheres to several international and national standards to ensure the accuracy, reliability, and comparability of national statistics. These standards are crucial for maintaining the integrity of statistical data and for facilitating its use in policy-making, planning, and international reporting. Here are the key standards and guidelines that Zamstats follows:

International Standards

1. United Nations Fundamental Principles of Official Statistics
    - Principle 1: Relevance, impartiality, and equal access.
    - Principle 2: Professional standards and ethics.
    - Principle 3: Accountability and transparency.
    - Principle 4: Prevention of misuse.
    - Principle 5: Sources of official statistics.
    - Principle 6: Confidentiality.
    - Principle 7: Legislation.
    - Principle 8: National coordination.
    - Principle 9: Use of international standards.
    - Principle 10: International cooperation.
2. International Monetary Fund (IMF) Data Quality Assessment Framework (DQAF)
    - Integrity: Professionalism, transparency, and ethical standards.
    - Methodological Soundness: Adherence to international guidelines.
    - Accuracy and Reliability: Source data adequacy, statistical techniques, and validation.
    - Serviceability: Relevance, timeliness, and consistency.
    - Accessibility: Data availability and clarity.
3. System of National Accounts (SNA)
    - Guideline: Provides a comprehensive framework for producing economic accounts.
    - Implementation: National income, output, consumption, saving, and investment data.
4. Special Data Dissemination Standard (SDDS) and General Data Dissemination System (GDDS)
    - Purpose: Enhance data transparency, quality, and dissemination.
    - Components: Coverage, periodicity, and timeliness of data; access by the public; integrity; and quality.
5. International Labour Organization (ILO) Standards
    - Surveys: Labor force surveys, employment and unemployment measures.
    - Guidelines: Concepts, definitions, and classifications.
6. Food and Agriculture Organization (FAO) Standards
    - Agricultural Statistics: Guidelines for agricultural censuses and surveys.
7. World Health Organization (WHO) Standards
    - Health Statistics: Guidelines for health data collection, including morbidity, mortality, and health services.

National Standards

1. Zambia Statistical Act
    - Legislation: Provides the legal framework for statistical activities in Zambia.

- Provisions: Defines the roles, responsibilities, and powers of Zamstats.

2. National Strategy for the Development of Statistics (NSDS)
    - Framework: A comprehensive plan to improve the statistical system.
    - Components: Capacity building, data quality improvement, and resource mobilization.
3. Zamstats Code of Practice
    - Ethical Standards: Ensures professionalism, impartiality, and confidentiality.
    - Guidelines: Best practices in data collection, processing, and dissemination.
4. Sector-Specific Standards and Manuals
    - Health, Education, Agriculture: Tailored guidelines for data collection and analysis in specific sectors.
    - Consistency: Ensures comparability across different data sets and over time.

Quality Assurance Frameworks

1. Data Quality Assurance Framework (DQAF)
    - Purpose: Enhance the quality of statistical outputs.
    - Components: Methodological soundness, accuracy, reliability, serviceability, and accessibility.
2. Statistical Production Process Standards
    - Guidelines: Detailed procedures for data collection, processing, analysis, and dissemination.
    - Documentation: Comprehensive metadata and methodological reports.

Statistical Classifications

1. International Standard Industrial Classification (ISIC)
    - Use: Classification of economic activities.
2. Central Product Classification (CPC)
    - Use: Classification of goods and services.
3. International Standard Classification of Education (ISCED)
    - Use: Classification of educational programs and related qualifications.
4. International Classification of Diseases (ICD)
    - Use: Classification of diseases and health conditions.

Data Collection and Dissemination Practices

1. Survey Methodology Standards
    - Sampling: Probabilistic sampling techniques to ensure representativeness.
    - Questionnaire Design: Best practices in designing and testing survey instruments.
2. Data Dissemination Standards
    - Timeliness: Prompt release of statistical data.
    - Accessibility: Ensuring data is accessible to all users.
    - Formats: Use of user-friendly formats and online databases.

Annex 5: Grading System for Research Outputs and Data

(adapting from University of Hull research repository)

1. By Type of Research Output

A1: Peer-Reviewed Articles

Research articles published in peer-reviewed journals.
High-impact, validated through rigorous review processes.

A2: Conference Papers

Papers presented at academic and professional conferences.
Often peer-reviewed, but generally shorter and less detailed than journal articles.

A3: Theses and Dissertations

Comprehensive research works submitted for academic degrees.
Subject to academic scrutiny and defense.

A4: Technical Reports

Detailed accounts of specific research projects.
Often produced by research institutions, governments, or corporations.

A5: Working Papers

Preliminary research findings shared for feedback.
Not yet peer-reviewed or formally published.

A6: Book Chapters

Contributions to edited volumes.
Usually subject to editorial review and approval.

A7: Datasets

Raw or processed data used in research.
Accompanied by metadata for context and usability.

A8: Software and Tools

Programs, algorithms, or tools developed as part of research.
Includes documentation and usage instructions.

2. By Quality and Validation

Q1: High-Quality, Peer-Reviewed

Research outputs that have undergone rigorous peer review.
Published in high-impact journals or conferences.

Q2: Moderate-Quality, Peer-Reviewed

Outputs published in reputable but less impactful venues.
Validated through peer review but not as widely recognized.

Q3: Preliminary, Non-Peer-Reviewed

Early-stage research outputs shared for feedback.
Includes working papers and drafts.

Q4: Non-Validated

Outputs not subject to any formal review process.
Includes personal communications, notes, and internal documents.

3. By Accessibility and Open Access

O1: Open Access

Freely accessible to the public without restrictions.
Includes articles in open-access journals and repositories.

O2: Restricted Access

Accessible only to certain groups (e.g., institutional members, subscribers).
Requires login or subscription for access.

O3: Confidential

Restricted to specific individuals or groups.
Contains sensitive or proprietary information.

4. By Usage and Impact

I1: High Impact

Widely cited and influential in the field.
Recognized for contributing significant advancements.

I2: Moderate Impact

Cited and recognized, but not as influential.
Contributes useful findings or methodologies.

I3: Low Impact

Few citations or recognitions.
May be of niche interest or limited scope.

5. By Completeness and Documentation

C1: Fully Documented

Comprehensive metadata, clear methodologies, and complete datasets.
Includes thorough explanations and usage instructions.

C2: Partially Documented

Contains some metadata and methodology details.
May require additional context or clarification for use.

C3: Minimal Documentation

Limited metadata and methodological details.
May be difficult to interpret or use without further information.

6. By Relevance and Subject Area

R1: Core Research

Central to the main focus of the repository's subject area.
Highly relevant to key topics and ongoing research.

R2: Related Research

Relevant to the subject area but not central.
Provides context or supplementary information.

R3: Peripheral Research

Indirectly related to the subject area.
May provide broader context or interdisciplinary insights.

Implementation

Each research output or dataset in the repository can be tagged with the appropriate categories from the grading system. For example, a peer-reviewed journal article with open access, high impact, and full documentation in the core subject area would be tagged as A1, Q1, O1, I1, C1, and R1. This tagging system allows users to easily filter and find research outputs based on their needs and the specific attributes they are looking for.

By implementing such a grading system, the repository enhances its usability, helping researchers, policymakers, and other stakeholders quickly identify and access the most relevant and high-quality research outputs and data.

Annex 6: Example of a tiered pricing model to access a research repository

(Adapting examples from https://www.subscriptionflow.com/)

A tiered pricing model for accessing a research repository can be designed to offer different levels of access and benefits based on the needs and budgets of various users. Here are some potential options for a tiered pricing model:

A. Basic Access Tier

- **Price:** Free or low-cost
- **Features:**
  a. Access to abstracts and summaries of research papers.
  b. Limited number of free downloads per month (e.g., 3-5 papers).
  c. Basic search and browse functionality.
  d. Access to open-access articles and datasets.
- **Target Users:** General public, students, and casual researchers.

B. Standard Access Tier

- **Price:** Moderate subscription fee
- **Features:**
  a. Full-text access to a larger selection of research papers and articles.
  b. Increased download limit (e.g., 20-30 papers per month).
  c. Advanced search and filtering options.
  d. Access to older archives and certain paywalled articles.
  e. Email alerts for new research in specified fields.
- **Target Users:** Graduate students, independent researchers, and small organizations.

C. Premium Access Tier

- **Price:** Higher subscription fee
- **Features:**
  a. Unlimited full-text access to all available research papers and articles.
  b. Priority access to new releases and embargoed research.
  c. Advanced analytical tools and data visualization features.
  d. Personalized recommendations and curated content.
  e. Ability to request specific articles not currently in the repository.
  f. Customer support and research assistance.
- **Target Users:** Academics, large institutions, corporate researchers, and libraries.

D. Institutional Access Tier

- **Price:** Negotiable based on the size and needs of the institution
- **Features:**
  a. Full access for multiple users within the institution (e.g., university or corporation).
  b. Customizable access options for different departments or user groups.
  c. Integration with institutional systems (e.g., single sign-on, library management systems).
  d. Bulk download capabilities and data export options.
  e. Institutional usage analytics and reporting tools.
  f. Dedicated account manager and enhanced support services.

- **Target Users:** Universities, research institutions, large corporations, and government agencies.

E. Pay-Per-View Option

- **Price:** Per-article fee
- **Features:**
    a. One-time access to individual research papers without a subscription.
    b. Pricing may vary based on the publication date and journal impact factor.
    c. Option to purchase bundles or credits for multiple articles.
- **Target Users:** Occasional researchers, media professionals, and users with specific, limited needs.

Implementation Considerations

1. **User Authentication and Access Control:**
    a. Implement robust user authentication to manage different access levels.
    b. Ensure secure payment processing and data privacy.
2. **Content Licensing and Permissions:**
    a. Obtain appropriate licenses for distributing research papers and datasets.
    b. Ensure compliance with copyright laws and agreements with publishers.
3. **User Experience and Interface Design:**
    a. Create an intuitive user interface that clearly delineates the features available at each tier.
    b. Provide easy upgrade options for users to move to higher tiers.
4. **Marketing and Promotion:**
    a. Offer trial periods or discounts to attract new users.
    b. Use targeted marketing to reach potential users in different sectors.
5. **Feedback and Adaptation:**
    a. Collect user feedback to continuously improve the service.
    b. Regularly review and adjust pricing and features based on user demand and market trends.

By offering a tiered pricing model, athe Zambia research and evaluation repository can cater to a diverse user base, ensuring accessibility for those with limited resources while providing enhanced features and services for users with more extensive needs.