

**Partnerships and collaboration in scholarship:
crossing and eliminating boundaries**

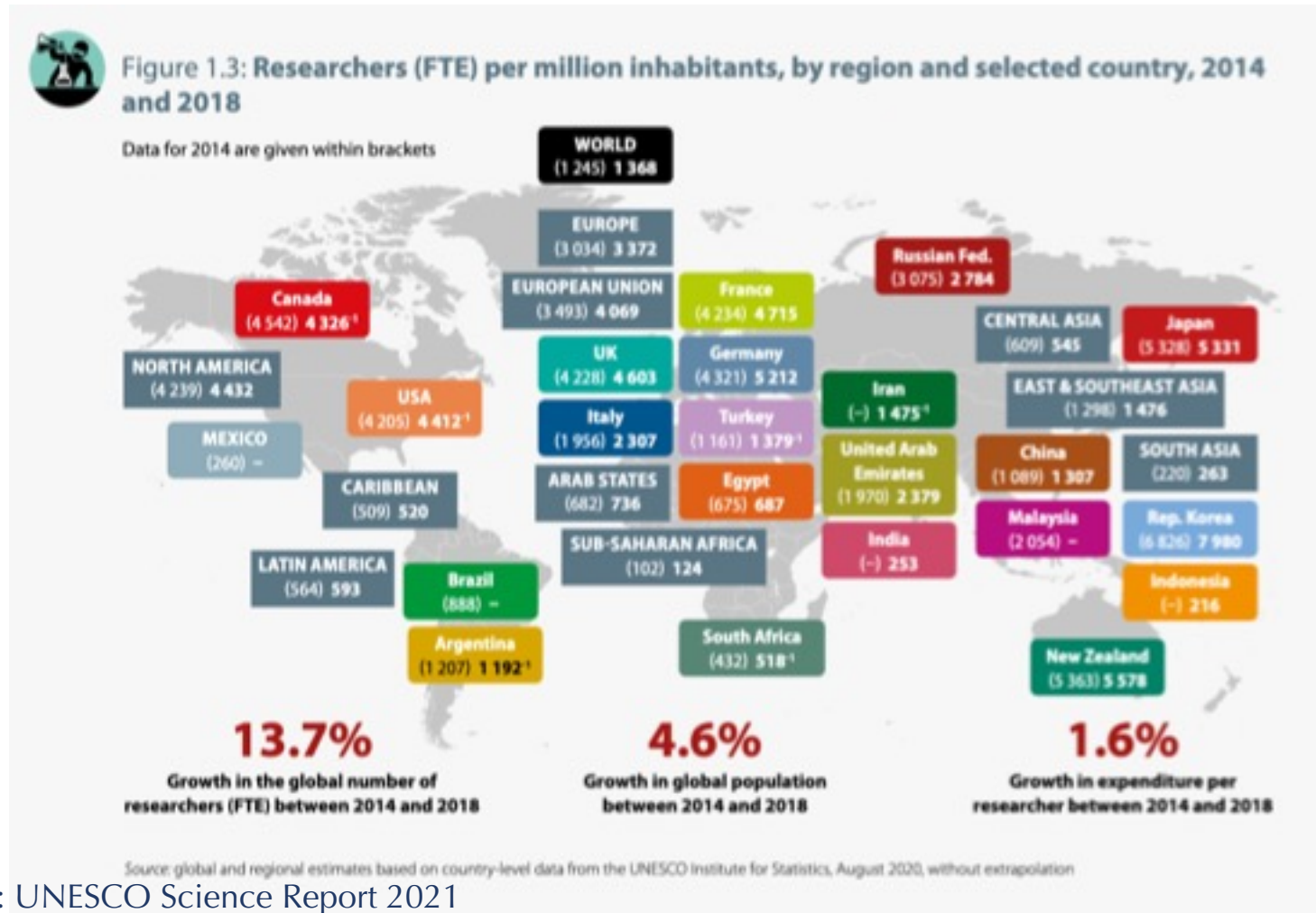
Daya Reddy

University of Cape Town

Fourth International ARUA Biennial Conference

Lagos, Nigeria, 15 – 17 November 2023

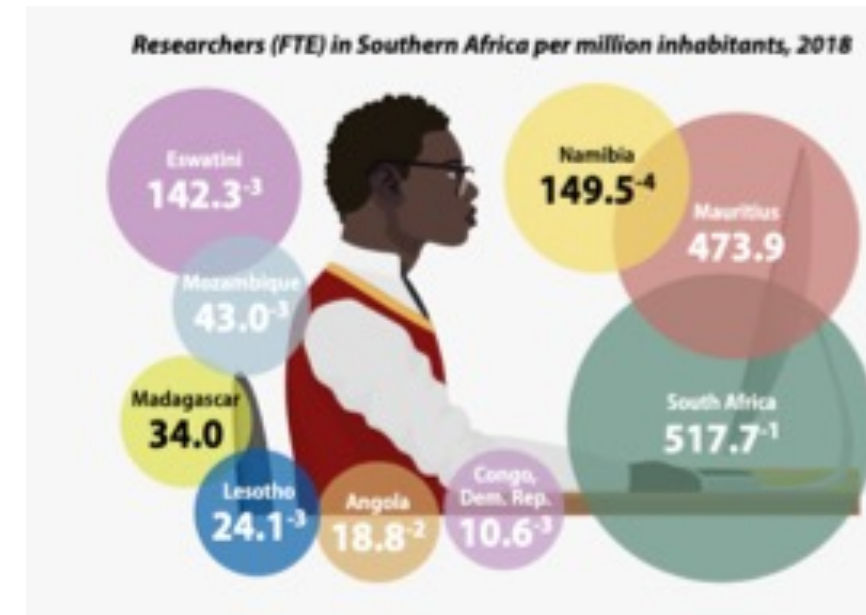
The state of science and scholarship



Source: UNESCO Science Report 2021

Researchers per million:

Europe 3 372
 World 1 368
 SSA 124
 Sth Africa. 518

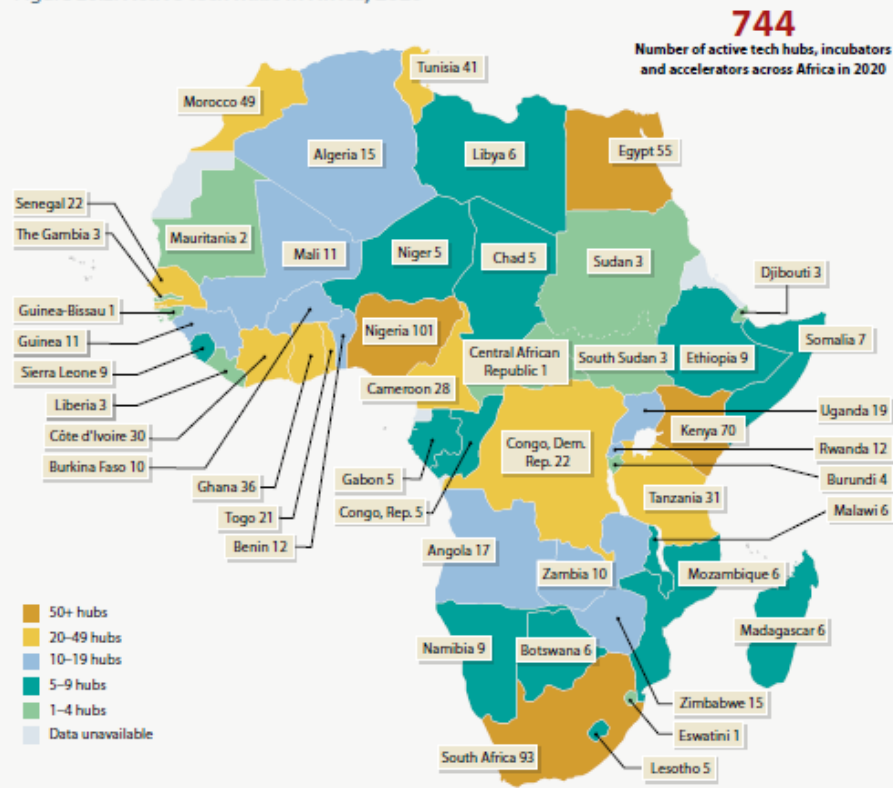


G20 countries account for nine-tenths of researchers (88.8%), research spending (93.2%) and scientific publications (90.6%) globally

Number of African tech hubs has more than doubled since 2016



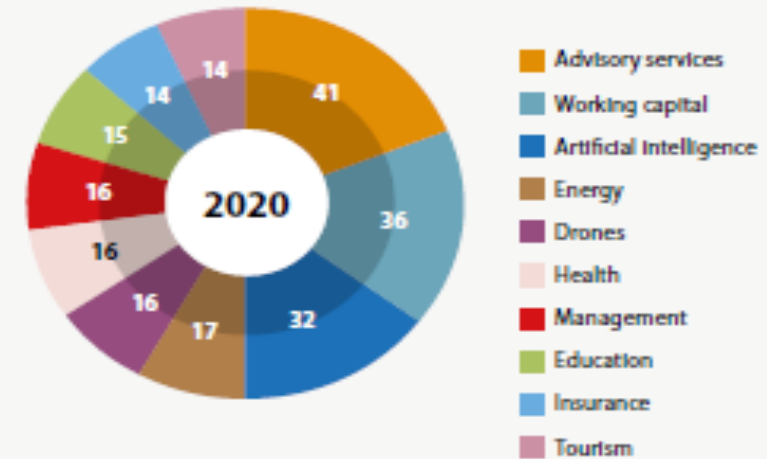
Figure 20.2: Active tech hubs in Africa, 2020



Start-up in Rep.Congo printing visors in 3D for Covid-19.
© HOZ 3D



Number of products developed by African tech hubs in top ten product categories, 2020



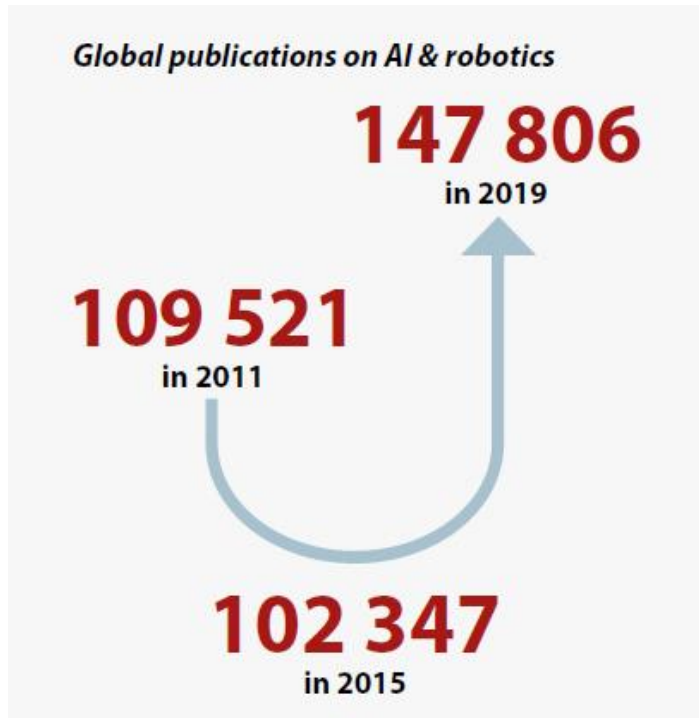
Data source: Briter Bridges



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Trends in the UNESCO Science Report (2021)

The challenges facing Africa in relation to development: digital technologies



Digital and related technologies have a very *short period* of time from development to release

AI is *rapidly pervasive*; some properties may only become apparent after release, and the technology could have both malevolent and benevolent applications

The challenge: African researchers must succeed in becoming not only shapers and receivers of knowledge, but *shapers and owners* of advances – otherwise we will be left behind, with existing inequalities exacerbated.

Why is this important?

- Big data analytics vital to tech-based industries: social media, automotive, pharmaceuticals, etc..
- Social, cultural and ethical implications
- Molecular structure for industrial applications, e.g. computational drug design
- Simulation Suite (SimSuite): allows for practice and refinement of fundamental surgery techniques
- These and other developments pose significant *transdisciplinary* challenges
- Essential to approach these collaboratively:
 - across disciplines
 - across sectors (universities, policymakers, industry, civil society)

Africa keen to embrace Industry 4.0

In Africa, a growing number of governments have come to recognize the importance of training researchers and developers in AI

2013: a local group of industry practitioners and researchers began Data Science Africa, an annual workshop where participants can share resources and ideas.

2017: Deep Learning Indaba,
with chapters in 27 African countries



**DEEP
LEARNING
INDABA**

🕒 APRIL 13, 2019

Google takes on 'Africa's challenges' with first AI centre in Ghana

by Kent Mensah



Why is collaboration important?

- Scholars as members of communities: “mutual-aid societies of life-long learners” (Axtell, The Pleasures of Academe)
- We communicate, share knowledge, gossip, engage in scholarly citizenship, engage in collaborative work
- Collaboration is the life-blood of intellectual progress - ideas and hunches take shape and grow from their embryonic origins to become worthy additions to knowledge
- Opportunities for networking and for (equitable) integration in the broader community
- Sine qua non of multi-, inter- and trans-disciplinary research

Building and ***strengthening capacity*** essential, as is material support

Science for policy: policies that enable effective collaborations



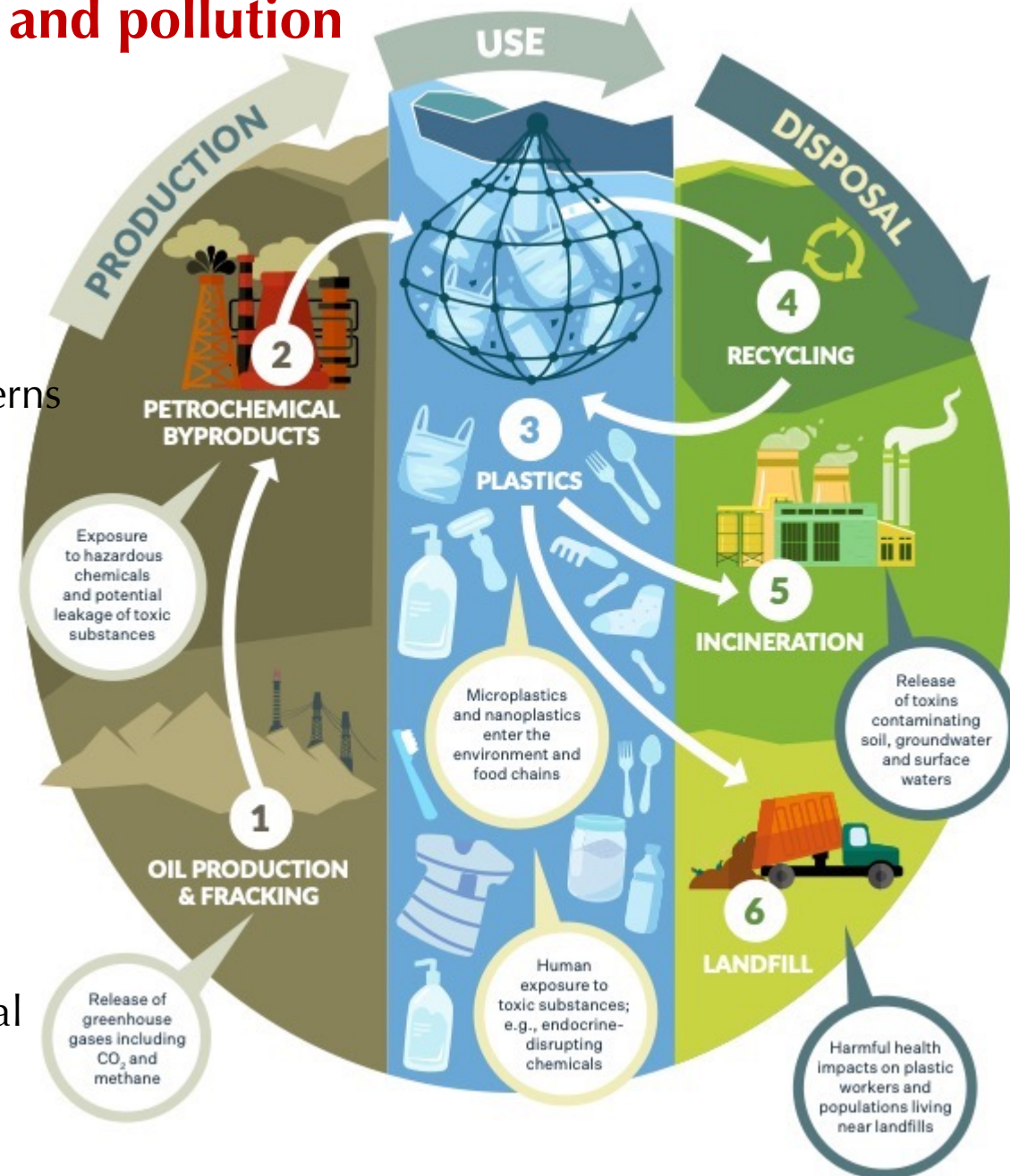
International collaboration

Over 2017–2019, international scientific collaboration ***greatest*** in ***geosciences*** (34.4% of publications) and other environmental sciences (31.6%)

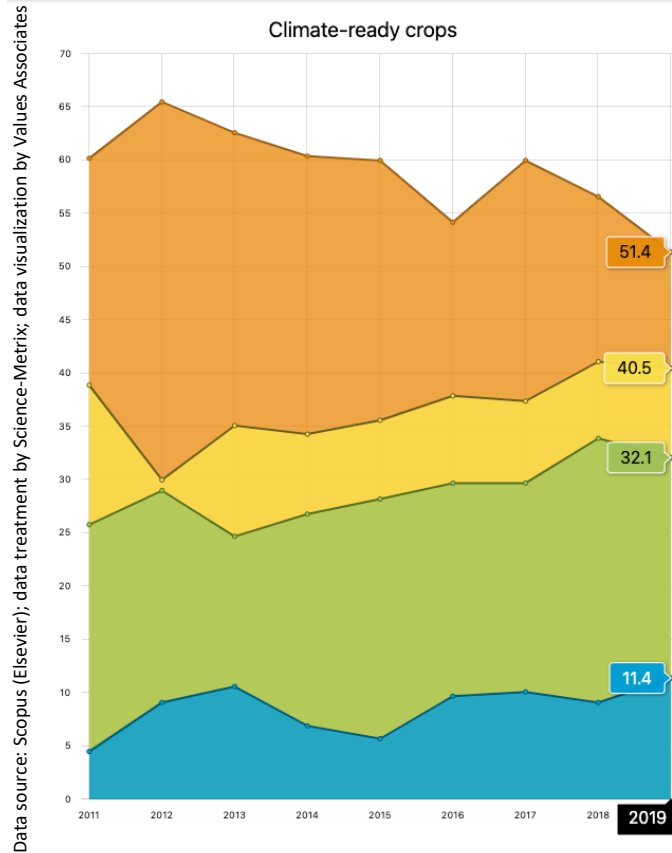
Over 2017–2019, international scientific collaboration ***lowest*** in the built environment and design (20.9%), cross-cutting strategic technologies (20.3%) and engineering (18.6%)

Example of transdisciplinary problem: plastics and pollution

- Micro- and nano-plastics move through the food chain
- Address social, economic, environmental impacts: practices, behaviours, cultural influences, consumption patterns
- Marginalised groups – depend on plastic waste – affect metabolic, neurological functions
- Integrated, interdisciplinary approach essential
- Careful consideration and understanding of sociological, anthropological and cultural dimensions, which play a crucial role in shaping people's behaviour



Climate-ready crops: low-income countries publishing much more, strong intl collaboration



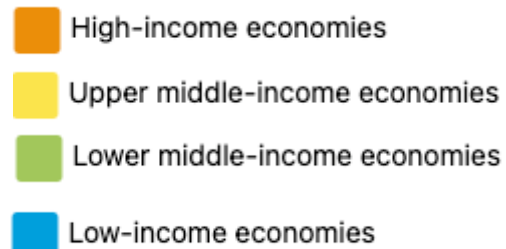
Example:

Climate-ready crops: output has doubled from low starting point

Low-income countries 4.5% → 11.4%

0.02%

of global publications



World total:

1 660 (2012–2015)

3 109 (2016–2019)

Surge in countries such as:

Italy 78/137:

Mexico: 57/133

Australia: 121/235

Kenya: 39/93

South Africa: 26/109



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What is the situation regarding collaboration in Africa?

A DECADE OF DEVELOPMENT
IN SUB-SAHARAN AFRICAN
SCIENCE, TECHNOLOGY,
ENGINEERING & MATHEMATICS
RESEARCH

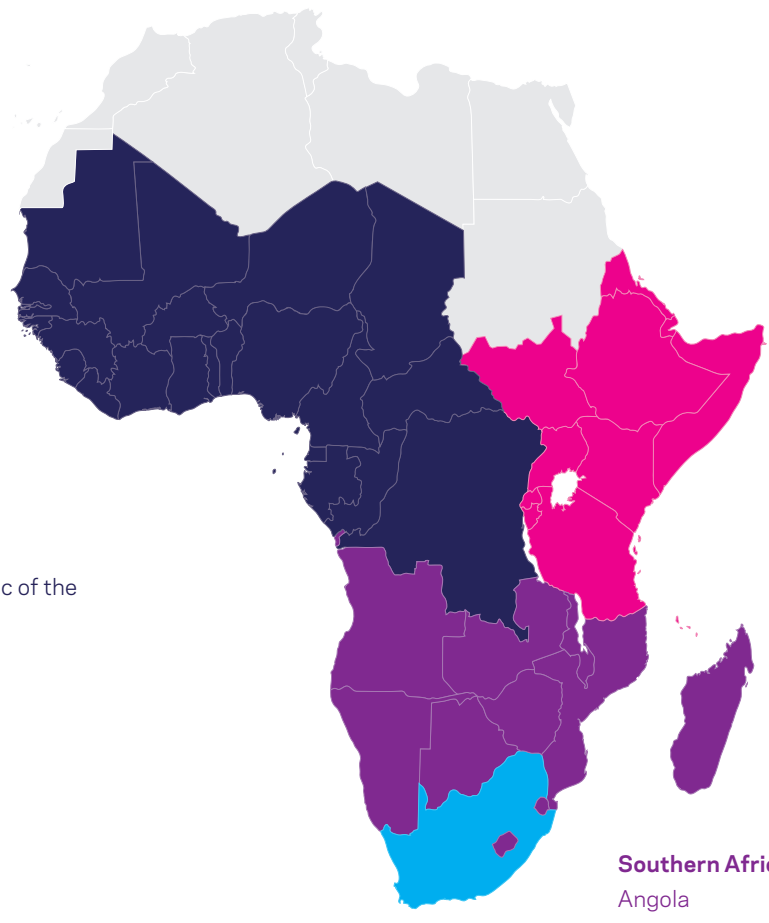
SSA, especially East Africa and Southern Africa, relies heavily on international collaboration and visiting faculty for their research output.

SSA's research capacity appears fragmented across regions, with each of the regions collaborating very little with one another.



A REPORT BY THE WORLD BANK
AND ELSEVIER





West & Central Africa

- Benin
- Burkina Faso
- Cameroon
- Cape Verde
- Central African Republic
- Chad
- Congo, Democratic Republic of the
- Congo, Republic of the
- Cote d'Ivoire
- Equatorial Guinea
- Gabon
- Gambia, The
- Ghana
- Guinea
- Guinea-Bissau
- Liberia
- Mali
- Mauritania
- Niger
- Nigeria
- Saint Helena, Ascension and Tristan da Cunha
- Sao Tome and Principe
- Senegal
- Sierra Leone
- Togo

East Africa

- Burundi
- Comoros
- Djibouti
- Eritrea
- Ethiopia
- Kenya
- Mauritius
- Mayotte
- Rwanda
- Seychelles
- Somalia
- South Sudan
- Tanzania
- Uganda

South Africa

Southern Africa

- Angola
- Botswana
- Lesotho
- Madagascar
- Malawi
- Mozambique
- Namibia
- Swaziland
- Zambia
- Zimbabwe

EXTRA-REGIONAL COLLABORATION

42%-79%

In 2012, the dominant share of SSA research is a result of international collaboration (42%, 68%, and 79% of total research for West & Central, East, and Southern Africa, respectively).

INTER-REGIONAL COLLABORATION

0.9%-2.9%

Inter-African collaboration (without any South-African or international collaborator) comprises 2% of all East African research, 0.9% of West & Central Africa, and 2.9% of Southern Africa.

CROSS-SECTOR COLLABORATION

1%-2.4%

Academic-corporate collaborations comprise between 1% and 2.4% of SSA's total research output from 2003-2012.

TOP ACADEMIC COLLABORATOR

Harvard

Harvard University ranked amongst the top 10 academic collaborators for the three SSA regions.

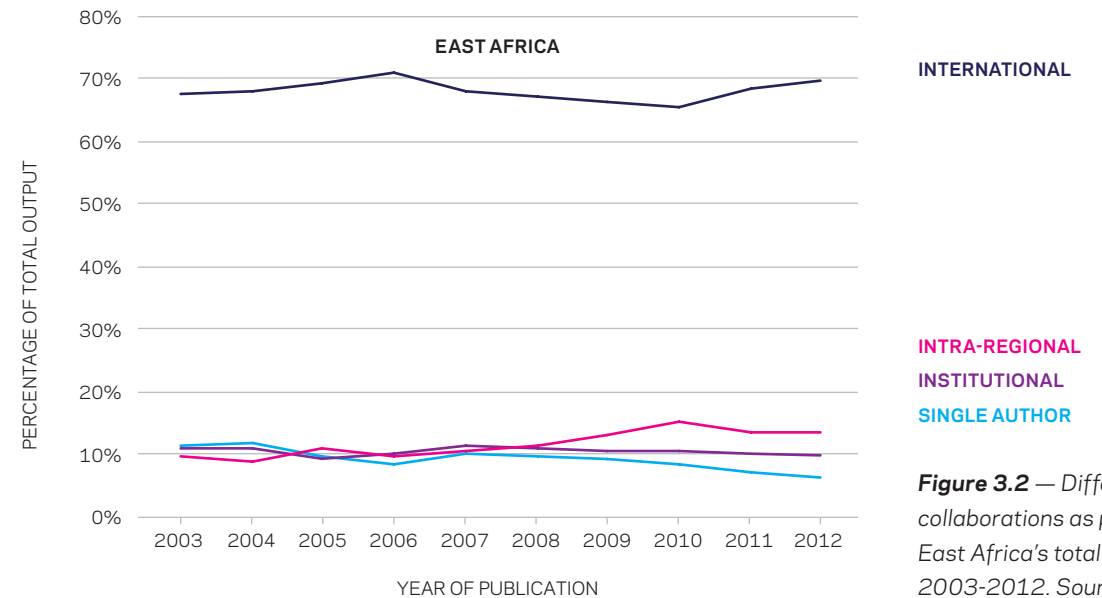


Figure 3.2 — Different types of collaborations as percentage of East Africa's total output, 2003-2012. Source: Scopus.

What to do?

- Enable and promote ***cross-disciplinary*** links and inter-, multi- and trans-disciplinary collaboration
- How do we strengthen ***capacity*** to ensure maximum inclusivity?
- What are the implications for ***academic programmes, curricula***, building the next generation – preparing academics and students for cross-disciplinary collaboration? What is ARUA's role?
- ***ARUA*** achievements to date: ARUA Centres of Excellence, pilot Collaborative PhD programmes
 - 20 Clusters of Research Excellence , 250 researchers,
 - > 100 institutions across 60 countries
 - public health, green transition, innovation and technology, capacities for science
- From observers, consumers and receivers, to ***equitable participants, shapers and owners***

Thank you!

