ATUC Report (November 2015)

This meeting of the Australia Telescope Users' Committee was held at the ATNF Headquarters on 24-25 November 2015.

Attendance: Virginia Kilborn (Chair), Jo Dawson (Secretary), Stas Shabala, Paolo Serra, Willem van Straten, James Miller-Jones, Stuart Ryder, Vanessa Moss, Andrew Butler and Claire-Elise Green (student representatives).

Commendations and Successes

ATUC would like to commend the ATNF on:
- Being awarded the CSIRO Chairman's medal for ASKAP
- Progress on MkII PAFs successfully installed at ASKAP, including phase closure and the first images
- L'Oreal-UNESCO Fellowship award to Dr Shari Breen
- Arrangements with the Breakthrough Foundation, which will provide funding for 25% of Parkes operations for the next 5 years.
- Data Reduction workshop in June. This was found to be a helpful way to rapidly progress from observation to publication.
- Efforts towards updating the ATCA User's Guide.
- The successful OCE proposal to hire George Heald, thereby expanding the WA-based branch of the Astro group.

Recommendations and Discussion from the ATUC Open Meeting

ATCA portal usability:
Feedback from the community indicates that the portal is an overall improvement to the observing system, however there are some usability issues that require attention.

1) Users have requested more guidance regarding the use of the Portal for booking observations.

2) The documentation regarding the booking of green time does not seem to reflect the reality of how the system works. Users are requested to use the standard booking tab, using a CX code and filling in the appropriate details. However, once this is done, there is no evidence that anything has happened. Although ATUC appreciates that a green time request requires approval, some confirmation of the booking request would be helpful, to clarify that it has made it into the system. In addition, requests for booking parts of green time blocks cannot currently be made (only whole blocks could be booked).

3) In some instances after successfully logging in to the portal, the browser shows only a blank page. This is a "known" issue, which apparently can be solved by modifying the URL, but needs to be better documented and ultimately rectified once and for all.

Recommendation:
1) *A short guide (web page, annotated screenshot, and/or video tutorial) to using the system should also be provided so that users know what to expect.*
2) *A confirmation message or email should be sent when a Green Time booking request is made, so that observers are aware that their request has entered the system. The booking system should also be flexible enough to allow particular sections of green time blocks to be booked.*

Collecting observer feedback:
ATNF staff raised the issue of lack of post-observation feedback from a wide range of users and asked ATUC for suggestions on how to increase the amount of feedback provided and the range of users that provide such feedback. ATUC noted that the feedback form is not currently in a prominent position on the ATNF webpages (they are on the side-bar of the otherwise blank User Feedback page http://www.narrabri.atnf.csiro.au/feedback/), and it includes outdated questions (e.g. relating to Narrabri accommodation, library, etc.). ATUC has a few ideas to help increase the number of observers filling in the form.

Recommendations:
  1) The observer feedback form be updated to remove questions that are now outdated (e.g. references to Narrabri accommodation, Windows Computing Facilities, etc.);
  2) That a weblink to the feedback form be placed in a prominent position on the observing portals and the observatory web pages,
  3) That the observers registered as observing each session on the portal be automatically emailed a link to the form at the conclusion of their observing run, in the same way as automatic reminders are sent 7 days beforehand to register on the portal.
  4) The current 1-10 grading system could be simplified to a 1-5 system, where 1=well below acceptable; 2 = below acceptable; 3=acceptable; 4=above acceptable; 5=well above acceptable.
  5) A free-form "comment" box should remain part of the questionnaire.
  6) It may also help encourage observers to provide quality voluntary feedback if they were incentivised by placing their name in the draw for a periodic (monthly or quarterly etc) prize such as an electronic voucher (e.g. iTunes voucher), box of

chocolates or CSIRO mug etc. (green time?), gamification (e.g. ATNF "points" or "star" ratings cf. eBay)

Accessing observer contact information:
Users request that important observing related contact numbers (e.g. SOC control desks, DA landline and mobile) be more easily accessible without needing to log in to a system. This information is difficult to find in the Observer's Guide and currently observers need to log in to the portal to get the DA number or log in to the ATNF internal page to get a phone list to contact the SOC desk. In this era of mobile devices it is becoming common to access information via tablets, smart phones etc. These contact details are even harder to access on these devices. Although all observers should be logged on to the portal, it would be easier for collaborators using mobile devices to contact the observer if these numbers were not login-protected and easier to find on the webpage.

The committee would also like to bring ATNF's attention to the fact that the list of contact details for ATNF staff at http://www.atnf.csiro.au/people/staff_list.html contains no phone numbers, room numbers, or e-mail addresses.

Recommendation:
ATUC recommends that a short list of the most important observing-related phone numbers be available via a link on the pink side-bar of the ATCA observing information webpage.

Accessibility of observing information online
Currently when users go to find information on how to observe with e.g. ATCA on the ATNF website the more obvious choice of link (under the Facilities tab on the home page) is the ATCA link under the heading "Observer information". However this link takes you to information on staying at the Narrabri site, which is now outdated. The actual information on how to observe with ATCA, including the ATCA user guide, is under the heading "Monitoring information", which is not obvious for new users, and feedback suggests this poor naming scheme continues to trick more experienced users as well.

Recommendation:
The committee recommends the above links to observing information be renamed so they are clearer and faster to find (e.g. replace the title "Monitoring information" with "Information for observers" or "Observing information central" and move the webpages currently under the link "Observing information" to "Narrabri site information" etc.).

ATCA User's Guide:

The ATCA User's Guide is currently more difficult to find and navigate than it could be. There is also no mechanism for making users aware of updates. The Guide's webpage is very long and overwhelming, making it especially difficult for new users to easily find the information that is important for them to know. Currently, the most pertinent observing information is buried ¾ of the way through the guide.

Recommendation:
ATUC recommends that the ATCA User's Guide be easily accessible from the ATNF home page. If updates are made, a summary announcement (with section numbers) needs to be made at the top of the page to make users aware of these. A short announcement should be made on the home page as well. On the Guide's webpage, put the "About this Guide" section (the most helpful section for first-time users) before the table of contents so that it is not so overwhelming. ATUC also recommends renaming that section to "Read this First" and making the text requesting feedback bold in order to encourage more feedback from users. To expedite the observation setup for new and experienced users and to supplement the observing training videos, an "Observing Setup Quick Guide" should be created to summarise the standard commands most commonly used during observing runs. This would be a summary of section 3 of the observing guide. The quick guide should be at the top of the Users Guide's webpage and be separately available as a downloadable pdf.

Feedback on ATCA observing videos:

ATUC has generally received very positive feedback on the ATCA observer training videos. In particular, the "Tutorial - Observing Applications" video was found to be helpful for a quick familiarisation for new observers and a good refresher for return observers. The "Reprogramming CABB into 1 MHz Continuum Mode" video was helpful in terms of content, but the audio quality was poor and the narration was not rehearsed (making it unnecessarily long). In addition, the LBA videos were particularly helpful because they contained a level of detail that is not found on the wiki. However, they were not well-advertised and difficult to find.

Recommendation:
ATUC recommends that ATNF devote time and effort to further build a library of high-quality and time-efficient training videos. They should be advertised on the ATNF home page and be made easily accessible from the ATCA webpages, User's Guide, and Portal. ATUC also specifically requests that videos be created for DA training and for reprogramming other modes of CABB.

ATNF radio school

The reduced numbers at the ATNF radio astronomy school in 2015 are surprising, but may just reflect the fact that the previous synthesis school was held just 1 year earlier instead of the more usual 2 years. The school continues to receive extremely positive community feedback from students and supervisors. The school attracts Honours, Masters and PhD students along with post-doctoral researchers. Feedback indicates that many of the students would like to attend the school twice at the encouragement of their supervisors, and gain as much out of it the second time as the first, if not more. There has also been some feedback suggesting it would be beneficial to alternate between holding a single-dish focused school (held at Parkes) and a synthesis imaging school (held at Narrabri). Perhaps it could be worth including a longer session (or even an entire day) on VLBI, in order to raise the profile and engagement with this important facility.

Recommendation:
ATUC strongly encourages ATNF to continue holding radio astronomy schools into the future. The committee suggests ATNF may consider seeking direct feedback from Australian students (e.g through university mailing lists) to determine numbers in support of different models of running the school (annually held at telescope site; bi-annually held at telescope site; yearly held in partnership with an external organisation; alternating between single dish and synthesis imaging). We strongly encourage ATNF to hold this valuable event at least every 2 years so all students have the opportunity to attend at least once. ATUC also recommends that the announcement of the school location and date be made early in the year to ensure students can 'save the date'.

Useful events:

During discussion at the ATUC open session the committee was asked to respond to the question of "what events are useful" to the astronomy community. Available feedback from ATNF users indicates that the following events are popular and useful:
- ATNF data reduction workshop
- ATNF radio astronomy school
- Astroinformatics workshop (which has been hosted by ATNF in the past).
- ASKAP Early Science day (and similar single day workshops such as that for Parkes)

The astronomy community is looking forward to the "Breakthrough" Science workshop next year. ATUC will request further specific feedback from the community on this question (what events are useful and popular and what are some events that they would like to see) before the next ATUC meeting.

Recommendation:
The committee is in strong support of ATNF running events such as those listed above for the benefit of the astronomy community. ATNF might consider hosting these events in distributed locations (i.e. locations other than Sydney). As well as reducing travel time and costs for many ATNF users, this could facilitate expanding the user base outside of ATNF and the traditional radio astronomy community, which would be a positive development, and could help in securing additional community support for continued operations funding of the full suite of ATNF facilities. The committee recognizes that alternative locations could increase the cost of organizing such events and suggests that a partner host (such as a University) could help to minimise the increased expense.

ATCA Legacy Projects:

There is general support for ATCA Legacy Projects in the community. The 25% fractional time dedicated to Legacy Projects is seen as a reasonable starting point and could be reviewed at a later point according to demand.

1) Archiving Legacy Project data products:
ATUC were asked to comment on the priority of archiving Legacy Project data. For a project to have lasting "Legacy" value, ATUC feel that it is critical that not only the raw data but also the fully-processed data products be easily and permanently accessible by the community. The only way to guarantee the longevity of a data archive once the proposing team has moved on is for CSIRO to host both the raw data and the processed data. Otherwise the lasting legacy value of the data would be at risk, and the full scientific benefits of such a significant investment of telescope time and resources would not be fully realised.

There are existing structures in place that could be foreseeably adapted for these purposes (e.g. http://data.csiro.au, where an archive of ATNF pulsar observations is available) such that value-added data products (FITS maps/cubes, catalogues, etc) could be uploaded to the centralised CSIRO location by survey teams on mutually-agreed timescales. This centralised CSIRO archive should not preclude the survey teams from creating their own data access portals if desired, but it should be required that the data products from all Legacy programs be hosted in one place by CSIRO as well. Consideration should be given to the resources (computing and people) needed for this process during the definition of how Legacy programs are carried out.

In defining the database requirements for hosting Legacy data products, it is important for ATNF to consider the needs of the community (i.e. VO compliance, postage stamp

view of data) and ATUC recommends that this plan be developed with community input to ensure the data products are useful and easily accessible.

Recommendation:
ATUC strongly urges ATNF/CSIRO to commit to the long-term archival storage of fully-processed Legacy Project data products.

2) CSIRO involvement with Legacy projects:
Legacy programs and their data products will be a key contribution by ATNF to the global astronomy community. Thus, it is important that ATNF ensure the success of these high-profile programs through an investment of staff time and resources. Part of this is making sure the data remains available (addressed in the archiving section above), and part is making sure that ATNF staff are sufficiently involved to ensure successful execution of the program. This includes not only the operational aspects (scheduling, observing, data reduction), but also the scientific aspects of the programs, and in the proposed residency scheme. For these residency programs to be successful, it will be important to specifically allocate time and resources to visiting Legacy program residents to maximise the scientific output of such visits.

Recommendation:
ATUC recommends that CSIRO/ATNF maintain a high level of CSIRO staff engagement with ATCA Legacy programs at all levels. In particular, it is important to make sure that some fraction of CSIRO staff time is specifically assigned to assist with residency programs if they are to be successful and productive. ATUC supports the ATNF suggestion that CSIRO staff be included in Legacy program proposals wherever possible.

3) Logistics of Legacy projects:
The official announcement of the Legacy Projects commits to allocating disk space on Marsfield machines for data reduction purposes. Users have asked for clarification on whether this also involves provision of processing power (e.g. machines with sufficient RAM), and the capability to log in to those machines from outside CSIRO. The data processing period for such a long-term project would necessarily span many months if not years, so remote access to the computing facilities would be required.

Recommendation:
ATNF should clarify their policy regarding the provision of both data storage and processing capabilities for Legacy teams prior to the official Call for Legacy Proposals.

4) Impact of Legacy projects

Feedback provided to ATUC suggested a need to monitor the impact of Legacy programs on other observing programs with the ATCA, in order to assess what effect these large projects have on the overall science being carried out.

Recommendation:
ATUC recommends that the distribution of telescope time between small/medium/large projects and between science areas be monitored closely during the start of Legacy programs, and that both the time allocation and scientific outcomes are reviewed regularly. ATUC requests that ATNF reports back on this to the community, particularly during the first 2-3 semesters that Legacy programs are running.

ASKAP tied array mode

ATUC was surprised to hear that ASKAP may not have any tied array capability. This is important for a wide range of ASKAP science, including VLBI follow-up of continuum sources (e.g. EMU) and spectral lines (extragalactic and Galactic HI and OH, masers, etc.), pulsar observations (e.g. COAST, which anticipated the availability of multiple tied array beams) and transient surveys (e.g. CRAFT, which proposed to use total power, incoherent beam formation in the first generation). If Parkes were to be closed in the next decade, lack of ASKAP tied array capability would put into jeopardy Australia's world-leading Pulsar Timing Array project and seriously compromise the sensitivity of southern hemisphere VLBI. Such VLBI capability is important not only for ASKAP survey follow-up, but also in the Asia-Pacific region and in the era of the SKA.

ATUC understands that the PAF signal processing path makes implementation of the tied array mode difficult. However, we note that this is a standard mode of operation for most modern (albeit non-PAF) correlators. In terms of invested resources, ASKAP is on track to be Australia's premier national facility, and ATUC believes that developing the tied array capability should be a priority for ATNF. We are aware that the ATNF has established a working group to determine the cost of implementing this capability and planning a way forward, and we welcome this development. ATUC acknowledges that resources are limited, and notes that the tied-array mode on the upgraded VLA was developed via a resident shared risk observing program. We suggest that, if necessary, ATNF might also investigate this option, seeking interested community partners who might wish to assist in developing this capability. In this light, we welcome the community consultation process led by Lisa Harvey-Smith. ATUC stands ready to assist with this process, if needed.

Recommendation:

ATUC recommends that the ASKAP tied array mode should remain a high priority for the ATNF, and that options should be sought to avoid losing this capability; options may include collaboration with external partners and competition for external funding (e.g. ARC LIEF). ATUC requests extensive community consultation, opportunity for community contribution/collaboration, and regular updates on the status of this capability.

NAPA override policy in rapid response mode

ATUC was asked to comment on the existing override policy for rapid-response NAPA observations. At present, a NAPA observation can only displace a lower-ranked proposal, which for rare and rapidly-evolving events (such as FRB follow-up), could lead to missing the opportunity to catch a unique source before it decays. ATUC recognises that this is a complex issue, and that any simple and transparent policy will have both advantages and drawbacks. However, ATUC feels that rapid response observations (and indeed NAPA observations in general) are currently at a disadvantage as compared to non-time critical observations. All regular observations above a certain grade will be scheduled in any given semester, whereas NAPA observations with grades above that cutoff will only be observed if the trigger event occurs at a time when a lower-ranked proposal is on the telescope. Ideally a sufficiently highly-ranked NAPA would be observed when triggered regardless of the ranking of the proposal on the telescope at the time, provided that a highly-ranked proposal that was displaced could still be accommodated in the schedule prior to the end of the observing semester. However, ATUC recognises the undue load that this could place on the schedulers. Moving to queue mode observing could potentially help alleviate this problem in time, but given the recent capability of rapid response triggers and the growing prominence of transient science, a policy decision is required on a shorter timescale.

Simple policy: If a NAPA meets a certain bar it can bump ANYTHING else, but then the time from the displaced proposal gets made up, either later in the semester or the following semester.

Recommendation:
ATUC would be happy for ATNF to reconsider their override policy for rapid response events, but urges ATNF to make any new policy very clear before implementation, to avert complaints from displaced users.

Long Baseline Array:

ATUC is concerned that the LBA still tends to be viewed as something that rides along with the core facilities of ATCA, Parkes, and ASKAP, even though it is offered as a National Facility capability. This is not helped by ongoing uncertainty about the future availability of Mopra or the tied-array capability of ASKAP. On the other hand, we commend the ATNF on recent work to improve access to Tidbinbilla through the host country time agreement, and encourage continued progress. There is evidence that students are being put off from pursuing a PhD using VLBI because of this uncertainty, which is a concern for the future health of this field.

On a similar note, ATUC is concerned about the future of Warkworth and the AuScope array. For the past 9 years, the AuScope array has been funded ($7M construction and $1M per year in operations) almost exclusively through geodesy, with the exception of the recent partial LIEF funding for broadband (3-14 GHz) receivers which were co-funded for astronomy and geodesy. AuScope has, however, participated in a large number of LBA observations. Recently, the geodesy funding stream has begun to dry up. With the potential loss of Mopra, the loss of the AuScope antennas as well would significantly compromise the uv-coverage and imaging fidelity of the LBA, especially at frequencies above 1.4 GHz, where Parkes receivers are rarely available.

ATUC welcomes the progress towards the PAF and UWB-low receivers for Parkes. As recommended in previous reports, we also encourage the ATNF to proceed with the Parkes UWB-high receiver, which is important for the LBA.

Recommendation:
ATNF should continue to support the LBA as a national facility, including operation of Parkes, ATCA and in the future ASKAP in tied-array mode, and correlation. ATUC also requests that the status of Mopra as part of the LBA be publicised as soon as any agreement is reached.

Recommendation:
An upgrade path to wider observing bandwidth with the LBA should continue to be considered.

New ATCA observing modes:

ATUC was pleased to see an update on ATCA trials of unattended observing, plus consideration of queue observing and rapid response mode. While a number of minor issues have been identified, there do not appear to be any show-stoppers apart from perhaps CABB mode-switching. Implementation of these modes will be central to

facilitating the ATCA Legacy Projects commencing in 2016OCTS, and ATUC would like to see unattended observing become the default mode for all ATCA observing from that time. However any PI who needs or wishes to actively participate in their observing should still be able and encouraged to do so. Staff resources devoted to implementing these new modes will ultimately be rewarded with the reduction in visiting observer training and supervision that will be necessary.

Consideration should also be given to implementing ~weekly delay calibration on, and monitoring of B1934-638 at the most commonly used observing frequencies (2.1, 5.5+9.0, 17+19, 33+35 GHz) to save on (and possibly even eliminate the need for) delay calibration and primary calibrator scans by the majority of users.

Recommendation:
ATUC encourages ATNF to continue trials of unattended observing, with a view to making this the default mode from the start of 2016OCTS. Further investigation of implementing queue-scheduled and rapid response observing with ATCA is warranted (together with regular monitoring of B1934-638 to avoid every program from having to observe it themselves), and plans for implementing these presented at the next ATUC meeting.

ATCA remote observing requalification:

ATUC has again received user feedback on the issue of requalification for remote observation with the ATCA. There is significant resistance in the community to the requirement that all users visit the SOC annually to maintain their remote observing qualification.

ATUC believes that the requirement that **all** ATCA observers visit Marsfield for requalification on a yearly (or 1.5 yearly) basis is not necessary, not appropriate for experienced users, and places an unnecessary financial burden on a significant section of the community. While the committee appreciates the original reasoning behind on-site retraining, the policy is becoming increasingly outdated in an era when the training experienced users get can be replicated in online meetings and videos, and when the additional benefits obtained from observatory visits are no longer available. This issue is even more pertinent when one considers that Parkes has successfully adopted a "project expert" model, in which observers can be trained by experienced users on their teams. While the committee recognises that there are some differences in observing between Parkes and the ATCA, these differences do not seem sufficient to warrant such disparate requirements in observer training.

Another related point is that users seem to be unaware of the existence of the current 6-month extension policy. Waivers of the retraining requirement seem to have been obtained on an ad-hoc basis by those in the know, and via "informal" channels (e.g. asking via email). If this policy is to be maintained, it should be formalised and disseminated to the community.

Recommendation:
*ATUC is happy with the existing requirement that **new** users must visit the SOC for observer training. However, for all other users ATUC strongly recommends that ATNF adopt one or more of the following models:*

- *A Parkes-type model in which "project experts" approved by ATNF are permitted to train or retrain observers on their teams for remote observing.*
- *Indefinite rolling extensions to the requalification period for experienced users who have been regularly observing remotely, with the definition of "experienced" and "regularly" to be defined as ATNF see fit.*
- *Remote retraining via videocon with Robin/Jamie combined with online tutorials to replace the requirement that repeat observers visit the SOC in person.*

In all cases the policy needs to be well publicised with formal channels in place for implementation, until such a time as queued observing is rolled out.

Facilitating inter-site synergy: Marsfield, Narrabri, Parkes, Perth, Boolardy, Geraldton

Clarification of ability to visit other sites:
ATUC would like to commend ATNF on the relatively smooth operation of remote observing for all telescopes from the Marsfield SOC. Feedback from an international user suggested that being able to observe in Marsfeld at the same time as collaborating with ATNF staff was overall a positive outcome of this change, and it is important to continue to offer this SOC capability in the future. However, it is also important in this era of remote observing to continue to facilitate connection between the telescope/operation sites and the observers.

ATUC would like to see an official definition from ATNF that clarifies the circumstances under which someone can visit the telescope sites and/or stay at the accommodation on site. It would also be good to see a summary of the accommodation capacity of each site (Narrabri/Parkes/Perth/Boolardy/Geraldton) and of the costs associated. For CSIRO-affiliated students, it is generally understood that accommodation/meal costs are covered but transport costs are not. It would be useful to see explicit definition of the costs for both CSIRO-affiliated students/postdocs/staff and non-CSIRO community members.

Recommendation:
ATUC requests that ATNF provide official specification of the possibility/scope for visits to the various telescope/operation sites: Narrabri, Parkes, Perth, Boolardy, Geraldton for both CSIRO staff/students/postdocs and non-CSIRO members of the community.

ATUC suggestions for site visit context:
Here ATUC offers a list of possible contexts for site visits. Many of these are framed in the context of Narrabri, but are equally applicable to Parkes and Perth to some extent. ATUC acknowledges that the Geraldton/Boolardy sites are a special case due to their higher level of remoteness, but it would be good to see encouragement of scientific, engineering and other forms of collaborations between these sites also.

1) "Internship"-style visit to telescope site
   The goal of this would be for a small number of people (1-2 at a time) be sent to a telescope site for ~2 weeks in order to learn how the different on-site teams work together to keep the telescope functioning (ie. operations, engineering, electronics, computing, etc). The first week would be spent with time divided between the different groups, shadowing their daily activities to learn what they do. The second week would involve the choice of staying with one particular group for the whole time, either for further education or to work on a small project. The outcome would be a better understanding of how the telescope sites function at a more detailed level. This program could be open to CSIRO postdocs/students as well as non-CSIRO postdocs/students, operating perhaps once every month or few months depending on demand. Accommodation for this should be provided on site and should be possible with existing capability, and may not require any large amount of organisation by CSIRO.

2) Writing/thesis bootcamps for CSIRO students
   An organised trip for a small number of CSIRO students (5-10 max) to visit the site and stay on site for ~1 week with the goal of providing a focused environment for writing (paper-writing, proposal-writing, thesis-writing, etc). This would require some level of organisation from CSIRO, perhaps 1-2 postdocs to organise the trip. During the week, other than dedicated sessions for working in the control room, activities could include: short talks by students to the on-site staff, visits to the telescope, tutorial sessions on scientific writing, etc.

3) Individual trips to site
   Short visits to site on timescales of 1 week to 1 month by individual students/postdocs for work purposes: working on a paper, reducing data, etc. Depending on whether the student/postdoc was CSIRO staff or not, the funding

mechanism would be different. It would be necessary for these individual visitors to stay on site for this trip to be useful, rather than in town. They could also be expected to give a short talk on their work to staff during the trip.

4) Small group trips to site
Short visits to site on timescales of 1 week by small research groups to work on particular projects: e.g. survey planning, busy week. It is foreseeable that this could involve more than the current accommodation capacity on-site (5-10 people), and so would perhaps require the visiting group to provide funding resources to facilitate their visit. For example, a small survey science team may wish to hold a week-long busy week on-site to work on data reduction or a pipeline, and will likely be able to fund this themselves. An update talk on the outcome of such a busy week could be presented at the end to staff.

5) Legacy residency programs on-site
There may be some circumstances in which it makes more sense for Legacy project team members to spend some time on site at the telescope rather than in Marsfield. Particularly, in special modes of observing operation or modified instrumentation if necessary. This should be a possibility offered as part of the Legacy program. Again, talks could be given during this time to on-site staff. This visit could also apply to non-Legacy observing programs that are complicated, non-standard, highly-involved, or highly weather-dependent.

6) Training new students/postdocs
To ensure that the next generation of students/postdocs in radio astronomy understand the instruments, it is important to enable them to visit the telescope site relevant to their work at least once. Now that remote observing is the only mode of observing, it means that a lot of educational experience on site at telescopes is lost. It should be possible for supervisors to go up with their students at the beginning of a PhD or postdocs at the beginning of a postdoc (if relevant), to spend a short time on site (2-3 days) for education/training purposes. Particularly in this case, it should be allowed for an experienced supervisor/observer to conduct observations during a training trip like this as this will be a key aspect of radio astronomy education and experience.