

HPC in South `Africa: Efforts in support of Physics

Dr Happy Sithole

28 September 2023

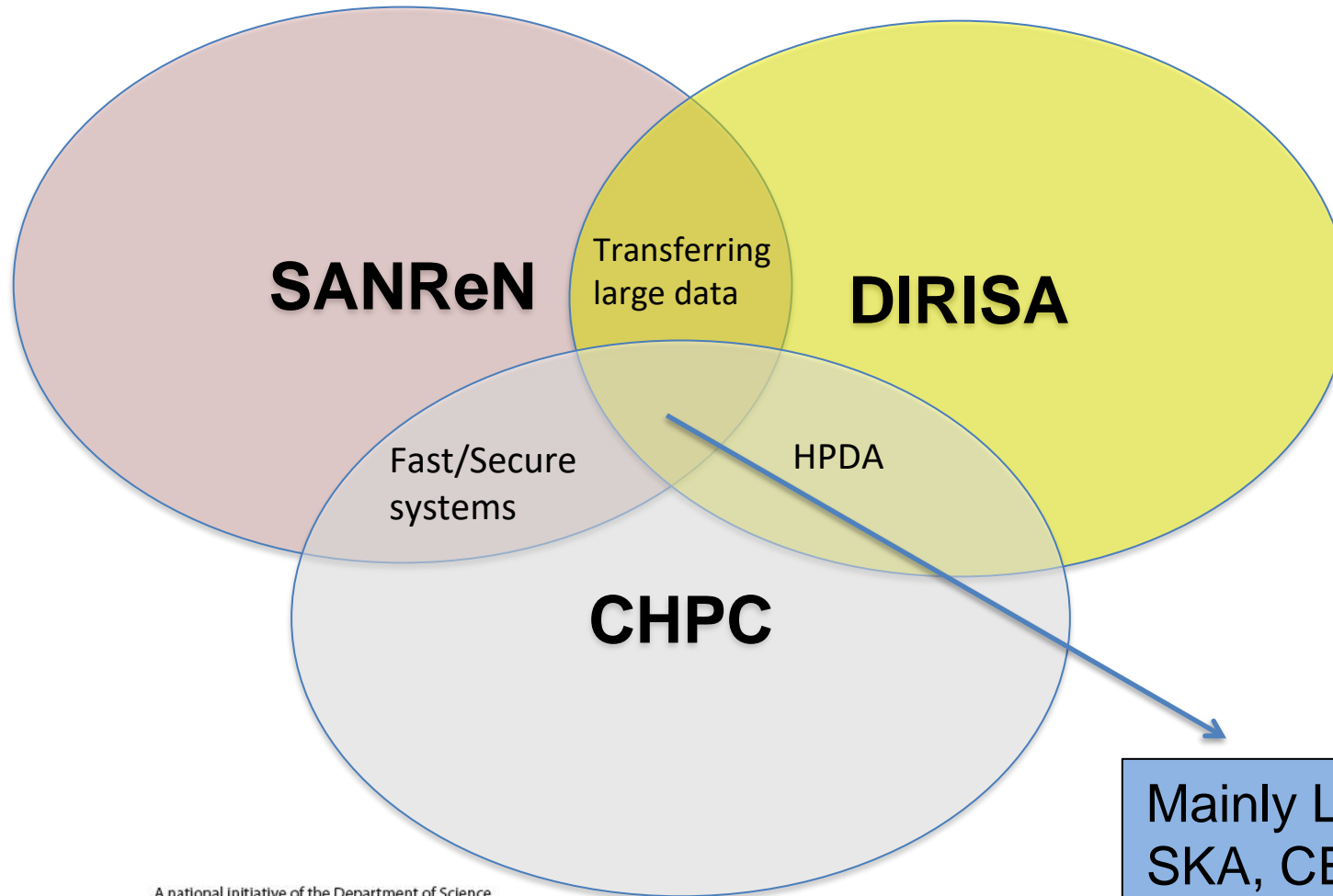
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- Common services between any two entities of NICIS
- Intersection of the three entities most crucial, as defines the success of overall NICIS.
- Development of cross-cutting skills internally and within the community

Mainly Large Scale Science projects:
SKA, CERN, 4IR, SADC C.I. Framework,
Climate Change (e.g. IPCC)

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Strategic Objectives

SO1

- Sustain a **world class** and relevant **national integrated cyberinfrastructure system** for Science and Technology

SO2

- Enable and promote **eScience** in South Africa.

SO3

- Position South Africa to take part in, host and **lead large scale global research and science projects** (e.g. SKA and CERN experiments).

SO4

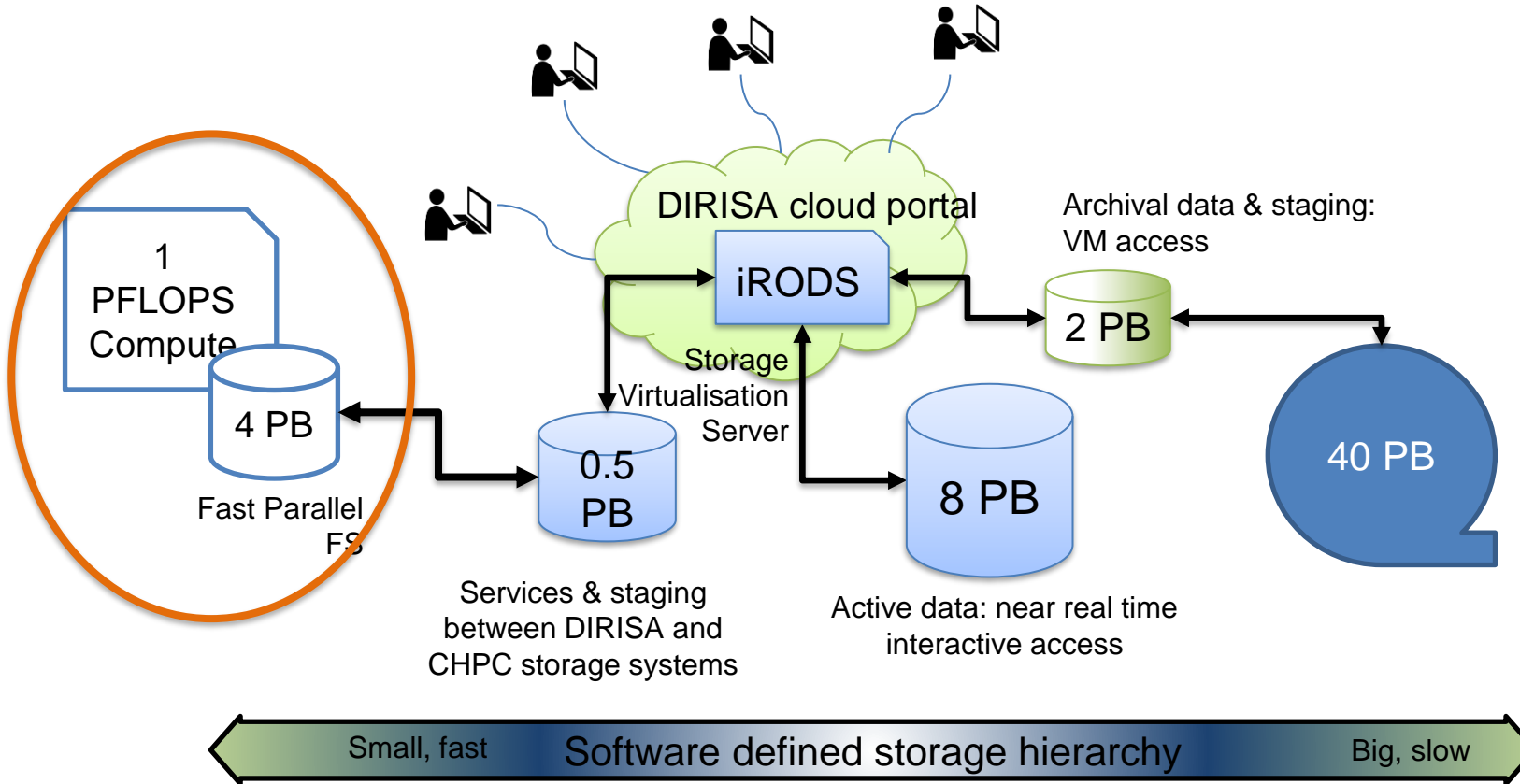
- Provide **thought leadership** to South Africa's evolving cyberinfrastructure strategy and activities, and facilitate the uptake of advanced cyberinfrastructure.

SO5

- Foster the development of **human capacity in cyberinfrastructure and its application**, and contribute to the transformation of this sector.

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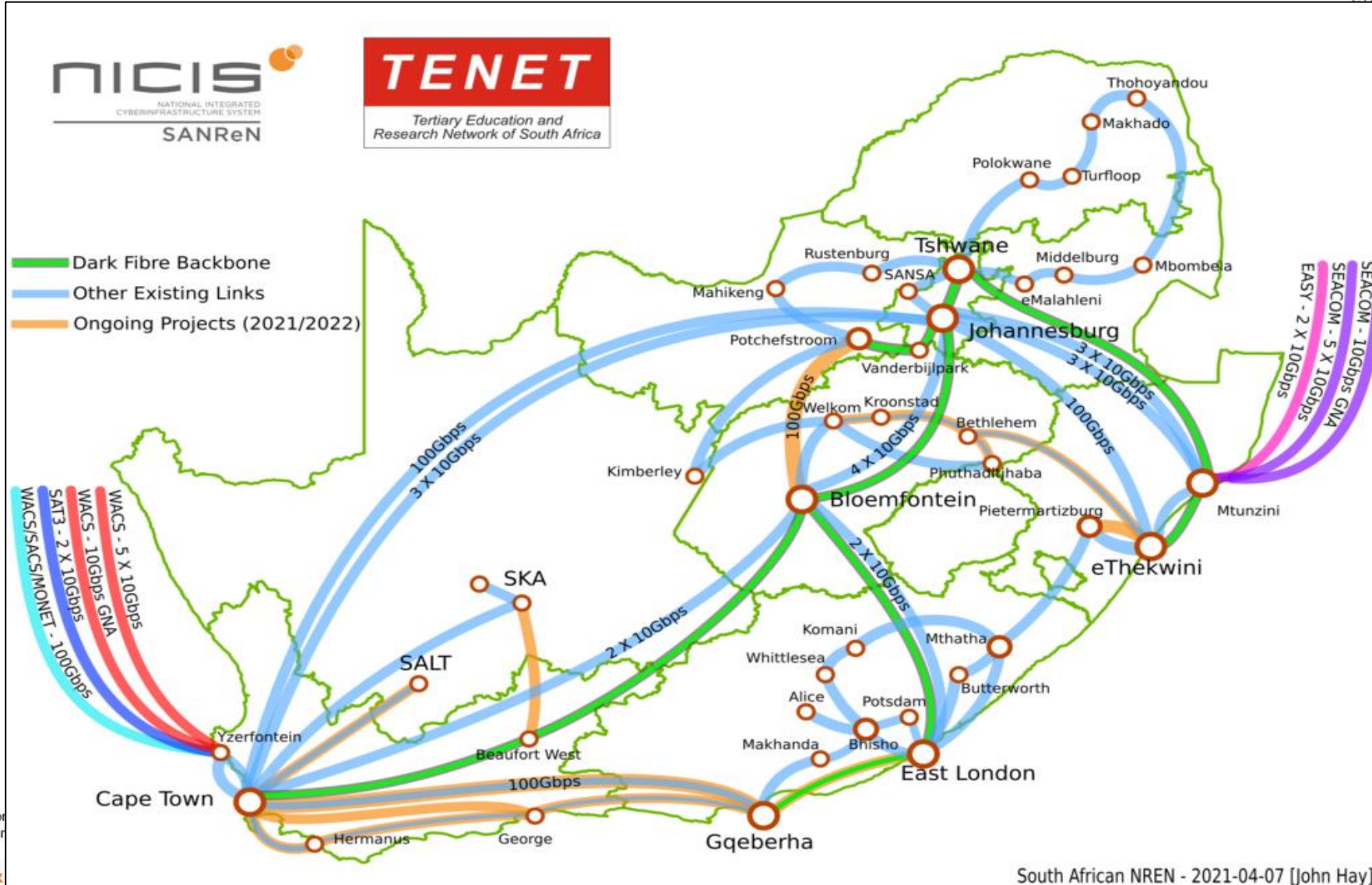




- Open (FAIR) Data & Open Science
- Federated locally and globally (“One-stop-shop” catalogue)
- Certified as Trusted Repository
- Linked to funder systems
- Suite of services for RDM and data intensive analytics

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Network Infrastructure



South African NREN - 2021-04-07 [John Hay]

NICIS Platforms



- **Lengau = “Cheetah”**
- **Installed 2015 with 1.6 PFLOP performance**
- **1 345 Nodes of INTEL processors**
- **Rear-door water cooling system**
- **7 Petabytes of Lustre storage**
- **Close to 100% utilisation**



- **GPU Cluster with 9 Nodes each with 4 NVIDIA – V100 processors.**
- **Mainly used for Machine Learning, Artificial Intelligence and Materials Science applications.**



- **OpenStack Cloud named SEBOWA**
- **52 Nodes with INTEL processors**
- **Installed in March 2020**
- **Used for many applications including COVID-19 Data Services**



- **CERN Tier-2 Grid facility**
- **Supports ALICE and ATLAS experiments**

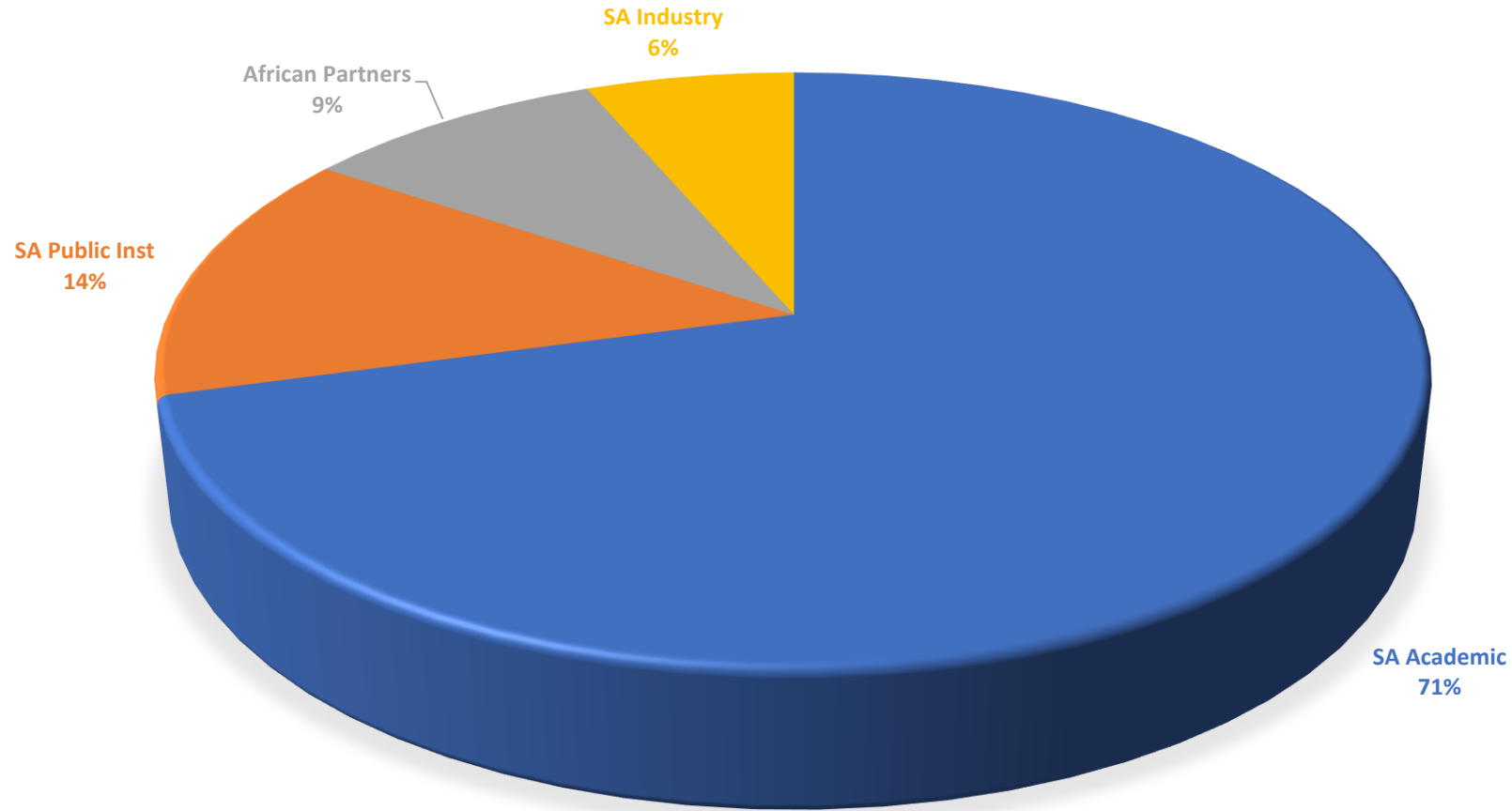
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Research in Technology



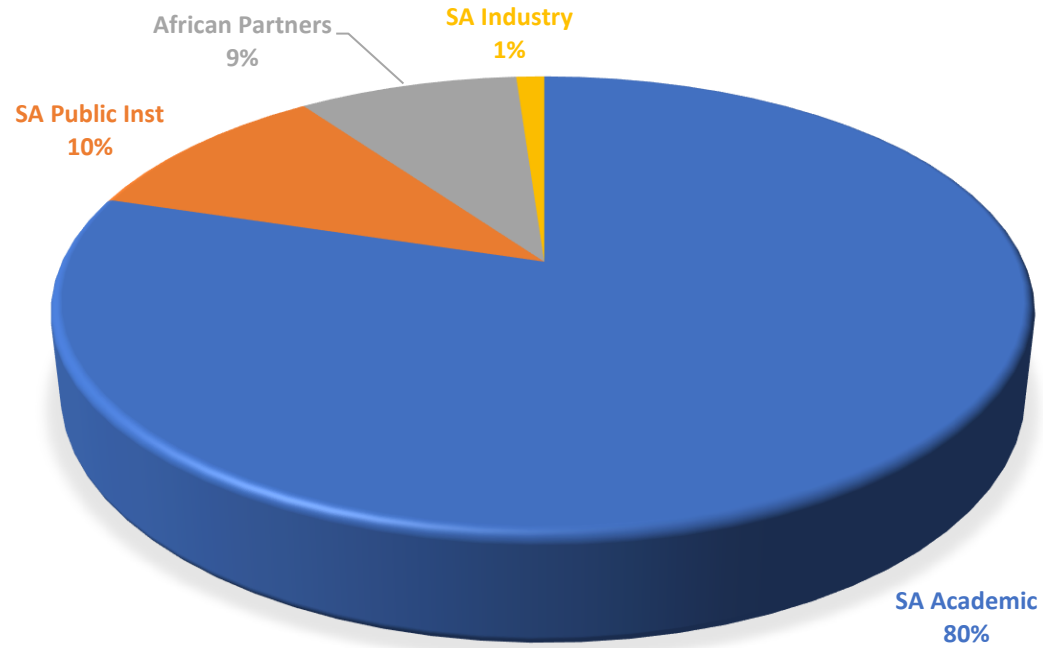
- Evaluate technology for HPC and cloud
- Investigate and develop technology to improve HPC systems
- Provide a consulting service for HPC and cloud technology
- Collaborate with users with special applications to drive efficiency
- Operate experimental systems

User Categories



CHPC User Categories *Total Hours Used* Past 6 Years

2016/17 – 2021/22



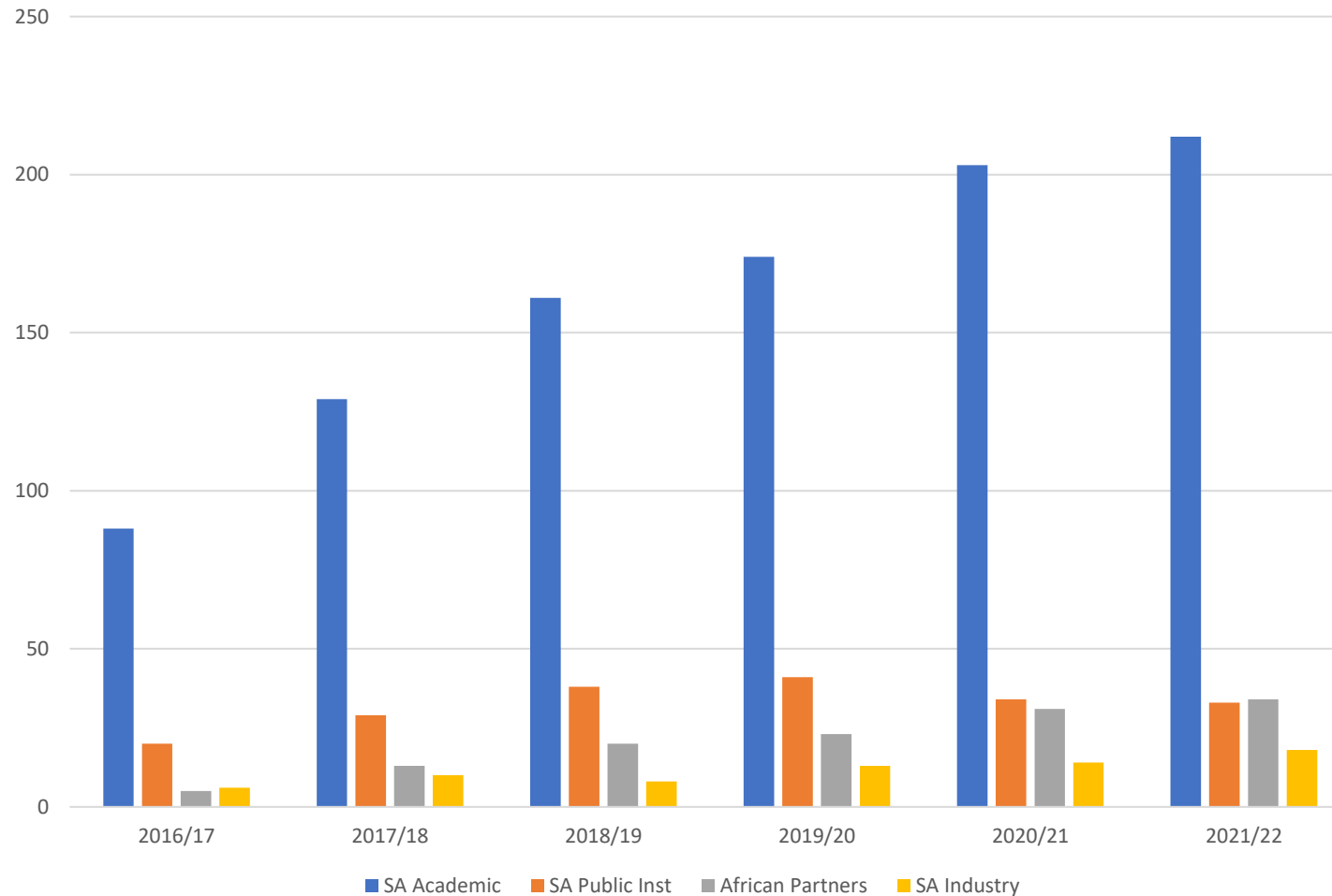
	Hours (Million)
SA Academic	791
SA Public Inst	103
African Partners	86
SA Industry	11

Total Hours: 992 Million

Hours Used (Million)

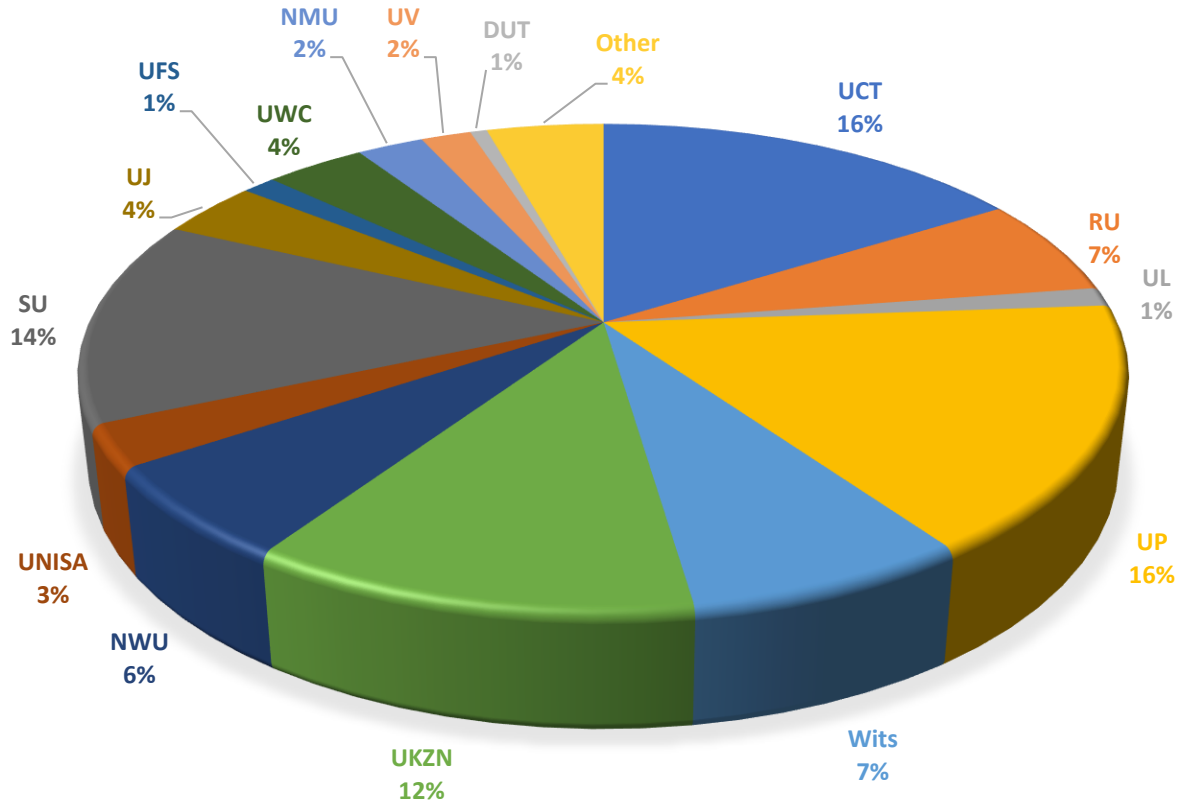
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CHPC User Categories



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CHPC Use: SA Universities



Total Active*
Programmes:
323

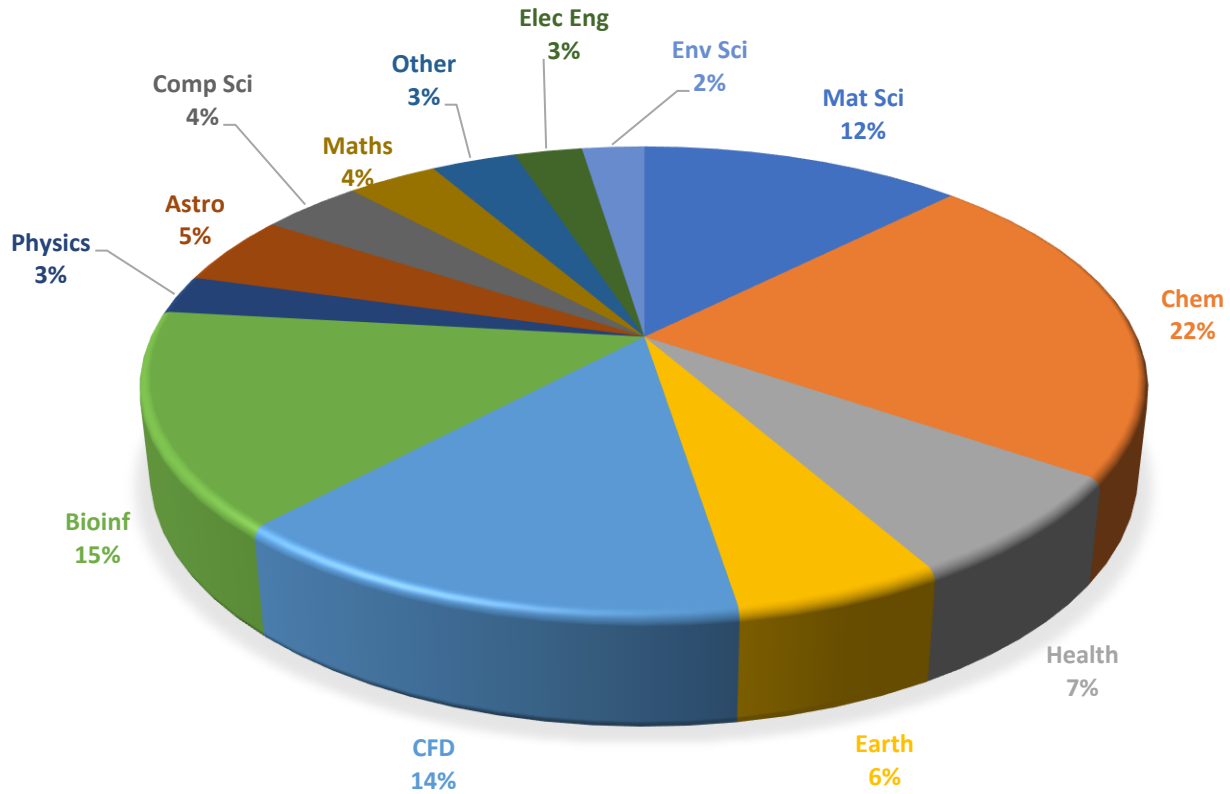
University	Programmes
UCT	52
RU	21
UL	4
UP	53
Wits	24
UKZN	38
NWU	20
UNISA	9
SU	44
UJ	12
UFS	4
UWC	12
NMU	8
UV	6
DUT	2
MUT	4
UFH	1
TUT	5
SMU	1
CPUT	2
VUT	1

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CHPC Domain Areas: *Total Active* Programmes*

Past 6 Years

2016/17 – 2021/22



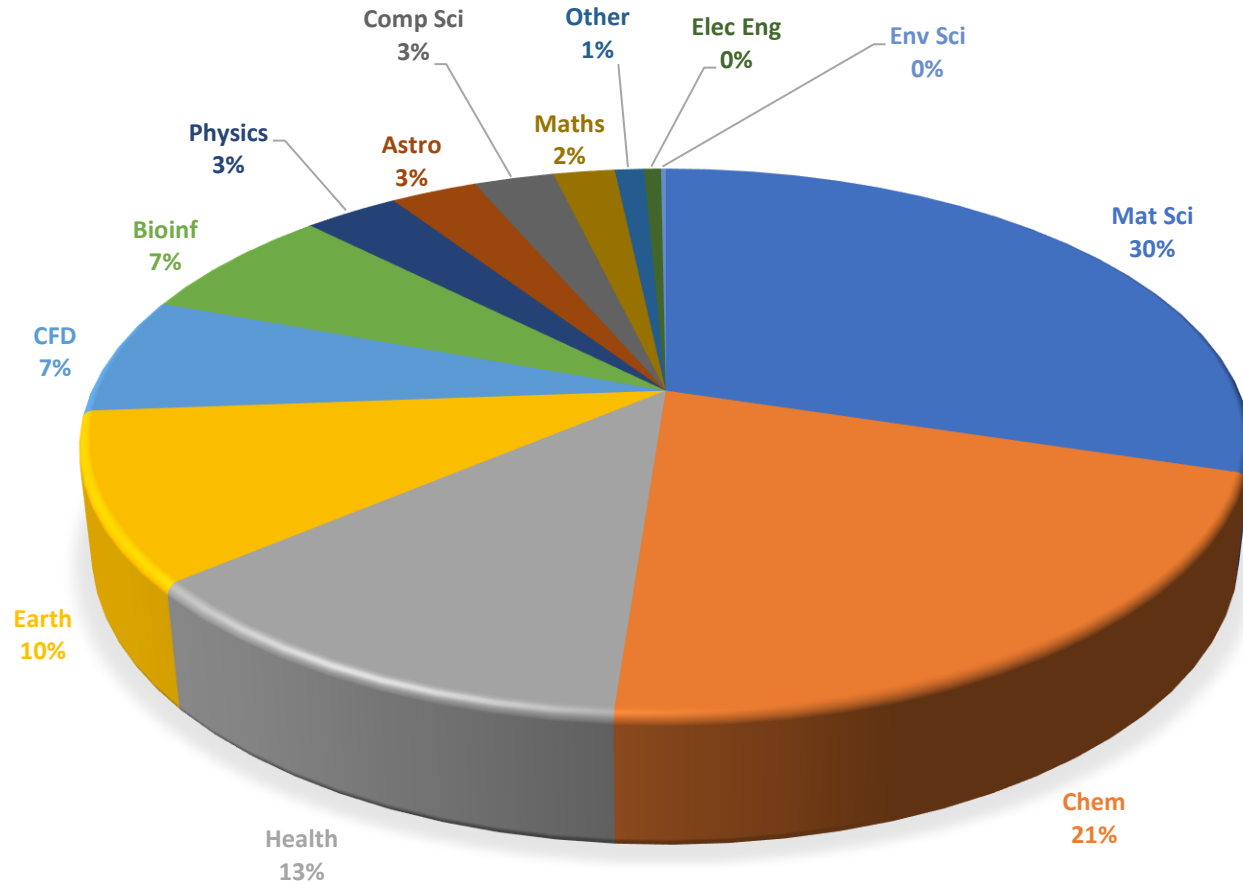
Active Programmes

Domain	Programmes
Mat Sci	57
Chem	101
Health	33
Earth	26
CFD	66
Bioinf	68
Physics	12
Astro	22
Comp Sci	18
Maths	16
Other	15
Elec Eng	12
Env Sci	11

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Total Active* Programmes: 458

CHPC Domain Areas



Domain	Hours (Million)
Mat Sci	295
Chem	212
Health	125
Earth	99
CFD	69
Bioinf	68
Physics	31
Astro	29
Comp Sci	26
Maths	20
Other	10
Elec Eng	6
Env Sci	2

Total Hours: **791 Million**

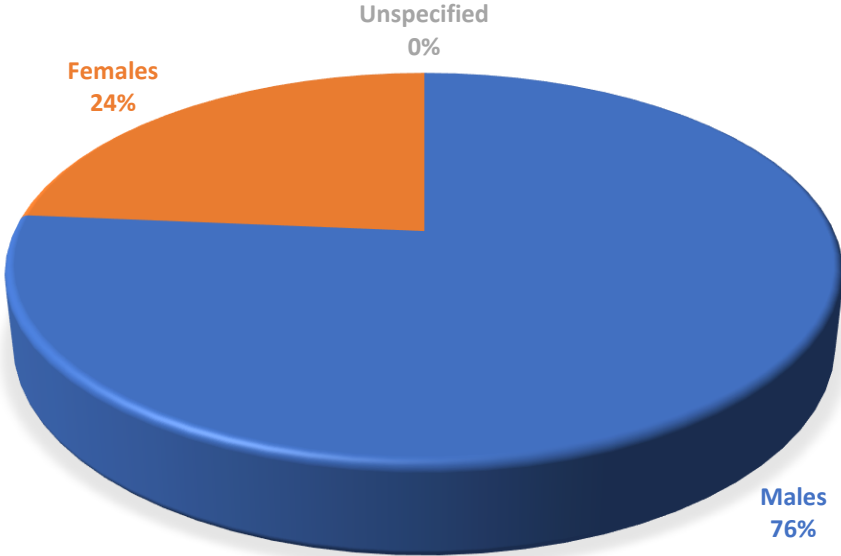
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Gender: Principal Investigators and Users

Past 6 Years

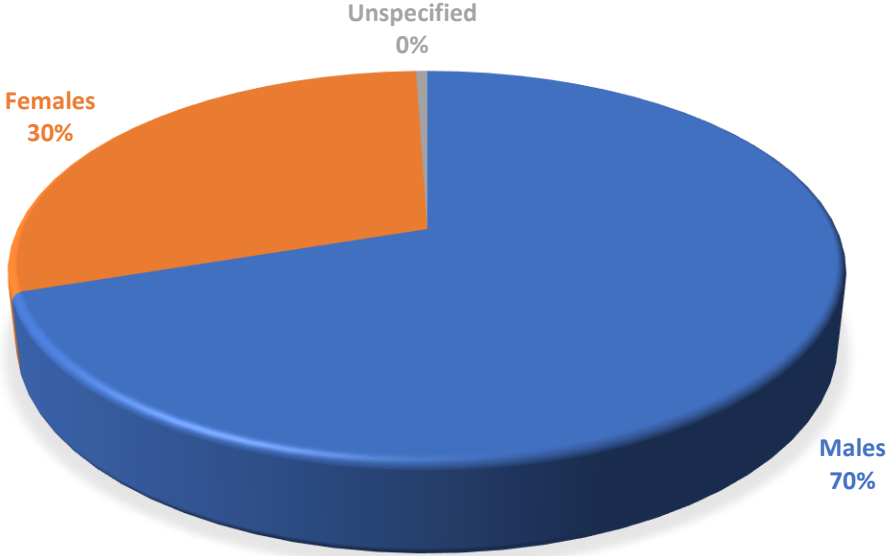
2016/17 – 2021/22

Principal Investigators:



Total PIs: 457

Users:



Total Users: 1728

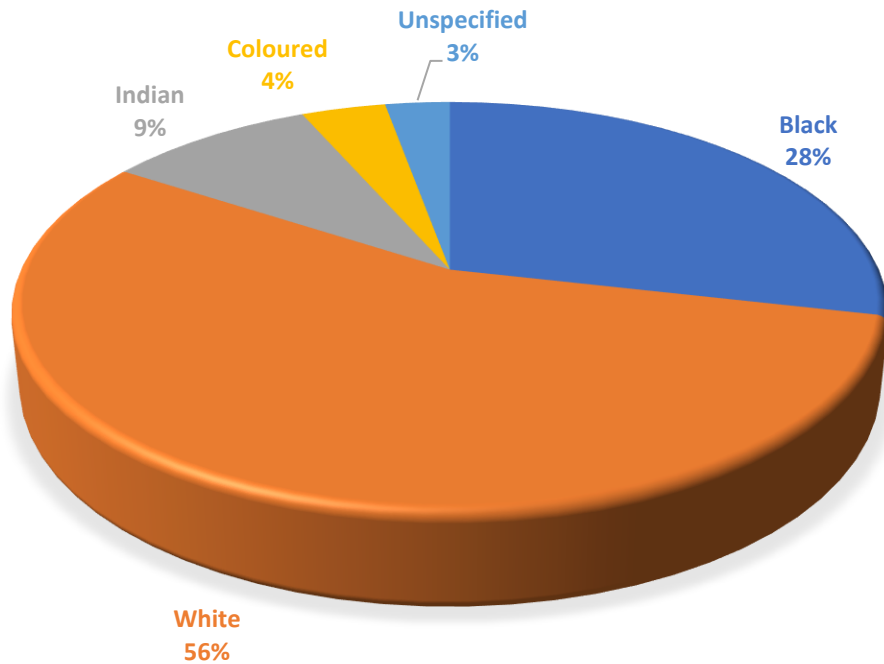
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Demographics: Principal Investigators and Users

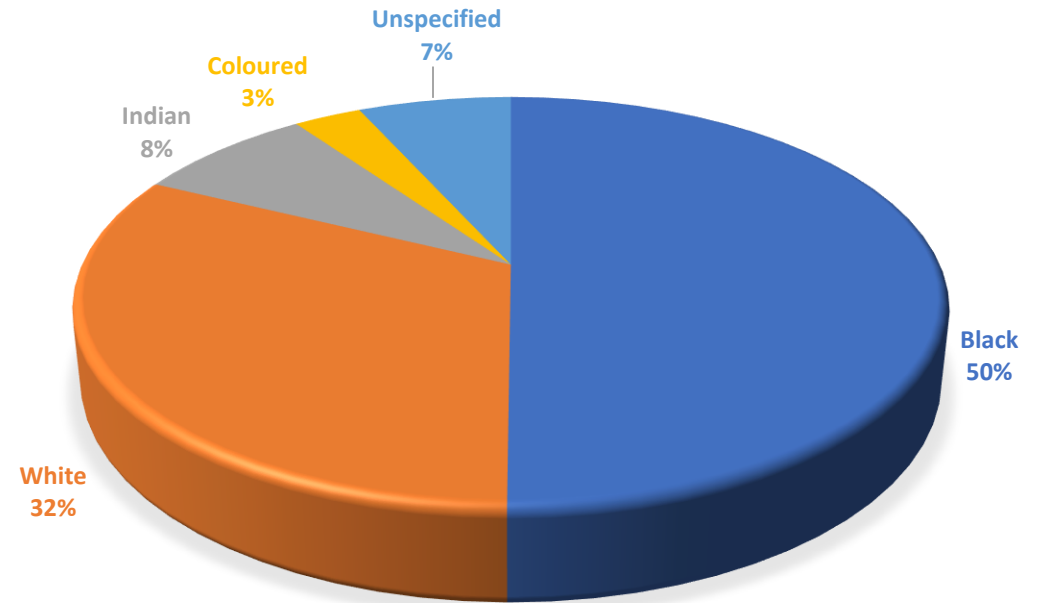
Past 6 Years

2016/17 – 2021/22

Principal Investigators:



Users:

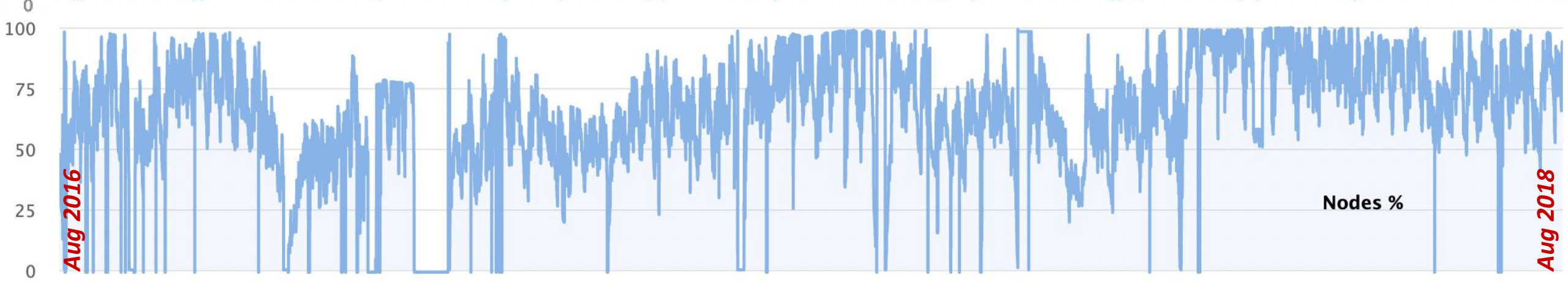
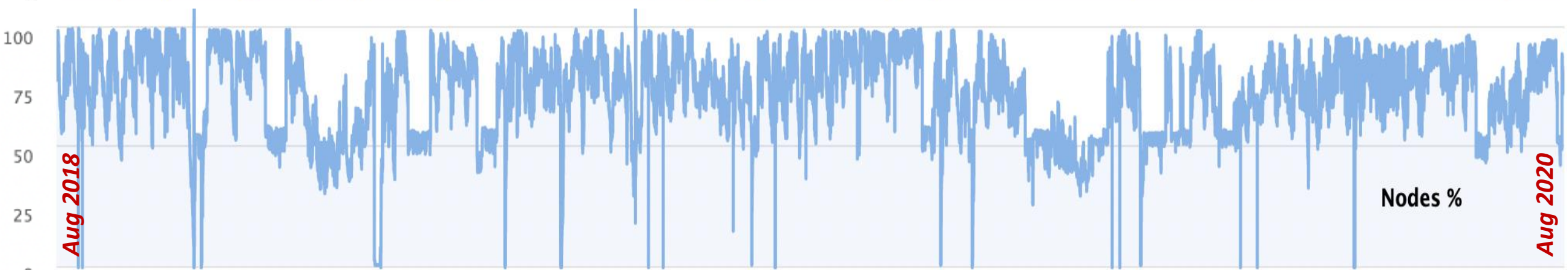


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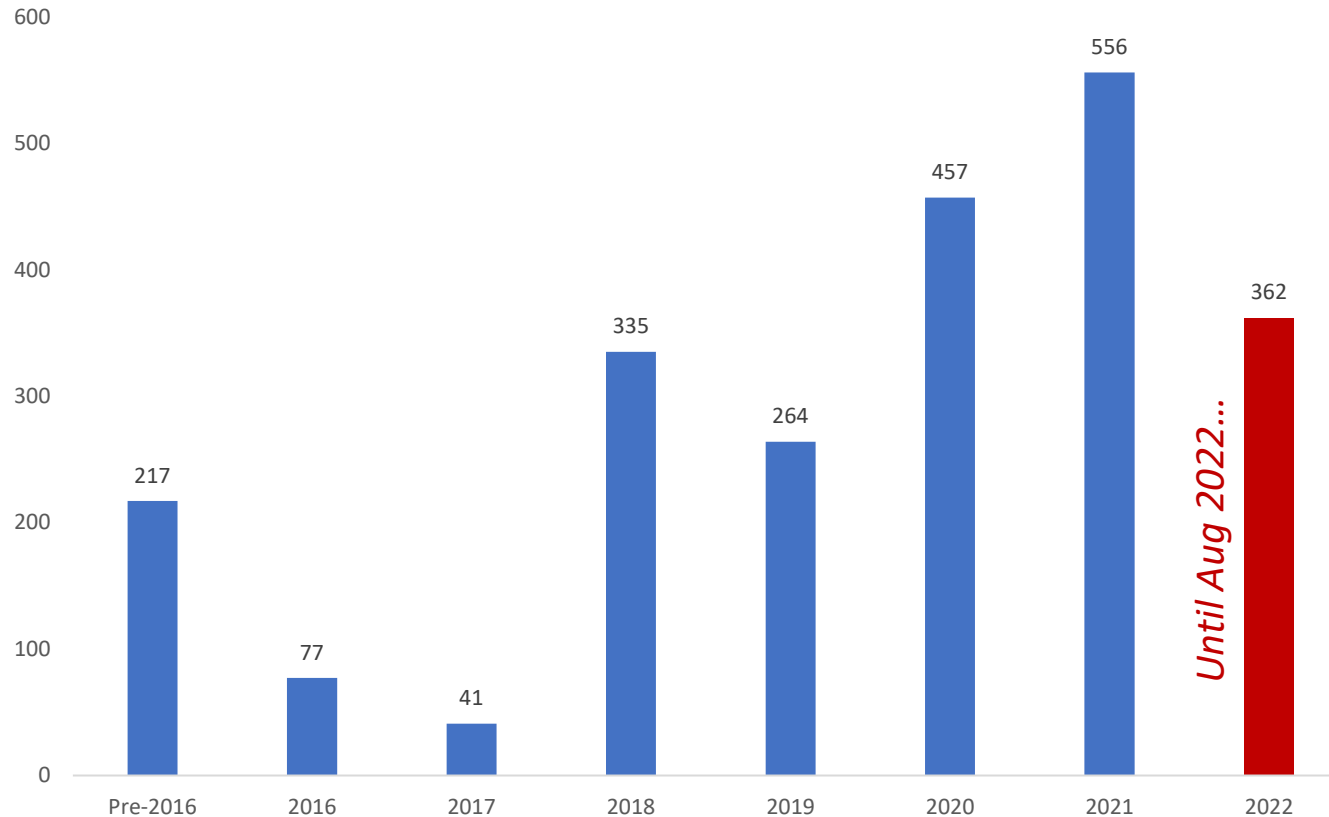
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CHPC Lengau Cluster Utilisation: 2016-2022



CHPC User Research Outputs: 2007-2022

Total Publication* Count Per Calendar Year

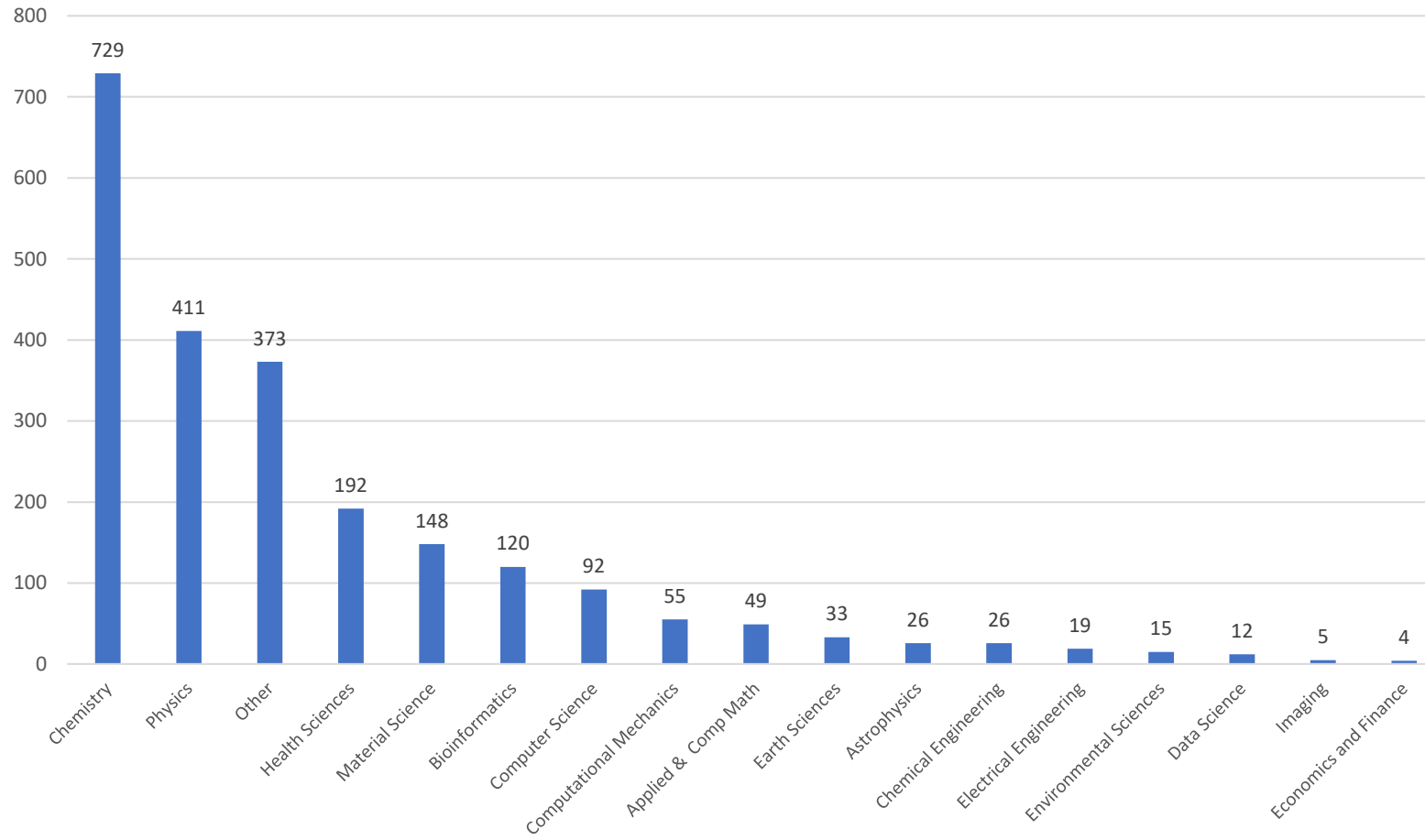


Total Number of
Publications*: **2309**

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CHPC User Research Outputs: 2007-2022

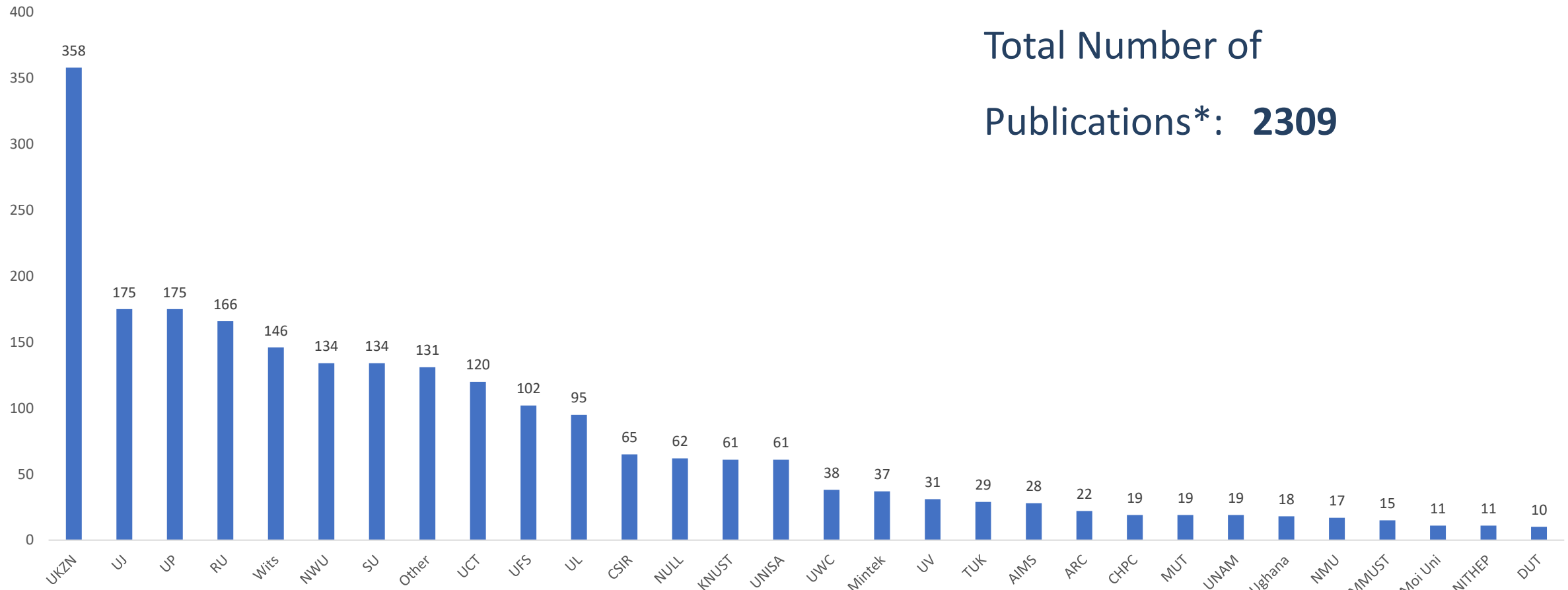
Total Publication* Count Per Domain Area



Total Number of
Publications*: **2309**

CHPC User Research Outputs: 2007-2022

Total Publication* Count Per Institution

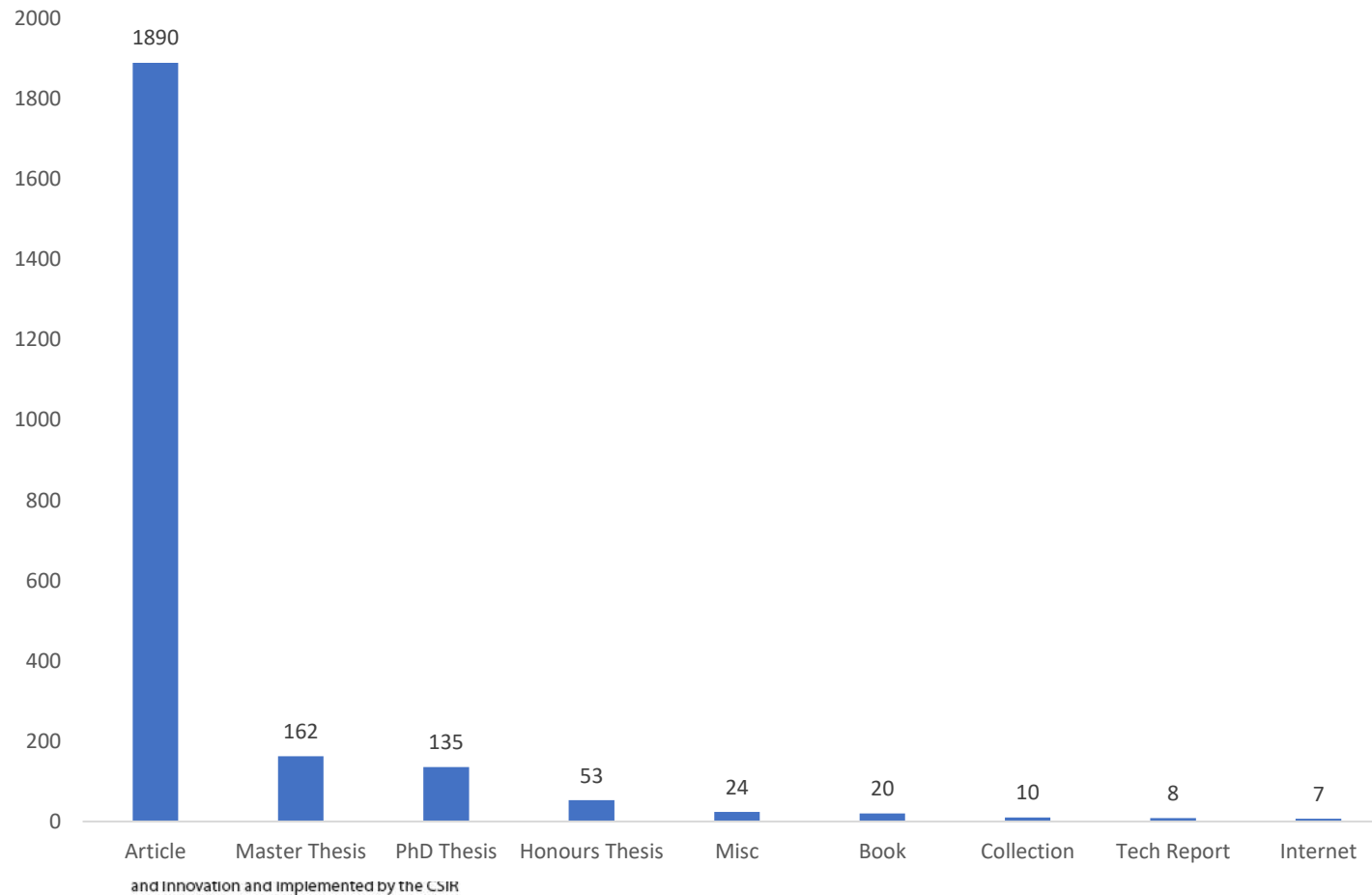


Total Number of Publications*: **2309**

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CHPC User Research Outputs: 2007-2022

Total Publication* Count Per Type



Total Number of
Publications*: **2309**

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