

## Director’s Response to ATUC Report – October 2024

We thank ATUC for their report, which is available from [this link](#).

Operations.....	1
ATNF Future Priorities .....	6
Policies .....	8
Training, user engagement and user support .....	9
ATUC operations .....	11

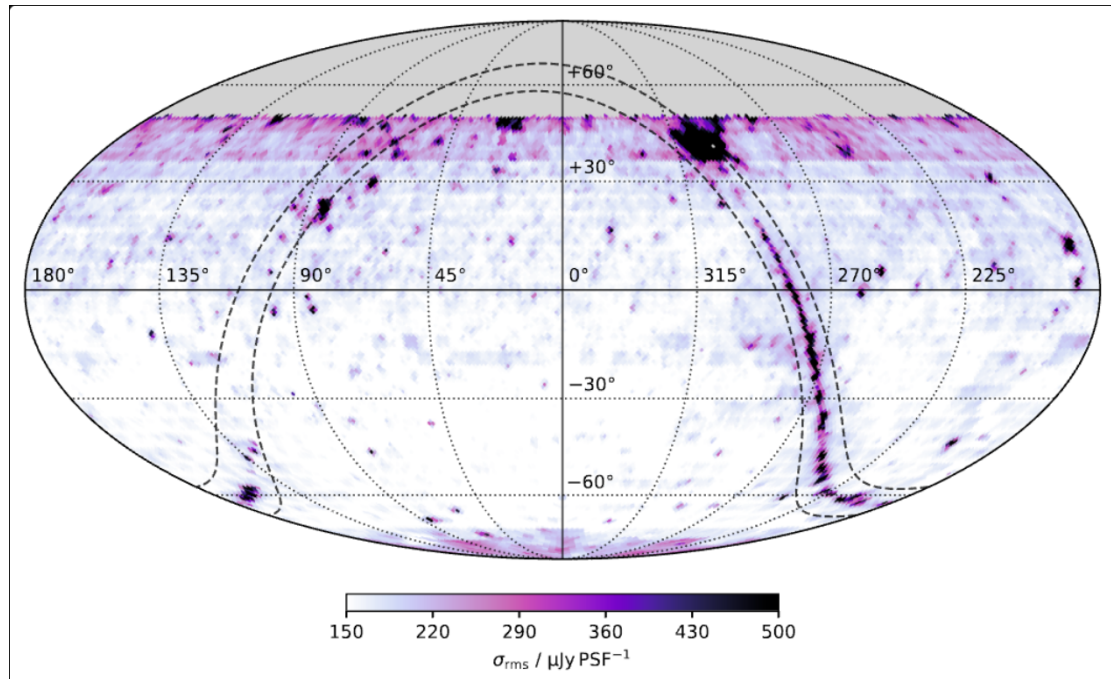
### Operations

<b>ID</b>	<b>3.1.1 (ATUC-39)</b>
<b>Owner</b>	Aidan Hotan
<b>Summary of request</b>	ATUC requests an update on the progress specific to the WALLABY survey (fraction of usable observations resulting from recent observations and workflow improvements) by mid-January 2024.
<b>Response</b>	<p>In September 2024, the Pawsey Supercomputing Research Centre made significant changes to the underlying platform management system for the Setonix supercomputer. This has had the intended effect of improving performance and we have confirmed that full-scale spectral line processing now keeps up with incoming data rates, allowing WALLABY to be observed without filling any temporary storage allocations.</p> <p>Towards the end of 2024 we conducted a concentrated observing campaign to increase the number of WALLABY fields available for the Survey Science Team to work with. We also implemented a night only constraint in an attempt to avoid large scale ripples in the spatial and frequency domains that are being caused by interference from the Sun. Since November 2024 we released 28 WALLABY scheduling blocks with a 100% success rate (no rejections). This verifies that night observations meet the WALLABY science data quality requirements and that we are capable of sustained spectral line observing. However, scheduling with a night only constraint impacts the observing efficiency of WALLABY.</p>

<b>ID</b>	<b>3.1.2 (ATUC-37)</b>
<b>Owner</b>	Aidan Hotan
<b>Summary of request</b>	Conduct a feasibility study over the next six months to evaluate the benefits of continuing ASKAPsoft-specific imaging development versus adopting widely supported ‘off-the-shelf’ solutions, which are already available. Additionally, consider a targeted assessment of the current pipeline’s adaptability for integration with external calibration and imaging tools to enhance development timelines where practical.
<b>Response</b>	We have conducted an internal preliminary feasibility study and have developed a proof-of-concept pipeline called Flint that we are planning to offer as an alternative way to generate science-ready data products. This uses Prefect and WSCLEAN along with some tools from the ASKAPsoft suite. Full feasibility assessment will require testing at scale to determine

supercomputing resource requirements and data throughput rates, but this will be done as part of the operational integration process.

The raw RACS-low3 data were processed with Flint to investigate both its scalability and general robustness, with pleasing results. The attached Figure highlights the RMS of the Flint derived images across the sky. Initial analysis of Flint’s output images shows both a consistent flux scale and a 20  $\mu\text{Jy}/\text{beam}$  improvement of the RMS sensitivity when compared to the images produced by the operational pipeline.



We note that this is just for one survey (RACS) and we have not yet explored in detail using a pipeline like this on the complete suite of surveys being carried out by ASKAP. We have only just started discussions and planning around how such a pipeline could be included as part of the mainstream ASKAP processing.

The existing YandaSoft/ASKAPsoft toolkit currently supports all ASKAP science modes and has a design philosophy somewhat complementary to other tools. Gaining and maintaining experience with other software packages has led to knowledge transfer and improvements in ASKAPsoft, which will continue to evolve and is likely to remain the best option for some, especially high data rate, science processing tasks e.g. joint deconvolution. On the other hand, Flint is likely to be more portable. We aim to leverage the strengths of both options while managing ongoing operational commitments during the Survey Science Projects.

ID	<b>3.1.3 (ATUC-41)</b>
Owner	Vanessa Moss
Summary of request	Within the next six months, develop and share a high-level simulation model to estimate realistic survey completion date ranges. ATUC recommends updates to this model each

semester, to incorporate evolving priorities and operational impacts, providing teams with a structured, realistic timeline where feasible to guide planning and resource allocation.

Response Here we consider both 1) approximate estimates of survey completion times (and highlight the challenges in making such predictions based on existing historical data) along with 2) more precise forecasts for the upcoming few months, and conclude 3) with a summary and future outlook. We note that many of the significant blockers to survey progress are fundamental limitations (e.g. solar activity, calibration overheads) and thus will only be addressed by external factors outside of the control of scheduling. Work is ongoing to build on the estimates outlined below, and an update will be presented at the next ATUC meeting summarising the current status.

### **1. Extrapolation based on historical progress**

While the most realistic estimates of survey completion times would technically come from extrapolating the historical rate of field release (i.e. informed by evidence), it is critical to recognise that we have only been running as intended for a few months following improvements to Setonix (e.g. since October 2024), and that the last two years have been significantly interrupted with a limited survey pool. Thus, this extrapolation cannot necessarily be taken as highly reflective of the future, which is an important caveat to consider in the below.

Considering the two largest surveys as indicators for progress, we see that EMU (+ POSSUM) received 24 fields between January 15th and February 20th, of which 16 have been released. With 721 fields remaining (a mix of 5 and 10 hr integrations, due to some fields not being above the horizon for the required 10 hrs), if we assume that software improvements will lead to most observed fields having sufficient quality for release, this suggests a survey completion time of 3.0 years from March 2025 at a rate of 20 fields per month (with similar progress towards completion of the smaller surveys on this timeline). Progress to date on surveys consistently in the pool (VAST, FLASH) corroborates with this approximate extrapolation, though FLASH has recently been significantly affected by a high prevalence of tropospheric ducting. DINGO, being only observable in a small time window each year, will rely on continued dedicated progress during this period.

However, with the strict night-time constraint in place, WALLABY has only received 8 fields in the same time period. This thus implies a completion time for WALLABY that significantly exceeds reasonable expectations. However, as WALLABY will get a larger share of time once EMU is complete, we can extrapolate from an EMU-equivalent progress rate to give a rough estimate of 6 years for WALLABY, although with high uncertainty as this also depends on when the night-time constraints can be relaxed (or if alternative observing or processing methods can be adopted to mitigate its effect). This may involve WALLABY reviewing science goals requiring the short baselines that are most vulnerable to solar interference, developing more robust source-finding or improved ways to subtract the influence of the Sun.

We cannot currently extrapolate effectively in this way for the remaining SSPs (GASKAP-HI, GASKAP-OH) as they have to date not been in the pool in full survey mode, though we expect this situation to change in the coming months based on recent progress. We also

anticipate being able to extrapolate more accurately for all surveys in the pool in the next 6-12 months, based on more stable operations having been in place for the months prior.

## **2. Projections based on simulations**

We reported to the ASKAP PIs the results from initial SAURON-based simulations to forecast survey progress over the coming months. These were presented at the end of January 2025 and hence by the ATUC meeting in April we will be able to compare these forecasts with a few months of observing.

These simulations make use of the SAURON scheduler, currently assuming an idealised facility (i.e., no offline periods, no impact from weather, all antennas available, etc.). This mode can be built upon in the future, but we start with this to examine closely the interplay between the underlying observational pool and variety of SSP constraints.

We note that we cannot currently accurately simulate GASKAP-HI or GASKAP-OH due to the fact that their survey strategy and constraints are still being determined, but will be able to in future.

The simulations show:

- With current observing constraints, EMU generally gets a reasonable fraction of the observing, with appropriate allocations to VAST and FLASH, but WALLABY does not receive a high fraction of observing time.
- This is primarily because of WALLABY requiring night-time observing, in conjunction with the calibration overheads and the time required to switch between observing bands. A huge improvement occurs if WALLABY can observe during the day.
- There is no significant improvement for other scenarios such as incorporation of the full WALLABY pool (currently limited due to pending development of bright continuum source removal) or shorter WALLABY scans, but there is some improvement if EMU is limited to daytime observations or we limit the frequency of band switches (although with an efficiency cost due to the large number of constraints, in particular night-only, placed on the mid-band pool)
- The full slides summarising the simulations can be found on the ASKAP Confluence:  
<https://confluence.csiro.au/display/askapsst/PIs+Coordination+Meeting+-+2025-01-30>

## **3. Summary and future outlook**

Our ability to approximately project on longer timescales is limited right now due to only recently being able to progress without significant processing limitations, but 1) we anticipate based on existing data that we will make good progress in the coming months and 2) we expect to be able to better use this approach in future once we have operated in this mode for the next few months. Initial simulations using SAURON for shorter ~month timescales show generally reasonable advancement for all surveys except WALLABY due to

the impact of the nighttime constraint, and we will work with the WALLABY team to explore options for mitigating this as well as continuing to consider other possible scenarios for adjusting scheduling constraints.

We re-emphasise the fact that the main blockers to survey progress come primarily from 1) strict SSP constraints such as night-time only or ducting avoidance, 2) calibration overheads due to long bandpass observations and band changes, and 3) interruptions to the ability to observe causing system downtime – i.e. there are no fundamental significant gains that can be made in scheduling itself, except in the case of applying considerable policy changes, e.g. formally changing the priority/progress of different SSPs or restricting/forcing band changes at set intervals, at the cost of observing efficiency. Further, in the absence of autonomous and dynamic scheduling being able to react 24/7 to the varying environment, system and survey constraints, the observing progress for ASKAP SSPs would be considerably lower.

We note that there has been progress on the alternative calibration method based on reference fields from RACS, which in theory will significantly reduce our bandpass calibration overhead and also remove the dependence on 1934-638. As the development of this continues to progress, we anticipate having the ability to simulate its effects on survey progress as well as obtain empirical results via live survey observations.

<b>ID</b>	<b>3.2 (ATUC-42)</b>
<b>Owner</b>	Josh Pritchard
<b>Summary of request</b>	ATNF to create and endorse a standardised ATCA data pipeline, for both archival and future data, which users can employ to achieve minimal radio continuum science-ready data products.
<b>Response</b>	<p>Completing a fully functioning standardised ATCA data pipeline for both archival and future data would be a major software project and we currently do not have the resources available for such a pipeline. We currently have:</p> <ol style="list-style-type: none"> <li>1. Alerted our new Head of Computing to this request</li> <li>2. Alerted the BIGCAT team to this request to ensure that BIGCAT output data products have sufficient metadata to make automation simpler in the future.</li> <li>3. A pipeline that automates the standard CABB continuum data reduction recipe in miriad, which has some flexibility for configuring operations and interactive flagging. This pipeline, developed by Josh Pritchard and will be made available prior to the ATUC meeting, takes in CABB RPFITS files and generates bandpass, gain and leakage calibrated data in UVFITS and MeasurementSet formats as output, along with plots of calibration solutions and other diagnostics.</li> </ol>

<b>ID</b>	<b>3.3 (ATUC-43)</b>
<b>Owner</b>	Phil Edwards
<b>Summary of request</b>	ATNF communicates to ATUC the outcomes of the analysis of investigation into different ATCA array configurations that may improve UV-coverage.
<b>Response</b>	An initial study was undertaken by a vacation student, Tan Dung Tu, supervised by Jamie

Stevens and Phil Edwards. These initial results were presented at the Vacation Student Presentation Day on February 5<sup>th</sup> and available from the recordings at <https://www.atnf.csiro.au/about-atnf/students-careers/summer-vacation/2024-2025-undergraduate-studentship-symposium/>.

This work is a first step towards determining prospective new configurations, with further studies to continue over the coming months.

<b>ID</b>	<b>3.5 (ATUC-44)</b>
<b>Owner</b>	Minh Huynh
<b>Summary of request</b>	ATUC supports ATNF’s exploration of data compression opportunities for more cost-effective data archiving.
<b>Response</b>	<p>We have not yet carried out a detailed study of data compression opportunities. We note the following initial considerations:</p> <ol style="list-style-type: none"> <li>1. Murriyang pulsar and high-time-resolution data sets are almost optimally packed. The high-time resolution data is usually low-bit quantized (with the upcoming cryoPAF search-mode data being 2-bit quantized).</li> <li>2. The SDHDF format used for Murriyang spectral line observations have been shown to enable a ~25% compression, but these data files are typically small and hence the savings through compression do not significantly affect the total size of the Murriyang data archives.</li> <li>3. The BIGCAT data sets soon to be produced using ATCA will be in ASDM format. A few initial tests have shown the potential for a significant reduction in data size using standard compression methods and hence this will be a focus for further research.</li> <li>4. Many of the ASKAP data products could be reduced in data volume by removing NaN padding around each image and using compression algorithms to reduce further. With some early tests with VAST datasets this allowed compression factors of 5 to 10x.</li> </ol> <p>Of course, there are many other methods that potentially could be used to compress our data sets and we note that the ASKAP DINGO survey team are exploring uv-gridding as a way to compress the spectral visibilities.</p>

## ATNF Future Priorities

<b>ID</b>	<b>4.1.1 (ATUC-45)</b>
<b>Owner</b>	George Hobbs
<b>Summary of request</b>	ATNF ensures that ATCA and Murriyang operations continue for a time period enabling a sufficient amount of high-impact science from the stakeholders once the new hardware (BIGCAT and CryoPAF) is commissioned. ATNF and LIEF stakeholders should together discuss and establish the appropriate operational time needed to complete an acceptable number of science goals.
<b>Response</b>	In our ATNF Future Vision document we concluded that we would work towards

- continue to operate Murriyang with a substantial program of external revenue to help fund its availability for science. The development of the UWB/M-H receiver will significantly increase its capabilities
- transition ATCA to new roles as some of its core capabilities become substantially, but not entirely, supplanted by SKA-Mid

However, our financial situation implies that we need to continue searching for external funding streams. One of the roles for our new ATNF Chief Scientist is to determine our science priorities over the coming years. We intend to run an ATCA-related science day adjacent to the upcoming ATUC meeting. We are actively developing a case for the future of ATCA, with a view to identify paths forward for continued merit-based access, and the science day will provide some input to that.

Updates around ATCA and Murriyang operations will be provided during the ATUC meeting.

<b>ID</b>	<b>4.1.2 (ATUC-46)</b>
<b>Owner</b>	George Hobbs
<b>Summary of request</b>	ATUC recommends that the ATNF seeks input from the broader user community, including on prioritisation, before committing to either a large upgrade (e.g. ASKAP), development of a new demonstrator (e.g. CASATTA/LAMBDA), or new instrumentation (SKA-Mid Band 5 receiver).
<b>Response</b>	<p>The ATNF Steering Committee has endorsed the development of a test-bed LAMBDA station as well as a prototype upgraded ASKAP PAF. Taking this forward to larger National-facility-standard systems will require significant funding as well as the support of the Australian astronomical community. CASATTA (and related aperture array ideas) are currently purely in a prototyping phase. However, community queries on these projects can be obtained through the following contacts:</p> <ul style="list-style-type: none"> <li>• LAMBDA: Tessa Vernstrom</li> <li>• CASATTA: Keith Bannister, Josh Pritchard, Baerbel Koribalski</li> <li>• ASKAP PAF: Aidan Hotan</li> </ul> <p>New instrumentation not related to the ATNF is not directly relevant to the ATUC (such as the SKA-Mid Band 5 receiver), although we understand that effort on external projects may delay ATNF-related projects, but also can provide essential external funding streams.</p> <p>In addition, the new Chief Technologist and Chief Scientist are working closely together to align future science and technology pathways for ATNF. We will include updates on these projects verbally in the Open Day.</p>

<b>ID</b>	<b>4.2(a) (ATUC-47)</b>
<b>Owner</b>	Amanda Gray
<b>Summary of request</b>	ATNF to release the internal Multi Messenger Astronomy document produced as a part of the “Future of the ATNF” efforts, which discusses the above mentioned facilities and their synergies with radio astronomy in some detail (some editing may be necessary to release



	this as a stand-alone document).
Response	The document on Multi Messenger Astronomy is available from the ATUC document repository: <a href="https://www.atnf.csiro.au/about-atnf/governance/atuc/atuc-document-repository">https://www.atnf.csiro.au/about-atnf/governance/atuc/atuc-document-repository</a> . The ATNF vision statement prepared for the Decadal Planning process is also available from: <a href="https://www.atnf.csiro.au/wp-content/uploads/2024/11/ATNF-to-2035-2.pdf">https://www.atnf.csiro.au/wp-content/uploads/2024/11/ATNF-to-2035-2.pdf</a> .

ID	4.2(b) ( <a href="#">ATUC-48</a> )
Owner	Elizabeth Mahony
Summary of request	A “Science with ATCA in the SKA era” day is held adjacent to the APR2025 ATUC meeting.
Response	We agree to organise a meeting relating to ATCA adjacent to the upcoming ATUC meeting. The funding situation for the ATNF is currently challenging and hence we request that the meeting directly supports the search for new funding opportunities for ATCA. This would include looking for synergies between members of our community, which may allow for future funding opportunities. The ATNF co-chairs of the organising committee for this meeting will be Elizabeth Mahony and Josh Pritchard (alongside the ATUC-nominated co-chair as requested above), and we will continue to engage with ATUC during the planning process in order to ensure that the meeting is a success.

## Policies

ID	5.1(a) ( <a href="#">ATUC-49</a> )
Owner	Phil Edwards
Summary of request	ATUC recommends adapting LBA user policy as necessary to enable commensal widefield correlation of LBA data, and communicating this to the broader user community.
Response	This will be included in the call for proposals for the 2025OCT semester. We will also communicate these plans to current LBA users to determine whether there are any concerns or queries from the user community.

ID	5.1(b) ( <a href="#">ATUC-50</a> )
Owner	Phil Edwards
Summary of request	ATNF works with the proposing team and any other relevant stakeholders on details of the implementation, including resourcing.
Response	An update on progress with the implementation plan will be shared with ATUC at the next meeting.

ID	5.2(a) ( <a href="#">ATUC-51</a> )
Owner	Aidan Hotan
Summary of request	ATNF works with ASKAP SSPs to make their data quality assessment processes available to GSP users.
Response	The validation scripts provided by the Survey Science Teams are already available for selection as <b>processing parameter options</b> . However, they are only expected to work as



intended for observing modes that produce the expected data products. For Guest Science Projects using processing parameters that differ significantly from the SSPs, the output of the validation scripts may not be valid, or the scripts may fail. ATNF does not have the resources to generalise these scripts and would need to do so without impacting ongoing SSP data throughput, so we will be unable to assist GSP PIs with custom validation reports.

If GSP PIs would like to enable the standard validation reports as part of their processing strategy, please make this clear during consultation with the Operations team which occurs prior to observations commencing. We could in future consider making the selection available as part of the OPAL submission process alongside other indications of the intended observing mode.

<b>ID</b>	<b>5.2(b) (<a href="#">ATUC-52</a>)</b>
<b>Owner</b>	Aidan Hotan
<b>Summary of request</b>	ASKAP GSPs are included in OPAL.
<b>Response</b>	This has been done, the four scheduled projects have been made public and should be visible when users search for ASKAP GSP codes for the 2024OCT semester. We will do the same for every semester going forward now that the process is established.

<b>ID</b>	<b>5.3 (<a href="#">ATUC-53</a>)</b>
<b>Owner</b>	Phil Edwards
<b>Summary of request</b>	ATUC supports reconsidering the scheduling of ATCA observations given the increasing fraction of successful NAPA proposals. ATUC recommends leaving blocks of time in the schedule regularly (e.g. 2 days per month), dedicated to replacing time for observations that have been displaced by NAPAs. Projects with the highest TAC ranking should be prioritised for allocation of the replacement time.
<b>Response</b>	This will be trialled in the 2025APR semester.

## Training, user engagement and user support

<b>ID</b>	<b>6.1 (<a href="#">ATUC-54</a>)</b>
<b>Owner</b>	Robert Hollow
<b>Summary of request</b>	ATUC supports organising the Student Symposium adjacent to the APR2025 ATUC meeting, and recommends that ATUC student representatives take a leading role in coordinating this initiative.
<b>Response</b>	<p>We are planning a one-day symposium on the Friday of the ATUC week. This meeting will be organised by Rob and the students. We are also planning new initiatives that will enable ATNF Science and Engineering staff to hear more of our student results throughout the year. We have:</p> <ul style="list-style-type: none"> <li>• Requested student feedback through a survey. The results of the survey (over half of the students have responded) will be presented at the ATUC meeting.</li> <li>• Started planning around the possibility of a monthly student newsletter and/or a monthly student-related meeting.</li> </ul>

--

<b>ID</b>	<b>6.2 (ATUC-55)</b>
<b>Owner</b>	John Reynolds
<b>Summary of request</b>	ATNF develop a clear pathway for dealing with minor user requests.
<b>Response</b>	<p>This problem remains challenging as the various telescopes have their own feedback mechanisms (in particular for fault reporting), many minor user requests can be dealt with by simply discussing with the relevant Senior Systems Scientists or with the project scientists for specific instrumentation. We do have a form that allows for input prior to an ATUC meeting: <a href="https://forms.office.com/r/nN3FSRiaue">https://forms.office.com/r/nN3FSRiaue</a>, which has been available since the 2023OCT ATUC meeting with limited use to date, possibly due to a lack of awareness. The current form has had a total of 9 responses over three ATUC meetings (with 4 leading up to the 2024OCT meeting. Our intention is to make that link more prominent on the ATNF Website, and to continue to advertise it as part of the communications regarding upcoming ATUC meetings. As a reminder, the inputs via this form serve as a direct input to each ATUC meeting and are considered as part of both the ATUC reports and Director’s responses.</p> <p>We note ATUC’s feedback on our draft response and believe that we have two related issues:</p> <ul style="list-style-type: none"> <li>• A way to collate small-scale feedback on ATNF-related issues, which are not suitable for including as observatory-specific fault reports, or through directly emailing the system or project scientists.</li> <li>• A way to ensure that emails/tickets/requests have not accidentally been missed and have been triaged for follow-up.</li> </ul> <p>We do not yet have a solution for this, but will verbally discuss this issue in the ATUC Open Session (in George Hobbs’s presentation).</p>

<b>ID</b>	<b>6.3(a) (ATUC-56)</b>
<b>Owner</b>	Shinoo Swapnil
<b>Summary of request</b>	ATUC recommends that accessibility concerns are taken into consideration during the final stages of development of the new ATNF website.
<b>Response</b>	<p>Accessibility concerns have been evaluated by the ATNF website refresh project team. ATNF website has included all accessibility features as recommended and used by the CSIRO IM&amp;T team. At this this additional accessibility will be included when they are released by the CSIRO IM&amp;T team.</p> <p>For any additional accessibility related assistance, users can contact us by clicking on this link <a href="https://www.csiro.au/en/about/Policies/Legal/Accessibility">https://www.csiro.au/en/about/Policies/Legal/Accessibility</a> available on the ATNF website.</p>

<b>ID</b>	<b>6.3(b) (ATUC-57)</b>
<b>Owner</b>	Shinoo Swapnil
<b>Summary</b>	ATUC pages are made visible, for example via a drop-down menu under “Governance”.

of request	
Response	ATUC pages have been made visible under “About” and “User Committee” ( <a href="https://www.atnf.csiro.au/about-atnf/governance/atuc/">https://www.atnf.csiro.au/about-atnf/governance/atuc/</a> ).

## ATUC operations

<b>ID</b>	<b>7.1(a) (<a href="#">ATUC-58</a>)</b>
Owner	George Hobbs
Summary of request	ATNF ensures staggered ATUC terms, with no more than four members rolling off in any semester.
Response	The ATNF Steering Committee has accepted this recommendation. We will therefore implement this during the next semester.

<b>ID</b>	<b>7.1(b) (<a href="#">ATUC-59</a>)</b>
Owner	George Hobbs
Summary of request	ATNF appoints one new student member each semester.
Response	The ATNF Steering Committee has accepted this recommendation. We will therefore implement this from next semester.