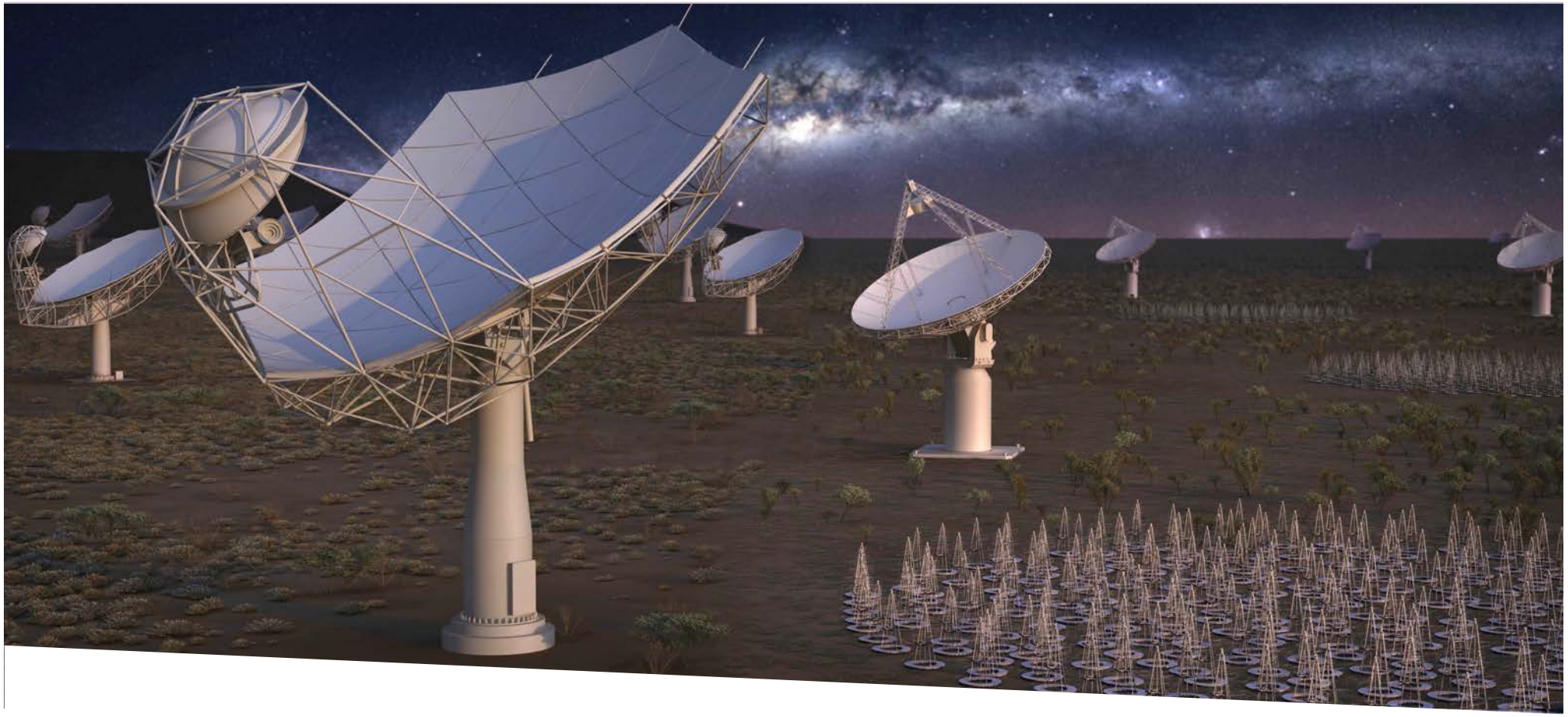
SKA SWG Update



SQUARE KILOMETRE ARRAY

Exploring the Universe with the world's largest radio telescope

Robert Braun, Science Director

16 April 2019

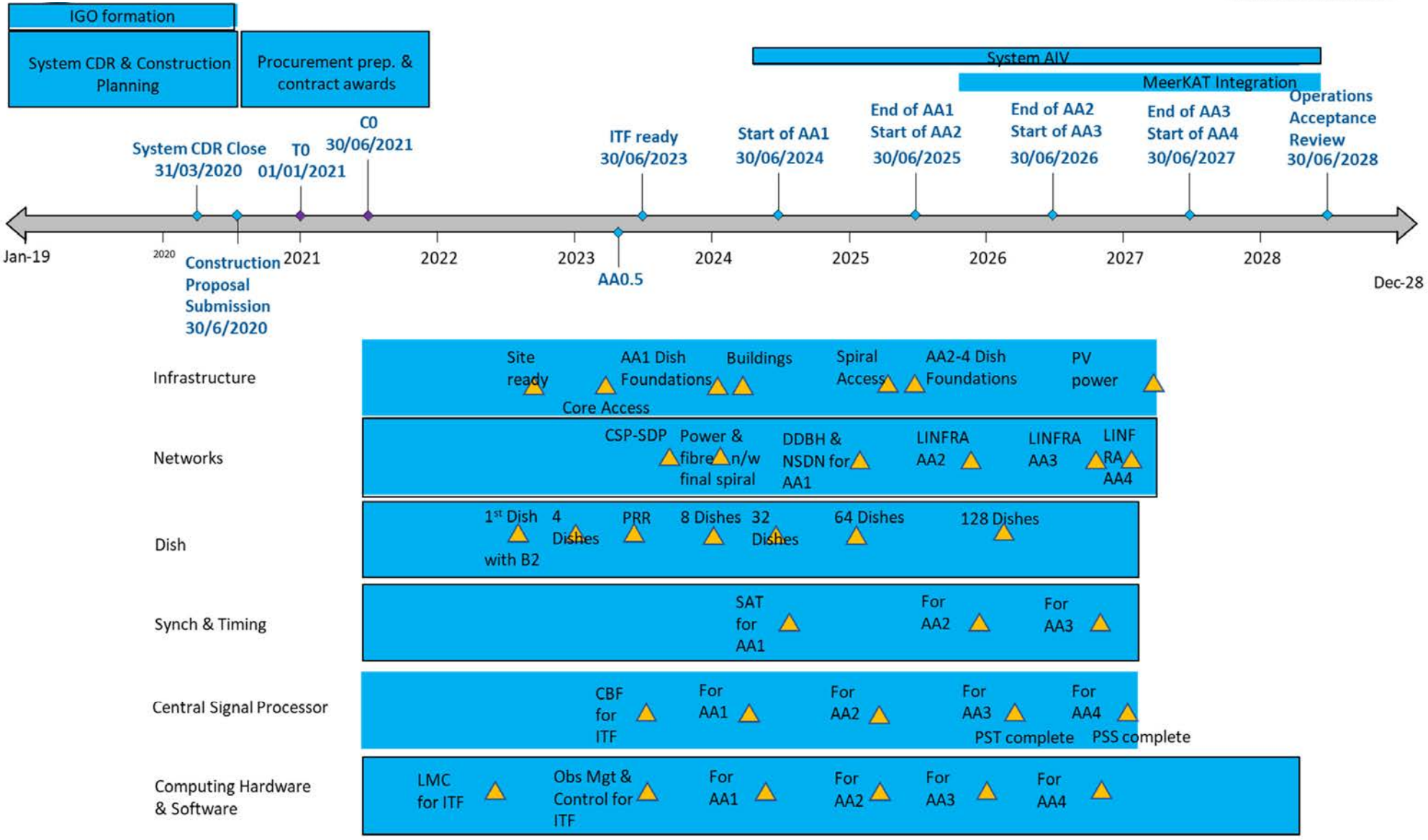
Science Activity Updates

- Engineering Schedule
- Science Milestones
  - Lead-up to KSPs
- SKA related meetings
- SWG Banners
- 2019 SKA Science Meeting and KSP Workshop
  - Please provide pdf talks for posting, including all break-out session talks

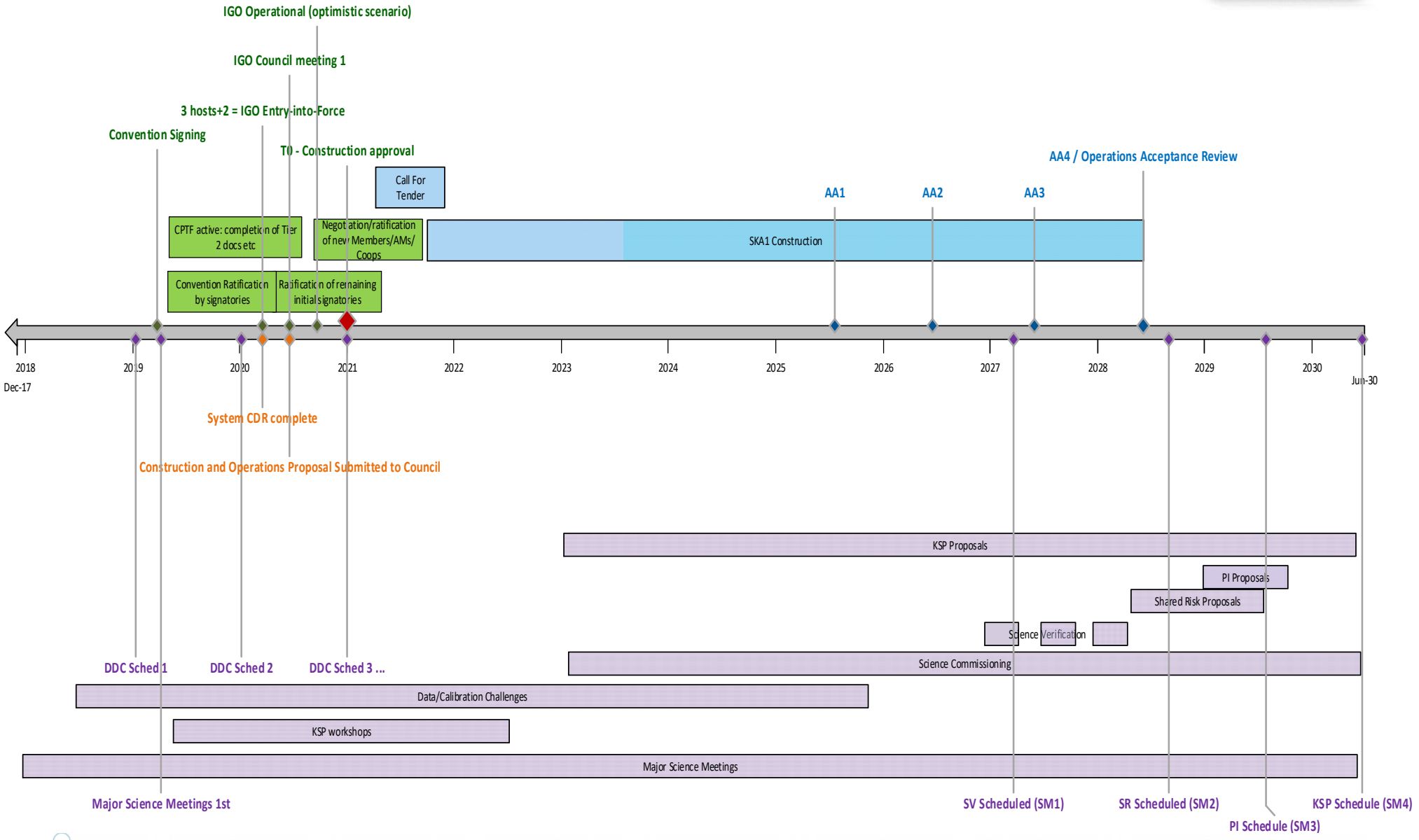
CDR Activity – Update March 2019

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
MeerKAT Integration			22 October 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	5 November 2018	11 – 13 December 2018 ++
AIV	29 October 2018	30 November 2018	4 March 2019
DSH Pre-CDR DSH CDR	17 September 2018 23 Aug 2019 (w B2) - Band 1, LMC Sub-CDR 20 Sept 2018	28 September 2018 13 September 2019 (w B2)	26 – 27 November 2018 Aug 2019 (DSH) 25 – 29 Oct 2019 (w B2)
System		Q3 2019	Q4 2019

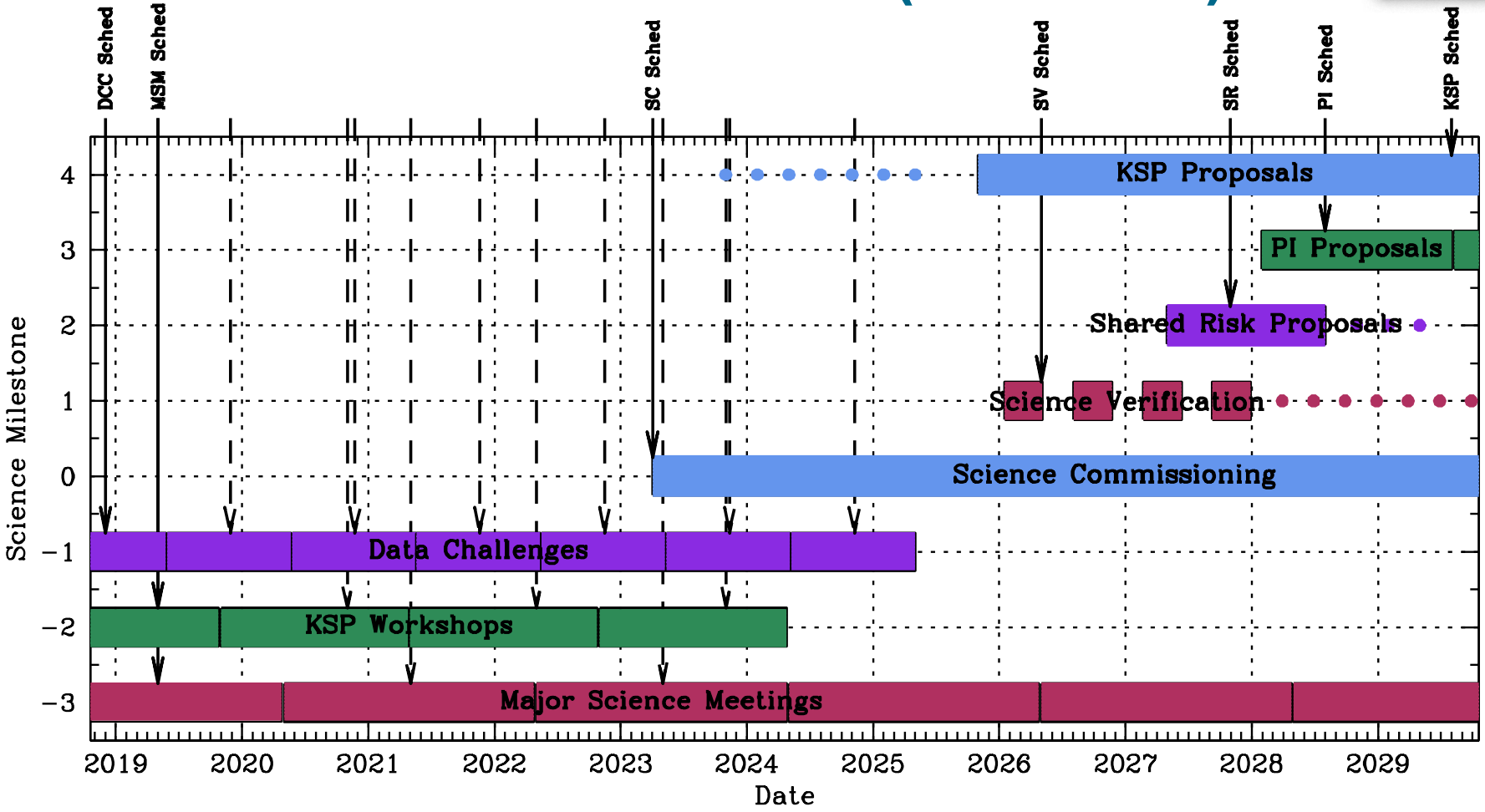
Engineering Schedule



Integrated Schedule



SKA1 Science Milestones (Doc. 822)



- Overview of preparatory and scientific observing activities

SKA1 Science Milestones (Doc. 822)

Table 3. Key events associated with Science verification observing.

Science Verification Event	Duration (months)	External Event (months)	Start Date (months)
Call / Deadline for Suggestions	2		AA2 + 5.5
Internal Assessment	1		AA2 + 7.5
Allocation	0.5		AA2 + 8.5
Start Schedule = SM1	0	AA2 + 9	AA2 + 9
Observe	0.5		AA2 + 9
Repeat as needed	X		AA2 + 9 + X

Table 4. Key events associated with "shared risk" PI observing.

Shared Risk PI Event	Duration (months)	External Event (months)	Start Date (months)
Proposal Call / Deadline	2		AA4 – 3
Proposal Review	3		AA4 – 1
Proposal Allocation	1		AA4 + 2
Start Schedule = SM2	0	AA4 + 3	AA4 + 3
Observe	9		AA4 + 3

Table 5. Key events associated with PI observing.

Normal PI Event	Duration (months)	External Event (months)	Start Date (months)
Proposal Call / Deadline	2		AA4 + 6
Proposal Review	3		AA4 + 8
Proposal Allocation	1		AA4 + 11
Start Schedule = SM3	0	AA4 + 12	AA4 + 12
Observe	12		AA4 + 12

SKA1 Science Milestones (Doc. 822)

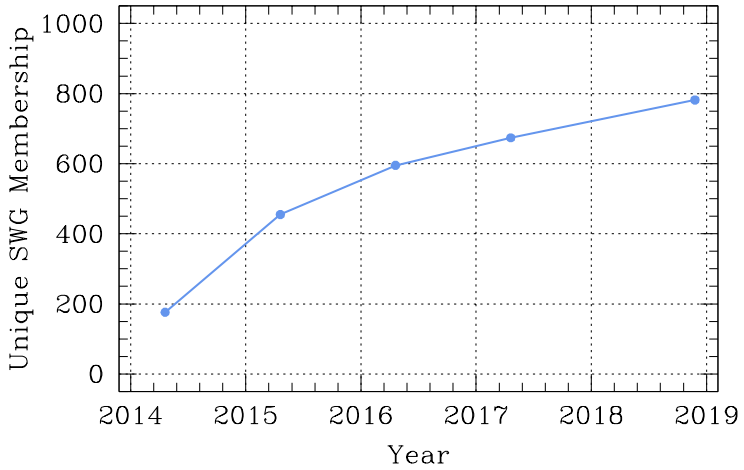
KSP Event	Duration (months)	External Event (months)	Start Date (months)
Preparatory activities	30		AA4 – 51
LoI Call / Deadline	3		AA4 – 21
LoI Assess	2		AA4 – 18
LoI Coordination Workshop Organise / Carry-out	6		AA4 – 16
Proposal Call / Deadline	12		AA4 – 10
Proposal Review	4		AA4 + 2
Proposal Allocation / Resource	18		AA4 + 6
Start Schedule = SM4	0	AA4 + 24	AA4 + 24
Observe	N x 12		AA4 + 24
Progress Review	N x 12		AA4 + 36, 48, …

Key Science Projects:

- **Notional** package of Key Science Projects developed in 2015 based on the highest priority science objectives that were recommended by the science community that were:
  - Consistent with capabilities of the SKA1 design
  - Consistent with a realistic observing schedule filled at approximately 50% for the first 5 years of scientific operations
- Indicative KSP policy (actual policy will be determined by SKAO Council)
  - Only scientists from SKA member countries may lead a KSP
  - KSP Leadership is guaranteed to be distributed amongst SKA members in proportion to their financial contribution
  - KSP participation (at the non-Leader level) is guaranteed to be distributed amongst SKA members in proportion to their financial contribution
  - KSP participation (at the non-Leader level) of SKA non-members is capped at the value defined in the Access Policy

A Package of Notional SKA1 Key Science Projects

SWG	Objective
CD/EoR	Physics of the early universe IGM - I. Imaging
CD/EoR	Physics of the early universe IGM - II. Power spectrum
Pulsars	Reveal pulsar population and MSPs for gravity tests and Gravitational Wave detection
Pulsars	High precision timing for testing gravity and GW detection
HI	Resolved HI kinematics and morphology of ~10^10 M_sol mass galaxies out to z~0.8
HI	High spatial resolution studies of the ISM in the nearby Universe.
HI	Multi-resolution mapping studies of the ISM in our Galaxy
Transients	Solve missing baryon problem at z~2 and determine the Dark Energy Equation of State
Cradle of Life	Map dust grain growth in the terrestrial planet forming zones at a distance of 100 pc
Magnetism	The resolved all-Sky characterisation of the interstellar and intergalactic magnetic fields
Cosmology	Constraints on primordial non-Gaussianity and tests of gravity on super-horizon scales.
Cosmology	Angular correlation functions to probe non-Gaussianity and the matter dipole
Continuum	Star formation history of the Universe (SFHU) – I+II. Non-thermal + Thermal processes



- Outcome of well-documented SKA1 science prioritisation process
  - All objectives originate with the science community
  - Review and strong endorsement by advisory bodies (SRP, SEAC)
- Should be viewed as ***representative*** package of high-impact science deliverables for the first five years of science operations
- Actual list of high impact potential projects already much broader
  - SWG number has grown from 8 to 13
  - SWG membership has grown fourfold from 2014 to 2019

KSPs: Next steps

- Further develop KSP concepts
  - Regular workshops to provide a forum for open discussion of KSP concepts
- Support development of potential KSP collaborations
  - There will ultimately be a competitive process of KSP proposal submission, evaluation and allocation
  - Regular workshops to provide a forum for the key areas of interest of particular communities to be presented, leadership aspirations to begin to be identified and resourcing strategies to begin development
- Maximizing commensality
  - It is likely that the same data stream will serve multiple KSP or PI-led groups, each with limited data rights to address specific scientific objectives
  - Regular workshops to provide a forum for early discussion of support for such commensal programs, including the development of efficient survey strategies intending to maximise the scientific return of the KSP package

Upcoming SKA-related Meetings

- CTA 1st Science Symposium, 6 – 9 May, Bologna
- SKA in Spain, June 10 – 11, Grenada
- New Perspectives on Galactic Magnetism, June 10-14 https://conferences.ncl.ac.uk/galacticmagnetism/
- EWASS SS11: New Inputs, prospects Milky Way Magnetic Fields https://eas.unige.ch/EWASS2019/session.jsp?id=SS11
- EWASS FRBs Special Session, 24 June, Lyon https://eas.unige.ch/EWASS/session.jsp?id=SS24
- EWASS SKA Special Session, 26 June, Lyon https://eas.unige.ch/EWASS2019/session.jsp?id=SS29
- CESRA Workshop, 8 – 12 July, Potsdam https://meetings.aip.de/cesra2019/cms/
- SKA Eng. and Ops. Meeting, 25 – 28 Nov Shanghai https://indico.skatelescope.org/event/551/

SKA Eng. and Ops. Meeting, 25 – 28 Nov Shanghai

Day 1: System CDR Preview

Day 2: Session 1. Commissioning

To include talks by Precursors, Pathfinders and peer projects

Session 2. Engineering operations

To include talks by Precursors, Pathfinders and peer projects

Day 3: Session 1. Observatory Science Operations

Session 2. Science Regional Centres

Day 4: Session 1. Aspects of Procurement

Session 2. Splinter sessions

Advanced Instrumentation Programme

Further sessions to be announced

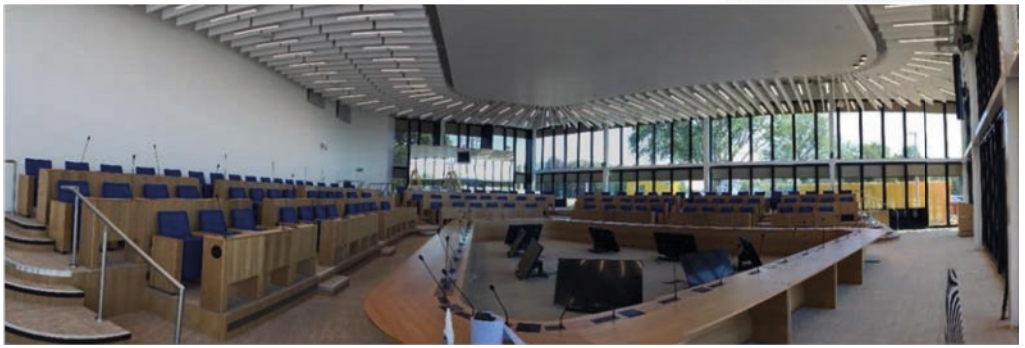
https://indico.skatelescope.org/event/551/

SWG Banners

- Now posted on each SWG page
- https://www.dropbox.com/sh/mpmvpkak7jx3w19/AABbnRyaBSGqKdB2994n0igIa?dl=0

Science Meeting

- 2019 SKA Science Meeting and KSP Workshop, 8 – 12 April
  - ~290 participants
  - Alderley Park venue
  - HQ reception on Monday
  - Will post all talks (please provide for break-outs!)



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