

SKA-France : What's new ?

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Astronome à l'OCA

Déléguée Scientifique CNRS/INSU-AA, SKA-France Director

French representative @ SKAO Council



Outline of the talk

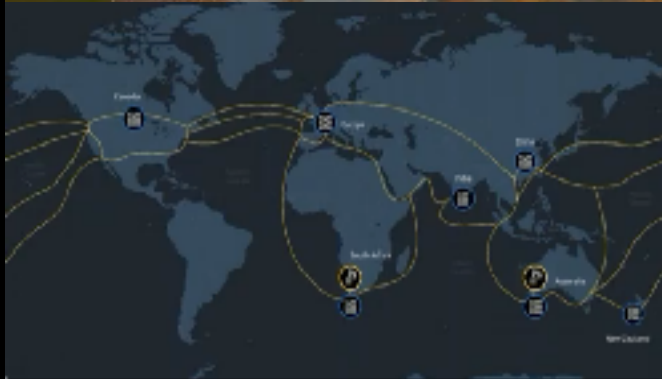
- Overview & Progresses of the SKA project
- The French participation in the SKAO
- **Current main developments in France**



SKA Phase 1 Baseline

- SKA-LOW (50-350 MHz) : 131072 log periodic antennas, spread across 512 stations
Maximum distance between stations: 74 km
- SKA-MID (350 MHz – 15.4 GHz) : 197 fully steerable dishes, including the existing 64 MeerKAT dishes
Maximum distance between dishes: 150 km
- SKA-HQ : SKAO headquarters located on the UNESCO World Heritage Site of Jodrell Bank
- SRC-Net (SKA Regional Center Network) : a world wide network of data/computing centres

50 MHz ————— 350 MHz ————— ... ————— 15 GHz →



Image/Video courtesy:
SKAO, H2020 AENEAS project

Construction strategy

- Construction split into stages (Array Assemblies):
AA0.5, AA1, AA2, AA*, AA4
- Target: build the SKA Baseline Design (AA4)
- Not all funding yet secured, therefore following
Staged Delivery Plan (AA*)
- AA2 will be an important milestone for the scientific
community: SKA telescopes will be scientifically
competitive → beginning of Science Verification



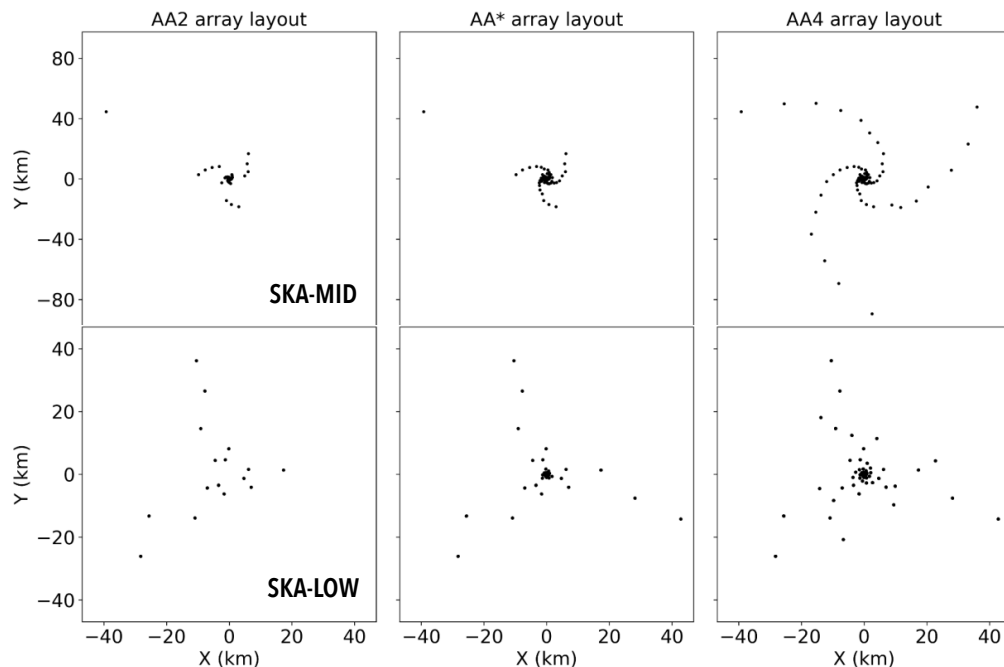
SKAO Staged Delivery, Array Assemblies and Layouts

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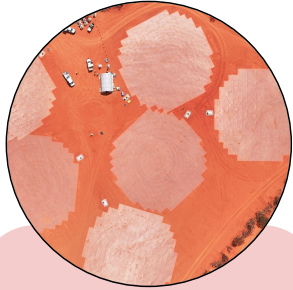
Available [on-line](#)

Role	Name	Description	Affiliation	Signature	Date
Author	Sarvesh Sridhar and Science Operations	Operations Scientist	SKAO	<i>Sarvesh Sridhar</i>	2025-06-10
Owner	Shari Breen	Head of Science Operations	SKAO	<i>Shari Breen</i>	2025-06-10
Approver	Stuart Whitley	Director of Programmes	SKAO	<i>Stuart Whitley</i>	2025-06-10
Released by	Lewis Ball	Director of Operations	SKAO	<i>Lewis Ball</i>	2025-06-10

Telescope	Maximum baseline length and number of stations/dishes		
	AA2	AA*	AA4
Low	64.8 km with 68 stations	73.4 km with 307 stations	73.4 km with 512 stations
Mid	108.0 km with 66 dishes (36.0 km, excluding dish SKA008)	108.0 km with 144 dishes (36.0 km, excluding dish SKA008)	159.6 km with 197 dishes



SKAO milestones

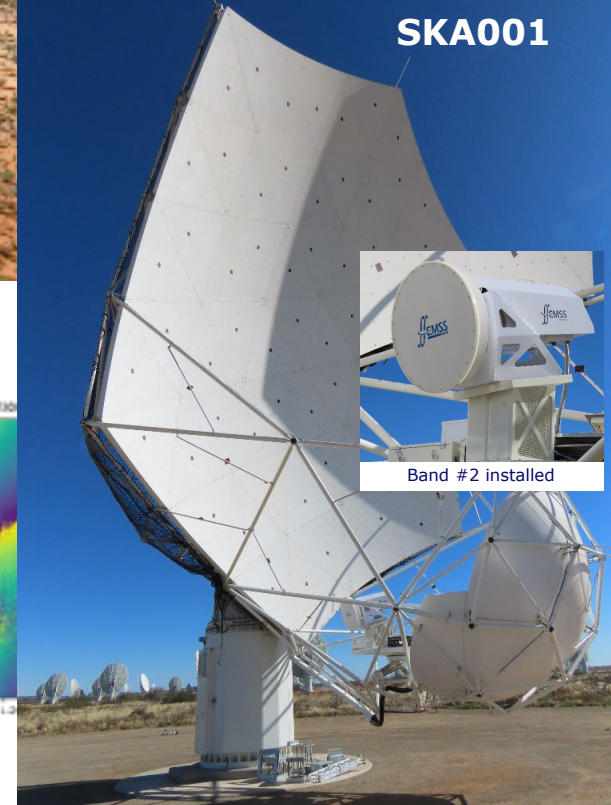
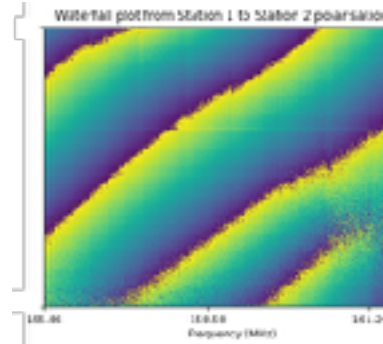
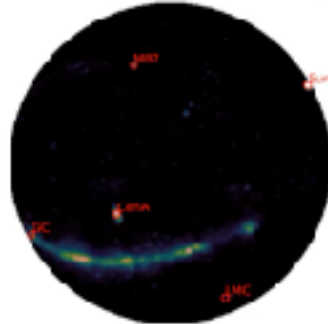


Construction

- Building antennas, dishes, roads etc!
- Followed by Assembly, Integration and Verification



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SKA001

Band #2 installed



Now



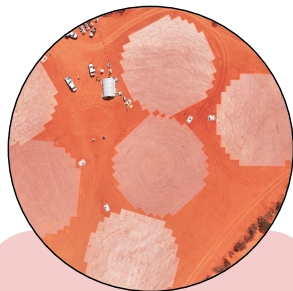
Now



SKAO milestones

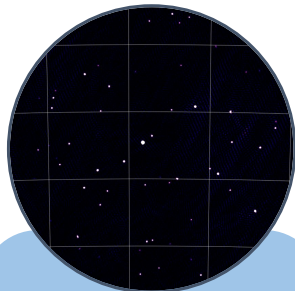
Community involvement starts

Credit: I. Heywood, SARAO



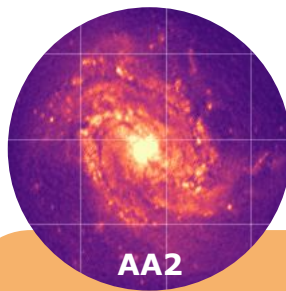
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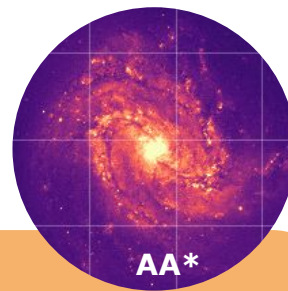


Commissioning

- SKAO activity
- Collaborative across system verification and science commissioning



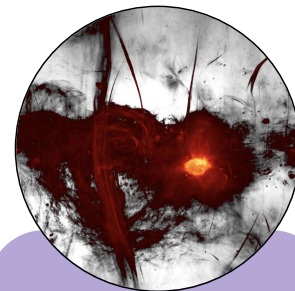
AA2



AA*

Science Verification

- A full dress rehearsal of the end-to-end system for every mode of operation
- Once modes and pipelines are working, the community can submit target ideas
- Data will be publicly available for scrutiny
- Build trust and fostering an early science return



Cycle 0

- Shared-risk PI projects
- SRCNet resources ready for user
- Proprietary periods



Now

Now

First half 2027

First half 2029

2030



Now

Soon

First half 2029

First half 2031

2032

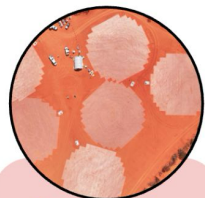


SKAO milestones

SKAO milestones

Community involvement starts

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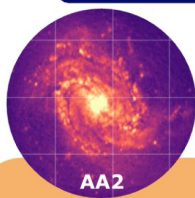
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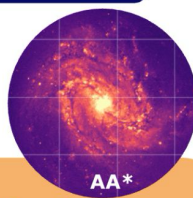


Commissioning

- SKAO activity
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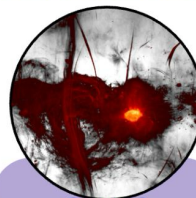
AA2



AA*

Science Verification

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Cycle 0

- Shared-risk PI projects
- SRCNet resources ready for user
- Proprietary periods

Cycle ~4
Steady state
operations
(all capabilities
available)



Now



Now

Now

Soon

First half 2027

First half 2029

First half 2029

First half 2031

2030

2032

2034

2036



SKA-Low



307

Stations

Up to **48**
station beams

Up to **1440**
substations

74 km

Max Baseline

AA*

Up to **16** subarrays, **commensal** Observations
• **Two telescopes**, frequency coverage of 50
MHz and 15.4 GHz

Continuum

Spectral Line

Pulsar Timing

Pulsar Search

Transient Buffer

VLBI

Observing modes

SKA will be **highly flexible**, complicated and delivered on an
enormous scale. Plan to deliver **highly processed** Observatory
Data Products adds to this complexity → we expect to
build up to **the full set of capabilities** over time

Delivery of capabilities



SKA-Mid

144

Antennas

36 km

Max Baseline

*108 km including SKA008

307
Stations

Up to **48**
station beams

Up to **1440**
substations

Up to **16** subarrays, **commensal** Observing
Two **telescopes**, frequency coverage of
MHz and 15.4 GHz

Continuum

Spectral Line

Pulsar T

Pulsar Search

Transient Buffer

V

Observing modes

SKA will be **highly flexible**, complicated and deliver
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74 km
Max Baseline

Delivery of capabilities



A year in the life of the SKA telescopes: overview and main outcomes

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Role	Name	Designation	Affiliation	Signature	Date
Author	Sarvesh Sridhar	Operations Scientist	SKAO	<i>Sarvesh Sridhar</i>	2025-06-13
Owner	Shari Breen	Head of Science Operations	SKAO	<i>Shari Breen</i>	2025-06-13
Approver	Antonio Chrysostomou	Deputy Director of Operations	SKAO	<i>Antonio Chrysostomou</i>	2025-06-13
Released by	Lewis Ball	Director of Operations	SKAO	<i>Lewis T Ball</i>	2025-06-13

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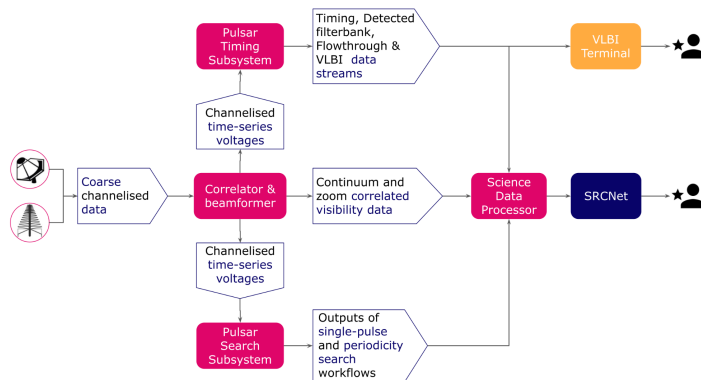


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Some information of interest for your community

The **transient buffer capture** mode consists of a buffer continuously recording a certain bandwidth of raw voltage data, in dual polarisation, corresponding to all Mid antennas and Low station beam data to capture transient events. ...

... The buffer can be dumped when an alert is received, either internally from the telescope (e.g., following the detection of a single pulse) or externally from multi-wavelength and/or multi-messenger triggers.



As defined in the Access Rules and Regulations of the SKA Observatory [AD7], the SKAO define three project categories:

- Key Science Projects (KSPs): projects that require significant observing time and resources over more than one observing cycle⁴.
- Principal Investigator (PI) projects: projects that require small to moderate allocations of telescope time, typically over one or a limited number of cycles within an overall time request threshold.
- Director-General's Discretionary Time (DDT): time allocated by the Director-General outside the normal allocation process, generally at short notice, when an unforeseen, unexpected or significant event has occurred requiring telescope time before the next cycle.



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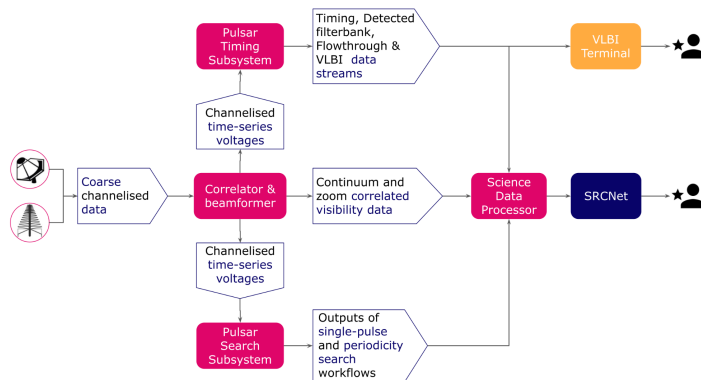
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These project types can be further categorised according to four additional attributes:

- Target of Opportunity (ToO; a pre-planned rapid response observation following an expected trigger),
- Long-Term Projects (LTP; projects requiring more than one cycle to complete, but require significantly less resources than a KSP),
- Joint SKA Projects (JSP; projects that require both Mid and Low to complete science goals, contemporaneously or not),
- Coordinated Projects (CP; projects that require coordination with an external facility or facilities, including but not limited to Very Long Baseline Interferometry (VLBI)).



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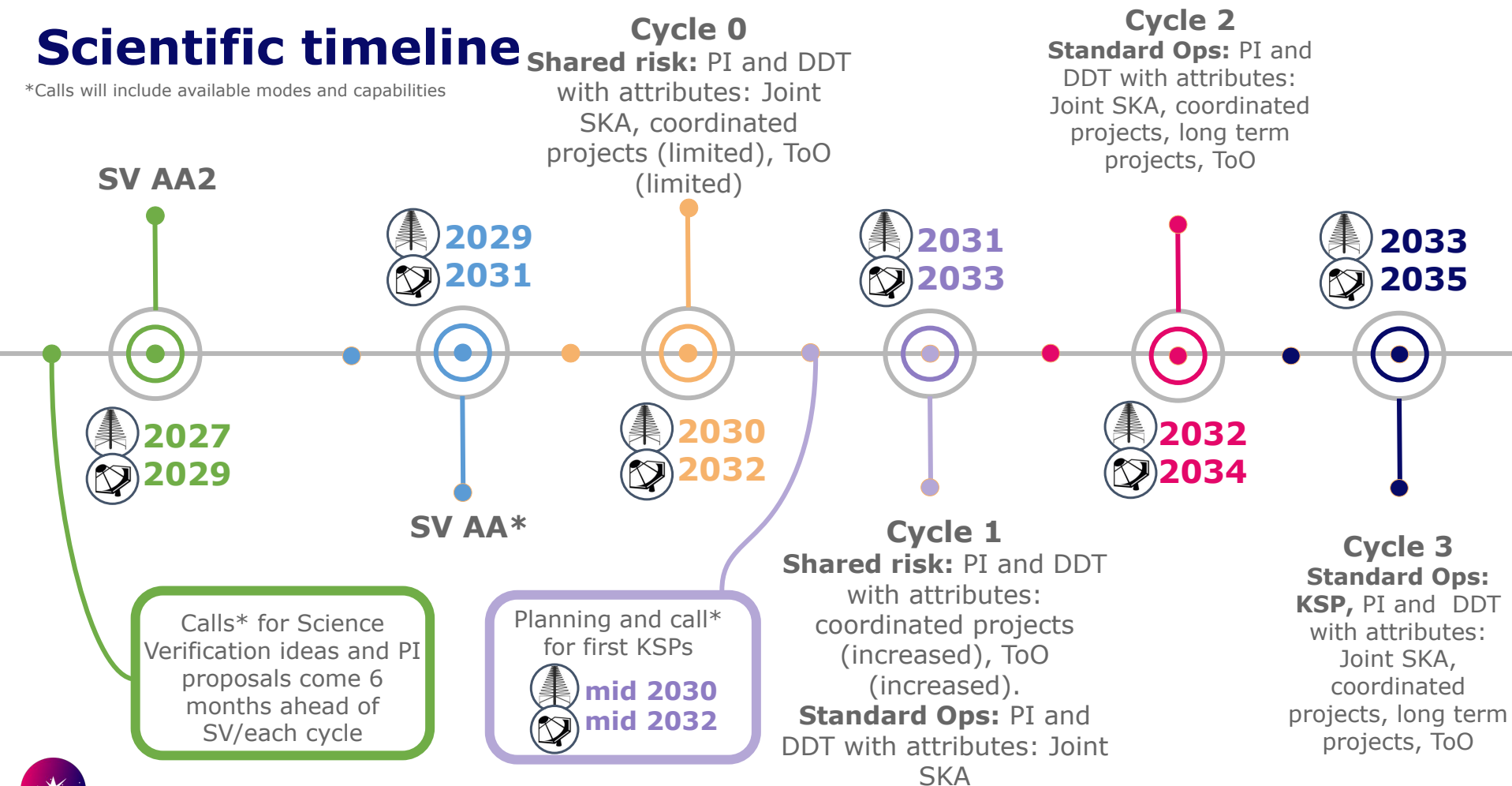
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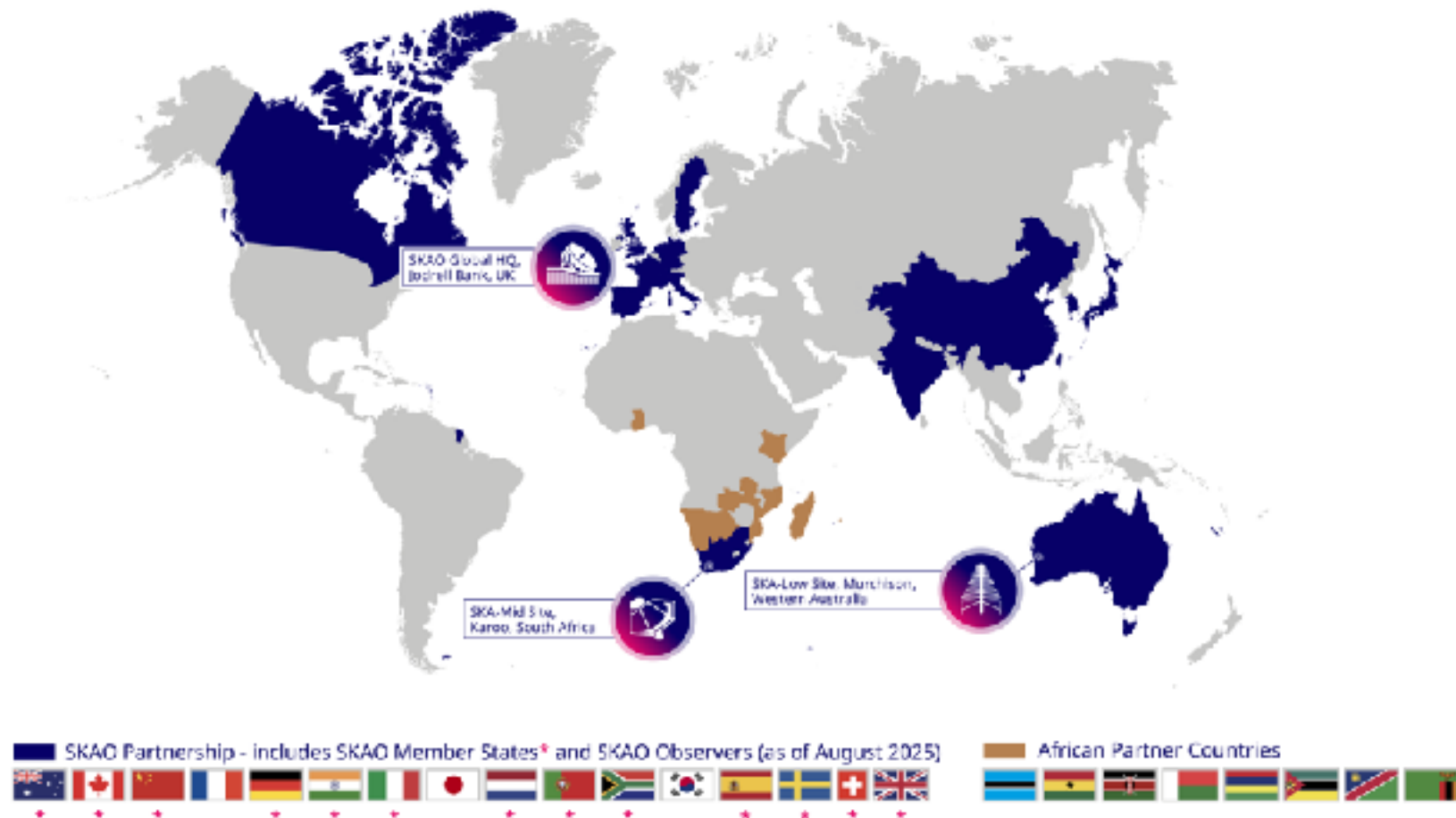
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Scientific timeline

*Calls will include available modes and capabilities



SKAO Membership



French membership: where we are



2021

Le Sénat

Actualités / France parlementaire / Projets et propositions de loi

Adhésion de la France à l'Observatoire du réseau d'antennes d'un kilomètre carré

Projet de loi autorisant l'approbation de l'accord entre le Gouvernement et le Royaume du Sénégal et l'Organisation du réseau d'antennes d'un kilomètre carré (OSKAC) relatif à l'adhésion de la France à l'Observatoire du réseau d'antennes d'un kilomètre carré par le Gouvernement le 10 octobre 2020.

Depôt au Sénat

- [Loi n° 121 \(2020-2021\) de M. Jean-Marc AVOINE, ministre de l'énergie et des affaires étrangères, déposée au Sénat le 21 octobre 2020 - \[Assemblée nationale\]\(#\) - \[Bulle d'impact\]\(#\)](#)

Première lecture au Sénat

Travaux de commission

COMMISSION DES AFFAIRES ÉTRANGÈRES DE L'ASSEMBLÉE DES FIANCES AMÉRICAINES

- [Commission des Affaires Étrangères](#)
- [Rapport n° 400 \(2020-2021\) de M. Jean-Marc AVOINE, ministre de l'énergie et des affaires étrangères](#)
- [Texte de la commission n° 400 \(2020-2021\) adopté le 10 mars 2021](#)

Séance publique

- [Comptes rendus des séances de l'Assemblée des Fiances Américaines \(17 mai 2020\)](#)
- [Réunion de l'Assemblée des Fiances Américaines](#)
- [Loi n° 121 \(2020-2021\) de M. Jean-Marc AVOINE, ministre de l'énergie et des affaires étrangères](#)

Première lecture à l'Assemblée nationale

- [Texte de la loi n° 121 \(2020-2021\) de M. Jean-Marc AVOINE, ministre de l'énergie et des affaires étrangères](#)
- [Loi n° 121 \(2020-2021\) de M. Jean-Marc AVOINE, ministre de l'énergie et des affaires étrangères](#)

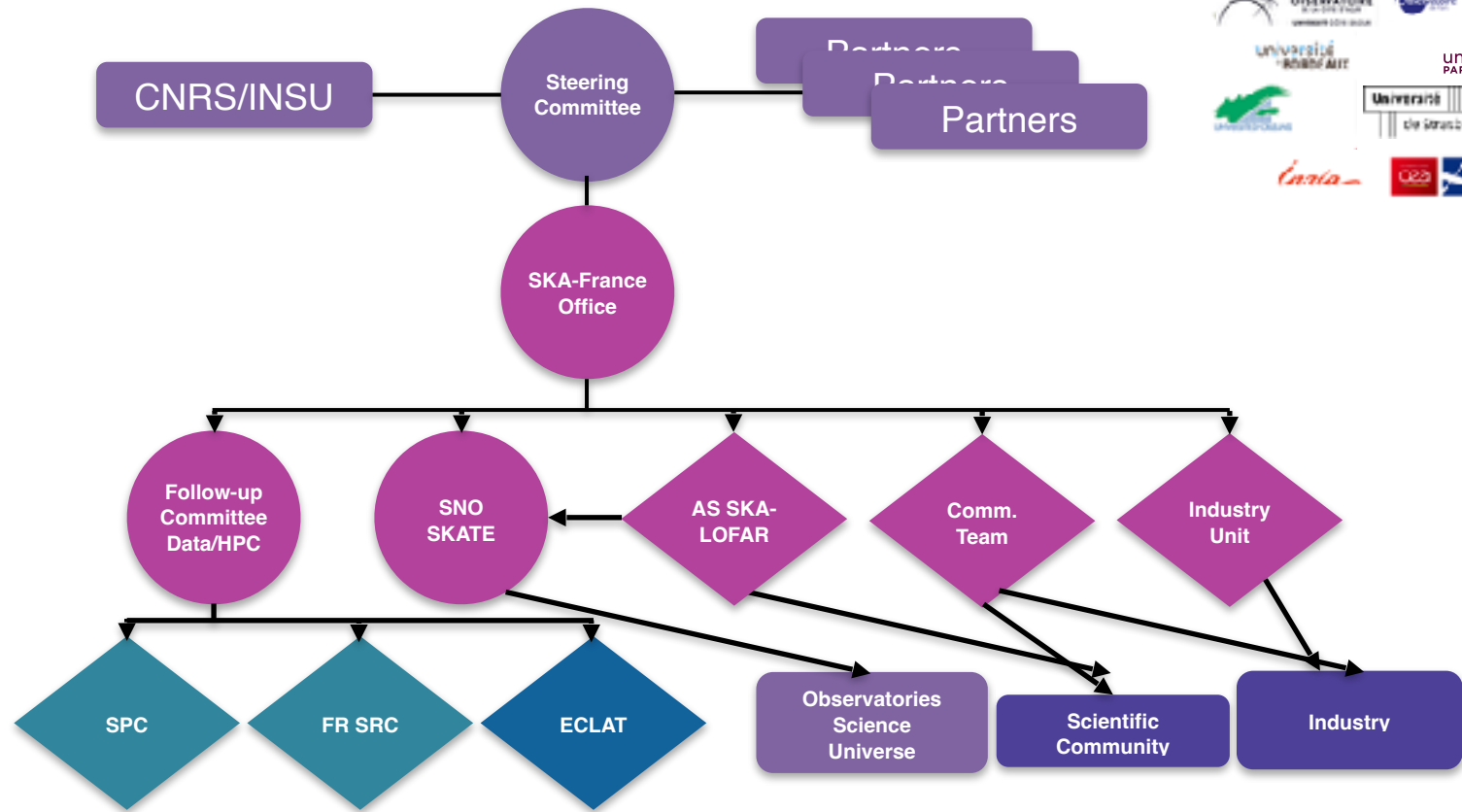
Les étapes de la discussion

1. Première lecture - Sénat
21 octobre 2020
2. Première lecture - Assemblée nationale
10 mars 2021
3. Comptes rendus de la procédure

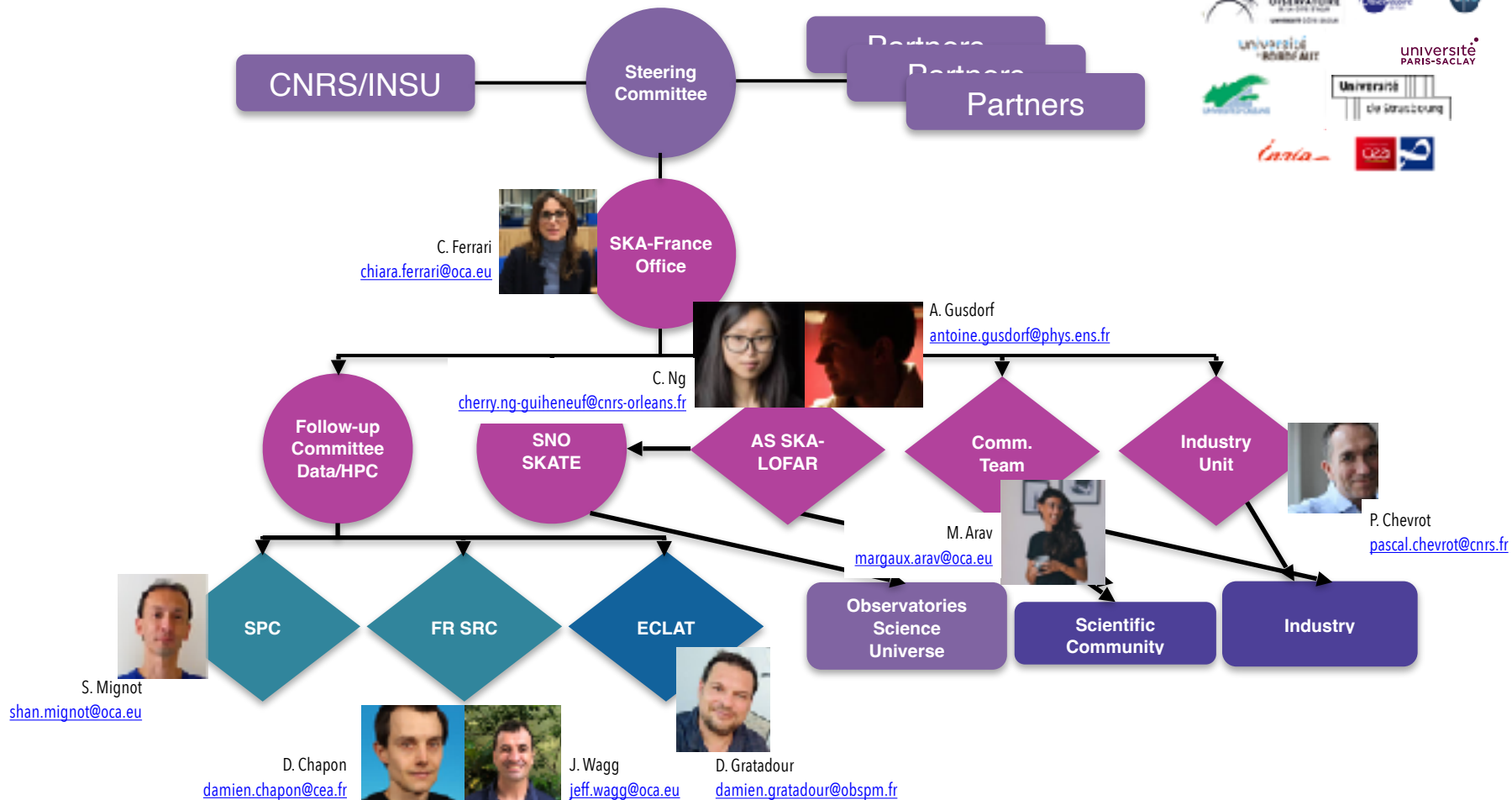
[Link](#)

2025

SKA-France: a national coordination



SKA-France: a national coordination

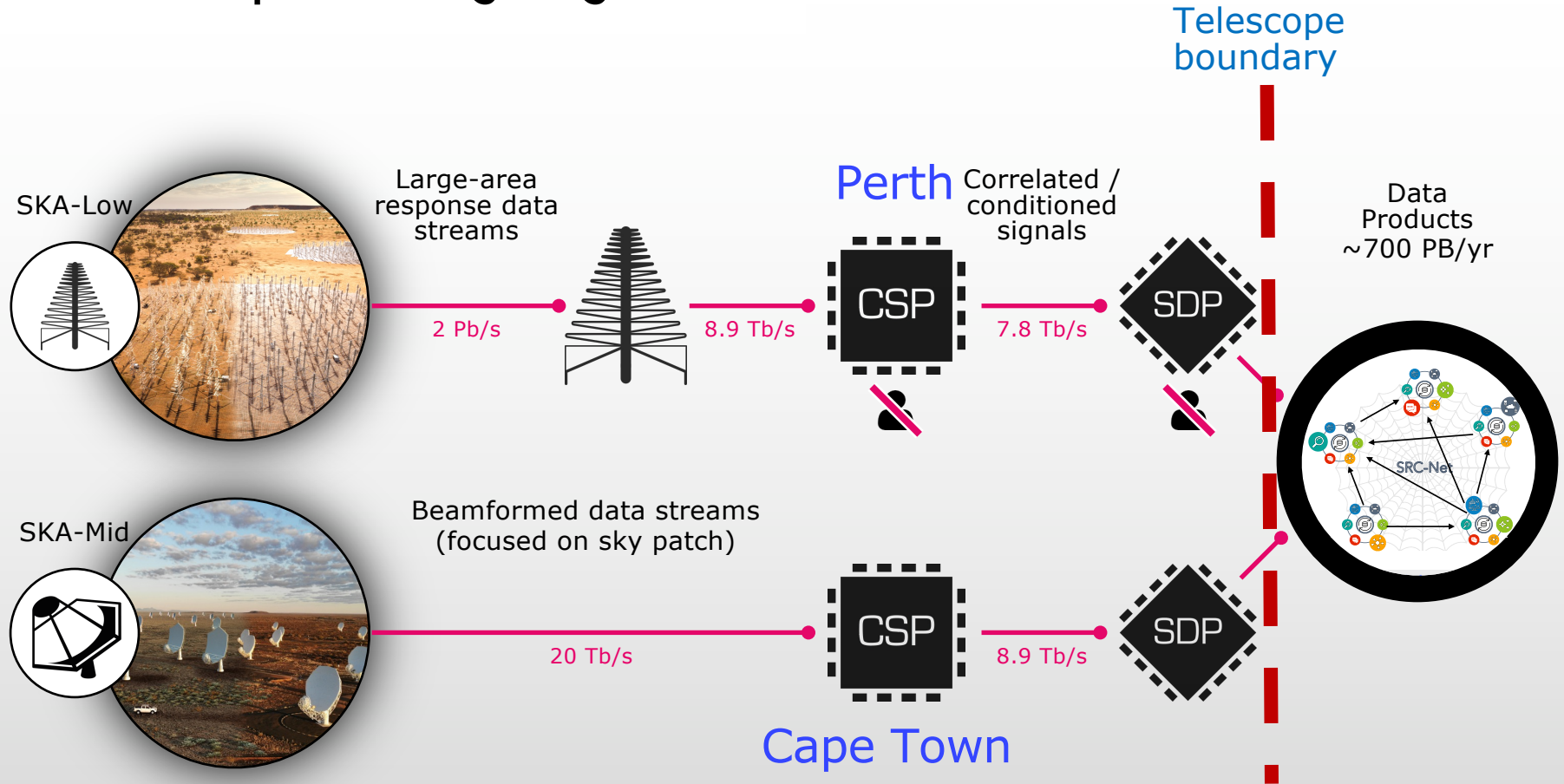


French participation in the SKAO

- A continuously growing scientific community preparing for the start of SKAO observations
 - Active exploitation of SKA pathfinders and precursors (NenuFAR, LOFAR, MeerKAT, ASKAP, FAST, ...)
 - Participation to all SKA Science Working Groups
 - Wide and recognised methodological expertise in data processing and analysis
 - The SKAO challenges interests a wider community of researchers, not only astronomers



SKAO data processing stages



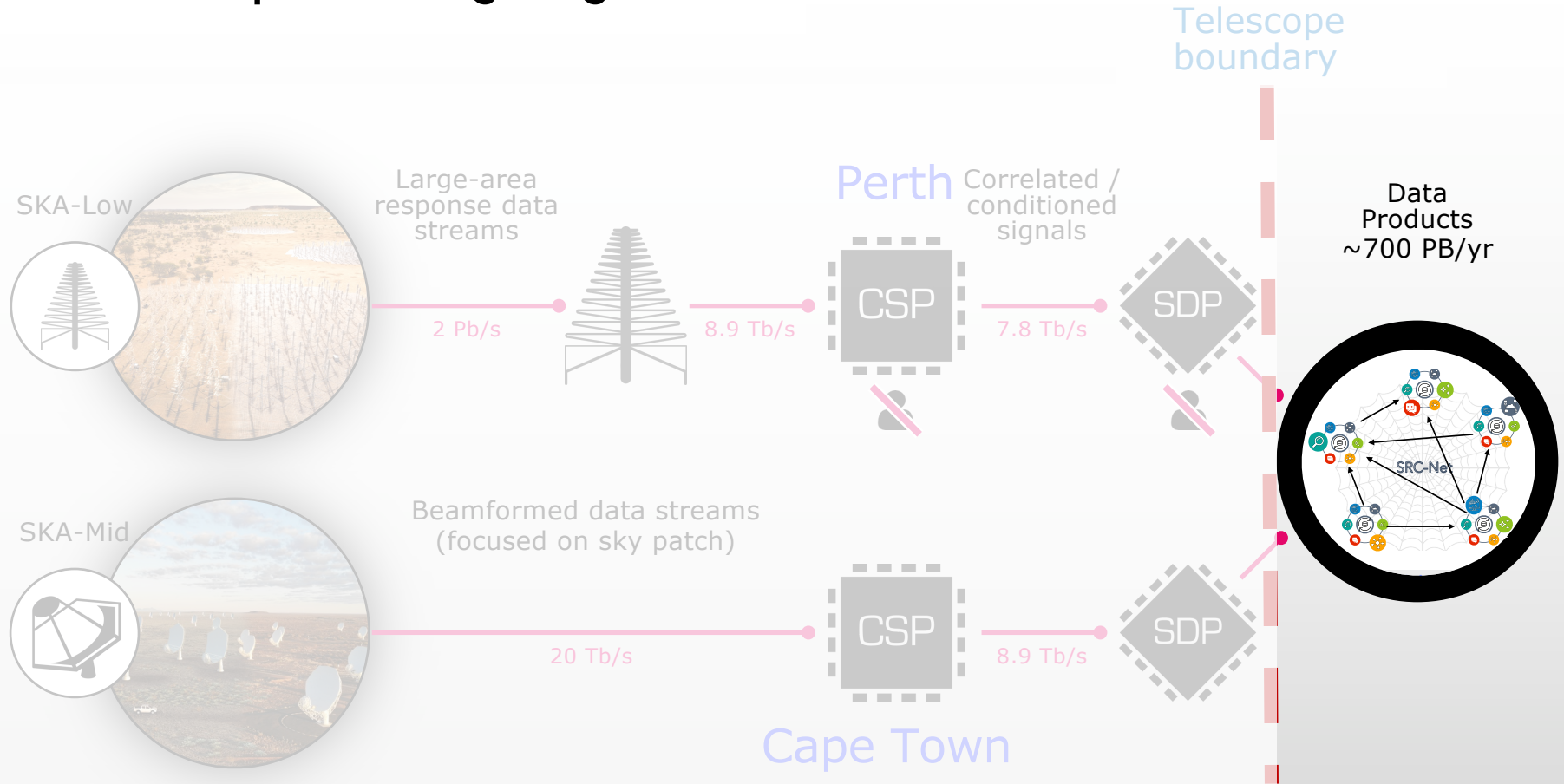
French participation in the SKAO

Construction & Operations

- Construction
 - Co-design & Equipment of the two sub-exascale computing centres of the Observatory
- Strategic objectives for SKA-France
 - Environmental sustainability of the project
 - Efforts made by France in the design of future SKAO computing centres with low environmental impact
 - Study of energy solutions for SKA-MID funded in 2019
 - SKA: fundamental research as a driver for strategic innovation and collaboration between academia and industry
 - SKA Regional Centre Network (SRC-Net): a new model of Data & Computing Centres for A&A



SKAO data processing stages



Objectives of the FR-SRC

- Contribute to the SRC Net at an appropriate level within the SKAO IGO
- Enable French scientists to lead/contribute to future SKA projects (KSP and PI)
- Provide to the French community the necessary access and support to SKA and pathfinders/precursors data
- Perspective: meet the needs of the French astronomical community

French SKA White Book

The French community towards the Square Kilometre Array

