SKA SWG Update

Robert Braun, Science Director

8 May 2018
SKA Board Meeting 26 Outcomes

• 11 – 12 April, Gothenburg, Sweden

• Bridging Plan: (covering interval between design element CDRs and System CDR/Construction Proposal)
  – Board approves centralised management approach and overall activity scope (about 66 FTE years)

• Early Production Arrays
  – Board endorses development of implementation plan

• Operations Model Review
  – Board endorses Panel recommendation of partnership model rather than Service Level Agreements for Telescope Operations, instructs further development
# CDR Activity – Updates

<table>
<thead>
<tr>
<th>Element</th>
<th>RRN Submission</th>
<th>CDR Submission</th>
<th>CDR Meeting</th>
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<tbody>
<tr>
<td>SaDT &amp; SAT</td>
<td>17 January 2018</td>
<td>28 February 2018</td>
<td>15-18 May 2018</td>
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<tr>
<td>TM</td>
<td>29 January 2018</td>
<td>28 February 2018</td>
<td>17-20 Apr</td>
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<td>CSP</td>
<td>18 May 2018</td>
<td>30 June 2018</td>
<td>25 – 28 Sept 2018</td>
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<tr>
<td>- PSS Sub-Element CDR</td>
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<td>- PST Sub-Element CDR</td>
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<td>- CBF-Low Sub-El CDR</td>
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<td>- CBF-Mid Sub-El CDR</td>
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<tr>
<td>INAU</td>
<td>19 March 2018</td>
<td>30 April 2018</td>
<td>27-29 June 2018</td>
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<td>INSA</td>
<td>19 March 2018</td>
<td>30 April 2018</td>
<td>2-4 July 2018</td>
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<tr>
<td>LFAA</td>
<td>30 March 2018</td>
<td>TBD</td>
<td>TBD</td>
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<tr>
<td>System CDR (incl. AIV) close</td>
<td>See Roadmap</td>
<td>See Roadmap</td>
<td>30 March 2019</td>
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<tr>
<td>SDP</td>
<td>17 September 2018</td>
<td>31 October 2018</td>
<td>31 December 2018</td>
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<td>DSH</td>
<td>ECP Pending</td>
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<td>- SPF B2 Sub-element CDR</td>
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**Green:** Successful phase  
**Red:** Potential schedule change  
**Blue:** Updated from last report

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Element CDRs

- **SADT** – over 1000 observations; review meeting still on track for mid-May
- **TM** – CDR passed, now focused on closing out some 500 review tickets
- **CSP** – Sub-system CDR reports have been released
- **INFRA** – passed the Review Readiness for their CDR and delivered packs
- **SDP** – passed the Readiness Review for their pre-CDR and delivered the pack
- **LFAA** – Readiness Review unsuccessful, see below
- **DSH** – Some delays to dish structure; sub-element CDRs planned throughout 2018, a few in early 2019
LFAA Recovery Plan

- Integrated Resolution Teams with substantial SKAO support
- Goal of keeping overall delay below 5 months

Review dates above are indicative only.

When will results be available?
Testing of SKALA4 Prototypes

- Two different implementations of new optimised EM design tested at MRO during week of 9 – 13 April
Testing of SKALA4 Prototypes

- Good prospects for flatter bandpass and generally improved performance (apparent high frequency cut-off at 300 MHz is artifact of measurement method)
SKA1 Science HPC Requirements

• In-depth study of SKA1 computing requirements from Science perspective underway

• SDP Parametric Model key parameters:
  – Use-Case Parameters: $B_{Max}$, $v_{Min}$ and $v_{Max}$, $T_{Point}$ (total depth for pointing)
  – Calibration Parameters: $N_{Ateam}$, $N_{Source}$, $N_{SelfCal}$, $N_{Major}$, $N_{patches}$ all are strong functions of ($B_{Max}$, $v$ and $T_{Point}$)
  – Model for functional dependence of the Calibration parameters on the Use-case parameters
  – Improvements ongoing to: source population numbers and sizes, dish/station beams
Updated Source Models

- T-RECS simulation outputs at 0.15, 1.4 and 15 GHz
Improved beam modelling of both SKA1-Low stations and SKA1-Mid dishes for integration of source counts, including side-lobes.
• Modelled calibration parameters that should permit ~thermal noise limited data products within very deep integrations
SKA1 HPC Requirements

- Instantaneous HPC load as function of ($B_{\text{Max}}, \nu, T_{\text{Point}}$)
SKA1 Science HPC Examples

- New estimates now in preparation of the use case mix that can be supported with various size HPC deployments
- Even modest HPC can provide significant science return, albeit with duty cycle limitations for the more demanding experiments
SKA1 HPC Caveats

- Computational efficiency assumed to be 10%; could be much better (LOFAR EoR GPU-based pipeline achieving >80% efficiency)
- Better representation of Direction Dependent Calibration methods needed in Parametric model
- HPC costs completely dominated by DFT; could be reduced with partial FFT usage; could be implemented with much higher than 10% efficiency (as noted above for GPUs)
SQUARE KILOMETRE ARRAY
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