



**Developing Open Science In Africa: Barriers, Solutions and Opportunities**

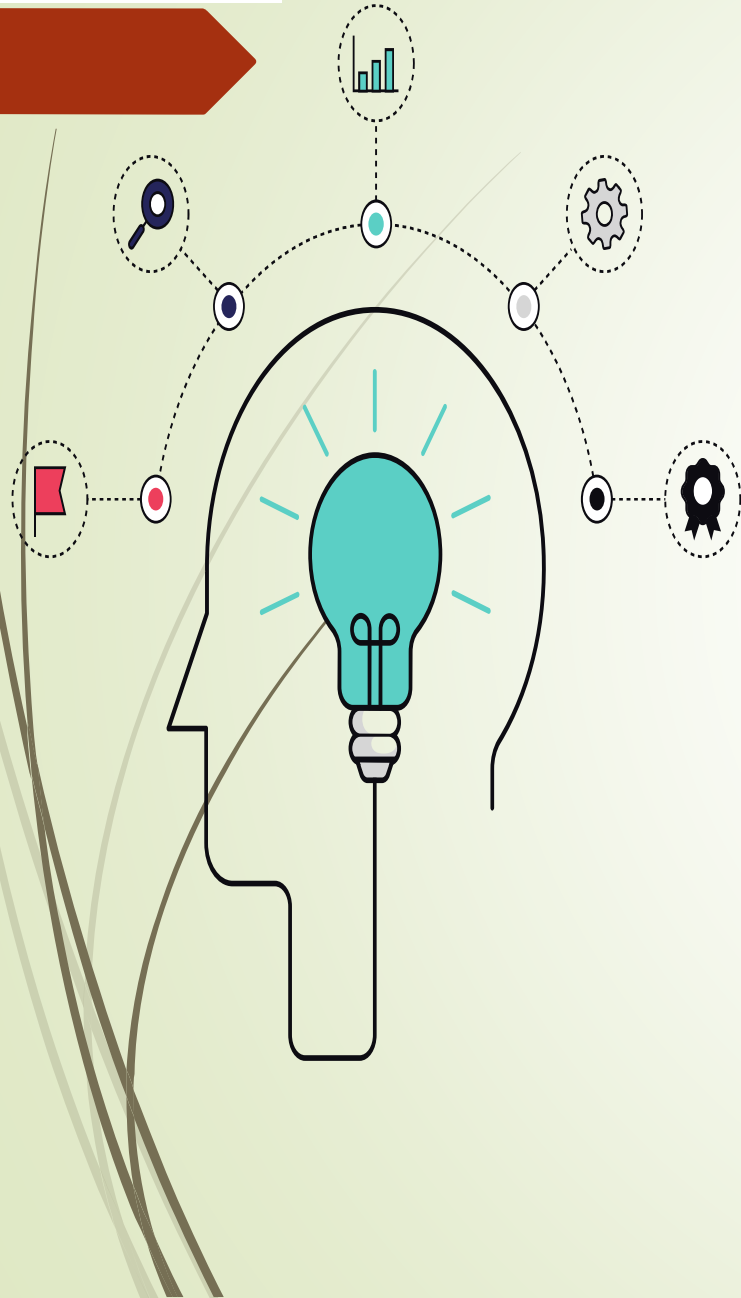
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# Thrust of the paper

Our paper argues for the development of open science in Africa as a means of **energising national science systems and their roles in supporting public and private sectors and the general public.** It focuses on the complexity of the social and economic challenges created by climate change and the demographic explosion and the difficulty of confronting them in the absence of an adequate digital infrastructure. ... and a well-developed science system. ...

We conclude that a **well-developed Open Science system for Africa, would develop and enhance collaborations and partnerships among Africans to tackle the challenges that they face and accelerate innovation and development.**



# PRESENTATION OVERVIEW

- Global trends
- Call for Open Science

Multifaceted

SOLUTIONS

INTRODUCTION



CONTEXT



METHODS



FINDINGS



RECOMMENDATIONS



Local context  
African science and  
science systems

BARRIERS

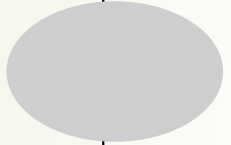
# Our Understanding of Open Science (ISC, 2020)

SAFETY,  
SECURITY,  
PRIVACY



OPEN SCIENCE

scrutiny



And to support humanity in achieving sustainable life on earth

challenge



Open to engagement with other societal actors in pursuit of knowledge

Makes evidence of data + evidence of science

Knowledge needs + interest of wider public

Accessible + free to all regardless of gender, geography, discipline, social standing

Makes Record of science



accessible and re-usable by all subject to constraints of SSP.



# INTRODUCTION: STATE OF OPEN DATA POLICY AND PRACTICE IN THE WORLD



The Global Open Data Barometer 2016, Source: World Wide Web Foundation (2016).

# Intro: Global trends; Call for Open Science

- Trend in Science changing : Europe, The United States, Canada, Australia, South America
- Challenge to hegemony of disciplinary science/Internal hierachy between discipline/autonomy of scientists + their institutions
- This is being superceded **but not replaced** by the new paradigm of knowledge production
  - Socially distributed, application-oriented, trans-disciplinary and subject to multiple accountabilities (Gibbons et al., 1995; Nowotny, Scott and Gibbons, 2003).
- These developments have been enabled by the digital revolution and its delivery of ubiquitous communication.

## Intro: Global trends; Call for Open Science

- Broad and Big data feeding the ferocious appetite of algorithms in AI with Machine Learning providing insights and knowledge from complex data
- Data being shared in an attempt to solve complex global problems such as Ebola and COVID-19
- OS has stimulated openness and interdisciplinary interactions
- This favour sharing data that is a necessary pre-condition for exploring the complexity inherent in many global challenges.
- This requires the integration of data from a diverse range of disciplines.

# Context: African Science & Science Systems

Surge in digital & computational technologies

Contribution to global scientific knowledge 0.74%/less than 1% Boulton et al ,(2020) Assaf, (2019); Fonn, et al (2018)

Most content on internet linguistically unavailable to vast majority of Africans

**MISSING OUT ON OPPORTUNITIES**

African research output not adequately visible

Poorly represented in indexing systems SCORPUS (2020) Web of Science(2020)

Online Journals only began to make impact Diff. access (AJOL, 2019)

AFRICAN RESEARCH PAPERS

Under utilised/under valued / under cited in international research arenas

Internet offers opportunities. However, 100s of worthy peer reviewed journals cannot host content online in isolation

- Resource limitations + digital divide
- Divergence digital capability: SA; Ethiopia; Kenya; Egypt

African Science are generally weak

Operate in isolation Siloed Less collaboration Poorly funded Weak infrastructure

- A. Scientists collaborate more with western scientists than among themselves
- B. Linguistic chasms of French/English/Portuguese plays role in fragmentation
- C. Indigenous languages + knowledge not in play
- D. Flashes of OS on the continent of 54 countries of over 1.3 Billion people with a budding youth population – A key asset in OS

OPEN SCIENCE IN AFRICA

Though weakly engaged with global community (Unesco Report, 2015)

**There are OS Initiatives in Africa**

- Operational OS projects of significance SANBI; AAS OR
- Active sectoral Initiatives – major dev: ENRENS/road maps/DS courses
- Proj in dev with major potential: SKA/ I K C C A RP (OCSD,2020) AOSP

World Bank Project-\$25B digitally enabled every citizen



# The Study

- Outcome of a much broader commissioned study on Open Science by the African Technology and Policy Studies (ATPS) and Scinnovent Centre.
- For the Science Granting Councils Initiative: “Open Science in Research and Innovation for Development”
- Professor Geoffrey Boulton, Edinburgh University (UK), Professor Joseph Wafula, JKUAT (Kenya) Dr. Cheikh, Loucoubar, Pasteur Institute (Senegal) Dr Joseph Mwelwa, Joint Minds Consult (Botswana).
- Masterclass paper for the Annual Science Granting Councils Forum – Dar es salaam – Tanzania (2019)
- A policy brief on Open Science
- This paper benefited from the earlier research efforts on Open Science in Africa.
- Target 15 Science Granting Council Initiative (SGCIs) members across sub-saharan Africa and 4 Science Granting Councils

## SGCs and SGCI member states – Sub Saharan Africa & Key objectives

**Participants in the SGCI** are: Kenya, Rwanda, Uganda, Tanzania, Ethiopia, Cote d' Ivoire, Burkina Faso, Senegal, Ghana, Zambia, Mozambique, Botswana, Malawi, Namibia and Zimbabwe.

3.4

**The SGCI is jointly funded by the** United Kingdom's Department for International Development (DFID), Canada's International Development Research Centre (IDRC), and South Africa's National Research Foundation (NRF). Swedish International Development Agency (SIDA)

**The objectives of the SGCI are to strengthen the ability of participating SGCs to:**

- 1) manage research;
- 2) design and monitor research programmes, and to formulate and implement policies based on the use of robust science, technology and innovation (STI) indicators;
- 3) support knowledge transfer to the private sector; and
- 4) establish partnerships with one another, and with other science system actors.

# Methods

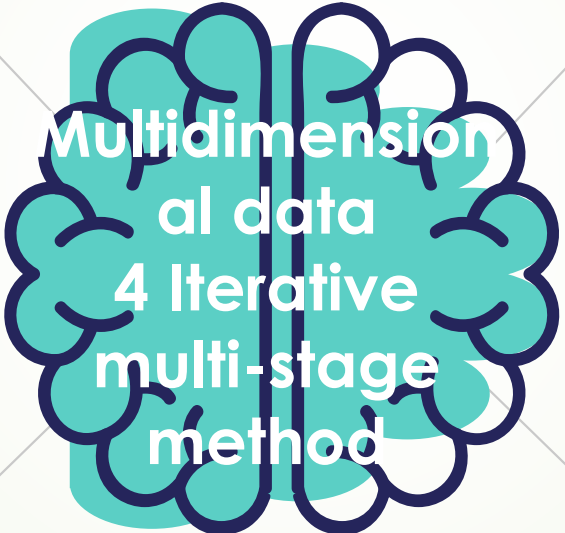
## 1. Systematic literature review

Collecting & assembling docs on OS /accessible peer reviewed/gray lit on OS/scan environment for challenges and opportunities /Baseline data



2. Analysed the broad scope of the research questions that were part of the brief to generate data for a report on OS  
Boulton et al (2019)

Process involved thinning out questions to design two questionnaires for the survey  
4SGC + 15 SGCI members.



3. Conducted survey  
-determine to OS +its relevance to development and to the 4<sup>th</sup> IR

13/15 returned questionnaires which sought respondents affirmation or disapproval of the hypothesis thus:

*The fourth industrial revolution is powered by the tools of the digital revolution. A collaborative "Open Science" area would be an efficient response to this challenge.*

Followed this up with key Questions: support for or resistance to open science, national experiences of open science, and key priorities.

4. Data collation, anonymization, analysis and aggregation. Data analysed using thematic analysis (Braun and Clarke (2006))



# RESULTS AND DISCUSSIONS

100% Agreement on hypothesis A and B

Rationale for rooting OS in Africa 4 economic dev and mainstreaming it in national + institutional research

National experience of OS

40% acknowledged Zambia – all results of publicly funded research free B.Faso/Malawi/Tanzania / websites +repositories. Kenya working on policy

SGCI see a means to enhance intra African collaboration (STISA 2024: To harness the technologies of the digital revolution to invigorate and relaease the potentials of African Science; stimulate innovation + creativity for economic and social development

## Barriers to OS

African States are at Different levels: Generally, Lack of political commitment in governments

Researchers and innovators have little trust in the OS approach

Lack of adequate human + infrastructural capacity in ICT to handle complexity. of OS and institutionalisation of OS

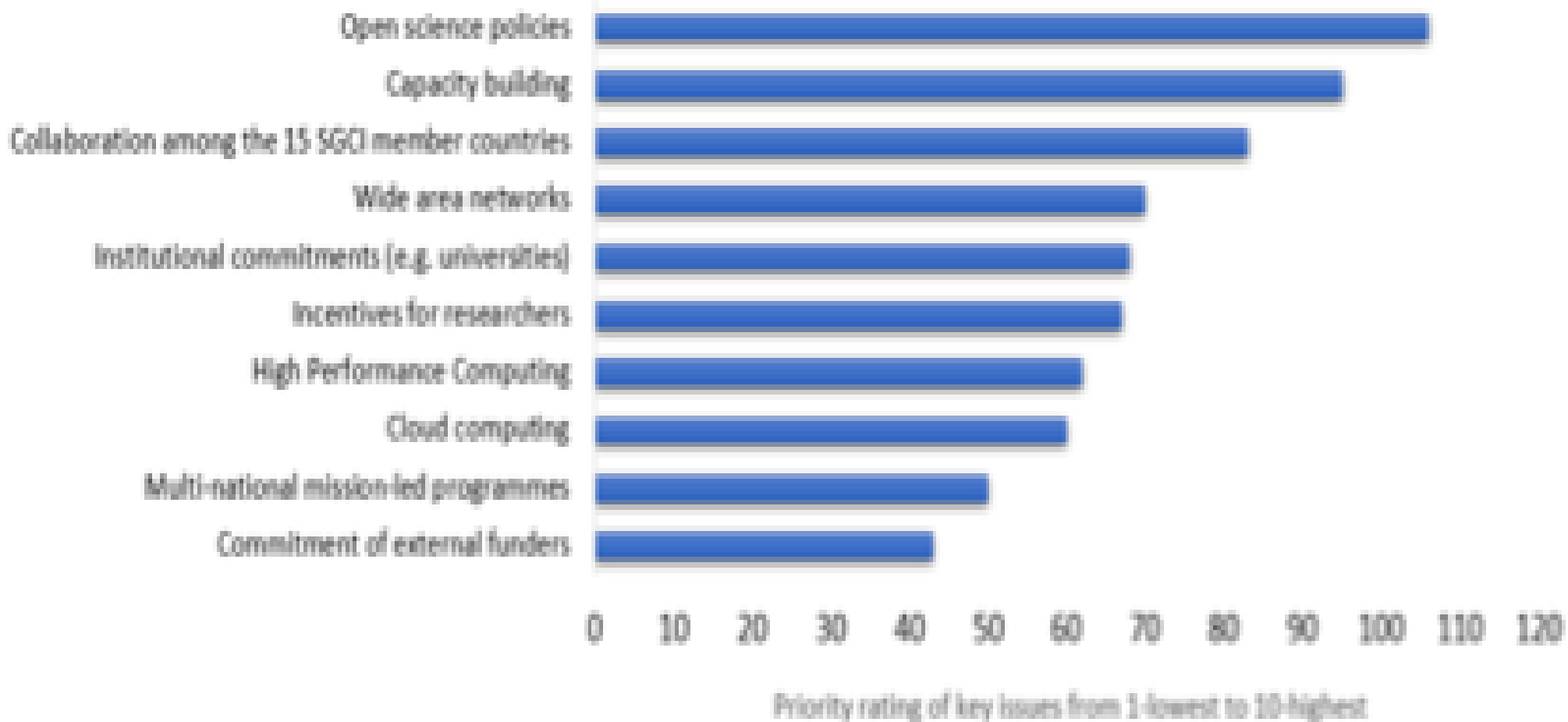
Lack of research data bases and journals dedicated to OS

Lack of policies at national + institutional levels to set regulatory framework for OS +coordination of relevant research efforts

Demand by funders, universities for researchers to publish in high impact journals does not promote OS –  
a) Journals rarely open access  
b) Access to published works/ access to internet prohibitive

## Priority ranking of 10 key issues to enable Open Science in Africa

Cumulative rating of 10 key issues contributing to Collaborative Open Science as per 13 SGC member countries in Africa namely: Kenya, Burundi, Uganda, Tanzania, Côte d'Ivoire, Botswana, Ghana, Zambia, Mozambique, Sudan, Sierra Leone, Malawi and Namibia



# Enablers, inhibitors and opportunities

## National Policy Frameworks

A framework of policy, regulation or legislation on data sharing, access and use is necessary in enabling sharing of scientific data and knowledge. (Wafula, 2019)  
For research undertaken in universities, deposit data in a trusted repository by a given date and using FAIR principles

## Resistance to openness and sharing



i) *The data supporting a published truth claim.* ii) *Data from publicly-funded research* iii) *Asymmetric benefits of N-S collaboration.*  
A.R, just data-collectors and laboratory technicians, with no realistic path to develop as research leaders.

2



## Incentives and motivations

OS fundamentally threatens the comfort zone of researchers, institutions, governments and international funders who have long-held habits of conducting science and how to handle and treat data from the scientific process.  
Africa should develop local knowledge + priorities  
Nkoudou, (2016)

3



## Africa should be part of the change

open science, left to the dictates of the north may threaten Africa's ability to identify research problems and deploy methodological and epistemological choices that would best serve the needs of the African societies (Piron et al, 2017).  
We agree with this view

4

## Operational Models for Open Science

- Elixir Life sciences resources across Europe
- Pan African Bioinformatics network for Human Heredity and Health for Africa – H3ABioNet
- European Open Science Strategy – Make open science a reality across all member states
  - Open science policy platform
  - European Open science cloud (2020)? Virtual environment – FAIR
  - Open Access publication (all articles benefiting from horizon 2020 funding , Access free of charge)
  - The EU Citizen Science Platform [Individuals and groups citizen science projects
  - Our view is Africa to study models, adapt/ develop Africa Afrocentric models of Open Science



# CONCLUDING REMARKS

- Our view is that Africa should closely study Open Science models and adapt/ develop Afrocentric models of Open Science
- This open science should accommodate indigenous knowledge systems expressed in multilingual formats to expand and assure access to millions of Africans who are likely to exploit the potential scientific knowledge for creativity and innovation for development and help to meet the AU Goals of Agenda 2063 .. “A wealthy and Prosperous Africa.”





# Thank you

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