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Response to ANASAC Report from May 2016 F2F Meeting

PREPARED BY	ORGANIZATION	DATE
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1 PREFACE

The following is the report of the ANASAC F2F Meeting of 17 May 2016 (Socorro, NM). ANASAC comments and recommendations are highlighted in yellow and and NRAO preliminary responses are inserted in red italic font. These responses will be incorporated into NRAO's overall response to the 2016 Users Committee report.

2 INTRODUCTION

The ANASAC met on May 17, 2016 in Socorro, NM, for the third time as a standing subcommittee of the NRAO Users Committee. The resulting ANASAC report consists of three parts: an executive summary, detailed comments, concerns and questions regarding specific charges, and an itemized action list with specific requests from the ANASAC

3 MEMBERS IN ATTENDANCE

Alberto Bolatto, Laura Chomiuk, Shih-Ping Lai, Dan Marrone, Karin Öberg (Chair), Rachel Osten, Dominik Riechers, Douglas Scott

4 EXECUTIVE SUMMARY

ALMA continues to produce amazing science results and to be in high demand. North American PIs have led some of highest-impact efforts, but are lagging behind their European colleagues in terms of numbers of publications, which is a concern. [addressed below]

During the last year ALMA officially transitioned from Early science into PI science mode, which is a commendable achievement. It is, however, concerning that this transition has not come with with implementation of an observatory-wide data-delivery target timeline, or the launch of a duplication checker or an efficient spectral scan mode.

This is indeed a concern. As such, the NAASC is working with the JAO and our international partners to provide a realistic goal for data delivery from the time the data are taken to delivery. Internally, the NAASC is working toward a timeline of 30 days for delivery of those data taken in standard observing modes. in Cycle 4 (45 days for non-standard modes). We will make every effort to hit that goal in Cycle 4 and are prepared to provide mitigation to PIs if we cannot achieve that goal through standard processing procedures.

A duplication checker was provided by the ALMA Observatory Scientist before the start of Cycle 4 and was made available off the ALMA Science portal. The requirements for the duplication checker to be implemented within the ALMA Archive and/or the ALMA Observing Tool are being developed for implementation towards the end of Cycle 5 and for the start of Cycle 6.

The JAO is fully aware of the ANASAC's requirement for improved spectral scans and representatives from the NAASC advocated strongly at the Cycle 5 ObsMode meeting for the development and testing of this mode. This observing mode is currently the second highest priority for development in Cycle 5 and the NAASC strongly encourages the ANASAC to help in the commissioning and testing of this new mode by taking advantage of our long and short term visitor programs including sabbatical visits to the NAASC.

The delayed launch of these capabilities is cause for frustration in the community. The ANASAC is also concerned that there seems to be inadequate testing and/or resources allocated to fixing bugs before the launch of new software, most recently the OT and the demographics survey. These tools are the main interaction point between the larger community and the observatory. Their functionality needs to be a priority.

Cycle 3 was indeed the first Cycle offered in the standard yearly observing cycle for ALMA. The computing and software teams were still in the process of defining the timescales for testing and implementation of bug fixes and new capabilities, respectively. In addition, Cycles 3 and 4 showed the roll-out of many new capabilities of ALMA including enhanced polarization, VLBI, Solar, Large Programs, ACA stand-alone and many new observing efficiency improvements that are not transparent to the users. Now that we have 2 cycles of experience, and an integrated software and testing schedule between science and computing, the time for testing is better defined with contingency and we anticipate that the software will be more robust in future cycles.

The NA ALMA development program contains a healthy mix of different types of projects. As Band 2 production commences, ANASAC is concerned that too much of the development budget may go into this single project. [addressed below] ANASAC fully endorses plans to obtain external and/or partner executive funding for some of Band 2 to ensure a continued diverse development program. ANASAC further recommends that community led EOC activities are made eligible to apply for development study money. [addressed below]

With the successes of the NA funded Solar and VLBI development programs, there is a very successful precedent that is now set that clearly illustrates the success of development program funds being used for EOC activities. The upcoming ALMA development workshops will continue to highlight

these successes and we encourage the ANASAC to continue to engage the community into applying for these funds in order to continue to expand on the capabilities of ALMA.

The ANASAC is impressed with the ongoing workshop and outreach program, and is excited about the 'Train-the-trainer' proposal. ANASAC would like to emphasize its appreciation of the NRAO-led summer-schools and strongly recommends that NRAO continues to offer an introductory interferometry school on Socorro-summer-school off-years. The ANASAC also repeats its wholehearted endorsement of the SOS program, and recommends that it is expanded if financially possible.

We agree that the Socorro summer school is the gold standard for the training of the next generation of black-belt radio astronomers. As the NAASC plans to roll-out the ALMA Ambassador program during Cycle 4 where we will train the community on our software tools and the run our training sessions, we are prepared to offer a similar service to the community to run a radio astronomy school in the off years of the Synthesis Imaging Summer School. The success of ALMA community day events (such as NRAO Live!) show that the universities have the infrastructure and logistical capabilities to run such large scale training events. NAASC staff will work with the university community and participate in a community led schools that can be held at campuses across the country. With the ANASAC taking the lead in organizing these events, we will be happy to provide instructors and trainers to participate.

Finally the ANASAC is very concerned about the outcome of the recent gender-bias survey, and look forward to see an updated report following completion of the Cycle 4 review process.

NRAO shares the ANASAC's concern on this matter, and has initiated an analysis of the just-completed Cycle 4 review process.

5 INTEGRATION OF ANASAC INTO THE UC

This is the third year in which the ANASAC has been a subcommittee of the NRAO Users Committee. The current meeting organization is a one-day meeting of the ANASAC focusing on ALMA, followed by a 2-day UC meeting. Compared to previous years the ANASAC meeting had a higher attendance of interested UC members. 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, however. While ANASAC has some specific charges that are separate from those handled by a UC, it is clear that there is also substantial overlap in operating two committees. There is concern that the existing separation between the two meetings leave no room for user-type questions for ALMA (it was not on the schedule for this year's meeting). We therefore request that NRAO consider to fully integrate the ANASAC and NRAO UC meetings.

NRAO thanks the ANASAC for this recommendation and will carefully consider its implementation.

6 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 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.

As our response above indicates, we are concerned with the timeline to delivery. Currently, we are delivering data within 72 days of the final data collected for the MOUS for a given Scheduling Block of a project. This is down substantially from earlier cycles where the delivery timescales were well over 3 months (and in some cases 6 months in Cycle 0 and 1). In select cases, the timescale from data collection to delivery is < 2 weeks (e.g. DDT and Time Constrained Proposals). The NAASC is preparing to take the necessary steps to get data into the hands of the PI as soon as possible (with the goal of less than 30 days). In addition, we have a reinvigorated our f2f visitor support program and have hosted 2-4 visitors a month for the last several months to work on ALMA data and publications.

ANASAC notes that the number of archival papers appear to be growing, though 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 be useful to know whether the NA ALMA papers are making use of the NRAO's page charge support.

We have provided this data in files at the bottom of the ANASAC f2f agenda page. The NRAO library keeps a listing of all ALMA publications, including citation data. In addition, we keep ADS private libraries with ALMA papers listed by category: SV, Cycle 0, Cycle 1, Cycle 2, Cycle 3 and most-cited. We will be glad to share these libraries with ANASAC.

NA ALMA papers are, indeed, making use of the NRAO page charge support. In the library roster of NRAO ALMA papers, 20 of 64 have been approved for 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). 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 SOS program.

NRAO is, likewise, enthusiastic about the SOS program and will make every effort to continue to support and expand it, as possible.

7 ANASAC CHARGE #2

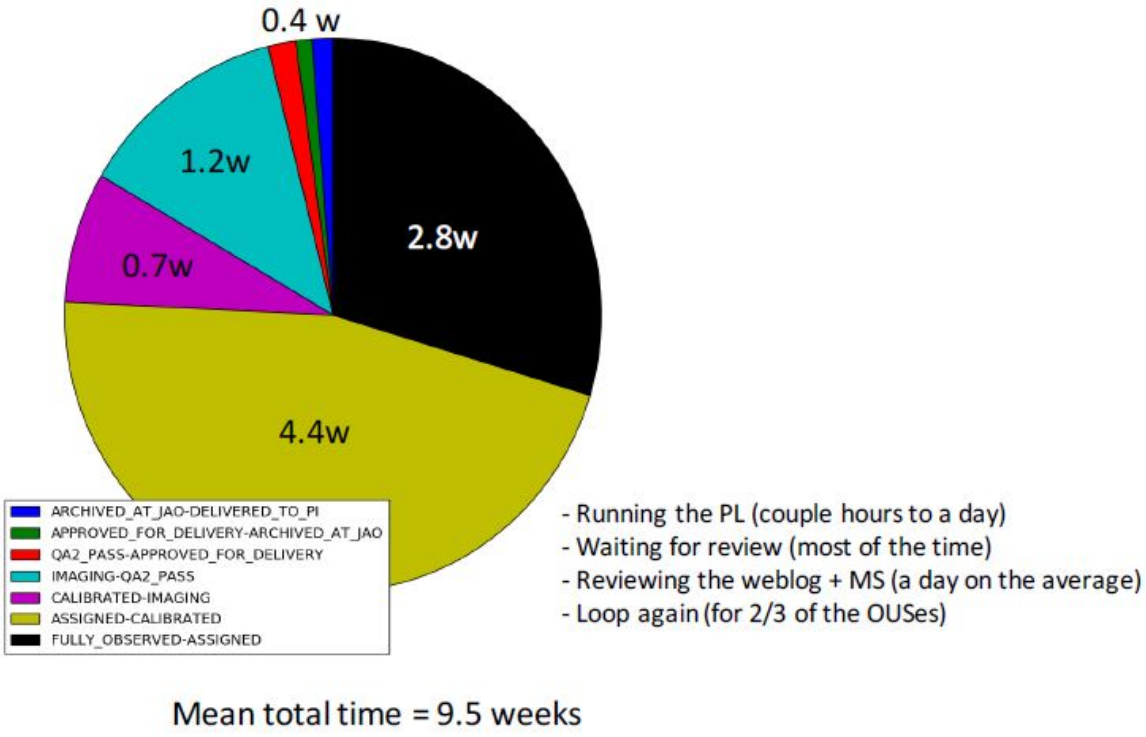
Assess the status of Cycle 1, 2 & 3 observations and progress made towards Cycle 4. For Cycle 3, are the data meeting user expectations? Are the data being released to the PIs in a timely fashion?

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 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 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 be 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 ARCs? How many days does the data set spend at the ARC before being delivered to the PI?

Below is a breakdown of the time taken before a dataset is delivered to the PI. As can be seen from the plot below, > 75% of the time is taken before a calibrated dataset is assigned to an ARC staff member for imaging and delivery. When the calibrated dataset arrives at the ARC, it takes about 1-2 weeks for that dataset to be imaged and delivered. The remaining 7 weeks is spent at the JAO running through the pipeline, being assigned for review and then a month for the web-log review. We are currently investigating these timescales with the JAO and evaluating the processes in order to speed up the data delivery to the PI. Again, the NAASC is prepared to take mitigating action to speed up the delivery process including taking control of the data calibration process for all NA programs.



The ANASAC applauds and endorses the initiative of the 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.

Recommendation noted.

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 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.

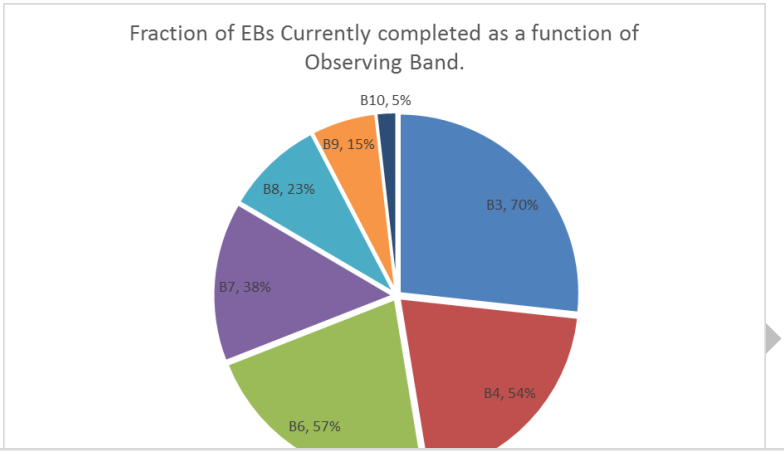
The ANASAC did not see any data on projected completion fractions of Cycle 3 A and B rated proposals and cannot thus comment on how well the observatory is doing compared to previous cycles. ANASAC requests that such a projection is made available in time for the next telecon. A breakdown by configuration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

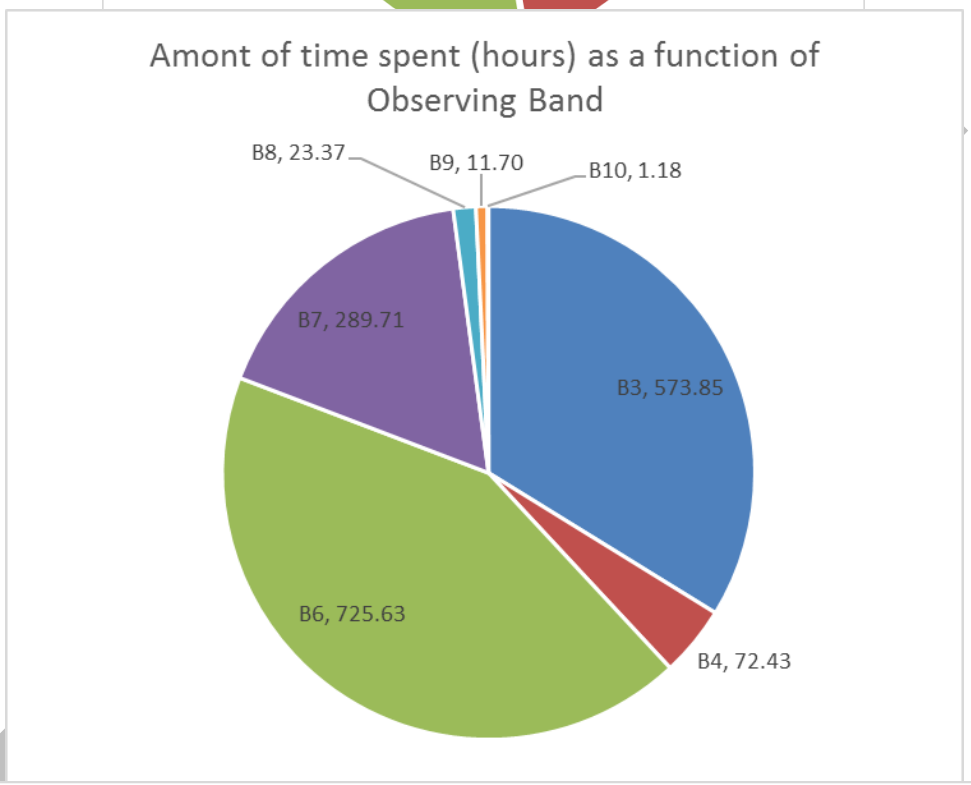
The follow estimate was done the week of 10 July and is generated for all 2015.1 observing programs (give or take a few SBs here and there). And as we are mainly concerned with the 12m array, it does not include the 7m or TP arrays at this time.

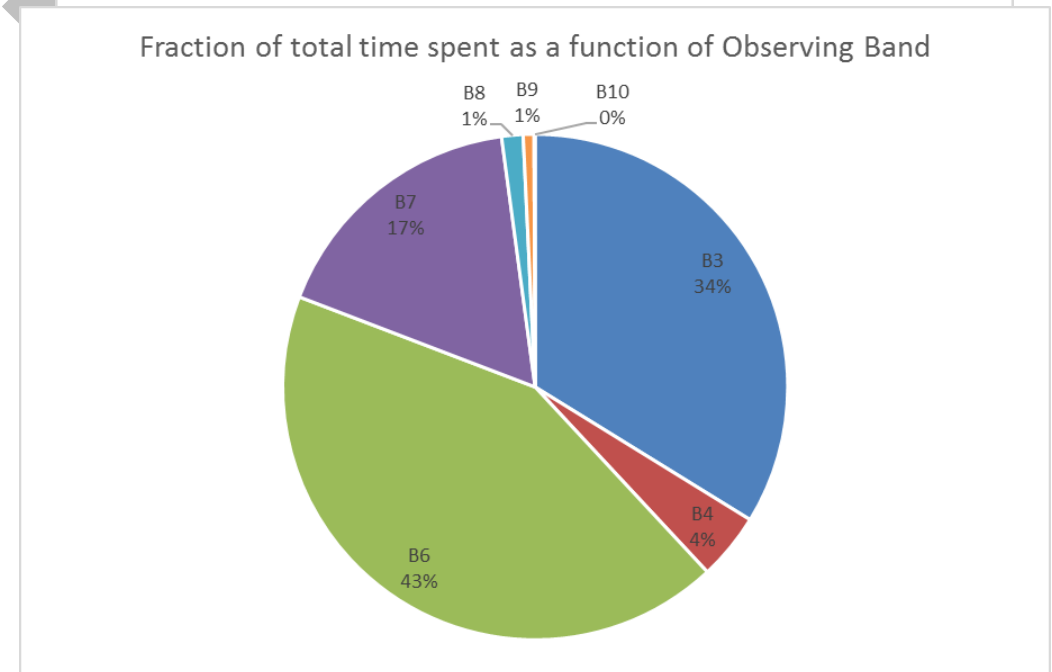
Over the past 8 months, here is the breakdown per observing band:

Band	Ebs Requested	Total time (QA0 pass)	Total Ebs run	Fraction of completed Ebs vs Requested
B3	880	573.85	619.4	70%
B4	156	72.43	85	54%
B6	1354	725.63	771.5	57%
B7	686	289.71	260.4	38%
B8	94	23.37	22	23%
B9	65	11.70	10	15%
B10	21	1.18	1	5%
Total	**3256**	**1697.87**	**1769.3**	

The total time is 1697.87 hours in 8 months (note, this is for A+B+C programs). For Just the A+B programs, you get 1109 hours. This averages out to 212 hours/month (138.6 hours/month for A+B only). Assuming 24 hours observing 4 days a week and 8 hours observing 3 days a week, we should be closer to => 480 hours per month times 65% observing efficiency gives 312 hours per month for PI science. (For 11 months, this gives about 3432 observing hours – 2100 hours was requested for Cycle 3. So we are definitely doing okay.) See the plots below as an illustration of how we are doing as a function of observing band:


Fraction of EBs Currently completed as a function of Observing Band.
B10, 5%
B9, 15%
B8, 23%
B3, 70%
B7, 38%
B4, 54%
B6, 57%


Amont of time spent (hours) as a function of Observing Band
B8, 23.37
B9, 11.70
B10, 1.18
B7, 289.71
B3, 573.85
B6, 725.63
B4, 72.43


Fraction of total time spent as a function of Observing Band
B8 1%
B9 1%
B10 0%
B7 17%
B3 34%
B4 4%
B6 43%

*Now, taking the time completed and estimating how much time is needed to execute the remaining SBs (this is a bit unrealistic because we are not taking into account array configurations we are not coming back to, the accumulation of more filler programs, etc…), assuming that there is 936 hours of PI science time available for the remaining 3 months (480 hours/month * 3 months * 65% efficiency), then you get the following table for the probability of completion per observing band (assuming the fractional amount of time spent in each observing band since the beginning of Cycle 3 from the figure above)*

Band	Remaining Ebs	Total time needed to execute (hours)	Remaining time in Cycle 3 (per band)	Probability of completion:
B3	260.6	241.4	318.24	132%
B4	71	60.5	37.44	62%
B6	582.5	547.9	402.48	73%
B7	425.6	473.5	159.12	34%
B8	72	76.5	9.36	12%
B9	55	64.4	9.36	15%
B10	20	23.6	0.468	2%

This also illustrates that for the end of Cycle 3, we are anticipated to execute about 2045 hours of PI science (assuming the remaining 936 hours is dedicated only to A and B ranked proposals – which it is not based on the current scheduling of C-ranked projects for lack of anything else to do at certain LST ranges.)

So overall, we are in trouble to have a completion fraction over 80% at this time on the 12m. Also, the fraction of time on high frequency projects will be in the <20% range.

We have also done this per executive and through 8 months so far, NA has completed about 51% of the EBs; EU – 45% and EA – 50% (again this includes filler) where we should all be about 70% as of right now more than 8 months into the observing Cycle.

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 hear 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. *[see below]* 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.

Updates on the status of the calibration and imaging pipeline can be provided at upcoming telecons.

8 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 ('ALMA2030') 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.

The instructions to reviewers are posted on the ALMA Development Call for Proposals Web page; reviewers are specifically requested to note relevance to the goals of ALMA2030.

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

For Cycle 5, the Projects and Studies will be clearly separated (Project deadline, 30 Jan 2017; Studies Deadline, 1 May 2017). Please see the plans and status reports as given at the AAS ALMA Development Splinter session, at the bottom of the ALMA Development Web page.

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.

ALMA is currently taking steps to ensure that when a software project is delivered, it is smoothly integrated and that additional resources are devoted to the support of the new software during the initial stages of operations.

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.

We plan to nourish a mix of projects at each Call, as we have been doing, with a substantial fraction of funding supporting community development.

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 EOC activities and recommends that the opportunity to apply for development study funds for this purpose is widely advertized in the community.

We strongly agree that community involvement in EOC activities would be very helpful on many grounds and will work to implement this, through development funds or other mechanisms.

9 ANASAC STANDING CHARGES

9.1 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.

9.2 Charge #2.

To lead community outreach through leadership of workshops. -- Plans for next NAASC-sponsored workshop -- Plans for 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.

See response above.

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.

All of the training material is already provided both as lecture material available off the web and in the "Synthesis Imaging in Radio Astronomy" text which is currently under revision based on the new material presented over the course of the past 2 schools and with ALMA coming into Early Science operations.

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 are still in the process of developing the program so there is no update at this time.

9.3 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 assess whether ALMA is widening the millimeter community, as well as the origins of uncovered gender biases in the proposal selection process.

While not readily apparent, the user demographic information is collected through the ALMA Science Portal at: https://asa.alma.cl/UserRegistration/secure/updateAccount.jsp?arc=na after login and the "Demographics" tab. To submit the preferences, the user must first go back to the "Account Info" tab and hit "Update". While not apparent, the interface does work and collects the requested information. We are currently working with the developers to improve the interface.

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.

We are in the process of generating a new user survey at the end of Cycle 3 and will include these recommendations into the new survey. In addition to the general user surveys done by ALMA. The NAASC does ask every f2f visitor to provide feedback on their visit. We will collate this information and provide this information to the ANASAC.

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.

We note these recommendations.