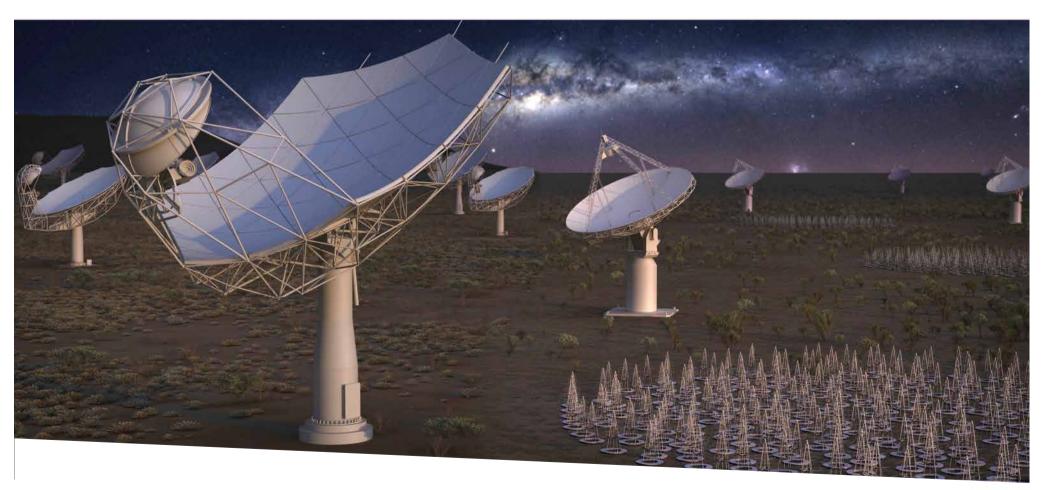
# **SKA SWG Update**





SQUARE KILOMETRE ARRAY

**Robert Braun, Science Director** 

Exploring the Universe with the world's largest radio telescope

9 October 2018



# **Agenda**

- Critical Design Reviews
- SWG Science Posters
- SKA Data Challenges
- SKA Science Meetings
- Community Updates

# **CDR Activity – Updates**



Element	RRN Submission	CDR Submission	CDR Meeting
TM	29 January 2018	28 February 2018	17-20 April 2018
SaDT & SAT	17 January 2018	28 February 2018	15-18 May 2018
INAU	19 March 2018	30 April 2018	27-29 June 2018
INSA	19 March 2018	30 April 2018	2-4 July 2018
CSP	18 May 2018 - PSS, PST, CBF-Low, CBF-Mid Sub- Element CDRs	30 June 2018	25 – 28 September 2018 !!
SDP Pre-CDR SDP CDR	9 March 2018 17 September 2018	25 April 2018 31 October 2018	20 – 22 June 2018 15 – 18 January 2019
LFAA	15 October 2018	29 October 2018	11 – 13 December 2018
AIV	29 October 2018	30 November 2018	<u>18 – 22 February 2019</u>
DSH Pre-CDR DSH CDR	7 September 2018 1 Apr 2019 - Band 1, LMC Sub-CDR 20 Sept 2018 - DSH Struct Sub-CDR 1 Apr 2019 - Band 2 Sub-CDR 1 Apr 2019 - Band 5 Sub-CDR 27 Aug 2019	? October 2018 22 April 2019	26 – 27 November 2018 27 May 2019 (DSH, B2) 23 Oct 2019 (B1, B5)
System			Q2 2019

**Green: Successful phase** 

**Blue: Updated from last report** 

**Red: Post System CDR** 

### **SWG Posters**

- Aim to have a poster for each SWG, similar to those put together by the Consortia (see next slide)
- First use would be AAS in January, then the April SKA meeting, ...
- Asking each SWG to produce a poster by mid-November
  - Suggest each SWG find someone from their core group to lead (can be co-chair)
- Size and template as shown on next slide (to be provided to SWGs)

Exploring the Universe with the world's largest radio telescope

### The Square Kilometre Array and the Cradle of Life

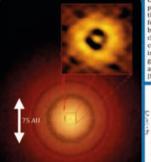




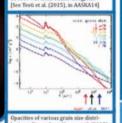


### From planet formation to the distribution of life with the SKA





loagulation of µm-sized dust articles in circumstellar disks i he first step in planet formation Crossing the 'cm parrier' is theoretically hallenging, Wavelength overage and resolution of SKA needed to observe cm-size grains at solar system scales and at low vertical scale-heights. ee Testi et al. (2015) in AASKA14)



3. Detect existence and study properties of exoplanet magnetic fields

The magnetic field of a planet probes its interior and its habitability, because (1) it can protect the atmosphere and surface from high-energy particles, and (2) it may imit atmospheric escape. SKA1-low will be

sufficiently sensitive to detect magnetospheric radio emissions revealing magnetic fields of gas giant planets, analogs of Jupiter, and potentially even the auroral emission of the host planet. Intended sample: 250 stars and hundreds of exoplanets with 10 pc of Earth

(See Zarka et al. (2015), in AASKA14)



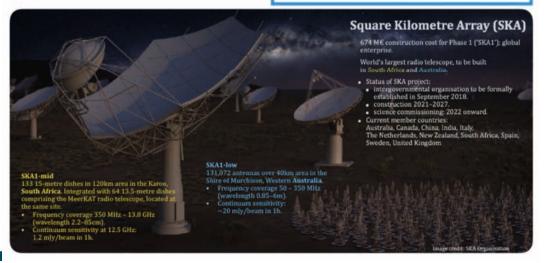
SKA1 will be capable of detecting emiss terrestrial transmitters such

as airport radars. For a source at 10 pc distance, a detection could be made in 15 minutes. With longer integrations, unbiased urveys of all (>10,000) stars within 60 pc are



The SKA Cradle of Life science working group (SWG) is one of the elever working groups advising the SKA Organisation on design, uture operations, with a focus on the above science topics. Sign-up is open to scientists from any country. Speak to Matthijs, or contact one of the current SWG chairs, Izaskun Jimenez-Serra or Doug Johnstone

Note: SWG ≠ key science project (KSP). Proposals for KSPs: -late 2022. KSPs w use ~50%-70% of time in first years of operations.





The SKA Dish Consortium is responsible for all activities necessary to prepare for the procurement of the SKA dishes, including the design and verification of the antenna structure, optics, feed suites, receivers, and all supporting systems and infrastructure for SKA1-mid.

The Dish element of the SKA includes planning for manufacturing of all components, the shipment and installation on site of each dish (including feeds and other components) and

One of the greatest challenges for the dish consortium is the mass production of several thousand 15m wide dishes, all with identical performance characteristics, all built with new design ideas, and built to lest and tolerate the harsh conditions of the deserts in which they will operate. Combine with that the overriding element of cost, and getting the very best price to performance ratio, and the dish element of the SKA is a formidable technical and engineering challenge.





### Milestones

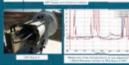
- Detailed Design Reviews scheduled for 2016
- The optics for the SKA antenna was finalised March 2015.
- SKA-mid Band-5 added as a deliverable for SKA1 in design concept enhancing sky frequency coverage.
- SKA-mid Band-1 Single Pixel Feed horn design completed and prototype testing underway at NRC.
- New members have recently joined the consortium (see below)

### Single Pixel Feed observing frequency and sensitivity

Band 1	0.35-1.05 (Ghz)	284
Bánd 2	0.95-1.76	10
Bland 3	1:65-3:05	SO#
Eland 4	285.18	la l
Band 5	4.6-13.8	25K







e consortium is het by Reger Frances of CSPO in Australia with 21 additional medicines amount the world, noticing C CLILLARD, MPRII, Vertra, ISS Franchiste, RASF, EE, CAAA, SIGA Sigats Africa, SASSI, Universidad Publica de Favorra entains, benefit (Secretical Consortium).



The Central Signal Processor (CSP) is the "brain" of the Square Klonetre Array (SKA). It converts digitated successful and the Square Klonetre Array (SKA). It converts digitated extronomical agrants detected by the SKA receivers into information needed by the Skience Data Processor. The CSP element includes design of the hardware and fermaner-bottoms necessary for the next generation of visibilities, pulser survey.













### Telescope Manager Consortium

The "Telescope Manager" element includes all hardware and software necessary to control the SKA telescopes and associated infrastructure. The TM includes the co-ordination of the systems at observatory level and the software necessary for scheduling the telescope operations. It also includes the central monitoring of key performance metrics and the provision of central co-

### Telescope Manager (TM) Status

### A schematic Diagram of Telescope Manage



BM1				
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### TM Primary Responsibilities



### TM Key Challenges



### Mitigation Strategy









Milestones

Stage 1 Closure

Stage 2 Closure

□ Sub-element CDRs & Prototype Test Reports





### Templates have finally been provided

- The banner/poster will be designed on a large canvas, in portrait orientation.
- For the InDesign file, we have marked the areas that you should **not edit**, with the editable areas clear of these marks. The design file itself is already at the correct dimensions. Below are also the basic criteria for InDesign to follow:
  - Font: **Eurostile Demi**
  - Font sizes; smallest: 30pt

Largest: 146pt

- Please provide a variety of relevant imagery, with all images provided being of the highest resolution possible. If the images are of poor quality, they can't be used. Please also provide the appropriate credits for each image.
- A main blurb of text detailing the general description of the SWG
- Text on what are the big questions (no more than 4, preferably less) they are trying to answer and the main science driver
- We don't need a detailed description of the SKA on these banners (unlike the example banner from CoL)

# DO NOT EDIT

General
Text/Blurb

Images/ Short Text





## **Data Challenges #1**

- Hope to release before end of October
- Continuum sub-band images ( $\Delta v/v_c = 30\%$ )
- SKA1-Mid, three frequencies:  $\nu_c$  = 0.56, 1.4 and 9.2 GHz
- One pointing: 8<sup>h</sup>, 100<sup>h</sup> and 1000<sup>h</sup> observations
- Data info:
  - Images of 32k pixels per side for the full FoV
  - 0.60" FWHM resolution at 1.4 GHz
  - Size of a single frequency slice: 4GB (x9 = 32GB total)
- Advertising soon for SKAO Post-doc position for radio astronomy simulations:

https://recruitment.skatelescope.org/category/ska-jobs/



- 2019 AAS SKA Splinter Session, Seattle, 6 – 10 January (next slides)
- 2019 URSI-AP-RASC, New Delhi,
   9 15 March
- 2019 SKA Science Meeting and KSP Workshop
  - Registration and abstract deadline:
     26 October
  - Web site: <a href="https://indico.skatelescope.org/event/467">https://indico.skatelescope.org/event/467</a>
- 2020 URSI GA, Rome, 29 Aug 5 Sept.
  - Call for workshops/sessions





## **AAS Splinter Session**



Preparations for 2020 US Decadal Survey underway (first science white papers due in January)

SKAO to host a splinter meeting at the January 2019 Winter AAS Meeting (Seattle), to ensure the US astronomy community (not just the radio community) is informed of

- the current status of SKA1
- 2. the expected capabilities of SKA1 and vision for SKA

The splinter meeting aims to:

- 1. show how SKA1 enhances primary thematic science areas presented by the Committee on Astronomy and Astrophysics
- 2. present possible paths for US involvement in SKA in the next decade

The winter AAS meeting is the largest annual gathering of astronomers in the world, and the next winter AAS presents one of the last opportunities for any community to show how their facility will address the key thematic science areas in a public forum which may contain panelists involved the decadal review.

## **AAS Splinter Session**



### Tuesday January 8, 9.00-11.30 (TBC)

- **1. Keynote**. The SKA vision. Jocelyn Bell Burnell (Invited, TBC)
- 2. Evolution of Galaxies

Kristine Spekkens (Invited, TBC)

3. Cosmology and the Cosmic Dawn/EoR

Jackie Hewitt (Invited, TBC)

4. A dynamical Universe: Gravitational Waves and Fast Radio Transients.

**Ingrid Stairs** 

5. Cradle of Life: formation of planets and search for ET life

**Doug Johnstone** 

6. SKA Current status. Joe McMullin (SKA Programme Director)

Science Topics extracted from list of Thematic Science Areas for Astro2020 (US Decadal review) White Papers.



## **Community Updates**

- Upcoming SWG/FG Meetings?
  - Scintillometry Workshop: 22/26 October, Shanghai
  - HI PHISSC: 11/13 February, Perth
  - FRBs: week of 18 February, Amsterdam
  - Others?
- Updates from participating SWG/FG Chairs
  - 5555

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www.skatelescope.org