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Africa's Research Capacity: Performance and Potential

Nico Cloete

Centre for Research on Evaluation, Science and Technology (CREST), Stellenbosch University

Peter Maassen

Faculty of Educational Sciences, University of Oslo

With support of:

François van Schalkwyk

Centre for Research on Evaluation, Science and Technology (CREST), Stellenbosch University

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ARUA & The Guild Virtual Conference



Centre for Research
on Evaluation,
Science and Technology



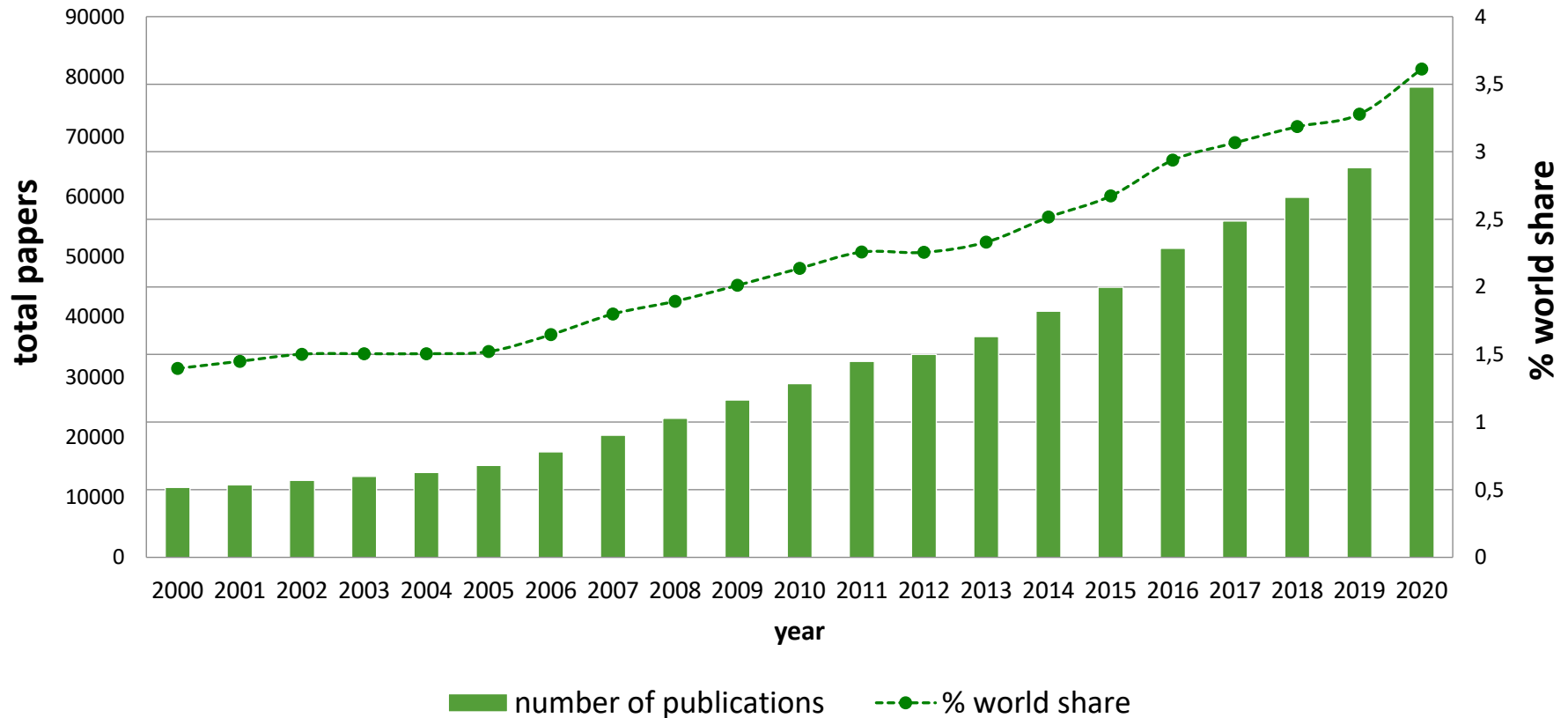
DST-NRF Centre of Excellence in
Scientometrics and Science,
Technology and Innovation Policy

Brief history of higher education development aid in Africa

- **Development aid went from institutional development (colonial period) to individual development, and now we are looking at driving development through collaboration**
- The World Bank (WB) argued through the (infamous) Psacharopoulos (1986) study that the highest returns on investments in education are from primary education, which led to their policy **Higher Education as Luxury Ancillary – nice to have but not essential.**
- WB seminar in 1994 with Manuel Castells led to **The Lessons of Experience –** higher education is the engine for economic and social development.
- This major change in WB policy led to **Constructing Knowledge Societies** (2002) but it did not do much till after 2012 Centers of Excellence.
- **EU – Strengthening the African Knowledge Society**
- What is common is that both are realizing that development is not ‘bottom up’ or driven by individuals, but depend on collaboration between excellent science, and that collaboration must connect to institutional and individual development.
- **The shift for the proposed EU-AU collaboration is from development aid to collaborative partnerships**

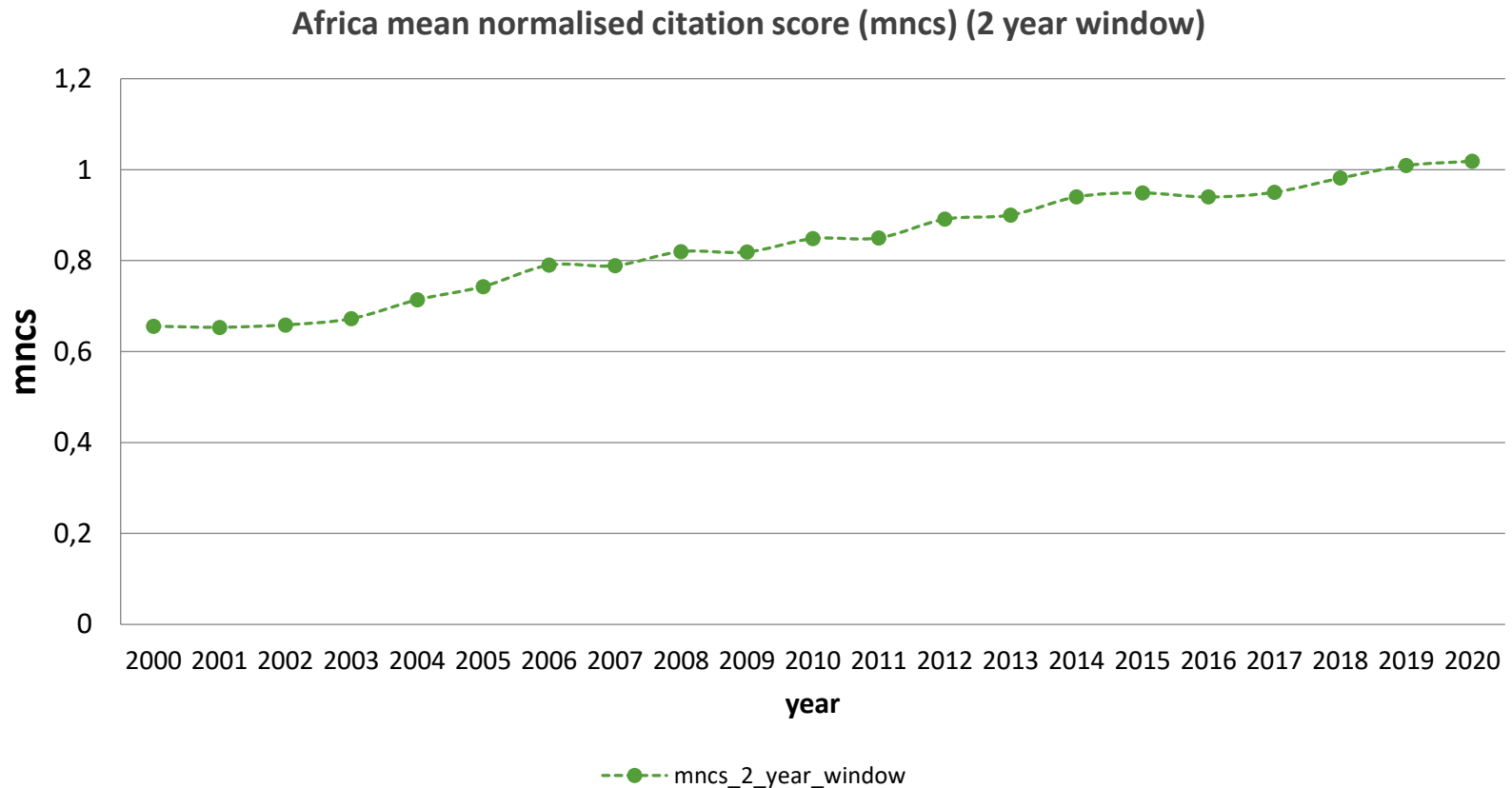
Africa's scientific output is increasing

Africa World share and Publication output (articles and reviews only)



Source: CREST/Web of Science (2021). Compiled by Jaco Blanckenberg.

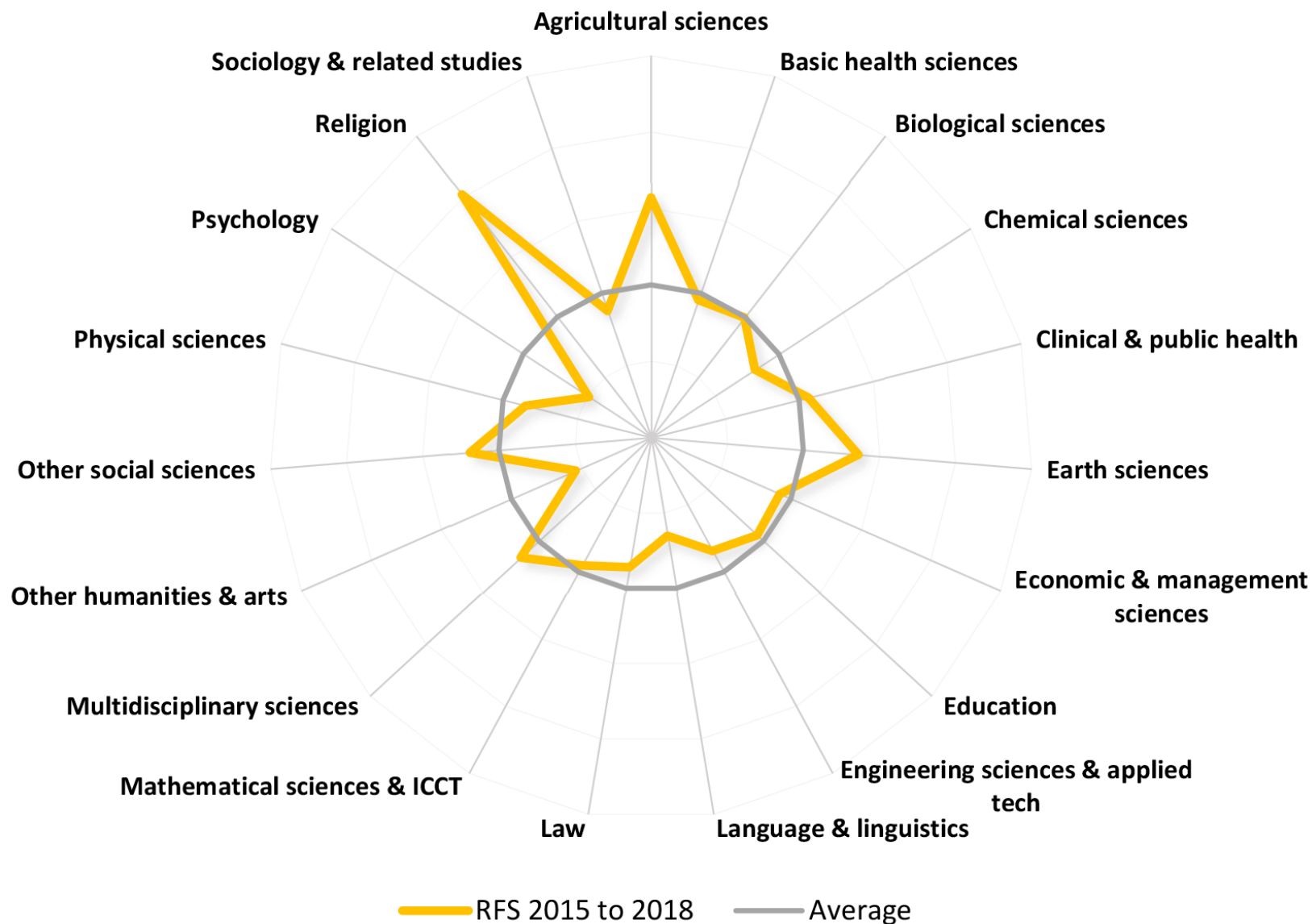
Africa's scientific output is becoming more influential



mncs = mean normalised citation score

Source: CREST/Web of Science (2021).). Compiled by Jaco Blanckenberg.

Relative strength in religious studies, agricultural sciences and earth sciences

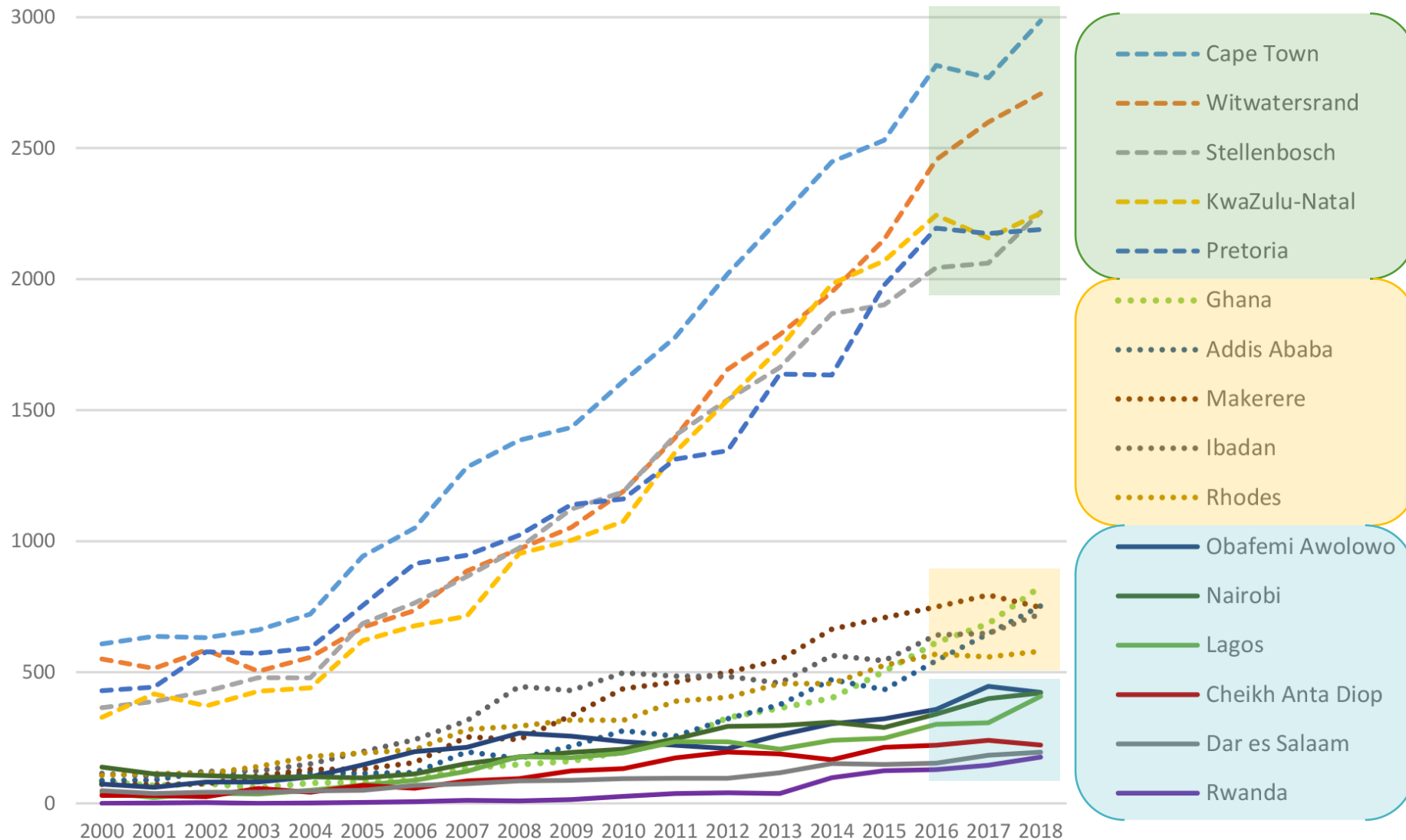


RFS = relative field strength

Source: Van Schalkwyk et al. (2021) <https://www.universityworldnews.com/post.php?story=20210112144237619>

Top research universities are increasing their scientific productivity

No. of publications (Web of Science)



Scientific collaboration between Africa and world regions (%)

	2000-2004	2008-2012	2014-2018
US	27.1	31.5↑	33.5↑
UK	23.6	22.3↓	23.1↑
EU	43.6	41.4↓	40.4↓
China	1.3	3.2↑	6.7↑

Source: Van Schalkwyk et al. (2021) <https://www.universityworldnews.com/post.php?story=20210112144237619>

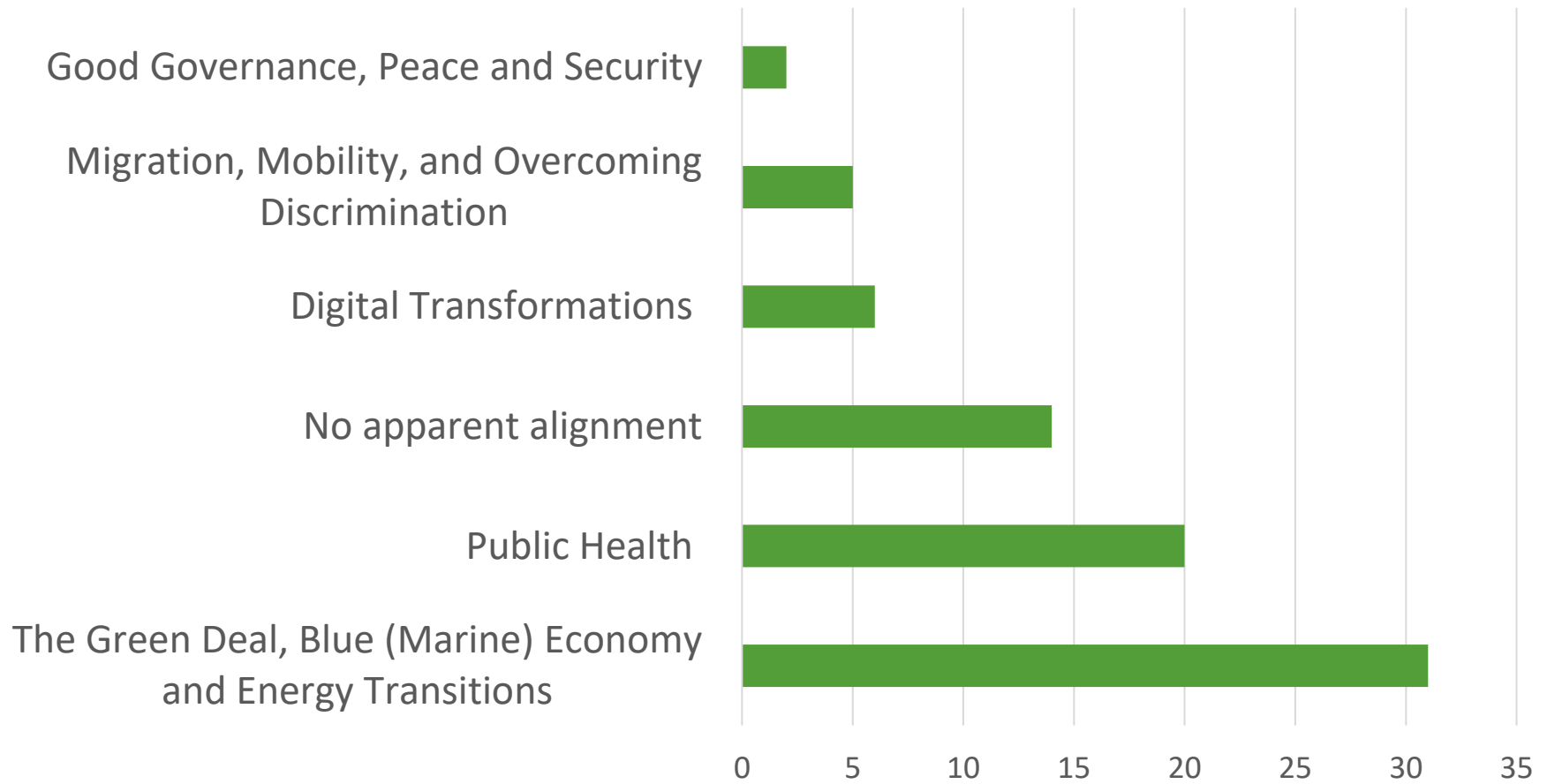
Centres of Excellence in Africa

Initiative	Funder	No. of CoEs	Est.	Region	Countries
DSI-NRF CoEs	South African government	16	2004, 2014	Southern Africa	South Africa
AUDA-NEPAD Network of Water Centres of Excellence	AUDA-NEPAD	3	≈ 2005	East, West and Central Africa	Multiple
ACE-1	World Bank	22	2014	West Africa	Benin, Burkina Faso, Cameroon, Cote d'Ivoire, Ghana, Nigeria, Senegal, Togo
ACE-2	World Bank	24	2016	East Africa	Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania Uganda, Zambia
ARUA		13	2019	Sub-Saharan Africa	Ethiopia, Ghana, Kenya, Nigeria, South Africa, Uganda

Source: Authors.

Centres of Excellence in Africa

Alignment with EU Priorities



Source: Authors.

Major challenges for realising Africa's science potential

1. Level of public and private R&D spending and the number of researchers
2. Science policy interface and institutions
3. Science statistics and data

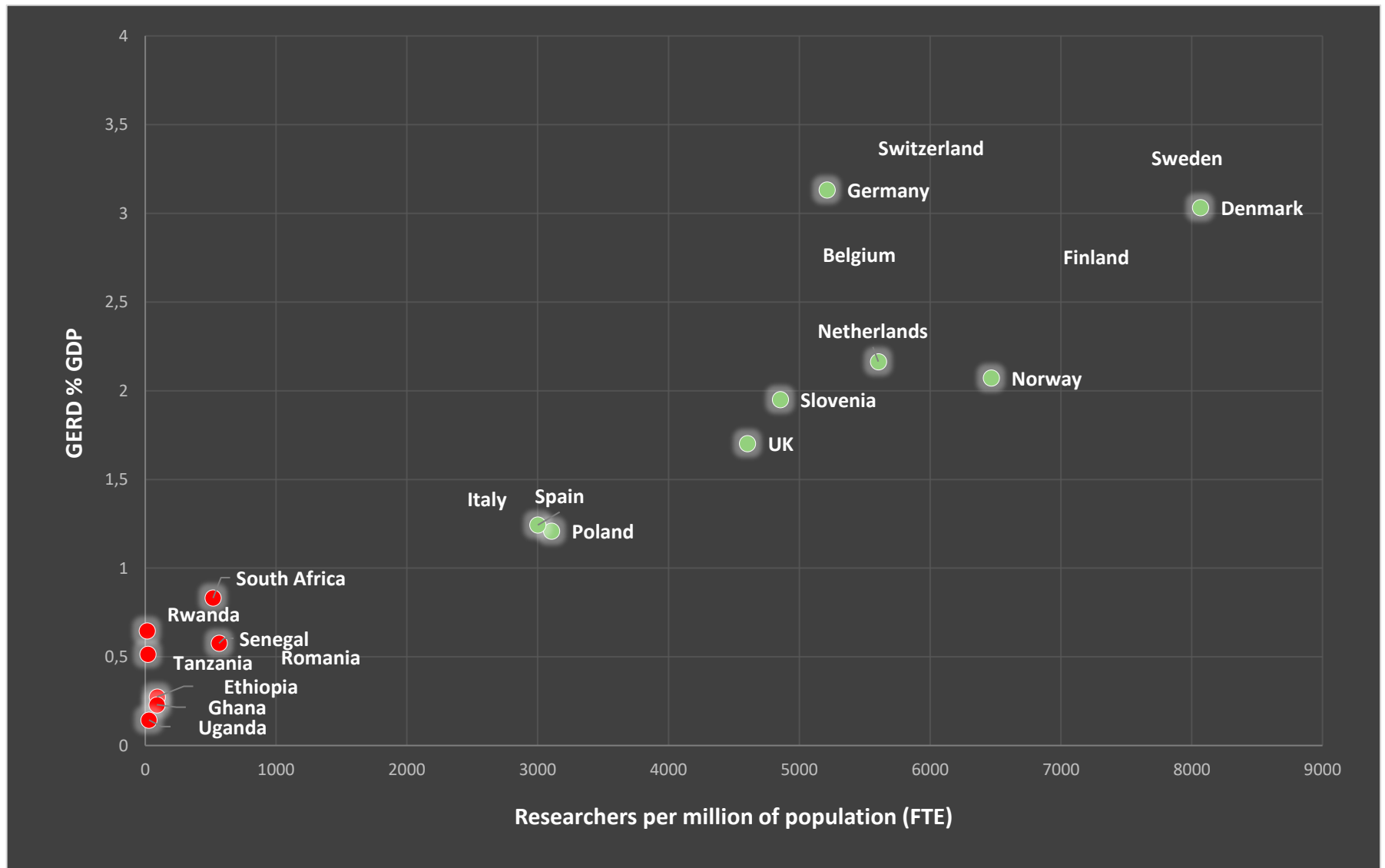


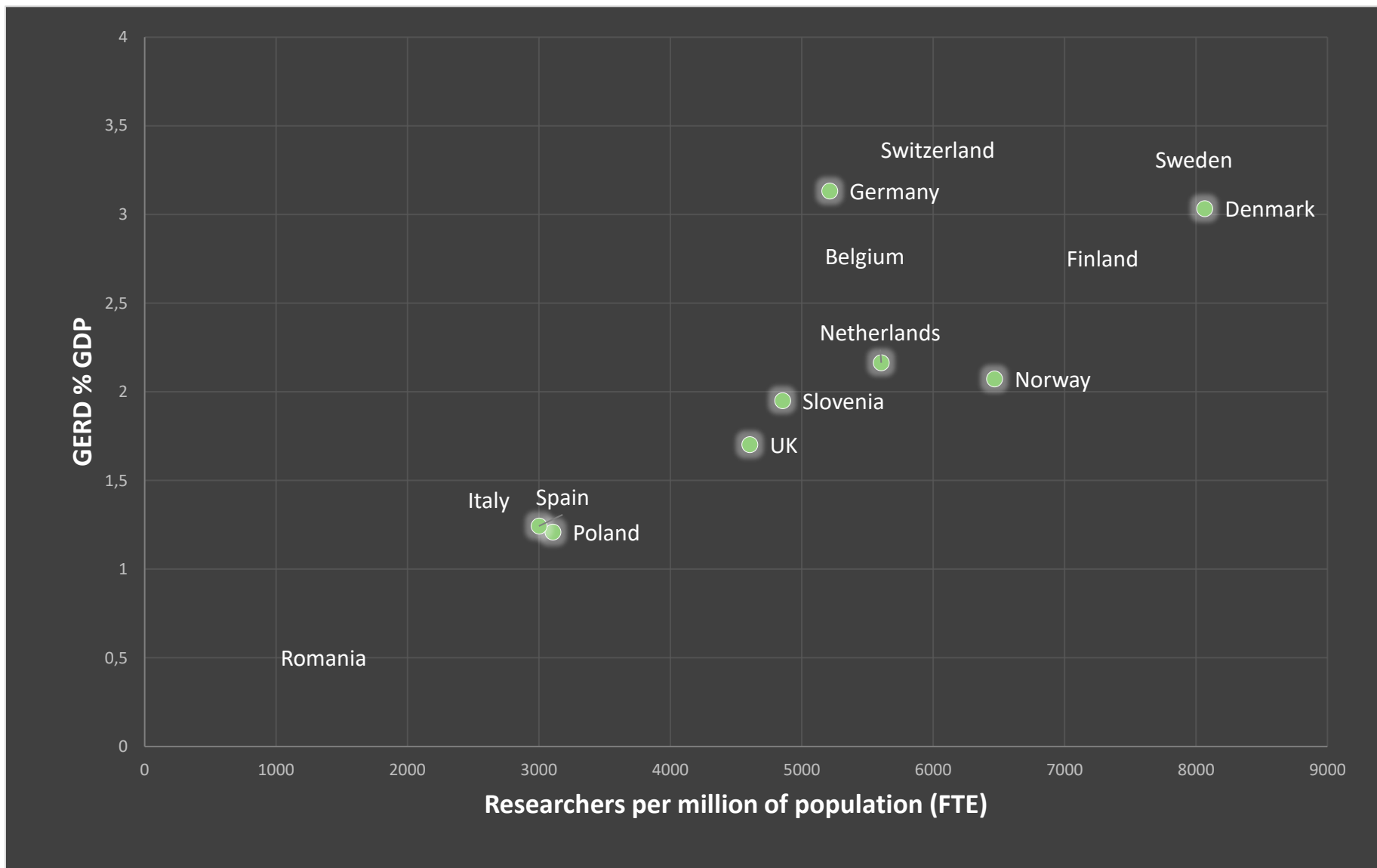
1. Science spending and number of researchers

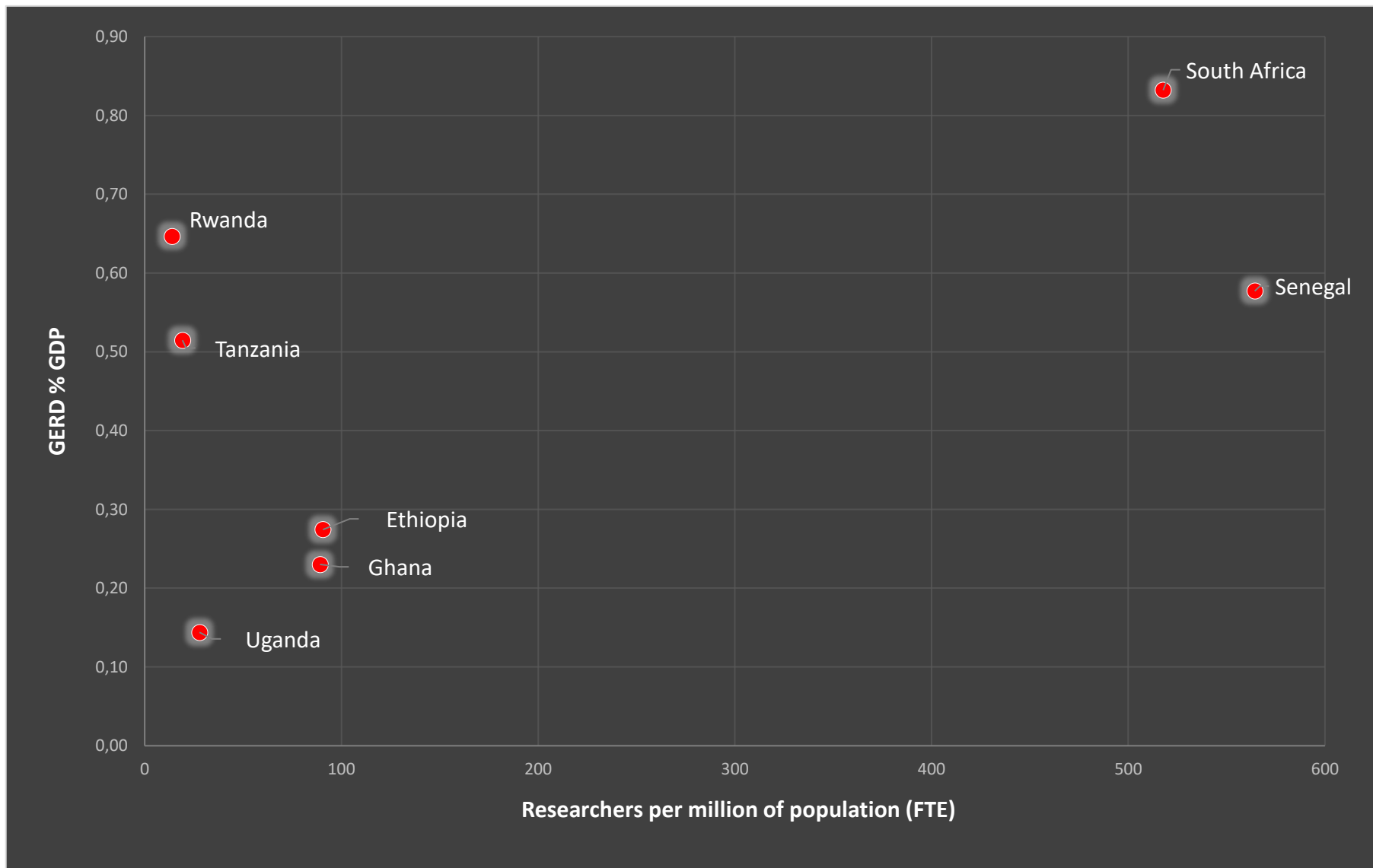


Global spending on R&D has reached a record high of almost US\$ 1.7 trillion. About 10 countries account for 80% of spending. As part of the ***Sustainable Development Goals (SDGs)***, countries have pledged to substantially increase public and private R&D spending as well as the number of researchers by 2030.



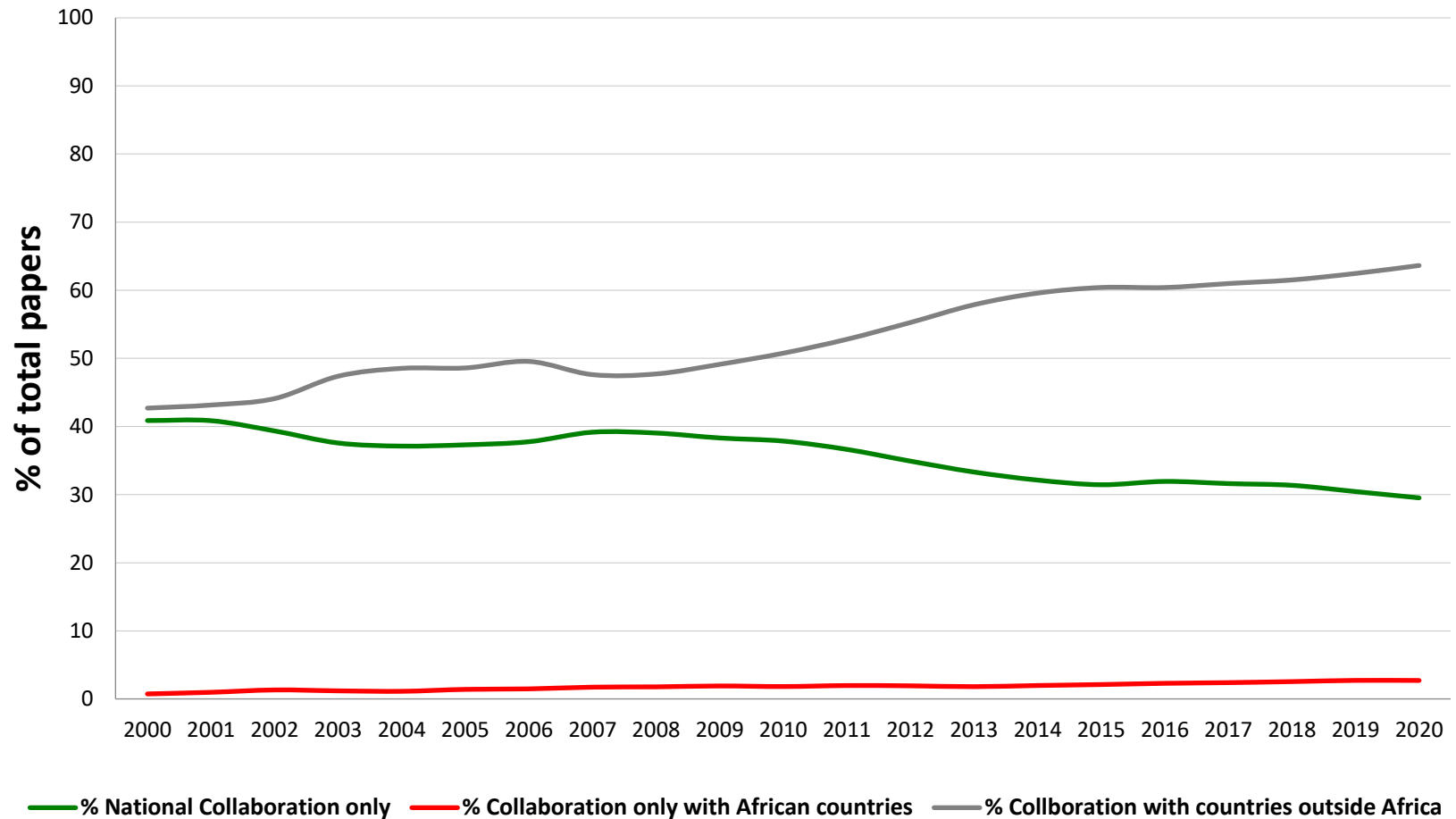




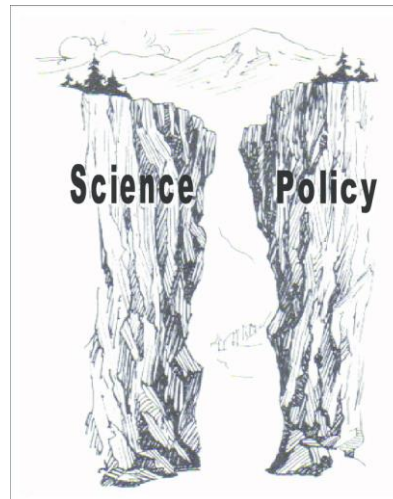


Poor collaboration between scholars in Africa

Africa publication collaboration profiles



Emerging African science policy interface and institutions



Emerging African science policy interface and institutions



Strengthening African science databases



Thank you for your attention

Contact details

Nico Cloete

E ncloete@chet.org.za

Peter Maassen

E peter.maassen@iped.uio.no

François van Schalkwyk

E fbvschalkwyk@sun.ac.za

T @Francois_fvs2

Strengthening the African knowledge society: towards more sustainable African-European Universities Partnerships

A virtual conference organised by the African Research Universities Alliance (ARUA) and The Guild of European Research-Intensive Universities: **Monday, 22 November 2021 @ 10:00 Brussels**

Prof J Catherine Ngila, Ag. Executive Director; c.ngila@aasciences.africa
The African Academy of Sciences, Nairobi

PRESENTER CONTACT



Prof J Catherine Ngila (CONTACT BIO)

Ag. Executive Director

The African Academy of Sciences

Address: 8 Miotoni Lane, Karen, Nairobi, Kenya

email: c.ngila@aasciences.africa /

jcngila2015@gmail.com

Tel: +254 725 290 145 | **Mobile:**

+254708235061| **Skype:** jcngila2015

RESEARCH LINKS

https://www.researchgate.net/profile/Jane_Ngila/

<https://scholar.google.co.za/citations?user=NNc4NEYAAAAJ&hl=en>

<https://www.linkedin.com/in/catherine-ngila-68a620114>

<https://orcid.org/0000-0002-0121-4567>

https://en.wikipedia.org/wiki/Jane_Catherine_Ngila

PRESENTATION OUTLINE

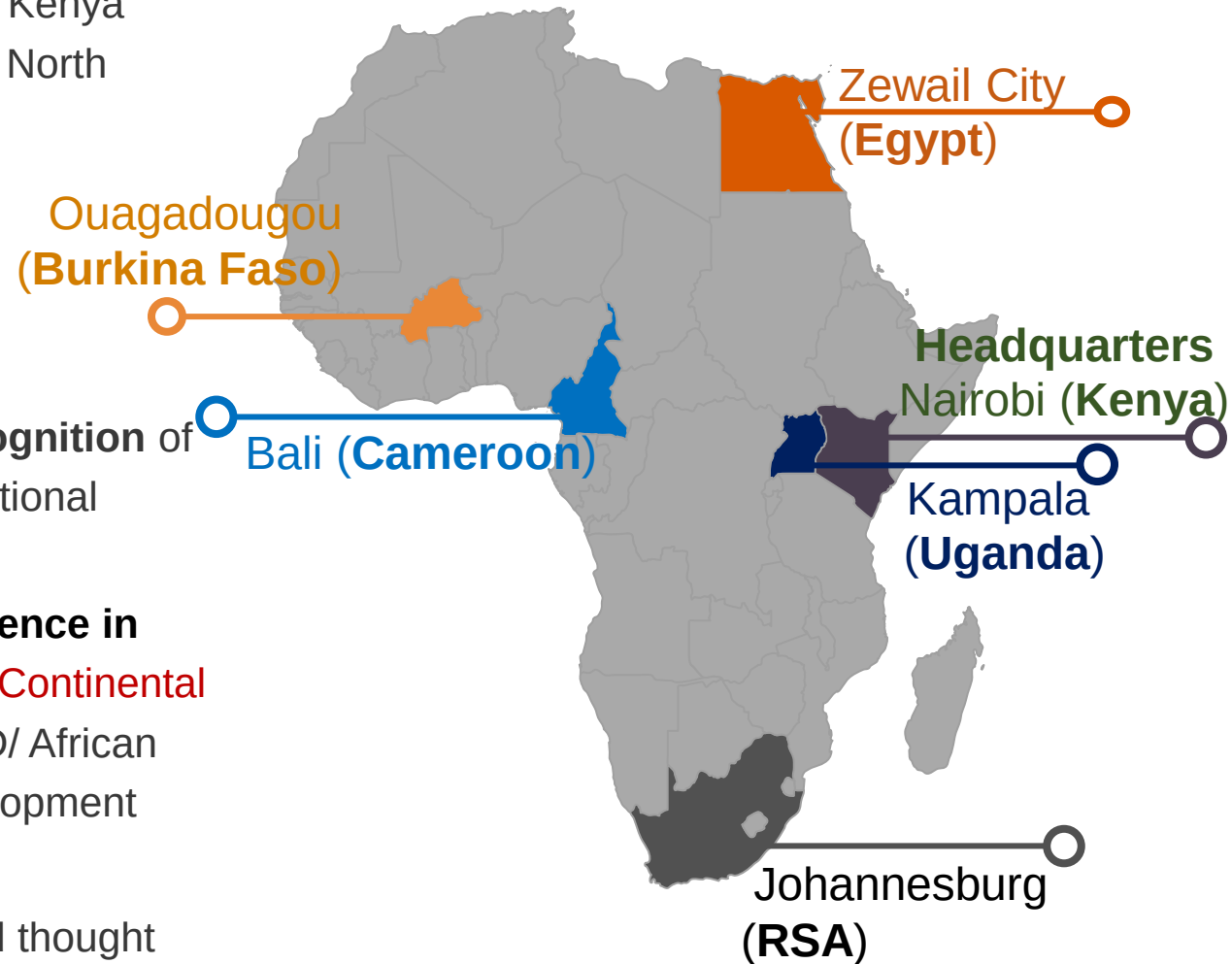
- About The African Academy of Sciences (AAS)
- AAS Strategy & Business Plan- Research Collaboration
- **Strengthening the African knowledge society: towards more sustainable African-European Universities Partnerships**
 - ✓ EU-Africa Cooperation through partnerships in five key areas
 - ✓ ARUA-The Guild European Research Universities
 - ✓ Situational Analysis- Research in Africa; Policy Framework (AU-EU 2017 Summit)
 - ✓ AAS Role in the African Research Agenda
 - ✓ AAS Research Management Programme for African Institutions
 - ✓ African Research Initiative for Scientific Excellence - Pilot Programme (ARISE-PP), a partnership between AUC and EC
 - ✓ AAS Research Capacity Building Programmes- ECRs; AAS Good Financial Grant Practice (GFGP); AAS Open Access Platform
- Recommendations for the way forward

About the AAS

- **Vision:** Transformed lives through science
- **Mission:** Leverage resources through research excellence and thought leadership for sustainable development.
- AAS is the only continental Academy in Africa enjoying the **support** and **recognition** of the African Union, with joint programmes with **African Union Development Agency (AUDA)** and New Partnership for Africa's Development (NEPAD) and several governments and major international partners.

The African Academy of Sciences (AAS)-1985/36yrs Ago

- A **non-aligned, non-political, not-for-profit pan-African** organization
- **Headquarters** in Nairobi through a hosting agreement with the Kenya government & with **5 offices** in South, East, Central, West and North Africa
- **Tripartite mandate:**
 - Recognition of excellence in the continent
 - Advisory and think tank functions
 - Implementing key STI programmes
- **Continental Academy** in Africa enjoying the **support and recognition** of the **African Union** and several governments and major international partners
- **AESA platform (Alliance for Accelerating Excellence in Science in Africa)** launched in 2015 as a declaration of African Union for **Continental Agenda setting & Business Planning-** jointly with AUDA-NEPAD/ African Union Development Agency-New Partnership for Africa's Development
- **Vision:** Transformed lives through science
- **Mission:** Leverage resources through research excellence and thought leadership for sustainable development



AAS STRATEGIC RESEARCH THEMES

FIELDS

1. Climate change
2. Health and Wellbeing
3. Research in STEM fields
4. Education & Gender
5. Social Sciences, Humanities and Arts
6. Early Career Researchers & Youth
7. Water and Sanitation
8. Agriculture, Food security & Nutrition
9. Sustainable energy
10. Policy Sciences

SUBJECT AREAS

1. Medical and Health Sciences
2. Mathematical Sciences
3. Geological, Environmental, Earth & Space Sciences
4. Engineering Technology & Applied Sciences
5. Cultural Sciences
6. Humanities & Social Sciences
7. Chemical Sciences
8. Biosciences
9. Agricultural and Nutritional Sciences
10. Policy Sciences

AAS Strategic Plan & AESA Platform

Shifting the Centre of Gravity of African Science

AESA -Alliance for Accelerating Excellence in Science in Africa

AAS Tripartite mandate:

- 1. Recognise excellence**
- 2. Advisory and think tank functions**
- 3. Implementing key STI programmes**

Goal 1:

Build R&D Leadership & environments

that support a vibrant research culture and leadership development over the long-term.

Goal 2

Support the development of an innovation and science-driven entrepreneurial culture

Goal 3

Identify and support rising research leaders
to stay and build their careers in Africa

Goal 4

Target critical gaps in the research landscape

AU-EU Cooperation

EU-Africa Cooperation through partnerships in five key areas:

- ✓ Green Economy Transition
- ✓ Digital Transformation
- ✓ Sustainable Growth and Jobs
- ✓ Peace and Governance
- ✓ Migration and Mobility

ARUA-The Guild European Research Universities

- ✓ To articulate the importance of research, education, and innovation; and for creation of the African knowledge society - AU Agenda 2063 and the EU green and digital transition Agenda.
- ✓ To ensure that higher education and research can meet Africa's economic, societal, and demographic challenges.
- ✓ To ensure that higher education is a central component of EU-AU strategic partnership of the future.
- ✓ To explore ways in which European and African national and supranational bodies can coordinate their efforts.
- ✓ To discuss the contributions of researchers and universities to achieve the objectives of the EU-AU strategic partnership.

Situational Analysis- Research in Africa

- Africa spends on average 0.45% of its GDP on research and development (R&D), which is significantly less than the global average of 1.7% and the African Union's target of 1%.
- Africa has less than 100 researchers per million people. This is over 10x less than the global average of 1,100 researchers per million people- this impacts on economic and societal progress on the African continent.
- Under-investment in supporting African researchers & Institutions limits their continental and global recognition.
- Africa must increase investment in R&D complemented by actions that make a career in research in Africa more attractive, while enhancing the quality of research.
- Support for cutting-edge basic research should form the training ground for upcoming generations of African scientists and next generation of scientific leaders.
- Empowered African Researchers will be- well positioned to implement AU Agenda 2063 and the Sustainable Development Goals (SDGs).
- Gender disparities between women and men scientists do impact on development

Policy Framework (AU-EU 2017 Summit)

- The 2017 Africa Union and European Union (AU-EU) Summit firmly identified the importance of investing in people through STI.
- The 2020 Joint Communication “Towards a comprehensive Strategy with Africa”, reflects the priorities of the EC to forge “partnership for sustainable growth and jobs”, ‘boosting education, research and innovation’ as key areas of mutual interest.
- The evolving policy context and coherent post-2020 strategic framework, boosts research and innovation for development, and ensure enhanced quality-based competition in partner countries.
- The African Research Initiative on Scientific Excellence (ARISE) Pilot Programme, is an example of a novel instrument by AU-EU- implemented by the AAS.
- ARISE –PP aims to transform Africa into a knowledge based and innovation lead continent.
- Africa (STISA-2024) is to accelerate Africa’s transition to an innovation-led, knowledge-based economy”.

THE AAS

AAS Role in the African Research Agenda

AAS Role in the Africa Research Agenda

- Continental Policy on Education & Research.
- Resource mobilization to empower African Researchers - implementation of STI Agenda by African Institutions.
- Investment to improve infrastructure in African Research Institutions Promoting Partnerships and Networks Intra-Africa and; the Global South and Global North (to arrest brain drain of the most talented researchers on the continent).
- Mentorship of Early Career Researchers through Joint projects with established researchers.
- Gender and Sciences- overcome gender disparities in STEM

.....The Role of AAS

- The AAS has a unique role as a pan-African scientific organization promoting international research partnerships and the development of a robust research ecosystem in Africa.
- The AAS is well positioned and internationally recognized to forge strategic science partnerships on the African continent and globally.
- The AESA , a programmatic platform of the AAS, was created in partnership with the African Union Development Agency (AUDA-NEPAD).
- AESA provides the funding and agenda setting to catalyse the development and implementation of STI programmes in Africa.

AAS Research Management Programme for African Institutions- **AIMS**

- **Collaboration between and within African Universities and Research Institutions**- with benefits of sharing best practices, leveraging on each other institution's strength, etc.
- **Capacity building using evidence-based benchmarks**- to address issues that are common accross the sector and encourage institutions to develop structures and systems that will affect change.
- **African leadership supported by global expertise on research management** must first appreciate the importance of research.
- **Building on existing structures and expertise**- there is need to invest in research and build on the existing structures to strengthen institutions. There is caution not to re-invent the wheel, as systems are already in place and African Institutions need to borrow a leaf.
- **Along-term approach to research management**- to avoid stop-and go approach, particularly depending on the Institution leaders as they change after their terms. A long-term approach to transform research in HEIs.

Inter-dependent Variables that determine the success factors for building effective sustainable research management at institutional level

- **Institutional leadership**- awareness and engagement at the leadership level , essential for continuity necessary to strengthen research management at an institutional level.
- **Long-term commitment** – on resources to ensure sustainability in terms of financial, career and professional development functions, sound policies and research practices.
- **High quality standards and good practices**- these need to be created, implemented and communicated to all stakeholders within and outside the institutions.
- **Individual capacity development for research managers**- career tracks must be established and maintained to promote the profession of research management supported by an infrastructure of networks and training opportunities, attracting and retention of professional staff.

IMPLEMENTATION OF AU-EU COOPETATION

**African Research Initiative for Scientific
Excellence - Pilot Programme (ARISE-PP), a
partnership between AUC and EC**

African Research Initiative for Scientific Excellence - Pilot Programme (ARISE-PP), a partnership between AUC and EC

- Effort towards a more attractive and inclusive continent for bright minds, including the diaspora returning to Africa.
- By **creating open and direct competition for funding** amongst the very best African women and men researchers- the ARISE Pilot Programme will reinforce the positive agenda for research in Africa.
- The ARISE Pilot Programme will complement and reinforce & support modalities targeting **capacity building and specific priority research themes** that reflect African Union and European Union priority areas of cooperation.
- ARISE-PP enable the **brightest talent in Africa and their ideas to be recognized** and offer further development opportunities, to nurture the next generations of African scientific leaders
- Encourage **more investment in R&D and enhance collaboration** on equal footing with other continents, such as Europe.

African Union- Affiliated Organizations

1. The African Academy of Sciences- Research Think Tank & Policy functions- African Union STI

<https://aasciences.africa/>

2. The African Research Universities Alliance (ARUA) : <https://arua.org.za>

Network of universities: provide members with Office and/or laboratory space; Infrastructure (equipment, IT facilities, etc.); **Academic support** (information, resource facilities and related research groups); Support for international faculty and students; **Management and leadership**; **Financial support**

3. The Pan African University (PAU) - <https://pau-au.Africa>: continental initiatives of the Commission of the African Union to revitalize higher education and research in Africa. **Water and Energy Sciences (Climate Change) (PAUWES, Algeria)**; **Basic Science, Technology & Innovation (PAUSTI, Kenya)**; **Life and Earth Sciences (Health and Agriculture) (PAULESI, Nigeria)**; **Governance, Humanities and Social Sciences (PAUGHSS, Cameroon)**; **Space Sciences (PAUSS, South Africa).**

4. Association of African Universities: <https://aau.org>

Higher Education in Africa through academic (HEiA), quality assurance, governance for development of HEiA:

- ✓ Supporting the core functions of Higher Education Institutions (HEIs)
- ✓ Facilitating a favourable Higher Education policy environment
- ✓ Providing a platform for discussions on emerging issues on HEIs

5. Africa CDC: Africa Centres for Disease Control and Prevention: <https://africacdc.org/>

Emergency Preparedness and Response; Laboratory Systems and Networks; National Public Health Institutes and Research; Public Health Information Systems; Surveillance and Disease Intelligence. Vaccine development

AAS Research Capacity Building Programmes- ECRs

1. ***The Human Heredity and Health in Africa (H3Africa)*** a programme initiated in 2010 by the **National Institute of Health (NIH), Wellcome Trust, and African Society of Human Genetics (AfSHG)**
 2. ***Developing Excellence in Leadership, Training and Science in Africa (DELTAS Africa)***- the goal is to produce researchers with the capacity to publish and lead locally relevant and high-quality research to impact health science, policy and practice in Africa. **Support of the Wellcome Trust and the UK's DFID/ FCDO/ NEPAD.** The DELTAS Africa focuses on the tertiary and postgraduate training of science students and professionals, along a defined career pathway.
- ***The Climate Impact Research Capacity and Leadership Enhancement (CIRCLE)***; which is a programme to develop the skills and research capacity for early career African researchers in the field of climate change. This programme involves collaborations between **African universities and research institutions to strengthen their research ecosystems, and is funded by DFID, UK.**
 - ***Climate Research for Development (CR4D)***- for action on Intergovernmental Panel on Climate Change (IPCC) Report on the Implications of 1.5°C warming (SR 1.5), in line with UN Environment 2018 Emissions Gap Report. The programme is supported by **UK DFID /Weather and Climate information SERvices for Africa (WISER)** and the **Africa Climate Policy Centre (ACPC)** of the United Nations Economic Commission for Africa (UNECA).

.....AAS Research Capacity Building

- ***African Regional Initiative in Science and Education (ARISE)***, a Postdoctoral Fellowship Programme for grantees to supervise doctoral and masters-level scientists and engineers in sub-Saharan Africa. Aimed to increase the number of researchers in Universities and Research Institutes in Africa, to enhance creation of knowledge-based economies. **European Commission Grant.**
- ***Future Leaders- African Independent Research (FLAIR)***- the programme supports fellowships for talented African early career researchers who have the potential to become leaders in their field. The programme is funded by **Royal Society, UK** and **Global Grand Challenge Research Fund.**
- ***African Postdoctoral Training Initiative (APTI)***- funded by **U.S. National Institutes of Health (NIH)** and **Bill & Melinda Gates Foundation** under the auspices of the *Coalition of African Research & Innovation (CARI)*.
- ***The AAS Affiliates programme*** which supports the development of promising African early and mid-career scientists into world class research leaders as per AAS' vision of transforming lives through sciences.
- ***Science and Language Mobility Scheme Africa (SLMS)***- The Science and Language Mobility Scheme Africa is a programme **which funds researchers from Anglo and Francophone Africa to undertake scientific research in language regions other than their own.**

.....AAS Research Capacity Building

- ***Mobility Schemes - Africa-India Mobility Fund-*** The Africa-India Mobility Fund (AIMF) is a programme designed to provide researchers from Africa and India with opportunities for short visits in either direction, to explore opportunities for building and strengthening scientific collaboration. The programme is supported by Wellcome Trust UK and Department of Biotechnology (DBT), Government of India.
- ***Climate Research for Development (CR4D)-*** This initiative was conceptualized at the Africa Climate Conference in 2013 as a mechanism to strengthen links between climate science research and climate information needs to support development planning in Africa. The initiative addresses climate research priority areas that have been identified in Africa by African researchers. The programme is supported by UK DFID /Weather and Climate information SERVICES for Africa (WISER) and the Africa Climate Policy Centre (ACPC) of the United Nations Economic Commission for Africa (UNECA).

AAS Good Financial Grant Practice (GFGP)

- AAS- **The Global Grant Community** is a platform of the African Academy of Sciences.
- The Global Grant Community platform consists of: <https://www.aasciences.africa/ggc>
 - ✓ The Good Financial Grant Practice Standard,
 - ✓ A portal-based pre-certification scheme
 - ✓ Certification scheme
- The AAS has developed **International Standard for Good Financial Grant Practice (ARS 1651)**
- **GFGP**- ensures grant management practice that **major funders** expect and look for when allocating funding.

These practices run across four areas of:

1. Financial management,
 2. Human resources,
 3. Procurement
 4. Governance
- GFGP mission is to allow more money to flow to the people who need it by using the **disruptive power of technology to digitize, standardize and de-risk the due diligence process for both funders and grant receivers.**

AAS Open Access Platform

What is Open Access?

Open Access provides free unrestricted access to publically funded research outputs so that all African researchers in society can benefit from the findings.

- African Academy of Science to put its research on global stage with innovative new publishing platform
- **AAS Open Research**, to enable AAS funded and affiliated researchers to publish immediately and without barriers.
- AAS Open Research- [join a growing number of funder publication platforms](#), such as those operated on behalf of [The Wellcome Trust](#) and the [Bill & Melinda Gates Foundation](#), and soon Ireland's Health Research Board. The platforms are based on a model developed by F1000Research, which uses immediate publication and transparent post-publication peer review.

RECOMMENDATIONS FOR THE WAY FORWARD

- Improve **Research Infrastructure** in African Institutions through funding.
- Establish **collaborations between European and African Institutions**.
- Facilitate **Mobility** funding to enable African Researchers visit established laboratories to gain skills.
- Strengthen **Research Management Processes** in African Universities and Research Institutions: institutions, researchers, standards
- Ensure **Good Finance Grant Practice** under Global Grant Community through the AAS
- Ensure **Open Science and Open Access**.
- Provide **mentorship to Early Career Researchers** through collaboration, joint project and exchange visits between African and European Researchers.
- Ensure applied research incorporate **innovation and entrepreneurship**

.....Way Forward

In order to achieve the above, the partnership between AU-EU should ensure:

- ✓ Enhanced capabilities of Emerging African Research Leaders committed to a research and teaching career in Africa.
- ✓ Strengthened institutional research management and support systems to enable pan-African research to thrive.
- ✓ Support for the generation of cutting-edge research in contribution to the transformation of Africa into a knowledge-based and innovation-led continent and towards the transformation of lives in African through science.

How do we Implement the Partnerships?

- Hosting of **workshops and conference** - disseminate and share experience
- **Joint project implementation** through collaborations
- **Meetings /workshops** –to conduct needs assessments for Africa continent
- **Skills training programmes** –short period training, exchange visits, etc.

Who will be involved in the Research, Education, and Innovation Partnerships

- ✓ Policymakers in Africa and Europe
- ✓ Stakeholders in Africa and Europe (universities, research institutions, research funding organizations, umbrella organizations, etc.)
- ✓ Development Policymakers & Stakeholders in Africa and Europe (NGO, Funding Agencies, etc.)

Funding Partners Supporting AAS Programmes



Republic of Kenya



Federal Republic of Nigeria



Republic of Botswana



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www.aasciences.africa



@AAsciences

Email: communication@aasciences.africa