

2016 NRAO Users Committee Report

May 17–19, 2016 in Socorro, NM

Executive Summary: The most significant findings of the 2016 NRAO UC are:

- We applaud NRAO’s efforts to continue the operations of the GBT and VLBA by creating two new entities, the GBO and LBO. However, NRAO will need an extensive effort to inform the community about the transition. The UC is concerned about the future of data archiving at the GBO and software infrastructure at the LBO. (§2.3 & 2.4)
- The UC would welcome the opportunity to give input into LBO and GBO at the 2017 face-to-face meeting. We would also like to see the full integration of the UC with ANASAC, with explicit charges given for ALMA, VLA, and observatory-wide infrastructure. (§1)
- An ALMA-wide data-delivery target timeline should be implemented. The UC is also concerned at the continued lack of a duplication checker and an efficient spectral scan mode. (§2.1)
- NRAO needs to be working strategically to ensure that the VLA remains preeminent in the face of likely changes in the radio astronomy landscape over the next 5 years. One recommendation is a forward-facing conference which presents VLA results and considers them as a springboard for ngVLA. (§2.2)
- The UC appreciates that the CASA team is increasingly aware of the users’ experience. We endorse the CASA UC’s recommendations. We request increased effort to respond to CASA HelpDesk tickets promptly and completely. (§3.1)
- The UC is happy to see investment of resources and more concrete timelines for improving user-facing software like the NRAO Archive and the Proposal Submission Tool. A Software Sub-Committee of the UC has been formed to give the NRAO detailed feedback on proposed upgrades. (§3.2)
- Frustration with the VLA prioritizer continues amongst both users and the NRAO TAC. The UC applauds the proposed elimination of observing sessions and improvement of the prioritizer algorithm. (§2.2 & 3.3)
- The UC is concerned about the outcome of the recent study of gender bias in proposal selection, and urges NRAO to continue this study in the future and consider strategies to counteract bias. (§2.1 & 4.1)
- We encourage NRAO to re-consider a call for “X” (legacy-sized) proposals. (§4.1)
- Jansky Fellowships should be preserved as the premier radio astronomy postdoctoral fellowship, with no service responsibilities. The option of fellows being resident at a non-NRAO site should be retained. (§4.2)
- It is possible that the prohibition on tuition support for SOS is harming users. The UC recommends that NRAO further investigate this issue, perhaps by surveying users. (§4.2)
- NRAO urgently needs to put in place a broad, open, and transparent method to give the community an active role in the definition of NRAO’s future. NASA STDT and WFIRST Science Investigation groups, including funding for community contributions, are attractive models to follow. A ngVLA Project Scientist and Scientific Advisory Committee need to be carefully selected for their ability to represent and reach the broader astronomical community. (§6)

1 Users Committee Structure

The Atacama Large Millimeter Array (ALMA) North American Science Advisory Committee (ANASAC) met on May 17, 2016 in Socorro, NM, for the third time as a standing subcommittee of the NRAO Users Committee (UC). This day focused on ALMA operations and development, and all UC members were invited to participate. The full UC then met on May 18 and 19, 2016 to discuss the operations and development of the Jansky Very Large Array (VLA), Green Bank Telescope (GBT), and Very Long Baseline Array (VLBA), along with observatory-wide issues. Members of the 2016 ANASAC and UC are listed on the last page of this report.

In preparation for the meeting, the UC published an online form for NRAO user feedback, and advertised it via eNews. The outcome was not overwhelming, with six received responses, but the UC found the feedback insightful. We would like to continue using the form next year.

In light of the reorganization of NRAO to focus mainly on ALMA and VLA, it is unclear whether a separation between ANASAC and UC meetings is warranted moving forward. While ANASAC has some specific charges that are separate from those handled by the UC, it is clear that there is also substantial overlap between the two committees. We are open to the possibility that the NRAO UC also be given specific charges to address—in which case, there would be little difference between the ANASAC and UC. There is concern that the existing separation between the two meetings leaves little room for user-type questions for ALMA (it was not on the schedule for this year’s meeting). We therefore request that NRAO consider a full integration of the ANASAC and NRAO UC meetings.¹

As GBT transitions to the Green Bank Observatory (GBO), and the VLBA to the Long Baseline Observatory (LBO), there are plans to remove these facilities from the purview of the NRAO UC and establish independent Users Committees for them. However, the NRAO UC is concerned at the planned lack of Users Committees for GBO/LBO in the upcoming year, as this will be a crucial year of delicate transition for both observatories. The UC recommends that GBO and LBO be invited to present at separate “add-on” sessions at the 2017 UC face-to-face meeting—offering cost-effective interim feedback to these fledgling organizations.

2 Facilities

2.1 ALMA Operations and Development

The ANASAC and the ALMA Science Advisory Committee (ASAC) have a series of specific charges:

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

Overall the North American (NA) community appears to do well. Once delivered, data are published at a reasonable (2 year or less) time scale, and there have been several high-profile ALMA publications from the NA community. The vast majority of Cycle 0 projects have resulted in peer-reviewed publications. There is a small number of projects without publications. Prompted by ANASAC, the PIs have been contacted and lack of publications appears to be due either to personal reasons or to inadequate data quality, i.e., not to difficulties with reducing or analyzing the delivered data. The number of publications from Cycle 1 and 2 is still quite

¹Throughout this report, we underline items for which we request action or feedback.

low, which most likely reflects delays in data delivery to PIs. ANASAC emphasizes the high priority that must be given to validate and deliver data quickly to maintain enthusiasm for and momentum of ALMA science.

ANASAC notes that the number of archival papers appear to be growing, although the exact definition of archival papers is complicated. ANASAC continues to advise that archival users are prompted to add a specific acknowledgement to their papers. This would facilitate tracking of “true” archival papers and thus the attraction and usability of the ALMA Archive (the latter continues to be a concern). The ANASAC was pleased to hear that in Cycle 4, the archive will provide additional metadata; this is a good step for enabling archive research.

ANASAC is concerned that in terms of numbers of publications, Europe is doing much better than North America despite a similar time share. ANASAC would like to to see additional metrics on the relative impact of the Europe and North American executives on the astronomy community. In particular we request data on the total number of citations of EU and NA-led papers, as well as lists of the top 10 most influential papers that has come out of each cycle and how they are broken down between regions. It would also be useful to know whether the NA ALMA papers are making use of the NRAO’s page charge support.

A plausible reason to why Europe is more productive is a better funded radio astronomy community. The NA funding model where ALMA PIs apply separately to NSF for funding does not seem to fail catastrophically; the current success rate for ALMA-related NSF proposals is ~20%, according to Phil Puxley (NSF)—slightly above the average NSF AAG success rate. The funding model does result in substantial funding uncertainty for student support, however, and ANASAC enthusiastically endorses the continuation, and if possible expansion, of the ALMA Student Observing Support (SOS) program.

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

In 2015, ALMA transitioned from Early Science with observations done on a best-effort basis, to PI Science mode, which comes with a new set of expectations on data delivery and quality. The NA community continues to be enthusiastic about the quality of ALMA observations, and the breakthrough science they have enabled. There is also frustration, however, with data delivery time scales and a lack of transparency on how proposals are selected and executed. It continues to be difficult for PIs to predict whether their observations will be taken in a cycle, and how soon after Quality Assurance Phase 0 (QA0) that data delivery can be expected.

In Cycle 3 slow data delivery seems to be caused by lack of or poorly managed resources (including disk space) at the Joint ALMA Observatory (JAO). ANASAC requests more detailed data on the average number of days that is spent on the the different stages of data processing. How many days does it take for a data set to go from QA0 to being entered into the pipeline at JAO? How many days are spent on analyzing the pipeline output and rerunning it if needed? How long from pipeline completion to delivery to the ALMA Regional Centers (ARCs)? How many days does the data set spend at the ARC before being delivered to the PI?

The ANASAC applauds and endorses the initiative of the North American ALMA Science Center (NAASC) to take over some of the calibration duties from the JAO earlier this year, when JAO backlogs caused unacceptable delays in data delivery. ANASAC agrees with the NAASC that 30 days is an acceptable maximum target delivery time from observation to giving the PI access to the data, and recommends that this target is adopted for the observatory as a

whole.

A source of frustration among the NA community is the delayed launch of key observing modes and tools, especially the spectral scan mode and the duplication checker. These have been listed as high-priority items by the ANASAC for many cycles and their delayed implementation is a source of concern. With regard to the spectral scan mode, ANASAC recommends that two kinds of calibration-light modes are implemented in the Observing Tool (OT): one which allows the user to reduce the overall passband calibration time across the scan, and one which set ups the spectral scan to be executed as a sequence of spectral settings rather than a complete scan in each execution.

The ANASAC did not see any data on projected completion fractions of Cycle 3 A and B rated proposals and cannot thus comment on how well the observatory is doing compared to previous cycles. ANASAC requests that such a projection is made available in time for the next telecon. A breakdown by configuration would be useful.

The ANASAC was encouraged to hear about progress with the calibration pipeline, and efforts to automate the imaging pipeline for ALMA data. Going forward, continuing to automate the calibration pipeline, such that it can handle the vast majority of data sets without human intervention, should have the highest priority. There was some concern about the JAO taking over the calibration and imaging pipelines, given the recent personnel and computing limitations in processing data through the calibration pipeline. Delivering science-ready images to PIs is a commendable long-term goal, and ANASAC looks forward to hearing more details on how this will be achieved at the 20% level in the upcoming cycle. ANASAC also recommends that a mechanism is developed through which the PI is included at the imaging and data assessment stage. This is especially important for large programs, since it would allow for a check on optimizing the initial observing strategy. Allowing the PI to provide input before the pipeline imaging begins would also be important to ensure that “science ready” images are really science ready from the point of view of the PI.

Once a 2 or 3-year configuration schedule is decided on, this needs to be clearly advertised to potential PIs to facilitate planning of large (and normal) observing programs.

ANASAC is very happy to see that there is now a reasonable policy in place on how to handle stale data and commend the NAASC for their efforts in putting this into place.

ANASAC Charge #3: The fourth Call for ALMA Development Studies/NA is under way. Please comment on the process, which was accompanied by specific suggestions (“ALMA 2030”) developed by ASAC and by reports from previous Studies.

ANASAC finds the existing selection of studies and projects exciting and of great potential benefit to the observatory. Overall, the current selection process thus appears to be working. ANASAC is happy to have been involved in the process to choose proposal reviewers. To further comment on the process, ANASAC requests to see what instructions are given to reviewers. ANASAC is particularly interested in learning the process through which “ALMA 2030” is taken into account by reviewers when selecting new projects.

We believe that the clear time separation between “studies” and “projects” calls (brought about this time by programmatic considerations) benefits the process and endorses the existing plan to not have a call for studies accompany the upcoming call for projects.

ANASAC was happy to hear that NRAO appears to be working closely with PIs of approved software projects to ensure smooth integration with CASA. ANASAC encourages NRAO to

continue to work closely with all development program PIs to ensure that the development program products are used in an optimal way by the observatory and data users. The ANASAC would like to hear further about steps being taken to ensure that deliverables from software projects are integrated into and maintained within the existing infrastructure.

The construction of Band 2 with ALMA development money could by itself easily consume the entire NA development fund over the next five years if no mitigating steps are taken, which would be catastrophic for maintaining a healthy and diverse development program. The NAASC is clearly aware of this “threat”, and ANASAC fully endorses plans to seek partners and/or funding from other sources. ANASAC strongly recommends that a substantial fraction of the development budget is set aside for other projects besides manufacturing Band 2 to ensure a strong and open development program.

The ANASAC was presented with a need for community involvement to commission key capabilities that are currently under threat to be heavily delayed or not commissioned at all. ANASAC suggests that development study funds could be used for such Extension of Capabilities activities and recommends that the opportunity to apply for development study funds for this purpose is widely advertised in the community.

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

ANASAC was presented with the option to endorse the Band 1 for full production. As ASAC has already affirmed that the science case for Band 1 is strong, there seems to be not further need to discuss this question at present.

ANASAC Standing Charge #2. To lead community outreach through leadership of workshops. Plans for next NAASC-sponsored workshop, community workshops, tutorials, etc?

ANASAC commends the opening up of the NAASC cluster to external users and recommends that this resource is advertised directly to successful ALMA PIs.

The data reduction workshop in January appears to have been a great success and ANASAC endorses the plan to offer two per cycle. However, ANASAC finds student training in interferometry even more important. If resources are stretched, ANASAC prioritizes offering an “Introduction to Interferometry” summer school (similar to the add-on to the single-dish school offered last year) on Socorro summer school “off-years” over a second data reduction workshop.

ANASAC recommends that the lectures at the Socorro and introductory interferometry schools are recorded and made available to the community through the NRAO and/or ALMA websites. Such recordings should provide useful introductions to novices, and refreshers for experts, who cannot make it to the schools. They may ultimately reduce the pressure on the summer schools and thus free up NAASC and NRAO resources.

ANASAC is excited about the “Train-the-trainer” program and looks forward to hearing an update on the launch of program, recruitment of trainers and feedback from the community on trainer-led workshops. We hope in the future that the VLA can also be integrated into these community education efforts, to promote synergies between ALMA, VLA, and ngVLA.

ANASAC 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 applauds the launched effort to extract demographic information from ALMA users, but are disappointed to find that it is very difficult for users to figure out how to actually provide that information. Tests by ANASAC members revealed that the demographics form that the user is automatically taken to when logging into their ALMA user account (a mechanism put in place weeks ago but clearly not adequately tested, which is a recurrent problem with software delivered by the project that needs to be addressed in a global context) does not work. This needs to be addressed as soon as possible. Accurate demographic information is key to assessing whether ALMA is widening the millimeter community, as well as the origins of uncovered gender biases in the proposal selection process.

ANASAC recommends that NAASC follows up on the previous user satisfaction survey in every or every other cycle to track user satisfaction, community perception, and whether there are “problem areas” across cycles with how the community interacts with NAASC and the observatory. It seems like PIs who visit the NAASC are generally satisfied, but it would be beneficial to hear some more detailed feedback, especially how the PIs experience the switch to interacting primarily with data scientists.

Finally, ANASAC would like to emphasize the importance of student support and training for widening the user-base and thus the importance of summer schools and a well-funded SOS program.

ANASAC Standing Charge #4. Evaluation of Proposal Process in Cycle 4.

The May face-to-face meeting occurred less than a month after the deadline for Cycle 4 proposal submissions, and our comments on Cycle 4 are thus limited to the perception of the preparation and submission of the proposals. Below we also comment on proposal evaluation based on Cycle 3.

We congratulate the NAASC and the Observatory for another cycle with a large number of proposals. There is clearly high interest and demand for ALMA observations. ANASAC looks forward to obtaining feedback on the proposal evaluation process, and especially on whether there is improvement regarding the number of proposals evaluated by each panel, and by each panelist.

Compared to previous cycles, there are some clear improvements in the proposal preparation tools. Some problems remain, however, and other have been added. The biggest problem concerned the tool’s inability to handle larger projects without going very slow or crashing. The pseudo-free-form boxes on “previous and related proposals” also caused frustration, as a poorly thought-out and/or hastily implemented feature. Going forward there is clearly need for both more careful testing and more resources to fix identified bugs before the OT is released. As mentioned above in the example of the demographics gathering effort, the user-facing software component of ALMA does not seem to be adequately prioritized (for example the continued failure to implement a duplication-checking tool). This is worrisome and a problem that the management of the project needs to urgently confront and address.

One proposed improvement of the OT concerns the handling of science goals. For surveys, it would be beneficial (i.e. conserve observatory resources) if observations of multiple sources within a science goal could be specified to achieve a constant signal-to-noise ratio.

Regarding the proposal review process, ANASAC is very concerned about the uncovered gender bias in the assigned proposal review scores. We appreciate that NRAO is taking this seriously and wholeheartedly endorse the plan to better educate reviewers about unconscious bias as well as to take steps to mitigate it. One important step would be to reduce the stress in

panels by reducing the number of proposals evaluated by each panel and panelist. ANASAC advises that the gender bias study is repeated once the Cycle 4 results are known and presented to ANASAC (and the other executives) as soon as possible. ANASAC recommends that additional demographic data are collected to explore the importance of career stage on proposal review grade. Finally, ANASAC looks forward to seeing the outcome of the ongoing *HST* experiment to scramble PI and co-Is and may have additional advice for ALMA and NRAO once the results are known.

ANASAC recommends that the fraction of A-rated proposals is increased. In addition to providing more security for PIs and thus facilitating funding applications, this would reduce the number of proposals that needs to be reviewed in each cycle.

2.2 VLA Operations and Development

The VLA remains the preeminent radio telescope on the planet. The improvement in operations to reach a steady state of $\gtrsim 70\%$ science observing efficiency, with ongoing development of new functionality, ensures continued success, at least for the near term.

The UC is glad to see the recovery in the VLA publication rate during 2015. As the causes of the previous downturn are not clear, continued monitoring of both the proposal pressure and publication rates is needed. Recent improvements in CASA and the VLA pipeline may be contributing factors to the improvement in publication rate, and continued efforts in these area are worthwhile.

Having expressed concerns about the VLA prioritizer in the past, the UC welcomes the investigation of alternative algorithms. We request that details on new approaches be presented to the UC software sub-committee (§3.2), and highlighted at the next face-to-face meeting.

The UC was asked its opinion about a box that proposers could check to state if partial observation of their program would be useful. The UC understands that this may be useful to scheduling B and C priority observations. We suggest requesting this information in a “Phase II”-like stage, after observing priority has been assigned. The text associated with this inquiry should be neutrally worded, as in “This program can be considered for partial observations [YES/NO]”. We also recommend that the rationale for this inquiry be stated clearly and openly to users.

While the VLA is currently the preeminent radio telescope, it is likely that the radio astronomy landscape will change significantly over approximately the next 5 years. With the exception of VLASS, the UC found little in the presentations to suggest longer term strategic thinking for VLA. NRAO must be taking steps now to ensure that the VLA is not a target, should there be another Portfolio Review. Strategies may include:

- Strengthening the link between the ALMA and VLA communities, in advance of the next Decadal Survey and in order to build a broad RMS user base. The UC recommends a broadening of NRAO Live! events from ALMA to include representation of the VLA at each event. To the extent that the next generation VLA (ngVLA) is “ALMA-Low,” it is especially important to make this link. This link should be carefully considered in upcoming efforts to expand the NRAO Live! program, through e.g., establishment of ALMA Ambassadors.
- A forward-looking conference where Jansky VLA results are highlighted and collected as catalysts for a ngVLA science case. The UC notes that such a conference should complement, and not conflict with, any ALMA conference.

VCLASS: The UC welcomes recent efforts on VCLASS, including the appointment of new personnel. The Committee emphasizes, however, that the Preliminary Design Review and Critical Design Review should include “go/no-go” decisions. It is likely that further pipeline performance improvements, yet to be demonstrated, will be crucial to achieving the potential of VCLASS.

The UC is glad to see NRAO’s careful consideration of the effects of VCLASS on PI science. We find that the ~15% reduction in order to conduct the VCLASS is acceptable, given the likely broad use of the survey.

Finally, the Committee would welcome V-LITE observations conducted commensally, but only if work toward this goal does not delay the VCLASS any further.

2.3 GBT Operations and Development

The GBT remains the premier single-dish facility in the world in the cm-regime, and the new high-frequency capabilities are extremely promising. It is unfortunate therefore that the fundamental science and new receiver capabilities of the GBT will not be contained within the NRAO umbrella. The loss of PI science time on the GBO is unfortunate, but necessary. The UC acknowledges the difficulties faced by the new GBO, and hopes that decisions that impact staff morale are considered carefully. We applaud the GBO for finding additional channels to support the telescope and its operations.

Despite the clearer path forward for the new GBO, many in the community feel uncertainty over the future of the observatory. It is imperative that the NRAO do all they can do to inform users of the upcoming transition, and its impact on users. The eNews article was a good start, but future eNews articles on the transition would be welcome, in addition to further information when the calls for proposals are released.

The UC is concerned about the possibility of GBO data not being present in the NRAO archive going forward. We feel strongly that, at the very least, the meta-data must be stored in a searchable database that will allow users to determine whether an observation has taken place. If the NRAO archive is not used by the GBO in the future, it is essential that users receive clear instructions on how to obtain the data. Reducing access to archival Green Bank data would only shrink the user base, which is unacceptable given the apparent decrease in interest for telescope time over the last couple years. The UC hopes to hear from GBO during the face-to-face meeting next year, and requests an update on plans for archiving GBO data at that time. The UC also encourages that GBO make data public whenever possible; we therefore encourage GBO to assist in archiving data from purchased time on the telescope.

With ALMA and the VLA moving toward science-ready data products (SRDPs), we hope the GBO will also continue to move in this direction. The lack of GBT pipeline support would further depress the publishing metrics for GBO data, as users increasingly expect SRDPs. Effort should also be made to incorporate user-created pipelines for large projects, so that such efforts do not need to be duplicated. At the next face-to-face meeting, we request an update on pipeline progress to produce SRDPs for users.

Community interest in high-frequency capabilities at the GBO appears to be strong, as evidenced by the over-subscription rate. The UC recognizes that there is additional cost associated with maintaining the high surface accuracy for high-frequency observing, as well as the added cost of building and maintaining the receivers. The failure to create a high-frequency consortium is likely caused in part by the fact that there have been few truly high-frequency receivers consistently available. With ARGUS and MUSTANG2.0 coming on to the telescope, the high-frequency capabilities of the GBT will be greatly increased. The removal of high-frequency

capabilities would discourage and decrease the user base, which again would be very negative in this time of decreased telescope interest. We therefore caution against making any decisions on the high-frequency operations of the GBO until the demand for these new instruments can be assessed (after $\gtrsim 2$ proposal cycles). We also request that the UC be kept informed about the demand for high frequency time (e.g., number of hours requested, granted, and available for all receivers in 2016B—and other semesters if possible). The GBO should heavily publicize first results from ARGUS and MUSTANG2.0, preferably in advance of the August proposal deadline.

2.4 VLBA Operations and Development

In contrast to last year, when the VLBA was notable for its near absence from the meeting, this year featured a specific presentation. Given that the VLBA remains a scientifically viable and exciting telescope, its higher visibility is a positive development. The UC hopes to hear from LBO at the face-to-face meeting next year, as the next year will represent an important transition for the Observatory.

This meeting presented the first indication of how the divestment of the VLBA, recommended by the Portfolio Review, is to be handled. The UC understands that a new institution, the LBO, is being created to operate the VLBA. This first indication was welcome, as it removes some of the uncertainty that has been surrounding the VLBA for some years. We also commend NRAO's efforts to develop a workable solution to enable continued operation and scientific results from the VLBA.

We caution that the discussion of the LBO at the UC meeting should be viewed as necessary, but not sufficient to inform the community. The NRAO must make multiple announcements, in multiple fora, to describe the forthcoming transition.

The UC understands that it may be necessary for LBO to move away from an Open Skies policy, even for the $\sim 25\text{--}30\%$ of time remaining available to the public. While we are saddened at this development, we can see how this departure may be crucial for the long-term health of the observatory. In the upcoming year, we would like to hear more about what this departure from Open Skies would look like, if it is deemed necessary.

A potential re-competition of the LBO would increase uncertainty felt in the community over the future of the observatory, although we recognize that any such decision is beyond the control of either the NRAO or the future LBO. After years of uncertainty regarding the fate of the VLBA, new factors that continue that uncertainty are not the means of ensuring the productivity of the most powerful long-baseline array on the planet.

The Committee finds the increase in proposals, particularly at higher frequencies, and the infrastructure developments to be positive developments. However, the UC is concerned about the software infrastructure supporting both telescope operations and users; the resources needed to maintain this infrastructure appear insufficient and fragmented. The possibility of VLBI capabilities being introduced to CASA could be positive, even though this effort appears to have been started in Europe. To the extent possible, the Committee encourages NRAO, and the future LBO, to participate in this work in order to ensure that the VLBA is supported fully. We would appreciate an update on fringe-fitting in CASA at next year's face-to-face UC meeting.

3 Data Management and Software (DMS)

3.1 CASA

The UC was gratified to see that the CASA team has taken previous feedback (from us and the CASA UC) on board and have begun addressing the fact that the typical CASA user experience is very different from the experience within the CASA team. We emphasize that reliability and speed should take highest priority in CASA development.

The UC was pleased to see the following developments:

- Data reduction Pipelines: the success rate for the ALMA and VLA calibration pipelines is increasing and seems to be proving useful to observers.
- Documentation: a nice unified CASA documentation interface has been created to show task description, parameters, changelog (history), and examples on four tabs. This will enhance the usability of CASA.
- ALMA development projects like ADMIT and CARTA: both are useful tools, and will be integrated into CASA in the future.
- CASA User survey: the development of second survey is underway, and the UC recommendations from 2015 are being taken into account in the development.
- Thoughtful feedback from the CASA UC: the UC endorses the CASA UC's recommendations.

The UC further recommends:

- Careful tracking of EU efforts to integrate VLBI capability into CASA (see §2.4).
- Shortening the response time to user HelpDesk tickets (see §4.3).
- Sending the CASA newsletter to the entire NRAO eNews mailing list (while giving subscribers a clear option to opt out). The CASA newsletter distribution has been limited, and this will broaden communication with the community.
- Continuing work on ways to improve error message reporting within CASA.

3.2 Founding of a Software Sub-Committee of the UC

At the suggestion of DMS staff and in conjunction with Science Support & Research (SSR) staff, the UC has decided to create a sub-committee that will focus on user-facing NRAO software like Archives, the Proposal Submission Tool (PST), Observation Preparation Tool (OPT), Science Ready Data Products (SRDPs), and the VLA Prioritizer (note: CASA is explicitly not in the purview of this sub-committee, as there is already a separate CASA UC). The tasks of the Software Sub-Committee will be to give detailed feedback on current software issues and review plans for software updates. The sub-committee will be engaged earlier in the process of planning software upgrades, compared to past engagement with the UC. The sub-committee is responsible for maintaining clear communication between NRAO and the broader UC on important software developments. The members of the 2016–2017 software sub-committee are Loren Anderson, Laura Chomiuk, Shih-Ping Lai, and Fabian Walter, and they look forward to hearing from NRAO.

3.3 Proposal Submission Tool and Observation Preparation Tool

We applaud NRAO’s commitment to investing substantial effort into improving the PST and OPT over the next year. In particular, we are excited to hear that NRAO will remove sessions from the proposal process, as sessions tend to be unintuitive to users and given un-due weight in the telescope prioritization process. The software sub-committee looks forward to working closely with NRAO as this substantial change is made to the PST. We also refer NRAO to Appendix B from the 2014 UC report, which details still-relevant issues with the PST and OPT that we hope to see addressed in the next year.

3.4 NRAO Archive

The UC was impressed at the new Archive Access Tool and Pipeline Interface Project, which were demonstrated at the face-to-face meeting. We look forward to giving NRAO detailed feedback as this software develops via the Software Sub-Committee, and we urge NRAO to deploy it widely as soon as possible.

The UC is concerned about uncertainties in archiving Green Bank data moving forward. We encourage NRAO to consider compatibility with GBO data as they develop the new archive tool.

3.5 Science Ready Data Products

The UC was happy to hear that there is an open discussion underway to define the sorts of SRDPs that could be delivered in the future. Again, the Software Sub-Committee of the UC looks forward to working with NRAO to define community needs and desires for SRDPs.

While the provision that SRDPs is a laudable goal in general, the UC is concerned that they not displace more urgent priorities, such as the aging archive interface (being addressed) and the PST/OPT interfaces.

3.6 User Computing Support

The UC appreciates NRAO efforts to support the community with computing resources, and expresses apprehension about the inevitable difficulties during the transition to the multiple observatory model.

The availability of NRAO computing resources remains essential for the user community. The current cluster at the DSOC is under severe strain, especially on the storage front, and while the planned expansion of storage is urgently needed, it is unlikely to reduce the pressure for very long. We commend the ongoing investigation of external resources, including AWS and XSEDE, but caution that it will require significant effort in user education, consultation, and the provision of canned scripts and recipes for common tasks.

4 Science Support and Research

4.1 Telescope Time Allocation

Despite the recent helpful addition of documentation that gives proposers a better understanding of how the VLA prioritizer works, there remains confusion in the community about the

connection between defined sessions, Science Review Panel (SRP) grade, and scheduling priority. The UC is very happy to hear that NRAO is considering some sweeping changes to how the scheduling is done. The suggested retirement of “sessions” removes one variable in this complex process, and thus, should lead to an improvement in user-friendliness. However, the UC is concerned about the impact this will have on scheduling priorities if it is introduced without other adjustments (e.g., if the result will be that a circumpolar source will always be weighted down in priority by the most oversubscribed part of its LST range—despite the fact this its high scheduling flexibility should instead result in the opposite impact on the dynamic schedule). We therefore strongly recommend that the elimination of sessions and improvements in prioritizer algorithm proceed in tandem. Also, the UC strongly recommends that detailed documentation be provided for any new process, so that proposers fully understand the implications in advance of the deadline for the semester in which the changes are implemented—if possible with a few detailed examples that make the expected outcome more transparent to proposers.

Given the demonstrated impact of ambitious, dedicated very large programs at other observatories, and the recent acceptance of the VLASS project, there is strong interest in the community for the ability to carry out similar projects at the PI level with NRAO facilities. The UC would like to ensure that the very best science is done with the VLA, and enabling larger projects may be one way to do that. A sub-committee of the UC has recently prepared a short document summarizing ingredients in the possible implementation of such projects (termed “X Proposals”; Scott, Riechers, Lazio, Chandler & Bastian 2015). NRAO decided last year that the time was not right to move forward with this idea—but with VLASS planning now much further along, the UC would like to see further investigation of this concept. A copy of the “white paper” is attached to this report, and the UC would appreciate an update on NRAO’s position and a possible timescale of implementation by the time of the next UC telecon.

The UC appreciates NRAO drawing our attention to the relatively low demand and success rate for Joint observations (e.g., *Hubble*, *Chandra*) via the NRAO call for proposals. We were surprised at the low rate at which this opportunity is being utilized, but we still strongly believe that these joint calls are indispensable, enabling science that simply can not be done any other way. The UC encourages NRAO to consider how these opportunities might be advertised more thoroughly, perhaps by specifically seeking out eNews articles or press releases from successful Joint programs.

The UC was glad to see that all NRAO facilities were included in the Gender Bias study. While the bias does not appear to be as strong for VLA,GBT, and VLBA as it is for ALMA (perhaps attributable to the smaller number of proposals read by a typical SRP, compared to an ALMA reviewer), bias still does appear to be present. We encourage further study of this preliminary finding in future semesters.

4.2 Students and Postdocs

The SOS program is extremely important, and the renewal of non-ALMA support by NRAO is a welcome change. Still, we have four recommendations:

- The awards currently come with a restriction that they cannot fund tuition, which benefits PIs at institutions where these grants are treated “fellowship-like” (i.e., where the tuition is simply waived) under the present rule set, but it adversely affects their use at other institutions that ask for tuition to be covered by other resources when disallowed on a grant. We request that NRAO explore whether this restriction (or wording in the rules of the program) should be changed, perhaps by surveying recipients.

- The balance between number of students funded and duration of funding at current rates of graduate school stipends is also worth reconsideration (the current funding cap does not allow support of students for a full year at some institutions—as desirable to ensure support throughout a PhD thesis), although we have no specific recommendation that it should be changed.
- The reporting of past SOS awards on the website should be continued (the last round is missing).
- NRAO could consider requiring slightly more information from awardees in the final reports to improve information about the success of the program in getting students through projects.

The Jansky Fellowship program is important to the standing of radio astronomy and its continued vitality with young scientists. It is the most prestigious fellowship in the field and its standing hinges on its continued parity with other top fellowships. While we understand the pressure on the program within NRAO (a pressure that has existed for a very long time), we continue to hold the unanimous belief that the Jansky Fellowship must continue unchanged. Restricting traveling fellowships, imposing duties, or even mentioning the possibility of duties in the job advertisement will harm the program, and by implication, the standing of radio astronomy in the US community. The UC however does encourage and support a dedicated mentoring program for Jansky Fellows by NRAO staff, and further investigation of strategies to ensure a stronger connection between off-site fellows and NRAO.

4.3 NRAO HelpDesk

We appreciate NRAO’s compilation of statistics on HelpDesk responses, quantifying the average response time as a function of department. We applaud efforts to decrease the response times, and to ensure that all tickets are responded to. However, we are concerned about the average delay of 4.1 days between ticket submission and first NRAO response for tickets in the CASA Data Reduction department (over the last year). We encourage NRAO to continue to work to shorten this delay, and we also suggest a strict response policy: There should be a 100% rate of response to HelpDesk tickets within one week of submission (even if the CASA team will not work on it in the near future, and the response is just a personalized acknowledgement). It may be useful to have the HelpDesk automatically re-send the ticket to the relevant NRAO staff after a few days if the ticket has not yet been responded to, to ensure that no tickets become lost in staff members’ inboxes. The UC also recommends that users are updated on the status of their tickets. We note that prompt HelpDesk responses are particularly important for the CASA Data Reduction department, because the CASA Users Committee has pointed out a need to lower the perceived threshold for submitting HelpDesk tickets; a user who submits a ticket but gets a very slow response may feel alienated by the process and reluctant to submit future tickets.

5 Central Development Laboratory (CDL)

Although most users of NRAO facilities do not have the opportunity to interface with the CDL, the UC nevertheless appreciates the CDL briefing. CDL appears to be successfully recovering from a period of relatively low staffing and morale, and the imminent hiring of a new permanent CDL director is expected to be another positive step.

As in previous years, the UC notes the essential role of the CDL in ALMA maintenance and upgrade projects. The UC encourages NRAO to continue to take steps to ensure that CDL's ALMA technical activities continue unabated, since these efforts provide clear science benefits for ALMA users.

CDL is currently involved in a large number of technical projects whose impact on users is not clear to the UC. Although the reported products of this work are certainly impressive (e.g., patents, licensing agreements, etc) and meritorious, the UC would be better able to comment if the intended outcomes of these activities were made more explicit; i.e., presented in terms of expected improved capabilities available to users. (This comment essentially repeats a recommendation made in last year's (2015) UC report; it appears that the May 2016 CDL presentation seems to have been responding to the *2014* UC report.)

Less-technical issues that continue to resonate with UC members include: seeking more effective engagement with the broader technical community (e.g., academia, Government labs, and non-US institutions) and engagement/recruitment of engineering and technically-minded physics students. The UC was particularly pleased to see that CDL is once again hosting summer REU students. However engagement with the broader community was not a topic addressed in this year's presentation.

6 NRAO Future Initiatives

Given the fact that the operations of two US-based observatories have been moved outside NRAO (the GBT and the VLBA), the UC feels that it is urgent that a clear strategy is developed by NRAO/AUI so that US-based radio astronomy has a prominent future. While the NRAO has been working on further defining the science and technology of the ngVLA, the task of engaging the radio community has proceeded at a slower than desirable pace. The feeling of the UC is that these efforts have so far been sporadic, half-hearted, and largely ineffective. Indeed, despite the language in the Radio Futures and ngVLA presentations to the UC about the importance of involving the RMS community, these words have not been effectively translated into actions. The UC feels that it could repeat here almost verbatim the recommendations about broad and open community involvement from its 2015 report.

The UC is in general terms very supportive of the ngVLA concept. But the process so far has not allowed the community to develop the necessary sense of ownership. This urgently needs to change, for time is running short. For the ngVLA to come out on top of the 2020 Decadal decision, it has to enjoy enthusiastic support within the traditional RMS community, as well as wide-spread support among other communities. With a focus on planet and star formation on the one hand, and questions of galaxy evolution on the other, the ngVLA has the potential to be a widely supported and exciting instrument (although we recommend that NRAO strategically endeavors to keep midscale options also open as secondary alternatives). Moreover, because of its planned wavelength range it also has the potential to build a bridge between cm and mm-wave radio interests. But it is key for NRAO to take action now to improve community engagement.

There is a disconnect between words and actions on NRAO's part that needs attention: the UC heard about how important ngVLA activities are in the next few years, yet only one NRAO staff member has a functional assignment with the ngVLA. We have several recommendations for increasing the visibility and transparency of ngVLA:

- Better publicity and more lead time in announcing meetings. The web site for the August

2016 Radio Futures meeting, important for starting discussion of options for the decadal survey, did not go live until ~ 2 months before the meeting, leaving the community with little chance to prepare (other ngVLA/Futures meetings have suffered from similarly poor advertising).

- Careful hiring of an ngVLA lead scientist. This role must engage the larger community; we suggest that it is crucial that the person chosen for this position can communicate with a broad constituency beyond the RMS base.
- Transparent establishment of an inclusive Scientific Advisory Committee. We suggest an open community call for nominations of interested people, with an expanded structure of focused working groups below it, largely modeled after the NASA Science and Technology Definition Teams (STDT) approach.
- A call to the community for additional ngVLA science drivers (to complement the current science working group memos) that may help define and sharpen other ngVLA science. We agree with the NRAO Director that, in the end, the ngVLA has to be mainly predicated on a few broadly attractive science cases. However, we believe that in order to promote a sense of ownership among the community (particularly the RMS community), it is good to showcase that the ngVLA will be a spectacular instrument for a wide range of observations.
- Public calls for ngVLA Community Representatives, whereby there is an open competition for funding associated with sharpening the technical definition and science case of ngVLA and yielding deliverables. The WFIRST call for Science Investigation teams is an interesting model to follow. The funding can be used for summer salaries, teaching buyouts, travel, or postdoc salaries, with deliverables being calculations, simulations, and software that address the requirements of particular science areas in detail.

A process like this is much more likely to engage the RMS community and promote the much needed sense of ownership: to own the instrument, the community has to be able to shape it. A proper path to do so needs to be laid out as soon as possible.

Clearly, this work requires some funding in the form of FTEs and travel to organize and coordinate activities, as well as to provide some manner of openly competed funding. The resources at NRAO are limited. We understand, however, that parent organizations like AURA are currently putting their own money into studies aiming at the 2020 Decadal competition. Because of the importance of the ngVLA for the long-term health of NRAO, we suggest that AUI should think too about the possibility of directly funding some of these activities.

Finally, we recommend that NRAO produces a visually appealing artist's rendition of the ngVLA, as an image that advocates can proudly show in presentations to the community.

7 Science Communications and Education & Public Outreach

The UC was pleased to see that NRAO continues to be actively engaging in science communications and education and public outreach. At this year's UC meeting, there was no dedicated presentation on the EPO activities, and the UC would appreciate a short update on EPO activities at the next year's UC meeting.

As in the past, the UC is pleased to see a sustained and high profile presence of NRAO in the astronomy community by its activities at the AAS, AAAS, IAU, SuperComputing2015

and similar meetings. We suggest that, as a diversity effort, NRAO look at participating in the SACNAS (Society for the Advancement of Chicanos and Native-americans in Science) or the NSBP (National Society of Black Physicists) conferences.

The UC was pleased to learn that the number of press releases (in particular for the VLA) increased since last year. Some UC members were not aware of the fact that NRAO is open to suggestions for eNews articles, and as a consequence fear that the community at large may also not be aware of this interesting option. Likewise, users may not be aware of the fact that help is provided by NRAO to help with press releases, artist rendering, etc. The UC encourages NRAO to think of ways to make the community aware of these opportunities and the resources provided by NRAO. One option to explore would be to advertise these options in the eNews or at the AAS booths. It may also be helpful to mine AAS abstracts for compelling results with NRAO facilities.

At the next meeting, the UC would appreciate receiving more quantitative feedback on number of press releases and eNews science articles, and what might be a reasonable goal for increasing press coverage in the future.

Appendix A: 2016 Socorro Meeting Participants

Laura Chomiuk (<i>Chair</i>)	Michigan State University
Loren Anderson (<i>co-Chair</i>)	West Virginia University
Alberto Bolatto (ANASAC/ASAC)	University of Maryland
Shami Chatterjee	Cornell University
Steven Ellingson	Virginia Tech
Rachel Friesen	University of Toronto
Trish Henning	University of New Mexico
Shih-Ping Lai (ANASAC)	National Tsing-Hua University
Joseph Lazio	JPL/CIT
Dan Marrone (ANASAC)	University of Arizona
Karin Öberg (ANASAC/ASAC)	Harvard-Smithsonian Center for Astrophysics
Rachel Osten (ANASAC/ASAC)	Space Telescope Science Institute
Dominik Riechers (ANASAC)	Cornell University
Douglas Scott (ANASAC/ASAC)	University of British Columbia
Fabian Walter	Max Planck Institute für Astronomie

Discussion Document: X Proposals

Douglas Scott, Dominik Riechers, Joseph Lazio,
Claire Chandler (*ex officio*), Tim Bastian (*ex officio*)

August 20, 2015

The VLA Sky Survey (VLASS) represented a novel effort to develop a next-generation sky survey with significant community engagement. Through a series of internal reviews, it was focused on two specific components, an All-Sky component (5436 hr) and a Deep component (3391 hr). NRAO chartered a Community Review, the results of which included the recommendation that the Deep component not proceed. However, the Community Review also noted that there might be significant, PI-driven science that could result from proposals of a magnitude comparable to that of the Deep component.

NRAO has an existing process in place for Large proposals,¹ but is neither explicitly encouraging nor set up to deal well with multi-semester projects. Moreover, it is not clear if the community has seriously considered proposals comparable in scale to the proposed VLASS-Deep component. One of the concerns expressed about the VLASS-Deep component during the Community Review was that there may be other exciting science projects, of a similar magnitude, that did not bubble up through the VLASS consultation process, but might be proposed in an open call to PIs. The Community Review did not have an adequate means of assessing how the VLASS-Deep might compare to other potential projects. Additionally, there may be an aspect of self-regulation in which such projects are not proposed because people believe that such proposals are not welcome.

As a further motivation, various NASA (and other) telescopes have enjoyed a significant science return from large science projects (which have gone by a variety of names, including “Legacy,” “Treasury,” and “Visionary”; until a suitable name is agreed upon, we will henceforth refer to these as “X” proposals).

This document is intended to lay out the basic principles under which NRAO could issue a call for X proposals.

- NRAO should issue a regular, but not frequent, call for X projects (e.g., once every 3 years). In anticipation that X projects could consume significant observing time, there should not be so many occurring that other PI-led projects are difficult to complete.
- Projects should have extraordinary scientific merit and community legacy value, and proposals for X projects must specify clearly why the science goals cannot be achieved through the standard SRP/TAC process. Their merit and value should be such that, for scheduling purposes, they would “outrank” all other projects except for A priority Target of Opportunity observations, i.e., successful X projects could not be B priority or lower.
- A possible outcome of the process could be that *no* X projects are selected (i.e., there is not an assumption that a proposal or proposals must be selected).

¹<https://science.nrao.edu/observing/proposal-types/largeproppolicy>

- The page limit for X proposals should be comparable to that for Large proposals (currently 10 pages).
- Proposals should describe a robust data management plan. An insufficient data management plan should be, in and of itself, justification for declining a proposal.
- Proposing teams should be expected to bring a certain level of resources to the project, and these resources must be clearly detailed in the proposal.
- Projects should require at least two semesters for completion but should also be able to be completed in a timely fashion. The objective should be that the science data products can be used by the larger community without significant delay.
- A letter of intent should be used to gauge community interest ahead of the proposal deadline.
- Once accepted, a project should be conducted to completion, subject to a periodic review of progress. The call for proposals should require that a proposal specify a set of milestones by which progress would be assessed.
- Proposals should be reviewed by both the relevant Science Review Panels (SRPs) and a special panel composed of members of the larger astronomical community. The SRPs would be asked to assess the merit of the science for their particular speciality, while the special panel would assure that X proposals are likely to produce results of interest to the broader community.

Topics for discussion

- Minimum time limit? Number of requested hours? Fraction of total observing time in a cycle? in a year? ...?