

# 2017 NRAO Users Committee Report

## May 31– June 2, 2017 in Charlottesville, VA

### 2017 Recommendations:<sup>1</sup>

#### ANASAC recommends that...

- ...student Observing Support (SOS) PIs are surveyed to determine whether it would be beneficial to make the spending more flexible, perhaps allowing for funds to be spent on tuition. ANASAC also recommends that PIs are asked to submit brief reports on the outcome of the project once SOS funds are spent (Section 2.1.1).
- ...clear guidelines are developed for ALMA Archive imaging products produced manually by users and that these products are more explicitly documented. More generally, we recommend that clear and practical image product heuristics for both the pipeline and manually imaged data are formulated (Section 2.1.1).
- ...notification emails are sent following archive data requests that include a reminder to use the ALMA archive acknowledgment in any scientific work using the requested data. This would allow us to better track the use of ALMA archival data in publications (carryover from 2016; Section 2.1.1).
- ...PIs obtain access to raw data upon request. This is especially crucial for Large Program PIs. We endorse the proposal to start the proprietary clock upon data delivery whether it is in raw or calibrated form (Section 2.1.1).
- ...PIs who receive polarization data be warned about the status of circular polarization to avoid them publishing incorrect results (Section 2.1.1).
- ...a survey be undertaken to determine ADMIT data products are in fact useful to a segment of ALMA Users (Section 2.1.1).
- ...ALMA continue to carry out extensive testing of the OT for future cycles prior to release (Section 2.1.1).
- ...JAO gather better demographics on PIs. This could be done by reminding people to update their demographics profile the next time they log in. This is crucial to asses e.g. the origin of gender disparities in proposal outcomes (Section 2.1.2).
- ...a survey be undertaken to determine the utility of ADMIT products to different segments of ALMA Users (Section 2.1.1).
- ...ALMA continue to carry out extensive testing of the OT for future cycles prior to release (Section 2.1.2).
- ...ALMA better publicize the status of new capabilities (Section 2.1.2).

#### The Users Committee (UC) recommends that...

- ...one member of the CASA sub-committee from North America or Taiwan is drawn from the UC (Section 1).
- ...there are continued efforts toward a more integrated ALMA-VLA presence (Section 2.2).

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<sup>1</sup>These are underlined in yellow throughout the main text.

- ...the VLASS Project develop a list describing how technical work done in support of the VLASS will feed back to enhanced capabilities or efficiencies for VLA operations, user data reduction, or other aspects of the Observatory (Section 2.2.1).
- ...the VLASS Project produces at least one publication describing the pilot observations (Section 2.2.1).
- ...VLA PIs are asked *after* observing priority is assigned if their project can be successful with less complete observations (carryover from 2016; Section 2.2.2).
- ...NRAO ask the partner observatories to distribute the NRAO call for proposals to their distribution lists, in the hope of getting more joint proposal submissions (Section 2.2.2).
- ...there is a formal target of two women on each SRP (out of 5+chair; Section 2.2.2).
- ...NRAO solicit expressions of interest for “X-proposals” on a short time-scale (see suggested time-line in Section 2.2.3).
- ...NRAO prioritizes updates of the PST rather than the OPT. We also encourage NRAO to consider the future combination of the PST and OPT into one product (Section 3.1).
- ...NRAO keep in mind the annoyance to users of having to maintain multiple versions of CASA when developing future CASA releases (Section 3.1).
- ...AWS resources and introductory material from the CASA hardware requirements page are linked and/or otherwise are advertised. We also recommend that NRAO create a Beginners Cookbook to facilitate the use of AWS resources by users (Section 3.1).
- ...resources for deployment on XSEDE or other super-computing facilities be made available, whether as part of an NRAO computing block grant or as a Beginners Cookbook (Section 3.1).
- ...NRAO continue to keep an eye on Helpdesk response times since it is important for NRAO’s reputation in the astronomical community that users know that they can get help with any problems in a timely fashion (Section 3.1).
- ...the CDL expands its efforts in multi-pixel and phased array feeds, as this technology will be increasingly important in the coming decade (Section 4).
- ...the CDL seek and develop opportunities for engagement with the broader technical community, including universities and other radio astronomy technology organizations in the US and abroad. We also continue to encourage CDL engagement with undergraduate and graduate students (Section 4).
- ...all postdoctoral fellows at NRAO are not called “Jansky Fellows,” as it dilutes the prestige of the fellowship program (Section 5).
- ...in both the written job ad and in language used elsewhere to describe the Jansky fellowship, any mention of functional duties clearly state that such work is optional (Section 5).
- ...NRAO solicits feedback from people who have received SOS funds regarding the impact of the funding restrictions and work completed using the funds (Section 5).
- ...NRAO does more to increase the visibility of the ngVLA in the radio astronomy community, and also in the broader astronomical community (see suggestions in Section 7).
- ...private funding opportunities for the ngVLA be explored. NRAO should also continue to seek partnerships with other institutions that could further the development of the ngVLA by means of additional technical work (Section 7).

**The UC suggests for the Next Face-to-Face meeting or upcoming ANASAC telecons that...**<sup>2</sup>

- ... ANASAC is updated on science-ready data products in an upcoming telecon when there are more concrete plans.
- ... attendance of non-ANASAC UC members at future ANASAC meetings is expected rather than being completely voluntary, and any ALMA-specific talks are removed from the UC meeting (Section 1).
- ... NRAO explores moving the CASA subcommittee meeting so that it is adjacent to the UC meeting, in an effort to increase communication between the CASA sub-committee and the UC (Section 1).
- ... outcomes of development study and project proposal calls are presented at the next ANASAC telecon (Section 2.1.1).
- ... the distribution of submitted and accepted proposals in terms of hours requested on the 12m array are presented at the next ANASAC telecon (Section 2.1.1).
- ... the possibility of increasing the A-rated fraction is revisited at the next meeting when more data on C4 and C5 are available (Section 2.1.1).
- ... outcomes from the spectral scan calibration tests this upcoming summer are presented (Section 2.1.2).
- ... updates are given on the VLA publication rate (Section 2.2).
- ... an update on VLA project completion (hours requested and hours allocated) as a function of SRP score be given. We request clarification on the actual proposal pressure in order to understand trends (Section 2.2.2).
- ... there is quantitative reporting on the gender distribution of the SRPs (Section 2.2.2).
- ... there is an update at next year's meeting on possible proposal selection biases (Section 2.2.2).
- ... information on updates to CASA documentation be presented (Section 3.1).
- ... there is an update on the Jansky mentoring program (Section 5).

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<sup>2</sup>These are underlined in green throughout the main text.

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# 1 The 2017 NRAO Users Committee Meeting

The NRAO Users Committee has three standing subcommittees: The Atacama Large Millimeter Array (ALMA) North American Science Advisory Committee (ANASAC; composed of UC personnel), the CASA subcommittee (composed entirely of non-UC personnel at the time of the 2017 meeting), and a standing software subcommittee (composed of UC personnel). ANASAC met on May 31, 2017 in Charlottesville, VA. This day focused on ALMA operations and development, and all UC members were invited to participate. The full UC then met on June 1 and 2, 2017, to discuss the operations and development of the Jansky Very Large Array (VLA) along with NRAO-wide topics. Participants of the ANASAC and UC meetings are listed in the Appendix to this report.

In preparation for the meeting, the UC published an online form for NRAO user feedback, and advertised it via eNews. We also requested informal feedback through the astronomers group on Facebook. This was the second year we sought feedback using these methods. The outcome was again not overwhelming, with six received through the online form, but the UC found the feedback insightful nonetheless. We would like to continue using the form next year.

The separation of the ANASAC and UC meetings is not ideal. UC members are invited to attend the ANASAC meeting, but are not expected to. Only members that attend the ANASAC meeting are therefore fully aware of ALMA-related issues, many of which arise at the UC meeting. Instead of our usual suggestion to combine the meetings, we suggest that attendance of non-ANASAC UC members at future ANASAC meetings is expected rather than being completely voluntary, and all ALMA-specific talks are removed from the UC meeting.

There are currently no CASA sub-committee members who are also on the UC. This limits the communication between the subcommittee and the UC. The UC suggests that one member of the CASA sub-committee from North America or Taiwan is drawn from the UC. In an effort to increase communication between the CASA sub-committee and the UC, we further suggest that NRAO explores moving the CASA subcommittee meeting so that it is adjacent to the UC meeting.

## 2 Facilities

### 2.1 ALMA

#### 2.1.1 Charges specific to this meeting

*ANASAC Meeting Charge #1: Scientific outcomes and impact from Cycles 0, 1, 2, 3 & 4. Is North America doing well – what are the challenges?*

The NA ALMA community appears to be doing well. Compared to the EU ALMA community, NA writes somewhat fewer papers per allocated ALMA hour, but this is in line with expectations considering the larger number of EU astronomers. It does not cause concern with ANASAC, though continued monitoring is requested.

An ongoing challenge for the NA community is funding and the “double jeopardy” experienced by most radio astronomers, i.e. they need two successful proposals, one to ALMA and one to NSF to carry out their science. In this context, the SOS program is crucial for the health of the community. ANASAC strongly recommends that funding is at minimum maintained at its current level, and if possible, increased. ANASAC recommends that SOS PIs are surveyed to determine whether it would be beneficial to make the spending more flexible, perhaps allow-

ing for funds to be spent on tuition. It would also be helpful if PIs submit a brief report after the funding has been spent, and whether NRAO could survey how many PhD theses in radio astronomy are supported by the SOS program.

Looking ahead, a major challenge is how to engage a larger fraction of the NA community with ALMA. ANASAC endorses the new focus on developing science ready data products, which should help with achieving this goal. As this project has just begun there is not yet much to comment on. However ANASAC would like to stress the importance of developing a system that includes PI interaction since for many kinds of observations, producing science ready products is unlikely to ever become a fully automated process. ANASAC looks forward to being updated on this important initiative in an upcoming telecon when there are more concrete plans.

A second important avenue to engage new users is through the Archive. It is imperative that the archive products become more standardized such that new and experienced users alike know what to expect. ANASAC recommends that clear guidelines are developed for Archive imaging products produced manually by users and that these products are more explicitly documented. It is also important to provide more informative ReadMe files that can be downloaded separately. In order to better track the use of ALMA data in publications, ANASAC recommends that the notification emails sent for archive data requests include a reminder to use the ALMA archive acknowledgment in any scientific work resulting from the use of ALMA data.

*ANASAC Meeting Charge #2: Assess the status of Cycle 1, 2, 3 & 4 observations and progress made towards Cycle 5. For Cycle 4, are the data meeting user expectations? Are the data being released to the PIs in a timely fashion?*

ALMA data continues to impress. In the past, a major challenge for NA PIs was the long delivery times for data related to the data backlog. This has since been resolved and ANASAC commends NAASC for their leadership in its resolution. ANASAC endorses the implemented goals of delivering data within 30 day to the PI for standard mode observations, and within 45 days for non-standard observing modes. The new structure with a large number of Data Analysts (DAs) is a great improvement. ANASAC applauds the efforts that have been made to improve the morale of the NAASC DA team and feels that this is important to maintain the efficiency of the team and minimize unnecessary turnover that would otherwise slow the delivery of data to PIs.

ANASAC was very happy to hear that the calibration pipeline is working well for the vast majority of projects and that calibration&imaging pipelines work for more than 50% of all observing blocks. Moving forward, further improvements of the imaging pipeline should be a priority to ensure efficient data verification and delivery. The existing policy to image all channels out to the size of the primary beam is for example not practical for large baseline and/or high spectral resolution projects and needs to be revisited. ANASAC endorses the NAASC plan to slowly migrate data calibration back to the JAO when possible, while continuously evaluating whether it can be done without causing a new backlog; ANASAC is worried that without the DA efforts and computing provided by NAASC the backlog would quickly re-emerge, especially in light of the upcoming long baseline campaign and the fact that Cycle 5 (C5) will have a 25% higher data rate.

One remaining concern is the relatively low completion rate in C3 (63-67% for A and B programs) and the projected low completion rate of A- and B-rated programs in C4. While much of this can be ascribed to unusually bad weather, it is still worrisome and has caused much frustration among PIs who expected their projects to be carried out. At this point ANASAC

does not recommend an increased A-rated project fraction, though this should be revisited at the next meeting when more data on C4 and C5 is available.

ANASAC commends NAASC for the role it has played in giving ToO PIs access to raw data as soon as possible after data collection. We think it is critical to the success of Large Programs that their PIs are also given access to raw data early in the execution of their programs. We further recommend that in upcoming cycles early access of raw data be extended to all PIs and we find it reasonable that the proprietary clock starts upon delivery of raw or calibrated data, whichever happens first. The data should still be calibrated and imaged by the project before delivery to the Archive to ensure standardized archive products. ANASAC does not agree that this will give an unfair advantage to experienced users. While it is certainly an advantage to be able to calibrate your data, it is hardly unfair considering that it takes time and effort to learn how to do so. If the proprietary clock starts upon data delivery this should mitigate any lingering concerns regarding this issue. A second concern that has been raised is that providing raw data to PIs may increase the burden on the ARCs. While this is in theory true, ANASAC was happy to hear that in this concern has so far never been realized. Rather the occasional release of raw data to the PI has been beneficial to PI and observatory alike. In summary, ANASAC endorses the effort within the observatory to increase the access of PIs to their data and will also continue to bring this issue to ASAC.

The status of circular polarization (CP) observations is worrisome. PIs can derive CP from the full Stokes data that is being delivered. However, ANASAC was told that the derived CP can vary substantially on short timescale for reasons that are not yet understood. Until this is resolved, PIs should be warned to avoid publishing incorrect results on CP.

Finally, there has been some hints in existing data that the absolute calibrations, especially for line observations, are not as precise as they should be, and ANASAC welcomes the plans to carry out “Repeatable precision observations.”

*ANASAC Meeting Charge #3: The fifth Call for ALMA Development Studies/NA just ended, as did the Call for ALMA Development Projects/NA. Please comment on the process, which was accompanied by specific suggestions (“ALMA2030”) developed by ASAC and by reports from previous Studies.*

ANASAC commends NAASC for the ongoing ALMA development studies and finds that they are an important step in the improvement of ALMA’s scientific return. ANASAC was presented a brief report on the latest call for development studies and projects. The number of proposals in both categories seems to be healthy, which is an improvement compared to some previous cycles. We look forward to a discussion of the outcomes of development study and project proposal calls at the next telecon.

ANASAC was also presented a brief report on the ongoing studies and projects. All projects appear to be in line with ALMA development goals. Of the projects we would like to especially draw attention to ADMIT and the development of B2. ANASAC notes that the value of the ADMIT data products currently being supplied to ALMA NA PIs is uncertain, and recommends that a survey be undertaken to determine whether they are in fact useful to a segment of ALMA Users. If they are not useful, we recommend an investigation into changes to the current ADMIT product that would improve their value. ANASAC notes that since ADMIT depends on the image cubes delivered to the archive, improvement in the quality of these images will also benefit the quality of ADMIT products.

The development of B2+ appears to be going well. This is certainly very good news, but it

does make it more urgent to develop a selection process for Band 2 versus Band 2+3 to ensure that ALMA development resources are used optimally. ANASAC will be happy to weigh in on the relative benefits of the two options once the process exists.

Six C4 studies are currently ongoing. Three of the studies appear very well aligned with ALMA2030 goals to increase receiver and processing bandwidths. ANASAC looks forward to the reports from these studies at the end of this cycle. Of the remaining studies two focus on improving the imaging capabilities, which is key to maximize the science output of the telescope. Overall, these studies seem well selected and several could probably be developed into interesting projects.

### 2.1.2 Standing Charges

*Standing Charge #1. To assist ASAC in presenting a North American view with respect to ASAC*

The main item that ANASAC will bring to ASAC regards the question of release of raw data to PIs. This is very important for large programs, but should be in general available as an option to all PIs (see above in Section 2.1.1).

A second item concerns the spectral scan mode, which has been a high priority for ANASAC for many years. ANASAC was presented with a plan to improve the spectral scan mode by eliminating the 5 settings / SB requirement, which is good. The ANASAC is concerned to hear that none of the different calibration scenarios evaluated so far have been found ideal for calibration across a range of frequencies. Developing such a calibration scenario should be a high priority and ANASAC looks forward to a progress update after the summer. In the longer term, pre-tuning needs to be made possible since it is key for fast spectral scans. ANASAC endorses the plan to offer two different spectral scan modes, one deep and one shallow.

*Standing Charge #2. To lead community outreach through leadership of workshops.*

ANASAC looks forward to the joint ALMA-NA and Taiwan Conference on “Magnetic Fields or Turbulence: Which is the critical factor for the formation of stars and planetary disks?” in February 2018 and is happy to note that several ANASAC members serve on its SOC. The conference topic appears very timely in light of the increasing polarization capabilities of ALMA.

A second workshop of interest to ANASAC is the “ALMA Long Baseline Workshop” in Kyoto in October. The ASAC face-to-face meeting is scheduled to be right before the workshop to encourage ASAC members to participate. We hope this workshop will inspire the community to consider what science can be done with the current longest ALMA baselines and what science could be done with even longer baselines in line with recommendations in ALMA2030.

ANASAC believes the proposed Victoria workshop on “New Horizons in Solar Systems” is timely and exciting. There are some concerns about overlap with the Origins of Solar Systems Gordon conference a month later. ANASAC recommends that the organizers proceed, but that they take steps to minimize competition with the Gordon conference.

*Standing Charge #3. To provide a mechanism for widening ALMA’s base within the community and feedback to the NAASC on community perception of ALMA.*

ANASAC believes that availability of science ready data products is key to widen the user base and ANASAC commends the NAASC efforts on this topic.



On the shorter term, an improvement of the tools used to propose, monitor and analyze data is desirable. ANASAC recommends that ALMA continue to carry out extensive testing of the OT for future cycles prior to release. While the OT has improved and CASA appears more stable, SnooPI is still very cumbersome, and the Archive continues to be difficult to maneuver. Both are a cause of frustration among NA ALMA users.

ANASAC is happy to hear the ALMA ambassador program is off to a strong start. This seems like an excellent solution to a rather tricky community training challenge. It was noted that the size of the research stipend given to the ambassadors was very generous and whether some of that might be better used to fund an extra student or two within the SOS program.

ANASAC requests that ALMA obtains better demographic data of its users. This is critical both to assess the origin of gender disparities in proposal evaluation outcomes, and to assess growth of the user base. This could be achieved by reminding people to update their demographics profile the next time they log in.

Finally, it would be beneficial for the community if ALMA better publicized the status of new capabilities currently being commissioned. This is currently very difficult to find out unless you are part of the commissioning team. A more transparent process would enable the larger community to plan ahead.

#### *#4. Evaluation of Proposal Process: Cycle 5*

The proposal process for C5 appears to have been much smoother for ALMA users compared to previous cycles. It was especially noted that the OT was more intuitive and far less “buggy” compared to previous years.

ANASAC was asked about the perceived effectiveness of end-user documents. The general view is that these have worked well, but that it would be beneficial to shorten the “Proposer’s guide” and move some items either into the Technical handbook, or a separate document explaining policies.

The ANASAC continues to be concerned about the short median proposal lengths in C3 and C4 and look forward to reviewing the statistics for C5 as soon as they are available. If there is little change compared to previous cycles, an even stronger statement to proposers encouraging more mid-size proposals might be necessary.

The duplication checking capabilities were better in C5, compared to previous cycles, but remains rather cumbersome. There is concern that the current policy is too restrictive, especially for spectral line observations, resulting in many unnecessary false positives. A high false positive rate results in both more work for the ARP, and more unwarranted anxiety among proposers.

## **2.2 Jansky Very Large Array**

The Jansky VLA continues to serve the community well. The UC echoes its comments from last year that it remains the preeminent radio telescope on the planet, producing exciting and cutting-edge science. The UC is very pleased to see the infrastructure revitalization projects underway, which will help to ameliorate the natural degradation of 1970s and 1980s era equipment. This revitalization is necessary both to keep the VLA at the forefront and to prepare for future improvements.

The UC recommends continued efforts toward a more integrated ALMA-VLA presence. While some aspects of ALMA may be difficult to integrate, there are several steps that can be taken (e.g., joint ALMA-VLA Community Days) to re-enforce the complementary between ALMA and the VLA and to link the two user communities. Not only is this approach scien-

tifically valuable, but it will help build support for the “Next Generation Very Large Array” (ngVLA).

Both NRAO and the UC have noted previous declines in the publication rate from VLA observations. While the publication rate recovered from 2014 to 2015, it has again declined, although the statistical significance of this decline is unclear. We look forward to updates on the VLA publication rate at next year’s UC meeting. If the trend continues next year, NRAO should take steps to understand the root cause. There has been speculation about “data poisoning,” whereby researchers are slow to publish due to the large volume of data generated by the VLA that must be reduced and analyzed, but a more systematic approach should be taken to understand from PIs the disposition of their data and what roadblocks (software etc.) they may face to publishing their VLA data.

### 2.2.1 VLASS

The UC congratulates the NRAO VLASS team on the successful Critical Design Review. There has clearly been an immense amount of technical work conducted to support the VLASS, and the UC looks forward to the initiation of the full survey later this year. With its approval to proceed, the UC encourages NRAO to ensure that sufficient resources are available to complete the survey in a timely fashion.

During initial discussions about the VLASS, the UC expressed concern that there would be significant impacts on the amount of PI-led time. The NRAO VLASS Project has shown considerable attention to this issue, and the UC thanks the team for its efforts to minimize potential adverse effects.

The UC recommends that the NRAO VLASS Project develop a list describing how technical work done in support of the VLASS will feed back to enhanced capabilities or efficiencies for VLA operations, user data reduction, or other aspects of the Observatory. Such a list will aid NRAO in evaluating the success of the VLASS, and provide useful information for the general user, and also about the impact of future large projects.

The UC encourages the NRAO VLASS Project to produce at least one publication describing the pilot observations. Further discussion on this topic should be conducted with the VLASS Survey Science Group (SSG), but documenting the VLASS pilot and using such a publication to begin to inform the larger community about its outcome is warranted at this stage.

### 2.2.2 Time Allocation

The Committee has previously noted its displeasure with the performance of the Prioritizer, as NRAO analyses showed that highly ranked proposals might receive less observing time than lower ranked proposals. NRAO has updated (“tweaked”) the Prioritizer, and the UC was happy to see a closer connection between the proposal rating and the Science Review Panel (SRP) score due to improvements to the Prioritizer. Nonetheless, a dependence on LST remains.

It would have been interesting to see whether the correlation between completion percentage and SRP score is similarly improved. For next year’s presentation, the UC requests an analysis of project completion (hours requested and hours allocated) as a function of SRP score. The Committee requests clarification on the actual proposal pressure in order to understand trends. Different presentations appear to conflict.<sup>3</sup>

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<sup>3</sup> Slide 10 of the Director’s Overview (Presentation 1, Day 1) shows a decrease in proposal pressure, while Slide 13 in the SSR report (Presentation 3a, Day 2) shows an increase.

The UC would like to ensure that NRAO retains a focus on two demographic issues related to the time allocation process. First is the question of gender balance on the SRPs and Time Allocation Committees. We suggest a formal target of having two women on each SRP (out of 5+chair), and request quantitative reporting on the gender distribution of the SRPs next time. The UC would be happy to help fill the role of finding new members, particularly if the requests can identify the subject areas of need. Second, the investigation of possible proposal selection biases should not end with the report that was posted this year. Please keep collecting data, and please keep updating us. Given the long experience of HST in particular and the close knowledge of one of our UC members, we encourage NRAO to consider adoption of best practices from STScI. We note the positive step already taken of introducing the reviewers to the concept of unconscious bias before they begin their reviews and before deliberations. One additional step to consider is to change to the proposal structure (like the author alphabetization that HST tried), although we think that not enough is known yet for NRAO to implement this change.

There was no discussion of the partial observation issue that was raised last year. We reiterate our suggestion from last year that PIs should be asked *after* observing priority is assigned if their project can be successful with less complete observations.

It is disappointing that the joint HST/Swift/Chandra proposal capability remains under-utilized. In the hope of getting more joint proposal submissions, we suggest that NRAO ask the partner observatories to distribute the NRAO call for proposals to their distribution lists.

### 2.2.3 X-Proposals

The UC has previously considered the issue of “X-proposals,” defined as projects that are larger than the current “large proposal” category, perhaps requiring of order  $\sim 1000$  hr. The concept of X-proposals emerged following the Community Review of the VLASS. The VLASS Community Review noted that there might be significant, PI-driven observing projects that could result from proposals of a magnitude comparable to that of the VLASS-Deep component ( $\sim 3000$  hr). However, just as there is judged to be a qualitative difference between proposals requesting 20 hr and 200 hr, the VLASS Community Review and this UC judge that there is a qualitative difference between proposals requesting 200 hr and 2000 hr.

The UC notes that NRAO’s current calls for proposals do not preclude 2000 hr proposals, although such projects are rarely proposed for. According to NRAO documentation,<sup>4</sup> few proposals have been awarded more than 500 hr and only two proposals have ever been awarded more than 1000 hr: the NVSS and FIRST. Many recent projects that would qualify as X-proposals have been awarded their time in a piecemeal fashion, i.e. CHILES (PI: van Gorkom) and GLOSTAR (PI: Menten). While it is certainly the case that proposals of this magnitude require a compelling justification, the small number of approved proposals is leading to a community perception that such proposals are not actually encouraged.

The UC re-iterates a point that emerged from the VLASS Community Review, namely that X-proposals should be viewed as *PI-led*. As such, the VLASS is manifestly *not* an X-proposal. Further, any such evaluation of X-proposals should include the feasibility of the project being carried out by the PI’s team, with minimal demands on *NRAO*, as an explicit criterion.

The UC was happy with the explicit consideration given to X-proposals this year during the face-to-face meeting and with the engaged discussion, including with the Director, that occurred during the meeting. As discussed at length during the meeting, the UC finds that the originally

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<sup>4</sup> <https://science.nrao.edu/observing/largeproposals> and <http://library.nrao.edu/proposals/>

proposed time scale ( $\sim 2022$ ) for the initiation of any kind of X-proposal process to be too far into the future. The UC also notes that X-proposals can help to ensure the VLA’s prominence in the field in the face of likely changes in the radio astronomy landscape in the next 5 years. The UC also notes that maintaining the prominence of the VLA is critical for engaging the community and the broader public in the idea of the ngVLA.

The UC recommends that NRAO solicit expressions of interest for “X-proposals,” with the following notional time line

**2017 October 1** Initial announcement that there will be a forthcoming request for expressions of interest.

**2018 January** Second announcement

**2018 February 1** Request for expressions of interest

**2018 May** Discussion of the level of community interest at the Users Committee meeting

We re-iterate our point made previously that a possible outcome of such a call for expressions of interest (or the actual call for proposals) could be that none of the submissions meets the necessary high requirements. There is no implicit assumption by the UC, nor should there be one at NRAO, that an X-proposal will actually be given time.

### 3 Software

The UC has long highlighted the importance of software in NRAO’s relationship with its users. Despite steady improvement in some software packages, the UC is concerned that as a whole NRAO’s software suite still lags behind where it should be in terms of usability.

#### 3.1 The Archive, PST, OPT, and CASA

The UC applauds NRAO’s efforts to update the archive. The new archive provides a wonderful platform for future developments. The PST and OPT should strive to emulate the speed and intuitiveness of the new archive.

The UC notes that the PST is of particularly high importance, as it is the first (software) interface that users encounter when planning VLA observations. In particular, as NRAO knows, the PST and OPT are in need of attention. NRAO is still defining what the new PST should look like, and we look forward to helping in this process. We note that the removal of sessions would already be a large step forward. An early version of the PST minus sessions was tried by the UC software sub-committee, who gave it favorable reviews. Given the apparent need to prioritize the updating of either the PST or the OPT, the UC is in favor of prioritizing updates of the PST. We also encourage NRAO to consider the future combination of the PST and OPT into one product.

The UC endorses the recommendations of the CASA subcommittee. We are pleased to see that CASA is continually improving. The need to maintain multiple CASA versions to handle ALMA data sets taken during different cycles remains an issue, although not one with an easy solution. The UC requests that NRAO keep in mind the annoyance to users of having to maintain multiple versions of CASA when developing future CASA releases. The absence of an improved data-viewer in CASA 5.0, such as the CARTA project, is disappointing as the current viewer leaves much to be desired. The UC stresses that replacing the viewer is of high importance.

We heard about the topic of CASA documentation updates in some detail last year, but it was nearly absent from this year's presentations. We stress the importance of NRAO updating the CASA documentation and request information on this effort at next year's face-to-face meeting.

### 3.2 Science-Ready Data Products

The UC commends NRAO's focus on providing science-ready data products (SRDPs) to the community. Early results are promising, and we agree that this is an important step for NRAO in making radio astronomy more accessible to non-experts. We look forward to seeing further updates over the coming year.

### 3.3 User Computing

As in past years, the UC appreciated NRAO's efforts to support the community with computing resources. The successful deployment of the CASA calibration and imaging pipelines on Amazon Web Services (AWS) is a significant milestone, and will provide reliable surge capacity when needed. The UC suggests linking to AWS resources and introductory material from the CASA hardware requirements page<sup>5</sup> and/or otherwise advertising its availability. We also recommend that NRAO create a Beginners Cookbook to facilitate the use of AWS resources by users. We reiterate the desirability of similar resources for deployment on XSEDE or other super-computing facilities, whether as part of an NRAO computing block grant or by making available a Beginners Cookbook for standard deployment modes for individual user super-computing allocations.

For on-site computing resources, the expansion of the NMASC cluster to support the VLASS is a welcomed development. We also noted that the differing patterns of usage of the NMASC and NAASC clusters was peculiar, but possibly understandable in the light of their different histories.

### 3.4 Help-Desk

The UC welcomes the report that Helpdesk response times have dropped significantly from last year, when we expressed concern. The average ticket response times of 2.1 days for CASA and 1.5 days for ALMA data reduction are a great improvement, and NRAO is to be commended for this. We recommend that NRAO continue to keep an eye on Helpdesk response times since it is important for NRAO's reputation in the astronomical community that users know that they can get help with any problems in a timely fashion.

## 4 Central Development Laboratory (CDL)

The UC appreciates the focus of the CDL on the present and continuing development of ALMA. During the meeting, there was some discussion of future directions for CDL. Of the topics identified, field of view expansion using multi-pixel and phased array feeds is of greatest interest among the members of the UC. The UC is also enthusiastic about the renewed focus on back-end systems and digital signal processing; in particular ALMA correlator bandwidth expansion. We encourage the CDL to expand its efforts in multi-pixel and phased array feeds, as this technology will be increasingly important in the coming decade.

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<sup>5</sup><https://casa.nrao.edu/casa硬件-requirements.shtml>

Although not discussed in the meeting, the UC renews its perennial suggestion that CDL seek and develop opportunities for engagement with the broader technical community, including universities and other radio astronomy technology organizations in the US and abroad. We also continue to encourage CDL engagement with undergraduate and graduate students.

## 5 Support of Students and Postdocs

The UC has consistently maintained that the Jansky Fellowship should be preserved as the premier radio astronomy fellowship. The increase in salary and science support funds are an excellent way to preserve the fellowships as desirable and sought-after for early career astronomers with interests in radio astronomical research. The UC is, however, against naming all postdoctoral fellows at NRAO “Jansky Fellows,” as it dilutes the prestige of the fellowship program.

The Jansky fellowship is not a funnel for employment at a national observatory, but rather supports more general career development. To that end, the UC agrees that Jansky fellows should be free to pursue functional duties, but we strongly stress that this should not be a requirement. We heard that Jansky Fellows are being strongly encouraged to spend 10-25% of their time on functional duties. We object to this encouragement. We propose that in both the written job ad and in language used elsewhere to describe the Jansky fellowship, any mention of functional duties should clearly state that such work is optional. In the response to last year’s user report NRAO commented that they were implementing a mentoring program for Jansky Fellows. The mentoring program should reflect the optional nature of functional duties, and we look forward to an update on this program at the next face-to-face meeting.

Student support through Student Observing Support (SOS) program enables data analysis of both VLA and ALMA data, and the UC is happy to see the continuation of the VLA component of the SOS program from 2016 into 2017. SOS funds cannot be used to cover tuition, an issue that was also raised in last year’s UC report. NRAO’s response indicated that these are not intended to be the equivalent of grants, which can cover overhead and tuition. NRAO said they would solicit feedback from the community specifically on this issue, but no feedback was reported at the 2017 face-to-face meeting. We reiterate the suggestion to solicit feedback from people who have received SOS funds regarding the impact of the funding restrictions. This feedback will help NRAO to gauge the impact of the prohibition.

## 6 Science Communications and EPO

The UC is pleased by NRAO’s continuing efforts to build and maintain effective science communications and education and public outreach programs. We recognize the challenge posed by the recent spin-off of the Green Bank and Long Baseline Observatories, and it seems that NRAO has responded appropriately. The new web site is excellent.

The UC remains somewhat concerned that the user community is still not sufficiently aware of the process (or perhaps even the possibility) to submit science results for consideration for public release by NRAO. While this is certainly due in some part to lack of effort from users to seek out such information, the UC nevertheless encourages NRAO to find ways to increase awareness among users about this possibility and to find ways to make it easier for users to prepare and submit their recent findings for this purpose. These publications are especially important for building public support for the ngVLA.



## 7 Future Initiatives

The UC was impressed by the level of detail and thought put into the future of NRAO, and agree generally with NRAO’s vision. NRAO has been involved in organizing number of Kavli meetings in the last couple years in which the Next Generation VLA (hereafter “ngVLA”) played a prominent role. It was noted that the future of NRAO is by nature intertwined with the future of the SKA. If the SKA was highly successful, the US radio-astronomy community will be at a disadvantage without US buy-in. If on the other hand the SKA cannot fulfill its promise, radio astronomy world-wide will likely suffer. One option that has been discussed is that the ngVLA could fill the role of the SKA-high (that is not pursued by the SKA office), which would be a natural entry-ticket to SKA for NRAO. The UC is happy with NRAO’s policy toward the SKA of keeping the door open, for example regarding sharing their experience regarding the CASA development.

The advancement of the ngVLA development over the last year has been spectacular. What was a project with little community involvement now has full-fledged science cases and many scientists actively shaping the science case. Also, the recent meeting with General Dynamics to discuss possible antenna designs is an important and exciting step: it demonstrates that the project has moved from hypothetical discussions to an actual project. The UC is very happy to see that both a Science Advisory Council as well as a Technical Advisory Council has been formed, and that a Project Scientist has been hired for the ngVLA. Still, the UC strongly encourages NRAO to secure funding to hire more staff to deal with ngVLA-related issues in the coming years. The UC stresses that furthering the ngVLA case should be NRAO’s top priority in the next few years.

The need for \$40M for design and development presents a challenge. As NRAO is well aware of, this challenge must be overcome soon, if the ngVLA project is to be kept on track (with the goal to have a proposal submitted for Astro2020). The UC heard that there have been efforts to attract private funding, e.g., from foundations, which we endorse. NRAO should also continue to seek partnerships with other institutions that could further the development of the ngVLA by means of additional technical work. The other issue that the UC is concerned about is that currently there is little visibility for the project outside of the radio astronomy community. This is a difficult problem to solve at this stage when the science case for the ngVLA itself is still evolving. NRAO should find ways to disseminate the ngVLA’s capabilities as soon as a first rough design is agreed upon (later in 2017).

Overall, the UC thinks that NRAO can do more to increase the visibility of the ngVLA, both within the radio astronomy community and also in the broader astronomical community. To this end, we offer the following recommendations, some of which were first mentioned in other sections of this report:

- NRAO should more heavily publicize the science of the VLA, including synergies with ALMA (Section 2.2) and successes of the VLASS project (Section 2.2.1). Some high-profile VLA press releases should mention the advances that will be possible with the ngVLA.
- We encourage NRAO to expand the funding for the second round of ngVLA community engagement grants. One stated purpose of these grants should be to encourage face-to-face meetings, as we believe this will best lead to advancements of the ngVLA science and technical cases.

- We suggest that in the call for the next round of community funding, NRAO includes an optional section for how the grant would engage the broader astronomy community. Indeed, a stronger connection to optical/infrared community plans would be highly desirable.
- We suggest that slides highlighting the ngVLA science case be made available (and easy to find!) on the ngVLA web site.
- Updating the design ngVLA web site would also help to give the impression of a project that is well on the way to being a reality. The web site should prominently feature the 5 main science drivers of the ngVLA.



## A 2017 Charlottesville Meeting Participants

Name	Institution	Attendance
Loren Anderson ( <i>UC Chair</i> )	West Virginia University	ANASAC&UC
Fabian Walter ( <i>UC Co-Chair</i> )	Max Planck Institute für Astronomie, Heidelberg	ANASAC&UC
Shami Chatterjee	Cornell University	UC
Steven Ellingson	Virginia Tech	UC
Trish Henning	University of New Mexico	ANASAC&UC
Shih-Ping Lai (ANASAC)	National Tsing-Hua University	ANASAC&UC
Joseph Lazio	JPL/CIT	ANASAC&UC
Dan Marrone (ANASAC)	University of Arizona	ANASAC&UC
Giles Novak (ANASAC)	Northwestern University	ANASAC
Karin Öberg ( <i>ANASAC Chair/ASAC</i> )	Harvard-Smithsonian Center for Astrophysics	ANASAC&UC
Rachel Osten (ANASAC/ASAC)	Space Telescope Science Institute	ANASAC&UC
Steven White (ANASAC/ASAC)	ARFL Space Vehicles	ANASAC&UC