

International Association of Social Science Service & Technology (IASSIST) Africa Chapter Webinar Series

Building a Sustainable Data Management Framework for Kenyan Research Institutes
in the Era of Big Data

Presented By:

Dr. Kenneth. G. Riany

→ Presentation Outline:

- 1. Introduction**
- 2. Challenges in Data Management**
- 3. Research Objectives**
- 4. Why the Study ?**
- 5. Research Design and Methodology**
- 6. Summary of Findings, Conclusion, and Recommendations**
- 7. Proposed Framework Overview**
- 8. Scope and Limitations of the Study**
- 9. Acknowledgements, Questions & Answers**



→ Introduction:

❑ **Kenyan research institutes grapple with data challenges:**

- In Kenya, research institutions are encountering data-related hurdles as research becomes increasingly data-driven.

❑ **Big data's compounding effect:**

- The rise of big data has exacerbated these challenges, adding complexities to data collection, storage, analysis, and sharing.

❑ **The call for a sustainable data management framework :**

- To address these issues, there's a clear need for a sustainable data management framework.

❑ **Presentation objectives.**

- This presentation proposes a comprehensive framework covering data collection, storage, analysis, and sharing. It also address data privacy, legal compliance, and ethics

→ Challenges in Data Management:

❑ Data Collection Challenges

Volume: Managing vast amounts of data from various sources.

Variety: Dealing with diverse data types, from text to images.

Velocity: Ensuring real-time data capture and processing.

❑ Storage Challenges

Scalability: Expanding storage infrastructure to accommodate big data.

Cost: Balancing the expenses of data storage, retrieval, and backup.

❑ Analysis Challenges

Complexity: Handling intricate data analytics and deriving meaningful insights.

Resource Requirements: Demanding computational resources and skilled data analysts.

❑ Sharing Challenges

Security: Safeguarding data during sharing, ensuring confidentiality.

Collaboration: Facilitating seamless collaboration while protecting data integrity.

❑ Impact of Big Data

Data Overload: Big data exacerbates the challenges due to its sheer volume, complexity, and pace of generation.

Resource Intensity: The need for advanced infrastructure, tools, and expertise grows with the influx of big data.

→ Research Objectives:

1

General Research Objective : to design, develop, and propose a comprehensive Sustainable Data Management Framework for Kenyan research institutes, with a focus on addressing the multifaceted challenges posed by big data and data-driven research..

2

Specific Research Objectives:

- a. Investigate the **existing data management practices** within Kenyan research institutes, identifying strengths, weaknesses, and alignment with global trends and best practices.
- b. **Design an adaptable and sustainable data management framework** tailored to the unique needs and challenges of Kenyan research institutes, encompassing data collection, storage, analysis, and sharing.
- c. Explore the **ethical considerations and legal requirements relevant to data-driven research**, that ensure ethical data handling, privacy protection, and compliance within the proposed framework.
- d. Determine **robust data security measures** that safeguard sensitive and personal data throughout the data lifecycle.
- e. Explore **collaborative partnerships** that leverage on collaborative infrastructure, knowledge exchange, and resource-sharing mechanisms that enhance the implementation and sustainability of the framework.
- f. **Propose capacity building initiatives** that equip researchers, data managers, and administrators with the necessary skills to effectively operate within the framework, ensuring its successful adoption and utilization.

→ Why the Study ?:

1

Advancing Research & Innovation:

- The key to releasing the revolutionary potential of big data for research and innovation lies in effective data management techniques.

2

Bridging the Knowledge Gap:

- A well-designed DMF may close knowledge gaps and promote evidence-based decision-making in a region like Africa where distinct problems frequently call for context-specific solutions.

3

Enhancing Data Privacy & Security:

- Big data's also raises important issues about data security and privacy. as research institutes gather and share enormous amounts of sensitive information

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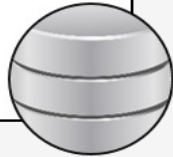
Collaborative Research & Global Partnerships:

- The design of a DMF opens doors for international collaboration and cooperative research between Kenyan academic institutions and groups like NRF, Kenya Education Network Trust (KENET)

→ Research Design and Methodology:

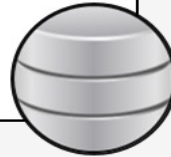
- Mixed Methods Research
- Positivism and Interpretivism

Research Design and Philosophy



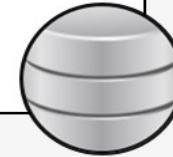
- Surveys
- Interviews
- Document Analysis
- Collaborative Workshops
- Expert Consultations

Data Collection



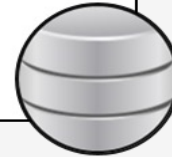
- Thematic
- Quantitative, Comparative,
- Pattern Recognition, Qualitative
- Data Coding
- Stakeholder Perspectives

Data Analysis



- Technology Acceptance Model (TAM) (Davis, 1989)
- Unified Theory of Acceptance and Use of Technology (UTAUT) Venkatesh *et al.*, (2003)

Theoretical Review



- Global Perspective
- Regional Perspective
- Local (Kenyan) Perspective

Empirical Review



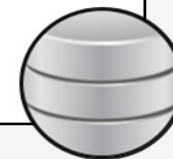
- Data Analysis Insights
- Conceptual Framework Creation:
- Stakeholder Engagement
- Component Refinement
- Policy and Guideline Consideration
- Iterative Refinements

Framework Development Process



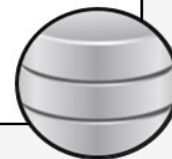
- Expert Reviews
- Pilot Testing
- Stakeholder Feedback collectively contributed to successive iterations of the framework

Validation and Iteration



- General Data Protection Regulation (GDPR)
- Kenya Data Protection Act 2019

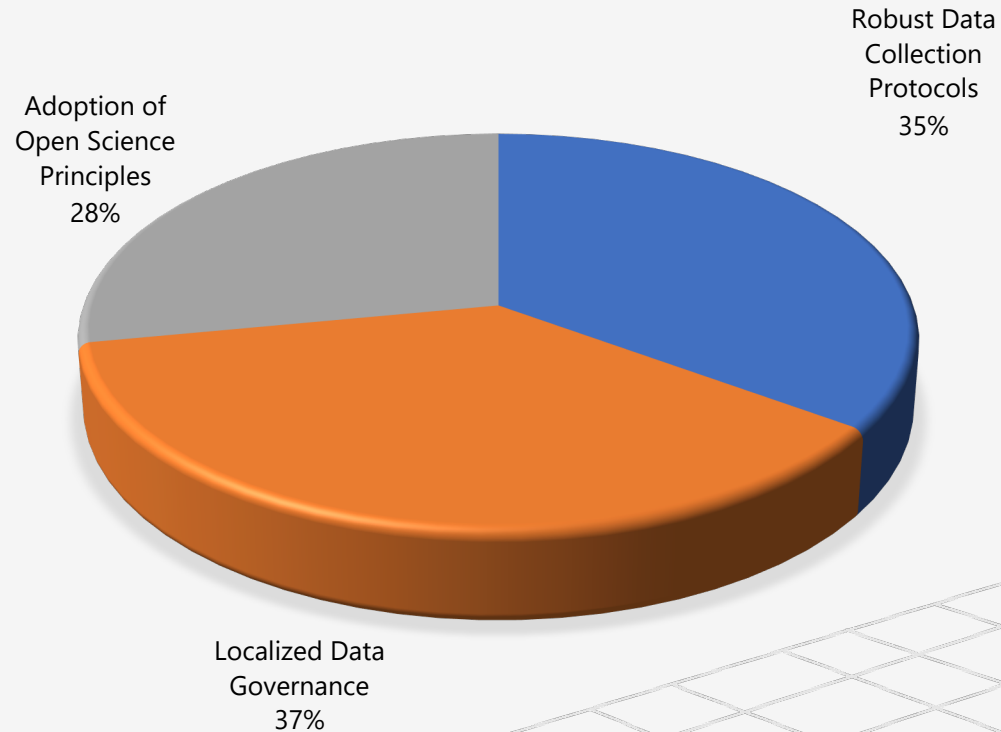
Ethical Considerations



💡 Summary of Findings, Conclusion, and Recommendations:

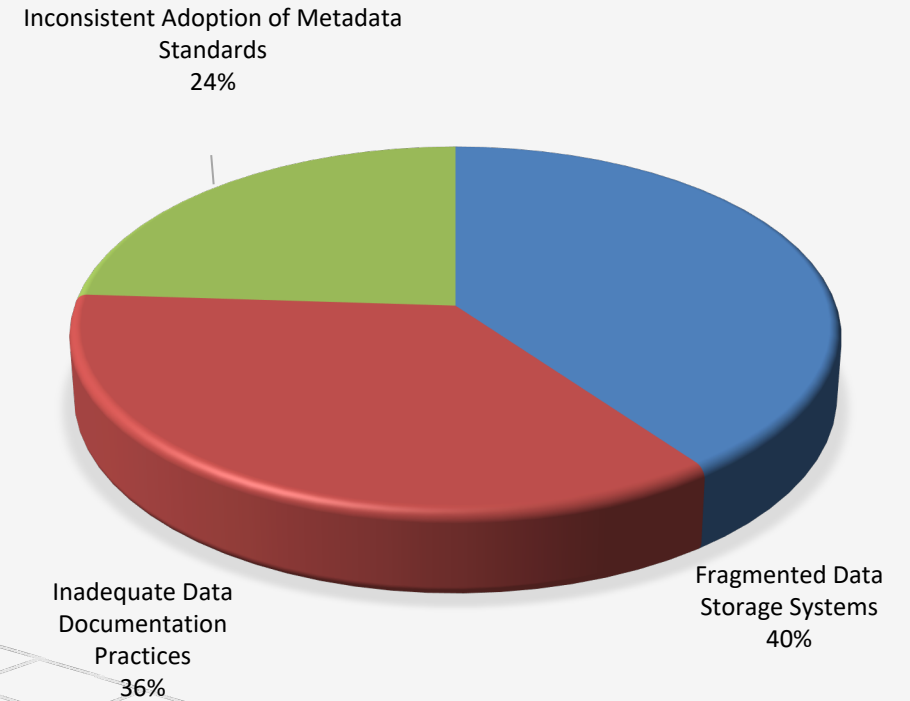
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Data Management Practices -Strengths



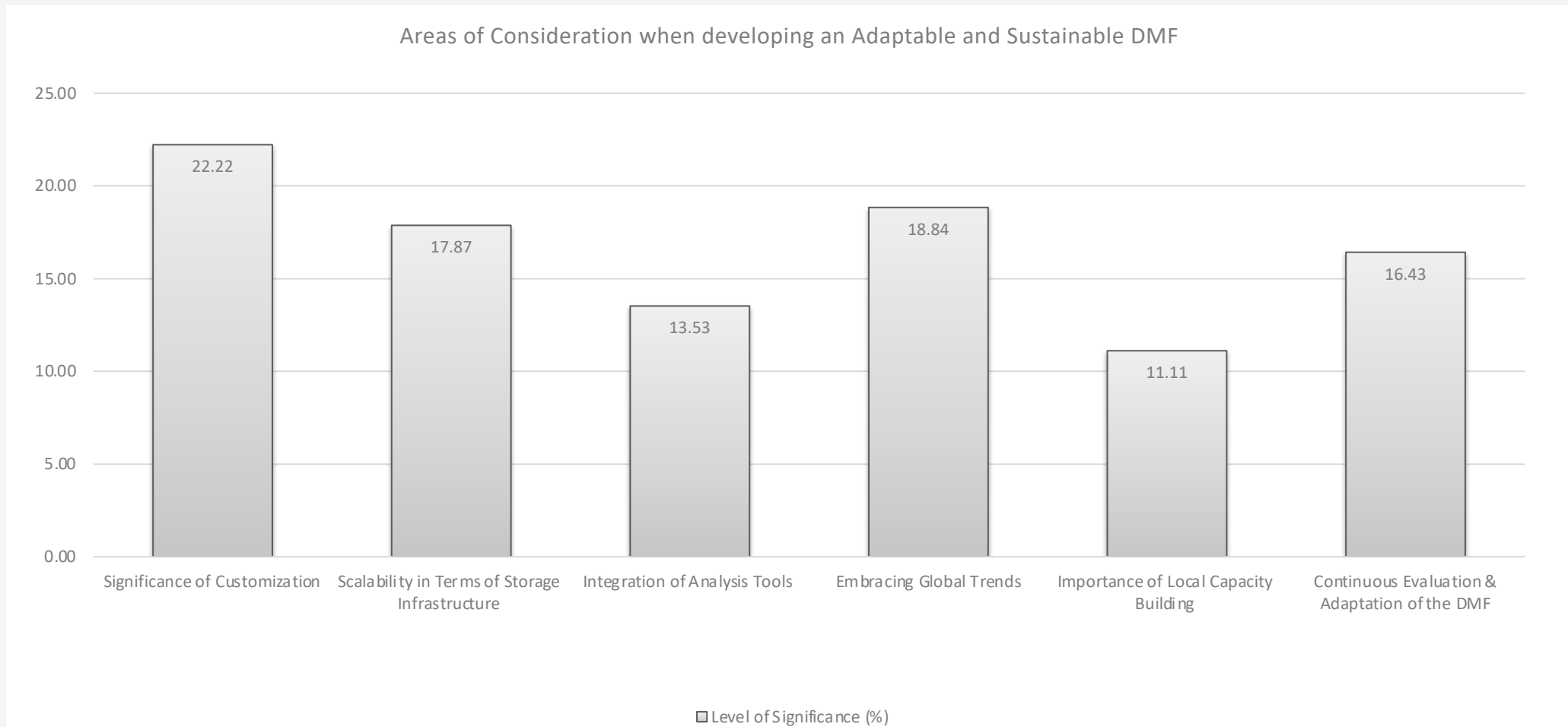
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Data Management Practices -Weaknesses



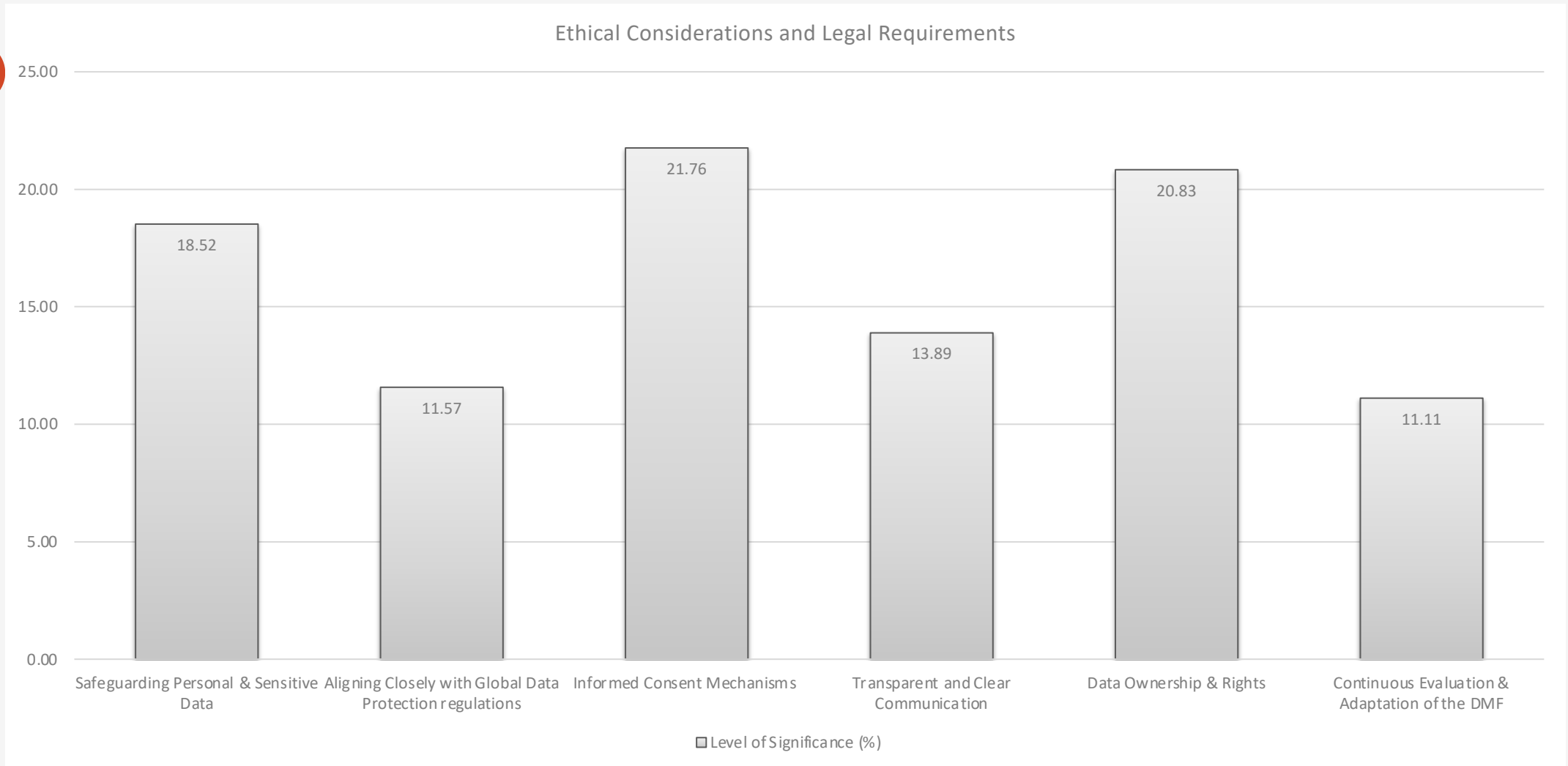
💡 Summary of Findings, Conclusion, and Recommendations:

3



💡 Summary of Findings, Conclusion, and Recommendations:

4



1 Data Governance Policies

- Establish clear policies and guidelines for data management.
- Define roles and responsibilities for researchers, data managers, and other stakeholders.
- Address ethical considerations, data ownership, and compliance with regulations.

2 Data Planning & Documentation

- Create data management plans (DMPs) before starting the project.
- Emphasize on detailed documentation for datasets, including metadata, data formats, and data dictionaries.

3 Data Storage and Infrastructure

- Identify secure and scalable storage solutions for different types of data.
- Consider cloud-based storage, institutional servers, or appropriate options.
- Ensure that data storage complies with security and privacy standards.

4 Data Security and Access Control

- Implement measures to safeguard sensitive or confidential data.
- Define access controls to regulate who can view, modify, or delete data.
- Use encryption and authentication mechanisms to protect data

5 Data Quality Assurance

- Establish protocols for data validation, cleaning, and quality control.
- Leverage on standardized data formats and validation tools.
- Implement version control to track changes and updates to datasets.

6 Metadata Standards

- Define metadata standards to ensure consistent and comprehensive data descriptions.
- Promote the use of standardized metadata schemas within the research community.

7 Data Sharing and Collaboration

- Encourage researchers to share data within the research community or publicly where appropriate.
- Facilitate collaboration by providing tools and platforms for sharing and exchanging data

8 Long-Term Preservation

- Develop strategies for preserving data over the long term.
- Consider data archiving, backup mechanisms, and migration plans for changing technologies

9 Training and Support

- Provide training and support for researchers on data management best practices.
- Offer resources and workshops to enhance data management skills

10 Compliance and Legal Considerations

- Ensure that data management practices comply with relevant legal and regulatory frameworks.
- Address issues related to intellectual property, licensing, and copyright.

11 Data Archiving & Disposal

- Implement mechanisms to monitor adherence to data management policies.
- Regularly evaluate the effectiveness of the RDM framework and make adjustments as needed.



12 Data Archiving & Disposal

- Define procedures for the responsible and secure disposal of data at the end of its lifecycle.
- Consider legal and ethical aspects when deleting or archiving data

Questions & Answers

Thank you

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