



SKA update

Sarah Pearce

22 April 2020

Australia's National Science Agency





Prof. Philip Diamond

Director-General
SKAO

2019 SKA SHANGHAI MEETING

CONCLUDING OUR PAST, REALISING OUR FUTURE

继往开来 探索宇宙



25-28
NOVEMBER
2019
SHANGHAI
CHINA

HOSTS
Square Kilometre Array
Organisation
Ministry of Science and
Technology of the People's
Republic of China

ORGANISERS
SKA China Office
Shanghai Astronomical
Observatory, Chinese
Academy of Sciences



Switzerland's EPFL Joins SKA Organisation



The main EPFL campus in Lausanne sits on the shores of Lake Geneva (Credit: Mediacom EPFL; CC BY-SA 4.0)

Preparation for Treaty Organisation

Council preparatory taskforce (CPTF)

- Provisional Observatory Council
 - 7 signatories attend plus 9 observer countries
 - Agreed Observatory policies - IP, Access, Operations, procurement
 - Allocating construction work to countries
 - Fair work return considerations
 - Initial funding schedule
 - Oversee transition from current company to Observatory



Ratification of Treaty

Ratification Schedule - Mar 2019

Council 1?1



Member	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020
Australia				●		
China				●		
India						
Italy			✓			
Netherlands	✓					
Portugal				●		
South Africa			✓			
Sweden				●		
United Kingdom					●	

Deployment/ design baseline

“The CPTF, which, among other things, is developing the Construction and Operations Funding Schedule, has agreed to recommend to the future SKA Observatory Council that the Members seek to deliver the full funding required for the Design Baseline. The Construction Proposal will set out the required timing for the delivery of funds from the Members, which may not all be available at the point of construction approval, by efficiently staging the deployment of facilities with a clear commitment to complete the full Design Baseline of SKA1 in a timely manner.”

COVID-19 implications

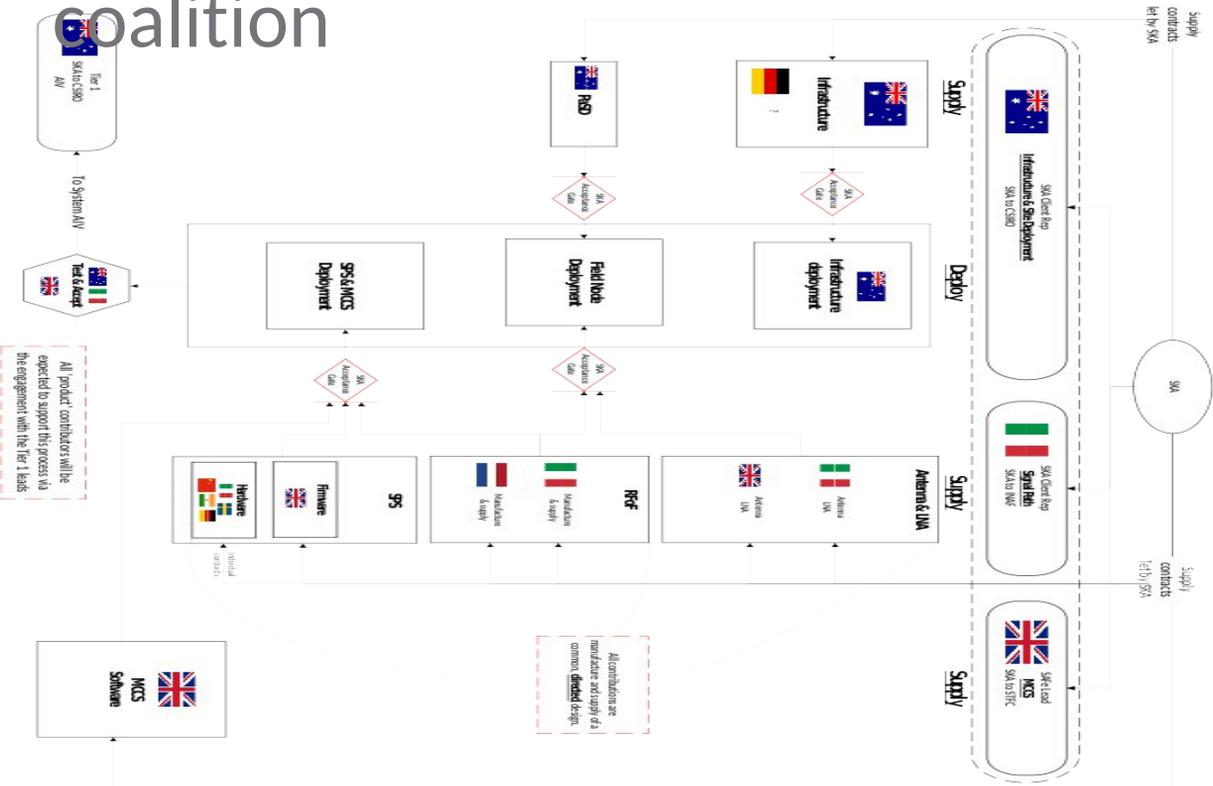
- 3 month delay in construction plan to Board/Council
 - To SKA Board in September
- Delay in UK ratification – hopefully still before end 2020
- Funding implications in Members not clear:
 - No additional funding for Australian Bridging work

Construction roles

- Provisional allocation of work packages agreed (Nov 2019) focused on members achieving 70 % Fair Work Return
- Australia (CSIRO) provisionally lead in:
 - Infrastructure
 - Infrastructure and Field node Management
 - Assembly Integration and Verification (AIV)
- And partner in:
 - CSP (correlator/beamformer) joint with Netherlands (CSIRO)
 - LOW Field Node (antennas, station power and fibre)
 - Italy lead (Curtin, CSIRO).
 - SDP (software and computing) – UK lead (UWA, Swinburne, CSIRO)
 - MID timing – UK lead (UWA)
- Approx 140 mEuro value

Infrastructure and field node

Coalition



System Critical Design Review



System CDR marked the culmination of six years of design work for SKA engineering teams.

NEW SKA-LOW PROTOTYPE SYSTEM INTEGRATION FACILITY TAKES SHAPE

BY ANNABELLE YOUNG (CSIRO)

Out the back of CSIRO's Astronomy and Space Science headquarters in suburban Sydney is the world's most advanced 'shed'. Unremarkable from the outside, this high-tech haven is where research engineers escape their offices to road-test technologies and piece together next generation radio telescopes. Despite the raging bushfires which blanketed Sydney in smoke over Summer, a dedicated team led by Research Engineer Dr Grant Hampson, transformed this workshop to create an integration test facility for the SKA-Low telescope.

Until recently, the 180 square metre space was used to test technologies for the Australian Square Kilometre Array Pathfinder (ASKAP) radio telescope. ASKAP is now operational, and the test facility has become the SKA-Low Prototype System Integration facility (SKA-Low PSI) – aimed at accelerating the development of SKA-Low.

The SKA-Low PSI will mimic the Murchison Radio-astronomy Observatory's "super-computing" control building – a major centre of

telescope control, monitoring, signal processing and communications. The new test facility offers a geographically accessible location for the SKA-Low telescope's digital 'backend' prototypes.

The SKA-Low PSI is enabling engineers to set up the telescope's electronic systems and experience some real-world challenges in an environment that mimics the site central facility. They can be executing continual tests which allows them to resolve issues and iron out unforeseeable bugs.

Hampson says there can be physical bugs, like a square connector versus a round connector – the classic square peg in a round hole. It may be surprising that an international project at the cutting edge of technology could encounter such a basic problem. However, these are very common and unavoidable in projects of this scale.

'Integrate early and often' is a common saying in the engineering world. Bringing parts of the telescope

together through early integration is a valuable opportunity to run tests, join the dots, and deliver precious savings in project time and money.

"We're going into this next phase of bridging to try and de-risk some of those interfaces and some of the test infrastructure needed to do that," says Hampson. "It's an important facility because you're looking at the integration of products for SKA - it's not only hardware but it's software as well."

Apart from the physical bugs, the software must 'talk to each other', and these software interfaces can also be driven through the SKA-Low test facility. SKA data flows are very complicated and testing these at the SKA-Low PSI gives developers the time they need to work through many of the complexities.

Most SKA products are developed independently, in local manufacturing and test facilities around the world in the various member countries. However, at some point they need to come

Left: Yuying Chen, CSIRO System Engineer, standing next to the upgraded Italian Frigo liquid chiller for the SKA-Low PSI facility. Credit: CSIRO



Above image: The new SKA-Low Prototype System Integration facility at CSIRO's Astronomy and Space Science division in Sydney. Credit: CSIRO

together for a complete demonstration. The SKA-Low PSI will initially be this place, and colleagues can come and tour the facility and see all the products in one place.

The SKA Office plays the important role of identifying the next product to be brought in for testing, and SKAO will be sending someone to work in the facility with the Low PSI team.

In construction, the SKA-Low PSI will be superseded with the Assembly Integration Verification (AIV) System Integration Test Facility (ITF) to be located in Geraldton, Western Australia. The AIV System ITF will be used for 'qualifying' products before they are placed on site.

The SKA-Mid telescope is also working on a PSI facility. Hampson says together we can learn a lot and help each other get SKA up and running.



Grant Hampson, CSIRO Research Engineer, takes the Australian Telescope National Facilities (ATNF) Steering Committee on a tour of the SKA-Low PSI facility. Credit: CSIRO

“IT'S AN IMPORTANT FACILITY BECAUSE YOU'RE LOOKING AT THE INTEGRATION OF PRODUCTS FOR SKA - IT'S NOT ONLY HARDWARE BUT IT'S SOFTWARE AS WELL.”

Dr Grant Hampson, Research Engineer



The MRO

- Site Entity
 - New Site Entity Leader appointed – Rebecca Wheadon
 - Includes radio quiet, site management, executing ILUA benefits
- Some delay due to Covid-19
- Heritage Surveys
- Lease
- ILUA
 - Requires community meeting





Operations in Australia



- SKA operations will be partnership between SKAO and CSIRO
- MoU close to agreement with SKAO:
 - Detailed staffing ~agreed
 - Australian Director employed by SKAO
 - Staff on site - CSIRO
 - Also construction support staff
- Key issues
 - Staff planning
 - Budgets
 - HSE
- New Head Operations started – Lewis Ball

Commissioning Scientists

- Understand the system as a whole; be able to diagnose faults in collaboration with hw/sw (AIV) engineers
- Collectively be able to cover all of the key areas listed below
- Have experience with technically similar projects
- Have data reduction and scripting skills
- Collaborate effectively with other disciplines
- Know what science users expect
- Useful skills:
 - General control, scripting, data reduction: off-line initially then SDP pipelines
 - Dish/Station performance: pointing, beams, efficiency, etc
 - Interferometry and correlation: correlation modes, delay/position, bandpass, flux, leakage calibration
 - Imaging and self-calibration: deconvolution, sky models, DI/DD self-calibration, beam models
 - Beam forming
 - Pulsar search
 - VLBI
 - RFI excision



Australian SKA Regional Centre

- Partnership: UWA, Curtin, CSIRO, Pawsey, ASKAP, MWA, AAL
- 3 years funding for first phase
- Projects with ASKAP and MWA
- Roles being advertised
- International SRC structure under consideration
- Engagement with optical, grav wave, theory



SKA Regional Centres

A White Paper by the SKA Regional Centre Steering Committee

V0.7, 21 February 2020

Peter Quinn (Chair, Australia), Michiel van Haarlem (Deputy Chair, Netherlands), Tao An (China), Domingos Barbosa, (Portugal), Rosie Bolton (SKA), Antonio Chrysostomou (SKA), John Conway (Sweden), Séverin Gaudet (Canada), Hans-Rainer Klöckner (Germany), Andrea Possenti (Italy), Simon Ratcliffe (South Africa), Anna Scaife (UK), Lourdes Verdes-Montenegro (Spain), Jean-Pierre Violette (France), Yogesh Wadadekar (India)

PURPOSE AND AUDIENCE

This white paper is intended to provide a common descriptive framework and dialogue for SKA Regional Centres (SRCs) that will enable the SKA Observatory (SKAO), the SRC Steering Committee (SRCSC) and the SKA community to jointly define the function and form of an operational SKAO/SRC collaboration that maximizes the ongoing scientific outcomes of the SKA. The audience for this paper covers the SKAO Board/Council, its advisory bodies and the national efforts aimed at developing individual SRCs including their stakeholders and funding agencies.

Jobs at UWA

Prospective staff

Director (Australian SKA Regional Centre)

Job no: 504227

Work type: full-time

Location: Crawley

Categories: Engineering and Mathematical Sciences

[International Centre for Radio Astronomy Research \(ICRAR\)](#)

[SKA Regional Centre Australia](#)

- ◊ Full time, three year, fixed-term appointment, with the potential to transition to an ongoing (continuing contingent) appointment
- ◊ Salary range: Level D, \$146,992 - \$161,715 p.a. plus employer contributed superannuation of 17%



SKA Science meeting and KSP workshop

- March 2021, Cape Town
- Up to 350 participants
- Title: “The Precursor View of the SKA Sky”
- Main venue secured, details being finalized





Thank you

We acknowledge the Wajarri Yamatji as the traditional owners of the observatory site