

# Open Science Dakar symposium

## Open Science in the South countries: Challenges and Prospects for a New Dynamic- Case of AOSP

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# Introduction

For Africa to excel in the new data dispensation, commitment and investment are required for:

- Open Data policies on governmental levels.
- Enabling Information and Communications Technology (ICT) infrastructure environments.
- Commitment to train system architects, system support staff, user support staff, data engineers, data architects, data stewards and data scientists to practice data science
- Effective and efficient Research Data Management Services.
- aspiration of the African Open Science *“to put African scientists at the cutting edge of contemporary, data-intensive science as a fundamental resource for a modern society”*

# AOSP priorities

- Open Data Policy;
- e-Infrastructure;
- Developing Human Capacities; and
- Research Data Management.

# AOSP Principal Platform Strands

STRAND 1	Shared broadband networks, computation and storage
STRAND 2	Good practices in managing and using core resources, including technical specifications, standards, protocols, and FAIR research outputs
STRAND 3	Cutting-edge support for domain scientists in data analytics and AI
STRAND 4	Collaborative research programmes on major regional priorities, that also facilitate creation of the critical masses necessary for regional scientific vitality
STRAND 5	Training, education and capacity enhancement
STRAND 6	Programmes of societal engagement on key topics in the transdisciplinary mode.

# OPEN SCIENCE POLICIES-Framework

- To exploit the benefits of the digital revolution, to contribute to the development of the 4th industrial revolution in Africa and to serve the needs of its science community
- The African Open Science Platform represents such a bottom-up, top-down convergence
- Getting this policy balance right is a vital priority for the AOSP

# ...2

- To date, there is no evidence that national-level open data policies have been finalised and fully implemented on the African continent.
- Some countries (Botswana, Kenya, Madagascar, Mauritius, South Africa, and Uganda) have indeed made progress in developing policies and strategies for open data, though they are not yet rigorously implemented.

# Priority issues for open science policy



- **Adopt the FAIR (Findable, Accessible, Interoperable, Re-usable) data principles.**
- **Apply instrumental, procedural and distributive data justice.**
- Create an enabling environment in support of Open Access for all research outputs.
- Support the use (application and implementation) of open licenses for both research data and literature.
- Provide a shared and interoperable research infrastructure.
- Incentivise data sharing and Open Access publishing



## ...2

- Encourage the use of Open Source software.
- Extend the principle of Open Innovation.
- Integrate data science and data management into institutional curricula.
- Include citizens as stakeholders through community engagement, science communication efforts.
- Determine where the limits of openness lie (e.g. privacy, safety and security).



# Observation

- African countries invest far too little in ICT, STI and R&D.
- Only two of the 54 African countries contribute 0.8% of their GDP (Gross Domestic Product) to R&D (UNESCO Institute for Statistics<sup>13</sup>), which is the closest to the African Union's suggested 1%.
- This trend reflects an absence of political will, a lack of resources and varying intra-African priorities.
- Part of the role of the AOSP is to address these dilemmas.

# CAPACITY BUILDING (CB)-Framework

- The AOSP mission is both dependent on and provides support for networks of education and skills involving the whole educational ecosystem.
- It entails crafting, developing and implementing an African Open Science curricula that will enable Africans to manage Open Science on their own terms.
- A framework for capacity building in Open Data and Open Science is therefore proposed to develop the requisite knowledge, attitudes, skills and values.

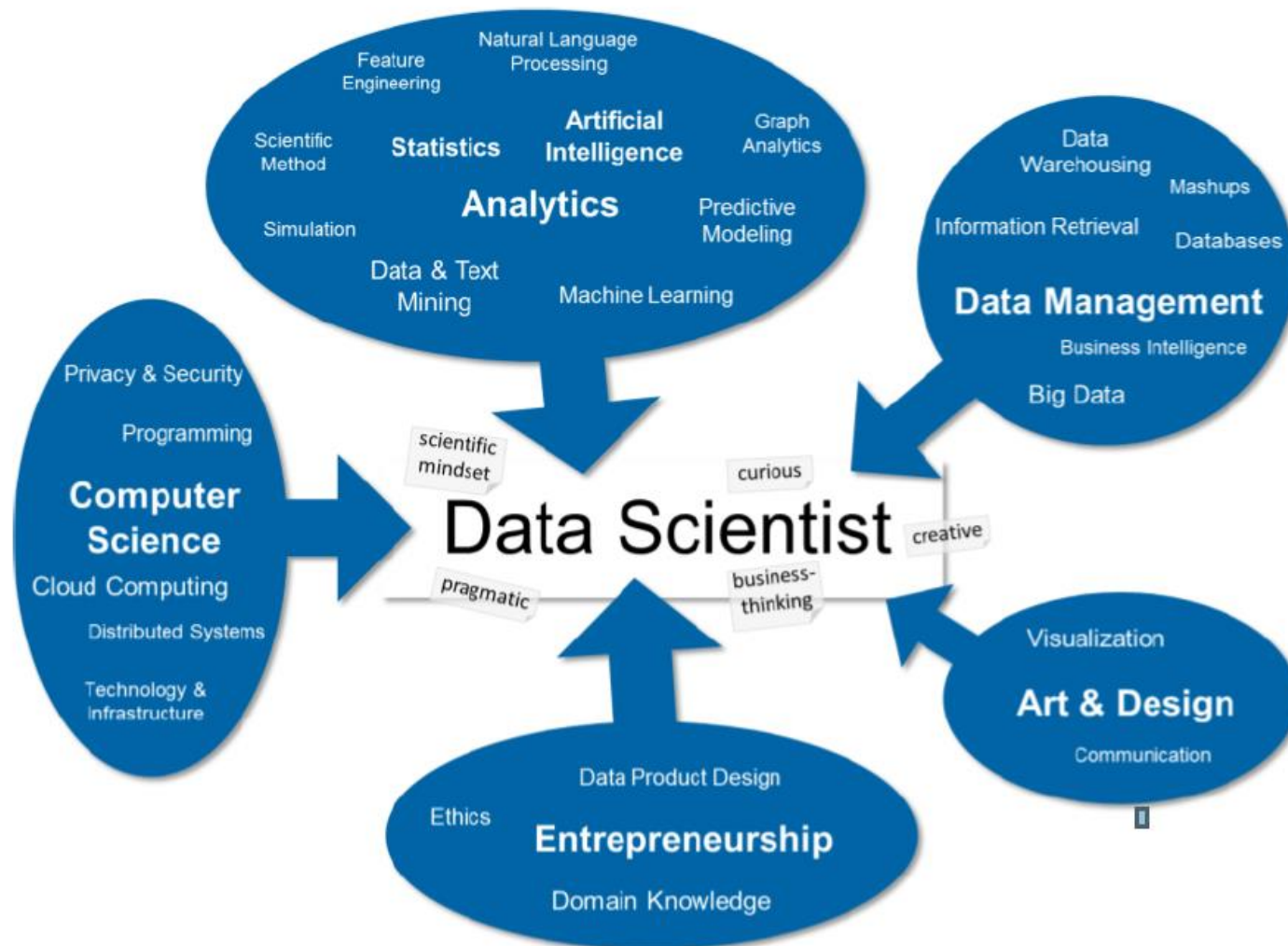
## CB...2

- African students are only exposed to data science during tertiary level education.
- By championing rationalised and coordinated training, the AOSP will endeavour to stimulate change on these matters in ways that advance African science priorities as outlined in the Science, Technology and Innovation Strategy for Africa (STISA 2024) and Agenda 2063.

# CB Requirements

- ✓ **Data stewards** who handle and manage data and whose responsibilities include planning, implementing and managing research data input, storage, search, and presentation. They create models for domain specific data, support and advise domain scientists/researchers during the whole research and data management lifecycle.
- ✓ **Data scientists** who have expertise in the overlapping regimes of business needs, domain knowledge, analytical skills, programming and systems engineering, and manage end-to-end scientific processes through each stage of the data lifecycle, up to the delivery of scientific and business value to science or industry.

# The data science skill set



# CB Benefits

- ✓ Unleashing Africa's potential for innovation and improved employment through work at the forefront of open data and open science.
- ✓ Opening new frontiers in technological innovation that utilise Big and Broad Data as bases for machine learning solutions.
- ✓ Applying innovative capacity to benefit many of the issues that are central to Africa's development: eg
  - ✓ disease control;
  - ✓ agriculture and food security;
  - ✓ health systems;
  - ✓ disaster risk reduction

# Challenges in Building Capacity

- Lack of political/managerial awareness of the vital need for investment.
- Lack of investment capital.
- Lack of leadership and direction.
- Lack of training opportunities.
- Inadequate infrastructure: slow and unstable connectivity, unreliable power supply, obsolete computer infrastructure from medium-scale server infrastructures to small numbers of workstations, lack of centralized and secure data storage.
- Negative attitudes towards data science from researchers already suffering from high workloads, inappropriate incentives and a conservative ethos.
- Training courses not acknowledged by national accreditation agencies



## Overcoming these barriers would benefit from:

- ✓ **Developing a federated pan-African strategy and actions through the African Open Science Platform as a bold and ambitious signal of intent.**
- ✓ **Developing agreements with a consortium of funders for a decadal support programme.**
- ✓ **Enhancing and coordinating supportive international collaboration.**
- ✓ **Creating training workshops and online seminars.**
- ✓ **Sharing resources among institutions and optimising the potential of those resources.**
- ✓ **Funders making provision for capacity building as a part of grant allocation.**
- ✓ **Institutions making provision for capacity building as part of institutional budgets.**
- ✓ **Including data science training as part of Continuing Professional Development (CPD).**
- ✓ **Integrating data science modules as part of all courses in higher education, and encouraging students to enroll in these modules.**
- ✓ **Incentivising employees and recognise efforts as part of performance appraisal**

# OS Incentives (OSI)

## ✓ Adopt open access principles:

- Provide a framework for developing new publishing models, which can be achieved by creating a concise set of open access principles for publishing models. This should be done by the stakeholders

# OSI ...2

## ✓ Stimulate new publishing models for knowledge transfer

- Encourage the development of publishing models that provide free access for readers/users. Bring in more competition into the academic publishing market. Foster the development of new models for academic communication, beyond the traditional scientific articles.
- Explore alternative ways of releasing research results, of commenting on them and of measuring their impact.
- Facilitate bringing in new users – such as citizens– into the research process

# OSI ...3

## ✓ Facilitate text and data mining (TDM) of content

- Reform copyright legislation to allow TDM for academic purposes and preferably also for societal and commercial purposes for users who already have legal access to content. Encourage researchers not to transfer the copyright on their research outputs before publication

# OSI ...4

- ✓ Improve insight into IPR and issues such as privacy
  - Clarify IPR regimes to all parties involved in public-private partnership projects and potential new parties who are not aware of the possibilities. Set rules and conditions for public funding of research in which open (data) is the default standard.

# OSI ...5

- ✓ Create transparency on the costs and conditions of academic communication
  - Introduce greater transparency in costs and conditions connected with academic communication as soon as possible so as to enable a better transition to open access

# OSI ...6

## ✓ Introduce FAIR and secure data principles

- Develop Principles & Guidelines for Data Management Plans and data stewardship.
- Create optimal conditions for sharing research output by introducing a quality hallmark for the FAIR principles, data, and data management requirements.



# OSI ...7

## ✓ Set up common e-infrastructures

- Align practices and work towards a sustainable federated African Open Science Platform (AOSP)) that aims to accelerate and support the current transition to more effective open science and open innovation in a Digital Single Market.

## Summary of African Open Science Policy Framework

Policy Statements		Enabling Practices	Policy Implementers											
			1	2	3	4	5	6	7	8	9	10	11	
1	Adopt Findable, Accessible, Interoperable and Reusable (FAIR) Data Principle	<ul style="list-style-type: none"> <li>Promote open science culture through training and awareness raising</li> <li>Develop cloud computing facilities that provide networked computation, data access and analysis tools</li> <li>Promote science diplomacy</li> </ul>												
2	Observe instrumental, procedural and distributive data justice while handling, using and distributing data	<ul style="list-style-type: none"> <li>Promote open science culture through training and awareness raising</li> <li>Encourage citizen science</li> <li>Support open collaboration through ICTs</li> <li>Develop cloud computing facilities</li> <li>Support Open Innovation</li> <li>Promote Science Diplomacy</li> </ul>												
3	Establish open access to publications through repositories and journals	<ul style="list-style-type: none"> <li>Promote Open Science Culture through Training and Awareness raising</li> <li>Encourage Citizen Science</li> <li>Support Open Collaboration through ICTs</li> <li>Promote Science Diplomacy</li> </ul>												
4	Support Submission of data to a repository before submitting the respective manuscript describing the respective data	<ul style="list-style-type: none"> <li>Promote Open Science Culture through Training and Awareness raising</li> <li>Encourage Citizen Science</li> <li>Support Open Collaboration through ICTs</li> </ul>												
5	Develop Shared and interoperable data infrastructure	<ul style="list-style-type: none"> <li>Develop cloud computing facilities that provide networked computation, data access and analysis tools</li> <li>Support open collaboration through ICTs</li> <li>Support open innovation</li> <li>Encourage citizen science</li> </ul>												

### Policy Implementer Key:

**1** -Government, **2** -Policy Makers, **3** -Universities, **4** -Scholarly Societies, **5** - Publishers, **6** - Research Institutes, **7** - Research Funding Agencies, **8** -Repositories, **9** - Libraries, **10** -Archives, **11**- Researchers

Policy Statements		Enabling Practices	Policy Implementers										
6	Encourage use of recognized waiver or license that is appropriate for data	<ul style="list-style-type: none"> <li>Promote open science culture through training and awareness raising</li> <li>Promote open software code</li> </ul>											
7	Public and private funders should adopt obligatory green, gold or a hybrid of green and gold open access policies with their respective implementation measures	<ul style="list-style-type: none"> <li>Promote open science culture through training and awareness raising</li> <li>Support open collaboration through ICTs</li> <li>Develop cloud computing facilities that provide networked computation, data access and analysis tools</li> <li>Support open innovation</li> <li>Promote science diplomacy</li> </ul>											
8	Offer incentives to acknowledge open practices in publications	<ul style="list-style-type: none"> <li>Promote open science culture through training and awareness raising</li> <li>Promote open software code</li> <li>Develop cloud computing facilities</li> <li>Support open collaboration</li> </ul>											
9	Encourage Open peer-review models	<ul style="list-style-type: none"> <li>Promote open science culture through training and awareness raising</li> <li>Support open collaboration through ICTs</li> <li>Develop cloud computing</li> <li>Support open innovation.</li> <li>Promote science diplomacy</li> </ul>											

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# Thank you