

SWG Chairs Telecon 21-Jan-2020

Notes by Evan Keane

Participants: Valentina Vacca, Sarah Blyth, Andrei Mesinger, Sebastien Mueller, Francoise Combes, Gianni Bernardi, George Heald, Paulo Serra, Natasha Hurley-Walker, Jason Hessels, Phil Edwards, Izaskun Jimenez-Sera, Abhirup Datta, Anna Nelles, Fernando Camilo

Apologies: Stefano Camera, Eduard Kontar, Doug Johnstone, Divya Oberoi, Mark Sargent, Laura Wolz, Ann Mao

SKAO participants: Robert Braun, Philippa Hartley, Evan Keane, Jeff Wagg, Rosie Bolton, Anna Bonaldi

Countdown to Construction

Robert describes the “countdown to construction” during the year 2020. A big year for the project.

Next SKAO has to deliver Construction and Operations Plan

Construction Proposal contains deployment baseline reference design, as well other things like schedule, cost book etc.

Operations Plan (rev3) is getting a formal review in March - covering planning, scheduling, observing modes, science data products etc. Rev4 of this, amended as per review, goes to the Council.

Robert overviewed the timeline for 2020 in terms of IGO, CDR, Prototyping, Construction Proposal and Procurement.

It looks like IGO will enter into force in July (approx) and will be quickly followed by a Council meeting. SKAO staff transition to IGO by end of the year. Q4 is when construction approval and release of funds should happen. Lots of parallel work in train. Enhanced support from within SKAO happening to ensure Final DSH CDR activities happen ASAP. Software aspect of prototyping are currently at <SAFE jargon>“program increment 5”</SAFE jargon> (PI5). These are 3-month long time-scale deliveries of software. AA0.5 is smallest deployment to be made (few dishes and few stations) and will be procured earliest for some additional end-to-end tests before wider procurement of everything else.

Deployment Baseline Definition

Definition: the deployment baseline is the subset of the design baseline that can be obtained with the construction budget.

Work on this of late, building upon work from 2017 accounting for improved knowledge on readiness and cost estimates (as we are now post CDR) and science priorities.

Many more, imminent, discussions on this:

SEAC consultation: Jan 28
SKA Board Science Reps consultation: Jan 31
CPTF: Feb 5+6 —> meeting to establish the target cost.
SKA Board meeting: 28 Feb to establish budget.
March/April: Integrate into construction and Ops Plans

Info sessions on this on 3 dates:

30 April - Perth
4 May - Cape Town
Early May - SKAO HQ

JH: do you want input from the SWGs?

RB: yes

JH: will consult SWG and summarise comments and send to you

RB: great

Principles were to minimise adverse scientific impact, maximising the re-instatement potential. Rough grading 1, 2, 3, 4. 1=no loss; 2=fast reinstatement, 3=science risk, 4=science loss

2017 costs were reviewed for feasibility and cost savings. A few infrastructure changes, that save money and have no science impact, were identified and put to the top of the list. Also, shifted most HPC cuts (SDP + PSS) to top of next tier with the hope that this is 100% recoverable, from the Operations Budget, after 2 years.

Further levels of cuts include partial deployment of Mid feeds, step-wise reductions in Low station number, Mid dish number, maximum baselines and replacing the Low log-periodic antennas with a dipole antenna.

JH: how does the Low antenna replacement relate to the other measures such as cuts to the maximum baseline?

RB: It has been placed in the list on the basis of assessed overall science impact. The relative antenna performance is compared on the next slide.

Overview of the whole list, and philosophy of having an agreed sequence of cuts, only going down as far as needed. Actual budget, which determines how deep we will have to go, is not yet clear.

<digestion time>

Questions re: list

NH-W: is there a version with numbers on them?

RB: yes, but they are still a work in progress. Will be forthcoming soon.

NH-W: mostly interested in orders of magnitude for now.

RB: order of magnitude is 5-10 MEuro per item.

NH-W: ideally we would want to avoid doing any impact '3' or '2' (or '4') items

RB: agreed. presenting the list in this way will hopefully convince the funders that they should avoid deep cuts

GH: have long-term impacts been considered? e.g. long-term operational impact of not burying fibres

RB: mostly just the construction impact so far. some items were removed from this list as they had more negative operational impact. The ones that remain survived that first order triage.

RosieB: SKAO Ops group could easily estimate some items, but some require quite a lot of checking to determine this detailed impact, but it is in progress.

SB: are we going to be sent documents or basing this on these slides?

RB: slides for now.

SM: I have a question about the impact of the Starlink satellites. Are these constellations a threat to the science?

RB: yes, definitely. lots of work happening on this. Expect tens of thousands of these satellites will exist, with up and down links in our bands (esp Band 5). Jan 30th meeting with us, ESO, other observatories across spectrum as to how to coordinate our efforts on this to engage and mitigate impact. Active area of concern.

Next slide compares SKALA4.1 and alternative "EDA" (Engineering Demonstrator Array) antenna design. CDR flagged possible issues of station Beam-Forming and calibration. Simpler antenna might make both of those better. EDA antennas are basically modified versions of MWA antennas. Robert showed the overall system sensitivity for these 2 antenna types, averaged over ZA 0-45deg, and described the background to these.

Questions re: plot

GB: what is this?

RB: Effective collecting area of 512 stations, with Tsys divided through

GB: I've been told a different story about this from AAVS calibration meetings. That story is that both were requirement compliant from 50-200 MHz which is not what is shown here.

RB: Have also heard this but don't think it is accurate. It has taken a long time to produce this plot. A few caveats here to note. The sky has been treated a bit differently in both. EDA plot uses Haslam (frequency scaled) 408 MHz sky at a nominal pointing direction. SKALA4.1 uses a different approximation for Tsys. It is not quite "apples with apples". This is the plot that has the widest agreement from all proponents of both antennas as to what should be used for comparison.

GB: it looks worse than 1.6x at top of band

RB: yes, but 1.6 is the average between 200-350MHz

JH: this is purely on the table as a cost saving measure or does it have science motivation?

RB: it depends on who you are talking to. Some people with experience with LOFAR and MWA are more comfortable with those antenna types. They are worried about the increase in technical risk of a more complex antenna, despite the positives. It is a risk issue that is being brought forward, which is fair and needs further study to resolve.

GB: I remain fairly sceptical that in 6-8 months from now that we will have cleared all of the doubt from everyone involved in these systems. The "ECP" (Engineering Change Proposal) on this is not like other ECPs. Jumping to EDA, if something awful were to be uncovered re: SKALA4.1, this would be more like a massive and significant re-baselining of the whole Low telescope. Big risk to science.

RB: From what I've seen so far, the residual risk will be ok to enable us to go ahead with the log periodic antennas. Agree that antenna replacement would be a profound change and would require a proportionately robust review.

AM: what if several years down the line we realise the LPD is a mess to calibrate, what contingency plans are in place for that?

RB: design very modular in this respect. Can simply replace antennas and use the same infrastructure, signal path, ground plane etc. Everything designed for a large antenna, so easy to replace with a physically smaller one.

AM: HERA also discussing something like this and the overhead of such a contingency plan is not seen as high.

SKA-related meetings

Organising science conference for this September is looking problematic as another conference has taken up all the available hotel space in Stellenbosch. Looks like this might move to Q1 2021. Being explored now.

SB: are you tied to having it at that particular venue? What about Cape Town?

RB: I'll get in touch with you separately on this.

NH-W: SPARCS meeting is also to be scheduled alongside this. Do they know?

RB: I told Russ Taylor about this already.

NH-W: if it can be moved to Cape Town that would work well.

Robert closed by requesting input from the SWGs on the cost savings ladder.

NH-W: been working on commensality. Would be great to get access to documents from RosieB on this, with technical limitations etc.

RB: yes, will follow up with Rosie on this.

<TIME UP: MEETING ENDED HERE>

Round-Table SWG updates - cut for time

AOB - cut for time

ENDS