SKAO

SKAO and IVOA

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SKA Regional Centres Architect (SKAO)

SKAO Mission

- “The SKAO’s mission is to build and operate cutting-edge radio telescopes to transform our understanding of the Universe, and deliver benefits to society through global collaboration and innovation.”

SKAO IGO **Membership**

- SKAO, is the **world's second intergovernmental organisation** to be dedicated to astronomy. Headquartered in the UK on the grounds of the Jodrell Bank UNESCO World Heritage Site with sites in Australia and South Africa

- The first SKAO Council meeting follows the signature of the SKA treaty, formally known as the Convention establishing the SKA Observatory, on 12 March 2019 in Rome, and its subsequent ratification by Australia, Italy, the Netherlands, Portugal, South Africa and the United Kingdom and entry into force on 15 January 2021, marking the official birth date of the observatory.

Prof Phil Diamond (left), SKAO Director-General, and NRC President Iain Stewart signed the cooperation agreement during an online ceremony on 24 November 2021.

SKAO Director-General Prof. Philip Diamond (centre), Australia's David Fredericks, Secretary of the Department of Industry, Science Energy and Resources (left), and South Africa's Dr Phil Mjwara, Director General of the Department of Science and Innovation (right) signing the Host Country Agreements during the fourth SKAO Council Meeting.

Growing in 2022

- Switzerland became 8th member in January
- Sweden Cooperation Agreement signed (Chalmers)
- Canada Cooperation Agreement signed in November (NRC)
- India Cooperation Agreement signed in March (NCRA)

- Five new countries we are working with:
  - Accession group: France, Germany, Spain
  - Observer group: Japan, South Korea
- Other discussions underway

How does SKA1 compare with the world's biggest radio telescopes?

SKAO

The Square Kilometre Array (SKA) will be the world's largest radio telescope, revolutionising our understanding of the Universe. The SKA will be built in two phases - SKA1 and SKA2 - starting in 2018, with SKA1 representing a fraction of the full SKA. SKA1 will include two instruments - SKA1 MID and SKA1 LOW - observing the Universe at different frequencies.

A telescope's capacity to receive faint signals - called sensitivity - depends on its collecting area, the bigger the better. But just like you can't compare radio telescopes and optical telescopes, comparison only works between telescopes working in similar frequencies, hence the different categories above.

The collecting area is just one aspect of a telescope's capability though. Arrays like the SKA have an advantage over single dish telescopes: by being spread over long distances, they simulate a virtual dish the size of that distance and so can see smaller details in the sky, this is called resolution.

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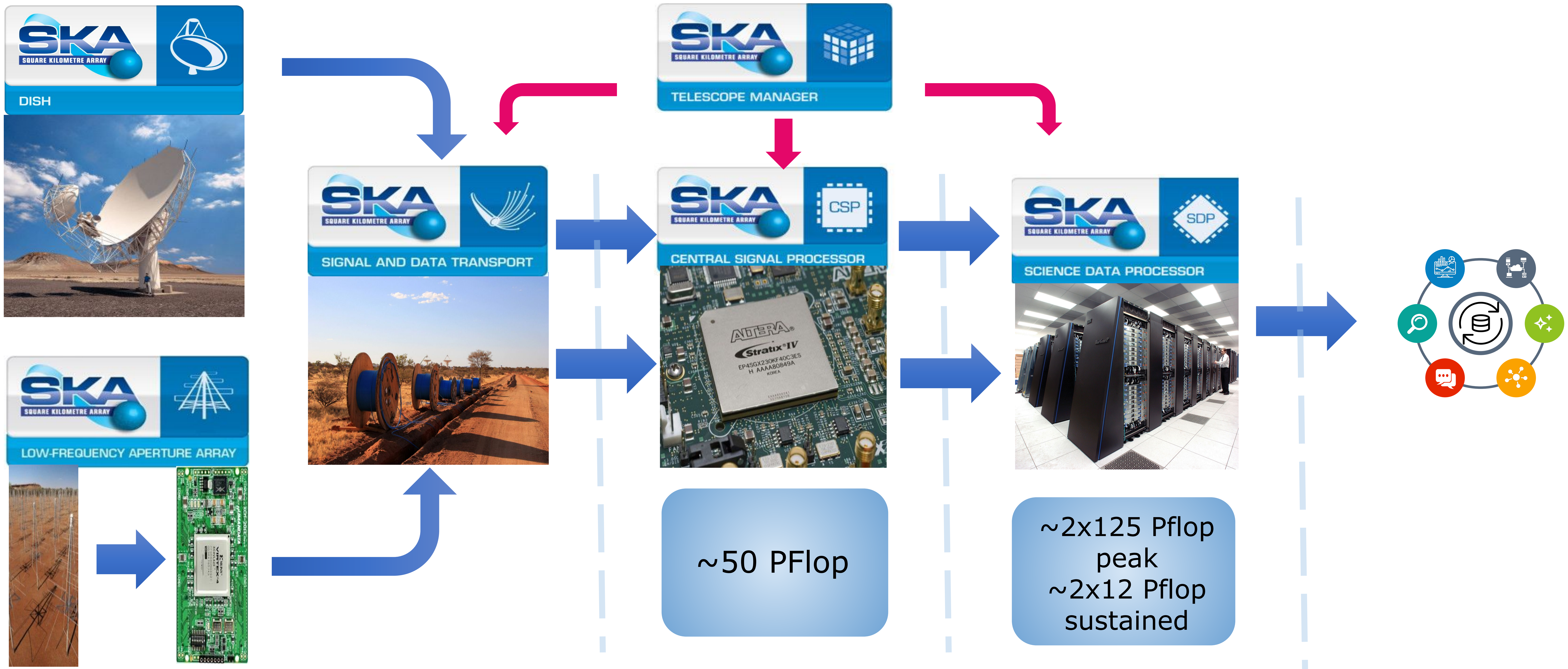
SKA Data Flow



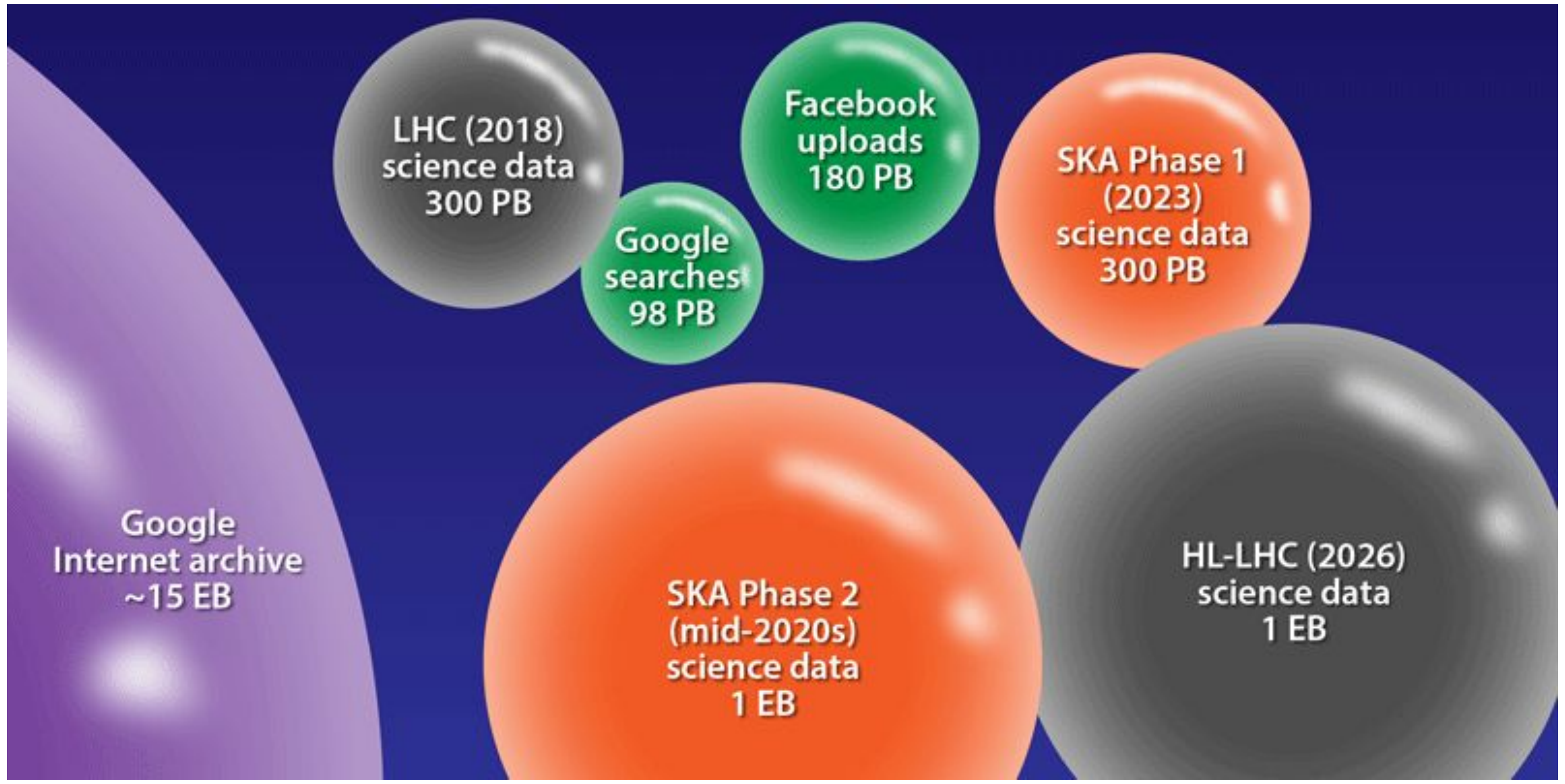
2 Pbits/s 8.8 Tbits/s & 7.2 Tbits/s 2x5 Tbits/s 600 PB/yr

South Africa and Australia Desert **Cape Town (SA) and Perth (AU)** **SKA Regional Centres**

Biggest Science Data Distribution Challenge

SKA Regional Centres (SRC) Net in Numbers

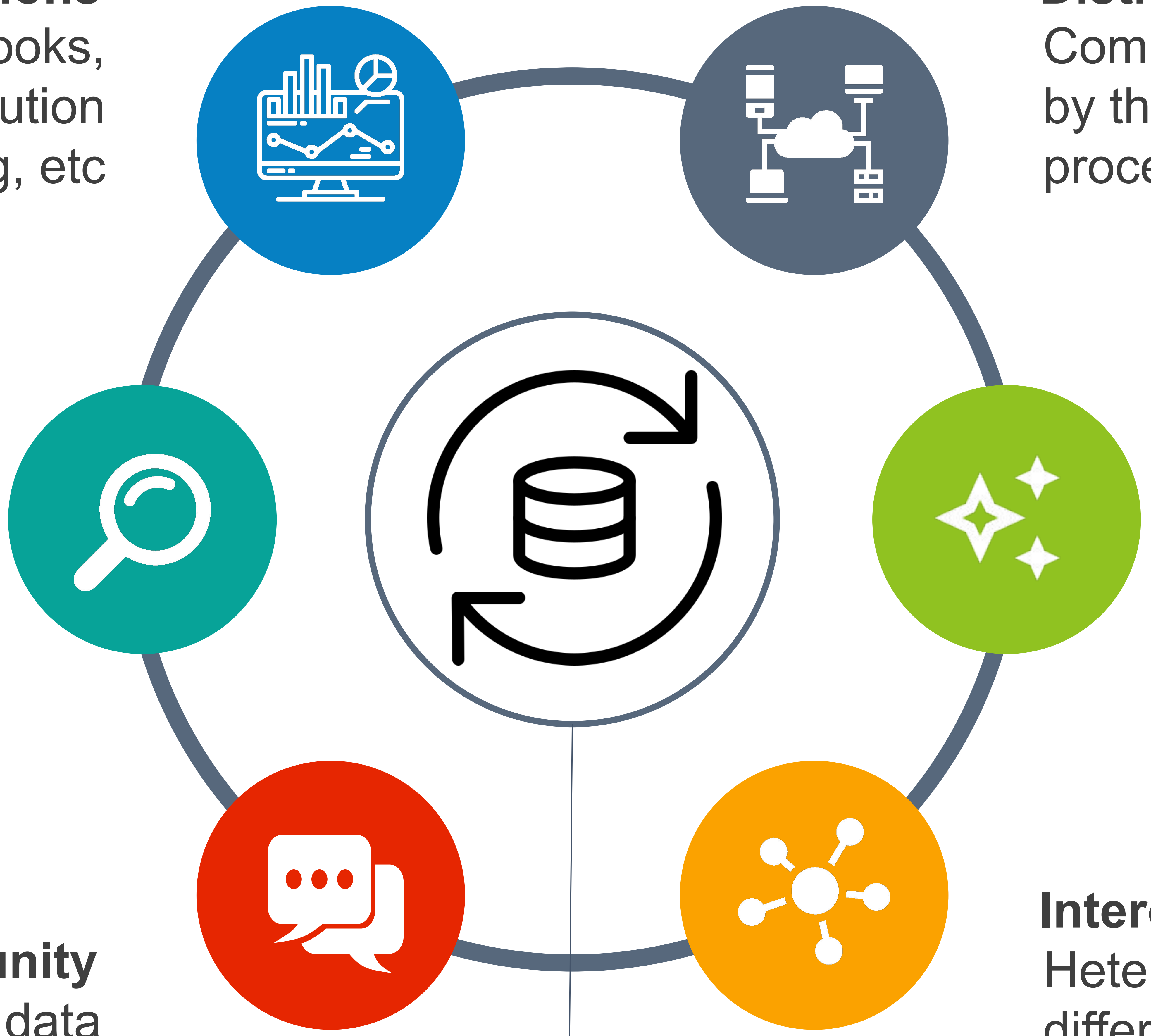
- 300 to 600 PB/year of Scientific Data
- Up to 15 countries involved
- 40 FTEs during prototyping phase
- Up to 100 FTEs during development phase
- More than 6 main data locations
- HPC availability for users
- Collaboration agreements with CERN, CNRS, Vera Rubin and others



SRC Node Capabilities

Science Enabling Applications
Analysis Tools, Notebooks,
Workflows execution
Machine Learning, etc

Distributed Data Processing
Computing capabilities provided by the SRCNet to allow data processing



Data Discovery
Discovery of SKA data from the SRCNet, local or remote, transparently to the user

Visualization
Advanced visualizers for SKA data and data from other observatories

Support to Science Community
Support community on SKA data use, SRC services use, Training, Project Impact Dissemination

Interoperability
Heterogeneous SKA data from different SRCs and other observatories

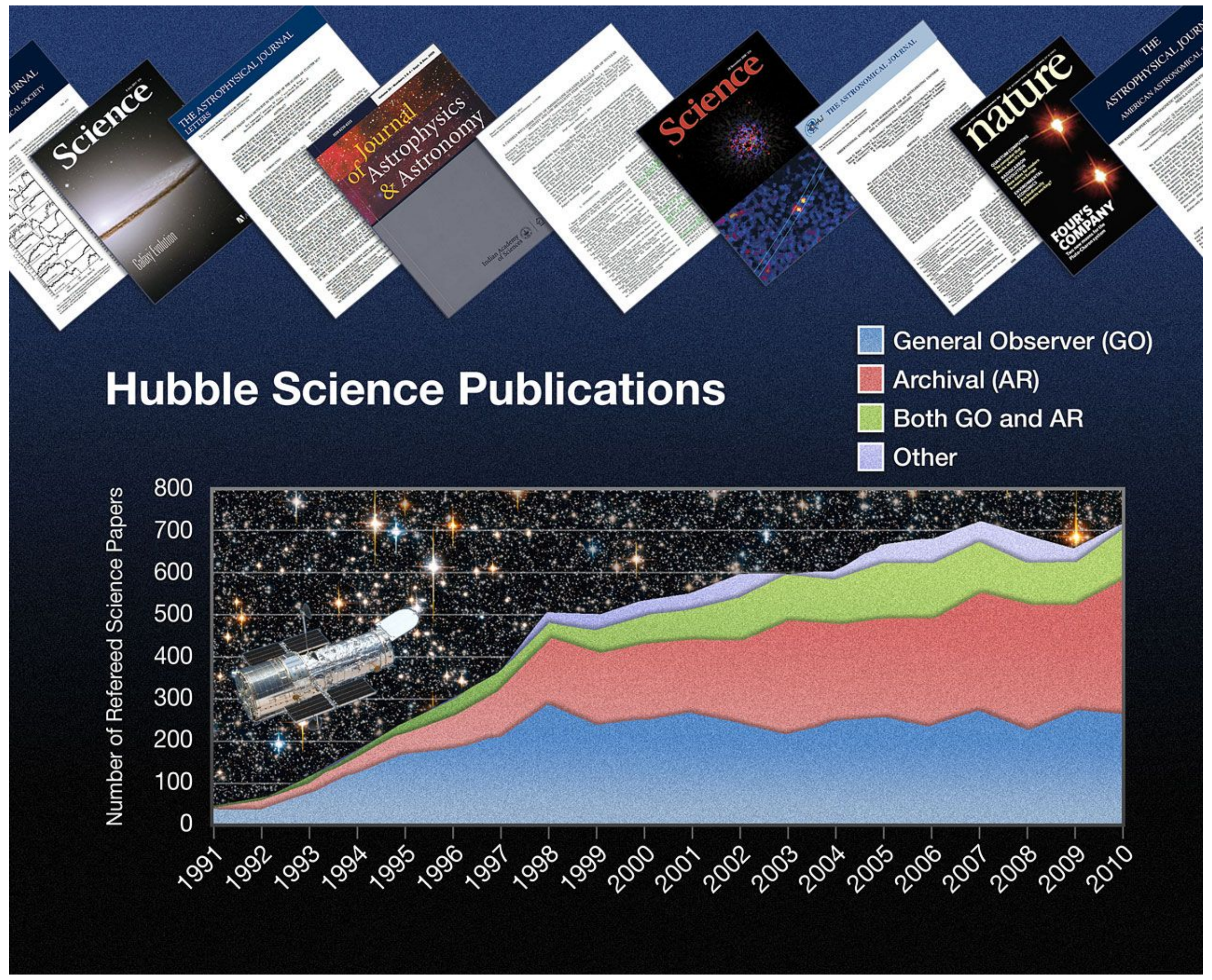
Data Management
Dissemination of Data to SRCs and Distributed Data Storage

SRC Federated Network

- Federated Authentication
- Federated Authorization
- Federated Computing
- Visualization Protocols
- Radio Data Protocols
- Big Data Analysis Techniques
- InterOperability with other missions
- Provenance
- Reproducibility of workflows

SRCNet principles: Use of Standards

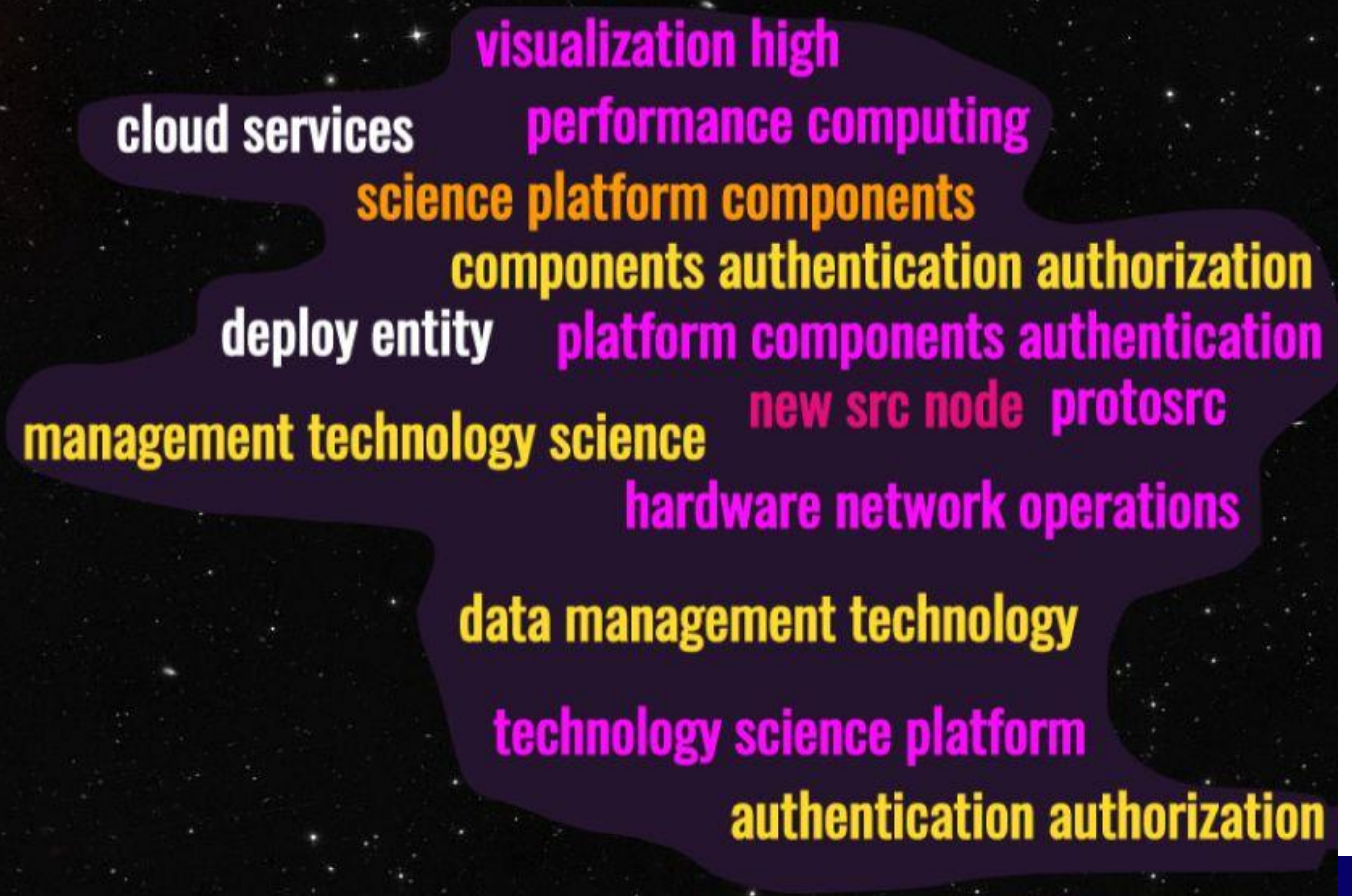
- Build SKA science archive around FAIR and IVOA standards
- Ensure interoperability with other archives and between SRCs
- Strong adherence to the FAIR principles
- New standards to be produced
- Scientific Exploitation Techniques



Multinational Development Teams

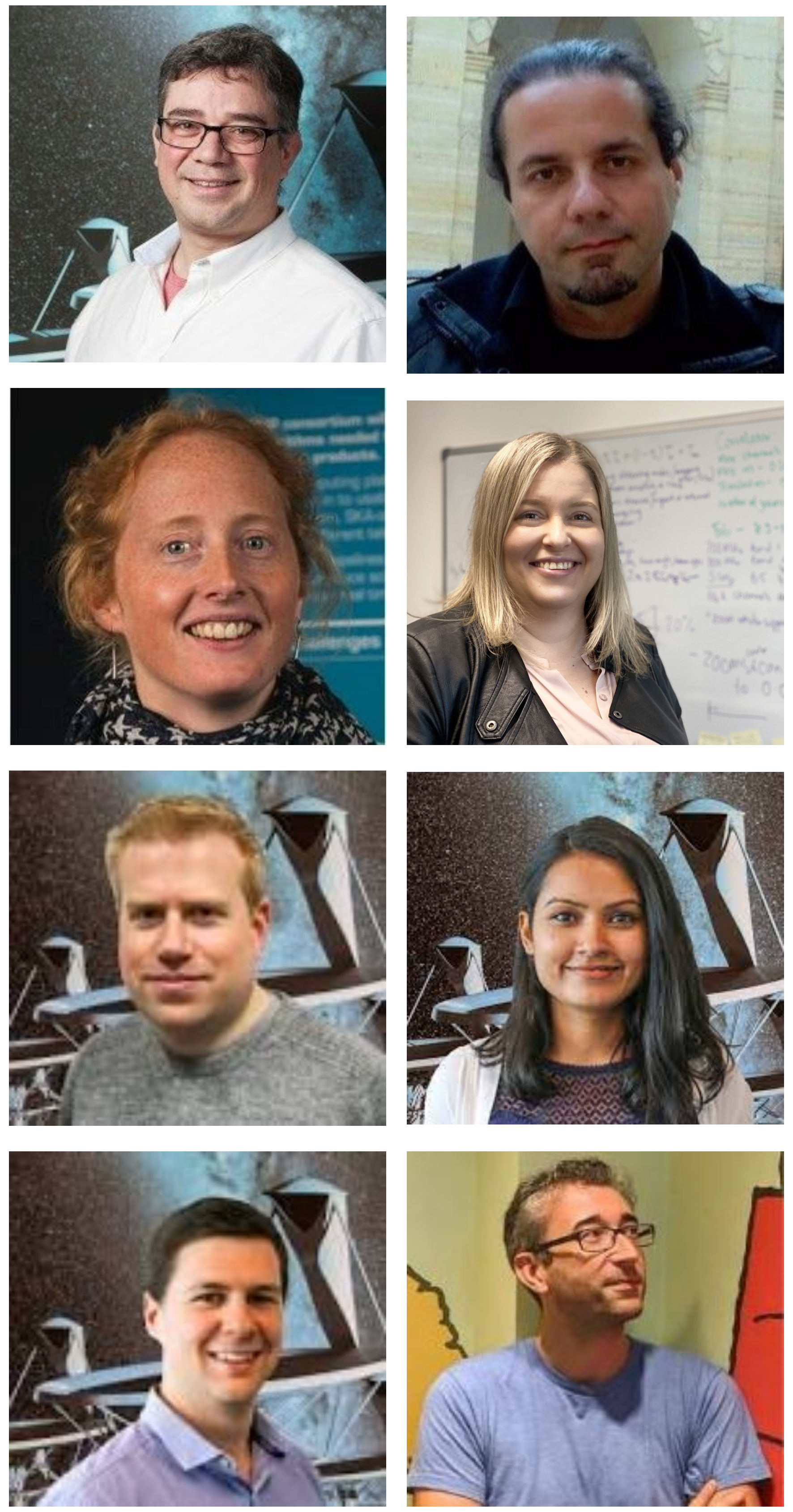
SKAO

12 Countries involved in the first development phase of the SRC Net



The SKAO-VO Team

- Antonio Chrysostomou - Deputy Director of Operations
- Jesus Salgado - SRC Net Architect
- Rosie Bolton - Head of Data Operations
- Shari Breen - Head of Science Operations
- Ben Mort - Head of Software Product Management
- Rohini Joshi - Operations Data Scientist
- James Collinson - Operations Data Scientist
- Rob Barnsley - Operations Data Scientist



- Plus around 100 experts distributed in the SRC Net

Reasons to join

- SKAO is an IGO, second in size on astronomical data
- SKAO will produce an unprecedented amount of astronomical data for the community
- New ways of data access and data processing
- Protocols and new engineering techniques are required
- Important engineering support on IVOA related areas
- Interoperability solutions globally shared
- Radio astronomy community engagement
- SKAO-IVOA formally linked
- Boost for SKAO and IVOA

We recognise and acknowledge the Indigenous peoples and cultures that have traditionally lived on the lands on which our facilities are located.

SKAO

www.skao.int