SKA Time Allocation Process: Proposals, Review, & Allocation

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SKA-China Workshop
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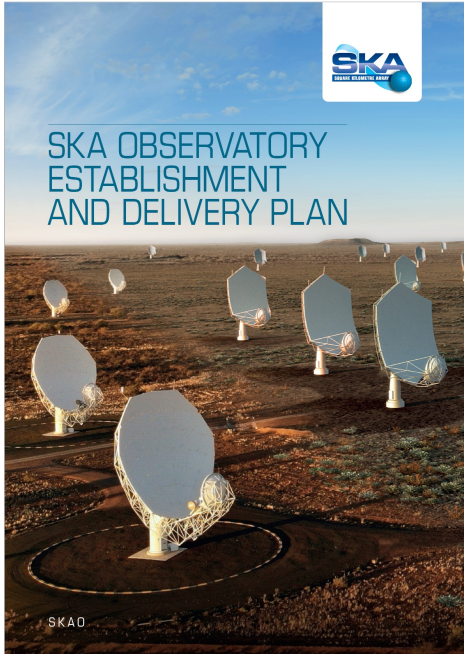
SKAO

Outline

- Access to SKA Resources
- Proposal Submission
- Proposal Review
- Allocation of Resources
  - Time on sky
  - Computing resources
    (see talks by Shari Breen and Rosie Bolton)

Important Documents

- SKA Observatory Establishment and Delivery Plan
  - describes Observatory Operations in practice
- SKA Observatory Access Policy
  - Council policy document outlining the high-level principles that will be followed to enable access to SKA telescope time and computing resources during routine operations
- SKAO Access Rules and Regulations
  - describes the implementation of the Access Policy, with rules and procedures on how scientists will gain access to SKA telescope time and computing resources during routine operations




SKAO

Access Rules and Regulations for the SKA Observatory

Document Number SKAO-GOV-0000127

Definitions (Access Policy)

Access	means to use or benefit from the use of SKAO resources, including time on a telescope and associated computing and network-related resources.
Director-General's Discretionary Time	Is time allocated by the Director-General outside the normal process of assessment by the Time Allocation Committee.
Key Science Projects (KSPs)	are observing projects that require the allocation of significant observing time over a period longer than one Time allocation cycle.
Member Time	is time available for scientists from Members and Associate Members.
Open Time	is time available for scientists from Members, Associate Members and Non-Members.
Observatory Data Products	are data products produced by the SKAO.
Principal Investigator (PI) Projects	are observing projects allocated through competitive process that are not Key Science Projects.
Share in the Project	is as defined in the Financial Protocol.
Time Allocation	is the process by which Access is allocated to SKAO users.

Guiding Principles

- Access is proportional to Member share
- Allocation is based on science merit and technical feasibility
- Access and allocation of SKA "Schedulable Resources"
  - Schedulable Resources include:
    - telescope time on sky (traditional resource)
    - associated computing resources needed to process the data, for example the Science Data Processor (SDP)
      (see later talks for more information on Science Data Products)

Access to SKA Resources

- SKAO resources are made available to scientists from Member and non-Member states
  - For members, allocation is proportion to their share in the project
  - For non-members, allocation is capped at a percentage defined as Open Time
  - Time allocation for all is based on scientific merit and technical feasibility, evaluated by a common proposal review process
- Calibrated data will be automatically generated by SKAO, these are called Observatory Data Products (ODPs)

  ✗ Raw Data
- Scientists will access ODPs via SKA Regional Centres (SRCs)
  - may require further processing (e.g., co-adding) to produce Advanced Data Products (ADPs) for analysis
    (see later talks for information on data products and SRCs)

Proposal Types

Key Science Projects (KSPs)

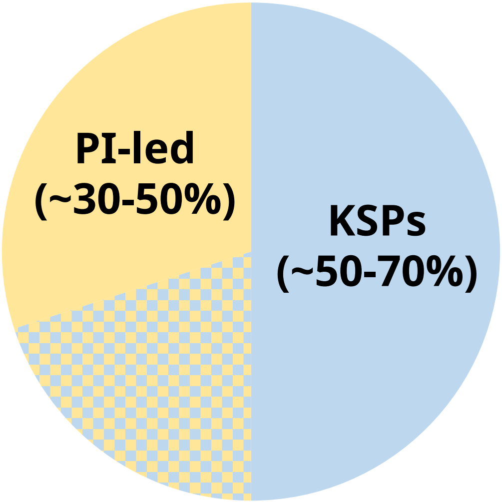
- Large programs (>500 h ?) performed over multiple cycles (nominally 1 cycle = 1 year)
- PI & leadership team from SKA-member countries; co-Is from any country (latter may be limited)
- Expected to provide added-value data products and tools back to SKAO
- Regular reviews to track progress toward goals

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



Possible Proposal Attributes

Target of Opportunity (ToO)

- rapid response triggered internally or externally
- may override currently executed observations
- may be awarded by normal review process, or by D-G as a DDT proposal outside of this process

Long Term Projects (LTP)

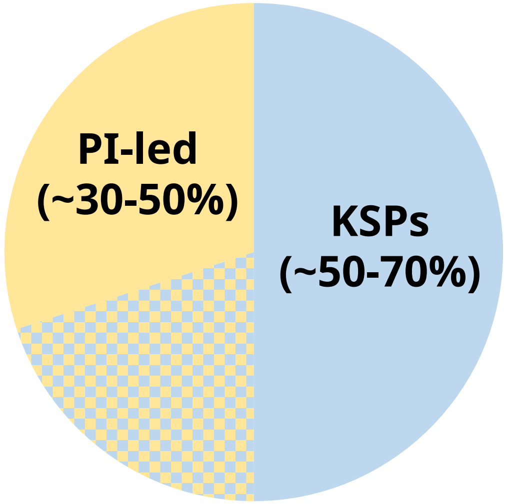
- requires more than one proposal cycle, but don't qualify as a KSPs

Joint SKA Project (JSP)

- requires both SKA-Mid and SKA-Low, and may require simultaneous observations (or very near in time)

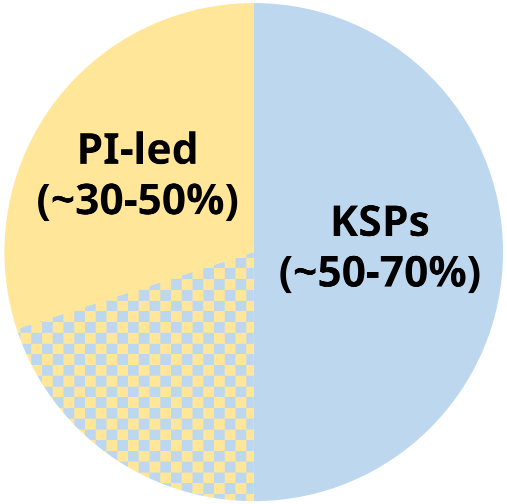
Coordinated Project

- of SKA observations with other facilities (ground or space based). Example is VLBI



Key Science Projects (KSPs)

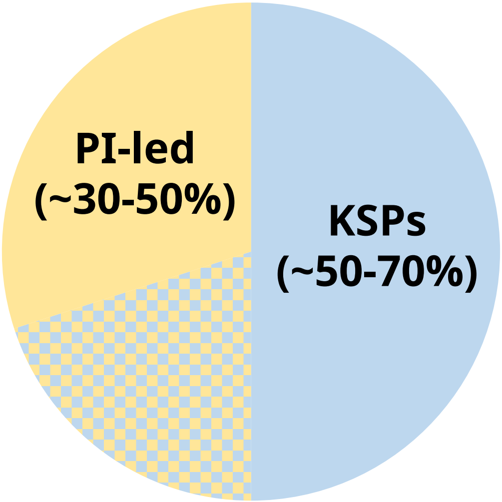
- must demonstrate they address **extremely compelling science questions**
- may take up to 5 proposal cycles to complete (nominally 1 cycle = 1 year)
- requires a **Leadership Team** to oversee the delivery of the scientific outcomes
- Leadership Team will be no more than 10 individuals (one member will be the main contact for communications with SKAO, in place of a PI)
- Leadership roles are only **open to scientists from Member countries**; co-Investigators may come from any country
- Progress will be reviewed regularly by an expert panel; if the science goals are unlikely to be achieve the D-G may terminate or reduce the project



Key Science Projects (KSPs)

Each KSP proposal will be required to include:

- a detailed management plan describing the roles and responsibilities of each member of the KSP Leadership Team and the qualities they bring to the proposed science
- a plan for the reduction and analysis of Observatory Data Products (giving details of any secured resources at SRCs)
- a plan for the dissemination of scientific results to emerge from the project
- a justification for any investigators on the KSP proposal from non-Member countries[1]
- a plan for the submission of ADPs into the SKAO Science Archive.

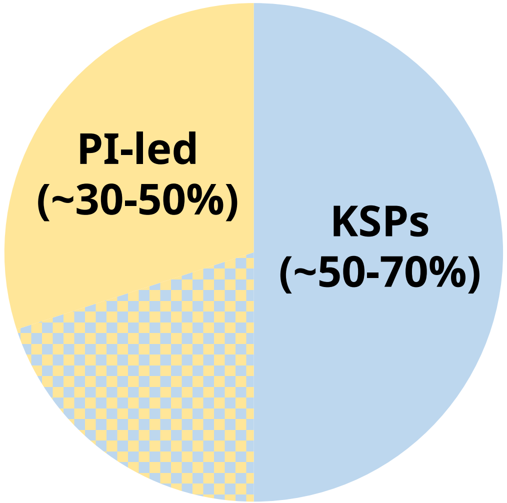


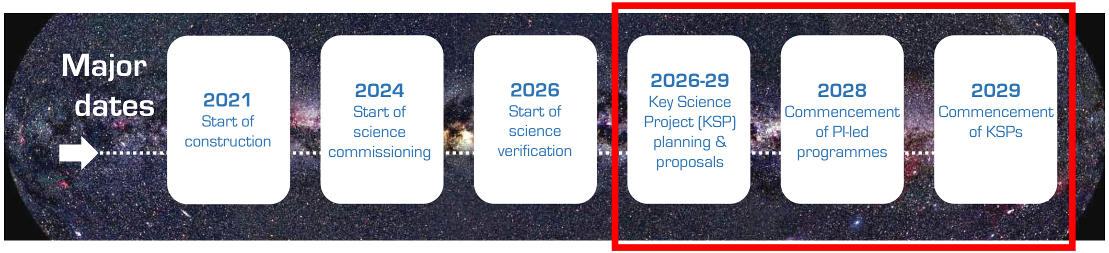
[1]a limit may be set on the fraction of investigators from non-Member countries.

Key Science Projects (KSPs)

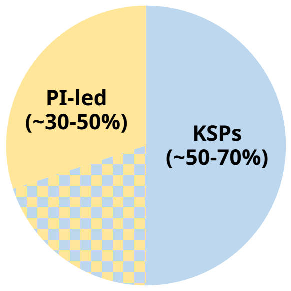
Planning for KSPs:

- SKAO will run at least one planning workshop and issue a call for Letters of Intent (preliminary co-ordination), starting > 2 years before first KSP observations
- Workshops provide a forum for co-ordination and perhaps collaboration of proposals with similar science goals and technical needs
- Data Challenges, to help the community get used to working with SKA sized data (see previous and later talks)





Telescope Access

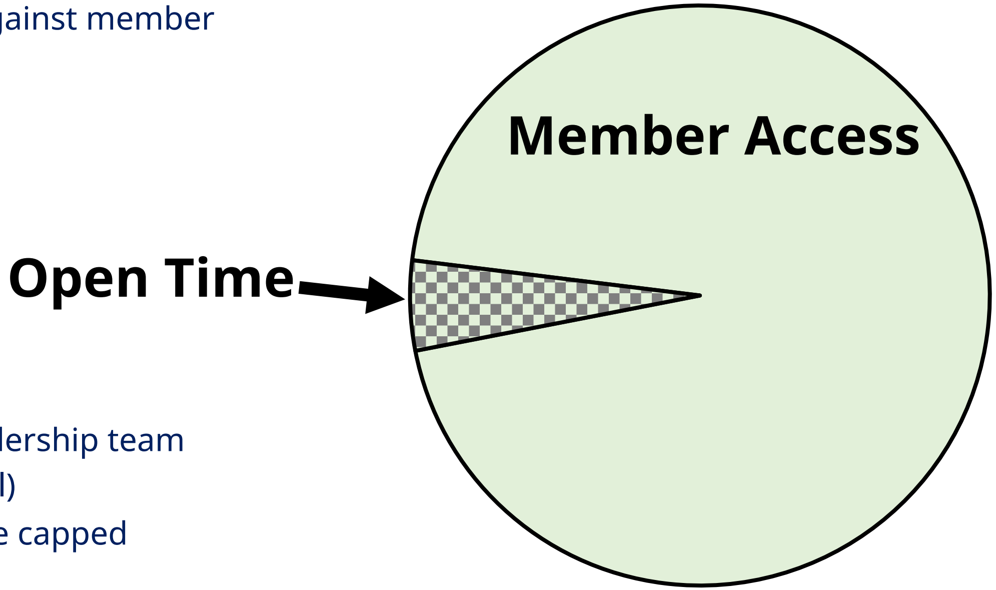


Commensal Science

- 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



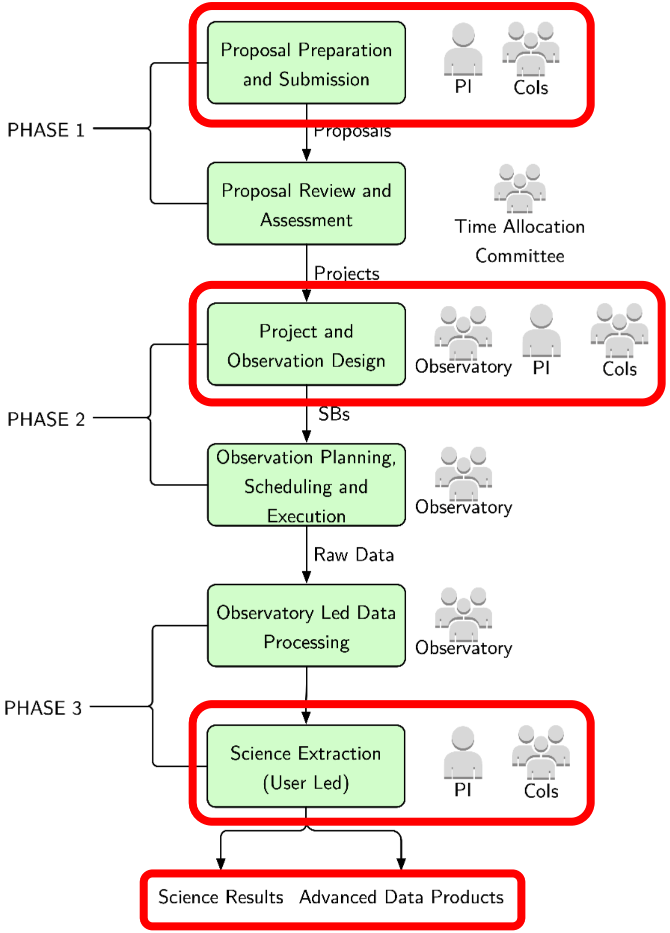
Non-Members

- 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

Proposal Submission & Review

Call for Proposals

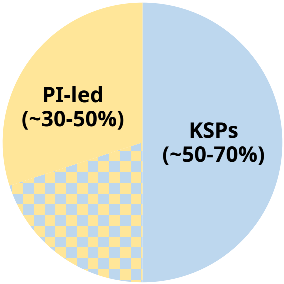
- Issued by SKAO, single call (not separate for each telescope), at least one month ahead of deadline
- SKAO will provide tools for proposal preparation and submission, including observing templates, allowable modes, and sensitivity calculators (see Adam Avison's talk)
  - similar to process used for e.g., ALMA, Herschel, JWST, Hubble, …
  - submission tool will validate proposals before allowing their submission
  - **Phase 1**
- Proposals will require a **technical case** and a **data management plan**, to demonstrate that the proposal is feasible within the resource constraints, and the resources required within SRCs
- Proposers will have a registered SKAO user account with a clearly identified primary affiliation

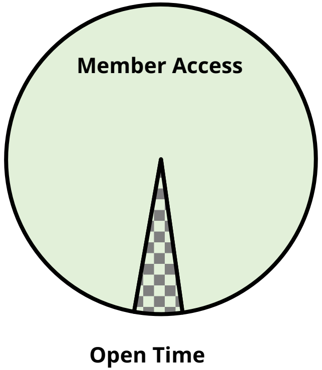


Proposal Submission & Review

Proposal Review

- all proposed reviewed and assessed by a Time Allocation Committee (TAC)
- SKAO will undertake a technical feasibility review, including evaluation of SRC resources that will be required
- TAC members appointed by D-G with advice from SKAO staff
- proposal assessment shall be:
  - driven by scientific merit and technical feasibility
  - be fair and transparent, informed by peer review
  - be able to resolve conflicts of interest
- The TAC shall:
  - rank each proposal according to scientific merit and technical feasibility
  - provide a recommendation of telescope time and resources for each proposal
  - present a ranked list of proposals to the D-G
- The SKAO shall construct the science program, considering:
  - sky coverage
  - scheduling feasibility
  - observatory resources
  - opportunities for commensality
  - members' share of the project





China 8 %

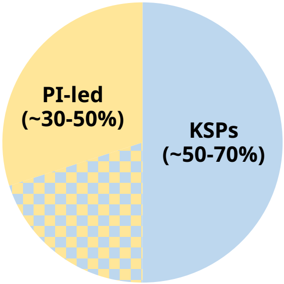
Proposal Submission & Review

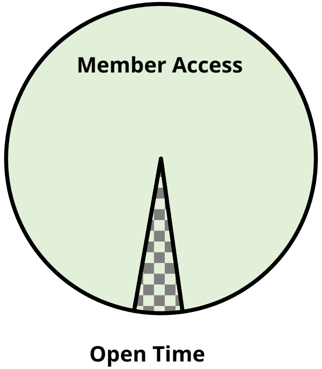
Proposal Review

- D-G makes the formal allocation of time and resources for observing projects
- Approved science program, including titles and abstracts, will be published
- **Successful proposal teams will complete the detailed observing setups be projects can be observed (Phase 2)**
- Details of the review process are still under discussion
  - will follow best practice used at other major observatories (e.g. ALMA, ESO, NRAO, STScI), tailored for the special needs of SKA
  - likely to be dual anonymous ("double blind"), where reviewers don't know the names of the proposing team, and the teams don't know the names of the review panel
  - review of KSPs likely to require extra attention (e.g., assessment of management plan)

Accounting Metric

- Share of SKA time/resources allocated to member countries, and Open Time, will be tracked using a detailed accounting metric (being developed)
- Commensal time (for secondary allocations) is not free, and will be accounted for with appropriate weighting
- The accounting metric will reflect the end-to-end resources used, not just time on sky
- Each investigator on a project will be weighted in the accounting to reflect their role in the project.





China 8 %

Phase 1

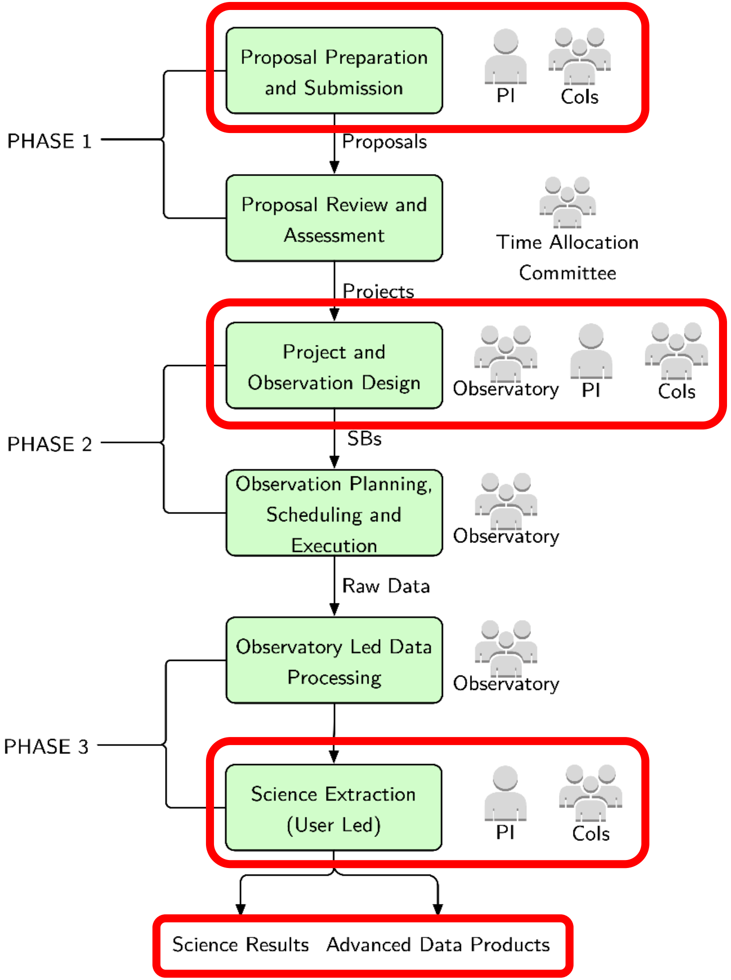
- Proposal preparation and submission
- Tools provided by SKAO

Phase 2

- Program approved by D-G following TAC process
- Detailed design of observations

Phase 3

- Calibrated Data received
- Science analysis, advanced data products
- *Publications! Discoveries!*



SKA Science Community
14 Working Groups
over 1000 scientists

+ Gravitational Waves
(banner in progress)

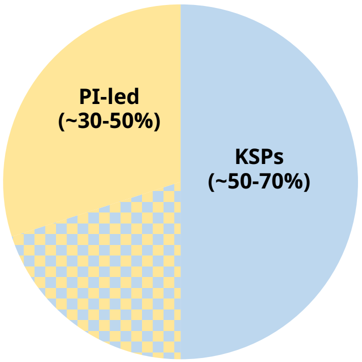
Telescope Access

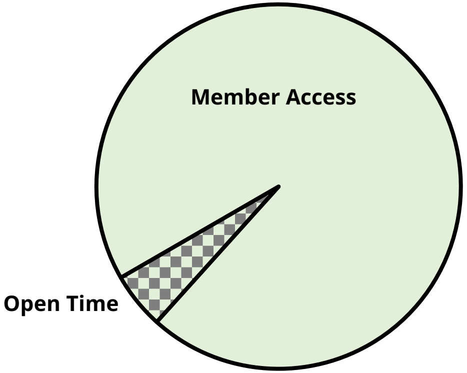
NO time has been allocated for ANY project

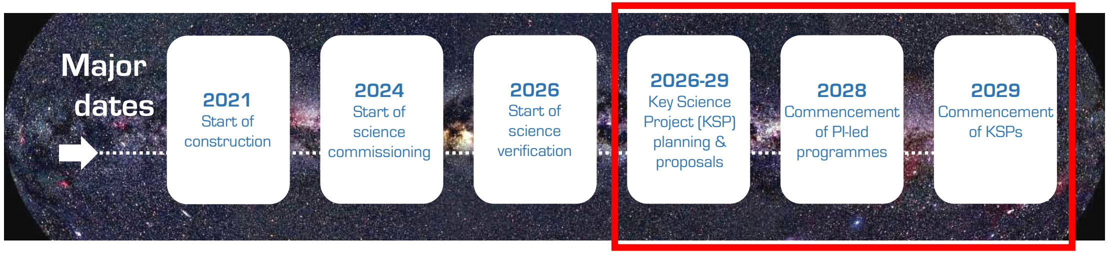
SWGs are NOT proto-KSPs

There are NO guaranteed KSPs

Time allocation will be based on
SCIENTIFIC MERIT
and technical feasibility
through a common proposal review process
(while accounting for member share)







The Road to Science

Science Commissioning

Science Verification

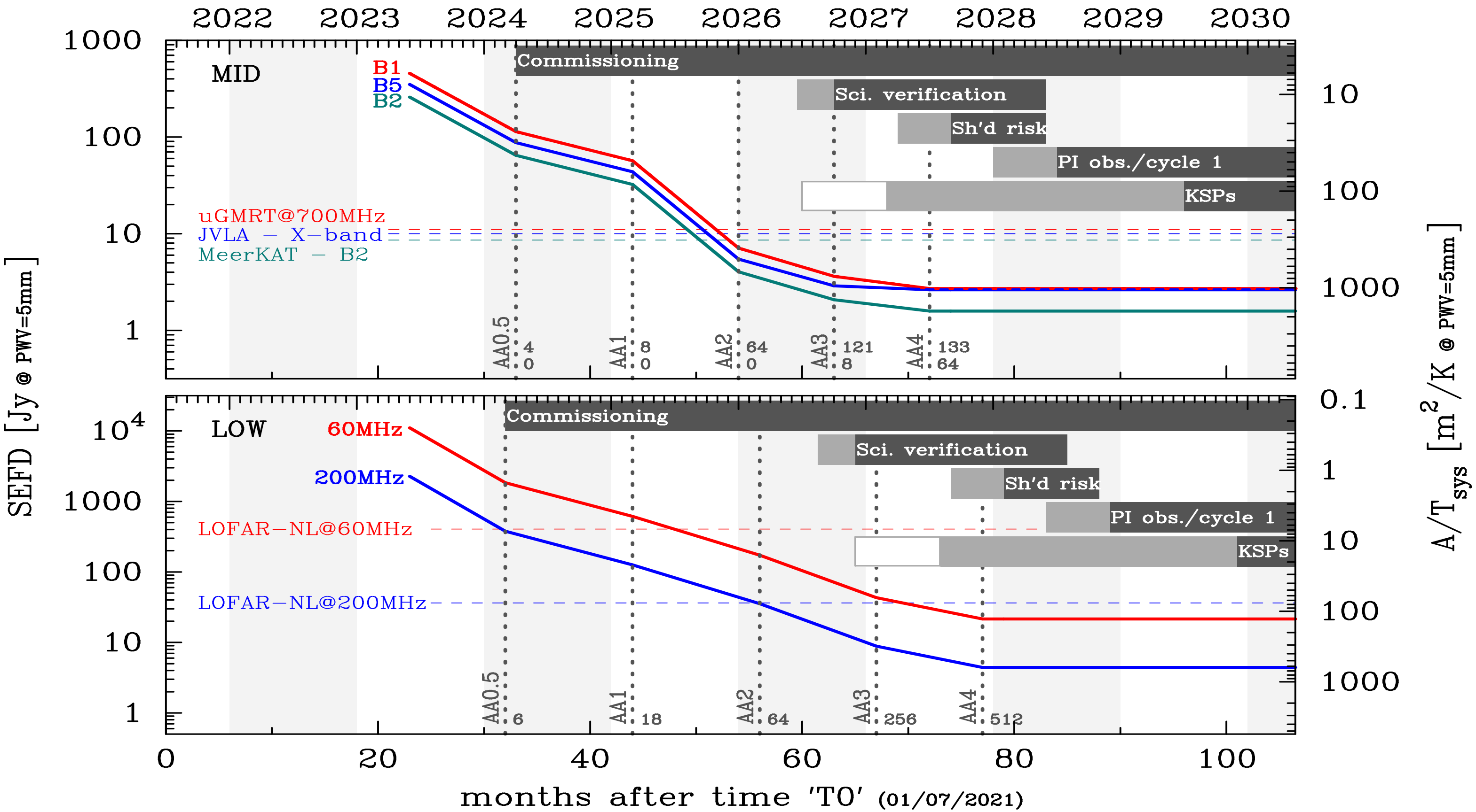
Shared Risk PI
Normal PI
KSP

Event	SKA-Low	SKA-Mid
Start of construction (T0)	✓ 1ST JULY **2021**	✓ 1ST JULY **2021**
Earliest start of major contracts (C0)	✓ AUGUST **2021**	✓ AUGUST **2021**
Array Assembly 0.5 finish (AA0.5) SKA-Low = 6-station array SKA-Mid = 4-dish array	FEBRUARY **2024**	MARCH **2024**
Array Assembly 1 finish (AA1) SKA-Low = 18-station array SKA-Mid = 8-dish array	FEBRUARY **2025**	FEBRUARY **2025**
Array Assembly 2 finish (AA2) SKA-Low = 64-station array SKA-Mid = 64-dish array, baselines mostly <20km	FEBRUARY **2026**	DECEMBER **2025**
Array Assembly 3 finish (AA3) SKA-Low = 256-station array, including long baselines SKA-Mid = 133-dish array, including long baselines	JANUARY **2027**	SEPTEMBER **2026**
Array Assembly 4 finish (AA4) SKA-Low = full Low array SKA-Mid = full Mid array, including MeerKAT dishes	NOVEMBER **2027**	JUNE **2027**
Operations Readiness Review (ORR)	JANUARY **2028**	DECEMBER **2027**
End of construction	JULY **2029**	JULY **2029**

Definitions

Science Commissioning (SC)	Execution & analysis of science observations, with the aim of testing and debugging the system
Science Verification (SV)	• Activities to verify the telescope system against the science requirements (to ensure the system meets the needs of the science users). • Verifies one or more observing modes (e.g. deep imaging in B1) • SV data will be publicly released • Community may be involved in project/target selection
Shared Risk PI Projects	PI projects that carry a risk of not being successful or not being scheduled. No guarantee of re-observing or re-scheduling. Will be used to exercise end-to-end operations (e.g. new modes; KSP preparation)
Principal Investigator Projects	Science Projects of modest time requests that can typically be completed within a single time allocation cycle using already commissioned modes
Key Science Projects (KSPs)	KSPs are observing projects that require the allocation of significant observing time and resources (ie compute) over a period longer than one time allocation cycle. It is anticipated that KSPs will take up 50-70% of available time during the first 5 years of full operations.

The Evolution of Performance



Anticipated Science Performance: https://arxiv.org/abs/1912.12699

Credit: Mark Sargent

The Road to Science

Key Science Projects (KSPs)

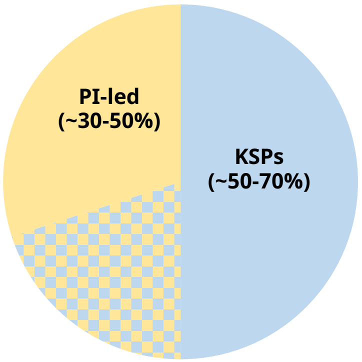
- Large programs (>500 h ?) performed over multiple cycles (nominally 1 year)
- PI & leadership team from SKA-member countries; co-Is from any country (latter may be limited)
- Expected to provide added-value data products and tools back to SKAO
- Regular reviews to track progress toward goals

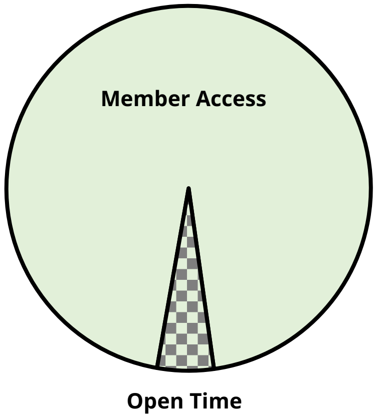
Principal Investigator (PI) Projects

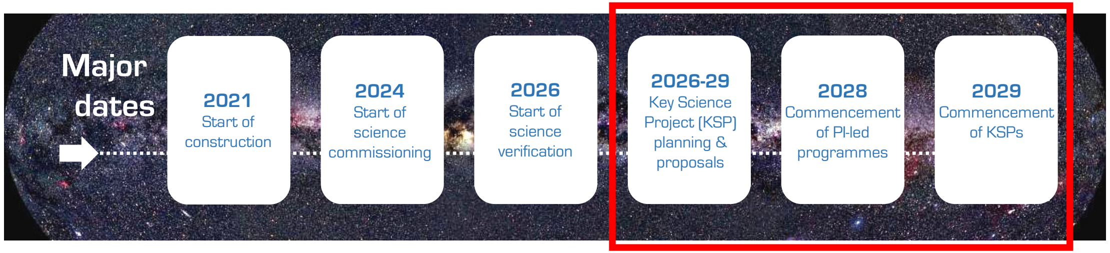
- Small programs (<500 h ?) performed within a single cycle

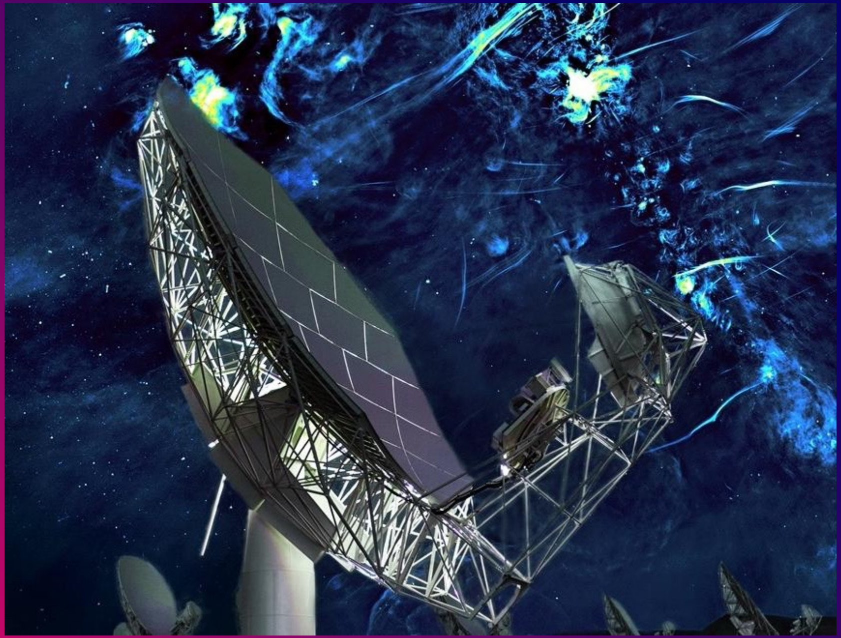
Access is proportional to member share

- China’s share currently 8%









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