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NRAO Response to the 2022 Users Committee Report

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CONTENTS

1	Introduction.....	2
2	NRAO Overview	2
3	ALMA Operations.....	2
4	GBO Operations	3
5	VLA/VLBA Operations.....	4
6	Data Management and SRDP	5
7	The VLA Sky Survey (VLASS) Status.....	6
8	Proposal/Observing/Data Reduction Software.....	7
9	ngVLA.....	8
10	GBO Development.....	8
11	ALMA Development	9
12	Proposal Outcomes and Statistics.....	10
13	Time Domain Astronomy	10
14	Community Access to NRAO Computing Resources.....	12
15	JVLA & VLBA -> ngVLA Transition	12

I INTRODUCTION

The following is the National Radio Astronomy Observatory (NRAO) and Green Bank Observatory (GBO) response to the report of the 2022 Users Committee (UC), from the meeting held (via Zoom) on 26-28 July 2022. This report includes responses to the recommendations for NRAO departments and domestic telescope facilities, for NA ALMA, and for the GBO. The full UC report is not repeated here -- only the key recommendations -- specifically, those in bold face in the UC report -- together with the NRAO / GBO responses to each (in blue). NRAO & GBO are very appreciative of the time and effort of UC members in attending the meeting and preparing the report, and for their considered advice. We look forward to discussing the recommendations at future telecons and face-to-face meetings.

2 NRAO OVERVIEW

The Panel recommends NRAO/GBO continue to support and develop pandemic era work models, such as long-term options for remote work available to all suitable positions.

Response: NRAO and GBO are continuing to refine in-person, teleworking and remote working policies to support our staff. Telework and remote working are becoming commonplace.

The Panel recommends continuing to explore ways to make positions more appealing, if not by higher wages, through other benefits.

Response: We continuously monitor and update our Total Compensation approach.

The Panel recommends that NRAO/GBO add an emphasis on improving the diversity of people in tenured/tenure-track and leadership roles.

Response: Noted.

3 ALMA OPERATIONS

The UC recommends NRAO consider continuing to offer NAASC town halls going forward as a way to help keep the community informed of new developments, capabilities, ALMA status, and the roadmap.

Response: This is an excellent suggestion. As the pandemic has subsided, we are able to resume some face-to-face interactions with the community, such as a Special Session on ALMA Development at the upcoming Seattle AAS meeting. We will continue to augment these interactions with virtual town halls that may allow a larger, or different audience to be reached.

The Committee recommends broadening the wavelength coverage of facilities with Joint observing time agreements with ALMA.

Response: We expect that the facilities with which ALMA has joint observing time agreements will grow over the coming few years. The initial facilities – JWST, VLA, and VLT – were logical to implement as the first group, but might be expanded as experience is gained.

(1) As the synthesis imaging school undergoes changes to location and schedule, the UC recommends coordinating with other GBO/NRAO activities to avoid overlap. (2) Efforts to expand the user base are appreciated, and especially in the context of rising ALMA oversubscription rates, the UC recommends tracking the persistence of new PIs (i.e., the rate at which they re-propose).

Response: (1) We appreciate the recommendation and continued support about the summer school. After a proper evaluation of the synthesis imaging summer school held in Charlottesville in 2023, we plan to offset the timings of the single dish and synthesis imaging schools so that prospective students can attend both in any given year. (2) NA ALMA has been working to expand and diversify the user base for a number of years, and agrees with recommendation to track the persistence of new PIs, as well as other metrics of performance in this area.

4 GBO OPERATIONS

For the data center, the UC recommends long-term archiving in a readily exchangeable format (e.g. FITS) as opposed to an internal format. While this will require additional development, the end result will be more accessible to a broader community.

Response: We completely agree that making GBT data available in a FITS format that user software can directly use would greatly benefit the GBO community. This capability is a high-level requirement for the new archive system for GBT data, which will employ the NRAO AAT system. There will be some work to specify the most useful format for pulsar data, and to build a pipeline to convert the raw GBT data into a suitable FITS format. Until this capability is available within the AAT system, users can download the data locally on GBO machines and run sdfits software (or psrfits software) to produce the SDFITS (or PRSFITS) data products.

The Committee recommends that GBO view “overlapping” capabilities at other observatories as opportunities to explore for collaborative or complementary work rather than as “competition” with the GBT.

Response: The director takes the point. Of course, the GBO wants to collaborate with our partner observatories, and already do so. For example, the GBT currently does timing of some pulsars discovered by FAST, and a CHIME antenna is being built on site which will help uncover the positions of FRBs and enable future GBT research. The “competition” statement was made in the context of whether some of the GBT users are now using other telescopes rather than GBT. The messaging will be better in future Users Committee meetings.

Related to this is the recommendation that GBO explore more collaborations with non-radio facilities (e.g. NICER) that could lead to increased demand for GBT time in the future.

Response: The GBT has agreements with several non-radio observatories for joint proposals, including HST and Chandra. GBO agrees that a joint proposal with NICER could be scientifically beneficial. A previous attempt to do so was made a few years ago and was stopped by NICER. GBO and SSR will try again to arrange a joint proposal program with NICER and report back to the committee.

The UC recommends that GBO further expand and advertise the availability of operator-driven observations for the GBT, especially in the context of widening access and reducing barriers to entry. Perhaps in the context of a larger survey that includes other recommendations in this report, as well as other questions they would like to ask) in advance of the upcoming AAS winter meeting.

Response: An increasing fraction of GBT observations are operator-driven. However, although operator-driven programs make sense for large projects with repetitive or routine observations, not all programs are well-suited for this mode. In particular, high-frequency observations above 40 GHz are difficult for the operator to execute due to the time-consuming and challenging pointing/focus and surface correction procedures. Operator-driven runs at 3mm would increase operations costs (specialized training and an additional dedicated observer to carefully monitor the observations).

The GBO will advertise this capability and help to enable this option for users who would prefer operator-driven projects on programs where it makes sense. Currently, for projects that provide operator instructions, all standard observations below 40 GHz could in principle be carried out by the operators.

The Committee recommends seeking more input from the community on the priorities for GBO for the next decade.

Response: We agree. Scientific priorities should be motivated by community needs. We are holding a series of workshops (e.g., the future of K-band science at the GBT in September) and a special AAS session in January to solicit more feedback, and we intend to hold more workshops. The suggestion of an asynchronous forum is good and we will work to implement this in the coming months.

The UC recommends that GBO create an expanded framework for training GBT remote observers that allows for certification of remote observers without the need to physically travel to Green Bank. In addition, the UC recommends that GBO consider providing additional funds for those that do choose to travel to GBO either for the Observer Training Workshops or individual training sessions to cover the cost of travel as well as on-site expenses for those that have a demonstrated need.

Response: We agree with this recommendation and no longer require on-site training for certification. The COVID pandemic required us to expand our remote training procedures, and the opportunities for remote training, via remote attendance at training workshops as well as one-on-one training with staff via zoom, will continue. If the budget allows, we will consider providing support for students/postdocs to be trained and observe on-site with the GBT if other funds cannot be found. Although we can successfully train observers remotely, on-site observing and training provides a much richer experience and better training for our users.

The UC would like to request, in the context of better understanding potential barriers to access to GBO facilities, that a study be undertaken to describe the historical distribution of proposal submissions (and proposal acceptance rates) at the institution level and at a regional, geographic level.

Response: The GBO will work with NRAO to study these issues. We fully support mitigating potential barriers for our users.

5 VLA/VLBA OPERATIONS

The UC strongly recommends continued development of VLBA casa tutorials for a larger variety of science user cases as VLBA/CASA development continues to progress.

Response: NRAO is happy to note the enthusiastic response of the UC to the first VLBA casaguide, and will definitely be developing more tutorials as increased VLBI functionality in CASA is delivered and/or as VLBA staffing resources allow.

The committee commends the work that is going into the VLA calibrator monitoring program and strongly encourages a timely integration into the VLA calibration pipeline.

Response: Work is already ongoing to have the monitoring database recognized and accessible to CASA, which in turn will allow the pipeline team to integrate it into the heuristics of the VLA calibration pipeline.

The committee is enthusiastic about the joint VLA/ALMA proposal opportunity coming up and recommends collecting user data to assess the enthusiasm of the larger user base.

Response: The joint VLA/ALMA proposal opportunity will be offered for the 2023B Call for Proposals (submission deadline Feb 1). Community outreach events including webinars, community day and ALMA Ambassador events will be offered to support users in the preparation of joint proposals, and NRAO will definitely monitor the level of interest in this opportunity through those webinars. Ultimately, the level of community enthusiasm will be evaluated via the proposal submission statistics.

The committee notes the importance of strongly encouraging in-person attendance especially for training new talent in data reduction.

Response: NRAO agrees with this recommendation, and indeed we have found over the last two years that in-person attendance at Synthesis Imaging Workshops and Data Reduction Workshops is critical for the hands-on data reduction aspects to be effective. In future, in-person attendance will be required for all hands-on data reduction components at workshops, to optimize the use of staff time and improve user engagement.

If staffing permits, we recommend running a pilot program for users to get near-real time correlation of their data using the fiber linked data.

Response: The diagnostic use of the real-time capability is already leading to reduced downtime and improved reliability to VLBA users, and it is indeed the long-term goal to allow real-time VLBA correlation for PI observations. Development that will lead to these capabilities is ongoing, but it is not expected to be available for at least another year, at the earliest. Initially the capability will probably be offered under the VLBA Resident Shared Risk Observing program, for frequency bands that do not require reference pointing. The science cases that would potentially benefit from real-time VLBA correlation have not been clearly elucidated, as yet.

6 DATA MANAGEMENT AND SRDP

We encourage NRAO to implement all key functions of the old archive system into the new system, and to canvas a broad cross-section of the community with suggestions for additional features that should be included.

Response: Prior to full decommissioning of the legacy archive system we are working to ensure that all the necessary features are implemented into the new system. As such, a development project on improving the functionality of the new archive system is being undertaken. Furthermore, prior to the UC meeting we implemented a new helpdesk department specifically for archive feedback and we are communicating with the community about our plans via the webpage:

<https://science.nrao.edu/observing/nrao-archive-tool-enhancements>.

We encourage NRAO to do a better job marketing the fact that (1) it maintains a separate archive of

ALMA data and (2) that the AUDI system exists. Based on the fact that many committee members were unaware of the system it is likely that despite efforts made to advertise, information about it has spread slowly throughout the community.

Response: We will continue to advertise AUDI and the new NRAO archive system for accessing these features. We are looking into an AAS splinter session for the upcoming meeting and live demos at the NRAO booth. We note that advertisement for the new NRAO archive, AUDI, and other SRDP features have been made in multiple venues over the years including, but not limited to, Facebook, numerous NRAO eNews articles, AAS, ALMA Ambassadors, and general word of mouth.

A few features of the new archive's user interface could be improved. The default when first loading up the page is to search by words in the proposal title, not by coordinates, and it takes a click to get the coordinate search function to pop up. Search by source name does not appear to be linked to SIMBAD lookup.

Response: We thank the UC for the suggestions and will take these under advisement as the archive improvement project is conducted. We note that there is already a resolver function in the new archive that searches SIMBAD and NED. However, the icon to use the resolver is not linked to the source name box, which may be the source of confusion; as we look into interface improvements we will try to make the use of this feature clearer.

7 THE VLA SKY SURVEY (VLASS) STATUS

The primary reasons for the slow roll-out of data products appear to be resource limitations. NRAO should consider increasing support for staff and computation devoted to VLASS.

Response: Significant new resources for VLASS will be hard to obtain in the current budgetary environment, however, we can reprioritize effort from other SRDP projects to focus more fully on VLASS. We will also take steps to reduce resource needs where possible, for example, by automating parts of the quality assurance process and using less compute-intensive imaging algorithms in the parts of the sky where their use allows the survey requirements to be met.

The VLASS is one of several ongoing or planned time-domain radio surveys, and these other surveys are encountering similar data analysis challenges. The committee recommends increasing communication with these ongoing projects to explore potential synergies (algorithms, computational methods, or even shared resources).

Response: There are already several informal links to other projects. NRAO staff scientists Josh Marvil and Anna Kapinska are project scientists for the ASKAP EMU survey, and both have been involved in VLASS. The VLASS Survey Science Group contains several members of other teams using ASKAP (Larry Rudnick, Bryan Gaensler), DSA-2000 (Gregg Hallinan, Casey Law) and MeerKAT (Russ Taylor). VLASS was also represented at last year's SKA Pathfinder Radio Continuum Survey (SPARCS) meeting. We will continue to communicate with our colleagues via these channels and any new ones that arise.

It may be possible to find out-of-the-box solutions for fast analysis of new data: for example, UV subtraction to identify transient candidates without computationally-costly imaging, or the use of "citizen science" review for some low-level QA tasks that currently are done by observatory staff.

Response: With respect to the UV subtraction, this is potentially an interesting technique, though distinguishing true transients from variable sources would be challenging and it would not be possible to implement a pipeline for this before the start of Epoch 3. Something that we are pursuing related to the citizen science idea is to train undergraduate students to be able to perform QA on VLASS images as part-time or summer job.

The committee specifically recommends that NRAO set an explicit goal to finalize all VLASS data products prior to the scheduled start of ngVLA operations in 2029 (and ideally sooner than that), and to investigate means of making the Epoch 3 data products available on timescales of 1 week or less after observations if possible.

Response: The current timeline for VLASS product production contains many uncertainties in both directions. VLASS processing involves the use of novel algorithms and implementations, and these may turn out to either be more or less computing intensive than we expect. The extent to which QA can be automated is also unclear. Thus, setting a firm goal for completion is risky unless we are prepared to cut scope, potentially degrading the science possible with the survey products.

Quick Look processing for Epoch 3 cannot be sped up significantly at this point as the calibration pipeline takes a week to run, and often needs to be run multiple times to correctly deal with the effects of interference. Imaging then takes a further few days. We will, however, seek to improve operational efficiency by allocating more computing resources to Quick Look processing and automating parts of the QA process, which should result in an improvement to the mean delivery time.

8 PROPOSAL/OBSERVING/DATA REDUCTION SOFTWARE

The committee strongly recommends that procedures and requirements surrounding joint proposals with other facilities should be communicated broadly and at the earliest possible date to the user community. This includes a thorough description of the logistical aspects of the process (non-standard page limits, what kind of technical justifications will be required for the secondary facility, etc.), how much observing time will be available in what modes and under what constraints, and how the review process will be conducted (including scientific, technical, and TAC review levels).

Response: We agree with the UC that advertising these capabilities are absolutely essential to the success of the joint proposal program. There are many avenues to convey this information to the scientific community which include the relevant proposal documentation, community outreach events including community webinars, NRAO eNews among many others. In addition, we will continue to partner with our colleagues at the other facilities to ensure the NRAO requirements are clearly listed in their communication plans. We will utilize as many resources as possible to convey all the necessary information to the scientific community to ensure they have a productive experience when submitting joint proposals.

The committee recommends that the software development teams think critically about continuing to develop CASA and other software under the RedHat Enterprise (RHEL) infrastructure. Non-enterprise RedHat OS ceased development in 2007, and a substantial portion of NRAO users operate using Ubuntu or CentOS, often with no option to use RHEL. Recognizing the complexity of this problem, the committee strongly recommends that NRAO immediately begin the process of implementing a wholesale shift to a more widely used operating system, and in the short-term, we recommend that NRAO explore stop-gap measures to ensure compatibility with these systems. Related, the committee wishes to emphasize the critical need to continue to provide timely support for the evolving Apple (Mac) hardware and software

landscape.

Response: We recognize the importance of supporting the operating systems that the user community has access to. We will investigate options for addressing this on both short and longer time scales.

The committee recommends that GBO make every effort to move away from IDL and GBTIDL for data processing. The committee recognizes that GBO provides access to computing resources that somewhat mitigates licensing barriers, and commends GBO for that service. However, the community has moved on from IDL and this legacy code is increasingly presenting barriers to entry for new users. The committee recommends GBO investigate in the short-term whether GBTIDL can be easily ported to GDL (GNU Data Language), an Open-Source IDL alternative. The committee also recommends that GBO immediately begin the transition to Python for all user-facing needs. The committee suggests GBO explore options such as the Google Summer of Code for securing extra personnel for this implementation burden.

Response: The GBO will have our software team investigate whether GBTIDL can be usefully ported to GDL, but initial tests are discouraging. GBO agrees that moving to python is valuable. Our software team will also look into providing more functionality in GBT data processing with python. The gbtpipeline, which can handle a subset of GBT data, is already written in python and so is the gbtgridder. These tools provide a python foundation for processing GBT data that we could build upon. GBT data processing is an area we will seek out collaborations with NRAO and interested university partners. For example, we are in discussions with a university partner to write some of the necessary python code. We will also investigate other possibilities, such as summer interns and the Google Summer of Code, as suggested.

The committee recommends that, broadly speaking across all development efforts for user-facing tools (including the ALMA Observing Tool, Telescope Time Allocation Tools, Archival Access, etc.) that undo functionality be incorporated as core functionality. The committee is concerned that substantial community time and resources have been lost due to the lack of these features in even relatively new tools (e.g. the ability to restore a deleted science goal in the ALMA OT).

Response: We will investigate the feasibility of introducing undo capabilities to current and future tools.

9 NGVLA

We recommend that the ngVLA team considers mitigation strategies if funding is delayed or schedule slips occur.

Response: We agree with this recommendation, and this has been a key element in the project planning to date. As part of the ngVLA design and development effort, we keep an active risk register that is used to do exactly what is being requested; it keeps track of specific activities that can potentially affect the overall progress of the project, and identifies various mitigation strategies in the case that there are funding delays, schedule slips, supply chain issues, etc.

10 GBO DEVELOPMENT

The UC suggests further increasing the communication plan through the use of asynchronous forums.

Response: See our previous response above. At the meeting, it was suggested that we follow the ngVLA example in building community consensus. We agree that we could learn from our NRAO partners about their experiences with the ngVLA, but the committee must understand that GBO has fewer resources to devote to this task.

We recommend recruiting a panel member with radar expertise be invited to join the committee.

Response: GBO supports this suggestion.

II ALMA DEVELOPMENT

The Committee recommends NRAO should continue and expand a purposeful public information campaign to familiarize the community with the technical details and (more importantly) the scientific potential of the WSU (building on the illuminating, concrete examples presented to the Committee during the meeting), as part of the preparatory work for establishing community input associated with an ALMAx10 project office.

Response: We agree that this is very important. The ALMA Integrated Science Team has prepared a White Paper (WP) describing in detail the key science benefits of the WSU with concrete examples. The WSU WP is in the final stages of review by the ALMA Science Advisory Committee, and we expect to publish it within the next several weeks (Astro-ph and ALMA memo). Additionally, we will be having a Special Session at the AAS in Seattle in order to present the WSU and science case to the community. Additionally, as recently [announced](#), we will be holding a pan-ALMA conference in December 2023 in Chile (hybrid format) to celebrate the first 10-years of ALMA operations and to look towards the future of the WSU and beyond. Wider advertisement for this meeting is on the near horizon.

We recommend NRAO/ALMA solicits community feedback on current and future ALMA commissioning efforts – especially before the transition from commissioning new and existing modes to establishing the WSU – to better understand how the potentially evolving scientific priorities of the community can optimize the constraints imposed by the WSU commissioning phase. One specific example could be prioritizing control software testing and development to facilitate the ALMA subarray capabilities.

Response: The ALMA Regional Science Advisory Committees and ALMA Advisory Committee are biannually asked to comment and help prioritize ALMA commissioning efforts, this has always been the case and will continue during the transition and WSU itself. However, we do expect that there will be somewhat of a ramp down of overall efforts towards “extending ALMA’s capabilities” during the transition period because many of the most expert staff across the observatory (hardware, software, and science) will be focused on delivering the WSU. While hope to minimize the impact of the WSU deployment and commissioning on Science Operations, and hope at minimum to avoid any lengthy period of shutdown, there certainly will be impacts. We expect to develop a roll-out plan for the WSU and its user impacts over the next year so that we can begin socializing it with the community, and be assured that we will be in close consultation with the ASAC and Regional SACs to optimize the plan.

The UC recommends that NRAO solicits community input on science use cases that can bolster support for pushing toward the “stretch” goals in the WSU development plans (reaching toward 4x the IF bandwidth at a 100 m/s channel spacing).

Response: This is a great suggestion, and we will plan to use future community events such as the AAS Special Session and “ALMA at 10 years, Past, Present, and Future” meeting to solicit community input.

12 PROPOSAL OUTCOMES AND STATISTICS

We recommend ALMA consider using a high-level review committee to ensure that proposals in niche areas are being treated fairly.

Response: This recommendation will be considered.

The Committee recommends that Dual Anonymous Peer Review should be implemented prior to the new TAA tools due to the anticipated delay in roll out of ~2 years. This has been prioritized for multiple facilities and NRAO should consider the significance this may hold for proposal outcome as well as the visibility and recognition to the user community.

Response: Dual anonymous is definitely one of the highest priority items for development within the new TTA tools. As was presented during the meeting, the possibility of adding this feature in the existing tools would cause undue risk to the existing suite of tools while also delaying the development of the new TTA tools. As such, this feature will not be offered in the existing suite of tools and NRAO staff will continue to train the reviewers of NRAO proposals about the risks of biases. User testing of the new TTA tools (including DAPR) will begin in the near future.

We strongly encourage tracking additional metrics beyond gender and continuing to present these data to the community. This should extend beyond the primary investigator and include details of the entire proposal team.

Response: We have started to collect the new demographic information related to proposal submission and this aspect will definitely be one that we keep track of going forward.

The Committee recommends that monitoring the success of multi-cycle proposals with quantitative metrics and potentially collecting details of TAC-to-TAC reviews would provide useful insight for this opportunity.

Response: We will start collecting this information and investigate if there are any trends.

Continue monitoring the Distributed Peer Review process and consider providing some oversight to ensure programmatic balance.

Response: Noted.

13 TIME DOMAIN ASTRONOMY

NRAO should provide a wide-reaching forum for general community input on time-domain science. An official survey sent by e-mail to prospective users soliciting input on areas of potential improvement would likely be the best mechanism for this, but NRAO may also want to solicit input on the issue at future town-hall meetings or via panels (particularly with regards to questions of prioritization, scheduling, and proposal-handling which affect the entire user base).

Response: NRAO has already started participating in several community led discussions on time-domain science and we are organizing our own conference in September 2022 which highlights the science cases for the VLASS where time-domain astronomy is a major contributor. Going forward, we will investigate additional ways to engage the scientific community and to ensure that our tools and processes are ready in the upcoming era of Rubin and other large, all-sky surveys.

Open a special DDT submission mode for very small amounts of time in standard observing modes that does not require a full review (e.g., a basic web-form with a one or two paragraph science justification that could be immediately approved by the director), (ii) Ensure that triggered proposals are accepted at a scheduling priority appropriate to the timescales relevant for the proposed science. This could be achieved, for instance, by devoting a specific block of A-rank time each semester exclusively for triggered projects. (iii) Remind SRP/TAC members of the DDT burden when reviewing triggered proposals: rejecting a proposal at this stage may cause the proposers to rely on the DDT mechanism instead, increasing the burden on NRAO. (iv) Make zero proprietary period the default for DDT proposals and require users to justify a non-zero proprietary time, but given point (5) below, this should be considered in order to avoid a race to publication.

Response: We will investigate this option in coordination with our telescope time allocation team and data management services to determine the feasibility.

In the short term, the observatory should consider solutions to “pre-approve” SBs, to automate SB checking/approval, and/or to support out-of-hours SB approval in certain cases.

Response: In some instances, this is already in place for the VLA, and is enabled for any program requesting fast response (24-48 hours). The VLBA is only semi-dynamically scheduled, and there is no mechanism for users to insert observations into the VLBA observing queue, although VLBA Operations will try to respond appropriately to fast triggers submitted during working hours. It would take considerable software development to change the way the VLBA is scheduled, and a clear demand for it, before we would be able to do this on the VLBA. For a more general SB that is not assigned to a PI or observing program and run when a new event occurs will take considerable coordination with the scientific community. We are planning to start having these discussions as we anticipate a larger number of time-critical observations as a result of the new all-sky surveys.

The observatory should continue to investigate mechanisms to enable rapid-response interrupt science (which displaces an existing observation to observe an extremely urgent target of opportunity in a mostly or fully automated way) on NRAO facilities.

Response: We already have this mechanism in place for the VLA and VLBA, and have been advertising it as a Resident Shared Risk Observing capability for several years. No proposals have been submitted requesting this capability. An automated interrupt option may not be available for the existing observing systems but can be included in the design and development for ngVLA operations.

The observatory could be more flexible about the (common) scenario when multiple teams with similar triggered proposals wish to observe the same target. These cases are likely to be complex, and it would be better to consult the relevant users directly and allow them to propose a resolution before instituting a one-size-fits-all policy. Making all data available to all triggering teams as a universal policy has (in some previous cases) triggered unfriendly competition and led to duplication of data-reduction effort.

Response: We will consider this recommendation from the UC going forward.

The committee was intrigued by the possibility of adapting the 20m telescope at Green Bank as a flexible time-domain facility for fast response and/or monitoring of rapidly-evolving targets. These applications are likely to be limited in practice, particularly in L-band which is heavily confusion-limited, but may find novel use cases. The committee recommends (i) soliciting general user feedback on potential uses of this facility if it were made available for rapidly-triggered observations, and (ii) considering the potential impacts for existing users (such as teaching programs) if the primary receiver was changed from L-band to X-band.

Response: We will consider this recommendation. GBO has tasked a data analyst to investigate the scientific usefulness of the 20-m (or even the 140-ft) for these studies and the impact it might have on the educational program. We will report back these findings to the committee.

14 COMMUNITY ACCESS TO NRAO COMPUTING RESOURCES

Recommendation: NRAO should consider a landing page with a simplified, high-level organization of services provided to the community (e.g., <https://irsa.ipac.caltech.edu/frontpage/>).

Response: Thank you for this useful suggestion. We will work on implementing such a page.

15 JVLA & VLBA -> NGVLA TRANSITION

The UC strongly recommends that there should be multiple opportunities for the TAG to share its ongoing work with the larger community, and for the TAG to collect feedback from the larger community.

Response: We support this recommendation, which is in the spirit of how we have set up the VLA/VLBA to ngVLA transition development process to allow for a high level of community participation and transparency. We also note that some members of the UC have been included as members of the TAG. Consequently, we expect (and will work with) these overlapping members to present and discuss with the larger TAG how to best share their ongoing work with the larger community, as well as identify means to collect feedback. NRAO will work with the TAG to help support and facilitate their decision on how to best engage the larger community.

We recommend that the draft transition plan should be posted for review for 90 days, and that community reactions should be broadly solicited, widely shared, and possibly incorporated into the final plan.

Response: Similar to the previous response, we also support that this recommendation be presented to the larger TAG so that they can discuss how to best implement the solicitation of feedback from the broader community before submitting their final recommendation to NRAO.

The Users Committee also suggests that the TAG should consider and rank alternate transition paths against the possibility that funding is delayed or that schedule is delayed.

Response: We also support that this recommendation be presented to the larger TAG by NRAO and the overlapping members in the UC for discussion so that they can consider this point when developing their transition options.