

37th TANGO Community Meeting Welcome

Marco Bartolini



Welcome TANGO community !









Our numbers

Thanks everyone

We have **100 people** registered for the event and **38** contributions from the community.

In the spirit of a community meeting, we tried our best to give space to all talks, as a result talks are a bit tight, thanks for sticking to the time allocated.

Let's use social events and slack for offline discussions!















Health and Safety at SKAO HQ

If the **Fire Alarm** sounds – **Evacuate** to the main **car park** and await further instruction, do not leave the site

No Fire Alarm Drills are planned at SKAO HQ this week

- For **First Aid** requirements, please contact reception
- **COVID Lateral Flow Tests** are available at reception, if you feel unwell please do test
- **Rest rooms** are adjacent to the main reception desk
- **No smoking** inside or around the perimeter of the building
- Mobile phone use is allowed only within the SKAO HQ building, WIFI calling is preferred. Mobile phone usage outside of the building is **STRICTLY PROHIBITED**



Use **SKAO HQ Floor Plan** to orient yourself





Assembly Point – Main SKAO Car Park







- 48% +

Working Agreements

Remember it's a **hybrid** meeting:

- Raise physical hand to ask questions (present)
- Raise virtual hand to ask questions (zoom)
- One conversation at a time
- Assume positive intent when unsure
- Be present
- Respect the timeboxes
- Stay muted to minimise background noises 22











All sessions are subject to the SKA Code of Ethics and Conduct.



Digital Coordinates

Zoom

All plenary meetings will use the same zoom room (link): ID: 619 661 2423 PASS: 855663 When presenting, share your presentation via zoom Indico <u>Conference website</u>, remember to upload your presentation!

Slack

<u>#37th-tango-meeting-2023</u> on TANGO slack

Miro

Feedback board and workshop ideas







Breaks and food



Catering for the meeting is provided in the **buffet area** with the glass doors, all the tables can be used.



Lunch and Coffee breaks will be served in the HUB area, next to the council chamber, at the right of the reception.



Transports

- (Map link) and return at 17:00 from SKAO HQ from Alderley.
- Thursday morning transports to the SKAO HQ, our reception can help arranging TAXIs to the airport.



 Pickup at 08:15 from the Wilmslow lodge car park (<u>Map</u>) link) and 08:30 from the Traffods Arms in Alderley Edge Social Dinner at the Giggling Squid (<u>Map Link</u>) in Alderley Edge, pickup at 18:30 from Wilmslow. Walking distance





Social Events



- We will walk straight from here today at 15:30 • Meet at the reception at 15:30, some umbrellas will be available
- Need to go there directly sharp after the end of our session
- The Giggling Squid in Alderley Edge Walking distance from within Alderley • Pickup at 18:30 from the Wilmslow Lodge

First Light Pavillion

Social Dinner





Program Detailed view on INDICO

			Sol Landa			
Tue 2	7/06 Wed 28/06 Thu 29/06 All days	>	Tue 27	7/06 Wed 28/06 Thu 29/06 All days		
	Print PDF Full screen	Detailed view Filter		E Pr		
09:00	Coffee and welcome		09:00	TANGO Community Devices and Tools: TANG		
	Council Chamber, SKAO	09:00 - 09:30				
	Facility Status Update: Facility status update 1	Lorenzo Pivetta				
10:00			10:00			
				Council Chamber, SKAO		
	Council Chamber, SKAO	09:30 - 10:50		Coffee Break		
	Coffee break			Council Chamber, SKAO		
11:00	Council Chamber, SKAO	10:50 - 11:10	11:00	TANGO Web Tools: TANGO Web Tools		
	Facility Status Update: Facility Status update 2	Sonja Vrcic				
12:00			12:00			
	Council Chamber SKAO	11.10 12.20		Council Chamber, SKAO		
	lunch break	11:10 - 12:30		Lunch break		
13:00			13:00			
				Council Chamber, SKAO		
	Council Chamber, SKAO	12:30 - 13:30		TANGO Ecosystem Updates: Contingency se		
	TANGO Ecosystem Opdates: TANGO Ecosystem Opdates	Nicolas Leciercq				
14.00			14:00			
14.00						
15.00			15:00	Council Chamber, SKAO		
15.00				Coffee Break		
	Council Chamber, SKAO	13:30 - 15:30		Council Chamber, SKAO		
	Visit to Jodrell Bank Observatory			TANGO Adoptions design and techniques: TA		
16:00			16:00			
	Council Chamber, SKAO	15:30 - 17:00		Council Chamber, SKAO		
17:00			17.00			









Workshops on Thursday morning

- No fixed agenda, open format
- Not a training event
- Aim for brainstorming and discussion, with active participation
- We expect your proposal on MIRO and we'll announce Wednesday evening the themes for the Thursday morning
- Up to 3 workshops can run in parallel
- Some ideas have already been collected:
 - Documentation
 - o IDLv6

• Operations, obsolescence, software updates Feedback session on TANGO adoption



SKAO update







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."







One Observatory, Two Telescopes









Membership April 2023

The Square Kilometre Array Observatory (SKAO)

An inter-governmental organization, governed by a treaty. SKAO was born on 4th February 2021.



Australia, China, Italy, Netherlands, Portugal, South Africa, Switzerland, UK

Spain (Imminent; articles deposited in London) Germany (Jul 2023; funding provided) Canada (Nov 2023; funding provided) France (Dec 2023; internal process)

India, Sweden (+ Canada, France)

Japan, South Korea



SKA MID Telescope





133 SKA 15m dishes

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- **64** MeerKAT 13.5m dishes
- Maximum baseline **150 km**
- 3 logarithmic spiral arms
- ~ 50% within ~2 km randomly distributed



First on-site dish prototype April 2019





MeerKAT antennas in the Karoo



SKA MID Image Quality Comparison

mod8k0v2s.ska1.sub



mod8k0v2v.vlaABCD.sub

Right Ascension (J2000)

Between 10 and 100 times the \star image fidelity of current facilities

 \star

Single "dirty" SKA1-Mid snap-shot compared to combination of four "dirty" snapshots, one in each of JVLA A+B+C+D



SKA LOW Telescope





SKA1-Low Antenna/Receptor

Antenna Beam

SKA1-Low "Station"

Station Beam



SKA1-Low "Array"

Correlation and Tied-array Beams

- ★ 512 aperture array stations
- ★ Maximum baseline 65 km
- \star 3 modified spiral arms
- ★ ~ 50% within ~1 km randomly distributed
- ★ Others in clusters of 6 stations arranged randomly over an area 100 to 150 m in diameter



★ ★

256 antennas per station38m station diameter



SKA LOW Telescope



- 512 aperture array stations
- Maximum baseline 65 km \star
- 3 modified spiral arms \star
- ~ 50% within ~1 km randomly X distributed
- Others in clusters of 6 stations \star arranged randomly over an area 100 to 150 m in diameter



256 antennas per station × 38m station diameter \star





SKA LOW Image Quality Comparison





modl8k0v2s.lofari.sub

- \star Between 10 and 100 times the image fidelity of current facilities
- Single "dirty" SKA1-Low \star snap-shot compared to LOFAR "dirty" snapshot

Perspective: SKAO Anticipation

In Australia and South Africa, construction has started on the biggest radio observatory in Earth's history

Published: December 5, 2022 1.24am GMT

How the SKA telescope is boosting South Africa's knowledge economy

Published: May 30, 2018 2.28pm BST

Technology, international bonds, and inspiration: why astronomy matters in times of crisis

Published: May 15, 2020 6.32am BST

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.

Event	MID	LOW
Construction Approval	2021 Jul	2021 Jul
Integration Test Facility start	2023 Jan	2023 Feb
AA0.5 Integration and Verification start	2024 Jul	2024 Jul
AA0.5 end	2025 Jan	2024 Nov
AA1 end	2025 Dec	2025 Nov
AA2 end	2027 Jan	2026 Oct
AA* end	2027 Oct	2028 Jan
Operations Readiness Review (handover to Operations)	2028 Jan	2028 Apr
End of construction (including contingency)	2028 Jul	2028 Jul

First data release to the community expected around AA2 (currently 2026/27) for commissioning and verification Planned schedule contingency has also been used to manage global and observatory impacts.

Operations Context

SKA Data Flows

Different computing models at different stages

- Real-time processing to lower data rates
- Storage and "big data" batch analysis

SKA Software - Key components

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Telescope Control System

the three key areas:

- Instrumental monitor and control
- U Observation configuration, execution and monitoring
- **Support for sub-arraying**
- Implementation is based on the

TANGO controls framework TANGO

The role of the Telescope Control System may be classified in

LOW and MID Telescopes - NOW -**Telescope Monitoring and control**

- Subarray creation and resource allocation
- Control of CSP & SDP Observing State transitions to allow a typical 'imaging scenario' in Cloud environment
- TMC/OSO scripting command time-out and recovery to appropriate previous state.
- Engineering Data Archive (EDA) ready for use
- Initial monitoring and control dashboards available

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LOW Telescope - NOW - MCCS

- Focus on enabling station level verification
- Data acquisition to file allows capture of data for offline processing
- TPMs can create beams with simulated data
- TANGO device hierarchy in MCCS software to monitor and control hardware
- Basic TPM monitoring points available in MCCS and simple dashboards demonstrated
- Devices for monitoring of Smart Boxes developed in MCCS (Modbus drivers to connect to actual hardware in progress)

Test execution - results

- Pol 1 Discrete pointing scan Orange: zenith beam Blue: +22 degree beam Pointing step: 2.5% geometric delay

Delay rate: ~1.1 arcmin/second Samples: 0.283s total power integration

Slide / 28

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LOW Telescope - NOW - PSI Integration

By the end of the PI we are able to demonstrate a working LOW integrated signal chain consisting of: Test signal \rightarrow CBF correlator \rightarrow SDP signal \rightarrow Measurement Sets

This is commanded using simple scripts connecting to the low-level control interfaces (CSP LMC and/or CBF LMC and SDP LMC). **DP DEMO 18.2**

PI17 Demo Advancing the integration of the LOW CBF with the control system and verifying control interfaces

Advances in the development of the Interface with Pulsar Processing

MID Telescope - Now - Dish LMC

- Dish LMC control of SPFRx (end of PI18) at MID PSI.
- Dish LMC forward logs from SPFRx to SKA logging
- Dish LMC modes SetStandbyLPMode, SetStandbyFPMode, SetOperateMode, SetStowMode, ConfigureBand2 and Track available
- Dish LMC dashboard available

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MID Telescope - NOW - PSI Integration

Testing of the MID signal chain consisting of

Test signal \rightarrow SPRFx \rightarrow MID CBF \rightarrow SDP \rightarrow Measurement Sets

has been demonstrated at the MID PSI by use of a minimal direct control of signal chain components.

Integration of **Dish LMC** with **SPFRx** Controller

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

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