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SKAO Regional Centre Network

SRCNet project overview
LOFAR LTA Development Meeting

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SRCNet Project Manager

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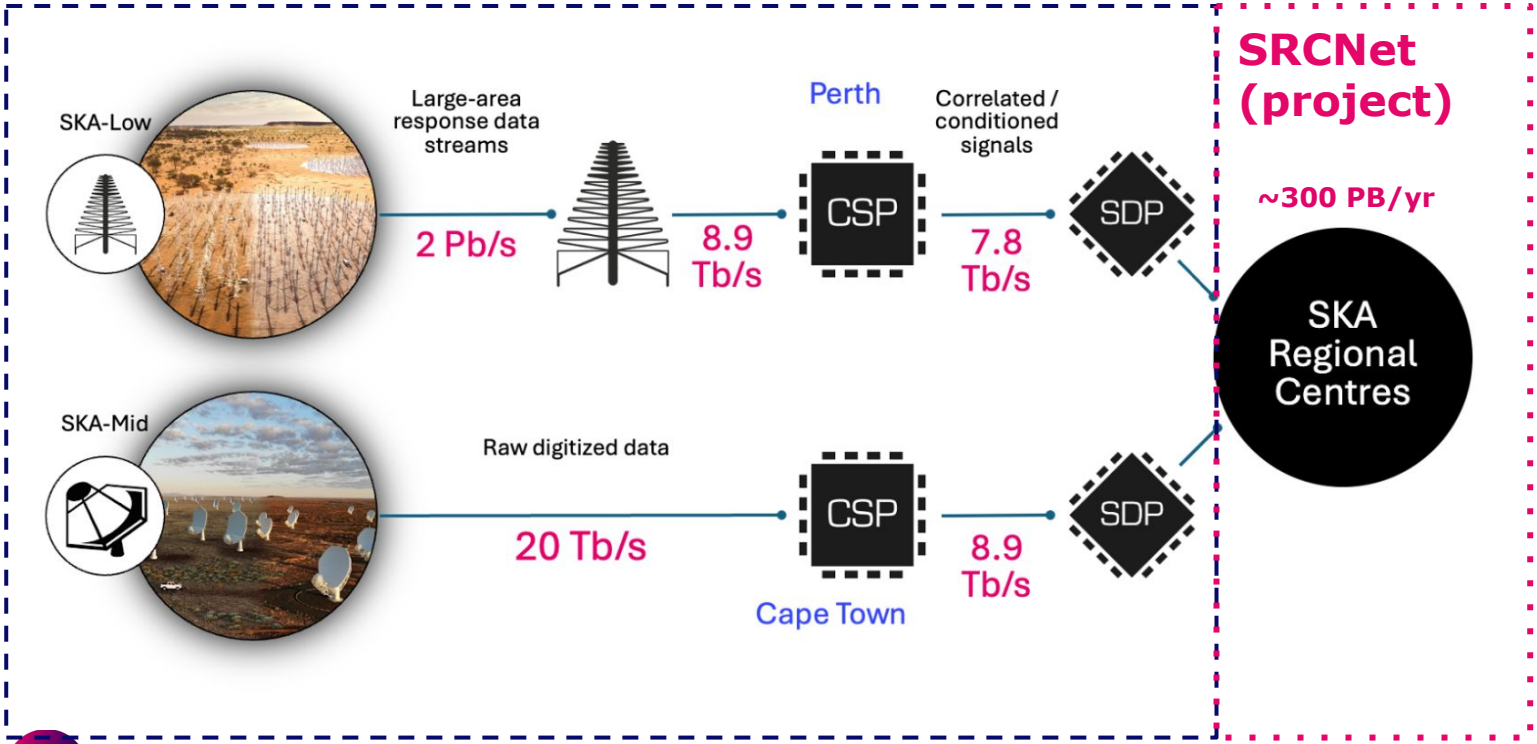
Why the SKA Regional Centres???

Several stages of cool, amazing, cutting edge data processing within the observatory… but **NO USER ACCESS**



Project Lead: Rosie Bolton

Project Manager: **Janneke de Boer** (me)

What are the SKA Regional Centres?

- The data volumes are too big to download
  => everything happens on the SRCNet

Current tools:
Indigo IAM
CAOM
PanDA
Rucio
CANFAR
CRIC
Harbor
Grafana

Tools can change!

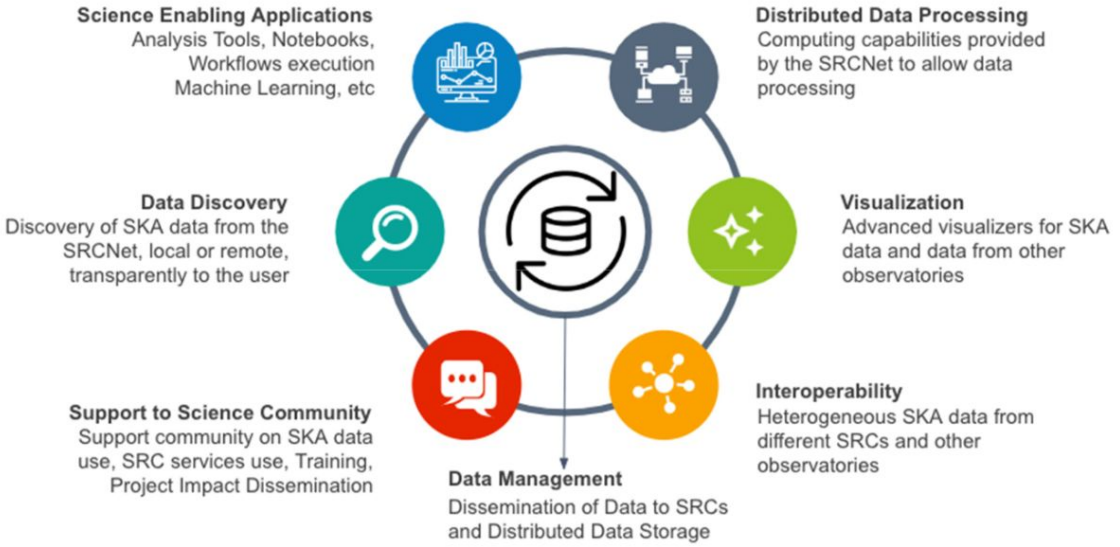


Figure 4. SRCNet node blueprint conceptual representation.

All the SRC blueprint implementations, the data lake, and the protocols involved will compose the SRCNetwork or SRCNet.

Behind the scenes - all should be hidden from user

Several sites (around 10-20) spread globally

Data replication must be efficient, and minimised

"Move the user (or code) to the data" where possible

The bulk SRCNet science archive will be centrally managed

SRC Operations Group able to trigger replications

At least 2 copies on different SRCs, but also consider storage class (eg. disk faster but more expensive than tape) - data lifecycle support

Auto-recovery if one site fails

Users shouldn't have to care which site is hosting them - consistent experience across sites

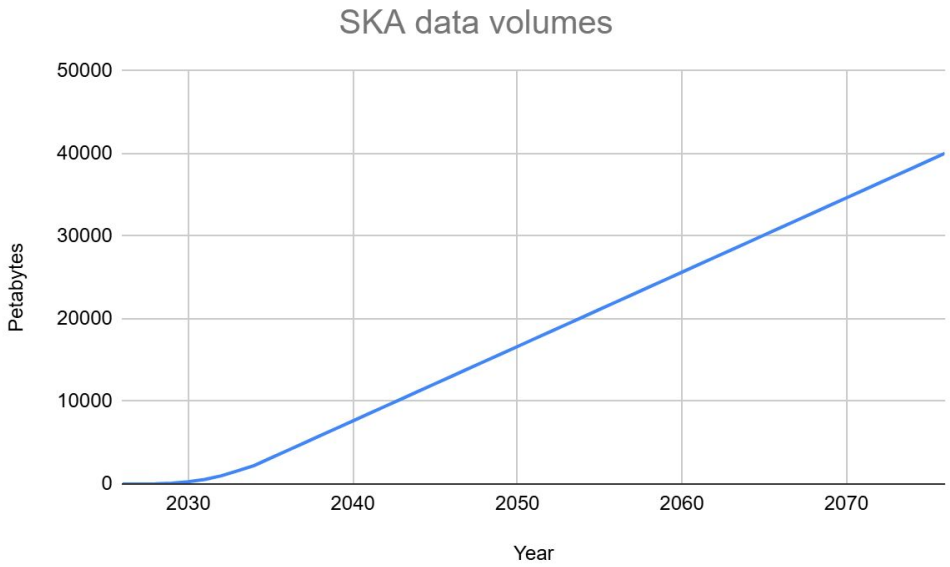
SRCNet project - big data project

Expected telescope output

Year	Annual increase (PB)	Cumulative total (PB)
2026	0	0
2027	0.5	0.5
2028	0.5	0.9
2029	25.6	26.5
2030	65.4	91.9
2031	88.5	180.4
2032	150	330.4
2033	198.8	529.1
2034	215	744.1
2035	300	1044.1

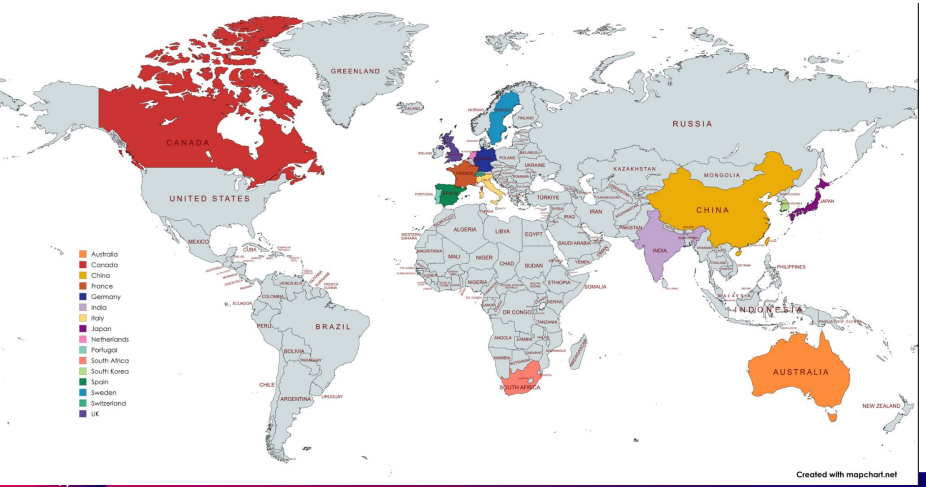
Steady state after 2035

Data to store: 300 PB/year, 2 replicas, user data products = ~900 PB/year



The SRCNet Project

The SRCNet Project aims to deliver a working SRC Network in time for formal start of SKAO Operations, and for intermediate science verification stages



Currently ~120 members, 62 person-worth of effort, spread over 14 countries + SKAO

SRCNet project structure

Lead: Jeremy Coles

Service Operations

Node operations, deployments etc

Lead: Jesus Salgado

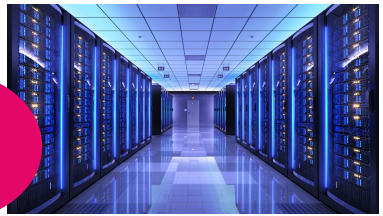
Software development

Lead: Carmen Toribio

Science Delivery

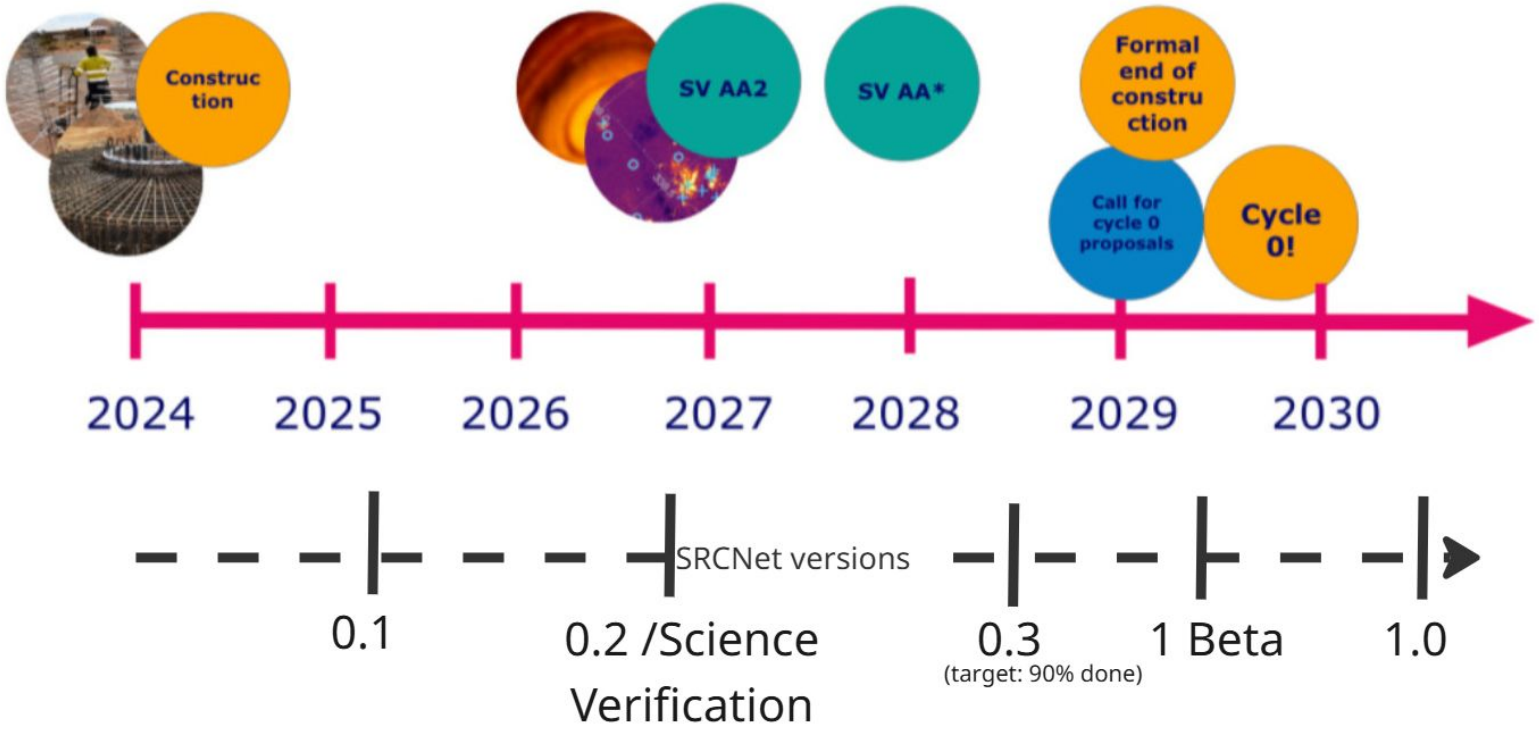
User facing, helpdesk, workflows, testing

Infrastructure



More on this later

Timeline SRCNet project



SRCNet 0.1 is internal to the project

So why is it exciting? Proof of concept established across many sites

SRCNet 0.1 2025

Milestone passed!

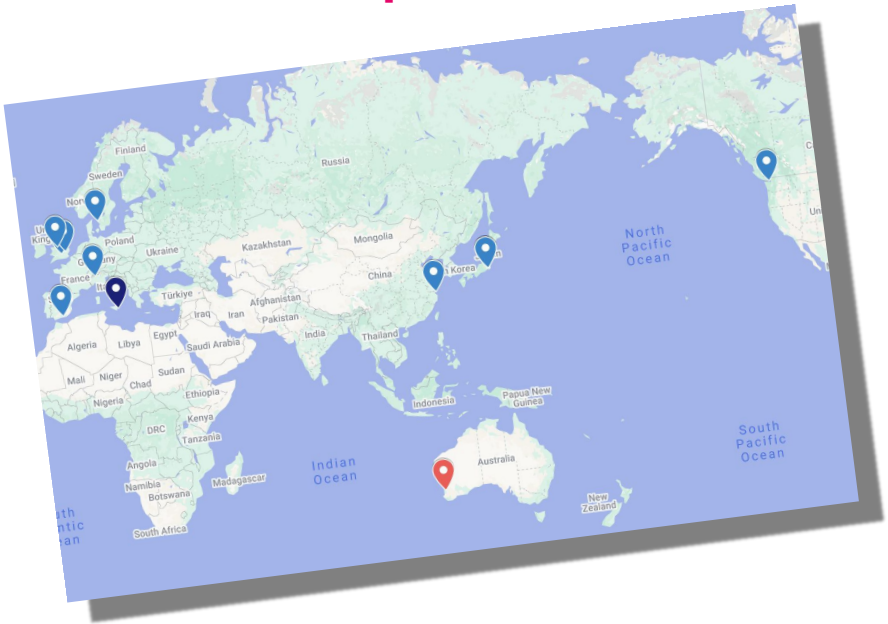
9 nodes now

Test campaigns successfully run

Data movement between sites centrally managed

Data ingestion at SDP location in Perth

Internal version, testing architecture



Millions of global data transfers made in test campaigns already

Key:

- 0.1 nodes (Spain, Switzerland, SKAO, Sweden, UK, China, Japan, Canada, Italy)
- SKAO ingestion site (Pawsey)

➔ **Centrally managed** data archive of 8 PBytes total

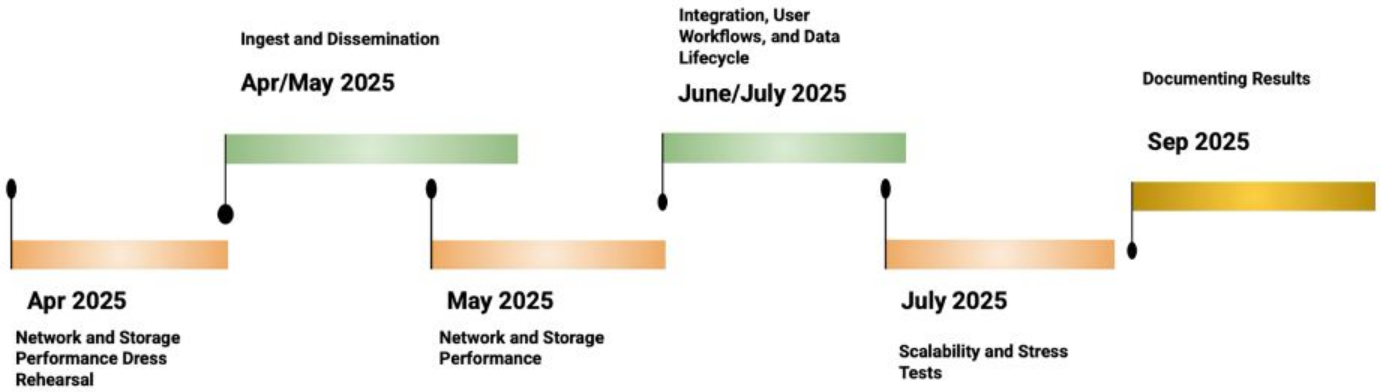
➔ Ingestion of data from an SDP site (Pawsey) on SKAO resources

➔ **Trust between sites** allowing resources to be integrated

Test campaigns 2025

SRCNet v0.1 Test Campaigns:

- Verification of deployments at sites
- Validation of Architecture, inputting into v0.2+ design
- Support and build the Operationalisation of distributed sets of teams



Data movement and data lifecycle testing

Test campaigns outcomes

9 Nodes successfully deployed and integrated, all were involved in the test campaigns

Rucio and FTS fun facts:

- 2 PB transferred during test period
- 1.7M files (3.3M including functional tests)
  - 1M in <24 hours
- Up to 150 TB per day transferred
- Up to 20Gb/s throughput

Main issues

- Expired tokens (FTS)
- Large file transfers (e.g. >1TB)
  - Long-haul ~30MB/s
  - Close-by ~500 MB/s

Next steps in the SRCNet project

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Including, not limited to:

- Compute - very difficult to estimate
- Distributed computing
- MoUs; get something more than trust
- Helpdesk; internal and external

Compute estimation (OLD)

Year	Compute (PFLOPS)
2027	0.5
2028	2.5
2029	5
2030	10
2035	25

Infrastructure

- SRCNet is not the only big data project in the world
- Let’s work together

=> Operator forum

- Release processes
- K8 Pods and Slurm Jobs to Read and Write in the Rucio SRC and User Dirs

=>SRCNet Infraforum starting soon

- OpenStack on bare metal, or as a Kubernetes service?
- Ceph storage architecture, nr of clusters
- # GBs per core (8?) - per physical or virtual core?

Interested? Let me know - boer@astron.nl

Most cringy collaboration image I could find -Togetherplatform

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End

Public confluence page:

https://confluence.skatelescope.org/display/SNC/