SKAO project update

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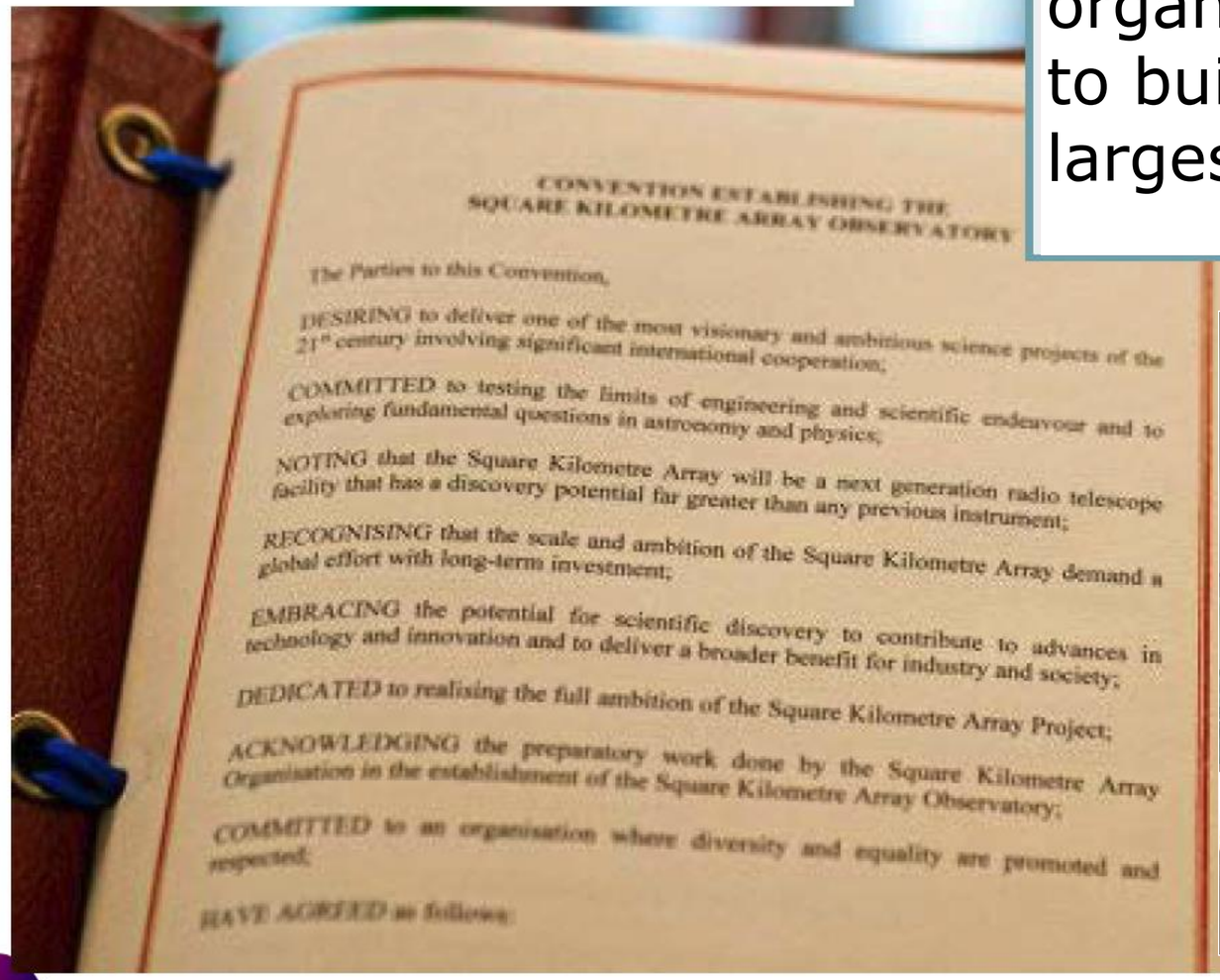
10 Sep 2024

The Square Kilometre Array Observatory is an intergovernmental organisation, created in January 2021, to build and operate the world's two largest radio telescopes.



Rome: 12th March 2019

SKAO Mission

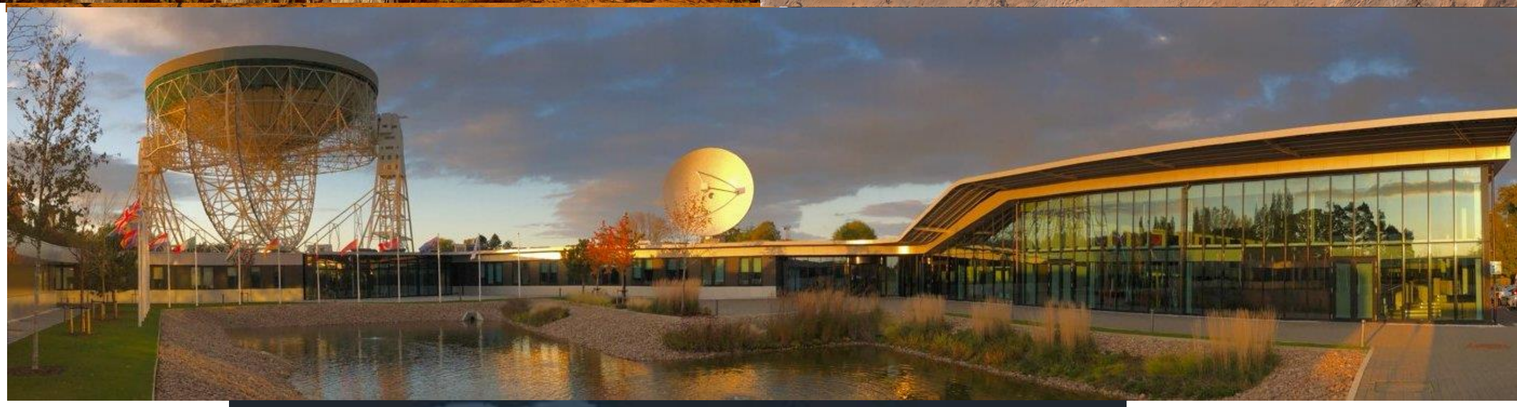
"The SKAO's mission is to build and operate cutting-edge radio telescopes to transform our understanding of the Universe, and deliver benefits to society through global collaboration and innovation."

SKA Phase 1

- SKA-LOW (Australia) : 131,072 log periodic antennas, spread across 512 stations. Maximum distance between stations: 74 km
- SKA-MID (South Africa) : 197 fully steerable dishes, including the existing 64 MeerKAT dishes. Maximum distance between dishes: 150 km

- SRCNet (SKA Regional Centres) : a world wide network of data/computing centres
- Some key figures:
  - Total project cost (first 10 years): ~€2.1B;
  - Early science 2026/27;
  - Operational in 2029/2030

50 MHz ——— 350 MHz ——— 15 GHz →



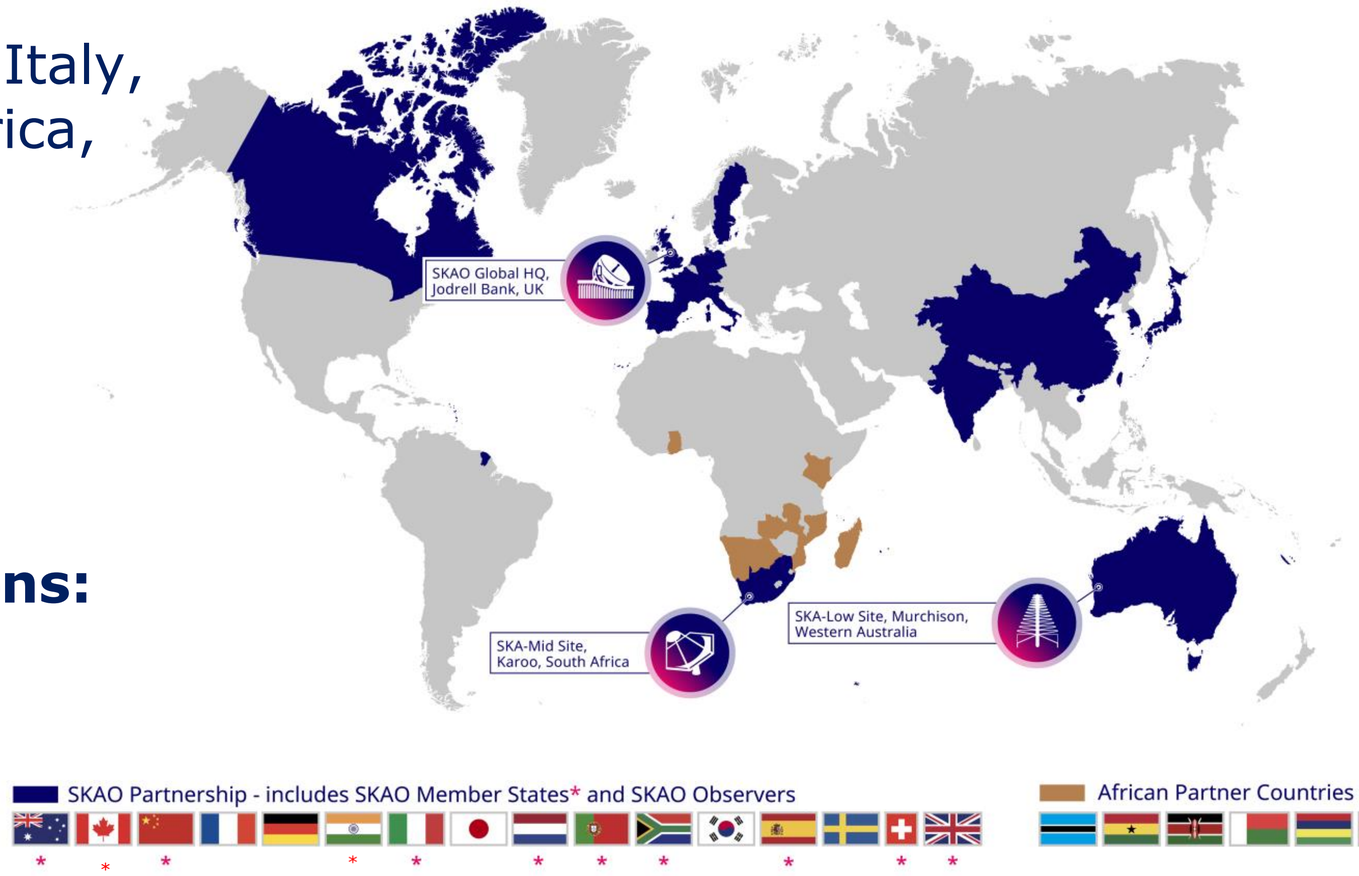
Membership

Members:
Australia, Canada, China, India, Italy, Netherlands, Portugal, South Africa, Spain, Switzerland, UK

Accession stage:
France, Germany

Awaiting government decisions:
South Korea, Sweden

Early stages:
Japan + others



New Members and partnerships

- **General strategy:**
  - European radio astronomy communities – esp: Poland, Ireland. Discussion starting Norway
  - East Asia – various interesting opportunities: Thailand etc
  - Africa and the African Partner Countries – longer term vision of SKA-Mid expansion
  - Others
- **General perspective:**
  - Community and more political approaches in play
  - Lots of small-medium scale leads to follow
  - Partnership (Cooperation Agreement) -> then Membership

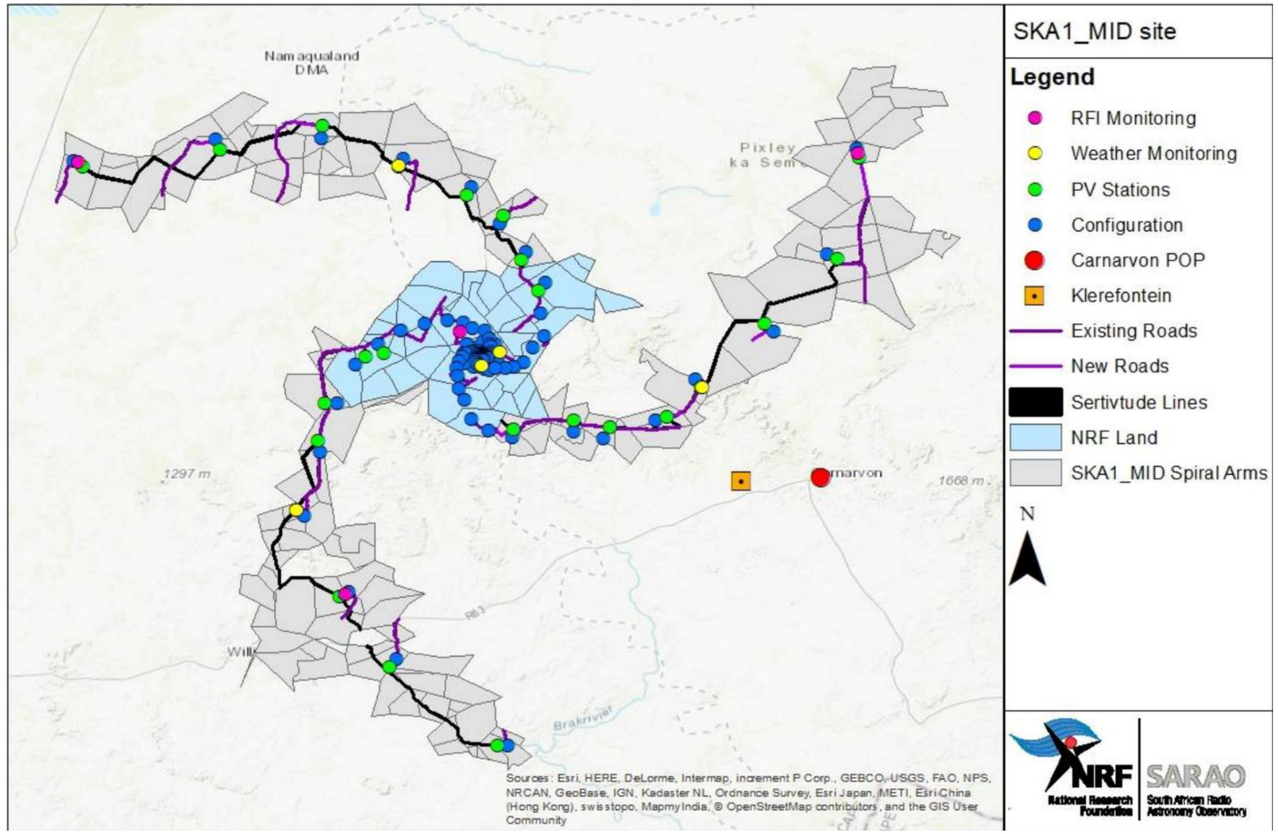
Construction Strategy

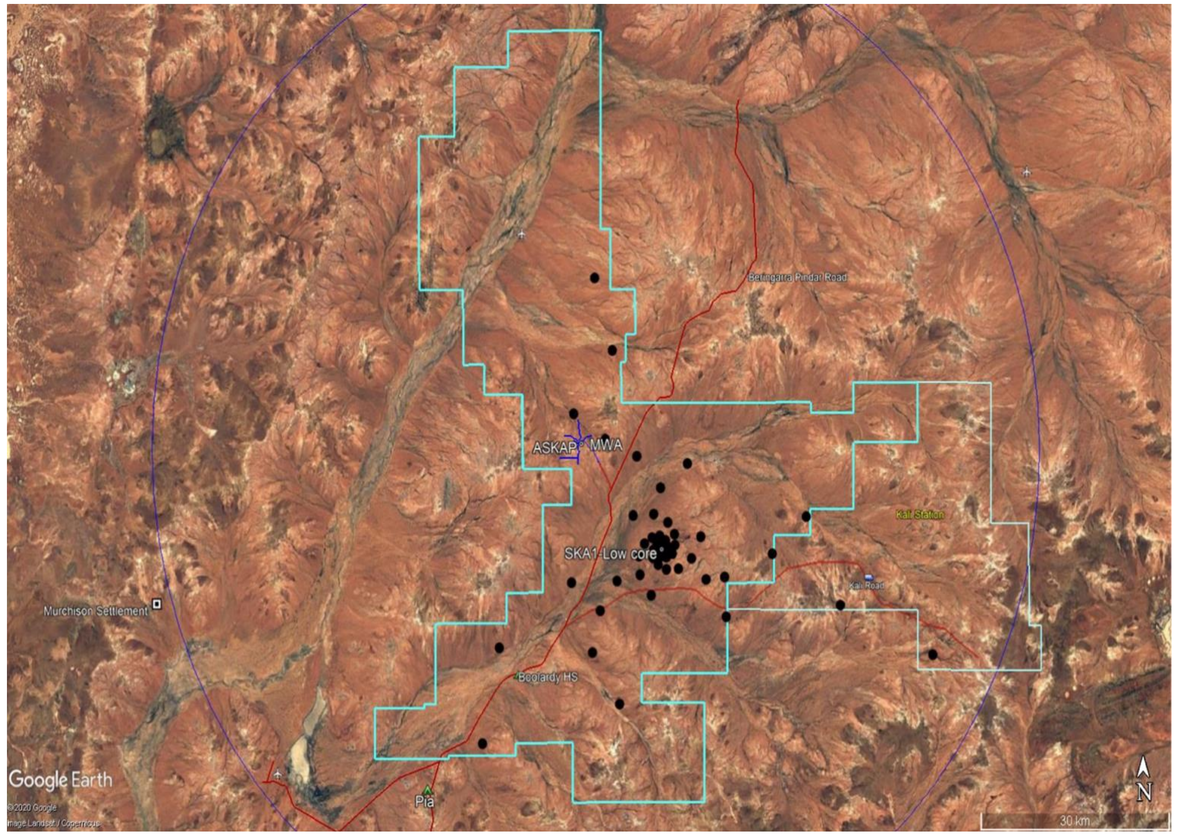
- **Target**: build the SKA Baseline Design (197 Mid dishes; 512 Low stations: AA4)
- Not all funding yet secured, therefore following Staged Delivery Plan (AA*)
- Develop the earliest possible working demonstration of the architecture and supply chain (AA0.5).
- Then maintain a continuously working and expanding facility that demonstrates the full performance capabilities of the SKA Design.

Milestone Event (earliest)		SKA-Mid	SKA-Low
Construction Approval		2021 Jul	2021 Jul
AA0.5 AIV start	4(3) dishes 4 stations	2025 Jun	2024 Jul
AA0.5 end	4(3) dishes 4 stations	2025 Dec	2024 Dec
AA1 end	8 dishes 18 stations	2026 Jul	2025 Nov
AA2 end	64 dishes 64 stations	2027 Jun	2026 Oct
AA* end	144 dishes 307 stations	2028 Apr	2028 Jan
Operations Readiness Review		2028 Jul	2028 Apr
End of Staged Delivery programme		Formal end of construction (including contingency): 2029 Mar	
AA4	197 dishes 512 stations	TBD	TBD

- 37 months into ~7-year construction phase: 92 contracts awarded; €776M total value

Array configurations in South Africa and Australia





SKA-Mid: 450km of roads, 650km of fibre, 250km of power cables and 109 foundations for SKA-Mid dishes

SKA-Low: 230km of tracks, 670km of fibre, 325km of power cables and 103,000 steel sheets for stations ground-planes.

SKA-Mid: South Africa

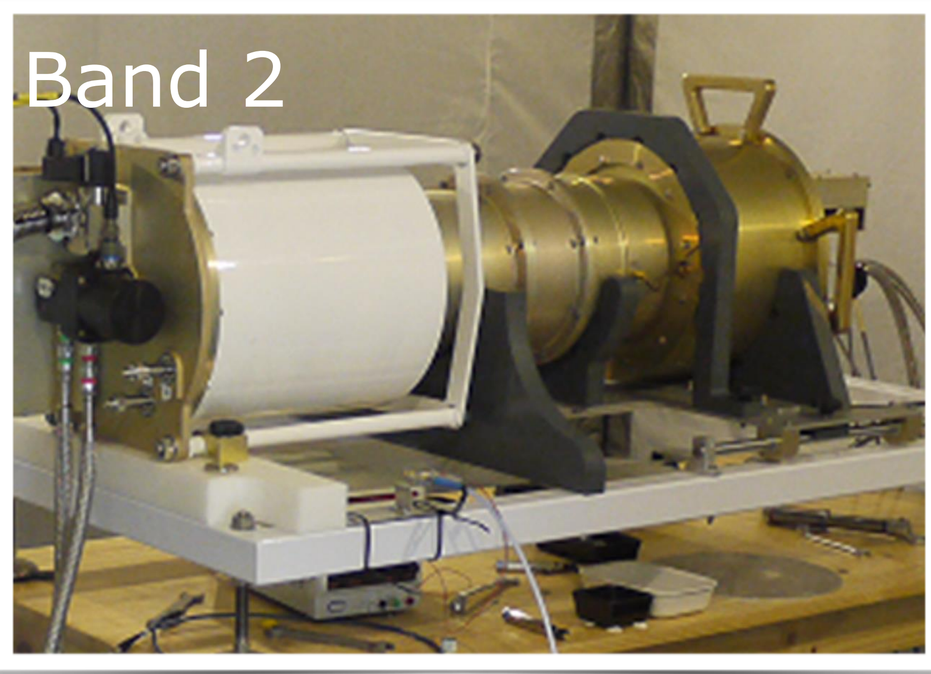
SKAO South Africa team

SKA-Mid construction camp


ZOOMLION
ZAT1500
CAUTION
ALS

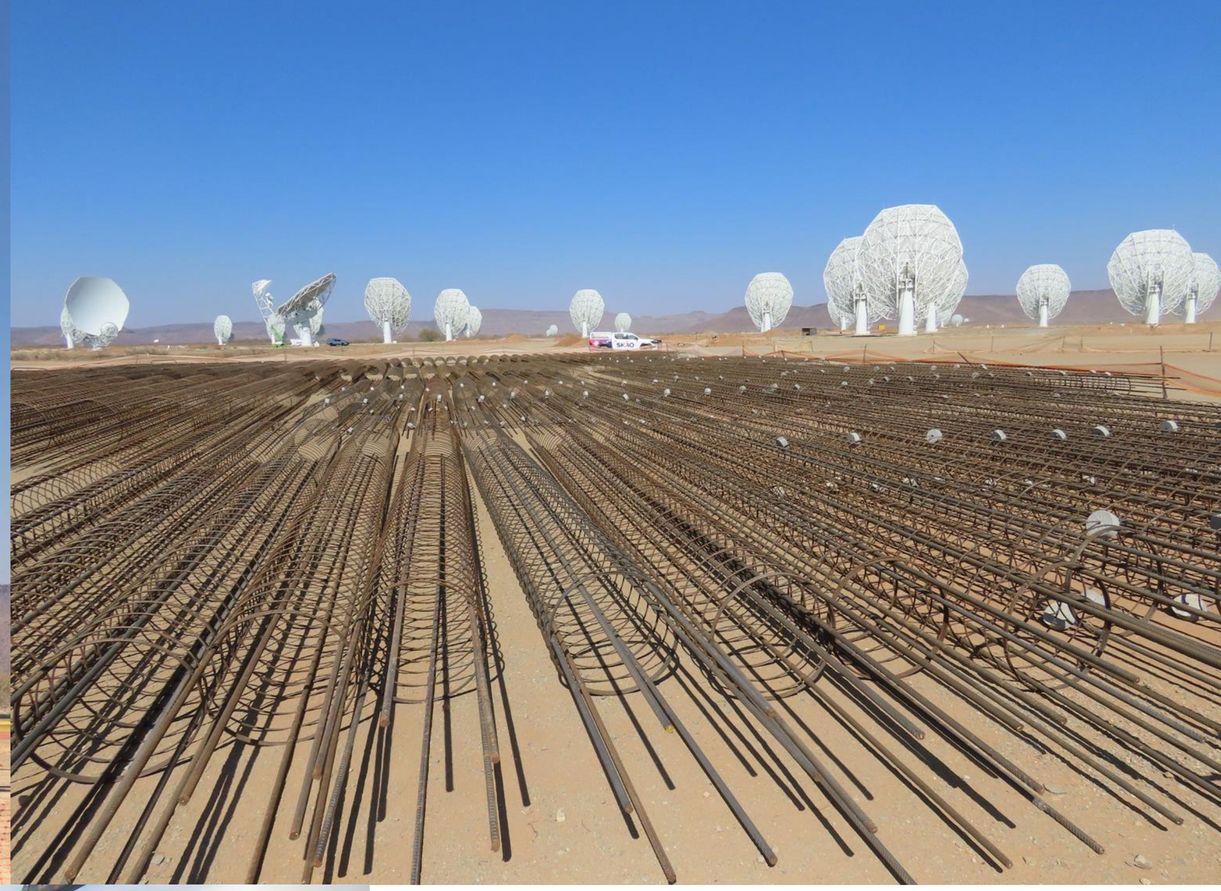
“Big Lift” of first SKA-Mid sub-reflector

First Generation Feeds/Receivers



SKA MID Construction Update

Dishes #1 to #3 on site, Dish #1 near completion. Dish #4 fully assembled in China, used as a test bed. Next two dishes in transit to South Africa.



Construction progressing well.

Carnarvon Community Meeting

Brandvlei Community Meeting

VanWyksvlei Community Meeting

Williston Community Meeting

Local Impacts:

- Significant investment by local contractors around SKA-Mid site – creation of jobs
- Continuation of SA Bursary Programme
- Massive presence at IAU GA in Cape Town
- New MoU’s signed between SKAO and AfAS/SARAO on support for Human Capital Development programmes in coming years

SKA-Low: Australia

SKAO team in Australia

76 staff now employed

SKA-Low construction camp

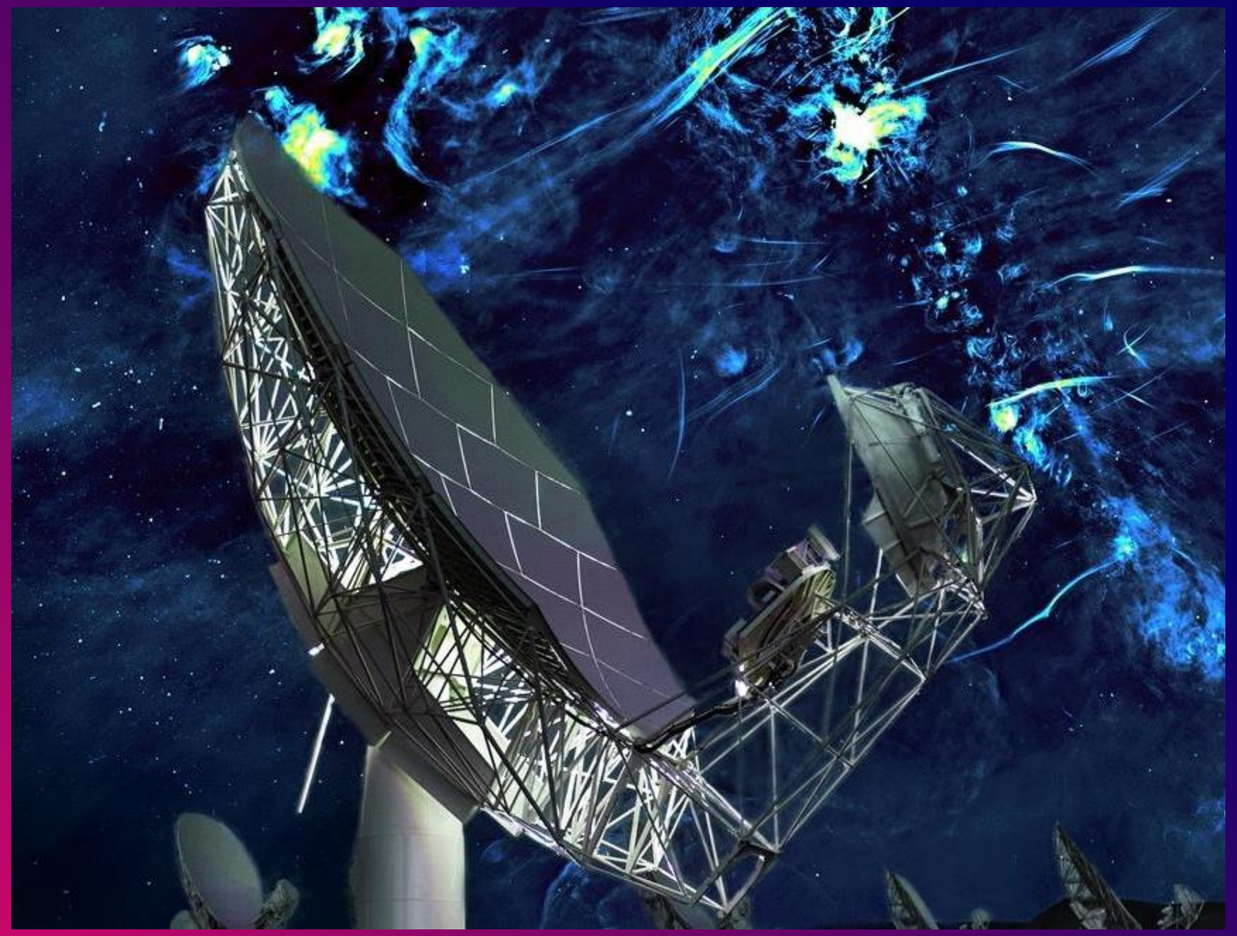
Challenging Conditions


SB 09

Current key challenges

Summary

- Construction activities are proceeding at pace – first array systems observing now/soon – science coming soon;
- Level of risk for the project has increased due to the global situation; however, mitigations are planned and a clear strategy is in place;
- Membership growing, focus now on 2030+ planning
- SRC structures in place and project development accelerating
- Complex range of challenges: financial, programmatic, external (eg satellite constellations) but being tackled



SKAO

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

www.skao.int

Telescope Access

Commensal Science

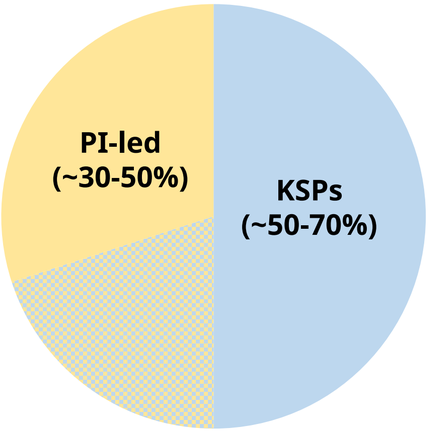
- Different observing projects utilizing the same telescope time (pointing direction); may use same or different observing mode (i.e., continuum imaging, spectral line imaging, pulsar/transient search)
- Maximizes the use of SKA resources
- Commensal science is not ”free”, will be counted against member share

Members (and Associate Members)

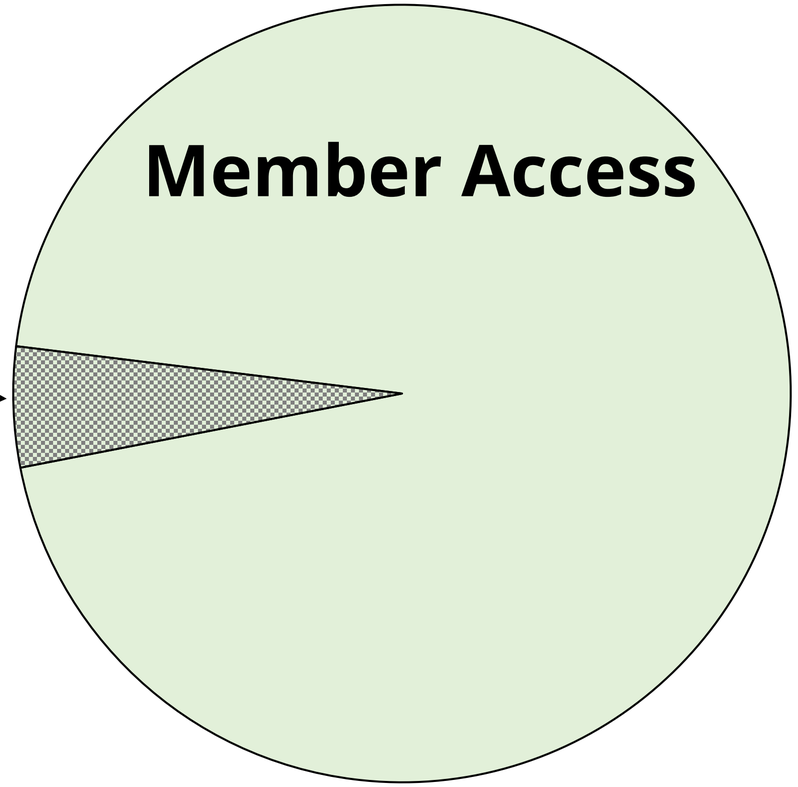
- Can lead any program (KSP, PI)
- Can be part of KSP leadership teams
- Access in proportion to member share

Non-Members

- Can lead PI programs
- Can be team members of KSPs, but not part of leadership team
- Access capped at **5% (”Open Time”;** TBC by Council)
- Access to any individual non-member entity may be capped



Open Time
(% TBD)



Telescope Access, based on contribution level

Key Science Projects (KSPs)

- Large programs (>500 h ?) performed over multiple cycles
- PI & leadership team from SKA-member countries; co-Is from any country (latter may be limited)

Principal Investigator (PI) Projects

- Small programs (<500 h ?) performed within a single cycle

Director-General's Discretionary Time

- Time allocated by the D-G outside of the normal TAC process

International time – fraction not yet determined