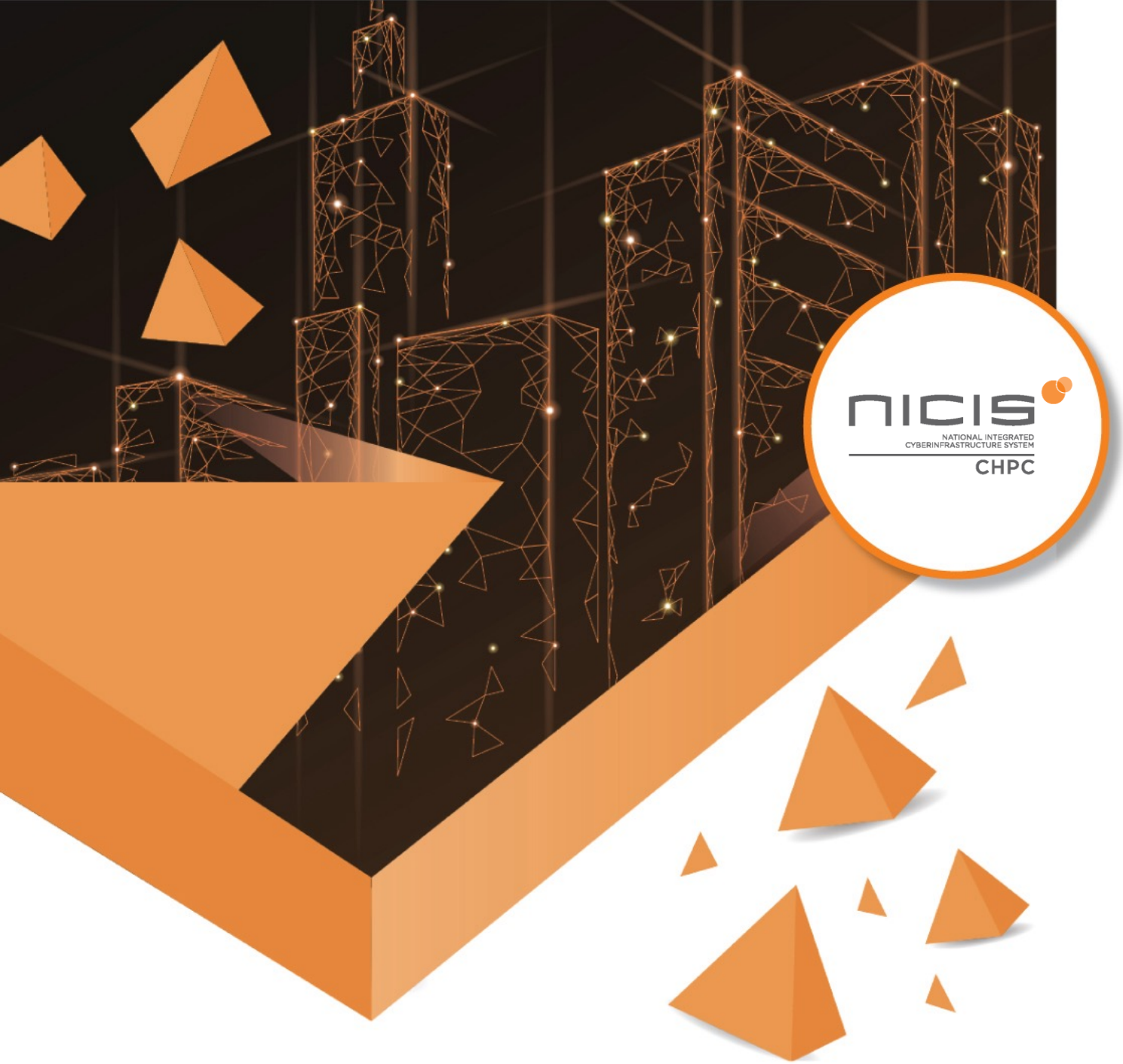

CHPC NATIONAL CONFERENCE 2025

FROM DATA TO DECISIONS: LEVERAGING CYBER-INFRASTRUCTURE

30 NOV – 3 DEC 2025

CENTURY CITY CONFERENCE CENTRE, CAPE TOWN

HPE intel eclipse

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2025 CHPC USERS BOF

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Agenda

- ❑ HPC Users and Usage (Lengau + New HPC Cluster)

  Werner Jv Rensburg + Eric Mbele

- ❑ Cloud Users and Usage (SEBOWA) - Dorah Thobye
- ❑ Quantum Computing Access and Usage - Nyameko Lisa
- ❑ NICIS 4-Year Business Plan Overview - Mervyn Christoffels

- ❑ Discussion, Questions & Answers

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HPC Users and Usage - Lengau + New HPC Cluster

Werner Janse van Rensburg

Eric Mbele

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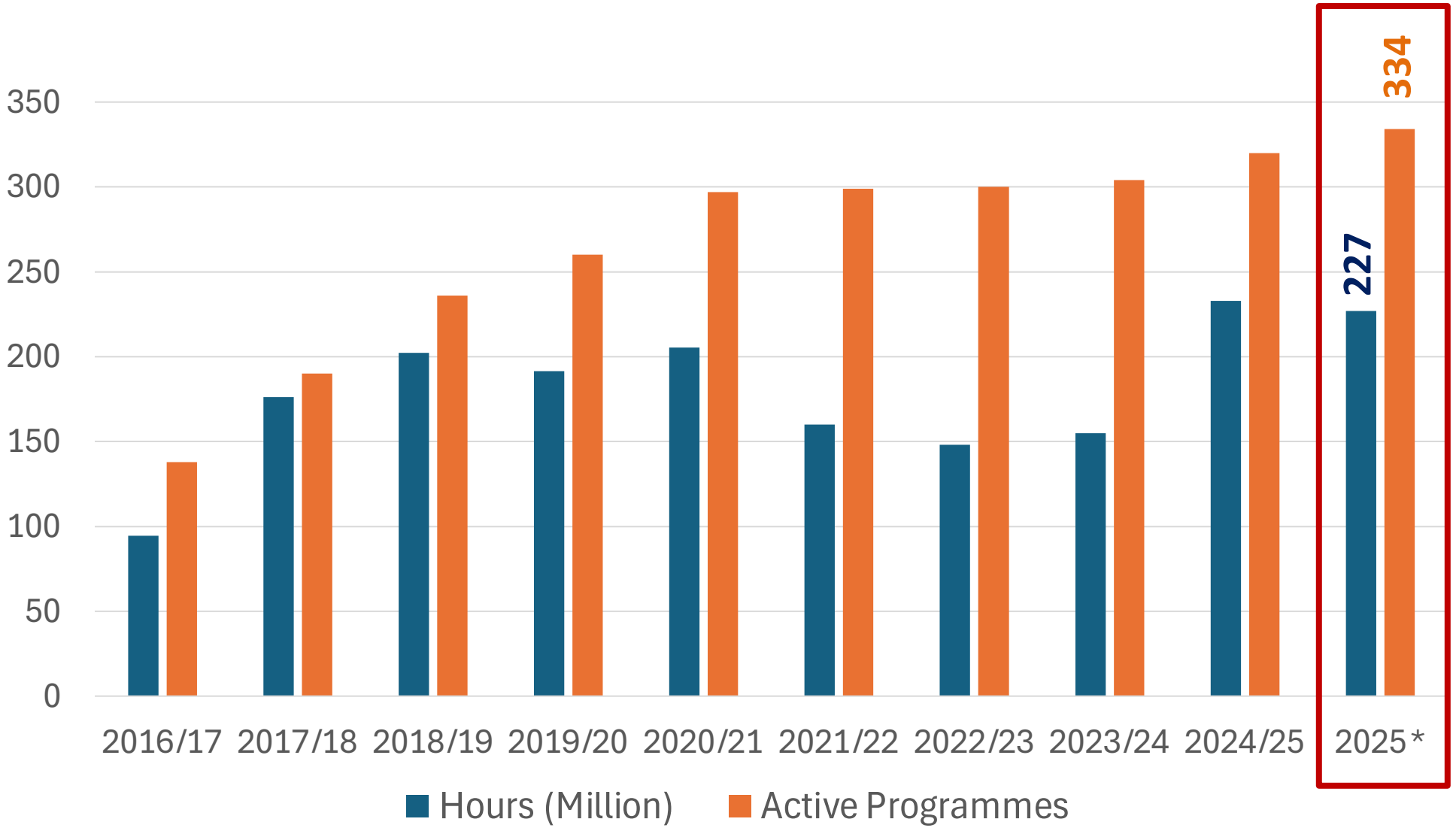
CHPC Lengau Cluster Usage

(Status on 30 Nov 2025)

	All Time	2024 12 Months	2025 12 Months
❑ Total Active* Research Programmes	**677**	**320**	**334**
❑ Total Core Hours Used (Million)	**1716**	**222**	**227**
❑ Total Active Users	**3057**	**1132**	**1268**

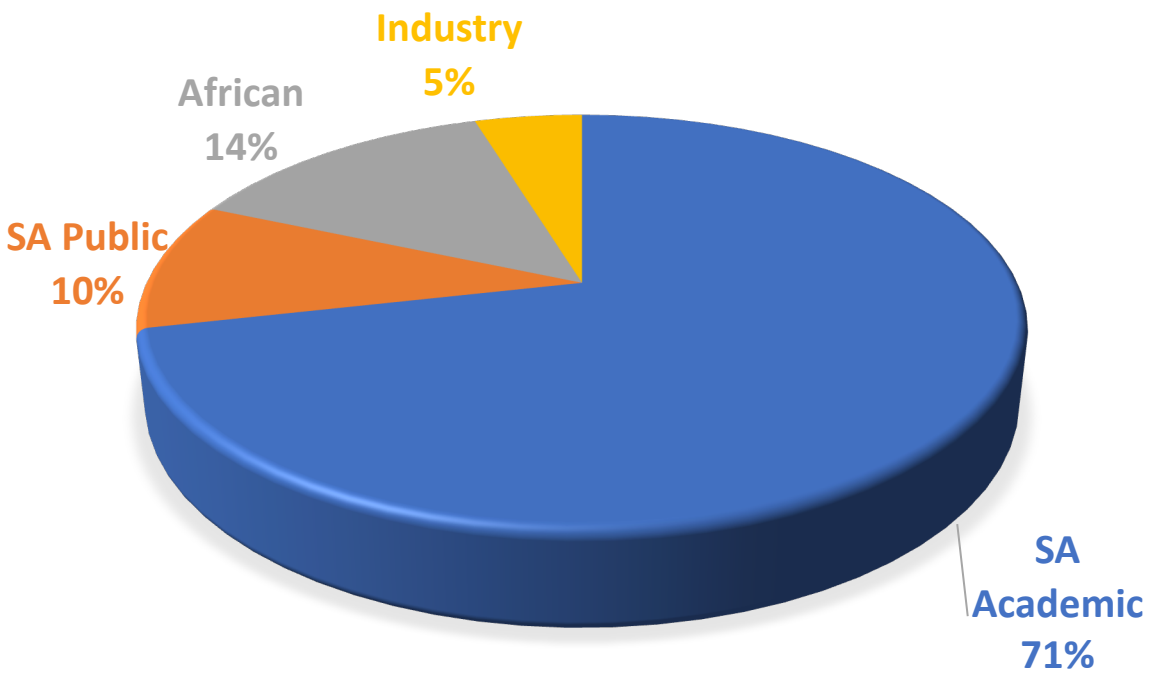
** Active refers to usage of more >1000 core hours*

CHPC Lengau 10 Years Usage



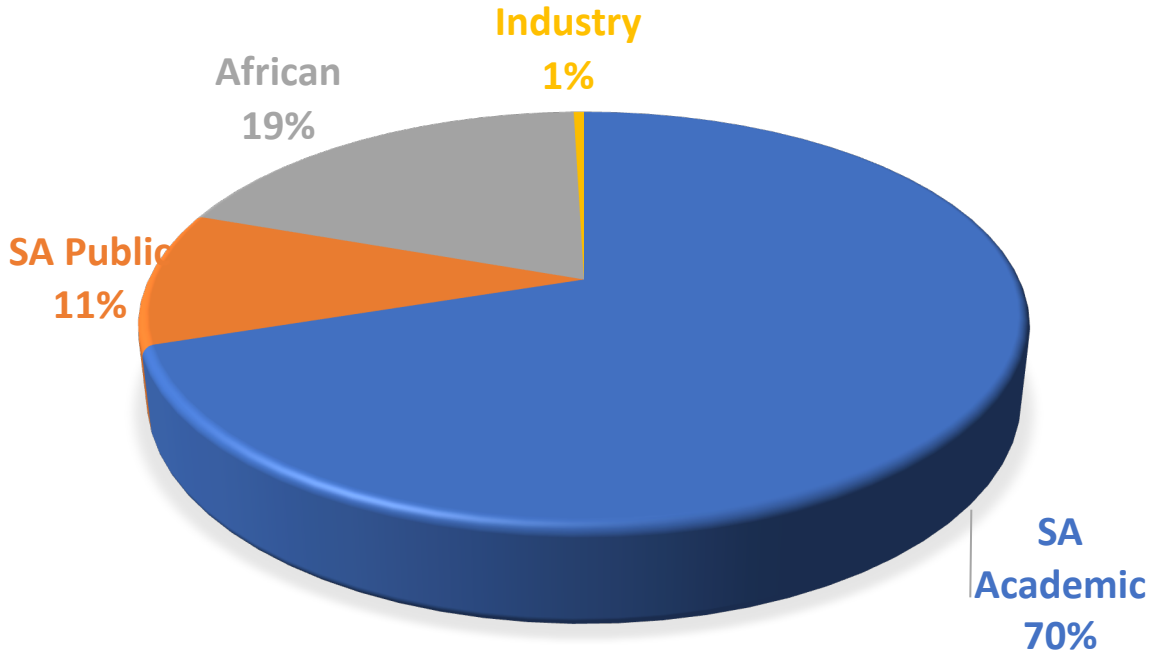
CHPC User Categories Total Active Programmes*

Past 12 Months *(1 Dec 2024 – 30 Nov 2025)*



 # Active Programmes

Total: 334



 # Hours Used (Million)

Total: 227 million

**__Active__ refers to at least 1000 compute hours used over the relevant period.*

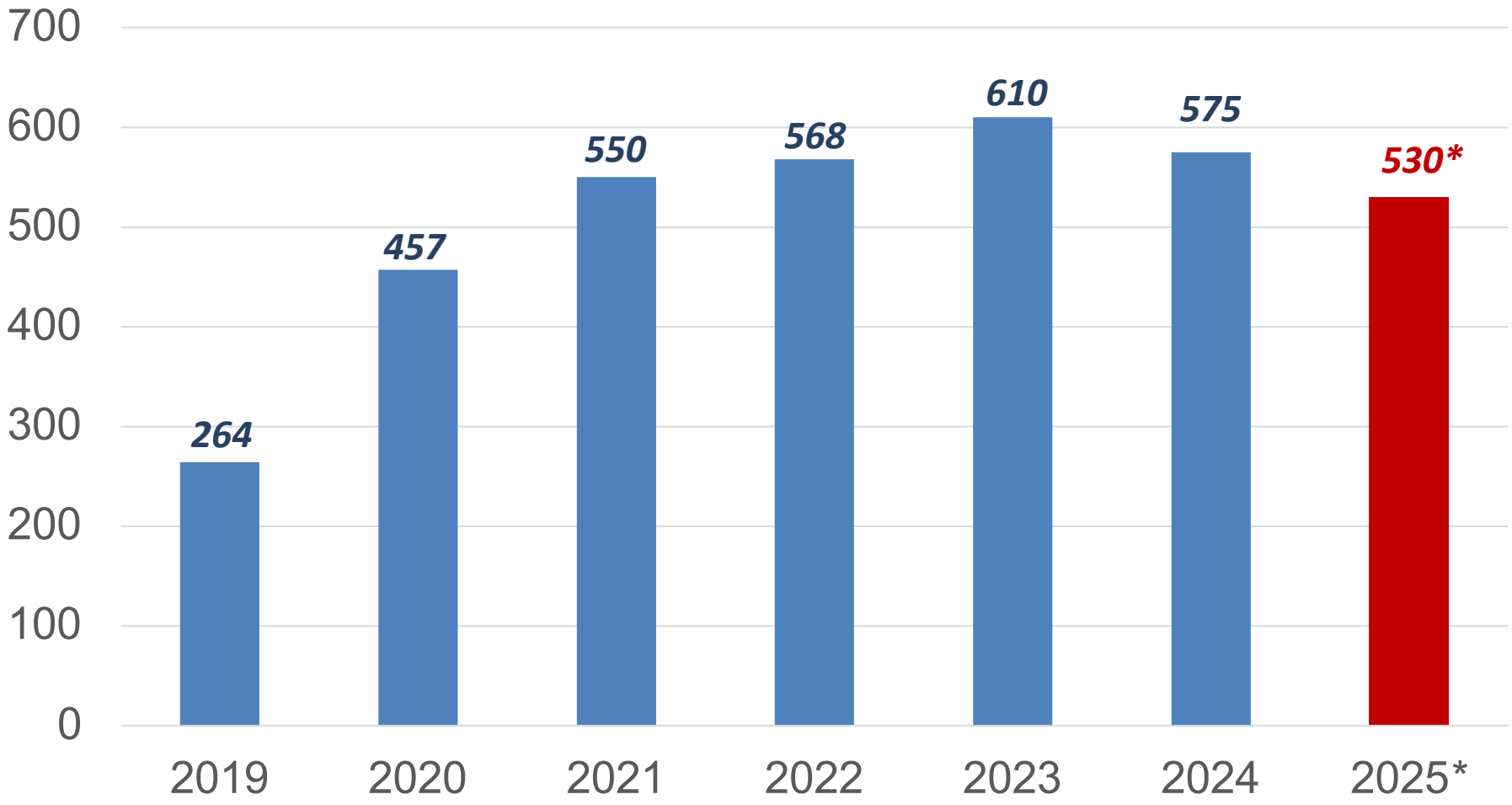
Top 10 CHPC Programmes: Hours Used Past 12 Months (30 Nov 2025)

#	Shortname	Discipline	Institution	PI	2025-Hours (Millions)
1	MATS1404	Material Science	University of Limpopo	pngoepe1	32.3
2	ERTH1200	Earth Sciences	University of the Witwatersrand	fengelbrecht	16.4
3	ERTH1609	Earth Sciences	South African Weather Service	rrapolaki	11.2
4	MATS0856	Material Science	University of Limpopo	pngoepe1	10.9
5	ERTH0904	Earth Sciences	University of Cape Town	babiodun1	7.1
6	CHEM0947	Chemistry	University of the Free State	jconradie	6.4
7	ERTH1556	Earth Sciences	Agricultural Research Council	sroffe	6.0
8	MATS1423	Chemistry	Kwame Nkrumah University of Science and Technology	fopoku	5.4
9	HEAL1382	Chemistry	Kwame Nkrumah University of Science and Technology	lborquaye	5.2
10	CHEM0792	Chemistry	University of Johannesburg	krishna	5.1
				TOTAL:	**106.0**

47% of all usage

CHPC User Research Outputs: 2019-2025

Total User Publications Reported

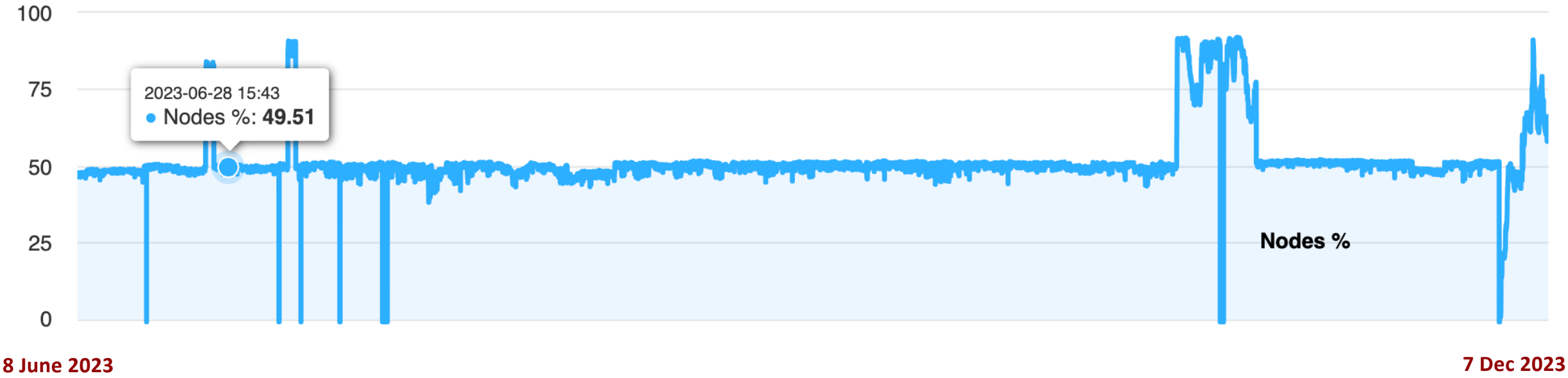


Only Verified Peer-Reviewed Papers…

2023 SLIDE

CHPC Lengau Usage: CPU Cluster

Usage for 6-month period ending: **7 Dec 2023**

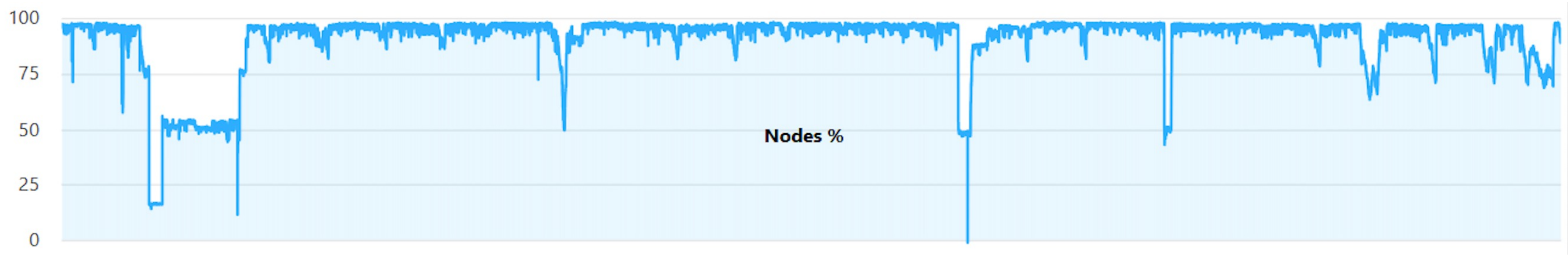


- More severe impact than equivalent period 1 year ago
- Onsite power provisioning now active by using two onsite 1 MW generators

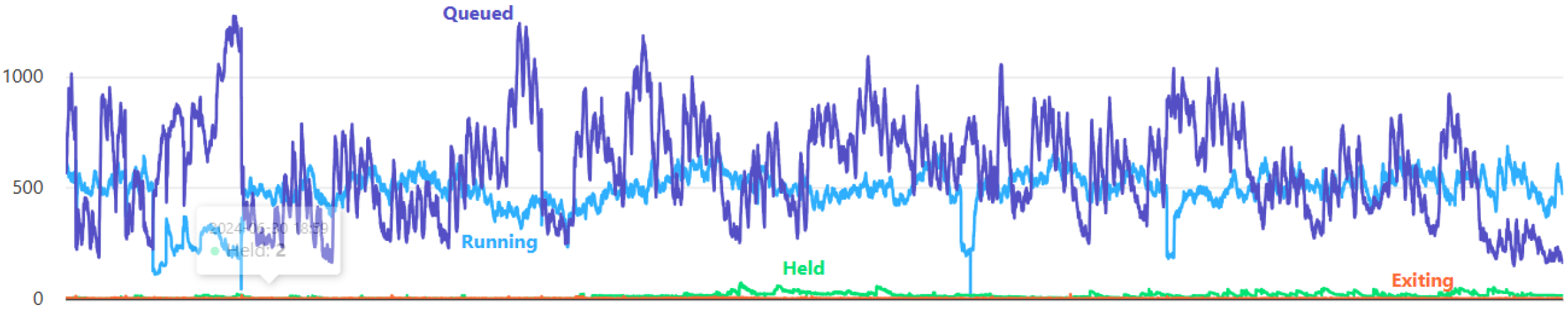
2024 SLIDE

CHPC Lengau Usage: CPU Cluster

Usage for 6-month period ending: **3 Dec 2024**

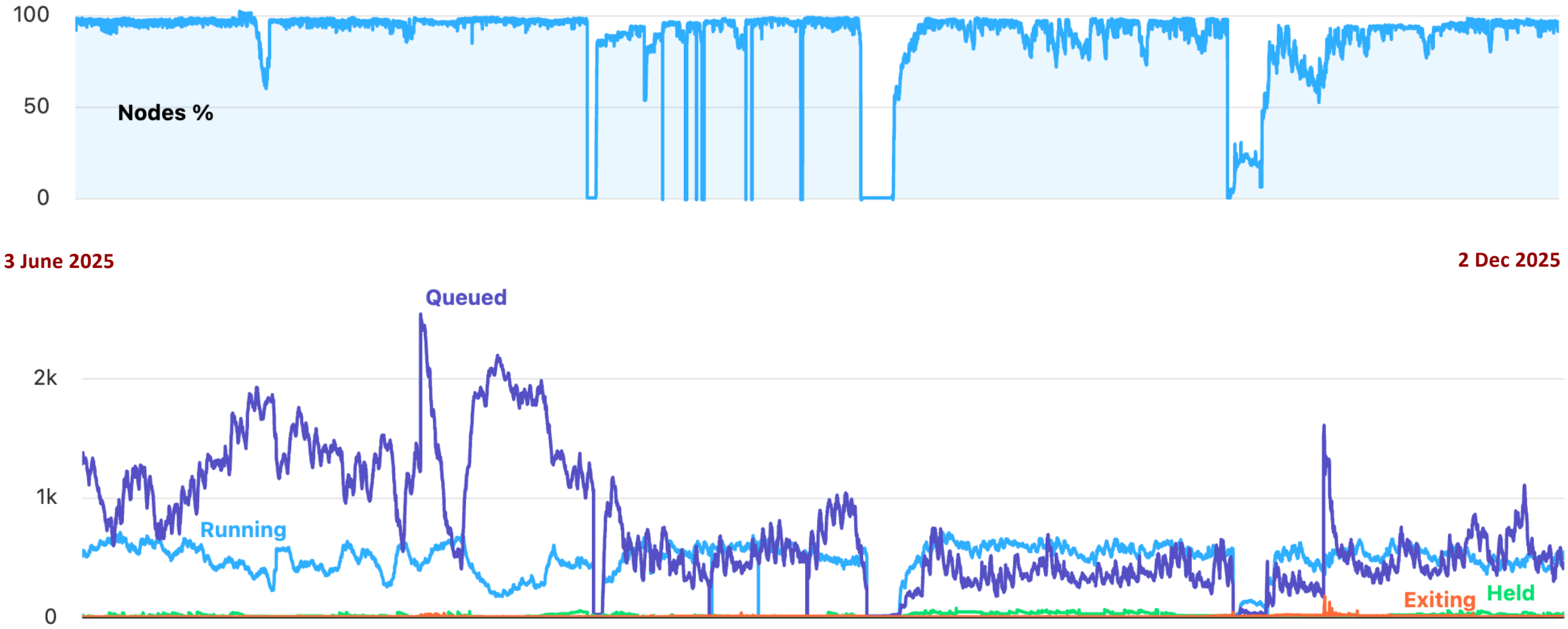


4 June 2024 **3 Dec 2024**



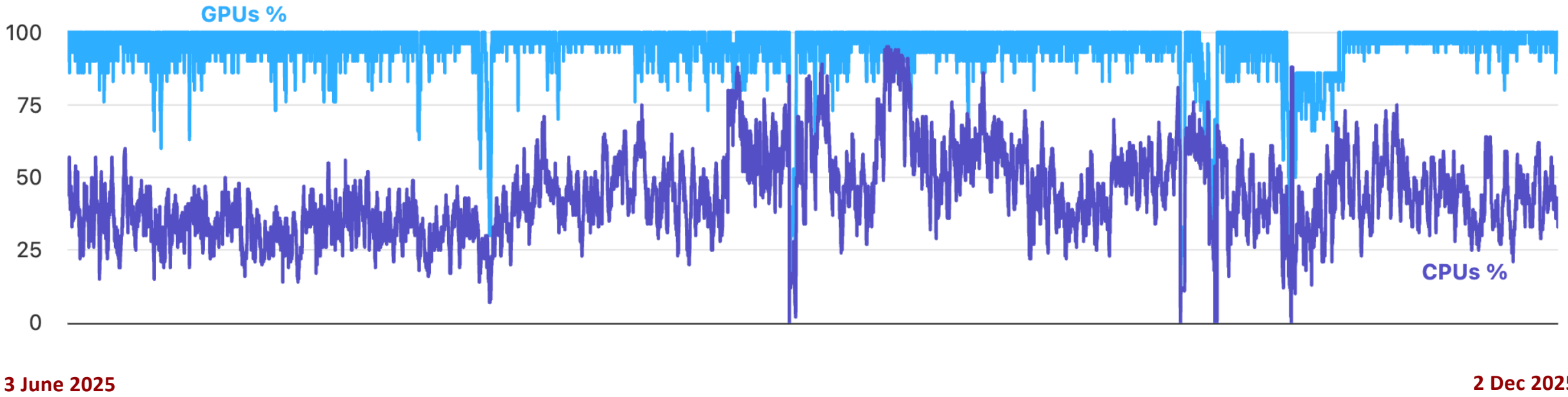
CHPC Lengau Usage (Past 6 Months): CPU Cluster

Usage for 6-month period ending: **2 Dec 2025**

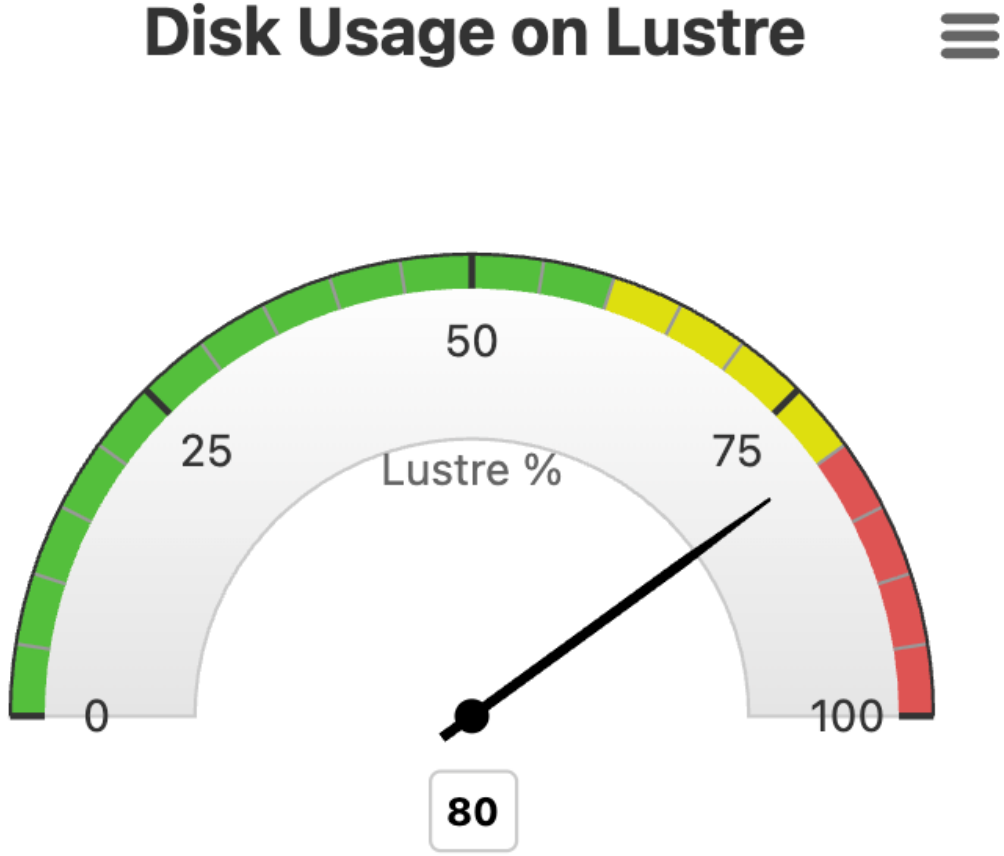


CHPC Lengau Usage (Past 6 Months): GPU Cluster

Usage for 6-month period ending: **2 Dec 2025**



CHPC Lengau: Lustre Storage



Status on: **2 Dec 2025**

User Data Categories on Lustre:

- ***Individual*** User Directories (±2PB)
- ***Shared*** Directories (±1PB)

Management of data according to Lustre Policy…

90 day deletion scripts running often…

Significant Storage Resources available from DIRISA…

CHPC Challenges Affecting Users… For Discussion

- ❑ Lustre Storage (Scratch Parallel File System)
- ❑ Lengau (Over)-Capacity Usage – Queuing Times
- ❑ Stability of Compute Nodes
- ❑ Scheduler Queue Settings (e.g. Walltimes, etc.)
- ❑ High Memory Nodes Required
- ❑ Old Operating System (CentOS 7.3.1611)
- ❑ Delay in provisioning of new HPC Cluster
- ❑ Etc…

CHPC Training and Development Initiatives

- Dedicated CHPC Training events
  - **CHPC Coding Summer School*** **+** NITheCS National Institute for Theoretical and Computational Sciences
  - CHPC Winter School in Practical HPC
  - **HPC Ecosystems Project***
  - **Student Cluster Competition (SCC)***
  - Domain specific workshops / Ad Hoc Training
- **CHPC National Conference***
- Women in HPC (WHPC) Program
- Outreach Programmes

CHPC Coding Summer School - 2026

NATIONAL INTEGRATED CYBERINFRASTRUCTURE SYSTEM
CHPC

NITheCS
National Institute for Theoretical and Computational Sciences

26 January 2026 to 6 February 2026
Africa/Johannesburg timezone

Registration Closes Friday 15 December at noon (12:00)

Overview
Registration

Contact
chpc@csir.co.za

The 16th CHPC & 8th NITheCS Coding Summer School on Data Science and Machine Learning

26 January – 6 February 2026

The Coding Summer School takes place in a physical form at various university and research locations around South Africa and Southern Africa. Students are required to attend one of the designated locations.

Representation from 2025 CSS

https://events.chpc.ac.za/event/164/

Closing Date: *15 Dec 2025*

Practical Access to CHPC

- **Research Programmes**
- **Faculty members at Academic Institutions (PI's)**
- **(Post-Graduate) Students**

wjvrensburg@csir.co.za

Practical Aspects:*

- Registration Procedures
- Principal Investigator vs User
- Research Programme Allocations
- Scheduling (Queues, Walltimes, Limits)
- Storage (Lustre and Home Limits)
- Allocation Evaluation
- Helpdesk

https://users.chpc.ac.za

helpdesk@chpc.ac.za

www.chpc.ac.za

- CHPC Mailing List: ***https://lists.chpc.ac.za/sympa/info/chpc-users***

New HPC Cluster: Ihlosi

HPE HPC System	System Configuration
HPE 42U racks (Compute nodes) HPE XD220 servers	8
HPE42U rack for Interconnect	1
HPE42U rack for mgmt nodes	1
DELL 42U rack for 9 GPU servers (NVIDIA Tesla V100)	1
Interconnect Network	HPE InfiniBand NDR (400Gbp/s) spine with NDR200 leaf to the nodes. Fat Tree topology
Cooling	Direct Liquid Cooling
Total Power	690KW
Compute Nodes	
Number of Nodes	512
CPU Type	Emerald Rapids 8593Q (64cores, 2.2GHz, 385W)
Memory Per Node (GiB)	512GB DDR5
Total Peak Performance (Tflop/s)	4613
Reported Linpack Rmax (Tflop/s)	4000

New HPC Cluster: Ihlosi

Management Nodes	
Management nodes	3 (HA)
Scheduler nodes	2 (HA)
NFS servers	3 (HA)
Login Nodes	2
DTN servers	2
MedeA server	1
Visualization nodes	4
Mslogin	1
LNet Routers	2
Software Stack	System Configuration
Cluster Manager	HPCM 1.18
Operating System	RedHat 9.4
Job Scheduling	System Configuration
Job Scheduler	Altair PBS Professional 2024

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Cloud Users and Usage - SEBOWA

Dorah Thobye

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AGENDA

- Cloud Infrastructure
- Resource usage
- Application process
- Future Plans

CLOUD INFRASTRUCTURE

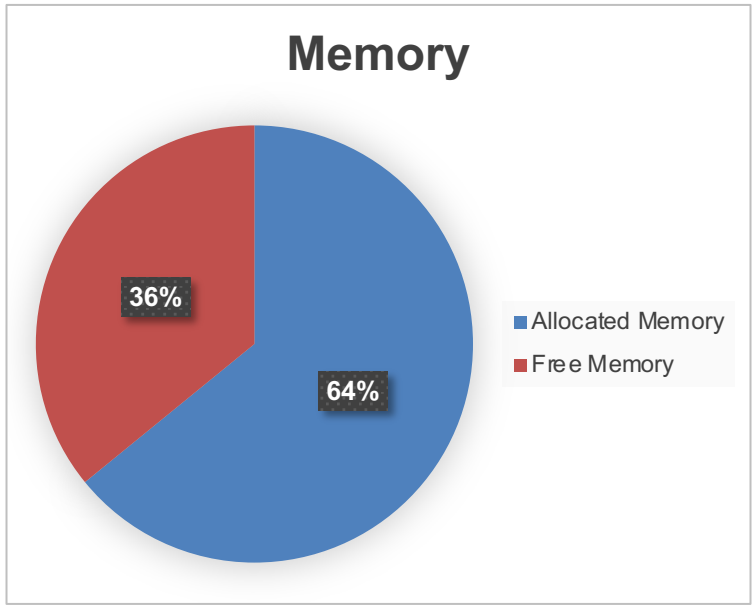
Cape Town zone

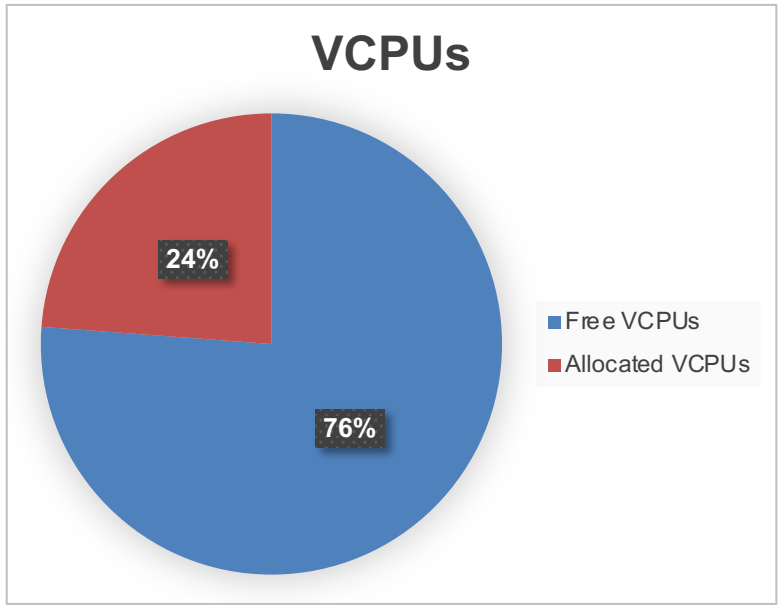
- SEBOWA computing resource pool includes 32 compute nodes with
- 11TB of memory and 20 CEPH storage servers with 3PB of storage
- The CEPH storage is configured with Erasure coding and keeps 3 copies of each data on separate storages serves to prevent data loss due to hardware failure
- There 65 projects hosted on SEBOWA; 53 are none NICIS and 12 are NICIS projects.
- Trilio backup and recovery.

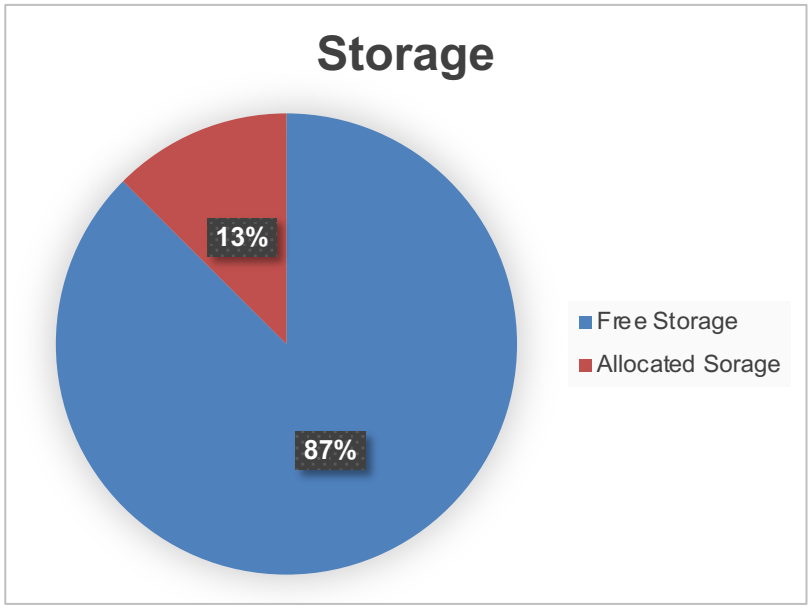
Pretoria zone

- Has a pool of 16 compute nodes with a total of 6TB memory and 1.5 PB of storage.

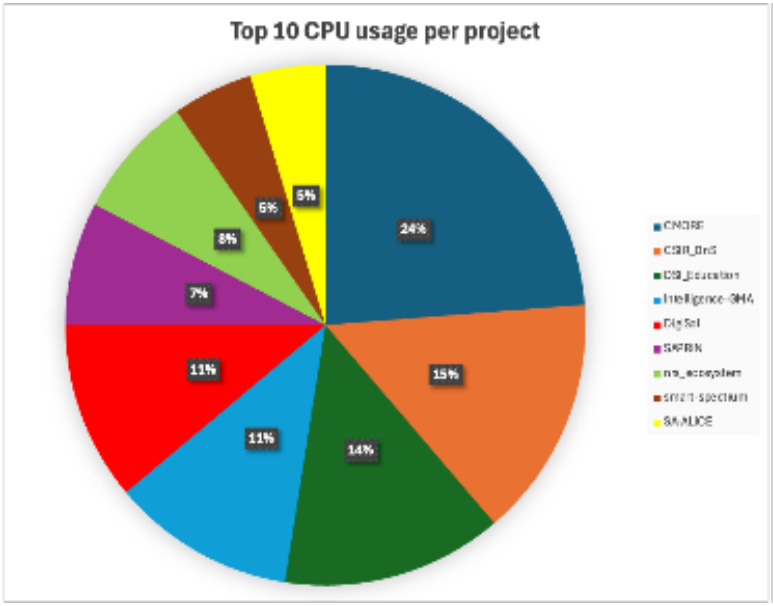
RESOURCE USAGE

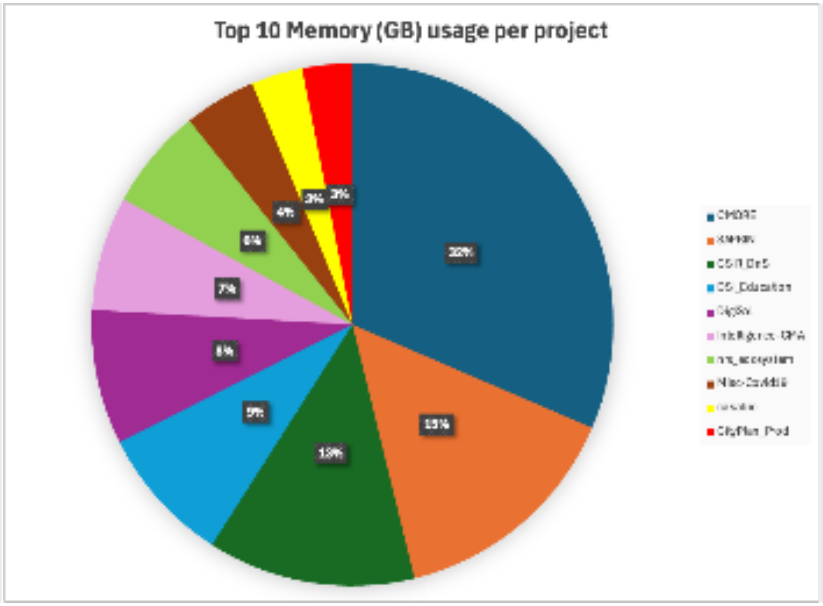


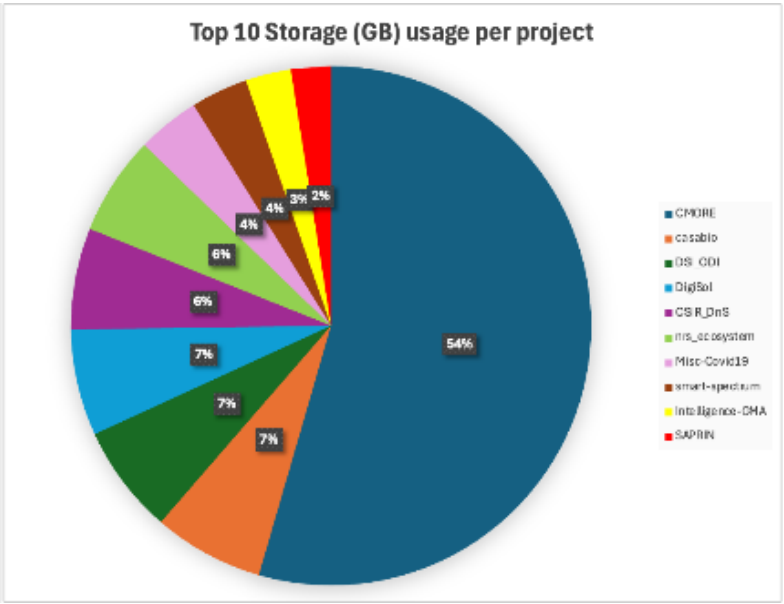




RESOURCE USAGE PER PROJECT







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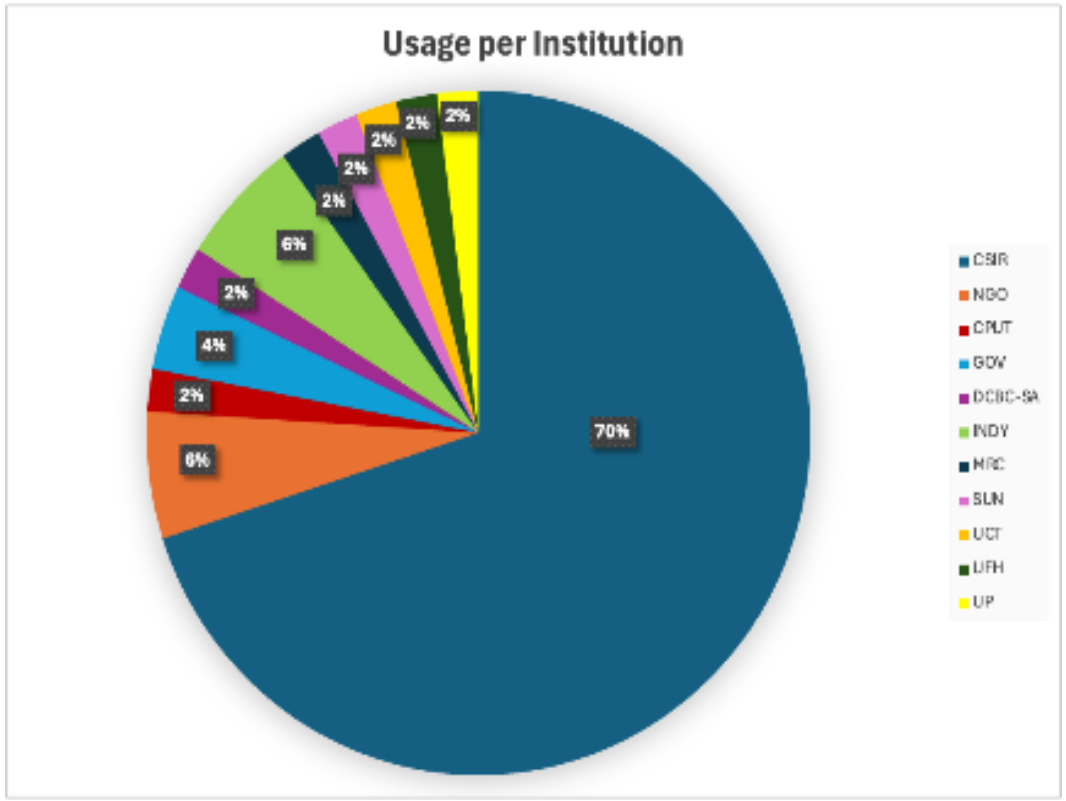
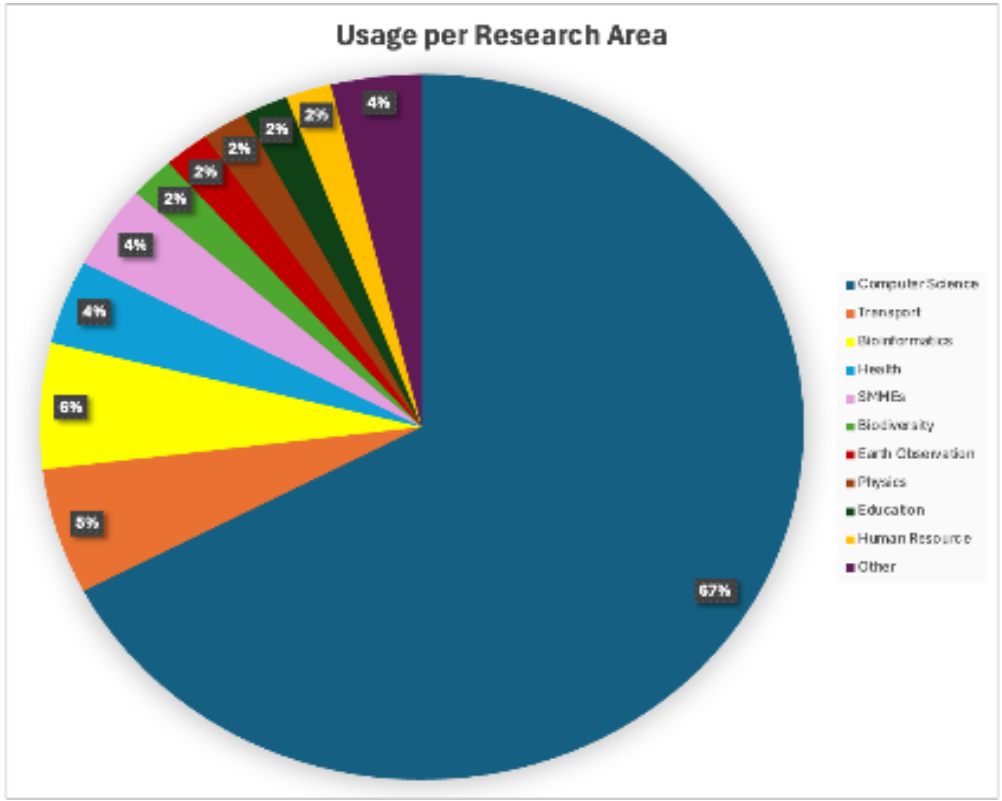
RESOURCE USAGE PER INSTITUTION AND RESEACH AREA





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FUTURE PLANS

- Memory increase
- Configuring the disaster recovery (DR) using Cape Town and Pretoria zone.
- Adding GPU to the two zones

APPLICATION FOR RESOURCES

- https://sebowausers.nicis.ac.za
- Email confirmation
- Login back to the URL.
- Put in resource request
- Create the project and add users to the project

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Quantum Computing:

Access and Usage

Nyameko Lisa

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South African Quantum Technology Initiative

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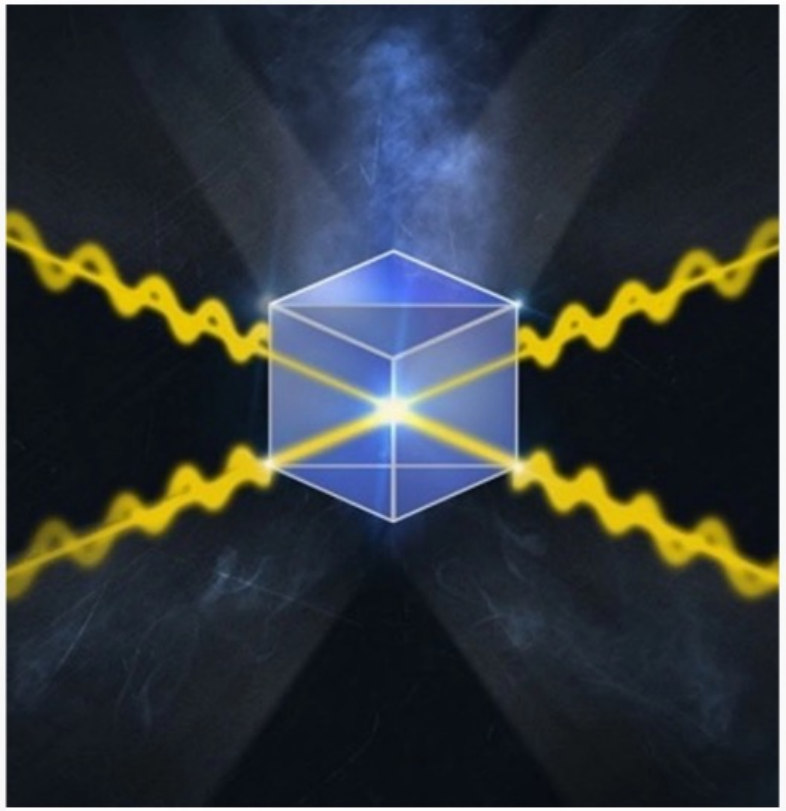
Quantum Computing

This flagship explores how quantum computing can be used effectively in order to solve problems relevant to the South African socio-economic context.

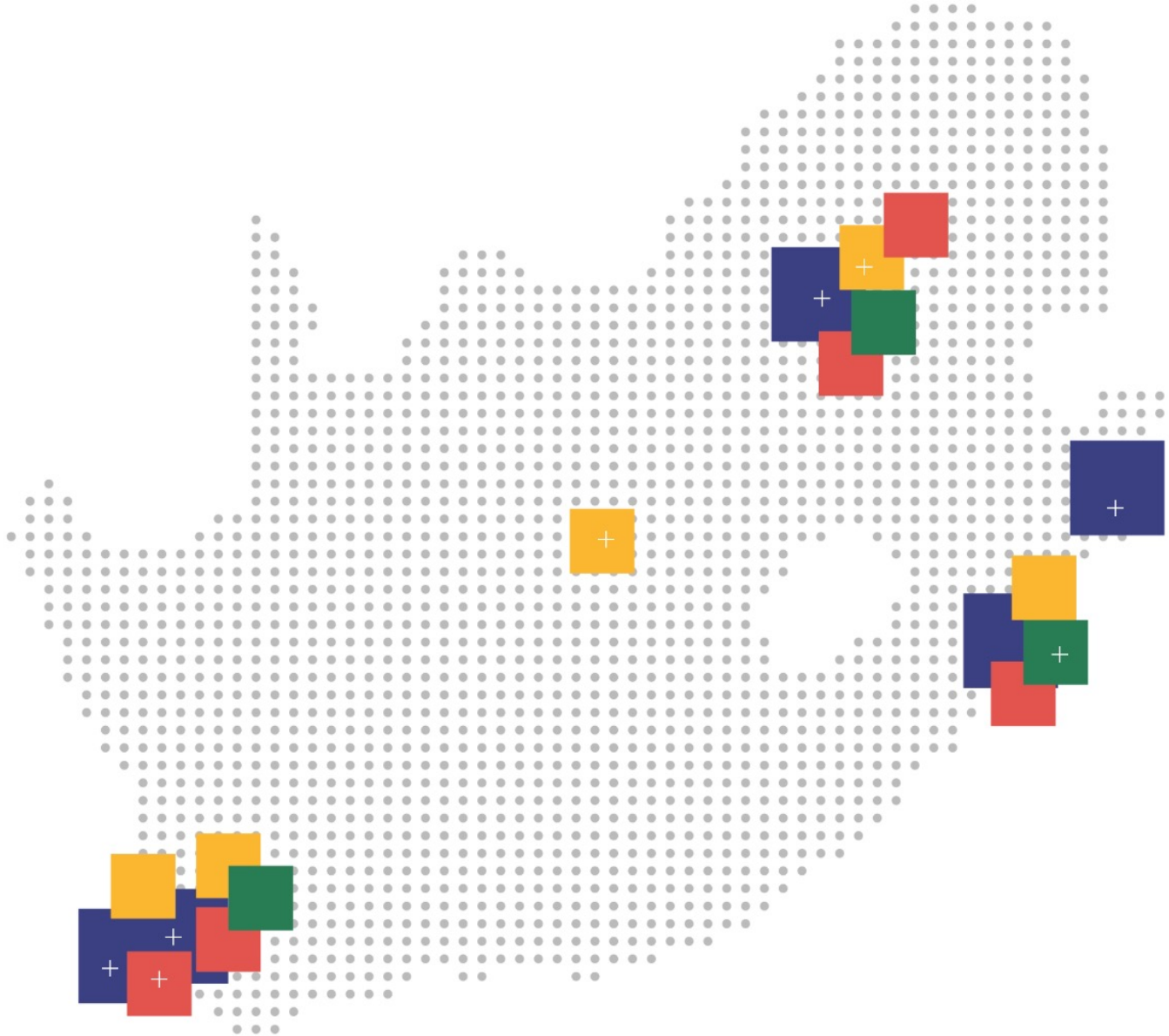
Quantum Metrology, Sensing and Imaging

This flagship will bring together the collective expertise of South African researchers to fast tract the development and deployment of a range of products for medicine, aerospace, military and telecommunications.



Quantum Communications

This flagship emphasises holistic technology development and deployment, bringing together disparate activities in single photon sources, detectors, random number generation, teleportation, as well as classical communication protocols.



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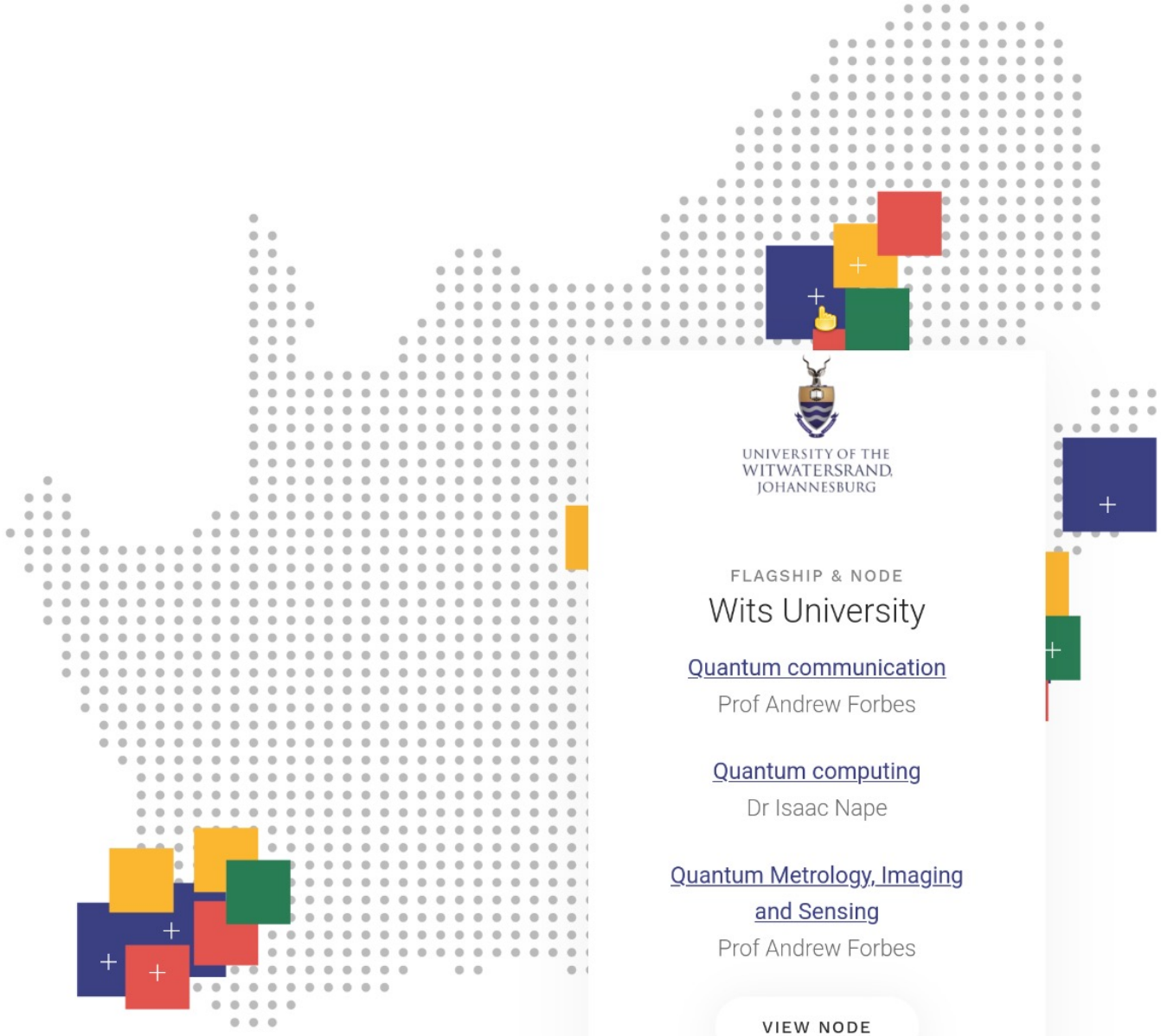

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FLAGSHIP & NODE

Wits University

Quantum communication

Prof Andrew Forbes

Quantum computing

Dr Isaac Nape

Quantum Metrology, Imaging and Sensing

Prof Andrew Forbes

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FLAGSHIP

University of Pretoria

Quantum Metrology, Imaging and Sensing

Prof Tjaart Kruger

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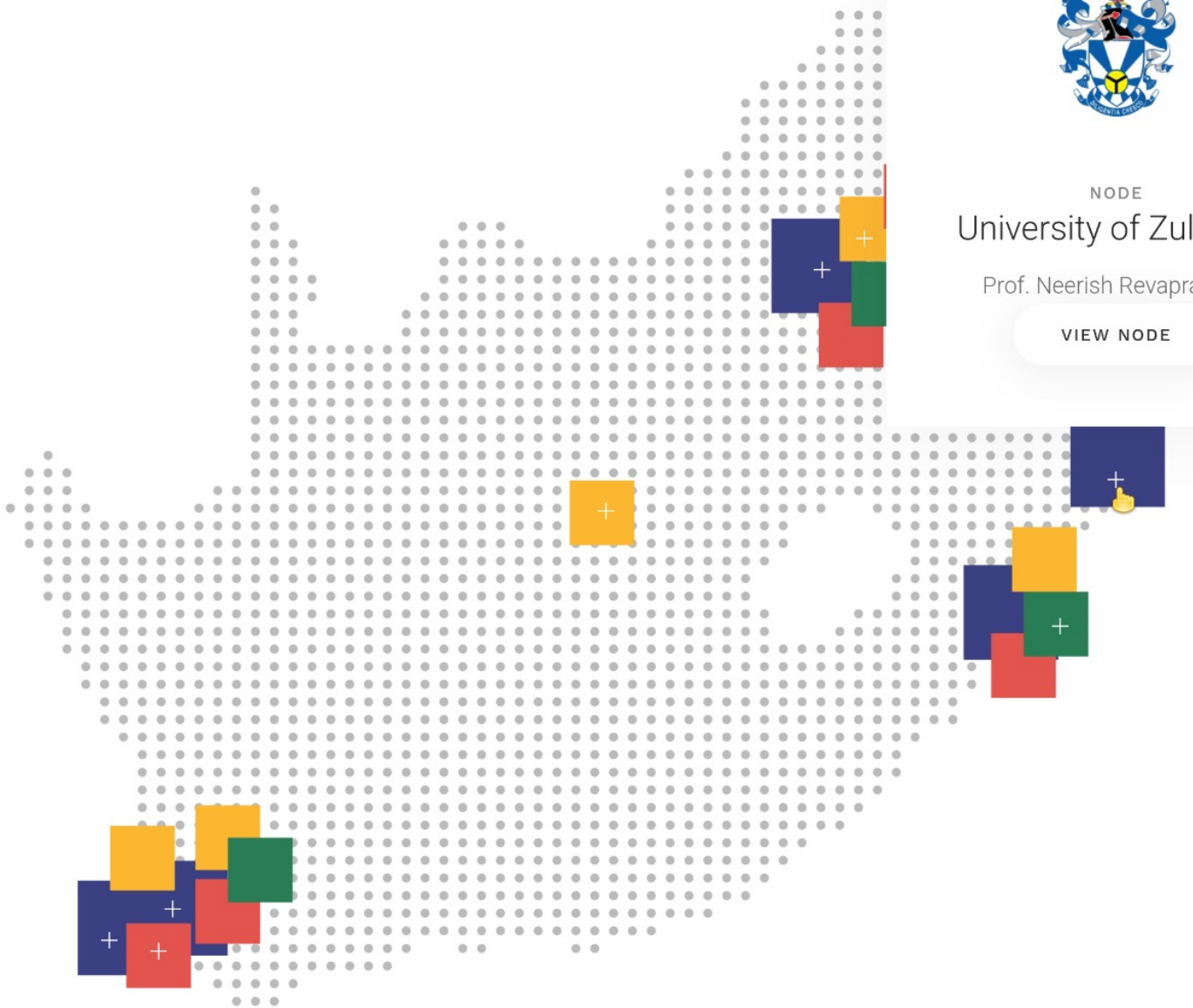

NODE

University of Zululand

Prof. Neerish Revaprasadu

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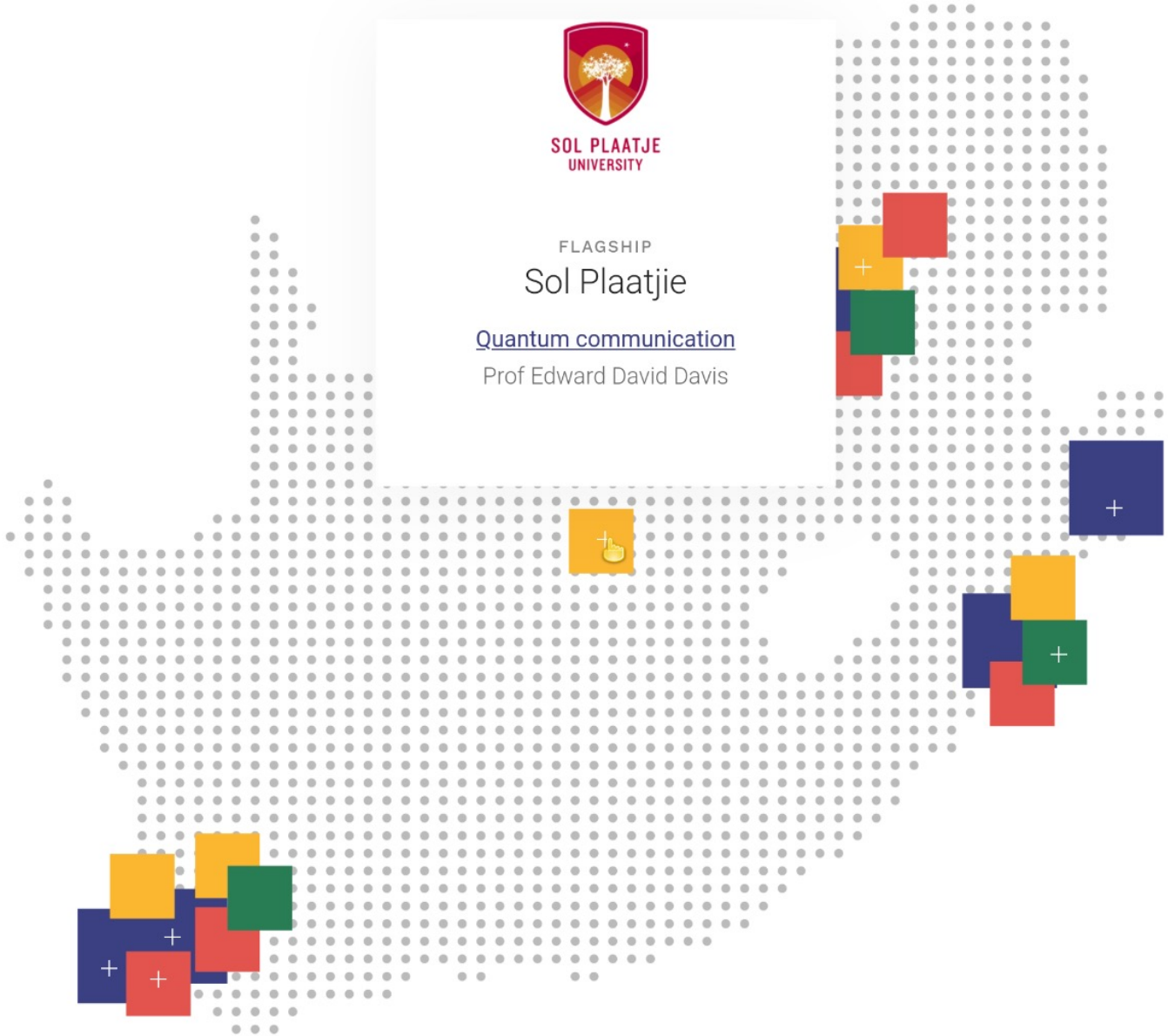
SOL PLAATJE UNIVERSITY

FLAGSHIP

Sol Plaatjie

Quantum communication

Prof Edward David Davis



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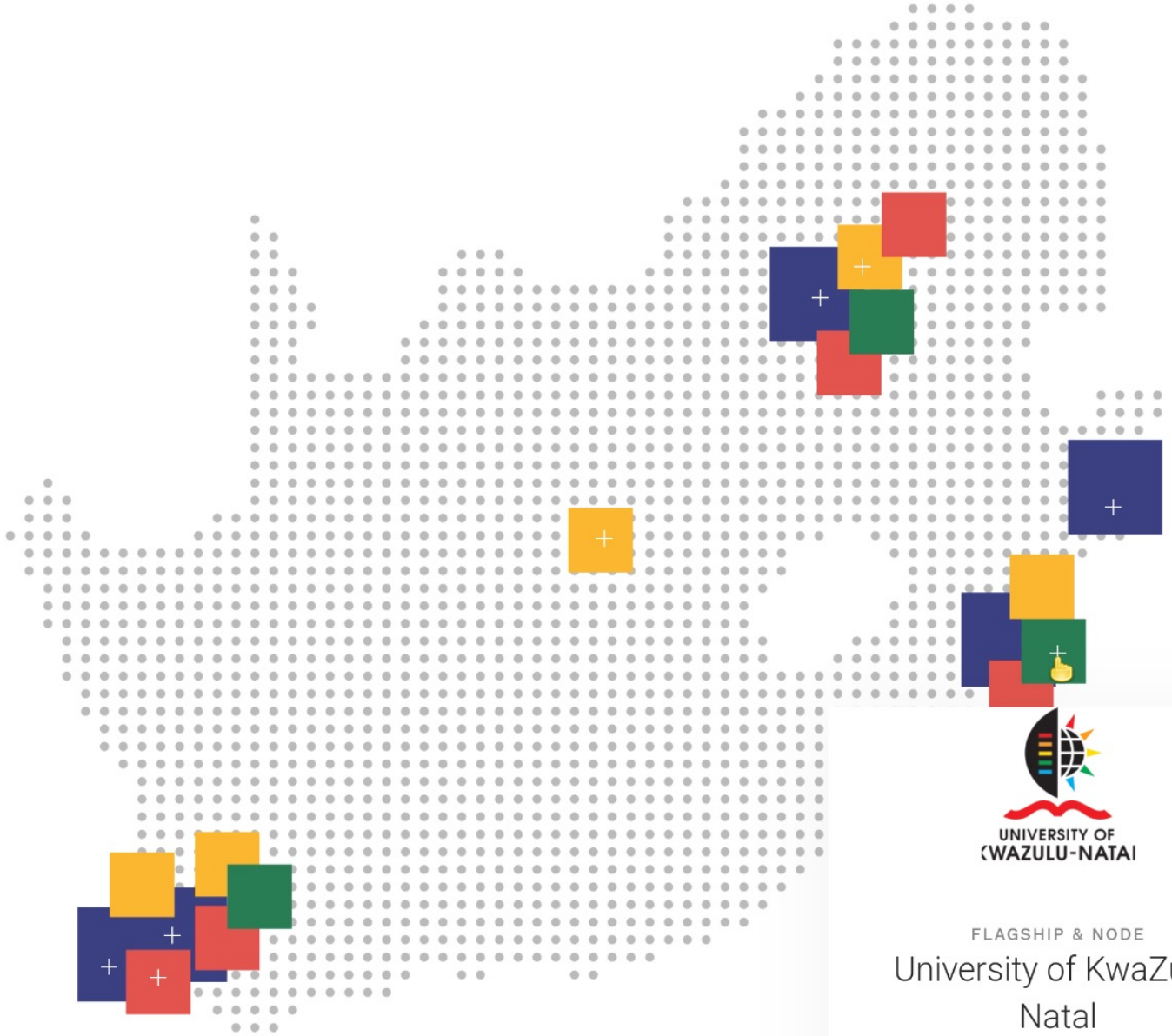

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University of KwaZulu-Natal

Quantum communication

Prof Thomas Konrad

Stellenbosch
UNIVERSITY
IYUNIVESITHI
UNIVERSITEIT

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University of Stellenbosch

Quantum communication

Prof Mark Tame

Quantum computing

Prof Mark Tame and Prof Francesco Petruccione

Quantum Metrology, Imaging and Sensing

Prof Mark Tame

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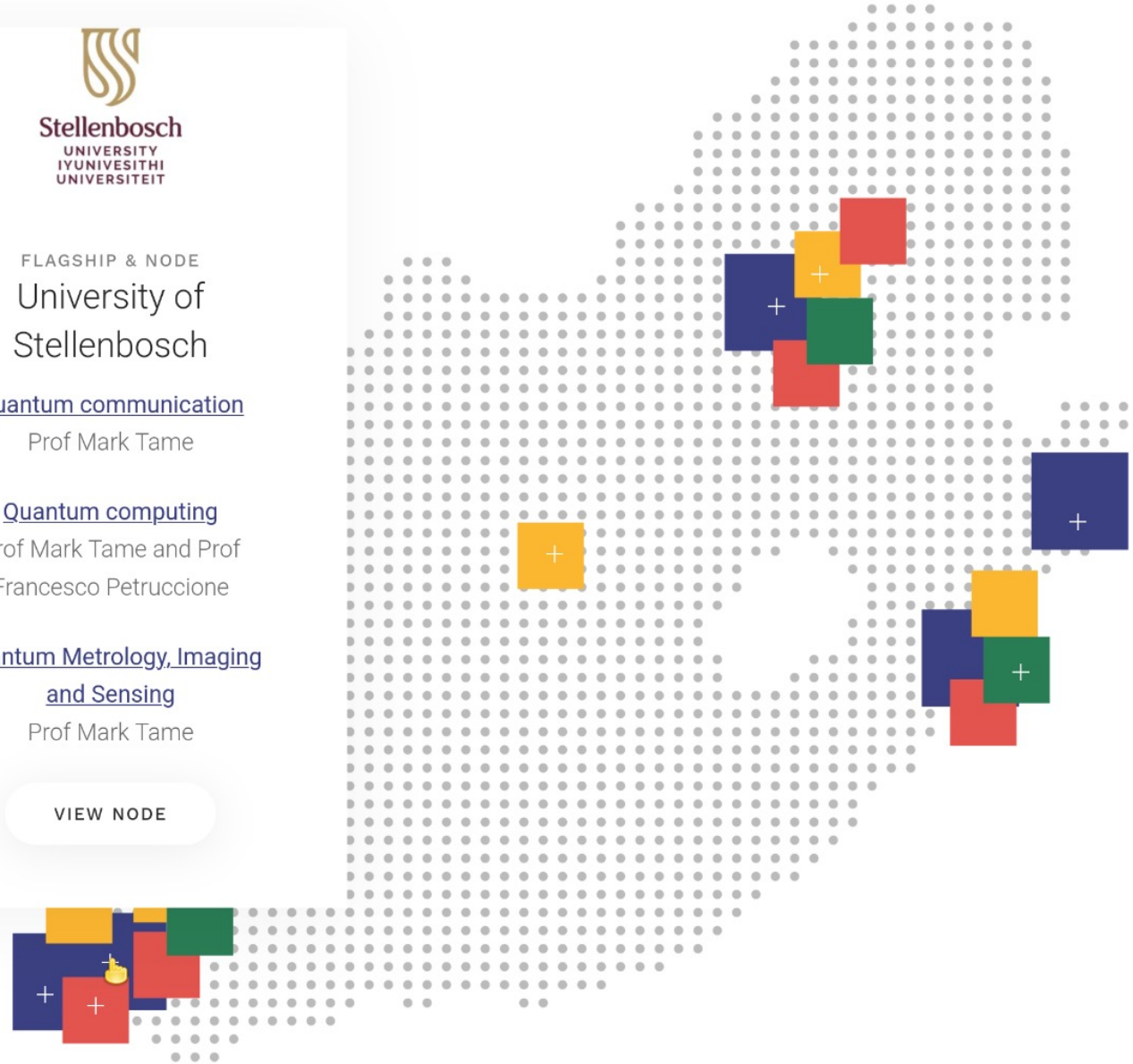

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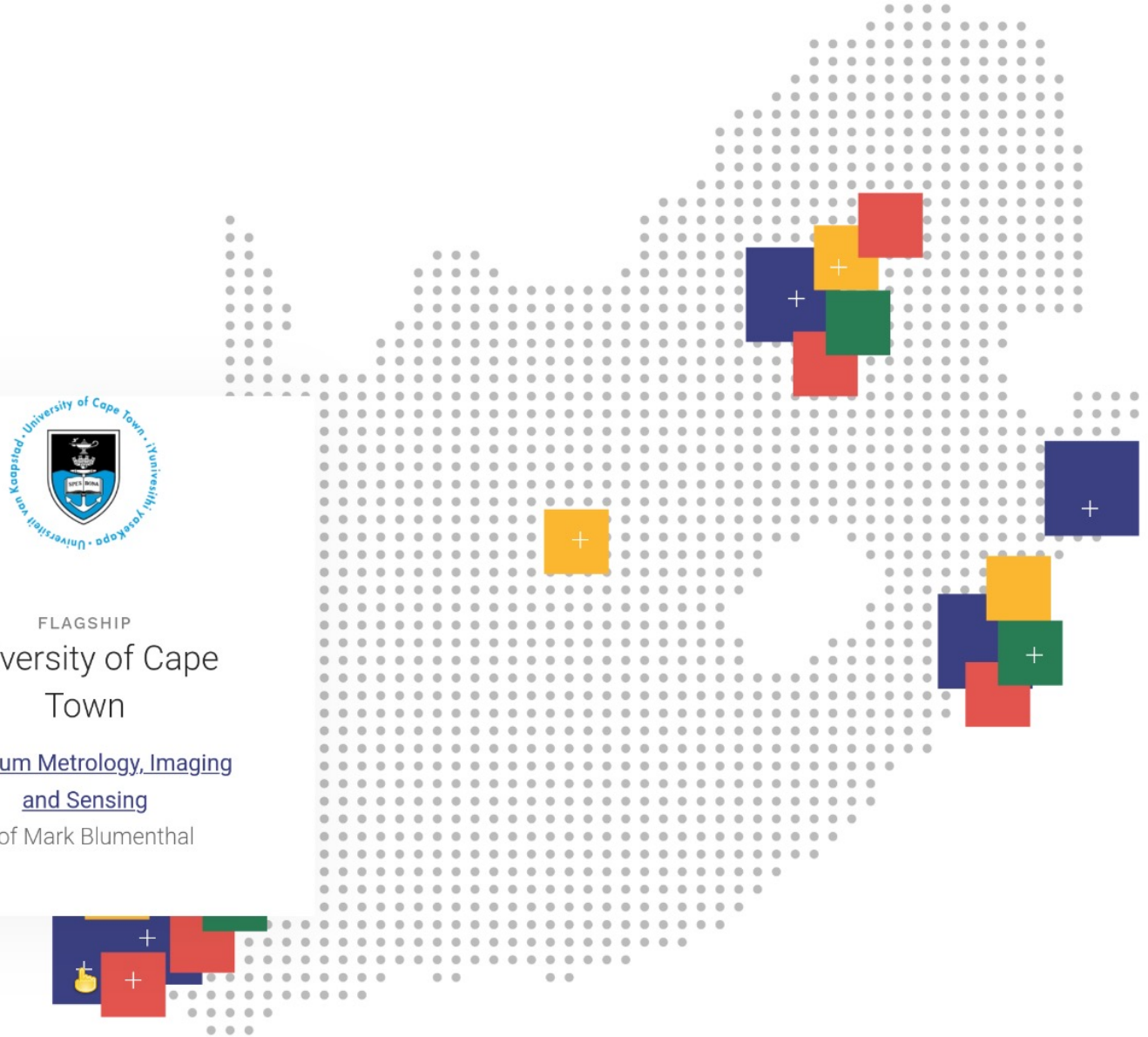

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University of Cape Town

Quantum Metrology, Imaging and Sensing

Prof Mark Blumenthal

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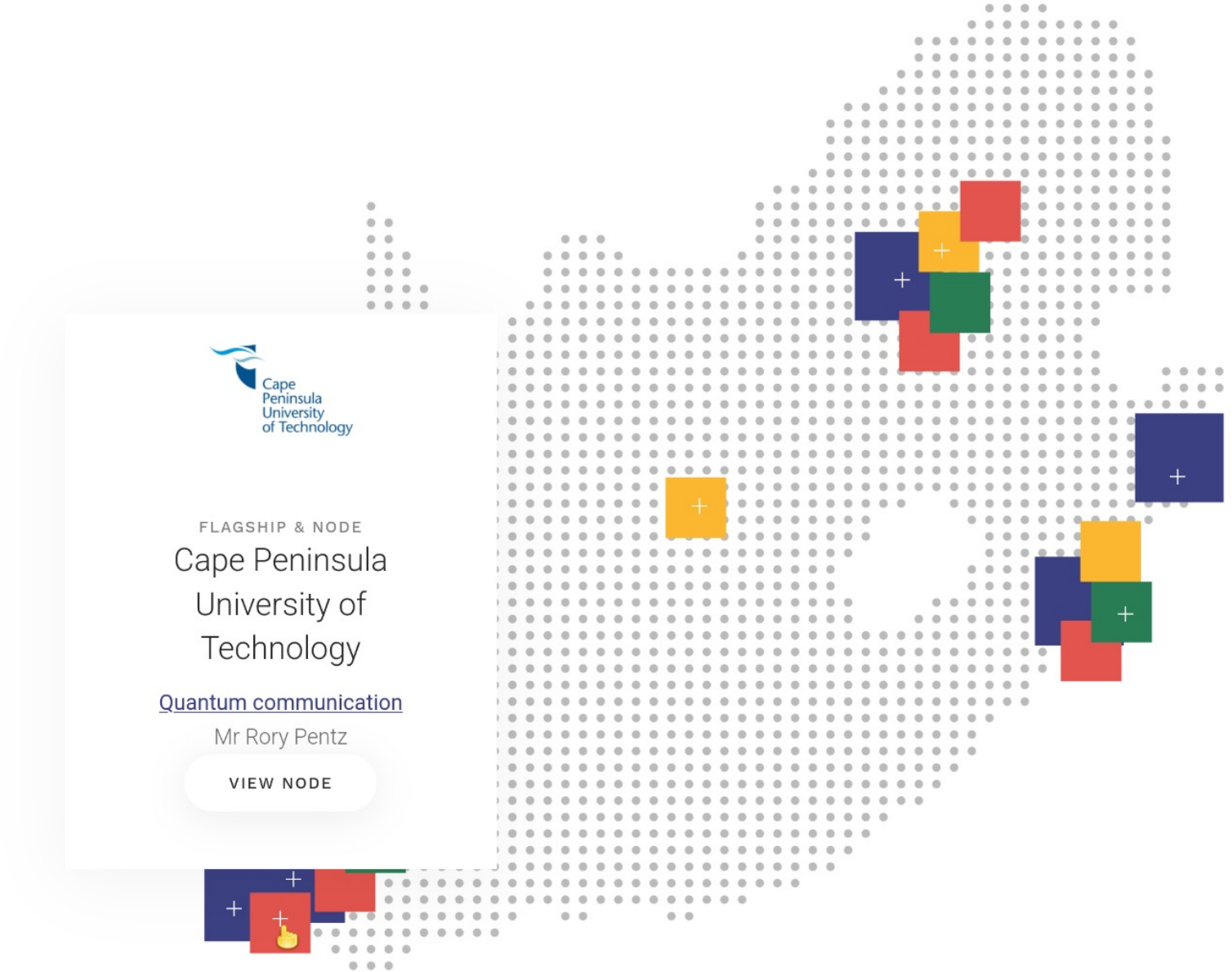

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QC Access through IBM Quantum

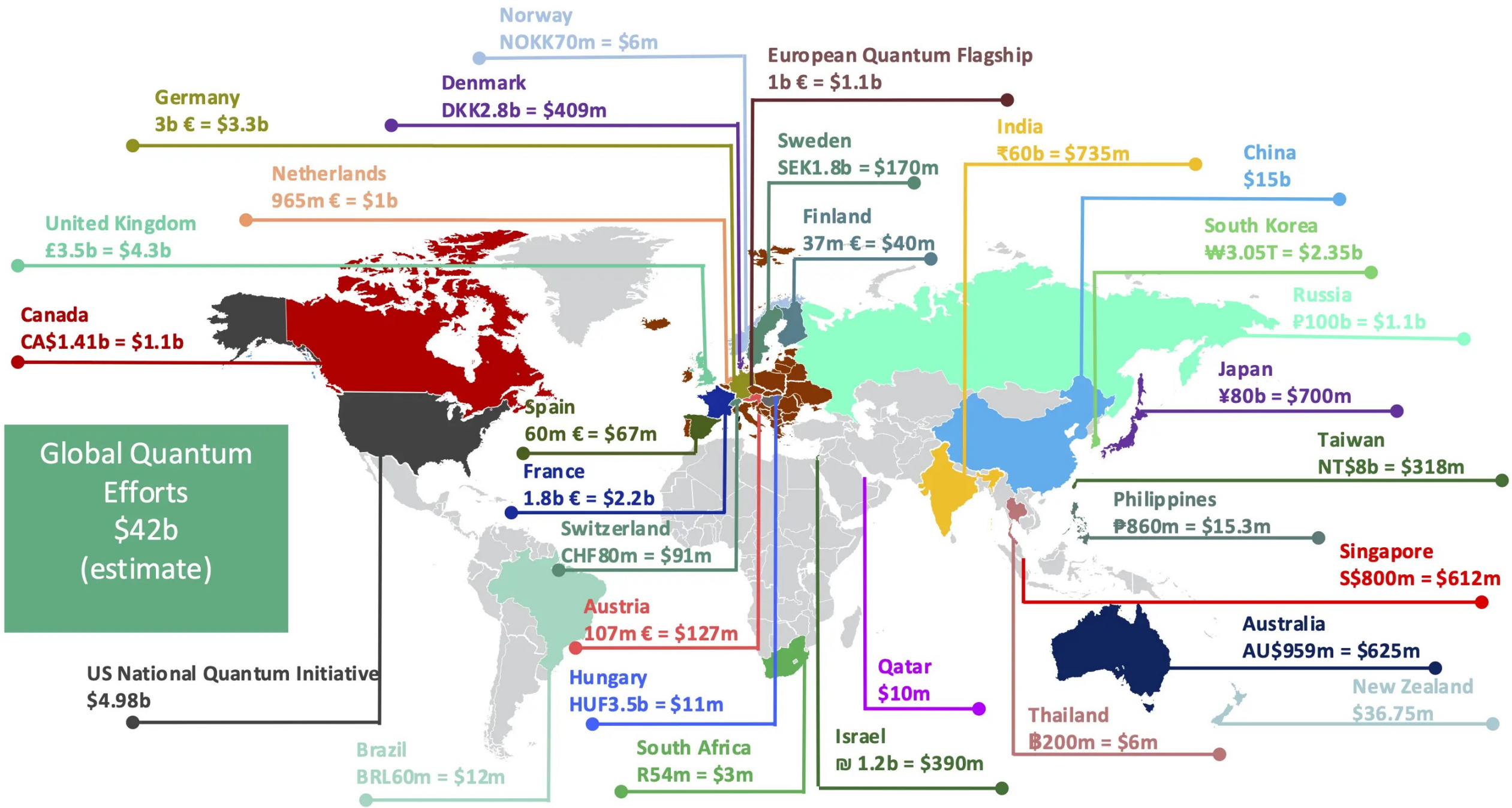
- QC Access Tender Procurement Completed 2025/26

- CSIR Purchase Order concluded (23rd June) to the value of R 8 mil
- SAQuTI contributing an additional R 2.5 mil
- 12 Month Subscription to IBM Quantum Premium Service

- Tender for 2026/27 to be published soon

- We strongly encourage anyone interested in the following to reach out to us and register as a Principal Investigator for access to quantum hardware.

- For more information please contact info@chpc.ac.za.

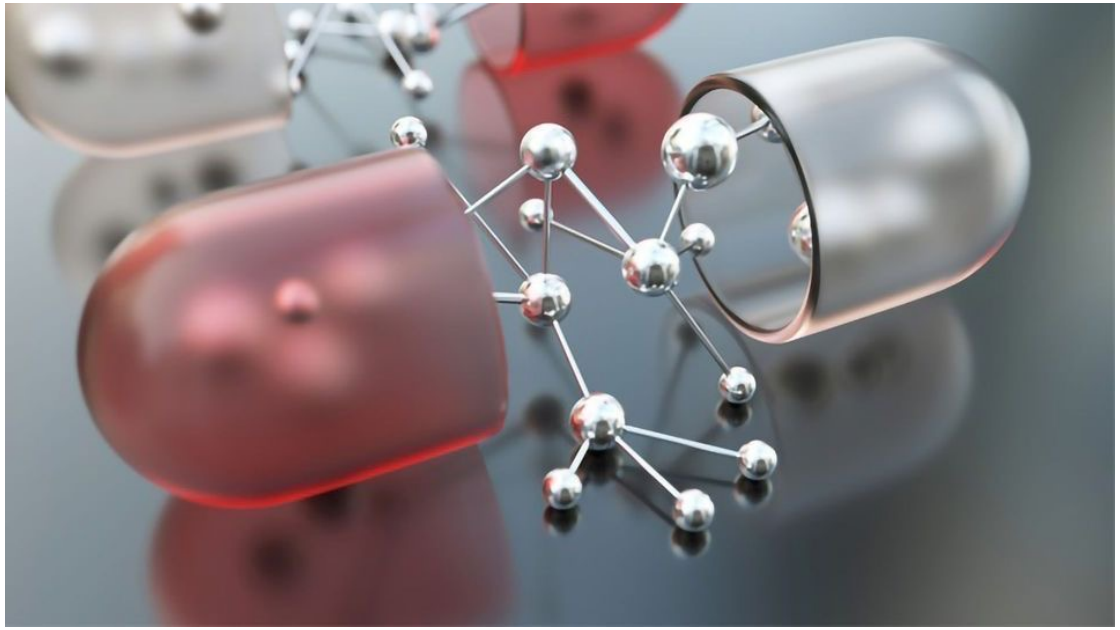


https://www.qureca.com/quantum-initiatives-worldwide/

Primary Classification	Q1 2025 Investment
Quantum Computers	$1,254,803,507
Quantum Software	$264,800,001
Quantum Hardware Components	$196,604,397
Quantum Communications & Security	$71,787,018
Quantum Sensing & Imaging	$30,037,689
Other Quantum	$2,000,000

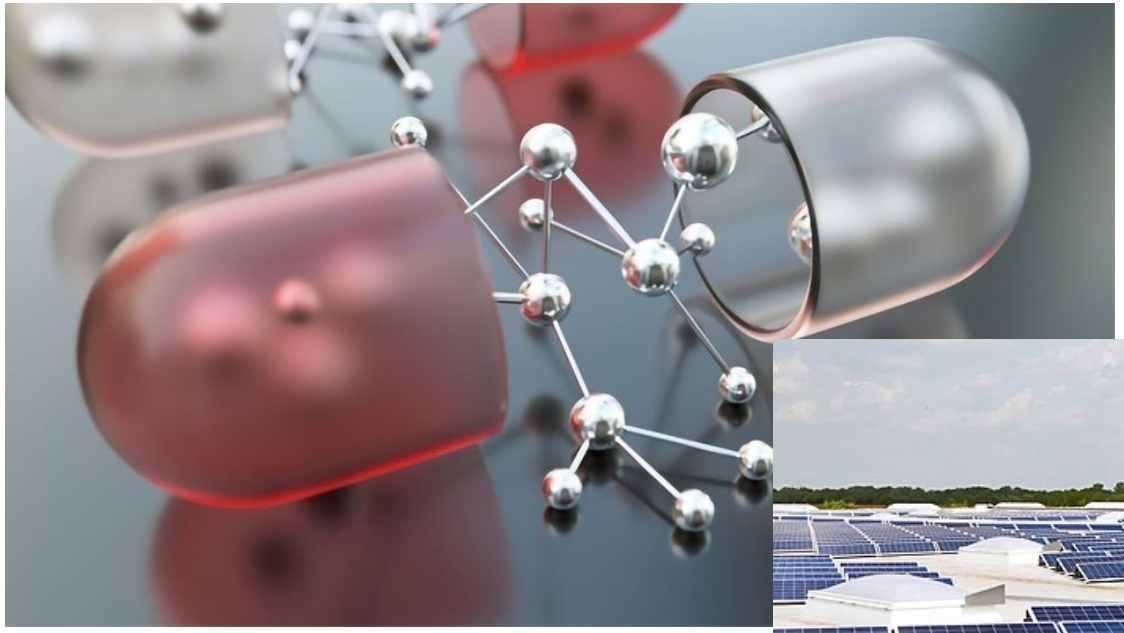
https://thequantuminsider.com

QC Applications



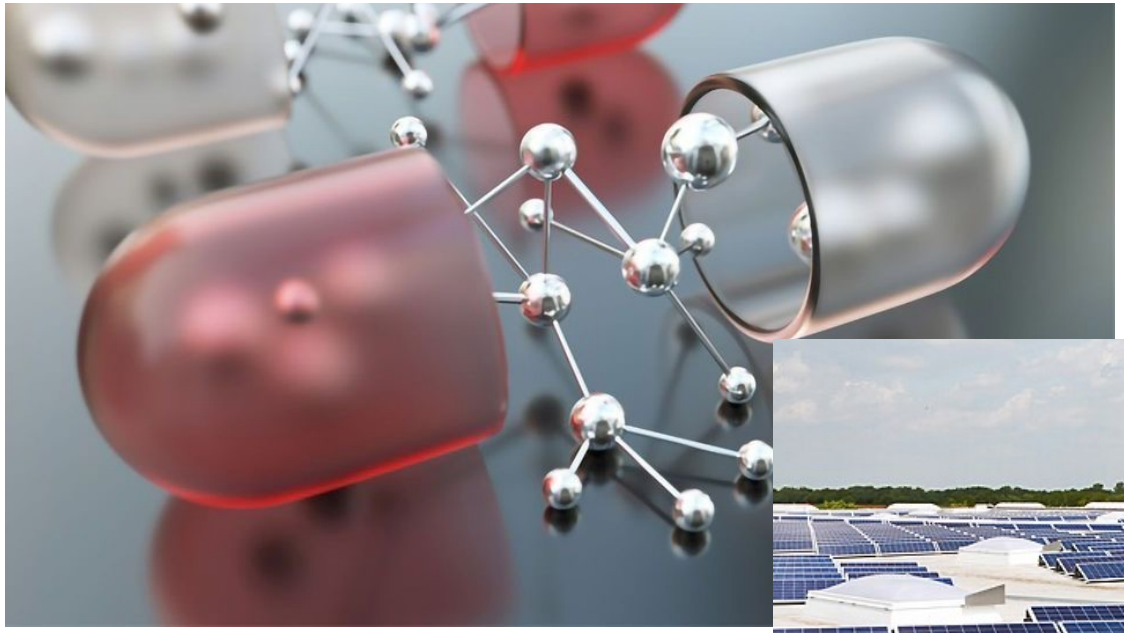
https://www.technologynetworks.com/drug-discovery/

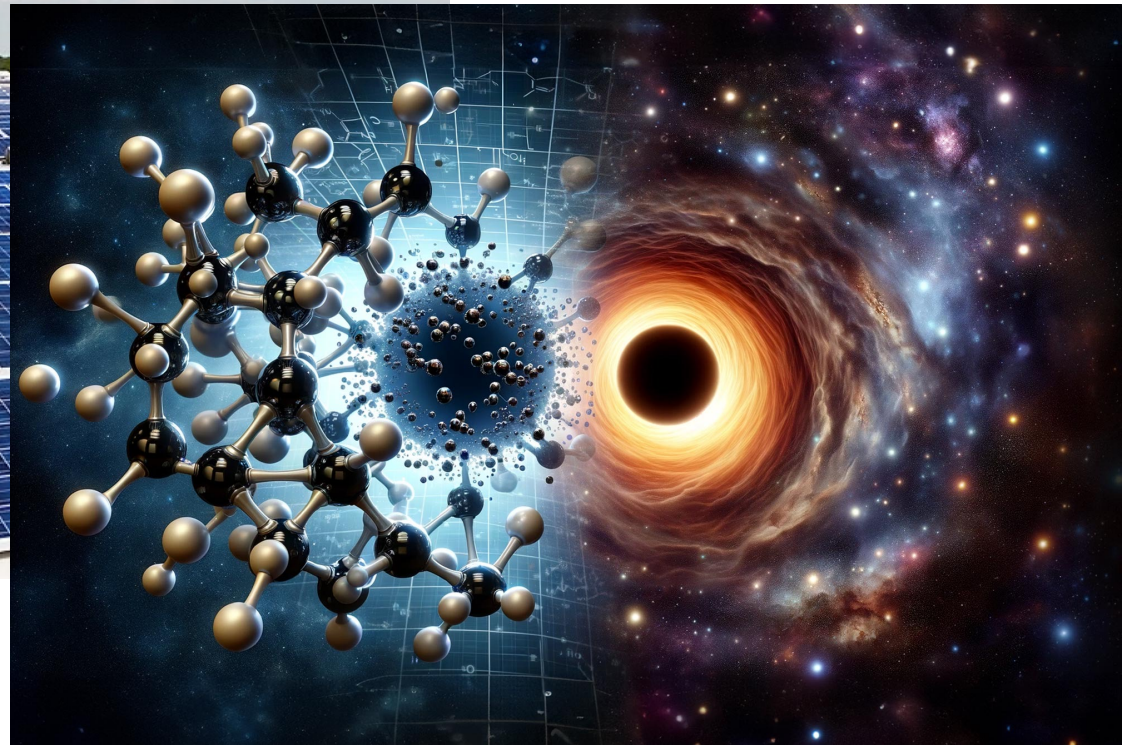
QC Applications



https://scitechdaily.com/

QC Applications





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CSIR IBM QIC – Users

SA – UK Quantum Knowledge Exchange Visit

Institutions visited:

- **Foreign, Commonwealth and Development Office (FCDO),**
  - Government Policy and Strategic Interventions.
- **Department of Science, Innovation and Technology,**
  - Dedicated Quantum Office within DSIT.
- **South African High Commission in the UK,**
  - Potential funding opportunities through the UK Chamber of Business / Commerce.
- **Royal Academy of Chemistry,**
- **Innovate UK – London, Waterloo,**
  - Funding entity similar to the NRF with dedicated Quantum Technologies calls.
- **The National Quantum Computing Center (NQCC),**
  - £30m program to deploy 7 quantum computing testbeds on-prem.
- **Oxford University – QCi3 Hub**,
- **SEEQC**,
  - Quantum Computing startup, integrating HPC and QC.
- **Imperial College,**
- **Royal Academy of Engineering,**

CSIR IBM QIC – Institutions

AIMS | African Institute for Mathematical Sciences SOUTH AFRICA

itv of Cape Town (UCT) (

UNIVERSITY OF KWAZULU-NATAL ™
INYUVESI YAKWAZULU-NATALI

South African Quantum Technology Initiative

NITheCS
National Institute for Theoretical and Computational Sciences

NELSON MANDELA UNIVERSITY

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

UNIVERSITEIT STELLENBOSCH UNIVERSITY

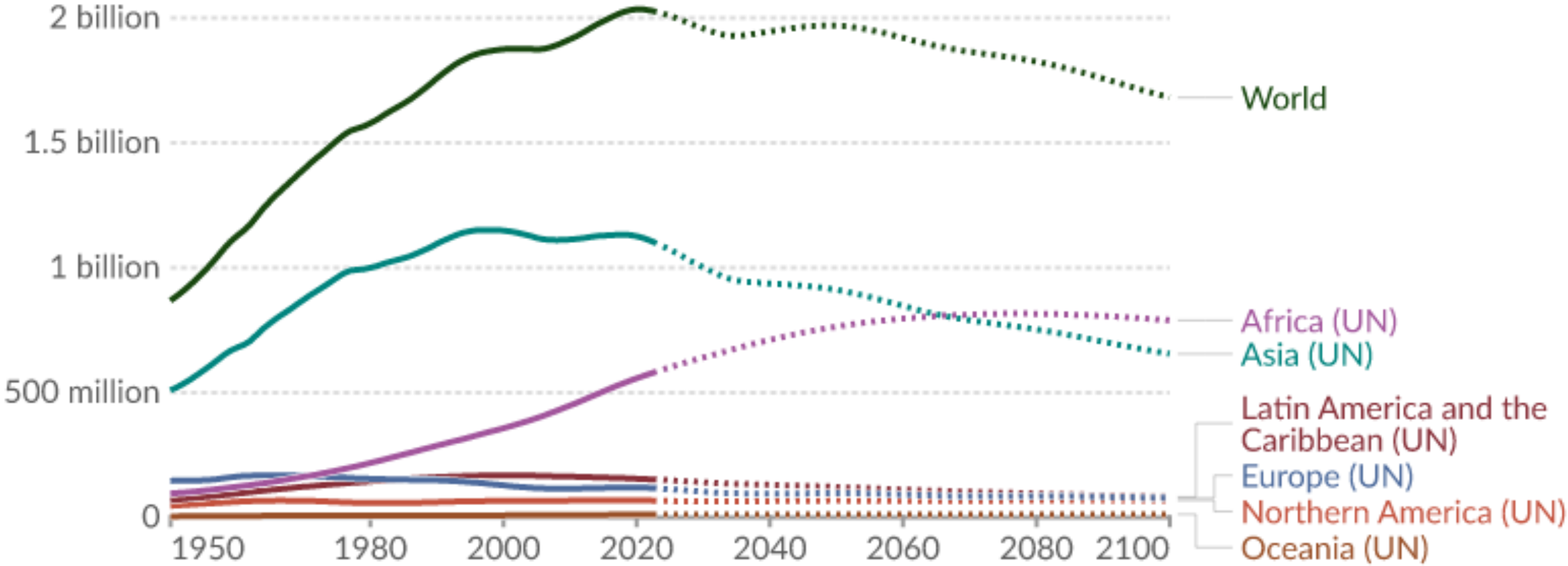
UNIVERSITY of the WESTERN CAPE

SUSTAINABLE DEVELOPMENT GOALS

Children under age 15, by world region

Our World in Data

Historic estimates with future projections based on the UN medium scenario.



Data source: UN, World Population Prospects (2024)

OurWorldinData.org/population-growth | CC BY

https://ourworldindata.org

CHPC: Cloud, HPC & QC Hub

"By ourselves we suffer serious limitations. Together we can be something wonderful."

- Max du Preez

IBM **Quantum**

THE NATIONAL INTEGRATED CYBER-INFRASTRUCTURE SYSTEM SINCERELY THANKS THE FOLLOWING COMPANIES FOR THEIR GENEROUS SUPPORT:

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