

ATUC Report (April 2022)

1. ATUC members in attendance):

Ramesh Bhat (Chair), Vince McIntyre (Secretary), Ivy Wong, Ryan Shannon, Emil Lenc, Nickolas Pingel (remote), Michelle Cluver (remote), James Leung, Yuanming Wang

1.1 Apologies:

Martin Bell

2. Commendations for S&A:

- Keith Bannister for winning the 2022 Pawsey medal.
- 3C273 Lunar occultation commemoration event.
- Participation and presentations by two ATNF students at the “RFI 2022” meeting.
- Hosting a successful online conference “VLBI in the SKA Era”.

3. ATNF Strategy

The ATNF is planning a review process to define its strategy in the 2030s. By this time the SKA is expected to be operational and start delivering breakthrough science along the lines of some of the Key Science Projects. It is possible that by this point ASKAP would have also been upgraded and undertaken a new set of surveys.

The ATUC strongly supports the internationally-leading role that the ATNF plays in technology, science, and operations of radio astronomical facilities, and the role that the ATNF plays in supporting its users and the Australian astronomy community more broadly. ATUC also strongly endorses a process to position the ATNF to continue to be a leader in radio astronomy technology and science in the 2030s.

The ATNF requested specific feedback on the strategic planning on the following three questions:

1. *How does ATUC suggest we include them and the broader community?*

ATUC recommends the participation of community members in working groups that will be formed to define the ATNF strategy in 2032. These working groups can provide input

into ATNF science going forward; for example, in science cases for the existing ATNF facilities into the SKA era. The ATUC encourages the ATNF to engage the community through Town Hall meetings; for example, the one that will likely be held in conjunction with the 2022 ASA meeting.

2. What does ATUC see as crucial training to retain, and/or new training in the future?

The ATNF provides crucial training in a number of areas that will need to continue into the 2030s.

Firstly, the ATNF provides students with experience in hands-on observing and pathways into careers both in astrophysics and in observatory operations.

Secondly, the ATNF provides important pathways for training engineers in radio astronomy instrumentation. It was noted in the open session of the meeting that the *summer vacation programme* has been a fruitful pathway for bringing engineers into radio astronomy.

For non-student training, a larger diversity of training programmes (eg. data access programmes) is encouraged.

Recommendation: Continue (if not grow) investment and support (inclusive of financial & career) in training student & ECR researchers, particularly in the specialised areas of engineering and synthesis observations.

Recommendation: In an effort to cater to a larger demographic base of users, short non-radio expert training for the greater community in the access of the large survey data products is also encouraged. Such programmes should be in addition to existing expert student training programmes, and not as a replacement.

3. *How can we best strengthen university connections* (students, joint appointments, LIEFs etc)?

There has been a substantial increase in the number of CASS jointly supervised students. Even in the SKA-era, there will be potential niche science areas for ATNF-operated facilities; e.g., Parkes and ATCA continue to play an increasing role in VLBI science and in follow-up observations for ASKAP detections.

Recommendation: The ATNF continues with vibrant student programmes (both for summer vacation and Ph.D. students). The ANTF should ensure diversity in its Ph.D. cohort. This can be accomplished through ensuring diversity in the summer vacation student programme.

The ATNF has benefitted from a number of joint appointments over the last half decade. These appointments provide natural links between S&A and Academic institutions, and stronger connections to ARC funding streams.

Recommendation: ATNF consider pursuing joint appointments. Appointments should be considered in places where the appointee can make *meaningful contributions to both ATNF and their University*.

The University sector has benefitted through successful awards of ARC Centres of Excellence. The ATNF has played a supporting role in these Centres of Excellence, through in-kind support of ATNF staff as Partner Investigators and telescope time (contingent on approval from the ATNF TAC).

Recommendation: ATNF continues to support future Centres of Excellence (CoEs). Future CoEs could be strengthened through strategic recruitments of co-supervised students and CSIRO postdoctoral fellows.

4. Diversity & Inclusion (D&I)

ATUC appreciates the update on the extensive D&I activities and actions undertaken since the last meeting. We commend the D&I committee for completing important action items in the 2020-2021 D&I Action Plan and enacting the 2021-2022 D&I Action Plan based on the successful inclusivity survey. It was encouraging to hear that many of the intended plans for the 2021-2022 Action Plan are on track. The ATUC endorses the overarching plan to reassess the needs of the Business Unit every two years, in line with biennial culture surveys. The summary of the progress report demonstrated an impressive integration of a 'D&I lens' in essentially all aspects of the S&A operations, including the addition of specific D&I objectives in all S&A Executive Annual Performance Plan.

The ATUC extends its full support for the D&I committee to ensure S&A continues to be a champion of diversity and inclusion within CSIRO. To that end, ATUC welcomes an evaluation on how to improve D&I within itself and looks forward to working with the D&I committee in any capacity to facilitate a comprehensive evaluation.

Recommendation: D&I Committee continues dialogue with the ATUC (and other S&A committees) about inclusivity to help identify aspects that need improvement.

While most of the planned activities focus on S&A staff, the ATUC would appreciate feedback from the S&A D&I Committee as to what actions and/or activities could be extended to Users of the ATNF (or alternatively how some of D&I initiatives could be implemented within the User Community Activities).

Recommendation: D&I Committee to suggest actions related to Users of the ATNF and specifically in relation to the Users and Time Assignment Committees.

At the April 2021 meeting, ATUC was briefed on the diversity in CASS and the paucity of women in certain units. Given new hiring practices and an influx of new personnel to fill SKA positions these demographic balances should have hopefully improved.

Recommendation: ATNF to provide an update on business unit demographics at the next ATUC meeting.

5. Data Archives

The CSIRO ASKAP Science Data Archive (CASDA) will be the mainstay for serving data products to the ASKAP community that is expected to grow as ASKAP moves into the full survey mode. It will also eventually be the archive for data currently held in ATOA (ATCA, Parkes and Mopra raw data, and curated data products such as the MALT-90 survey).

ATUC was asked to advise on the set of priorities for future development on aspects including migration to new servers, cutout services, integration of visualisation tools (e.g. CARTA). The ATUC however felt that without fully understanding the work involved behind all of these tasks, it would be hard to assign some priorities. ATUC has therefore reordered the list provided in the slides to what we consider useful to the community (see below).

- Migration to new servers (currently 7years old)
- New cutout UI
- UI/UX refresh
- Integration with the CARTA visualisation tool
- ATOA migration (analysis in Q4 2022, development in 2023)
- Delete function for deposits before data is released

- Derived data/L7: ability to deposit FITS tables and other types (e.g., plain text)
- Search UI: show integration times & filter by polarisation
- Improve validation workflow
- Custom DOIs

ATUC also received some feedback in the open session about specific improvements to CASDA which we pass on here for evaluation by ATNF staff:

- ATNF consider presenting higher-order survey products earliest within the search results; for example finished images appear earlier than clean component images for a single polarisation
- RACS seems like a good early candidate for enabling the proposed 'postage stamp' type access
- some Users noted that the current CASDA tutorials appeared to be out of date and that a review for outdated material might be in order

ATUC notes that there could be a gap between BIGCAT starting operations and the migration of ATOA. The current ATOA ingest rate is roughly 40 TB/yr, dominated by UWL data. BIGCAT is expected to produce up to 500 TB/yr (for the full bandwidth), and the CryoPAF non-pulsar products are expected to be ~50-100TB/yr.

Recommendation: ATNF to confirm that the existing ATOA system would be able to cope with the expected data rates, and consider further data archiving requirements.

ATUC was also asked about archiving other CryoPAF data, where data rates could be as high as 80 TB/day (e.g. large pulsar surveys). In the past, the projects involving the highest data rates were run by consortia who also built the backends for producing the data and so dealt with the data storage largely by themselves. Currently, the major source of high-data rate is the UWL system, which is a national facility instrument (maximal rate of about 12 TB/day). The high data rate observations are almost entirely pulsar observations, most of which are stored in the CSIRO DAP facility (while some are transported to Swinburne University's OzSTAR supercomputer where they are processed and deleted). The DAP archive is growing at ~900 TB/yr, which is as much as the infrastructure can handle. With CryoPAF also intended to be a national facility instrument, the data archiving requirements should be reconsidered.

While in general all data should be archived to the extent practically possible, ATUC considers that archiving data from projects using the maximal CryoPAF data rates will likely be prohibitive given the resource constraints of DAP. The ATUC therefore likes to

suggest that ATNF consider (and implement) a process to involve project teams in dealing with very high data rate observations.

Recommendation: ATNF to consider (and implement) a process that involves project teams in dealing with high data rate observations.

Recommendation: ATNF to consider working with the project teams toward developing the techniques to ‘decimate’ the data products (for example converting from 8-bit depth to 2-bit) in order to make it feasible to archive large data and make them available to the wider community.

6. ASKAP

ATUC was pleased to hear that Phase II pilot surveys are currently nearing completion, and that the commissioning and migration to the Setonix supercomputer is expected to be completed in conjunction with the expected start of full survey operations in October 2022.

6.1 RASSP

The ATUC commends S&A for assembling an expert panel to conduct a comprehensive review of each SSP’s expected scientific merits, legacy value, and survey plans, in an effort to guide the ultimate time allocation during full survey operations.

6.2 Split-band mode

The ATUC was also updated that the panel proceeded with the assumption that the mode won’t be available. Furthermore, the panel noted that the science case for the split band mode “wasn’t compelling”.

The ATUC has consistently advocated the consideration of a split-band implementation. While the ATUC accepts the decision made by RASSP, the ATUC also feels that, for the purpose of a better understanding of the rationale behind the decision to postpone the implementation of the split-band mode, some further clarification would be useful on how the decision was made to postpone (or abandon) a split band mode. The ATUC would appreciate being provided with a summary of the RASSP panel reports.

Recommendation: ATNF to provide further clarification on the decision regarding the split band mode, and if possible, provide a summary of the RASSP panel reports.

6.3 Consolidation phase

A Consolidation phase will succeed the pilot Phase 2 surveys, with the goal of increasing ASKAP reliability to ensure that the observing duty cycle is at least 70% during the main observing time.

6.4 Guest science proposals

The ATNF intends to offer a fraction of available ASKAP time to guest science projects. The ATNF steering committee and the RASSP panel have advised on the fraction of time to offer through such a scheme. ATUC supports a Guest Science Programme on ASKAP, as it has the potential to deliver novel science not covered by the key survey science projects. ATUC was asked to advise on how the guest science projects would be evaluated.

To manage the guest science proposals, ATUC suggests that these guest proposals be assessed through the regular ATNF Time Assignment Committee, which will be able to advise on the science impact of the proposals, and whether or not ASKAP is a suitable instrument to execute the specific science case. We suggest that both the proposers and the TAC factor in the resources required to reduce the data at Pawsey, and if additional work is needed to further develop pipelines at Pawsey, as this could be a major roadblock in achieving the proposed science goals. Alternatively, the proposal needs to clearly indicate (or demonstrate) that they can process the data using their own resources.

Recommendation: Guest science proposals need to be assessed through the regular ATNF TAC process, who can advise on the science impact and assess the suitability of ASKAP for the proposed science objectives, as well as the resources required for data reduction.

6.5 Encouraging community awareness and uptake of observatory projects

We *congratulate the RACS team* for their timely and efficient publication of RACS-low catalogue which has been publicly-available to the community for the past ~6 months. We also commend the RACS team on the provision of the RACS images on data servers such as Aladin, CIRADA and Data Central to enable access to the RACS data

products to non-radio astronomers. The legacy value of RACS will increase over time until it is superseded by the ASKAP EMU survey.

RACS will become increasingly useful once a greater variety of data products (e.g., RACS-mid & RACS-high, spectral indices) and improvements (eg. astrometry and flux scale) become available. The ability to generate postage-stamp cutouts from user-provided coordinates, and access through other catalogues, such as integration with Data Central services, will help facilitate such comparisons — see discussion on Data Archives above.

Recommendation: ATNF continues to promote RACS through timely publication of the source catalogues, intuitive data access portals, conference presentations in addition to hosting regular workshops to help promote the science data products being produced by RACS and the SSTs.

Recommendation: ATNF continues to improve the accuracy and reliability of the RACS data products such as the flux-scale and astrometric uncertainties.

6.6 Helping the community with prompt and effective use of ASKAP survey data

There is now a vast amount of data products that have been produced during the two phases of ASKAP pilot surveys. Related to the effective use of ASKAP data is the efficiency and effectiveness of the CASDA data archive that connects the users to the data products.

Recommendation: Continued direct engagement between the ATNF and ASKAP user groups (both within and external to SSTs) in an effort to ensure timely communication of feedback relating to matters that impact the effective use of ASKAP data.

Recommendation: ATNF pursue the suggested improvements to the CASDA interface to develop more efficient and effective tools for user access to the ASKAP science data products.

7. National Facility Support model

The ATUC was updated on the developments relating to the proposed new user support model for ATNF managed facilities. The model was first proposed at the previous ATUC meeting. It will transition ATCA (where the observers were supported by rostered Duty Astronomers) to a Parkes-like model, where observers are supported by Project-based

Experts (either from the project team, or astronomers within or outside ATNF, nominated to support the observing team).

The ATUC is concerned that the rollout of the new model (which started with a soft start in the ongoing semester, to be followed by more extensive tests and trials in the coming OCT2022S semester), may potentially lead to an inevitable decrease in the observing efficiency, particularly at the early stages, as the result of additional failed observations and potentially longer timelines for any issues to be resolved.

Another related concern is the handling of handover between the project experts. This is particularly a major concern for ATCA, given that the deployment and commissioning of BIGCAT will significantly overlap with the timeline over which the new support model will be rolled out and tested. The projects that switch during nightly/early morning hours are likely to be most impacted.

In principle, PORTAL should be able to handle this, provided effective communication can be ensured between the project experts during the handover process. But this will also necessitate *project experts receiving necessary training* and developing adequate expertise that is likely more specialised than current DA training. It is therefore vital to ensure that there are *dedicated resources* (including financial & personnel) for training related to BIGCAT.

The transition from CABB to BIGCAT will also necessitate making suitable updates to the cookbook so data analysis can be handled as smoothly as possible. An updated documentation will also help increase the number of users being able to shake out the system in the early stages, and thus help with the commissioning process.

Recommendation: ATNF to consider and implement suitable measures to minimise the impact in the observing efficiency from project handovers, especially during the BIGCAT commissioning phase.

Recommendation: ATNF to develop additional training requirements and material for project experts, and ensure that there are dedicated resources (including financial and personnel) for effective training.

Recommendation: ATUC suggests a suitable revision of the cookbook as one of the measures to facilitate a smoother transition from CABB to BIGCAT.

While the current support model for Parkes has been working quite efficiently, there are indeed concerns that the deployment and commissioning of a major instrumentation

such as CryoPAF will necessitate suitable training schemes for Parkes support. This could be potentially modelled after the successful UWL training that was held for Parkes support staff in early 2020.

Recommendation: ATNF to develop plans for implementing similar training for project experts at Parkes as the CryoPAF development and commissioning moves forward.

7.1 Student Programme

The ATUC recognises the importance of student training in maintaining and developing ATNF's strengths in radio astronomy. The training programmes can also strengthen the connection between university-based students and S&A. User feedback has indicated that there is a need for more in-person training opportunities as it will help ensure more effective interaction between student researchers and dedicated resources allocated to training programs.

Recommendation: ATNF to organise an *in-person radio school for 2022*, if permitted by pandemic regulations.

In the past Duty Astronomers were provided with travel support for their trips to Narrabri or Marsfield. This provided student Duty Astronomers with the opportunity to collaborate with their ATNF supervisors. In the absence of the DA program, alternative pathways to support student-supervisor interactions are highly recommended.

Recommendation: ATNF to consider (and provide) support for student travel to the observatories (Narrabri) or ATNF sites (Perth/Marsfield), in replacement of previous travel support that was offered as part of the duty astronomer program (for domestic students).

7.2 Observer Training and Qualification

International observers have noted that observer qualification has been relaxed during the pandemic. In the future, international observers will continue to benefit from online training and observing qualifications.

For the training of international observers and project experts, the ATUC feels that the ATNF may need to invest in a more comprehensive online training programme, allowing international observers to qualify for observing without requirements of visiting the SOC. In particular, ATUC recognises the importance of on-site visits for telescope training and

recommends that ATNF investigate viable options to simulate these experiences (e.g. VR training modules) as part of the online training programme on a longer timescale.

Recommendation: ATNF to consider investing in a more comprehensive online training programme that will allow international observers to qualify for observing without making a visit to the SOC.

Recommendation: ATNF to investigate options to simulate the observing experiences (e.g. VR training modules) as part of the online training program.

8. ATCA & BIGCAT

The ATCA remains an important facility for astronomers in Australia and internationally, with its flexible observing configuration, high frequency receivers, and the access to the Southern skies. The ATUC is therefore concerned about the reliability and usability of the CABB correlator, especially in spectral-line modes, where the loss of a number of correlator blocks tends to significantly impact the ability to execute useful spectral-line observations. This would especially impact student researchers, and particularly PhD students, who need to complete their observations before BIGCAT is commissioned.

Recommendation: At future calls for proposals, ATNF to provide advice on the risk of successful completion of spectral-line projects, if CABB reliability deteriorates.

The ATUC commends the Project Leader for maintaining clear communications with users about required observing mode in the BIGCAT project. After the initial workshop there has been frequent follow up to clarify and define the required observing modes.

As noted earlier in the report, users have raised concerns around the BIGCAT timeline and delay. A significant element of the project has been delayed due to reallocation of ATNF effort to other projects (e.g., Quasar). ATUC had in fact noted this concern in its *April 2021 report* by flagging the risks involved and the potential impact on Technology development projects. In the case of BIGCAT, RF upgrades to double the bandwidth are now delayed to 2024.

The ATNF has always promoted, and also benefited from, University co-investments in instrumentation upgrades, particularly through the ARC LIEF programme, but delays like these can *potentially impact the ability of some Universities to participate in future LIEF bids*. The most direct impact is availability of university-based chief Investigators, who are limited to participating in no more than two LIEF projects at a given time.

Recommendation: ATNF and partners develop realistic expectations for timeline to complete projects like BIGCAT and maintain *regular channels of communication* in an effort to ensure any delays are relayed to stakeholders in a timely manner.

9. Parkes (Murriyang)

ATUC commends the ATNF Parkes (Murriyang) team for organising a successful Lunar occultation commemoration event.

ATUC is pleased to note the development of a new and improved DHAGU observing PORTAL for Parkes/Murriyang, which has enabled a greater telescope autonomy in terms of conducting observations, and has decreased the need for frequent observer interventions during an observing run. As such, some experienced users have now expressed a desire to conduct unattended observing with Parkes, particularly during long overnight observing sessions.

The ATUC further notes the success of previous UWL training workshops. As Parkes enters a transition period between UWL and CryoPAF, which will also necessitate the staggered release of observing schedules, it might also be a good time to update the user manuals for observations and data processing. Also, it may be timely to plan for CryoPAF training workshops to better prepare the user community.

Recommendation: ATNF consider a general policy of permitting unattended observing at Parkes.

Recommendation: ATNF starts planning training workshops as CryoPAF development moves forward.

10. Technologies

ATUC appreciates updates provided on the progress being made with the LIEF-funded projects, CryoPAF, BIGCAT and CRACO. The digital backends of these systems will greatly benefit from R&D investments that were made in RFSoc/Alveo type systems. While the development of CRACO and CryoPAF systems appear to be on reasonable track, with the expectation of both CryoPAF and CRACO being in early operational phase by Q1 2023, there have been significant delays with the BIGCAT project, for

which Jimble installation is expected in Feb 2023 and the full RF upgrades not until Q2 2024. This has naturally caused some significant concerns within the user community.

10.1 RFI:

ATUC recognises the ongoing priority of the ATNF in investigating RFI mitigation across observatories. ATUC would welcome an update of related activities at the next meeting.

Among the mitigation strategies is the notch filter installation on the UWL system. It is probably too early to assess the effectiveness of these filters (as it has been only two weeks since the installation by the time of this ATUC meeting). However, the ATUC understands the plans to develop the next-generation UWL backend using the Jimble digitiser technology that is anticipated to be more RFI-resilient. Even though the Jimble system considered for this upgrade is similar to that being used for developing BIGCAT, a clear timeline for possible upgrade is not known at this stage.

At the last ATUC meeting, the ATUC was provided with a comprehensive update on the plans and progress with RFI related activities, including the formation of a RFI working group. The ATUC is pleased to note that there are now active student engagements in this important area, including a joint supervision of a PhD student project focused on RFI mitigation techniques for PAFs (by leveraging spatial filtering and adaptive nulling), in collaboration with Sydney Uni. ATUC also commends multiple student presentations at the recent RFI2022 conference, demonstrating positive benefits of engaging summer students in RFI related R&D early on.

Recommendation: continue RFI R&D projects and active student engagements with Universities.

10.2 Science and Instrumentation workshop:

In light of the continued progress being made on the technology development front, including RFI mitigation and digital systems, and recognising that the ATNF is keen to further develop and firm up its strategic vision into next several years and beyond, it is very timely to organise a science and instrumentation workshop, to provide a forum for fruitful exchange of ideas and knowledge transfer, and also to inform or shape science drivers and priorities in the coming decade(s). Even though the proposal for such a dual-focus workshop was indeed discussed at the previous ATUC meeting, there was strong endorsement within ATUC to hold this as an in-person (or hybrid) meeting for ensuring maximal value benefits. With interstate travel restrictions beginning to ease

within Australia, it should soon be feasible to hold such a meeting in conjunction with the next ATUC meeting.

Recommendation: *ATNF to actively pursue the plans to organise the proposed science and instrumentation workshop alongside the next ATUC meeting. ATUC will be happy to work closely with the ATNF in the related planning and organisation.*

11. ATUC & SST/Survey projects

The ATUC recognises that community consultation, and clear communication avenues between ATNF and the user community, are mutually beneficial, particularly in light of developing the ATNF Vision for the coming decades.

The ATUC sees its key role as being an advocate for the Users of the ATNF, as well as feeding back issues and suggestions to ATNF. As consultation with the ATUC does not imply a comprehensive consultation with the wider user community, a specific request for community consultation can be accommodated if sufficient lead time is provided for ATUC to carry this out before the ATUC meeting.

As an example of a slight mismatch in the expectations, ATUC has the impression that the *ASKAP Operations teams do not view the ATUC as representative as the SSTs for useful inputs/feedback that could be more relevant/important for their prioritisation, yet ATUC has been asked to verify the CASDA big-ticket prioritisations.*

The ATUC's view is that direct and regular/active engagement between the ATNF and relevant user community (e.g. CASDA users) need to take priority moving forward. As an example, the ATUC would like to note that this type of consultation was successful for defining the requirements for the BIGCAT modes.

Recommendation: Considering the importance of regular and active engagement between the ATNF and the user community, make this a priority moving forward.

Recommendation: ATNF make a distinction between obtaining Community Feedback and ATUC Feedback depending on the use case (noting that ATUC is not necessarily a representative subset of the entire user community).

ATUC would appreciate receiving a high-level summary of the updates from the two ASKAP SST PI meetings that precede the six-monthly ATUC meetings. Summaries of

this kind would indeed be helpful to ATUC for addressing potential user feedback related to recent updates to the instruments, survey(s) and/or data archives.

Recommendation: ATNF to provide a high-level summary of the updates from the two ASKAP SST PI meetings preceding the six-monthly ATUC meetings.

12. User Feedback

A number of user feedback items (e.g., relating to BIGCAT delays, and an automated observing mode for Parkes) have already been covered under the respective sections. The ATUC has also received feedback on the training requirements for ATCA observer qualification, in particular the requirement to do on-site training at Marsfield or Narrabri. These have not been enforced for the past two years due to the COVID-19 pandemic, but the question arises whether, and when, these requirements will come back into force. Further, the changes to the support model may require additional adjustments being made to these requirements.

Recommendation: ATNF to suitably update the requirements for ATCA remote observer training to match current (and constantly evolving) circumstances.

13. Date and format of next meeting

As noted in the previous reports, the *ATUC is keen to return to holding hybrid in-person meetings, as they have proven more fruitful and efficient*. The committee has indeed benefitted from opportunities for in-person interaction with attending ATNF staff, out of the scheduled meeting sessions.

During the open session of this ATUC meeting, on-line break-out sessions were trialled, where individual members met with ~ 10 users to discuss a couple of specific topics (i.e. the new National Facility Support model; and the observer training requirements in anticipation of new technologies/instrumentation such as BIGCAT and CryoPAF) . The sessions encouraged communication from a wider range of community members, with noted participation from early career researchers. The committee found these sessions to be very useful as they also complemented the nature and range of feedback typically received through other (regular) channels. The ATUC endorses the inclusion of similar break-out sessions in future meetings.

Recommendation: ATNF to consider similar break-out sessions on the topics of wider community interest in future ATUC meetings.

13.1 ATUC membership

The current membership lacks expert ATCA and LBA and users. Given the anticipated developments in BIGCAT in the coming years, the makeup of ATUC would benefit from having one or more members who are also expert ATCA users. Moreover, many users, particularly student members, are interested in serving on the Users committee. While the terms of reference are published on the ATUC website, further practical information on the duties and expectations of ATUC members would also be useful.

Recommendation: Recognising that ATUC members are appointed by the ATNF Steering Committee, ATUC requests the steering committee to consider appointing members with experience in ATCA or LBA.

Recommendation: ATNF to publish the main duties of members on the ATUC website.