WORLD BANK GROUP

Science, Technology and Innovation for Achieving SDGs – Potential for Partnership through Regional Approaches in Africa

Kyoto

October 25, 2018

Motivation for a Regional Approach

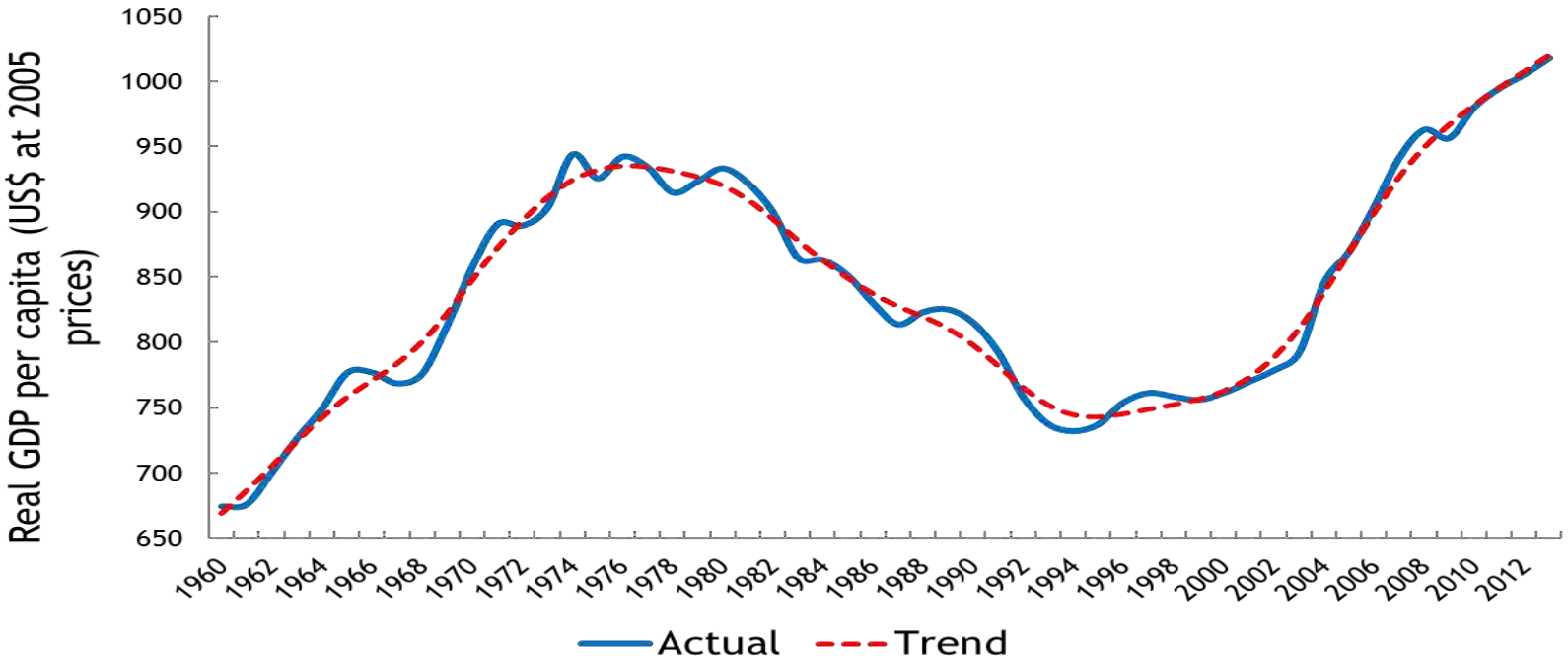
Background

- Sub-Saharan Africa lags behind in higher education and research output in science, technology, agriculture, health and related fields.

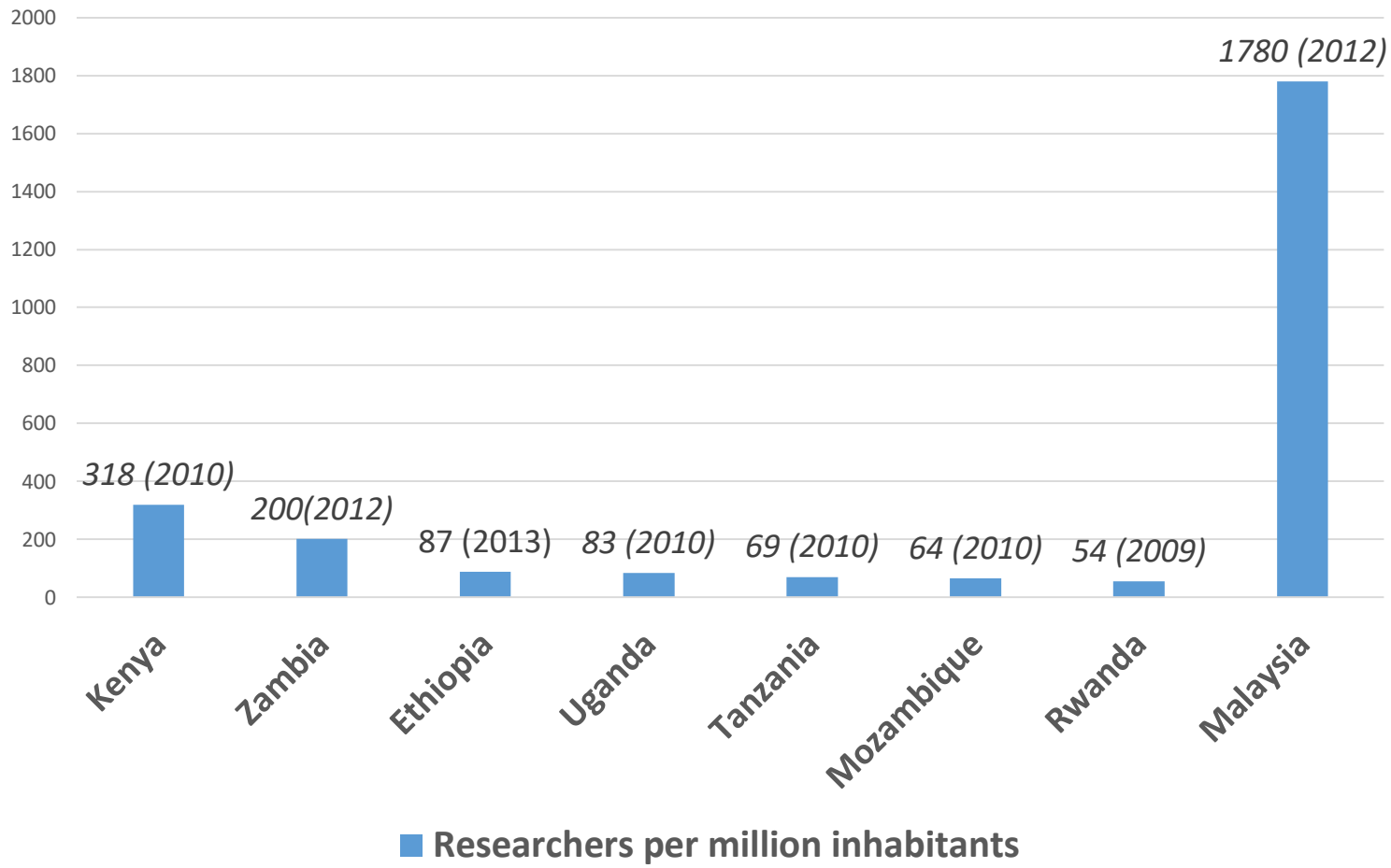
- Recent economic growth and foreign investment have boosted demand for greater technological skills and applied research in these areas.

Background

Africa's Growth: Recovery in Last 20 Years, Driven by Natural Resources



Researchers per million inhabitants



Source: *UNESCO Institute for Statistics (2015).*

Continental + National Efforts

- The African Union Science and Technology Consolidated Plan of Action
- The African Science, Technology and Innovation Indicators (ASTII) initiative
- Efforts of US and other private foundations to support higher education
- And others – the above is not an exhaustive list
- Individual countries are also making efforts to build science and technology capability - but many lack capacity, size etc

Operationalizing a Regional Approach

Many of the continental approaches, while having ownership, encountered difficulties in taking an idea from concept to implementation, monitoring of results

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Challenge: Designing a regional approach for effective and efficient implementation, with broad ownership from African governments and involvement of technical/ scientific experts

World Bank's Began Regional Approach in 2014

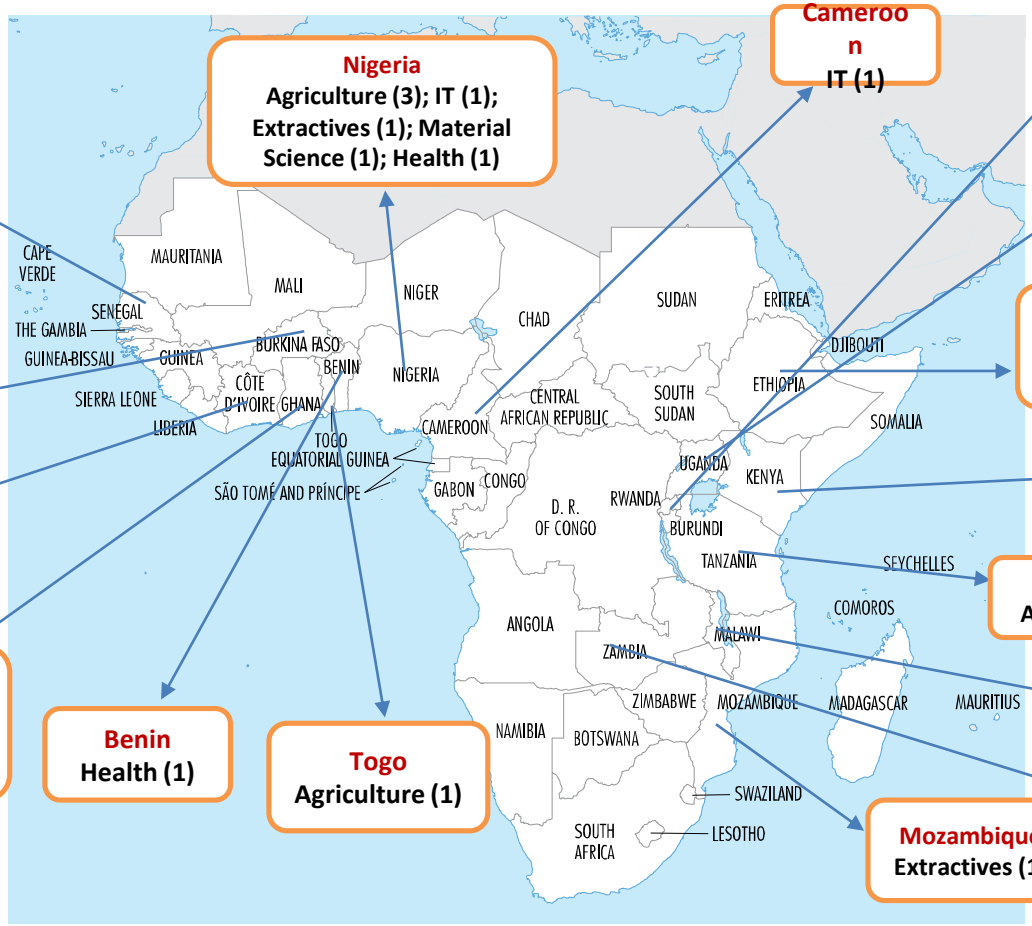
- World Bank has large portfolio of country-level projects in higher education (over $3 billion dollars for education support in Africa out of which approximately $600 million is for higher education and skills).
- Regional approach began in 2014, and expanded with two main initiatives, focusing on science and technology at post-graduate level
  - **Africa Centers of Excellence** (*financed through Bank credit to individual countries/ centers, with a common selection and implementation approach*)
  - **PASET Regional Scholarship and Innovation Fund** (*initiated and financed by African governments*, contributions from donors and private sector; Bank provides regional grant for administration and growth of permanent Fund, capacity building of regional body and universities)

ACE and PASET RSIF

Africa Centres of Excellence

- **Objective :**
  - Promote Regional specialization
  - Post graduate training and applied research in priority sectors
- **ACE 1 launched in 2014 - $165 m:**
  - Strong RESULTS at mid-term
- **ACE 2 Launched in 2016 - $148 m**
  - All countries and centers implementing
- **ACE for Impact – Third Phase– approx. $ 280m**
  - Under preparation

46 Africa Centers of Excellence in 16 Countries



Senegal
IT (1)
Health (1)

Nigeria
Agriculture (3); IT (1); Extractives (1); Material Science (1); Health (1)

Cameroon
IT (1)

Rwanda
IT (1); Energy (1) Education (1); Statistics (1)

Uganda
Agriculture (2)
Material Science (1)
Health (1)

Ethiopia
Agriculture (1); Water (1); Transport (1); Health (1)

Burkina Faso
Water (1)

Kenya
Agriculture (2)
Energy (1)

Tanzania
Agriculture (2; Water (1); Health (1)

Ivory Coast
Agriculture (1)
Statistics (1)
Extractives (1)

Ghana
Agriculture (1)
Water Mgt. (1)
Health (1)

Benin
Health (1)

Togo
Agriculture (1)

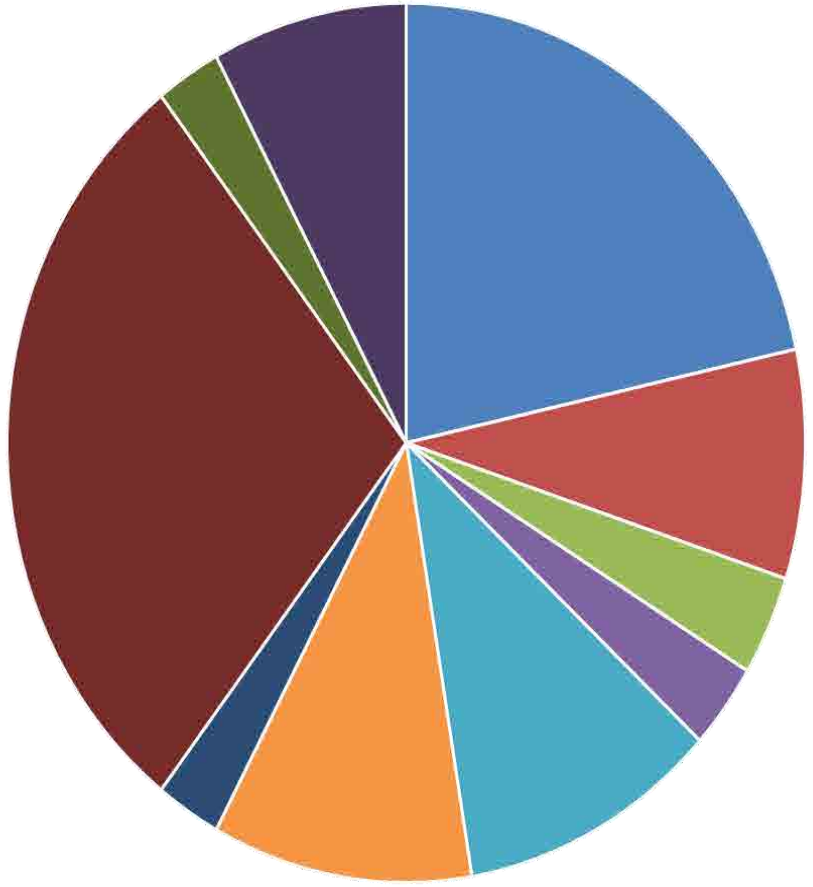
Malawi
Agriculture (1)
Health (1)

Zambia
Extractives (1); Health (1)

Mozambique
Extractives (1)

ACE Selection Process

Distribution of ACEs in 46 countries by Sector



ACE Selection Process

- A rigorous, competitive and transparent process to select each ACE (publication of each submitted proposal by Ministry of Education; grievance redressal)

- A call for proposals preceded an independent, two-step evaluation, which included a technical review as well as an onsite and leadership assessment. **ACEs also undergo financial management, procurement and safeguards assessments.**

Selection Criteria:

1. Addressing a specific challenge in one of the identified priority areas in the region;
2. High proposal quality;
3. Institutional capacity;
4. Providing geographical balance;
5. Eligibility and availability for IDA funding.

Results from ACEs

- ACE adopts a results based financing model –funds disbursed against achieved results.
- Examples of results regarding Excellence in Education and Research.

➢New students (% of regional students)

➢International evaluation and accreditation of education programs

➢Published articles

➢Externally generated revenue

Results from ACEs

ACE1:

- 6,500 MSc and 1,600 PhD students supported.
- 4,000 women have been supported under the project in MSc, PhD and Short Term Professional Training programs
- 25 new Masters programs
- 15 programs obtained international accreditation
- 600 students have undergone a one-month internship in key sectors including utilities, hospitals, NGOs, and international firms
- Revenue generation: close to $ 20 million from industry and NGOs

ACE 2:

- 1,800 MSc and PhD , of which 600 women
- 158 MoUs have been signed on research and training collaboration with regional and international universities and research institutions.

PASET RSIF Launched on June 13, 2015

$10 million pledged by Senegal, Rwanda, Kenya, Ethiopia and Cote d'Ivoire in initial funding

Will award grants for PhD scholarships in ASET fields over 10 years

The launch was led by HE President Macky Sall of Senegal along with representatives of the heads of states in Ethiopia and Rwanda

Regional Scholarship and Innovation Fund (RSIF) – Flagship Program of PASET with Three Windows

The PASET Regional Fund has three windows:

- **Window 1: PhD Training** aimed primarily at existing faculty/academic staff in priority Applied Sciences, Engineering & Technology (ASET) fields & new students entering such fields

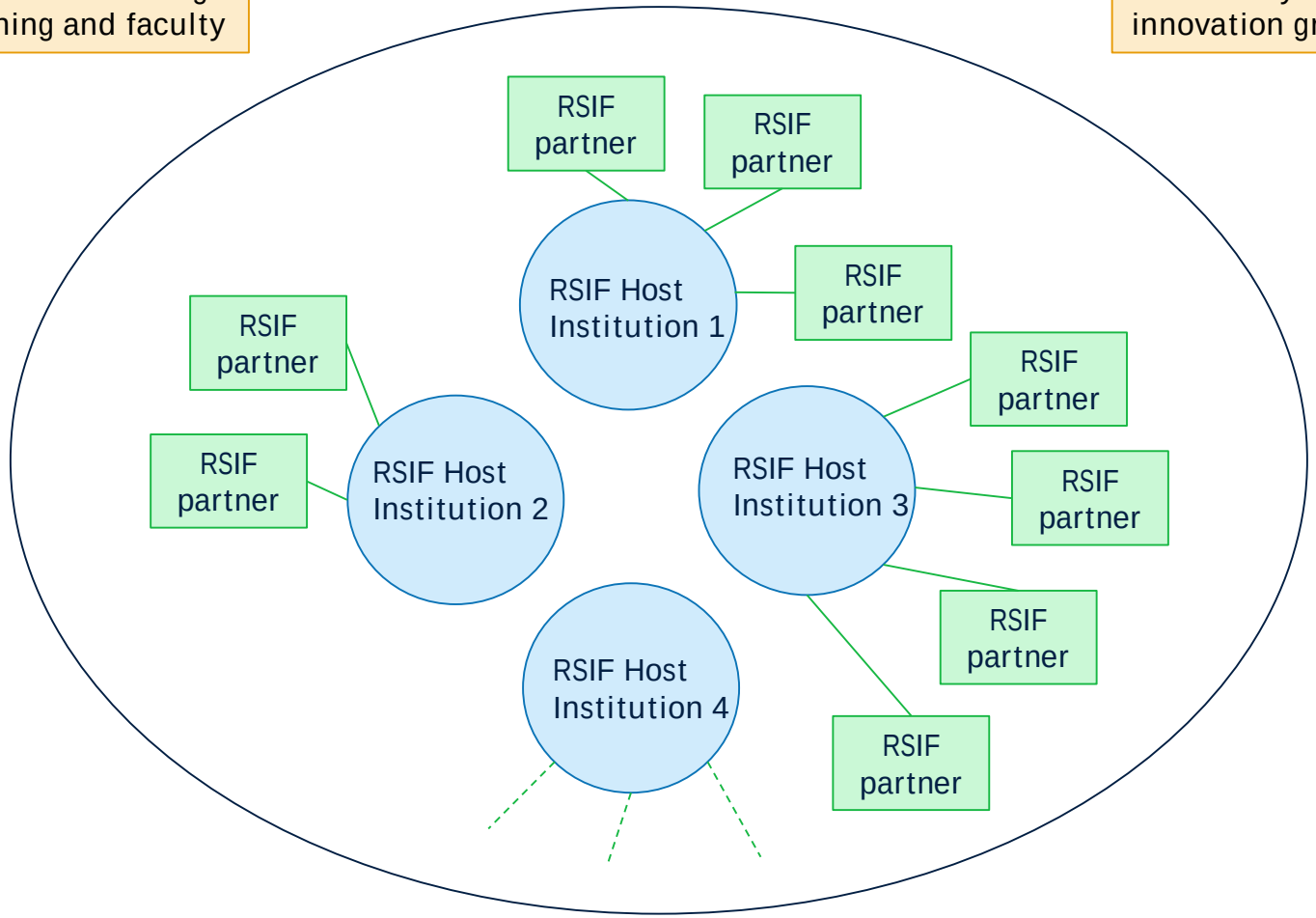
- **Window 2: Research Grants** to facilitate scholarship recipients to undertake research and utilize research assets in support of the needs of the priority sectors within Africa

- **Window 3: Innovation Grants** to provide tools that enable scholarship recipients to establish enterprises

1. Impact on RSIF host universities. Emergence of 10 SSA universities known for research excellence

2. Impact on quality of teaching/research at SSA universities through PhD training and faculty

3. Impact on business and society through innovation grants



World Bank and other donor support for RSIF

World Bank Grant:

- $ 15 million grant to competitively selected African regional organization (***icipe***) to administer and grow the Fund; Target to grow fund to $ 65 million, with a Permanent Fund
- Design and implement all three windows of the Fund; also includes small amount to pilot innovation grant
- Pays for administering the contributions of governments and other donors during project period
- ***icipe*** will organize selection of universities and students for Window 1, call for research and innovation grants under Windows 2 and 3
- African governments endorsed competitive selection of icipe to administer RSIF.

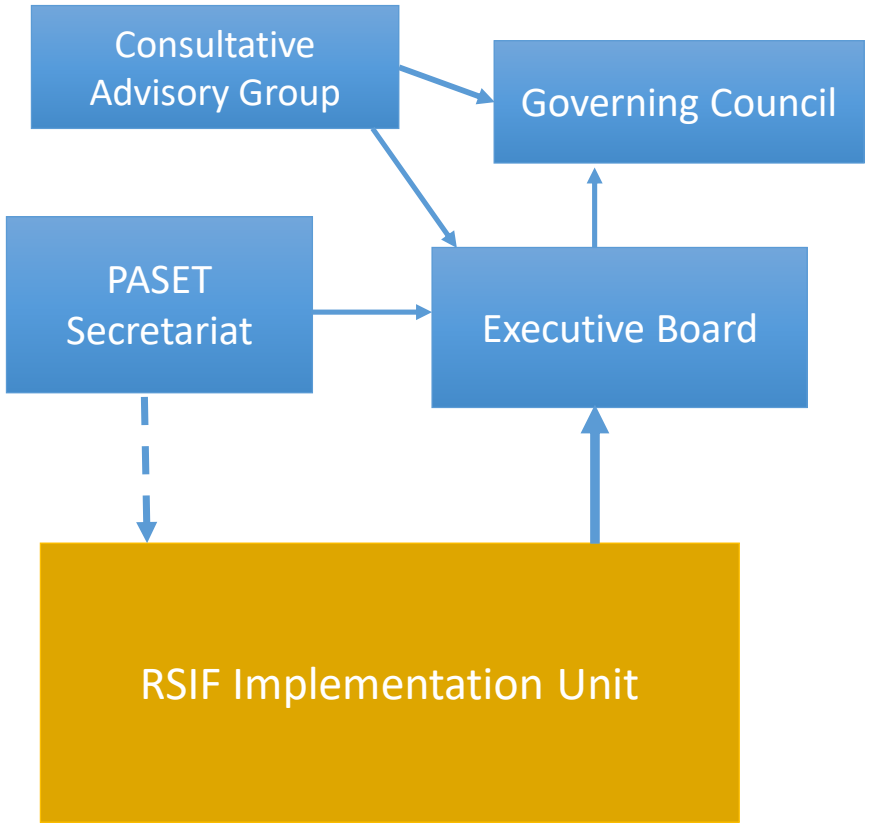
Korean Government Grant:

- Administered as part of World Bank project, through a Trust Fund
- Supports Ph.D grants and research grants
- Follows same process as others; grants for “sandwich” PhD programs in Korean universities, and collaborative research with Korean researchers on African problems

RSIF Current Status

- Window 1 (Ph.D grants) designed and 1st group of universities and 1st cohort of Ph.D students selected using initial contributions of African government.
- ***Icipe*** designing the 2nd call for universities
- Research Grant Window and Innovation Grant Window being designed
- Terms of Reference for design of Permanent Fund being prepared
- Fund raising strategy being designed

Governance of PASET and RSIF



- **Political ownership and strategic leadership by contributing African governments and donors**
- **Technical advice form African and international experts**
- **Efficient implementation**

Full arrow indicates direction of reporting.

Dotted arrow indicates close collaboration & guidance.

ACE and RSIF are complementary but different

ACEs receive funding from Bank as each Centre achieves results	… RSIF envisaged to become sustainable PAN AFRICAN SCIENCE FUND
Sustainability of centre to be assured by Government/ University	Bank grant establishes Pan African Science Research Fund as a sustainable fund; countries benefit in proportion to contribution
Each Centre tries to generate additional resources from private sector and others	Governments, donors and private sector can join the same architecture and benefit from economies of scale
Donors can co-finance a Centre or fund additional centres	Donors and private sector can fund specific “themes” or groups (eg women) but get regional impact

PASET FORUM

How ACEs and RSIF promote innovation

Examples of Innovation from ACEs (Gaston Berger University is a RSIF host institution)

Gaston Berger University
Senegal
MITIC - ACE for Mathematics, Computer Science, and ICT

- A Study of IoT Solution for Preventing Cattle rustling in African Context

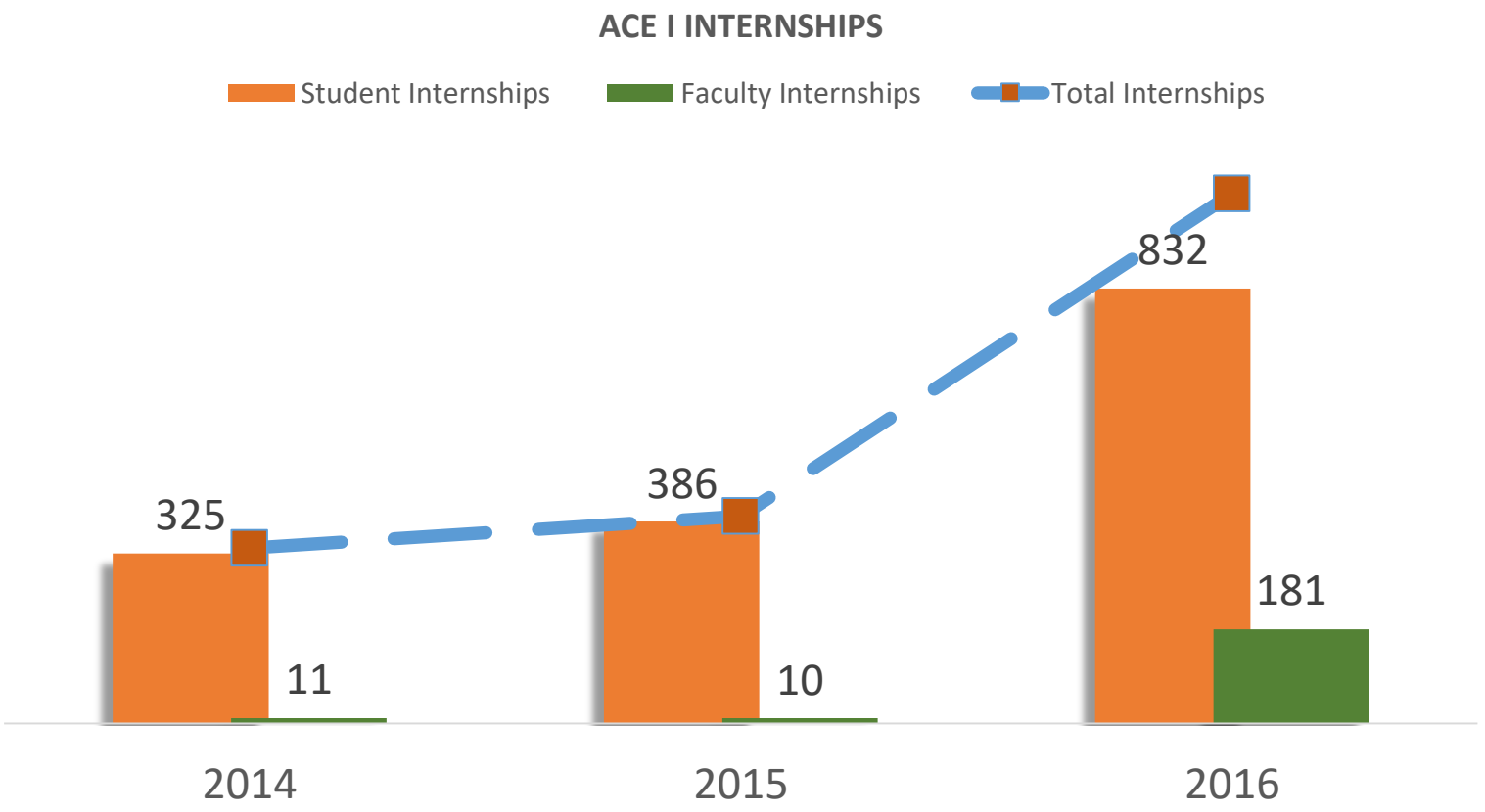
Makerere University
Uganda
MAPRONANO - ACE for Materials, Product Development and Nano-Technology

- Nano-technology innovation in solar technology, water purification, environmental bio-remediation.
- Commercialization of research for solar water heaters, hybrid solar drier

University of Rwanda
Rwanda
MITIC - ACE for Mathematics, Computer Science, and ICT

- Machine learning for population health outcomes prediction
- Disease classification and prediction using methods from data-mining and Machine Learning literature: a case study of heart failure subtypes in Rwanda district hospitals
- Spatio-Temporal and statistical prediction models of human infectious diseases in East African countries

ACE – Industry Linkages



RSIF Innovation Window

Under the World Bank Grant, *icipe* will

- Identify existing incubators, accelerators and tech hubs for potential partnership as well as venture capital and investors for Africa

- Develop courses for universities on entrepreneurship and business model development and develop professional business incubation capability

- Conducts study on best practices for IP office establishment and IP policy of host university and capacity building on sound management of intellectual property

- Competitively grant six innovations grants to support innovation-enabling environments in host institutions
- Competitively grant five innovation grants to support innovation projects and commercialization of research presented jointly by faculty of host institutions involved in a PhD program with RSIF scholars and private productive sector.

- Monitoring and evaluation strategies of the innovation grants

Opportunities for Collaboration

Collaboration with Japan to date

❑ October 2017 - present

- Informed MEXT's global university project's target universities on collaboration opportunity with ACE and PASET.
- Conducted 2 webex meetings with interested 20 Japanese universities and organized follow-up webex meetings between ACEs and Japanese universities.
- Following universities are discussing MoUs with ACEs.
  - Tokyo University of Agriculture and Technology
  - Shibaura Institute of Technology
  - Sophia University

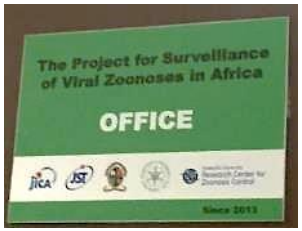
❑ January 2018

- Participated in Japan-Africa Academic Network (JAAN) annual meeting to present PASET and ACE and collaboration with the World Bank on higher education.

❑ May 2018

- Met representatives from Hokkaido University in University of Zambia running a "study-in-Japan coordinator project" commissioned by the MEXT. Representatives participated in the ACE 2 meeting in Lusaka.
- Identified synergies between ACE/PASET and "study-in-Japan coordinator project"/JAAN, including student/faculty exchange, joint research, and scholarship provision.

Hokkaido University Lusaka Office in University of Zambia



ACE center leader from University of Zambia below has received a PhD in Japan and been working with Hokkaido University

Japanese Universities have already collaborated with ACEs

MoU already Signed

Japan	ACEs	Sector
Hokkaido University	University of Zambia (ACE for infectious disease of humans and animals)	Health
Tokyo University of Agriculture and Technology (TUAT)	University of Ghana (MoU with ACE for training plant breeders, seed scientists and technologists will be developed)	Agriculture
University of Tsukuba	University of Malawi (ACE for Public Health and Herbal Medicine)	Health
University of Nagasaki	Ahmadu Bello University (ACE on Neglected Tropical Diseases and Forensic Biotechnology) - Nigeria	Health

MoU in Discussion

Japan	ACEs	Sector
Tokyo University of Agriculture and Technology (TUAT)	Sokoine University of Agriculture (ACE for Innovative Rodent Pest Management & Biosensor Technology Development) - Tanzania	Agriculture
Shibaura Institute of Technology (SIT)	University of Ghana (ACE for Cell Biology of Infectious Pathogens)	Health
	Sokoine University of Agriculture (Southern African Center for Infectious Disease Surveillance and ACE for Innovative Rodent Pest Management & Biosensor Technology Development) - Tanzania	Health
Sophia University	University of Malawi (ACE for Public Health and Herbal Medicine)	Health
	Addis Ababa University (African Railway Education and Research Institute)	Industry
University of Tokyo Kobe Institute of Computing	University of Rwanda-College of Science and Technology (ACE for Internet of Things)	Industry

Joint Workshop

Japan	ACEs	Sector
University of Tokyo	Nelson Mandela African Institution of Science & Technology (Water Infrastructure & Sustainable Energy Center for the Future)	Industry

Collaboration Modalities
1) University-University

ACE

- MoU between ACE and Japanese university to collaborate on research or Ph.D/ Masters training in mutual areas of interest
- ACEs have an incentive , and are funded during project period
- Great teaching and research opportunity for Japanese professors

RSIF SSA Host University

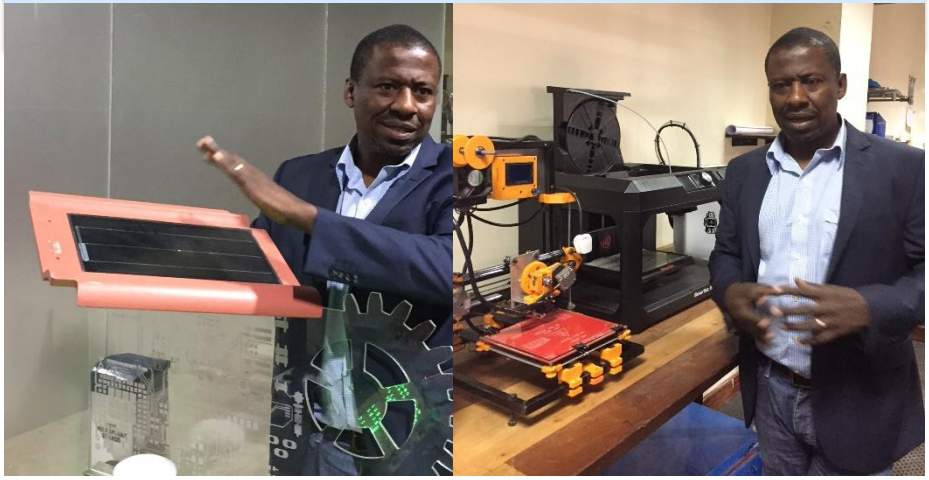
- Selection of international partner universities for long-term partnership with SSA universities
- “Sandwich” training for Ph.D, collaborative faculty research, collaboration on innovation grants
- Regional organization (icipe) ensures minimum standards for high quality collaboration (standardized MOU, protection of intellectual property
- Japanese universities gain from “deep” partnership

High quality research facility and super computer from Université Félix Houphouët-Boigny in Cote d’Ivoire (ACE & RSIF host university)

Collaboration Modalities
2) University – Industry through Innovation grant

Opportunities

- Japanese companies partner with RSIF host universities to apply for PASET RSIF innovation grant to receive incubation service
- PASET RSIF incubators, in collaboration with local tech hubs provides business incubation support to create new enterprises and commercialize research



Innovation from local tech hub - Gearbox (solar panel embedded roof and 3D printer made in Kenya)

Advantages

- All the innovation partners have connections with African market and investors and provide legal/business incubation services and access to entrepreneurial talent to form enterprises smoothly
- No need for investing in an incubation process in Africa – partners have a track record of successful incubation
- Potential for applying Japanese technologies to African market to incubate new products and services
- Potential for finding seeds of innovation from African universities and jointly commercialize

Collaboration Modalities
3) Funding for ACE / RSIF

ACE

- Co-finance one or more ACE
- Although funding particular centre, regional impact and sharing of knowledge is possible through ACE network
- Collaborate in selected areas of interest to Japanese universities
- Japan benefits from World Bank design and supervision of 3 large ACE projects in multiple countries

RSIF

- Fund RSIF Window on research grants, innovation grants or Ph.D grants
- Become supporter of a prestigious Pan African Science Fund (like National Science Foundation) to train future African leaders/scientists/innovators and develop capacity of African universities
- Broad regional impact through SSA host universities
- Highly talented scientists and researchers will study in Japan and conduct research
- Japan participates in the RSIF governance along with African governments, World Bank and other donors