



African Regional Workshop on SciTinyML  
29 April

# The Challenge



Fundamental research and development conducted at academic and research institutions in Africa is at risk.



AI resources (compute power, data accessibility, engineering) are out of reach and restraining development.

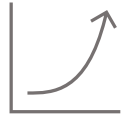


Imbalance in AI resources and innovation between those in Africa and the rest of the world.

# The Solution



An AI operation that supports the needs of academia and industry throughout Africa.



Provide compute power, data access and engineering to academia and industry.



Democratize AI development across Africa.



Support a new generation of AI researchers and AI enabled scientists.



Enable next-generation research at African institutions and power the next-generation of breakthroughs in AI technologies and applications.

# Stanford: National Research Cloud

[National Research Cloud](#)

[Video: Why We Need a National Research Cloud](#)

[How to Build a National Research Cloud](#)

## A CALL FOR A NATIONAL RESEARCH CLOUD

### The challenge

**AMERICAN INNOVATION IN ARTIFICIAL INTELLIGENCE IS AT RISK**

- Research conducted at American colleges and universities has created fundamental breakthroughs powering the U.S. economy today
- AI resources (compute power and data accessibility) are growing out of reach of universities
- Imbalance in AI innovation ecosystem between academia, government, and industry

### The solution

**A NATIONAL RESEARCH CLOUD FOR AI ACADEMIC RESEARCHERS**

What will a National Research Cloud do?

- Provide compute power and data access for universities
- Democratize AI development across U.S.
- Train a new generation of AI scientists
- Power next generation of breakthroughs in AI technologies and applications

### The call to action

Presidents and provosts of 22 top computer science universities support

**A TASK FORCE OF OFFICIALS FROM GOVERNMENT ACADEMIA INDUSTRY**

to establish recommendations for a FUTURE NATIONAL RESEARCH CLOUD.

### What policymakers can do

- 1 Pass **LEGISLATION** establishing a task force with leaders from government, academia, and industry
- 2 Partner with **ACADEMIA AND INDUSTRY** to create a balanced AI ecosystem
- 3 Invest in American **INNOVATION AND LEADERSHIP** in AI

**3.4 MONTHS**  
Time it takes to double the amount of compute required for the largest AI training runs since 2012  
Source: OpenAI

**\$1.5M**  
Estimated compute cost of training the Meena chatbot  
Source: GCP Pricing Calculator estimate of compute reported in arxiv.org

**4%↑**  
Average growth rate in AI PhDs granted 2010-2017  
Source: 2019 AI Index Report

**22%↑**  
Growth in AI PhDs granted in 2018  
Source: 2019 AI Index Report

**Stanford**  
Human-Centered Artificial Intelligence  
hai.stanford.edu @StanfordHAI HAI-Policy@Stanford.edu

# Headlines



Largest and most comprehensive undertaking of its kind in Africa's history.



Africa's only shot at turning 4IR / machine learning / AI revolution into reality.



In development for 5 years. Funded out of the pockets of those involved for the greater good.



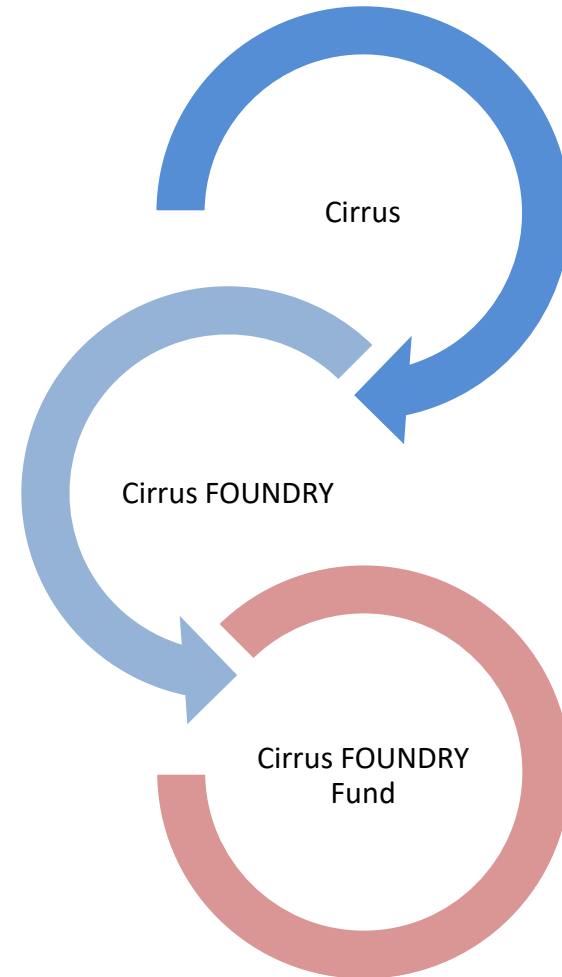
Primary operations and infrastructure to be based at Wits University.



Wits University's moon-shot project to significantly impact not only the University and South Africa, but the entire continent.

# Component Overview

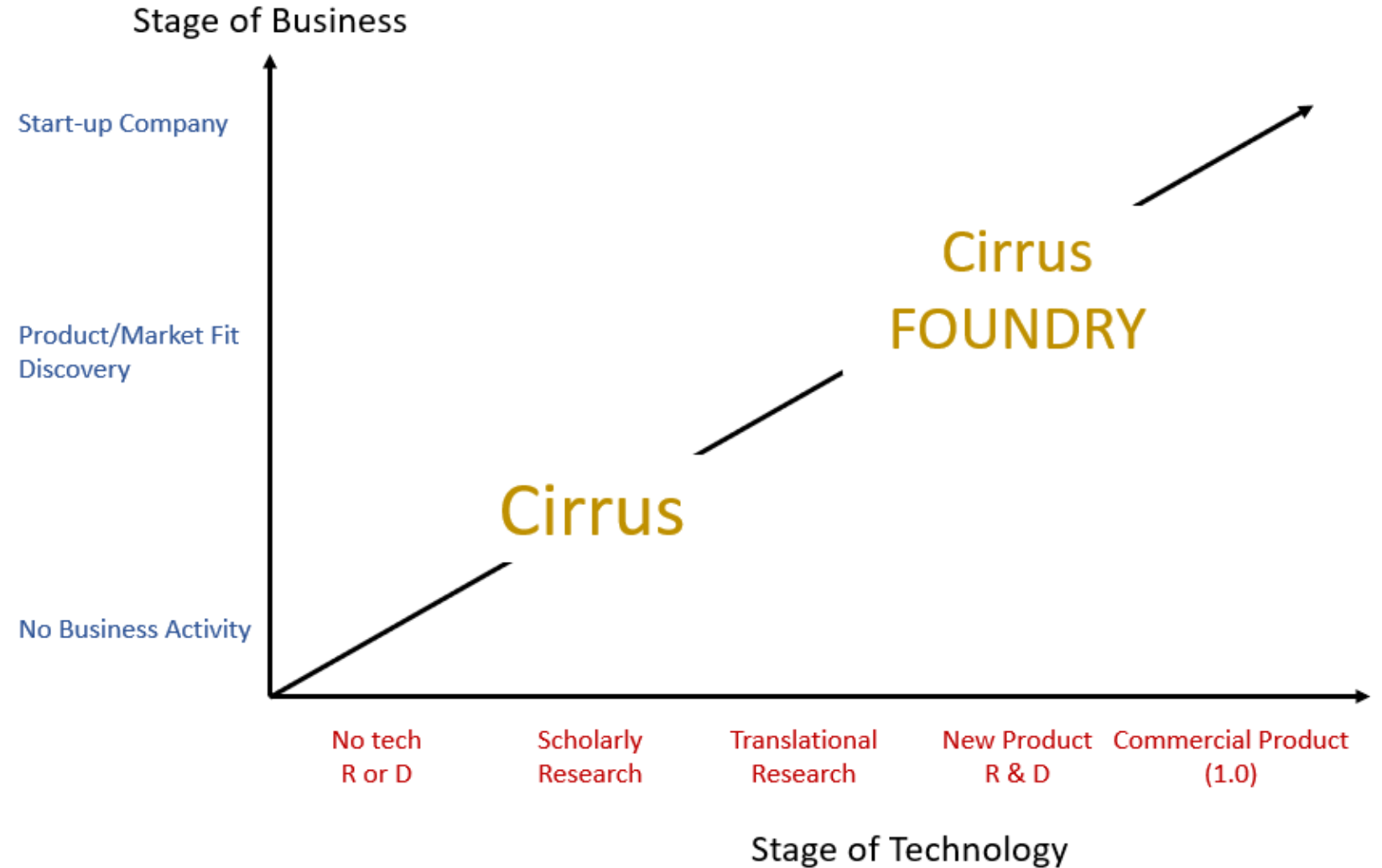
- Ideation
- Product creation
- Start-up portfolio
- Monthly classes, events and workshops
- Academic programmes



- Pre-seed
- Seed

- HW / SW / Data / ML Engineering
- Global Collaboration Network
- Partner and Affiliate programmes
- Co-development programme
- Open Learning programme
- Summer and Winter programmes
- Salons and teatime sessions
- Academic programmes
- Research to Communication programme
- Digital Asset Locker
- Sandbox
- HPC platform
- Data management platform
- Research support

# Research to Development





In the process of building the AI Africa Consortium.

Over 200 academic and research institutions from Africa and around the world are being invited.

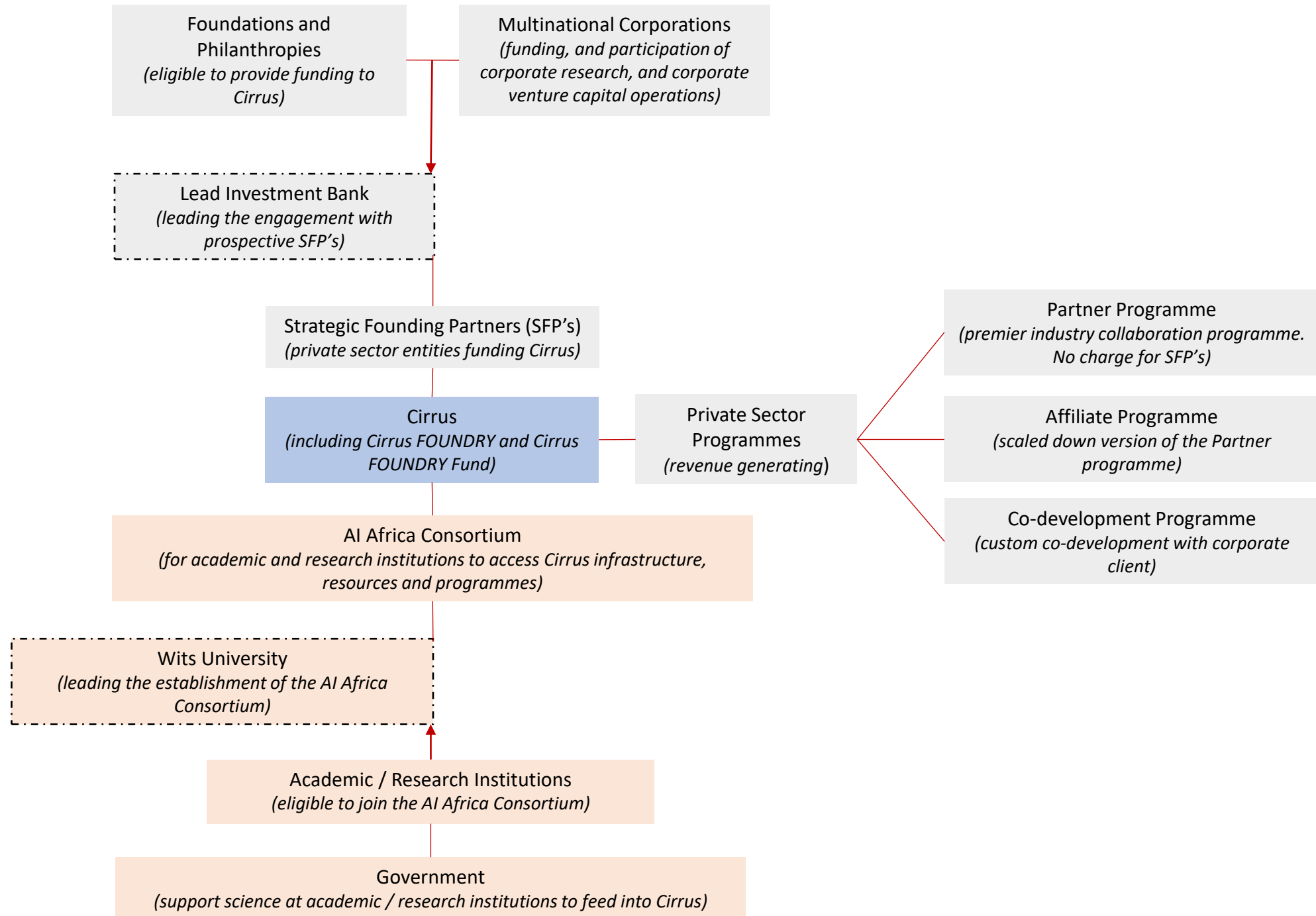
Starting with the African Research Universities Alliance (ARUA).

Several Embassies and Consulates are joining Wits to assist.

Consortium website: <https://aiafrica.ac.za/>



# Schematic Overview



# Current Activities: TinyML4D

TinyML4D Academic  
Network Call:  
<https://bit.ly/3rWrGcU>



**African Regional Workshop  
on SciTinyML:  
Scientific Use of  
Machine Learning on  
Low-Power Devices**

**25 - 29 April 2022  
Online**

Further information:  
<http://indico.ictp.it/event/9792/>  
[smc370@ictp.it](mailto:smc370@ictp.it)

TinyML is a subfield of Machine Learning focused on developing models that can be executed on small, real-time, low-power, and low-cost embedded devices. This allows for new scientific applications to be developed at an extremely low cost and at large scale.

#### Directors:

Vijay Janapa REDDI,  
John A. Paulson School of Engineering and  
Applied Sciences, Harvard University, USA

Gregg BARRETT,  
AI Africa Consortium, South Africa

#### Description:

The TinyML process starts with collecting data from IoT devices, then training the collected dataset to extract knowledge patterns; these patterns are then packaged into a TinyML model that considers the target microprocessor's limited resources such as memory and processing power.

The resulting model is then deployed on embedded devices where it is used to evaluate new sensor data in real-time. Typically, power requirements are in the mW range and below which enables a variety of use-cases targeting battery operated devices. TinyML represents a collaborative effort between the embedded power systems and Machine Learning communities, which traditionally have operated independently.

#### Topics:

- ML general concepts
- Introduction to TinyML
- Getting started with the TinyML training kit
- Examples of TinyML applications
- Scientific Applications of ML

#### Local Organiser:

Marco ZENNARO, ICTP

#### How to apply:

Online application:  
<http://indico.ictp.it/event/9792/>

Female scientists are encouraged to apply.

#### Grants:

Prioritily will be given to African participants that are part of the ICTP TinyML Academic Network.

#### Deadline:

**15 April 2022**



Harvard John A. Paulson  
School of Engineering  
and Applied Sciences



# Current Activities: AI Testbed Hardware



## Graphcore MK1

Graphcore Intelligent Processing Unit (IPU)

---

1216 IPU Tiles, 14nm

---

> 23 Billion Transistors

---

IPU-Links interconnect

---

Poplar Software stack, PyTorch, Tensorflow



## Groq

Groq Tensor Streaming Processor

---

> 26 Billion Transistors, 14nm

---

Chip-to-Chip interconnect

---

GroqWare software stack, Onnx



## Habana Gaudi

Habana Gaudi Tensor Processing Cores

---

7nm

---

Integrated 100GbE based interconnect

---

Synapse AI Software, PyTorch, Tensorflow

# Science Benchmarks

Benchmark	Science	Task	Owner Institute	Specific Benchmark Targets
CloudMask	Climate	Segmentation	RAL	<a href="#">link cloudmask specifics</a>
STEMDL	Material	Classification	ORNL	<a href="#">link stemdl specifics</a>
CANDLE-UNO	Medicine	Classification	ANL	<a href="#">link candle-uno specifics</a>
TEvolOp Forecasting	Earthquake	Regression	University of Virginia	<a href="#">link tevelop specifics</a>

# Current Activities: SkyDeck

**Berkeley** SKYDECK

[JOBS](#) [ADVISORS](#) [PROGRAMS](#) [COMPANIES](#) [PARTNERS](#) [ABOUT](#)

UC Berkley's SkyDeck:  
Potential to put forward  
start-ups for interviews.

Bring us your moonshots...



# Current Activities: SAIF


FUNDING OPPORTUNITY - Are you an African based AI Start-up? Apply for a non-equity micro seed grant from the Swedish AI Fund (SAIF) to kick-start your business.

Apply here:

<https://aiexpoafrika.com/2022/03/30/swedish-ai-fund-saif-aims-to-help-early-stage-african-ai-companies/>



AI CENTER



ai MEDIA

## Launch of Swedish AI Fund for Africa

Helping the African AI Ecosystem Grow

Call for applications to the SAIF Africa are now open and close April 31st – microseed funding applications are welcome from across the Africa region from early stage startups focusing on AI products and services.

**APPLY NOW**

to learn more



In proud partnership with:



# Current Activities: Remote Excellence Fellowships



e l l i s  
European Laboratory for Learning and Intelligent Systems

ELLIS Unit Nijmegen Remote  
Excellence Fellowship - 2022

*Remote Excellence Fellowships: A remote internship system for talented Masters students to allow students to connect with leading researchers in Europe.*

Links

[AI Africa Consortium](#)