



UNLOCKING RESEARCH DATA FOR AI THROUGH FAIR-ALIGNED DATA INFRASTRUCTURE

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- Despite the enormous investments in academic research, a significant portion of raw big data generated across African universities and research institutions remains inaccessible.
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Limits



Reproducibility

Unshared data prevents others from verifying results.



Transparency

Hidden data obscures methods and assumptions.



Innovation

Lack of access slows new discoveries.

Current Work at MAREN

- At MAREN, we are exploring data management frameworks such as **YODA** and **iRODS** to strengthen research data stewardship aligned with **FAIR principles**



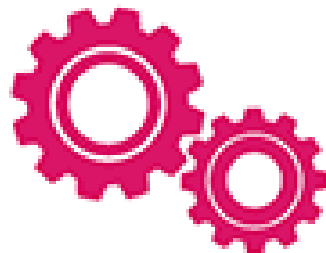
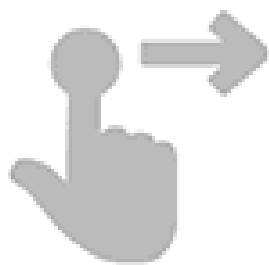


Findable

Accessible

Interoperable

Reusable



The AI Question

- Africa's AI progress is slowed by the lack of quality, domain-specific datasets.

This raises a key question:

- *Can research data managed under FAIR-aligned infrastructures be repurposed for AI training?*

Methodology



Key Findings

- There are strong use cases showing how FAIR research datasets are being reused to design, train, and validate AI models to speed scientific discovery in:
 - materials science
 - climate research
 - life sciences
 - particle physics

Key Findings contd..

- **Technical feasibility:** FAIR-aligned data can support AI training, but success depends on rich metadata, domain ontologies, and access to computing infrastructure.

Observations from Malawian Datasets

- A brief review of publicly available Malawi-related datasets on Harvard Dataverse highlights
 - Metadata is mostly descriptive with limited use of structured vocabularies.
 - Most datasets include documentation or codebooks, but few define variable-level metadata or ontologies.
 - No machine-actionable schema (JSON-LD/RDF) detected in reviewed records.
 - Dataset discoverability is good, but semantic interoperability remains low.

Key Findings contd..

- **Governance and ethics:** FAIR principles alone do not guarantee responsible AI reuse; issues like licensing, bias, and privacy still need stronger governance frameworks.

The African Context

- Limited data management practices for raw research data
- Human discoverability vs machine-actionable reuse.
- Lack of compute infrastructure
- Governance and licensing mechanisms for AI reuse are weak or unclear

The MAREN Case

- Establish institutional data management infrastructure
- Prepare infrastructure for FAIR readiness
- Promote adoption and Support institutions to add structured metadata and domain ontologies.
- Federate access with controlled governance
- Integrate HPC for compute resources

Beyond Malawi – The Role of African NRENs

- Enable researchers to access and reuse FAIR datasets across borders
- Use Federated infrastructure for shared storage and compute
- Harmonize governance, licensing, and ethical frameworks
- Regional data commons: Create domain-specific, shared repositories

Conclusion

- FAIR-aligned data can enable AI-driven scientific discovery where metadata, ontologies, and compute are sufficient.
- Global cases show feasibility in resource-rich, well-governed ecosystems.
- African NRENs, like MAREN, can use existing infrastructure to support FAIR readiness, federated access, and HPC integration.
- Regional collaboration can expand AI-driven discovery beyond national boundaries.

Questions??

Thank You

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