

## ACURA Advisory Council on the Square Kilometre Array (AACS) Report to the CASCA Board, May 29, 2020

### AACS Meetings and Activities

AACS met by telecon on April 28, 2020 a summary is provided within this document. The next telecon is scheduled next autumn.

The year so far has been one of modest activity for the AACS. The search for a new chair took some time.

### AACS Membership

Current membership of AACS is as follows:

Ingrid Stairs UBC  
Gregory Sivakoff Alberta  
Rob Thacker CASCA president  
David Stevens Industry Rep MDA  
Séverin Gaudet Observer NRC  
Erik Rosolowsky Alberta  
Doug Johnstone UVic  
Kristine Spekkens RMC CDN SKA Science Director and SKAO Board member  
Michael Rupen Observer SKAO Board member  
+Gilles Joncas Observer ACURA IC Chair  
+John Hutchings Observer CASCA/LRPIC

### Canadian SKA Activities

April 28<sup>th</sup> AACS meeting, held by telecon:

The circulated agenda for the meeting was:

1. Agenda and welcome (Thacker)
2. Review minutes & action items (Thacker)
3. Moving forward & LRP update (Thacker)
4. Update on national/international SKA (Rupen, Spekkens)
5. Other updates (All)
6. Futures & domestic awareness (All)
7. Report to ACURA (All)
8. Next meeting
9. AOB

Participants: Thacker (Temporary Chair), Spekkens, Simard, Gaudet, Stairs, Rupen, Johnstone, Rosolowsky, Joncas, Stevens, Sivakoff, Hutchings

Thacker provided an update on how issues had been reported back to ACURA in interim since Dr Gaensler stepped down as AACS Chair. He then noted the pressing situation faced by the project since it has moved in considerably since Feb 2019 and was close to needing funding from a Canadian perspective. In this context providing detailed feedback to ACURA is important both to improve awareness and to buttress potential lobby efforts in Ottawa for the anticipated future monetary request.

#### *Project progress since October 2019*

Spekkens provided an update on the progress on the project since October 2019. A number of key milestones have been passed:

- The Critical Design Review – the meeting for this was undertaken in December 2019, with the process being essentially completed in early April.
- An external review of the SKA Operations Plan was undertaken via video on March 23-25. A positive report by the review panel was received shortly after.
- External Cost Audit review of SKA1 construction plans was completed in mid April. A positive report was received including some helpful suggestions.

Director Phil Diamond noted that despite lockdowns in many of the countries participating in the SKA the community has adapted and continues to move the project forward (see Spekkens update). A draft construction proposal is now underway, as well as development of a procurement strategy. The project remains committed to try to ensure that construction begins in 2021.

#### *SKA Regional Centres update*

Severin Gaudet provided an update on SKA Regional Centres (SRCs). Note, these centres are required to handle the significant storage, processing and networking required to go from the post-observation stage through to science analysis. Canada has sufficient hardware and archive development expertise to make key contributions to the SRC network.

The 2016 decision that put SRCs beyond the project scope implies that SRCs will likely be operated as a partnership between the SKAO and participating countries, and the newly-formed SRC Steering Committee (SRCSC) is working on defining the governance, function and cost of the SRC networks. A white paper outlining these principles will be presented to the Board in May.

In terms of Canadian contributions to the SRC network, a component commensurate with a 6% participation is envisaged. The overall estimated cost in the 2021-30 period for this component of the project is \$45M.

#### *Governance discussion*

Luc Simard informed the committee he has been attending the Council Preparatory Task Force (CPTF) meetings since May 2019 as a formal Observer. Until the IGO that will

oversee the project during the construction and operations phases of SKA1 comes into force (which requires 5 countries to ratify the treaty including the host countries), the CPTF represents the interests of the IGO. It is independent of the existing SKA Organisation (the UK company limited by guarantee that is overseeing the design and pre-construction phase) and its Board of Directors, with close coordination between the SKAO and the IGO taking place through the Joint Working Group on Transition (JWGT). The CPTF was also instrumental in ensuring the deployment baseline would be the design baseline, moving beyond the 2013 costcap.

The transition from the SKAO to IGO is taking longer than anticipated and may well no longer be completed within 2020 (see Spekkens update). However, preparation of funding, transition and construction schedules are all underway although the precise procurement model has undergone an evolution.

### *Canadian participation and internal concerns*

The committee discussed one of the key organizational questions: how will Canada participate in the organization? Clearly, the precise instrument of participation chosen will influence both scientific and technological contributions that are possible. Full Membership (ie. signing on to the treaty) would provide Canada with scientific, technological and governance leadership rights that are commensurate with its participation level. Associate Membership would provide full scientific and technological leadership rights, but no governance seat on the IGO Council. A third option is a cooperative agreement with the IGO, with terms to be negotiated but which would be unlikely to provide the same scientific and technological participation rights as Full or Associate Membership. While the governance advantage provided by Full Membership relative to Associate Membership is clear, it should be noted that there is no precedent in Canada for entering into IGOs (which provides *sovereign* protection to the organization and to its employees)

Potential Canadian hardware contributions - beyond an SKA Regional Centre - were outlined in the Spekkens et al (2019) white paper submitted to LRP2020: [*Canadian leadership in SKA1-related technologies includes the design and fabrication of correlators and beamformers for SKA1-Mid, low-noise amplifiers and digitisers for SKA1-Mid Bands 1 and 2, and signal processing and monitor & control for SKA1-Mid. Notably, Canada led the Central Signal Processor element consortium that passed CDR with no action - the only consortium to have received this high rating. The technologies above provide a suite of possible in-kind contributions to offset SKA1 construction costs for good return on capital investment.*]

There was recognition that the overall cost of Canadian participation in the project, when operations are included over a 10-year time span, is significant and will require a Cabinet-level decision. The pre-release LRP2020 recommendations continue to affirm the importance of the SKA to the research community. To date, much of the effort of government awareness has fallen on the NRC given the important roles that a number of key personnel from the NRC have played in the governance and technological aspects of

the project. However, before a major funding request can go ahead, a clear strategy on improving awareness within the university community, especially within the VPR and President's offices is needed. This would mirror the approach taken for funding TMT. At present, there are no simple briefing documents and these need to be developed. Further meetings on this issue need to be held quickly.

Importantly, ACURA has a key role to play in ensuring that the support of the SKA from the research community is made clear to government. Clearly, though the first step in this path is reporting to ACURA. Thacker agreed to draft the main document with contributions coming from other individuals. A next meeting is to be scheduled after the ACURA update on May 29th.

“Key ACURA considerations?”

As mentioned earlier, the ratification of the SKA Observatory Convention is under way with two countries having signed as of March (The Netherlands and Italy). The Convention will enter into force with five signatories, three have to be the host countries (Australia, South Africa and the UK). NRC (and ACURA through Joncas' presence as an observer during the IGO negotiations) have been participating in all major SKA-related meetings so far since the project receives strong support from the Canadian astronomical community via LRP2010 and MTR2015. Currently, NRC is gathering all relevant information regarding membership options for further consideration by our Government.

Canadian participation in the SKA has been strongly supported again by the most recent Long Range Plan for Astronomy and Astrophysics (LRP2020); second after a VLOT in ground-based facilities.

Considering the current situation both nationally and internationally, the AACCS, with the help of ACURA, should embark in a number of actions to obtain Canadian commitment fairly rapidly, within the next few years. These actions should be centered on strategic and tactical communications, communications, communications. The repetition is to stress the importance, as localization is for realty.

- Develop information channels to university research VP's and community
- Identify a team of university-based champions
- Advertisement and online/social media presence
- Industry connections
- Lobbying

To pursue these endeavours, we would like ACURA to reflect and give advice on two courses of action:

- Hiring an individual dedicated to providing help in communication strategies and material.
- Whether we should hire a different lobbying firm to win support in Parliament.

## Update on the International SKA Landscape

Since the project updates provided at the April 28<sup>th</sup> AACS meeting, the SKAO Board, SKAO Members and CPTF held meetings the week of 18 May. Unsurprisingly, the focus of all meetings was the impact of Covid-19 on the short-term and long-term health of the project. The immediate impact is that it is now unlikely that the SKAO → IGO transition will occur in 2020, with the primary bottleneck stemming from delays in UK parliamentary approval of the Headquarters Agreement. Additionally, retaining expertise as well as momentum towards construction are now more complex and risky.

In response to the global crisis, the SKAO has drafted a 2021 business plan to position SKA1 as a “shovel-ready” construction project, ready to begin as soon as the IGO becomes operational. The driving principles behind the plan are to retain skills and expertise, maintain momentum towards construction, and to save time once construction actually begins. The plan would ramp up SKAO staff by for construction preparation activities (e.g. telescope control, data handling software, off-site system integration, DSH completion, construction tender readiness) to allow for the early delivery of first working set of SKA1-Low and SKA1-Mid arrays (AA0.5) in order to retire risk (= lower costs) and retains the overall construction timeline in the next decade (even if shovels go into the ground later than originally anticipated). Notwithstanding this plan, there are now added complexities and risks to establishing the IGO, funding the Design Baseline, and starting construction. The situation is fluid, and the AACS will keep the ACURA Board abreast of developments as they arise.

## AACS Budget Report

No expenditures over the last year; Some money was budgeted for the SKA lunch at CASCA, which was cancelled when the event moved online.

## Recommendations

AACS makes the following recommendations to the ACURA Board:

- AACS request a budget from ACURA for next year.
- That ACURA ramp up its activity (e.g. through industry connections) regarding supporting SKA in anticipation of a request to government.
- That ACURA develop a plan for how to do so, considering the advice of AACS and other stakeholders, and taking into account past experience securing TMT funding as well as the similarities (big money) and differences (scalable nature of interferometers relative to optical apertures) between the TMT and SKA.