ATUC Report (October 2019)

1. ATUC members in attendance:

James Miller-Jones (chair), Cormac Reynolds (secretary), Ramesh Bhat, Shari Breen (remote), Jo Dawson, Miroslav Filipovic, Bi-Qing For, Stefan Osłowski, Maria Rioja, Cherie Day, Chikaedu Ogbodo.

2. Commendations for CASS:

- Successful and well-attended Apollo 11 event at Parkes
- ASA Peter McGregor prize for the DiFX Collaboration
- ASA Louise Webster Prize for Shivani Bhandari
- Successful Radio School at Narrabri
- Diversity and Inclusivity initiatives led by Jane Kaczmarek
- Realisation of the first tranches of the ASKAP RACS
- High-profile ASKAP-CRAFT results on FRB localisation

3. Diversity & Inclusion

ATUC wishes to commend CASS on the positive suite of initiatives and actions that are being taken to identify and address workplace culture issues, including the beneficial effect of resourcing through the 0.2 FTE time allocation provided to the new Diversity Champion. The committee wishes to explicitly recognise the effort and commitment that Jane Kaczmarek has brought to the role, and recommends that CASS commit to maintaining the post (and FTE allocation) of Diversity Champion going forward. ATUC suggests that CASS consider the merits of nominating a permanent staff member for the post at such time as it is readvertised, thus mitigating against potential negative career impacts (e.g. reduced scientific output) on more junior staff.

ATUC noted that the ASA Pleiades scheme was not mentioned in the Diversity and Inclusion talk, and would encourage CASS to share as appropriate any feedback received from the assessment panel following the most recent submission, as well as any plans for moving towards a successful Award in the future. However, given the increasing national prominence of the SAGE initiative, ATUC recognises that much of CASS's future activity in this domain will be within the SAGE framework, building from CSIRO's existing Bronze SAGE award, and looks forward to the positive impact such organisation-level initiatives will bring.

While the clear gender imbalance in the most recent CASS vacation scholarship recipients was notable, ATUC appreciates CASS's engagement with this issue, recognising that this was a CSIRO-wide scheme in which CASS had no control over the application process. However, the Committee recommends that CASS investigate at a high level whether there might be any possibility of making changes that could promote a better gender balance in future CASS Vacation Scholarship rounds. If the intent of the programme is (even in part) to help promote women in STEMM, then an appropriate legal framework should be in place to ensure that gender identity can be factored into the assessment process. The committee recommends that if necessary the CASS Executive seeks clarity on any relevant legal aspects of this issue, and consider options such as targeted funding pools for a given number of female hires, should such options be considered feasible and appropriate. ATUC also recognises that student numbers do also reflect wider societal problems affecting the underlying applicant pool, particularly for engineering-focused projects. Nonetheless, without action to promote STEMM-based career paths to under-represented groups by organisations who have the potential to do so, this situation is unlikely to improve.

Recommendation: *CASS to retain the position of Diversity Champion with at least its current level of committed FTE resources, ideally seeking to appoint a permanent staff member to the role.*
Recommendation: *CASS to share with ATUC as appropriate their response to any pertinent outcomes of the recent Pleiades awards, and future plans for engagement with the SAGE initiative.*
Recommendation: *CASS to explore options for improving the gender balance of students selected for the CASS Vacation Scholarship scheme.*

4. Anonymised proposal review:

ATUC was interested to see the suggestion of anonymised proposal review, and is certainly supportive of initiatives that could reduce any existing biases in the TAC process. However, it was not clear that the existing statistics had revealed any underlying issues to be addressed. The Committee had additional concerns regarding whether it would be possible to properly anonymise proposals, given the fact that the community is relatively small, and that institutional memory persists in the TAC with long-running projects such as the Legacy or Large projects, and would be maintained at some level by the continuity of proposal codes. The Committee was also concerned as to the impact this would have on the success rates of student-led proposals, if it were not possible to identify that a student was PI.

ATUC is keen not to increase the amount of effort required from either the TAC or CASS staff to review proposals, but a majority of the Committee was amenable to taking initial steps such as moving the proposer names to the back of the proposal (so that reviewers see the science of the proposal before being presented with information about the proposing team), randomising (rather than alphabetising) the author ordering, and presenting first name initials rather than full

names (to remove any gendered information). However, a concern persisted within the Committee that this measure could potentially introduce new but unquantifiable biases that would be difficult to correct for.

Given these remaining concerns, should such a system be implemented it would be important to conduct a proper analysis of the situation before and after the change, to determine what effect it has on the statistics of successful and unsuccessful proposals. The person or group responsible for this analysis should be identified ahead of time, with a time period set (perhaps 2-4 semesters) for reanalysis to determine the impact of the changes. ATUC would be very interested to see the results of this analysis when complete.

Recommendation: *While ATUC was not unanimous on this point, the majority felt that CASS should consider implementing steps towards some level of anonymised proposal review (e.g. re-ordering of author names, and placing this part of the cover sheet at the end of the proposal to let the science come first), especially if thorough analysis of historical data reveals any bias. A formal assessment of the impact any changes have should be monitored, with special attention paid to any new biases that may be introduced.*

5. Joint positions with the Universities

ATUC supports the idea of pursuing joint positions with the Universities, both to mitigate possible impacts of any ASL constraints, and to foster a closer partnership with the broader university community. However, ATUC suggests that such initiatives should build on clear areas of common interest, and ensure that the joint position holders are set up for success. In particular, the contractual arrangements should clearly define expectations and responsibilities at each institution, so as to avoid potential pitfalls associated with excess work-loads and to ensure appropriate mentoring at each institution.

Recommendation: *That CASS continue to investigate the possibility of joint-appointments where there is a clear alignment, but carefully explore the associated challenges, and ensure that clear goals and expectations are set for each position.*

6. LIEF proposals and Technology development

ATUC was pleased to see the continuation of the formal EoI process for LIEF bids with CASS. With several compelling technology development options presented at the Open Session, this process provides a focus for the community to self-organise and identify their high-priority initiatives.

The science case for the Coherent FRB backend (which was also considered last year but was not pursued on the grounds that the science is too time-critical to apply for a LIEF) remains

highly compelling, and has now been strengthened by the initial tranche of high-impact FRB papers published by the CRAFT team. Now that another year has passed without this initiative being funded, it would seem prudent to consider a LIEF proposal lest another, more timely funding stream cannot be identified. This development would also serve as a test-bed for the ASKAP tied-array mode (useful for the long-baseline VLBI using SKA-Mid). However, its high scientific impact notwithstanding, this backend would likely serve a smaller community than the LIEF proposals submitted last round (BIGCAT and the CryoPAF).

The Cryo-PAF remains a very promising technology and a potential source of external revenue in the longer term (like ADE PAFs). ATUC also notes the strategic value of continued development of the Cryo-PAF, as it will enable extending ASKAP's scientific capabilities in the future. However, given that the pending proposal was the third LIEF submission for this initiative, then careful consideration would need to be given to the appropriate path forward should the current proposal be unsuccessful.

The existing BIGCAT proposal would also serve a large community, benefitting all ATCA users, and may be necessary to secure the future of ATCA through to ~2025, when SKA may begin to come online. As outlined in the mid-term review submission, the current timeline for SKA strongly motivates continued ATCA operations through to mid-decade, and the enhanced capabilities provided by BIGCAT would enable optimal scientific return over this period. Should the current LIEF bid be unsuccessful, ATUC would encourage the exploration of a resubmission, assuming that the University partners remained willing.

ATUC notes that the development of LBA-Low is of strategic value, despite directly benefiting a relatively small community. It is also a relatively low cost investment, and has added value in terms of testing SKA-low stations for longer baselines, and providing a platform to develop and test the RFSoC. However, ATUC felt that the size of the community whose science would directly use such a facility might be a challenge for any potential LIEF bid.

The possibility of a LIEF for the Ultra Wideband Mid+High (UWBM+H) was raised, and ATUC indeed felt this timely to consider. However, as LIEFs must be community-driven, it is likely too late in the process to allow for extensive community consultation to gauge interest, redefine the science case and identify a lead institution in time for this year's LIEF round. If this initiative is to be considered for next year's LIEF round (i.e. a 2021 submission), then any such consultation would need to begin over the coming months.

Recommendation: *Continue active engagement with the community regarding LIEF priorities (as informed by the EoI process, with the coherent FRB backend and any potential resubmissions seeming to be the highest current priorities), and seek university partners for strategic projects.*
Recommendation: *Explore the possibility of a future Community Workshop on UWBM+H, looking towards a potential future LIEF submission in 2021.*

7. ASKAP

ATUC would like to congratulate all the science and ASKAP operation teams for the success of the early science and pilot surveys to date. The ATUC science day showcased the fantastic science results coming out of these data, and we look forward to seeing their continued progress over the coming months.

The broader concerns of the user community concerning the timeline to full survey science operations on ASKAP were well addressed by the Terms of Reference for the review process, as presented by the ASKAP operation team. In order to be fair and fully prepared for the international review process that will lead to the observation allocations and overall scheduling, ATUC strongly recommends that all Survey Science Project teams (SSPs) are able to obtain their full 100 hours of allocated, successful pilot time and assess the data before writing their revised science cases. The process of the review should be clearly defined and communicated in advance to the teams through the ASKAP PIs meeting. The SSP PIs appeared to be happy with the current plans for open time allocation, although these will need to be fleshed out.

The consolidation process (whereby the array is handed back to the engineering team following the conclusion of the pilot surveys) is sensible, as it will allow CSIRO to ensure that the system is stable and ready to proceed with the full survey science observations, and to initiate any ASKAP-X improvements. However, we recommend that an exception be made for transient searches and follow up during this period by CRAFT, VAST and the gravitational wave project. In particular, with MeerKAT coming online with the capability to do fast transient science, CRAFT could lose its current edge in the field if it is unable to observe for the full period of engineering consolidation.

We commend the ASKAP operations team for their efforts to improve system stability, especially in terms of the correlator dropouts and the disk issue that had resulted in extensive issues with the Pilot Survey data. We do note that the new disks only provide a temporary reprieve to the issues caused by the previous disk space constraints, and that this will likely continue to be an issue in the future when the full surveys are underway.

ATUC was very interested to see the various ASKAP-X initiatives being discussed. In particular, a number of SSPs have expressed interest in splitting the bandwidth into two non-contiguous frequency chunks to avoid the unusable RFI band (1150 - 1280 MHz). As far as we are aware, this is capable of being implemented in firmware, with only software needing to be updated. However, there is currently no support for this mode of observation. While a system that simply doesn't observe part of the band would be trivial to implement, a split band system would be non-trivial. An alternative development would be to trade off bandwidth for beams (e.g. 72 beams), which would significantly improve observing speed. If any studies have been conducted to explore the feasibility of this option, ATUC would be interested to see the results. Finally, a

rapid imaging mode has been proposed, although ATUC recognises that it will likely be used primarily by VAST. We recommend that CASS (together with the ASKAP operational team) assess the required resources for implementing the various options, and prioritise based on a combination of resource requirements versus availability, and the broad utility of any such upgrades. It would be helpful to have the plans for any ASKAP-X improvements available before final survey strategies are defined by the SSPs.

ATUC notes the valuable commissioning lessons being learned with ASKAP, and recommends that CASS documents these issues to preserve the institutional memory going forward. The exchange of ideas and knowledge is ongoing through the SKA fellowship, and it is important to continue to work with the SKA office to ensure that this knowledge can benefit the SKA during its own commissioning phase. ATUC therefore recommends that CASS consider strategies and specific steps for retaining this "corporate knowledge" within CASS, which could include initiatives related to documentation libraries and staff retention.

Recommendation: *Clear communication of the Terms of Reference for the SSP review process and the plan for transition to full operations.*
Recommendation: *That science observations for time-critical projects such as CRAFT, VAST and gravitational wave follow up be permitted during the Engineering consolidation phase.*
Recommendation: *That CASS explore the effort and resources required for the various ASKAP-X options, to enable the community to provide input as to prioritisation.*
Recommendation: *That CASS continue to work with the SKA Office to document the lessons taken from ASKAP commissioning, such that they can be applied during the SKA construction and commissioning phases.*

8. ATCA

ATUC was encouraged to see that ATCA continues to produce excellent science, and notes the encouraging progress towards completing the first round of Legacy projects. ATUC was very pleased to see the increasing prominence of "transient science" which further demonstrates that we have an excellent instrument in the Compact Array, which is now being used in ways beyond its traditional scope.

ATUC noted that all Legacy projects have reporting requirements, although the required timescale (as inferred from the periodic email requests from CASS) appears to have varied between 12 and 18 months. ATUC would recommend clarification, and consistency between CASS requirements and TAC requirements, ensuring that the instructions on OPAL provide the up-to-date requirements (rather than being provided in an email to a subset of the Legacy survey PIs). Also, ATUC reports that very little of the computing resources, hosting websites, data release, or access to experts that were originally discussed have been made available to the Legacy projects. Most pressingly, the plans for supporting the originally-envisaged regular data releases should be clearly conveyed to the Legacy teams, so that the community can start to make use of the anticipated Legacy data products.

ATUC is of the opinion that an evaluation of the first round of Legacy projects is needed before considering a formal future call. At the same time, ATUC was pleased to note that observers are being encouraged to apply for compelling large scale projects even in advance of any formal future call for additional Legacy projects.

ATUC noted the significant drop in ATCA observing time requests for the 2019OCT semester. It is hoped that this might be only temporary as the Legacy projects are beginning to ramp down while the anticipated wave of follow-up requests resulting from the ASKAP pilot surveys (specifically in the 4-10 GHz band) has not yet flowed through the system. However, close monitoring of the oversubscription rate in future semesters would be warranted.

ATUC commends Vannesa Moss for her efforts to incorporate the recent changes to the Duty Astronomer program, namely the location of both training and performance of these duties being widened to Perth and Narrabri. This has been very well reflected in the new sign-up document for DAs.

Recommendation: *That CASS clarify reporting requirements for the Legacy projects, and provide assistance to ensure that the planned Legacy data releases can be implemented.*
Recommendation: *That the success of the Legacy projects be evaluated, and the ATCA subscription rate be monitored, prior to making a decision on any future round of Legacy projects.*

9. Parkes

ATUC commends CASS on deploying the UWB-low receiver and backend system for science operation at Parkes, and congratulates authors of the early science results already published based on observations with the new system. The performance of the system is outstanding overall, although we note that not all the observing modes (for instance some of the spectral line modes) have yet been implemented. ATUC believes that enabling the key science modes is crucial for the continued success of UWB-L.

Another area which would benefit the whole user community is the deployment of RFI mitigation methods for the receiver. Improving the RFI mitigation would not only help recover a larger part of the band but would also significantly reduce the data processing time for users, in consequence reducing the turn around on producing publication-quality results from the new receiver.

The community appreciates the opportunities enabled by retaining the legacy down conversion system such as the Voyager tracking. Ideally, we would like to see the legacy system retained but it is not clear whether there are any costs involved in doing so. If the cost (in FTE effort or expenditure) is minimal then it would seem to make sense to retain this system. However, if this

requires significant resources, then ATUC would recommend consulting with the community about potential opportunities, before making a decision based on a cost-benefit analysis.

ATUC commends the Parkes team for the significant efforts made to update the User's Guide and consolidate user resources to streamline support and training, given the substantial changes to the system. ATUC encourages those staff members who are training observers to continue these efforts to ensure the new training information is easily accessible, accurate, and updated regularly to reflect changes. To that end, consistent official releases of updates to how the systems and interfaces are used, along with any major changes to the User's Guide should be regularly communicated to the user community, and a record maintained via the newly implemented 'history of changes' webpage.

Likewise, ATUC strongly encourages new and infrequent users to have a training refresh in order to meet the required observing competency level. ATUC would also advocate for a competency checklist similar to that proposed for ATCA. ATUC will provide further feedback on the new documentation next time after it has been properly released.

Recommendation: *Continue efforts to improve and consolidate the new User's Guide and support resources, as well as ensuring new and/or infrequent users obtain refresher training.*
Recommendation: *Continue development of remaining observing modes with UWB-L, such as spectral line modes and data quality improvement through RFI mitigation.*
Recommendation: *Clarify the cost-benefit trade-off of continued presence of the legacy down conversion system.*
Recommendation: *Implement a competency checklist similar to that being developed for ATCA.*

10. LBA

The committee appreciated the presentation of LBA science and its current status, and welcomes the response to our previous feedback. It is satisfying to see all the ATNF facilities included in the Open Session presentations and discussions. There has been good community feedback on the flexibility of the LBA for ToO projects as compared to other VLBI networks, and also on the efforts and dedication of support staff, which have helped lead to high impact research. ATUC reiterates its strong support for efforts to retain all telescopes in the network.

The current on-going and planned technological developments (e.g. BIGCAT, UWB, Cryo-PAF, potentially UWBM+H) will result in enhanced performance of the LBA array, both via increased sensitivity and via enabling new types of science. This work will be applicable to VLBI arrays in general, building on the role of the LBA in developing new approaches that then impact the whole field, such as in the case of DiFX.

The cryo-PAF technology has a particular strategic relevance for SKA1-VLBI. Large area single telescopes in the VLBI array making joint observations with SKA1 stations or dishes would

benefit from wider fields of view, and PAFs provide this. A major science driver for this will be to enable ultra-precise astrometric capabilities for new science applications. This approach is relevant to all large telescopes spread around the world. Also, in this context, it was very encouraging to learn that the ASKAP multiple tied-array capability is "approved".

Additionally, we highlight the unique role of the LBA in providing the long baseline component for SKA1-Mid, with exclusive access to some parts of the sky. In the shorter term, the LBA can serve as a pathfinder for exploiting such benefits with joint observations with FAST, and/or MeerKAT, which are now VLBI capable and with multi-beam capabilities in place and/or planned.

LBA is in a privileged position for pursuing collaboration with the fast-growing East Asia VLBI Network (EAVN) and we encourage CASS to do so. Both networks share matching frequency coverage in the cm and mm bands. Also, they share the capability for innovative simultaneous multi-frequency observations, and the feasibility of joint observations has already been demonstrated with observations between KVN and ATCA. An increasing number of telescopes worldwide have such a capability; in Australia, Mopra has the support of KASI to install such a quasi-optics multi-frequency receiver.

There is a growing interest in the wider community for LBA at low frequencies. The LBA-LOW concept was well received by the global SKA-VLBI community at a recent meeting at SKAO. As discussed above, this would appear to be a relatively low-cost, strategic initiative that positions Australia well for taking advantage of SKA-low, and which would be received positively by the community. As mentioned in our last report, ATUC would be interested to see a rough estimate of the resources required for its implementation.

Recommendation: *CASS to continue efforts to maintain the viability of the LBA network, particularly with the potential capacity-building upgrades on the horizon such as the cryo-PAF technology and enhanced bandwidth from BIGCAT and the UWB.*

Recommendation: *CASS to investigate the resources (particularly in terms of FTE effort) needed to realise the long-baseline, low-frequency concept.*

11. CASS Vision and Mission

In the last meeting, ATUC requested a clearer statement on the CASS science strategic vision going forward. We commend the efforts made so far toward this and acknowledge that this document has been delayed due to the Mid-Term Review, but will be further informed by the outcome of this review process and the views of the wider community.

With the delays to SKA science operations, ATUC strongly encourages the continued support of current facilities through to at least the time when the SKA comes online. With the increased interest in transients, including an increase in transient-related proposals on ATCA, ATUC

wonders whether there would be any merit in recognising this aspect of ATNF operations in the new vision. While we acknowledge that the nature and number of follow-up proposals prompted by early and future ASKAP science is currently unclear, the increased call for follow-up could also potentially be considered for the new statement. We look forward to seeing the long-term vision for how ASKAP will fit into Australia's National Facility in the SKA era.

We also commend the CASS-led efforts to submit a very strong white paper for the Mid-Term Review and further encourage all levels of CASS to give feedback during the review process in order to strengthen the radio astronomy community's position within the wider astronomy community and ranking within the Decadal Plan. ATUC will continue to advocate with their colleagues in the community for strong engagement with this process, and to identify their radio needs, whether through the ASA-led survey or through other avenues.

While we commend CASS for its efforts to diversify its work and play into new strategic areas such as Space, we note that even self-sustaining funding streams may require new hires, which could potentially impact other areas of regular operation via possible ASL constraints.

Recommendation: *That CASS continue to develop the strategic vision for ATNF facilities.*