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## Response to the 2018 CASA Users Committee Report

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## OVERVIEW

This document is the official response from the Common Astronomy Software Applications (CASA) group to the recommendations of the 2018 CASA Users Committee (CUC). The recommendations of the CASA Users Committee along with the full context of Committee discussion are contained in the Annual Report dated 31 December 2018.

We wish to thank the members of the CASA Users committee for their time and effort. The constructive recommendations in the Annual Report are beneficial for CASA strategic goals and decision making. As we communicate in the current document, the CASA team agrees with the recommendations by the CUC in most instances. We are limited in some cases by available resources but generally feel that we can provide an acceptable response or mitigation to every CUC request. The CASA team will strive to satisfy the commitments in this response over the next year.

Below we discuss the recommendations that the CUC has explicitly called out in their Annual Report. There is a broader discussion and context in the text of the Annual Report that we have attempted to incorporate in to our responses. We have maintained the section numbering from the CUC annual report to simplify cross-referencing between the documents. In this document we have extracted and summarized the recommendations of the users committee from their report (in black) and provided the response of the CASA project (in blue).

## 2018 CUC RECOMMENDATIONS AND RESPONSES

### 6.1 User Servicing

1. *We encourage NRAO to see if data on CASA issues as reported in the User Survey correlates with telemetry data that will become available in the coming year.*

[Response] We are looking forward to the new insights into CASA usage that the telemetry data will bring. We will define several telemetry report types that can be compared to the type of information collected in the user survey.

2. *CUC Chair and Bjorn should schedule an early Spring 2019 meeting to discuss developments in the User Survey and other User related issues.*

[Response] We agree to have the CASA User Liaison Bjorn Emonts coordinate with the CUC Chair to schedule a mid-cycle meeting of CUC participants on user related issues.

3. *Some committee members seemed to feel that some issues were handled via email, and thus outside the Helpdesk. We hope that NRAO could determine the best way to send most if not all requests through the Helpdesk.*

[Response] While the Helpdesk continues to serve as the official method of CASA support, we recognize that there are some users with closer working relationships and more frequent contact with the CASA team. In addition, there have been occasions

where we asked for feedback from the community directly to the CASA team, e.g. in the CASA Newsletter. We provide an email address that is monitored by the CASA User Liaison, CASA Project Scientist, and CASA Lead to support these instances (casa-feedback@nrao.edu). To date, the email traffic is very small and would not skew helpdesk statistics. If this changes in the future then we will re-evaluate the public email avenue.

4. *The User Survey should continue, and efforts should be made to maintain and increase the number of responses*

[Response] The survey participation this year was very good with over 100 responses. However, this was driven by an advertisement campaign and does not represent natural participation. Results of this survey are about to be published in a memo. Rather than re-advertising the same survey, we plan migrate to a new survey, possibly one that pops up when a user downloads CASA from the website. This survey will focus on feedback that cannot be otherwise captured by telemetry or website analytics.

## 6.2 User Outreach

1. *The user survey was very successful and provided very good insights. We recommend to keep it running. The question about 'reliability' should be handled with care.*

[Response] We expect to produce a reliability metric/score this year by dividing the number of crash reports by the telemetry recording of successful executions. As this will be the first time doing such a thing, there will be no historical data for comparison. We will work with the CUC on appropriate takeaways and messaging of this data.

2. *The Newsletter is currently the main channel of communication to users, and well maintained. For accessibility the layout and format could be optimized.*

[Response] We will keep our newsletter contents to a manageable size and try to encourage readership through concise and relevant articles. We do inherit the layout from the NRAO newsletter which limits our options for formatting.

3. *We would welcome an update on the Newsletter readership statistics.*

[Response] At the moment, we are limited to the use of Google Analytics for obtaining statistics. We will investigate the accuracy of the duration measurement in our statistics and determine if there is a better way to capture user engagement.

4. *There is room for additional communication channels besides the Helpdesk and Newsletter. We encourage NRAO to investigate the needs from both developers and users to exchange information, and identify solutions.*

[Response] In addition to the helpdesk, newsletter, and email address, NRAO hosts regular data reduction workshops to introduce and reinforce CASA usage to the community.

These workshops are attended and supported by the CASA staff. The online forum does not receive enough traffic to be viable and will be closed this year in favor of limited participation in broader astronomy communities.

5. *We suggest to have a set of CASA outreach materials (slides, posters, flyers) to promote CASA at meetings.*

[Response] In the past year we have promoted CASA with flyers and posters at the AAS meetings in Jan 2018 and 2019, as well as the 2018 ADASS conference. We can provide updated versions of these flyers/posters as well as CASA logos to promote CASA at other meetings. We will make CASA outreach materials available for download on the CASA website.

### 6.3 Documentation

1. *We applaud the efforts to fully populate the online CASAdocs, and would like to see it extended to the rest of CASA*

[Response] We now have complete coverage of all CASA tasks in CASAdocs. We are evaluating what subset of CASA tools to fully document for general usage as we only wish to advertise functionality that is thoroughly and continuously tested. We believe there are a small number of tools in active use by the community but the majority are only used under the covers by CASA tasks. We will move to more thoroughly document the subset of popular tools once they are identified.

2. *We would like to see recommendations on the usage of tasks (e.g. tclean vs. clean) and capabilities (e.g. parallelization)*

[Response] Historically we have been very conservative in deprecating functionality, even after it has been superseded by new functions, as there may always be some outlier use case that benefits from the old method. This ends up sowing confusion and fragmentation in the user community. Going forward, we will strive to be more aggressive in removing outdated tasks with the understanding that older versions of CASA will always be available should a deprecated task need to be resurrected. We will also be more careful to mark and differentiate the sections of CASA not yet officially endorsed but available for experimentation.

3. *We recommend the inclusion of verification tests and more detailed explanations of tasks both for experienced users and to improve perceptions.*

[Response] Tremendous effort has been put in to CASAdocs task descriptions and the scientific verification of their accuracy. We are now in the process of systematically developing new automated verification test scripts for each CASA task based on CASAdocs and elaborating where necessary in the documentation to be fully testable. These will be very clearly affiliated on a one to one basis with each task. We plan to release these tests in batches as they are developed starting with CASA 6. The new modularity of

CASA 6 allows users to choose whether or not to download and install CASA task tests and associated data (which can be quite large). The number of available tests will grow over the next few releases until all tasks are covered.

## 6.4 Performance, Computing and Reliability

1. *The Crash Reporter and telemetry included in CASA 5.4 are excellent tools to obtain feedback on CASA performance and reliability. Since there is a wealth of applications for this data, we recommend to focus the efforts on some well defined goals.*

[Response] We are currently working to define a set of telemetry reports that may be run at regular intervals to summarize user activity over time. The initial set of reports can be made available mid-year to the CUC for feedback. This will be an iterative process to see what strategic trends and decision making can be gleaned from real world usage. In a follow on stage, we may add a blacklist of known pipeline processing and/or internal users to differentiate telescope operations from general usage.

2. *The performance of CARTA was very impressive, and the plan to make this a client-server application will help to keep this light-weight.*
3. *There is a split in the CASA user base between pipelines and single users. Different performance metrics are needed for pipelines and single users, and long term strategies need to cater to both user bases.*

[Response] The performance benchmarking to date has admittedly been skewed towards production cluster computing environments. We agree that a more sensible approach is to characterize the performance and expected gains beginning with laptop class hardware, moving through workstations and culminating with cluster environments. We are also working to better tradeoff and support both single user performance and multiple concurrent user performance.

4. *The performance metrics shown at the meeting are impressive. The committee recommends making these metrics available to users, as they can be especially helpful for pipeline development and maintenance.*

[Response] The road to robust and fully endorsed parallel CASA has been a long one, but as we are finally seeing the maturation of tclean in parallel mode, we will be making a larger push to advertise and recommend it to the user base. We expect to feature parallel CASA and the collected performance benchmarks in an upcoming newsletter. Longer term, a standard set of regular performance metrics will be collected and reported to the community for each release.

5. *If possible, the development of a CASAmark (analogous to the olds AIPSmrk) would be helpful to determine the necessary computing power for typical CASA use cases.*

[Response] We plan to support the automated collection of performance metrics from an assortment of datasets and configurations. This information will be published with each CASA release. Combined with the aforementioned performance gains from laptops/workstations/cluster environments, it should be possible for users to make an informed decision on what configuration is best suited to their needs.

## 6.5 CARTA

1. *The demonstrated v0.9 of CARTA was impressive in its capabilities*
2. *The CUC would like to have a list of the features that will be in the December release, and a more complete timeline of feature implementation in order to more fully comment in our report*

[Response] The CARTA online documentation page contains a complete accounting of included functionality and a high level roadmap of when major new features will be added. NRAO can provide the CUC with a more detailed internal planning document.

3. *Could the v1.0 release be demonstrated at the January 2019 AAS meeting (at the NRAO area of the convention hall)?*

[Response] Unfortunately, the January 2019 AAS meeting was too close to the CARTA v.1.0 release to effectively coordinate a demo. The restrictions on the NRAO booth were rather tight making it difficult to show a CARTA demo. Instead, we advertised CASA and CARTA with flyers at the NRAO booth. We will consider demonstrating a next version of CARTA at other meetings if the opportunity presents itself.

## 6.6 Pipelines & SRDP

1. *The relationship between SRDP and CASA needs to be better defined in a long run.*

[Response] This is a growth area with new software development processes coming online at the division level to handle SRDP workflow. We anticipate a learning curve with the first few development waves. However, most impact for the next year is focused on other software teams rather than CASA and pipeline. SRDP is now a stakeholder of CASA and provides requirements and priorities accordingly.

2. *The progress of the pipeline team besides parallelization is impressive and the excellent performance of the team in the past is continued under the new leadership.*
3. *Improvement toward less intervention in both interferometric and single-dish cases is anticipated in the near future.*
4. *Priorities for ALMA Cycle 7 Pipeline are properly set overall, especially in reducing human intervention in QA time. However, higher priority should be given to handling*

*of strong telluric absorption lines in calibration for ALMA, as it's critical in the submillimeter regime for ALMA spectral observations.*

[Response] Priorities on ALMA pipeline development are set by the ALMA project. The ALMA project has done a development study on the issue of telluric calibration: [https://science.nrao.edu/facilities/alma/alma-develop-old-022217/FDM\\_Tsys\\_Development\\_Final\\_Report.pdf](https://science.nrao.edu/facilities/alma/alma-develop-old-022217/FDM_Tsys_Development_Final_Report.pdf) In CASA 5.6 (the casa pipeline version for Cycle-7) changes will be made to the way bandpass solutions are created for calibrators that are affected by strong telluric lines, so that science targets suffer less from residual telluric features. Additional improvements on removing telluric features would require changes to the way the system temperature is observed by ALMA. This is not trivial and happens outside of CASA. As per advice of the ALMA CASA Subsystem Scientist, this request should be passed on to the ALMA North American Science Advisory Committee (ANASAC) for prioritization in the ALMA project. The CASA User Liaison can assist in this process.

- 5. It would be instructive to provide some brief introduction and/or explanation of the pipeline scripts executed together with the data delivered.*

[Response] The pipeline team is now ramping up efforts to incorporate pipeline documentation alongside CASA documentation on the CASAdocs site. This should help considerably with end user knowledge and usage of pipeline in CASA.

- 6. The pipeline webpage should be made more known and public to general CASA users.*

[Response] The updated pipeline documentation will form a section in CASAdocs, so that it will be easily visible to general CASA users alongside standard CASA documentation. This effort is now underway.

## **6.7 Imaging Developments**

- 1. We encourage the ARDG to advertise their work at conferences/summer schools as this would be beneficial for both increasing the CASA user base and increasing collaboration on algorithm development.*

[Response] The ARDG is a new group and the focus of the past year was on setting up the group. Going forward the group is starting the ARDG Seminar series at NRAO to share its activities with interested scientists. The ARDG staff has also begun participating in conferences to talk about its work with the general radio astronomy community and plans to continue to give talks at the VLA Data Analysis Workshops. ARDG will also discuss with the organizers about an explicit talk at the NRAO's Synthesis Imaging Workshop, which is an important forum to widely disperse information about new algorithms for the benefit of the community in general.

- 2. A tutorial of how to base algorithmic developments on CASA (e.g. via a Jupyter notebook on the CASA guides webpage) using the new modularized CASA 6.0 would be valuable and help encourage international effort.*



[Response] We plan on providing at least one or more updated CASAguides in a Jupyter notebook as part of the CASA 6 release. We will explore how/when to release further guidance on joint single dish / interferometer imaging and in what form to do so.

## 6.8 Interaction with the CUC

1. *Having access to an agenda or list of topics discussed by Internal Stakeholders would help keep the CUC informed during the year so that we can be better informed at the fall CUC meeting.*

[Response] As representative of the CASA Users and Users Committee, the User Liaison will keep the CUC informed about the agenda or topics of the Internal Stakeholders committee meetings. The CUC and User Liaison can also discuss whether there is a better format for this.

2. *The CUC recommends improving communication between the committee and the CASA User Liaison in between the CUC meetings.*

[Response] We agree that improved communication between the committee and the CASA User Liaison will be beneficial. The User Liaison will provide updates to the CUC between meetings if there is important user-facing information that the Users Committee should be aware of.

## 6.9 External Contributions

1. *With the VLBA coming back into NRAO, and the ongoing development of SRDP, the committee recommends investing in making CASA fully VLBI-capable and securing resources to maintain this capability for the longer term.*

[Response] We have formed a coordination team for VLBI development spearheaded by a CASA scientist. This team meets on a regular basis to ensure VLBI work is planned, developed, tested and included in each CASA release according to standard CASA practices. VLBA has been added as a CASA stakeholder and broader VLBI concerns may also feed in to overall SRDP goals and requirements.

2. *Collaboration with third parties is an excellent way to implement functionality for very specific applications in CASA. The process to include new functionality is somewhat obscure, and the committee recommends a closer feedback loop with external parties to ensure their continued commitment, and successful delivery of CASA products.*

[Response] Using Single Dish development and now the VLBI coordination team as a model, generally it seems that a CASA team member serving as a point of contact to outside development groups is the best way to facilitate successful integration

of new functionality. We do not always know who is using CASA in further development, but in instances where collaborative potential is known, we will strive to keep a POC from our team in touch to facilitate integration.

### **6.10 CASA Users Committee Membership and Organization**

The CASA team agrees with the CUC that it is in everyone's best interest to have the Users Committee as complete as possible during the yearly face-to-face meeting and Spring telecon. As pointed out, the work load on the individual committee members increases substantially when there are fewer actively involved CUC members, and a broader available expertise during the CUC meetings will be beneficial for CASA's strategic goals and decision making. The CASA team will make an overview of when committee members are scheduled to rotate off and discuss this with the CUC chair before the Spring telecon. For 2019, we will attempt to appoint new members by April.

As part of the selection procedure, we will continue to take into consideration the expertise of new members regarding high-priority topics within CASA, and also keep a balanced geographical distribution. The appointment of a Chilean member has proven problematic in recent years. Chile is currently forming an ALMA Regional Center (ARC), which is expected to be approved in April. As soon as that happens, NRAO management will discuss with the Chilean ARC management an appointment to the CASA Users Committee.