

The PASET-Regional Scholarship and Innovation Fund for Applied Sciences, Engineering and Technology in Rwanda





Rsif in Rwanda



Research. Innovate. Transform Africa

Rsif - Designed for Impact

Flagship project of PASET



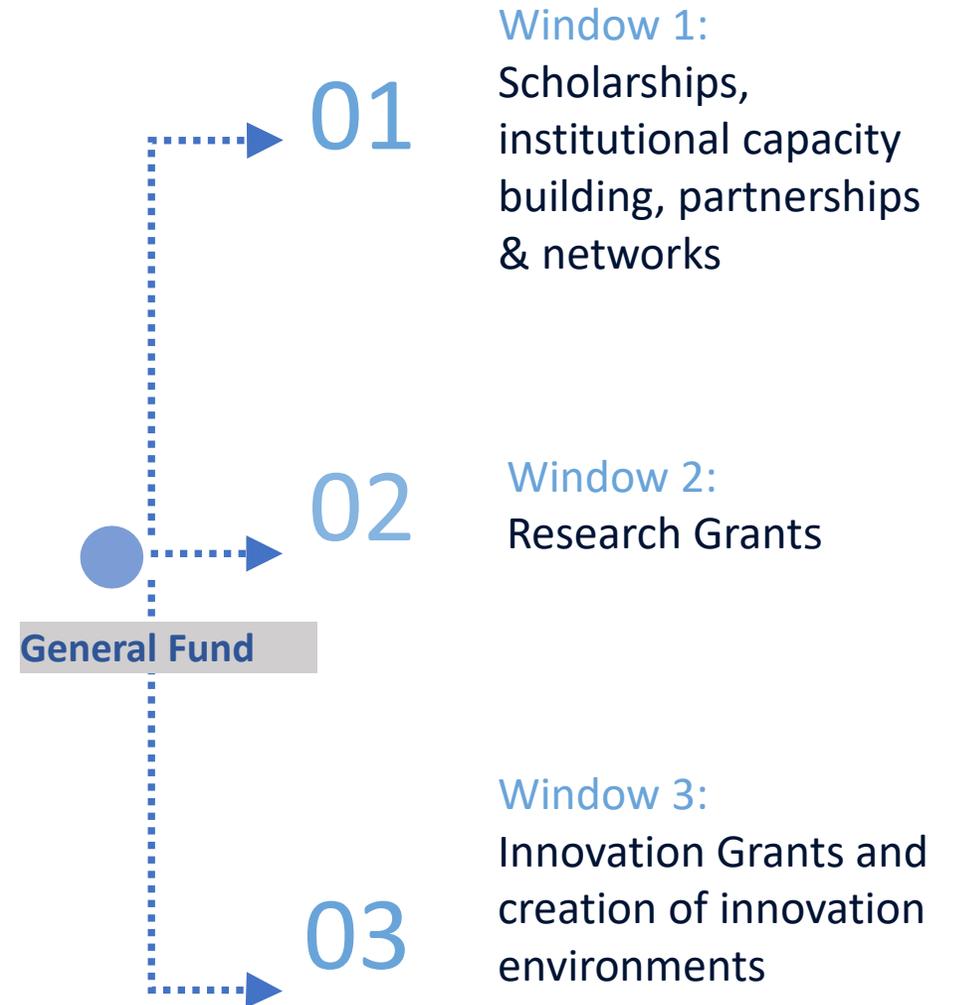
Building sustainable doctoral training, research and innovation ecosystems for development in Africa

Objectives

— Create a stock of highly skilled scientists, professionals and innovators in applied sciences, engineering and technology (ASET) areas

— Address imbalances in the number of women and disadvantaged groups in ASET fields in Africa

— Build African university capacity to provide relevant ASET training

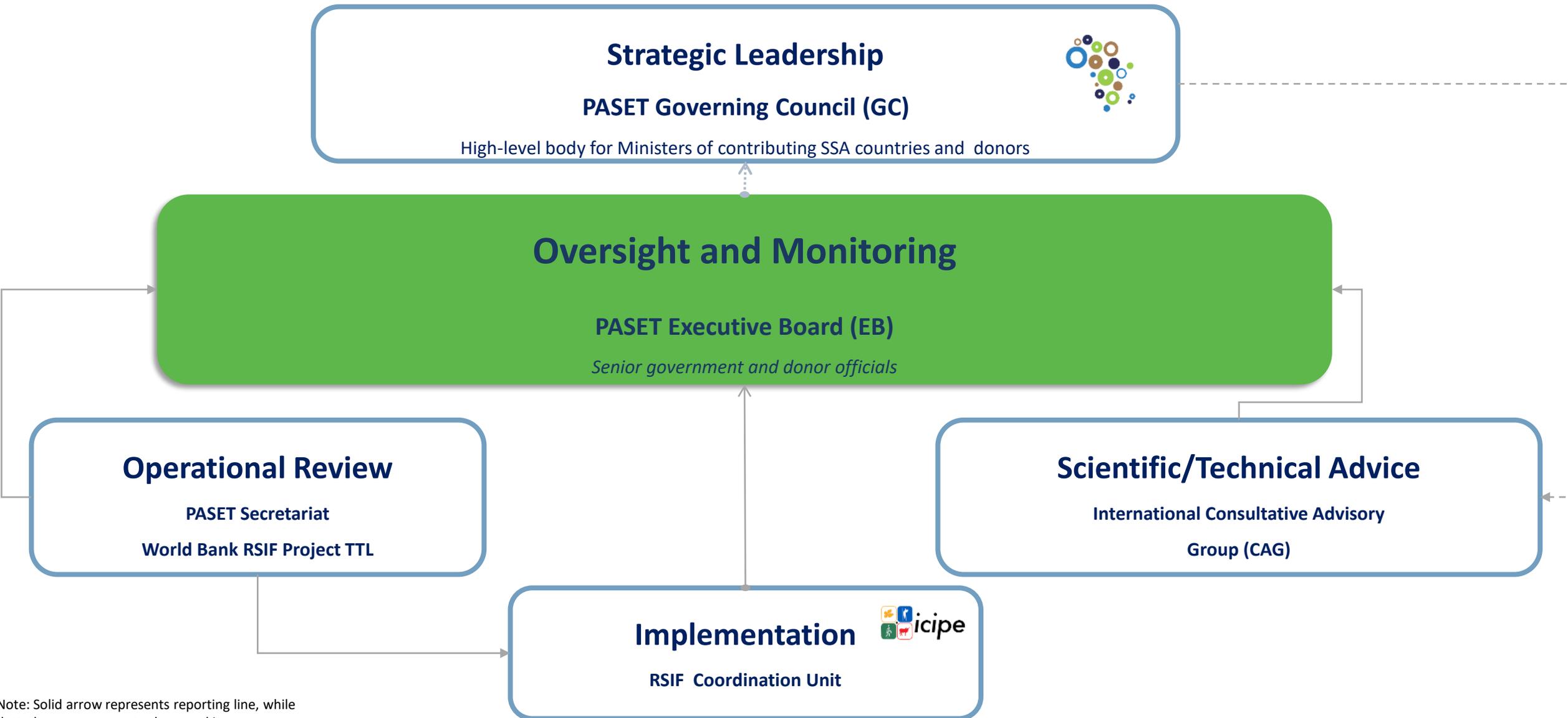


Rsif is a unique African initiative

1. Owned and managed by African governments through PASET (11 African governments)
2. To-date, investments from 9 African governments (between US\$1 -6 million each), the World Bank, Korea and other funders
3. Managed by an African led international research/innovation and training institution – *icipe*
4. Regional approach to grow Africa's STI agenda
5. Sustainability - vision to grow Rsif into a Pan-African science fund
 - establish a Permanent fund
 - exploring innovative financing and leveraging of private capital, e.g. blockchain technology, carbon credit, venture capital fund.



Inclusive, Efficient and Transparent Governance



Note: Solid arrow represents reporting line, while dotted arrow represents close working relationship

icipe Rsif - Fostering Excellence

- Highly Competitive Selection
- Ongoing Mentoring

- Selective Matching
- High Level of Interaction



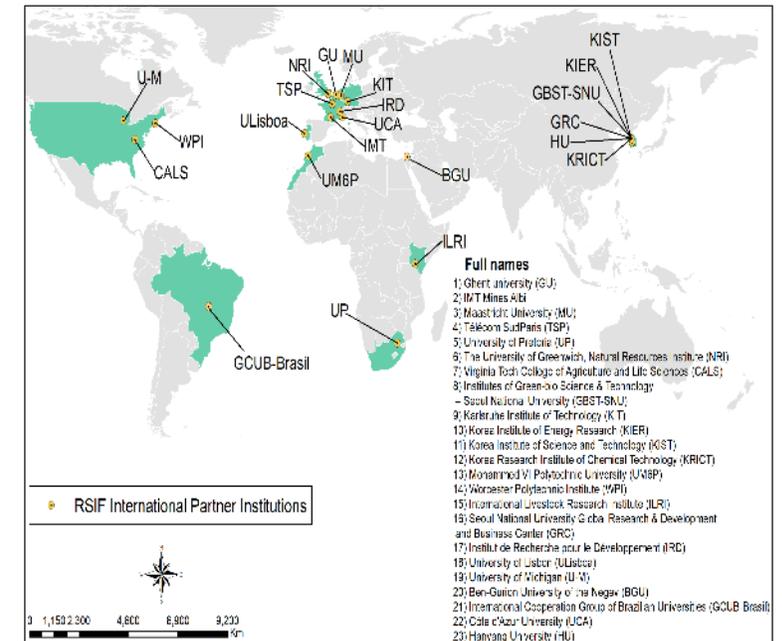
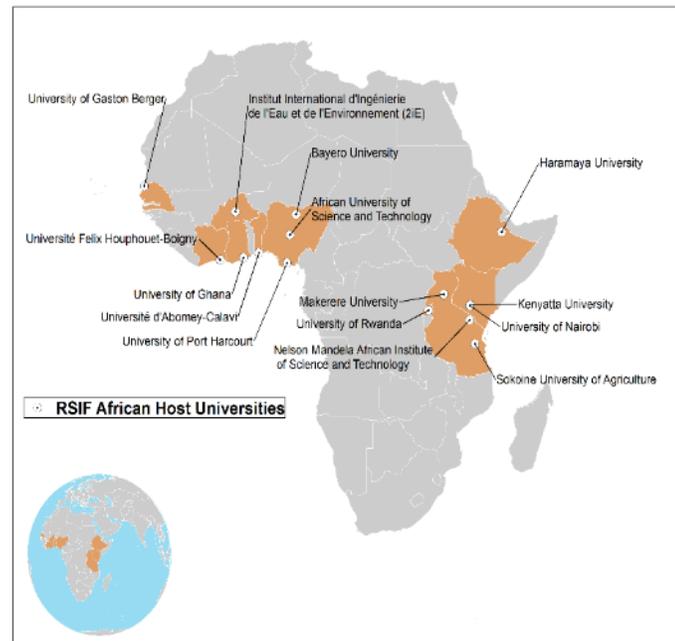
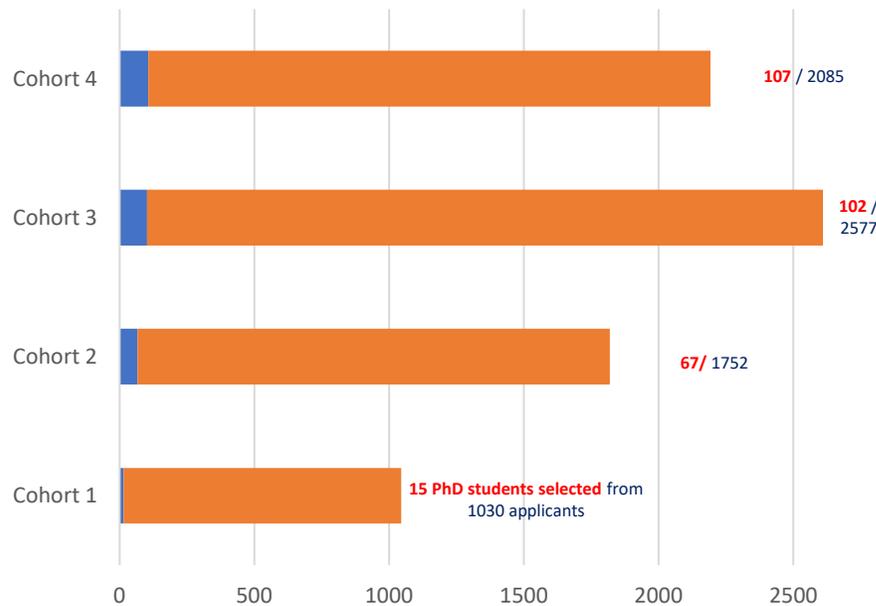
291 PhD Scholarships



15 African Host Universities
(4 AHUs admit first Rsif students in 2022)



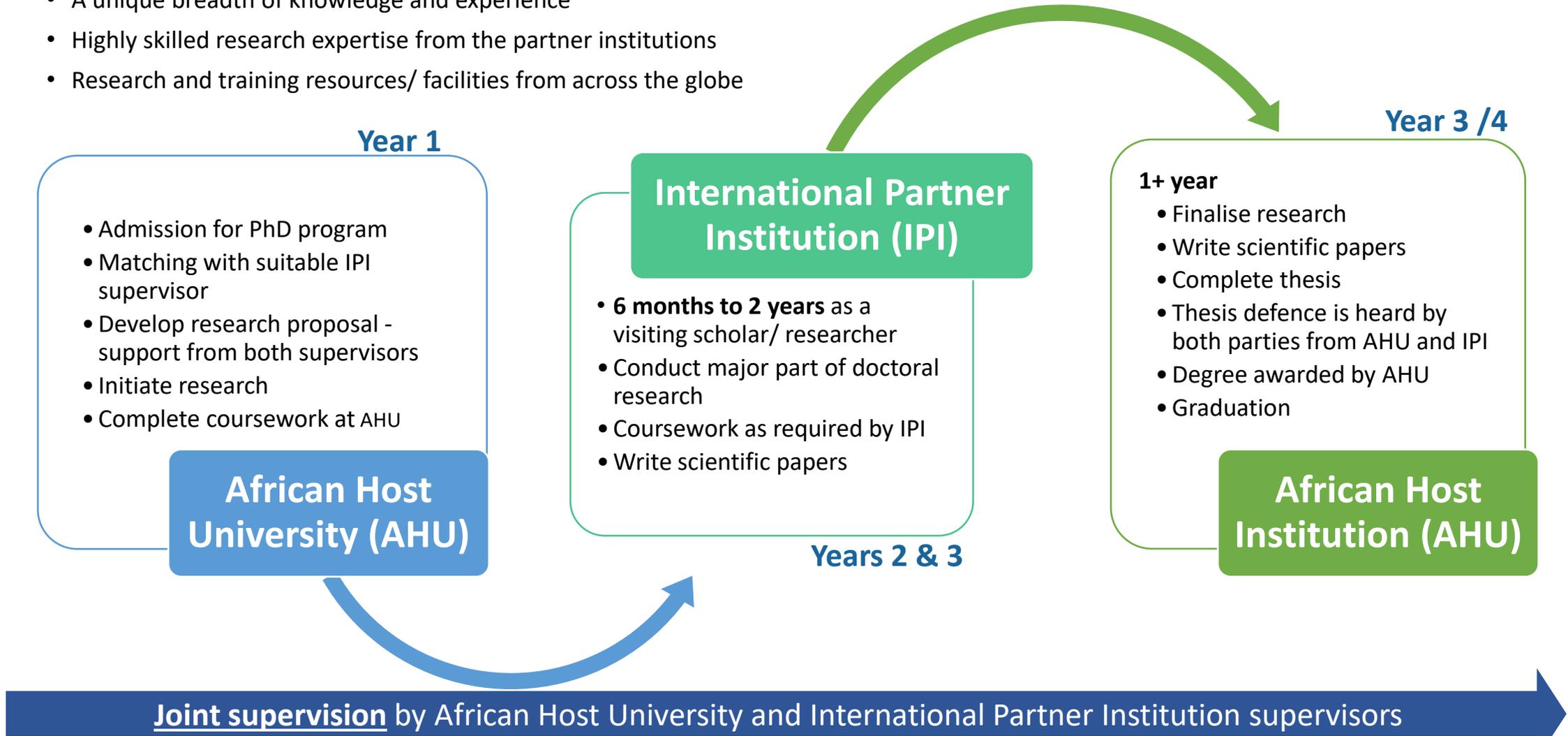
23 International Partner Institutes/universities



Rsif PhD Sandwich Model

Enables scholars and faculty members access to:

- A unique breadth of knowledge and experience
- Highly skilled research expertise from the partner institutions
- Research and training resources/ facilities from across the globe



Rsif and Rwanda

Rwanda is a PASET founding member

- Hosted two PASET Forums
- Current chair of PASET Governing Council, Hon Dr. Valentine Uwamariya, Minister of Education Rwanda
- Participates in PASET Executive Board
Mr. Mike Hughes, Ministry of Education

Investments in RSIF in pursuit of common agenda:

- supporting the building of international level PhD programmes anchored within African universities (i.e. UR),
- accelerating high quality PhD training
- strengthening capacity for innovative research and respond to African challenges

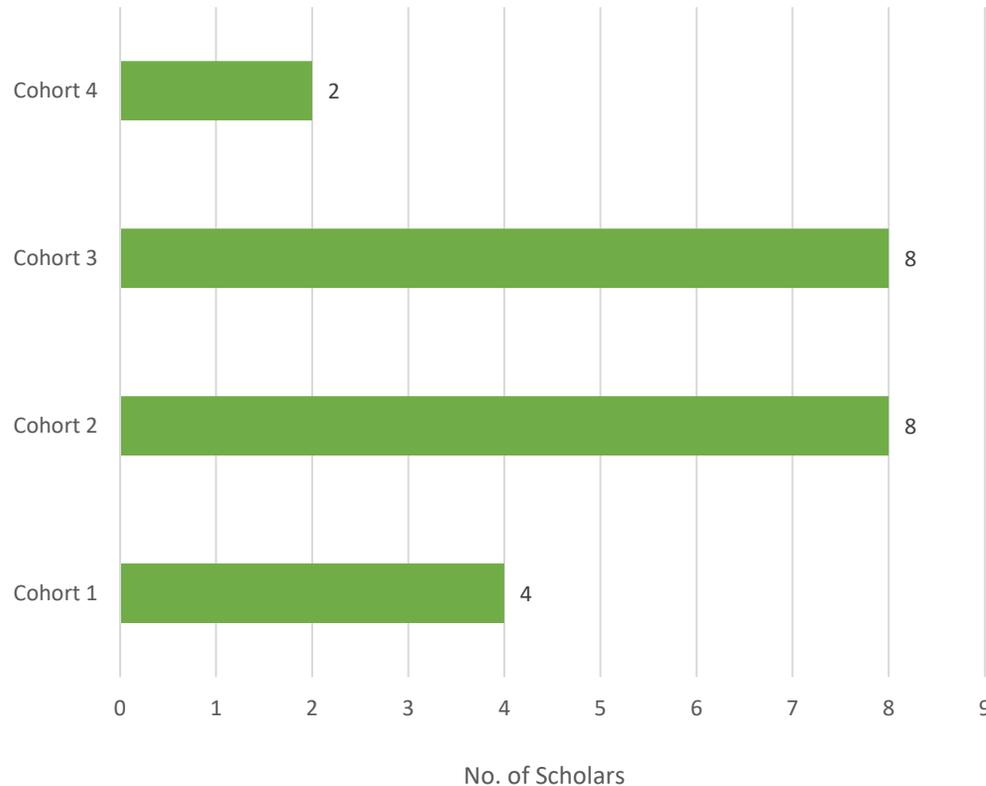


Photos: Rwanda hosted the PASET Governance meetings in Kigali 1-2 February 2023

Rwandan Rsif PhD Students Overview



- 22 Rwandan Rsif doctoral scholars
- Scholars registered under 5 thematic areas in 8 African Host Universities (reduced “in-breeding”)
- 39 publications



Thematic Areas	African Host University	Scholars
Climate Change	Universite Felix Houphouët-Boigny, Côte d'Ivoire	3
	Haramaya University, Ethiopia	2
ICTs including Big Data & Artificial Intelligence	University of Rwanda, Rwanda	2
Minerals, Mining and Materials Engineering	African University of Science and Technology, Nigeria	3
	Nelson Mandela African Institution of Science and Technology, Tanzania	1
Food Security and Agribusiness	University of Ghana, Ghana	2
	Sokoine University of Agriculture, Tanzania	8
Energy including renewables	University of Nairobi, Kenya	1

Building Rwanda's Research and Training Ecosystem: Rwandan nationals' Rsif PhD Students (22) Status

Cohort 1

- 4 Scholars completed PhD Studies and graduated
- 27 journal publications

Cohort 2

- 8 scholars at the AHUs, collecting data in the field
- To start international research placements
- 10 journal publications

Cohort 3

- 8 scholars at AHUs, collecting data in the field
- Preparing for international research placements
- 2 journal publications

Cohort 4

- 2 scholars have reported to their AHU, in first year of study



Photo: Hon. Dr. Uwamariya, Minister of Education, Rwanda and PASET GC chair with the four Rwandan Rsif graduates in Kigali on 2 February 2023.

Rwandan RSIF PhD Graduates: Cohort 1

Name	African Host University	PhD Research Topic	International Partner Institutions	Status
Dr Gahamanyi Noel	Sokoine University of Agriculture (SUA), Tanzania	Assessing the molecular epidemiology and antimicrobial susceptibility profiles of Campylobacter species from human and animal feces in Tanzania and Korea	Korea Institute of Science and Technology, Korea	Completed and graduated –best post-graduate thesis award 8 journal publications Lecturer of Medical Microbiology, School of Medicine and Pharmacy, College of Medicine and Health Sciences, University of Rwanda. Awarded RSIF JIRA grant
Dr Jean Nepomuscene Hakizimana	SUA, Tanzania	Determination of the genetic variation and epidemiology of African swine fever virus in selected countries of Eastern and Southern Africa	University of Ghent, Belgium	Completed and graduated – first Rsif PhD graduate 5 journal publications At SUA, conducting research work Awarded RSIF JIRA grant
Dr Jeanne Pauline Munganyinka	African University of Science and Technology (AUST), Nigeria	Geometallurgical studies of selected gold ores with the application of environmentally friendly lixivants	Worcester Polytechnic Institute, USA	Completed and graduated – first female Rsif PhD graduate 6 journal publications
Dr Jean Baptiste Habinshuti	AUST, Nigeria	Optimization of Tantalum recovery from typical Rwandan and Nigerian tantalite ores	Worcester Polytechnic Institute, USA	Completed and graduated. 8 journal publications

Rwandan Rsif PhD Students – cohort 2 (2020)

No	Name of Student	Gender (M/F)	African Host University	Research topic	Status	International Partner Institution
5	Petronille Dusingizimana	F	University Felix Houphouët-Boigny (UFHB), Côte d'Ivoire	Assessing the potential of conservation agriculture to increase maize smallholder farmer's resilience to climate change in Rwanda: Kirehe Case study.	At UM6P, Morocco 2 publications	Mohammed VI Polytechnic University (UM6P), Morocco
6	Safia Kalisa	F	University of Ghana, Ghana	Overcoming Agricultural Value Chain Challenges, a Gateway to Food Security and Economic Growth	At AHU	To be confirmed
7	Nduwayezu Anastase	M	UFHB, Côte d'Ivoire	The effect of climate change on potato crop in Rwanda: Impact on major diseases	1 publication	International Livestock Research Institute (ILRI), Kenya
8	Isidore Nsengimana	M	Sokoine University of Agriculture (SUA), Tanzania	Epidemiological investigation of Rift Valley Fever virus inter-epidemic circulation in Rwanda		Virginia Tech University, USA
9	Celestin Sirimu	M	SUA, Tanzania	Exploiting natural antimicrobials for food bio preservation focusing on microbial safety, quality and shelf life	1 publication	Institutes of Green-bio Science & Technology Seoul National University (GBST-SNU), Korea
10	Fidele Maniraguha	M	University of Rwanda	Monitoring Agriculture Pest Insects using Dual-Polarization Weather Radars	4 publications	SNU - Global Research & Development and Business Center (GRC), Korea
11	Eric Nizeyimana	M	University of Rwanda	A Decentralized Blockchain-Based Air Pollution Spikes Monitoring Framework Over Intelligent IoT Edge Networks	2 publications	GRC-SNU, Korea
12	Jean Claude Dusabumuremyi	M	University of Ghana	Zero Energy Cooling and Drying System for Reduction of Postharvest Losses of Fresh Carrot (<i>Daucus Carota L</i>) In Rwanda		IMT-Mines, Albi, France

Rwandan Rsif PhD Students – cohort 3 (2021)

No	Name of Student	Gender (M/F)	African Host University	Research topic	Status	International Partner Institution
13	Vincent Habimana	M	Sokoine University of Agriculture (SUA), Tanzania	Evaluation of heat stress effects on milk yield traits and metabolites for dairy cattle reared in Tanga region, Tanzania	1 publication	ILRI, Kenya
14	Jean D'Amour Mwangereza	M	University of Nairobi Kenya	The Optimization in Selection of Biomass Materials for Bioenergy Production (East African Region Countries)		Korea Institute of Energy Research (to be confirmed)
15	Theophile Mugerwa	M	African University of Science and Technology ,Nigeria	Water contaminants removal using activated carbon developed from biomass		To be confirmed
16	Colette Abimana	F	Nelson Mandela African Institution of Science and Technology, NM-AIST Tanzania	Electrochemical Properties Investigation Of Biomass-Derived Composites-Based Supercapacitors Storing Solar Photovoltaic Power		IMT-Mines Albi, France
17	Drocelle Nirere	F	SUA, Tanzania	Evaluate the integrated effect of Nitrogen, phosphorus and vermicompost on soil properties and soybean yield and quality towards food security in Rwanda	1 publication	University of Ghent, Belgium (to be confirmed)
18	Jean Damascene Tuyizere	M	SUA, Tanzania	Conservation Tillage for Soil Fertility Restoration in Two Agro Ecological Zones of Rwanda		Virginia Tech University, USA
19	Donatien Ntawuruhunga	M	SUA, Tanzania	Implications of Climate-Smart Agroforestry on Households' Well-Being in Two Contrasting Agro-Ecological Zones of Bugesera and Rulindo Regions in Rwanda		ILRI, Kenya
20	Ma-Lyse Nema	F	Université Félix Houphouët-Boigny (Côte d'Ivoire)	Landslide occurrences in Kivu Catchment, Rwanda: Assessing and Modeling its Causes and Risks Management		To be confirmed

Rwandan Rsif PhD Students – cohort 4 (2022)

In first year of study

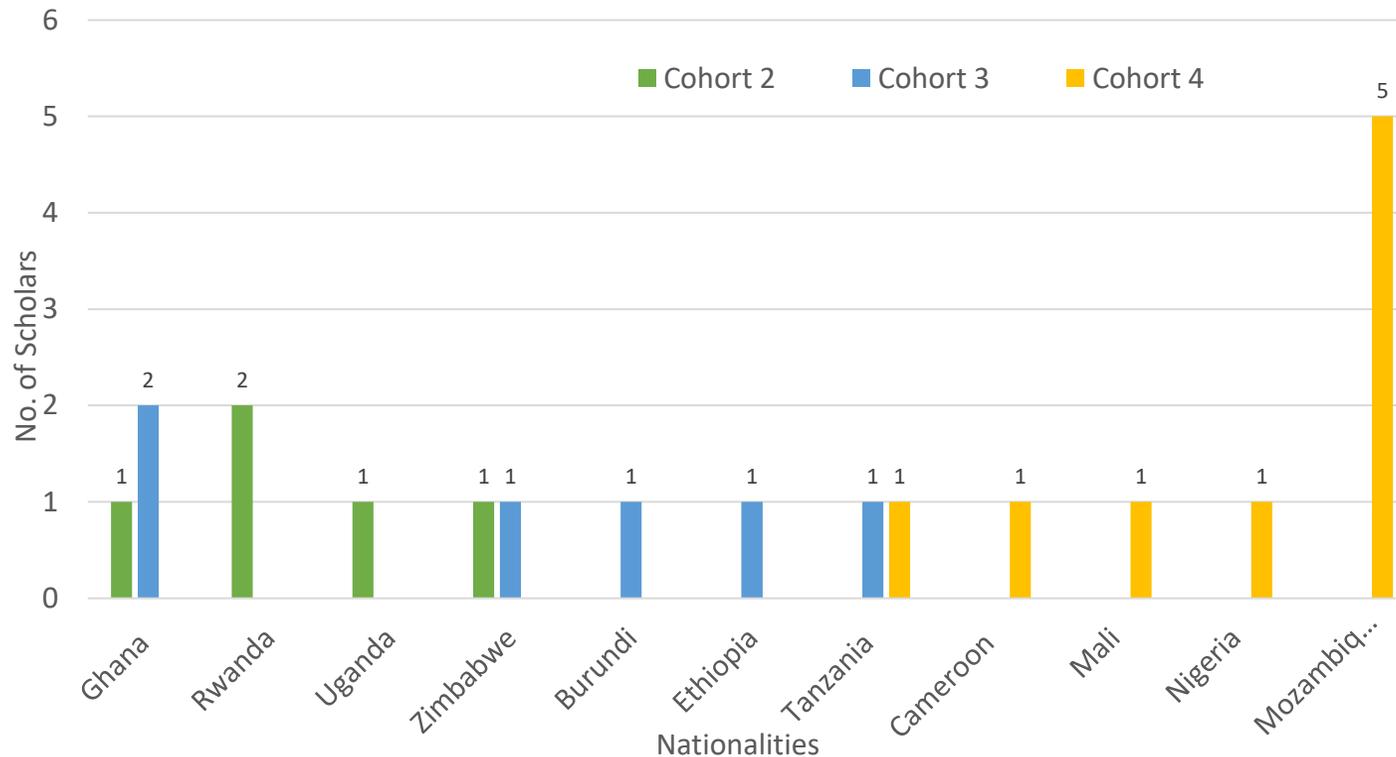
No	Name of Student	Gender (M/F)	African Host University	Research topic	Status	International Partner Institution
21	Charles Lwanga Twagiramungu	M	Haramaya University (HU), Ethiopia	Biochar produced from local plant-based biomass and its effects on growth performance and physiology of eucalyptus in its earliest life stages	At HU, Ethiopia	To be confirmed
22	Elie Ntirenganya	M	HU, Ethiopia	Assessment of socio-ecological conflicts and losses associated to pesticides application and Honeybee's production among farmers around Gishwati-Mukura National Park, Rwanda.	At HU, Ethiopia	To be confirmed



Benefits to Rwandan Institutions

Benefits to University of Rwanda

- Hosting 18 Rsif PhD scholars (44% women) from 11 African countries at the ACE Internet of Things (IoT)
- 7 Rsif research and innovation projects ongoing
- 8 publications by Rsif PhD students to date



Rsif funded PhD students at UR - Cohort 2 (2020)

No	Name	Nationality	Gender	Research topic	Status	International Partner Institution
1	Barbara Kabwiga Asingwire	Uganda	Female	Architectural Design of IoT-based Healthcare Heterogeneous Traffic: Performance Analysis and Optimization	1 journal publication	GRC – SNU Seoul National University, Korea
2	Eric Nizeyimana	Rwanda	Male	A Decentralized Blockchain-Based Air Pollution Spikes Monitoring Framework Over Intelligent IoT Edge Networks	2 journal publications	GRC-SNU
3	Prudence Munyaradzi Mavhemwa	Zimbabwe	Male	Improving usable security in the design of user authentication of Internet – of – Medical Things. A case of Rwanda		University of Pretoria, South Africa (UP)
4	Fidele Maniraguha	Rwanda	Male	Monitoring Agriculture Pest Insects using Dual-Polarization Weather Radars	4 journal publications	GRC-SNU

Rsif funded PhD students at UR Cohort 3 (2021)

– preparing for international placement

No	Name	Nationality	Gender	Research topic	Status	International Partner Institution
5	Amsalu Tomas Chuma	Ethiopia	Male	Hybrid Context-dependent AI-IoT Based Electromagnetic Compatibility Prediction for Biomedical Devices		Karlsruhe Institute of Technology (KIT), Germany (TBC)
6	Chiedza Hwata	Zimbabwe	Female	IoT based Electromagnetic Compatibility Monitoring System for Biomedical Devices		KIST, Korea (TBC)
7	Destiny Kwabla Amenyedzi	Ghana	Male	Acoustic Signal Network Analysis and Embedded Processing in Agriculture		Rochester Institute of Technology (RIT)
8	Micheline Kazeneza	Burundi	Female	Machine Learning methods for automatic recognition of IoT-sensed acoustic signals within a farm		University of Pretoria (UP), South Africa (TBC)
9	Promise Ricardo Agbedanu	Ghana	Male	A self-learning intrusion detection for Internet of Things.		Rochester Institute of Technology (RIT)
10	Theofrida Maginga	Tanzania	Female	Convergence of IoT, Mobile Vision AI and Natural Language Processing to Support Low-Literacy Rural Farmers in Early Detection of Crop Diseases: Case study of Maize in Tanzania	1 journal publication	GRC – SNU Seoul National University, Korea

Rsif funded PhD students at UR Cohort 4 (2022)

– in first year of study

No	Name	Nationality	Gender	Research topic	Status	International Partner Inst.
11	Blondelle Melina Atsafack	Cameroon	Female	Contribution to the design of tele-operation tools for micro-hydropower plants in isolated sites in Africa		To be confirmed
12	Lasseni Coulibaly	Mali	Male	Application of Intelligent Routing and Switching in Internet of Things Based on Network Function Virtualization for Reduced Latency Communications.		To be confirmed
13	Armando Egas Jose	Mozambique	Male	Real-time decision making support system for smart agriculture through internet of things platforms		To be confirmed
14	Catija Issumalgy Abdula	Mozambique	Female	Technological Development of Women in Mozambique		To be confirmed
15	Onelia Fernanda Chico Caribo Trindade	Mozambique	Female	Application of the internet of things in blended education		To be confirmed
16	Valinho Antonio	Mozambique	Male	Assessment of the spatio-temporal dynamics of corn production in Mozambique		To be confirmed
17	Abidemi Matthew Orimogunje	Nigeria	Male	Development of a multicriteria algorithm to mitigate handover failure in 4G and 5G mobile heterogeneous network		To be confirmed
18	Rehema Hamis Mwawado	Tanzania	Female	Development of a TinyML Framework for Crop Disease Classification Tasks on Constrained Embedded Devices		To be confirmed

Strengthening research networks for University of Rwanda

International Partner Institutions (IPIs) signed agreements and exchanging staff and students with University of Rwanda:

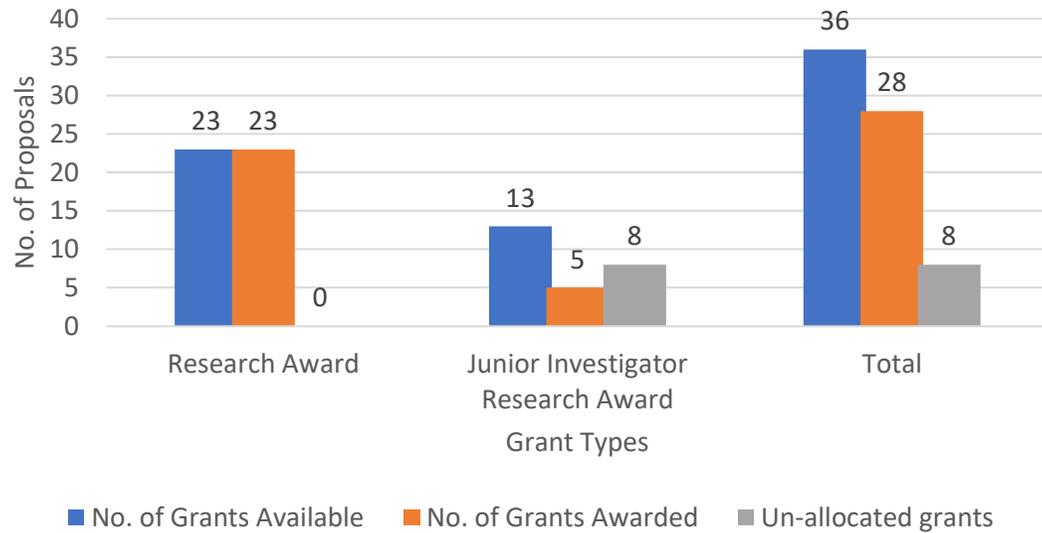
1. The Seoul National University - Global Research & Development and Business Center (GRC), South Korea
2. University of Pretoria (UP), South Africa
3. Karlsruhe Institute of Technology (KIT), Germany
4. Worcester Polytechnic Institute (WPI), USA
5. Institutes of Green-bio Science & Technology – Seoul National University (GBST-SNU)
6. Rochester Institute of Technology (RIT)

Icipe supported two proposal writing meetings for teams from Rwanda prepare competitive proposals to the EC funding opportunities

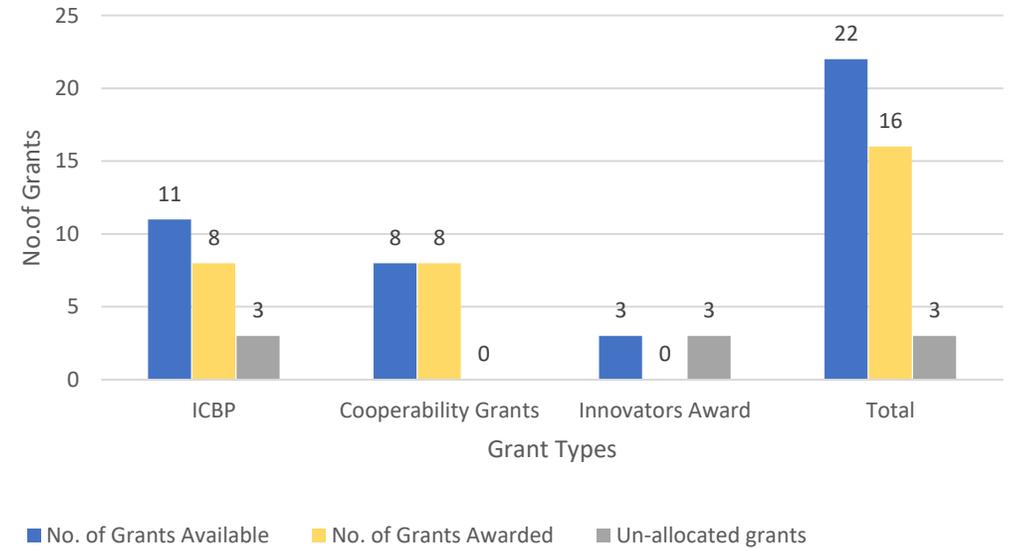


Enhancing Research and Innovation Excellence

Rsif Research Grants



Rsif Innovation Grants



Total Grants Awarded: US\$ 3.2 M

44 Research and Innovation grants awarded in **7** SSA countries

Strengthening Research and Innovation Capacity at the University of Rwanda



Photo: UR exhibited their Rsif funded projects during the PASET meetings in Kigali in February 2023

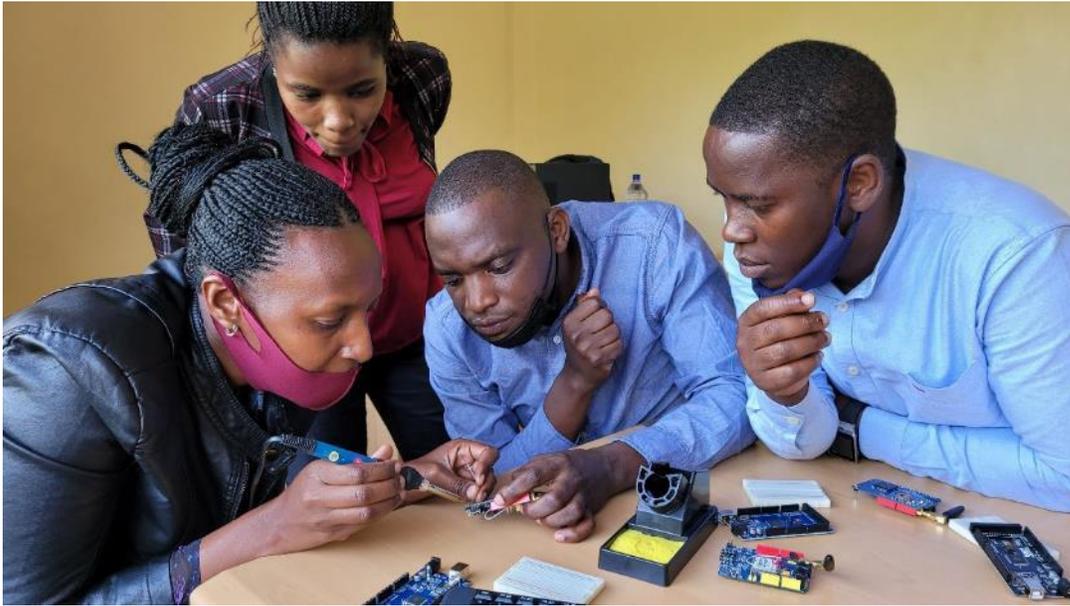
- **High quality research on key developmental issues (4 Research Grants awarded to ACE IoT faculty)**

- Real time assessment of the indoor air pollution in urban and rural households
- Agricultural data from acoustic monitoring
- Electromagnetic Compatibility Monitoring and Prediction Models for Biomedical Devices
- Tools for Evaluating African Lakes

- **Increased opportunities to translate research outputs into commercial products (2 innovation commercialization grants awarded to faculty)**

- Smart Bee-Hiving Technology
- Infectious Diseases Outbreak Prediction using Geolocation Data with Machine Learning

Strengthening Research and Innovation Capacity at the University of Rwanda



University of Rwanda PhD scholars learn how to develop an IoT prototype for indoor air pollution monitoring by households

- **Increased University-Industry cooperation, networks & partnerships building**
 - (2 Industrial partners and 9 International partners collaborating in the Rsif Research & Innovation projects)

- **Better qualified scientific workforce through PhD student mentorship**
 - 10 PhD students involved in Rsif research & innovation projects

- **Support to early career scientists to enhance research excellence**
 - 1 Rwandan Rsif PhD graduate won Junior Investigator Research Award:
 - ✓ Prevalence, antimicrobial susceptibility profiles, and genotypes of thermophilic *Campylobacter* species from humans and animals in selected regions of Rwanda

Multiple benefits to Rwanda's research and innovation ecosystem

1. RSIF graduates, with strong research networks, able to “win” additional research awards.
2. Reduced “inbreeding” at UR
3. UR received video conference equipment, library resources and benefit from various trainings e.g.
 1. Over six staff trained in proposal writing training workshops
 2. Arranged exchange visits for UR staff to Morocco and Japan
4. New institutional research and training networks including with e.g. UGB-Senegal, UP-South Africa, UM6P-Morocco, GRC-SNU Korea etc.
5. Graduates equipped with advanced technologies, cross cutting and technical skills and relevant international, regional and national networks
6. 39 journal publications from Rwandan Rsif students to date in high impact journals
7. Research outputs and knowledge generated in line with national priorities: e.g. smart technologies based on IoT, antimicrobial resistance, disease control etc.

Emerging impact – set to “snowball”...

First Rsif graduate to return home (2021)



Dr. Noël GAHAMANYI, Rwanda, Rsif Cohort 1
Alumnus

Research area: Molecular Epidemiology and
Antimicrobial resistance
8 journal publications in period
RSIF research award to kickstart research career

Graduated from Sokoine University of Agriculture,
Tanzania – (with best post-graduate thesis award!)
Placement at Korea Institute of Science and
Technology

- Founding member Rsif Alumni network
- Speaker at Rsif Conference 2022 in Morocco
- Returned to University of Rwanda, training the next generation of science leaders. Solving critical problems

Thank You

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