Indian Industry engagement in SKA: current status and future prospects

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SQUARE KILOMETRE ARRAY

Exploring the Universe with the world's largest radio telescope

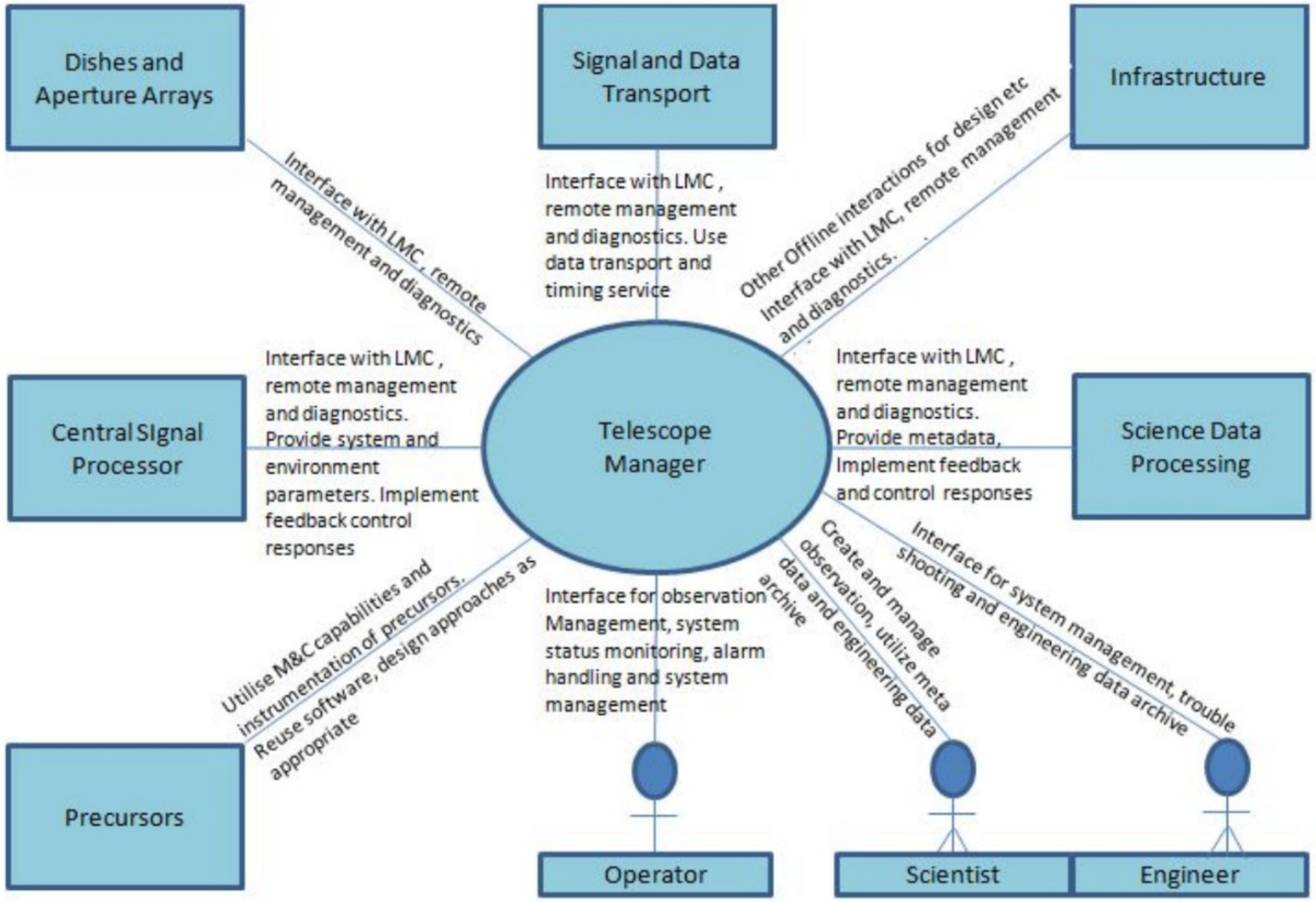
NCRA • TIFR

Talk Outline

Engagement with Indian Industry

- Past engagements (2012-18)
- Ongoing work (2018-2020)
- Future prospect (2021-2027)

Telescope Manager



Past Indian engagement with the SKA

During the detailed Design Phase (2012-2018)

India has **one of the strongest industry participation** from any SKA member country in the work done so far.

- NCRA led the development of the **Telescope Manager** system through an international consortium with smaller participation in SaDT (NCRA), SKA-Low (RRI)
- Industry participation was solicited using an expression of interest in 2012
- Tata Consultancy Services and Persistent Systems Limited were identified as meeting the technical requirements. Work contracts awarded to these partners
- We worked extensively with these two partners to successfully clear the PDR in Jan 2015 and CDR in April 2019
- Besides providing expertise in core technical activities, our industry partners provided us with project management support as well.
- Our industry partners were **more like collaborators than contractors** – they worked closely with the SKA office and with our other international partners in the Telescope Manager consortium

What’s happening now – Bridging Phase

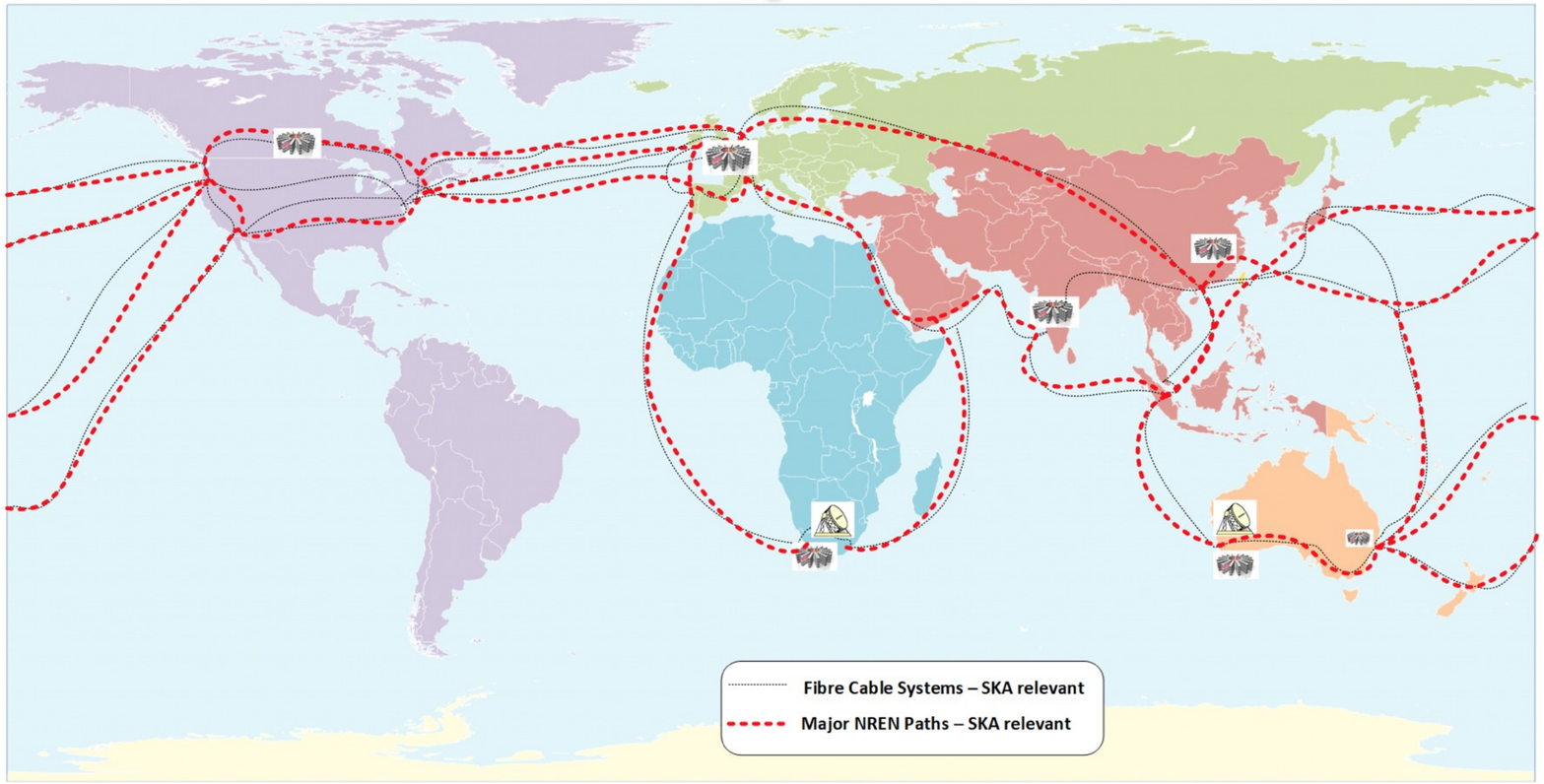
During the Bridging Phase (2018-2020)

- Scaled Agile Framework - SAFe approach adopted. This is an iterative and incremental approach. One full team at NCRA (~7 members) is involved in a variety of activities **focused on retiring some high risk items** identified in the TM CDR
- Raman Research Institute, which was a partner in the MWA, has good experience in developing digital receivers for low frequency telescopes. RRI plans to develop an **integrated prototype for the SKA-Low digital receiver**
- We aim to start the development of a **prototype SKA regional centre**
- We will also **prepare the Indian radio astronomy community** to be ready for SKA science

The SKA Regional Centre concept

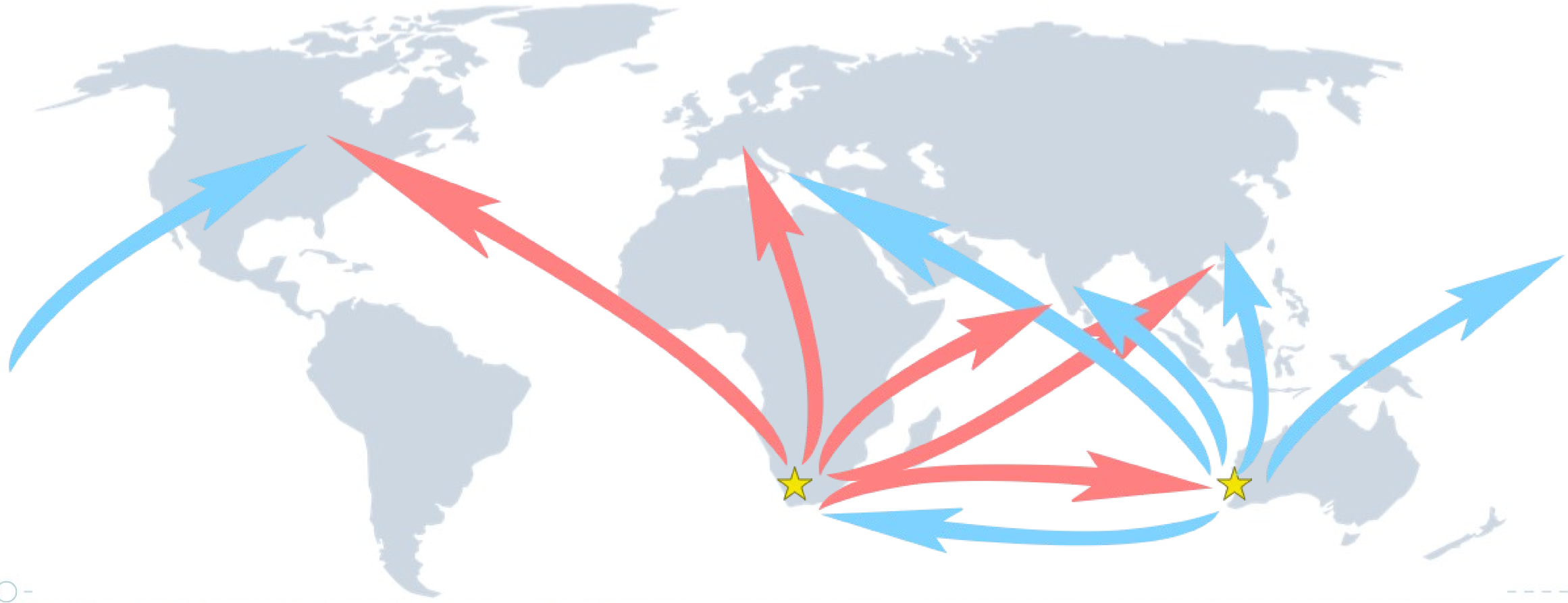
The data rates and volumes are so large that it is not cost efficient to store the raw visibilities

- if we maintain ~ 0.5-1 TB/s output data rate from the correlator this will generate approximately ~45-85 PB of raw data from each telescope every day.



SKA Regional Centre data flow

Observatory Data Products flow from Science Data Processors in Perth and Cape Town to SRCs around the globe



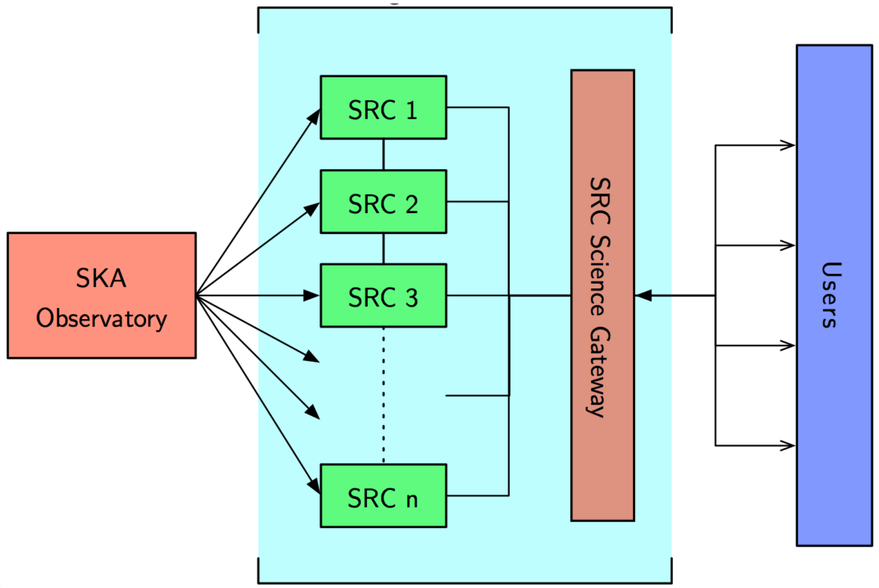
SKA Regional Centre access portal

SKA Regional Centres (SRCs)

1. The science data products that emerge from the SKA observatory are not in the final state required for science analysis and publication
2. The data volumes are so large that direct delivery to end users is unfeasible
3. The community of scientists working on SKA science data will be geographically distributed

This global network of SRCs will provide the SKA community with

- platform for collaborative science
- transparent and location agnostic interface for users
- access to project data for all SKA users
- a place for development of software tools: analysis, modelling, visualisation



Upcoming industry opportunities

During the construction phase (2021-27)

- **Most of the work during the construction phase will be through work contracts to industry.** SKA member nations are assured a fair return on investment
- India has demonstrated its capabilities in development of complex software (TM), but engagement in building of hardware is also desirable and is being explored e.g. through digital receiver development at RRI (more on that in the panel discussion)
- Antenna and front-end electronics
- Signal processing for SKA-Low
- Pulsar signal processing
- Data centre development (hardware + analysis/visualisation software) as prototype SKA regional centre

Upcoming industry opportunities

During the construction phase (2021-27)

- The exact modalities of how these contracts will be awarded is to be finalised both at the international level and within India
- **Industry partners are encouraged to talk to us about their interests and expertise areas if you have not done so already**

Thank you!