SKA SWG Update

Robert Braun, Science Director

9 October 2018
Agenda

- Critical Design Reviews
- SWG Science Posters
- SKA Data Challenges
- SKA Science Meetings
- Community Updates
## CDR Activity – Updates

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

**Green:** Successful phase  
**Blue:** Updated from last report  
**Red:** Post System CDR

Exploring the Universe with the world’s largest radio telescope
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
**Dish Consortium**

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

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 the acceptance testing.

One of the greatest challenges for the dish consortium is the mass production of several thousand 15m wide dishes, all with identical performance characteristics, built with new design ideas, and tested to meet the harsh conditions of the deserts in which they will operate. Combine with that, the over-riding element of cost, and getting the best price to performance ratio, and the aim of one of the SKA is to be a transformative technical and engineering challenge.

**Milestones**

☑️ Pre-investment Design Review was completed in 2010.
☑️ Detailed Design Reviews scheduled for 2011.
☑️ The optics for the SKA antenna were evaluated March 2012.

Design recommendations include Single Pixel feeds and Phased Array feeds with optimal performance.

SKA-mild Band 5 acted as a deliverable for SKA in design concepts enhancing sky frequency coverage.

SKA-mild Band 5 Single Pixel Feed horn design complete and prototype testing underway at NRC.

New members have recently joined the consortium (also)

**CSP Consortium**

The CSP (or Central Signal Processor) of SKA is the “brain” of the Square Kilometre Array (SKA). It controls and organizes the information collected by the SKA’s 3000 antennas and feeds the “eyes and ears” of the SKA into the massive computer systems that will process the data. The CSP also includes an extensive software package that will be used to interpret the vast amounts of data for analysis.

CSP feeds are the perfect synchronizers for the massive data streams from the SKA. Each feed is connected to a computer which analyzes the data, and each computer is connected to a larger computer which analyzes the data, and so on, until the data is analyzed by the CSP.

**Telescope Manager**

The Telescope Manager (TM) is an essential part of the SKA. It controls the operation of the SKA, from the acquisition of data to the analysis of the data to the presentation of the data. It is the heart of the SKA, and its success is essential for the success of the entire project.

**Milestones**

☑️ Kick-off
☑️ SKA Level 1 Requirements Review
☑️ Technical Interchange Meetings (1-3)
☑️ CSP Baseline Design Review
☑️ Stage 1 Review (SR & PDR)
☑️ Stage 1 Downsize
☑️ Technical Interchange Meetings (4-5)
☑️ Delta PDR
☑️ Single-chip Consoles & Prototype Test Reports
☑️ Critical Design Review
☑️ Stage 2 Downsize

**Telescope Manager (TM) Consortium**

The Telescope Manager (TM) consortium includes all hardware and software necessary to control the SKA telescopes and associated infrastructure. The TM includes the coordination of the systems at observatory level and the software necessary for scheduling the telescope operations. It also includes the control of monitoring of the performance metrics and the provision of central control of safety signals generated by elements of the SKA. The TM provides software access to all observatories, to all remote locations for transmission of diagnostic data and local control.
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)
Data Challenges #1

• Hope to release before end of October
• Continuum sub-band images ($\Delta \nu / \nu_c = 30\%$)
• SKA1-Mid, three frequencies: $\nu_c = 0.56, 1.4$ and $9.2$ GHz
• One pointing: $8^h, 100^h$ and $1000^h$ 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 ($x9 = 32$GB total)
• Advertising soon for SKAO Post-doc position for radio astronomy simulations:
  https://recruitment.skatelescope.org/category/ska-jobs/
Science Meetings

• 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: https://indico.skatelescope.org/event/467

  • 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
1. 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
  • ????
SQUARE KILOMETRE ARRAY
Exploring the Universe with the world's largest radio telescope