ATUC Report (April 2021)

1. ATUC members in attendance (all remote):

Ramesh Bhat (Chair), Cormac Reynolds (Secretary), Martin Bell, Michelle Cluver, Miroslav Filipovic, Bi-Qing For, Emil Lenc, Philippa Patterson, Nickolas Pingel, Ryan Shannon, and Yuanming Wang

2. Commendations for CASS:

- Newcomb-Cleveland prize to CRAFT and ASKAP teams
- Completion and publication of the RACS Survey & discovery of Odd Radio Circles (ORCs) and related publicity
- CRACO LIEF funding success
- Congratulations Kevin Ferguson for new role as Director of CDSCC
- Congratulations Sarah Pearce for appointment as acting CSIRO Chief Scientist

3. SKA

ATUC was pleased to hear the update on SKA activities and looks forward to continued updates at future meetings. The ratification of Intergovernmental Organisation (IGO) treaty by multiple member countries and formal announcement of the IGO and accompanying substantial funding commitment from member countries all represent exciting progress. The community can expect to benefit from increased SKA staffing in the near future.

4. Diversity and inclusion (D&I)

ATUC is broadly pleased at the range of initiatives reported as part of the D&I portfolio, including the new organisational structure and publicly accessible materials. The material included targets for improving gender diversity in the CSIRO workforce, some of which were only modest (about a few percent) increases, but appear to be based on detailed consideration of likely staff turnover and diversity in the relevant recruitment pools, which should make them achievable. However, there is likely going to be more recruitment in the near term than used in the modelling.

ATUC recognises the long-term implications and importance of these efforts in terms of improving the overall gender balance within the scientific leadership at CASS. It notes that there was feedback from the community conveying disappointment at the overall lack of gender and age diversity amongst speakers at the ATUC Open Session.

The committee strongly endorses CASS's continued commitment to the co-sponsoring of the Women in Engineering undergraduate scholarship.

ATUC is also pleased to learn of CASS' submission to the ASA Pleiades scheme application.

Recommendation: *In light of new hiring opportunities related to SKA and the spin-off company, CASS should revise its 2025 demographic targets for staffing.*

5. Radio astronomy technologies

ATUC was pleased to learn of the incorporation of a company to develop phased-array feed technologies (PAFs) for satellite downlink. This provides the opportunity to deliver greater benefit from PAFs to industry, further technological development of PAFs that could benefit radio astronomy, and develop a larger community of engineers in design. We note that there is a short-term risk of project delays as existing staff are spread more thinly across projects.

ATUC also notes the progress being made on the technology front, i.e. the use of Jimble/Blue Ring boards and ALVEO COTS technologies for new digital systems - the flexible and scalable advantages of these make them extremely appealing for developing new digital systems, and make the technology that can be easily repurposed, and thus common technologies that can be tailored for multiple facilities. ATUC looks forward to further updates on this front.

ATUC is supportive of further technology development projects for the foreseeable future, such as LAMBDA and the ASKAP tied-array capability, but not in a position at this point to comment on prioritising them.

5.1 Science and Instrumentation Workshop

With new technology developments on track, and funding secure for the development of the CryoPAF and CRACO, now is an opportune time to host a joint science and instrumentation workshop to bring together engineers and scientists to discuss new technologies and their priorities. ATUC would be happy to discuss this further with CASS management and team leaders.

ATUC would also like to suggest a formal discussion be initiated on the ASKAP upgrade and future of ASKAP science - i.e. beyond 5-10 years. An initial "town hall" meeting seems like a good forum, to solicit ideas and science cases to go forward in this direction.

Recommendation: *CASS + ATUC to assess the prospects and feasibility of organising a science and instrumentation workshop alongside the next ATUC meeting - strong preference (and endorsement) for in-person meeting, for greater value and benefits.*

Recommendation: *Initiate mid-to-long term discussion of the ASKAP future direction as early as possible.*

5.2. RFI

RFI mitigation (across ATNF Facilities) was mentioned as part of future developments. ATUC considers this to be an important issue with significant repercussions on current and planned technologies. The committee recognises that more resources are needed, as well as the fact that building trust with respect to implemented solutions requires the close coordination between astronomers and engineers. Considering that multiple (and interesting) PhD projects can be conceived within this area, student involvement can have a big impact. However, attracting suitable candidates has proven (unsurprisingly) challenging. Working with universities to explore joint PhD projects (as in the case of the University of Sydney, mentioned in the presentation) and uniting these efforts could assist the progress on this front.

The ATUC Meeting Open Session could be a useful platform to a) inform/remind the community on the seriousness of this issue, b) discuss how best to approach some viable solutions, and c) engage support and resources towards addressing it.

Recommendation: *ATUC suggests allocating a presentation slot at the next ATUC meeting to cover the current status of RFI across facilities and the expected impact moving forward. And, if possible, what efforts are needed towards a solution. ATUC notes that CASS research engineer Aaron Chippendale provided a similar contribution at the recent BIGCAT workshop and considers a broader platform and increased awareness to be an appropriate next step.*

Recommendation: *CASS to consider the creation of a tiger team (involving a partnership of astronomers and engineers) with the intent of coordinating efforts in RFI mitigation moving forward.*

6. Data archives and CASDA

New backend systems take data at high rates (owing to their wide bandwidths), which is putting a strain on existing data archives. This is resulting in data taking longer to appear in archives (e.g. DAP) and data access having slow transfer rates to pull from archives (via DAP/ATOA). Delays are especially problematic for time-domain/time-critical projects. ATUC considers these problems to be aligned to the core functions of the ATNF and hence should be of high priority.

Recommendation: *CASS/CSIRO to implement faster data transfers from ATOA/DAP.*

Recommendation: *CASS to increase the file size for web download from ATOA (currently set to 20 GB for UWL).*

Recommendation: *CASS to enable ways for quick turnaround download of data from DAP.*

Recommendation: *CASS to assess the cost and FTE requirements for implementing eventual migration of ATOA to CASDA.*

6.1 Feedback on CASDA Development:

CASDA has proven to be a successful tool for accessing ASKAP Pilot Phase I data. Related to the concerns about data archiving and transfer raised by the users, CASS requested feedback from ATUC on future multi-stage CASDA development plans. Stage 4.1 will transfer the archive to a disk-based storage system to be completed by mid-2021. Stage 4.2 will incorporate data from other ATNF facilities by mid to late 2022, and Stage 4.3 will look to increase the file transfer rates during 2023. ATUC recognises that proposed upgrades 4.2 and 4.3 are contingent on funding.

Recommendation: *In light of community feedback on the limitations of the ATOA, ATUC urges an analysis of the cost involved for the funding and advancement of the Stage 4.2 timeline. This could resolve all of the above issues with accessing data from ATOA and set the stage for the ingestion of CryoPAF and BIGCAT data in advance of these instruments coming online.*

The committee was also asked to provide feedback on the documentation for CASDA. While the current CASDA documentation is generally sufficient for accessing ASKAP Pilot Phase I data products, updated documentation and user tutorials will be necessary in advance of completing Stage 4.2.

Recommendation: *ATNF liaise with survey science projects to update documentation and develop video tutorials for interacting with CASDA, describe how to assess data quality, and read release notes. Video tutorials will be especially useful looking towards the anticipated migration of data from other ATNF facilities.*

7. ASKAP

ATUC is pleased to hear that the ASKAP team has commenced technical tests in preparation for the pilot survey phase II, has improved the reliability of ASKAP observing (which includes the use of a dynamical scheduler), and plans to form a tiger team for investigating the split-band mode implementation. While the split-band mode implementation has been delayed until late 2021, ATUC strongly supports the plan and looks forward to seeing the start of implementation. ATUC was also pleased to hear that the new Pawsey supercomputer will be the workhorse for ASKAP (real-time) processing by late 2021.

ATUC feels that the present support for targets of opportunity (TOOs) is adequate. The science case for TOO observations will necessarily focus on poorly localised transients, or opportunistic, timely observations where ASKAP is the only interferometer that can observe the transient.

Other transients are likely better followed up with more sensitive instruments with narrower fields of view.

There are a few discussion points relating to ASKAP operations that were raised by the team. With the near completion of Phase I data release and the imminent start of Phase II, ASKAP operations team is interested in knowing if the SSTs are ready to move onto the full survey mode upon the conclusion of Phase II. The ASKAP team is also seeking feedback on the best communication channel regarding the observational status and the requirements for surveys to SSTs and community.

Recommendation: *ASKAP team to consult with the SSTs along with assessments on phase II operations in due course (e.g. during the April 2021 PI meeting). A broader engagement with the community and an update on observational status could be done via the monthly ASKAP science forum, e.g. reminding the SSTs that the observational status is available in the ASKAP Observation Management Portal (OMP).*

Previous ATUC recommendations were for a cap on the possibility of guest science to 10% of the total observing time. The rationale for this limit is based on the limited available resources for the development of new data reduction pipelines for observing projects that are outside the scope of the approved SSPs. However, the ATUC position is that the prospect of guest science should not entirely be discounted if the proposal fits within existing observing modes and data reduction schemes --- especially if the expected outcomes will significantly boost the scientific impact of ASKAP.

However, design and development of any new modes for guest science will likely pull valuable resources away from the active development of processing pipelines for several SSPs. ATUC hence would like to suggest that any potential guest science proposals should not unduly affect the observations and processing of data for current SSPs.

Recommendation: *CASS to carefully assess any potential guest science proposals and to ensure they do not unduly affect the observations and processing of data for current SSPs.*

ATUC is pleased to hear that ATNF is considering educational opportunities for the community in ASKAP operations. However, ATUC feels it is important to first identify the targeted audience (e.g. Ph.D. students vs undergraduate students) so suitable learning outcomes can be devised and related with the ASKAP operations. It is also important to first define what are the intended outcomes (e.g. knowledge of interferometry, antenna design, digital signal processing, etc.). These could focus on specific ASKAP operations and observations that have flow-on effects for data reduction and scientific analysis. After identifying these learning outcomes, appropriate learning resources can be developed, possibly in conjunction with a team of professional educators/learning designers. These resources will also depend on the target audience (e.g. the public, high school, undergraduate students etc.). The ATCA of course provides an alternative tool for hands-on radio astronomy education.

Recommendation: *CASS to identify the targeted audiences (Ph.D. students vs undergraduate students) and learning outcomes related with ASKAP operations, before developing educational material and resources.*

8. ATCA

ATUC is pleased to see the proposal statistics and breakdown into ATCA science, NAPA, and follow-up science that ensue from ASKAP pilot surveys. ATUC looks forward to seeing these reported at future meetings. It is encouraging to see that ATCA capability is being exploited to augment ASKAP survey science. ATUC values the Narrabri Lodge, which is open to visitors, and encourages astronomers to visit.

ATUC was also pleased to hear of the well attended and productive BIGCAT workshop held in March. This provided the opportunity to further refine science cases, and more importantly, the observing modes needed to exploit the BIGCAT capability.

8.1 Duty Astronomer/Observer Training

ATUC has received several feedback relating to the level of competency (and support) of new observers and duty astronomers (DAs). The common theme of the feedback is that in some cases DAs and observers are inadequately trained to deal with even minor observing issues and DAs are often unaware of the responsibilities of their role (e.g. when and how they should be available, which issues are appropriate for calling the on-site person, etc.). On a related point, there were comments pointing to a lack of information being provided to new observers on what training is required and how to go about arranging it.

ATUC recommends that CASS implements a review of observer and DA training. Below we list some possible changes to DA and observer training that could be considered:
1) Introduce some basic testing of the capabilities of trainee DA's before qualifying them;
2) Develop video (e.g. YouTube) resources so that core capabilities of observers and DAs can be revised online, including specialised training for particular correlator programs and frequencies;
3) Develop interactive training modules that teach key capabilities of observers and DAs;
4) Improved communication to DAs on the level of support likely to be required by observers during their DA week -- e.g. some system to flag new observers, or observers who self-identify as requiring assistance. This way the DA knows if they need to be watching closely and offering assistance during setup; and
5) Develop a simple version of the user guide with clear steps for setup and common problems.

The specifics of the training above will undoubtedly change once the BIGCAT correlator is commissioned. A modular system whereby education modules can be easily updated and improved upon would therefore be highly advantageous.

Recommendation: *ATUC recommends that CASS perform a comprehensive review of the approach to DA and observer training and consider the suggestions above to improve the quality of training.*

Recommendation: *CASS to contact PIs (particularly new observers) with information on how to arrange training sessions in advance of their first observations.*

Recommendation: *CASS to consider bringing back the "Friend system," to introduce an experienced observer to help for schedule files, set-up and observing to (inexperienced) DAs/observers. (ATUC notes that the 'Friend' request checkbox still exists in the proposal system, although Friends are no longer assigned.)*

8.2 Legacy Surveys

ATUC appreciated the updates presented on the status of the Legacy Surveys, and looks forward to receiving regular updates on the progress and outcomes of this important initiative, particularly the plans and status for data releases. Feedback from the Legacy Surveys highlights the need for assistance from ATNF for data ingestion and hosting. ATUC has some concerns about the pace of data release and publications from the projects, and hopes that semi-regular progress updates will improve the pace of these outcomes. Some of the legacy teams have noted a lack of support and direction from ATNF on data releases, despite multiple requests to ATNF (directly from the teams, and through ATUC) since the commencement of the surveys.

Recommendation: *CASS to formulate a plan for supporting legacy project data releases and present it at the October 2021 ATUC meeting.*

8.3 ATCA Science case

At the May 2020 meeting, a draft science case for ATCA was discussed and made available to ATUC for comments, which is now publicly available via the ATUC webpage. ATUC has been informed that a revised version was later presented to the steering committee. ATUC seeks some clarification on the plans for further development of the science case and the timeline for its release or for advancing to the final version. Specifically, are there plans to seek further community feedback in the near future, considering that this has been framed as a "living" document?

Recommendation: *ATUC seeks some clarity regarding the current status of the ATCA science case document, as well as plans for any further community feedback and discussion regarding its content (if any).*

9. Parkes (Murriyang)

ATUC is pleased to note the progress on the development of the Rocket/Cryo PAF receiver, and looks forward to further updates at the next ATUC meeting.

ATUC further notes that CASS has recently secured a modest contract to support spacecraft tracking for Parkes. Diversifying the revenue streams for Parkes while maintaining at least 50% open access for regular science proposals should help result in a sustainable national facility.

ATUC congratulates CASS and its University partners for submission of the UWH LIEF bid for the 2021 round. We note that there were fewer University partners on this bid than usual (due to COVID-19 financial restrictions at Universities and the proposal development occurring after some university internal LIEF deadlines).

10. Proposal submission and review:

ATUC looks forward to being briefed on the UNSW report on TAC grading practices (when it is completed), as well as the plans towards transitioning to fully anonymous reviewing. ATUC was pleased to learn of the discussions with SARAO about their proposal review process (including feedback they had received about their process). ATUC notes that NRAO was able to remove bias in gradings by both appointing gender balanced TACs (a current practice of ATNF) but also discussing bias and unconscious bias at the beginning of their TAC meetings. There is also the opportunity to collect further information in the proposal submission systems to understand and mitigate biases.

ATUC also notes some of the proposal instructions have not been updated since this transition. (For example, instructions for “Large Projects” proposals to comply with anonymous scientific justifications.)

Recommendation: *TAC members should be briefed on unconscious bias at the beginning of TAC meetings.*

Recommendation: *ATNF to acquire statistics on gender and career stages through OPAL.*

Recommendation: *ATNF to pursue anonymised proposal submissions and to report back to ATUC with an assessment of the impact of this scheme on grading biases.*

Recommendation: *CASS to consider masking the proposal history from TAC reviewers to facilitate a more effective anonymisation in the proposal review process.*

Recommendation: *CASS to review and suitably update proposal instructions for scientific justifications to reflect the revised (and partially anonymous) process (for example, update instructions for “Large Project” proposals to comply with anonymous scientific justifications).*

11. ATSC Feedback to Community:

The Steering Committee performs a key role in advising the Director and CASS management on matters relating to scientific and long-term strategic directions. These recommendations are confidential, however, advice related to the User Community (e.g. capping 10% of ASKAP time for guest observing for next several years, and consideration of a tiger team for split-band implementation subject to a short timeline) was communicated as part of the standing reports, but is not readily made accessible in a collated form. However, doing so would make it much easier for the User Community to provide comments and feedback on these important matters.

Recommendation: *ATUC recommends that ATSC recommendations that are relevant to the User Community (and can be made public) should be collated and communicated in a widely accessible format, i.e., either summarised in the Director's Report or separately via the ATUC web pages.*

12. Radio school

CASS has traditionally organised (or co-organised) an in-person annual "radio school" for training students and early career researchers in observational radio astronomy and data analysis. These schools have been held at Narrabri, Parkes, or Geraldton, and they provide important hands-on training for students, and opportunity to visit a radio telescope, interact with senior, lecturing astronomers and fellow school attendees. The hands-on nature of the activity and networking opportunities would be difficult to achieve in a virtual format. The Ph.D. student and ECR communities in Australia have been supportive to each other and tight-knit as a result of events such as the radio school.

Border closures would likely restrict in-person attendance to a radio school to Australians and New Zealanders. It has been noted that the outcomes of hybrid conferences (i.e. a mixture of in-person and virtual attendees) are lesser than in-person-only or virtual-only conferences. A virtual data reduction workshop, targeting a broader range of users/audience, and focusing on data analysis, could complement the radio school.

Recommendation: *CASS to continue hosting in-person radio schools where possible. CASS may also like to consider recording the lectures and making them available online for students or ECRs who are unable to travel, as well as for future use.*

Recommendation: *CASS to consider holding a virtual data analysis workshop, to allow for remote and international participation, assuming the resources (time and effort) are available to organise a workshop in the near future. Hosting an in-person radio school, however, should be a priority.*

13. LBA

ATUC was pleased to see the annual LBA update at this meeting, and the encouraging news about the continuing scientific productivity of the array. The diminishing opportunities for the use of Parkes at frequencies above the UWL range are a cause for concern but ATUC is hopeful that this will be alleviated in the future once the UWH receiver is funded and commissioned.

Recommendation: *CASS to evaluate the impact of the reduced availability of Parkes at high frequencies for LBA operations, and consider mitigation strategies for the period until a UWH receiver becomes available.*

13.1. LAMBDA (Low-frequency VLBI) Proposal

ATUC welcomes the development being made on this front, and the proposed/conceived plans for technology demonstration using low-frequency stations and test-bed facilities. LAMBDA has the potential to be a strategically important initiative for now and into the SKA era. ATUC looks forward to further updates on the progress, particularly with technology demonstration testbeds at the next meeting.

ATUC encourages the further development of the LAMBDA science case, and wider community input would be useful at this stage. The mooted high resolution low frequency science workshop seems to be a good step in this direction.

Recommendation: *CASS to continue developing the science case for LAMBDA, in closer consultation with the wider community. A community workshop to focus on this would be welcome.*

Recommendation: *CASS to include an update on the roll-out of the testbed facility at the next ATUC meeting.*

14. User Feedback received by ATNF

ATNF operations solicit feedback from project principal investigators every semester. A brief report on this feedback is provided at each ATUC meeting. While this has been very useful, if possible, ATUC would appreciate looking over some of this feedback in more detail before the next meeting.

Recommendation: *ATUC would appreciate further details on the nature of the feedback (or be provided with the feedback itself if it can be easily and anonymously done) as it might highlight some issues raised to ATUC, or in the open session.*

ATNF operations requested suggestions on how to improve the response to feedback, as the response rate has been relatively low. ATUC feels that one way to address this is to explicitly

solicit response from all observers (as registered on the PORTAL), and not just the project PIs. The feedback form could be embedded in the PORTAL, or at least the link to it should be displayed more prominently than is currently the case. A reminder email could also be sent to all observers registered on the PORTAL, e.g. immediately after their observing is completed. These measures may help increase the response rate.

Recommendation: *CASS to solicit responses from all observers if possible (as registered on the PORTAL), and not just the project PIs.*

15. User Feedback received by ATUC

ATUC received a comment from an ATCA observer pointing out that the technical review of their proposal failed to identify a serious technical flaw in the request, which meant the proposed observation was not technically feasible. In this case the imaging goals required observations in two different configurations but only one was requested. The feeling of ATUC is that this was a single case, and in general the TAC technical review has been satisfactory. That said, the issue has been noted and ATUC will continue to monitor feedback in this area.

ATUC also received a comment regarding whether or not unprocessed ASKAP data (such as the half band currently affected by RFI in ASKAP mid-band observations) could be considered as Guest Science. Guest Science is requested through an observing proposal process so that the science case, processing requirements and data storage can be assessed and planned for. ATUC's view is that access to the unprocessed data in question for use in Guest Science would need to go through the same proposal process to ensure that it does not impact Survey Science processing and that it can be appropriately resourced.

16. Future of ATUC meetings

ATUC discussed the format of future ATUC meetings. The consensus is that there are more value benefits from committee members attending them in-person, when possible. Working around compressed time zones and managing distractions from other commitments (e.g. teaching commitments) have inherent limitations, and unavoidably impact the efficiency of ATUC functioning, particularly during closed sessions. The remote meetings also have restricted opportunities for valuable informal interactions with CASS management/staff that an in-person meeting allows. Recent meetings have demonstrated the feasibility of remote presentations and participation in the Open Sessions, and it is therefore it is expected that some presenters and attendees may continue to choose to participate remotely. ATUC thus feels that such an option should be supported, even as committee members are encouraged to attend in person.

Recommendation: *CASS to consider resuming in-person ATUC meetings as soon as it is viable, while continuing to provide an excellent remote experience for speakers and other participants in the Open Session.*