



ALMA BOARD

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Membership of the ALMA Scientific Advisory Committee

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[Responses from ALMA Board Draft March 19, 2013](#)

General Comment from the Board: The Board very much appreciates the work and thought that have gone into this report, and thanks the ASAC for their continuous work for ALMA. We also thank Kohno-san for all his work in leading the ASAC in this past year, and we look forward to working with Rob Ivison and the rest of ASAC members in the next year.

Charge 1: (cycle 0 outcomes)

- Although some of the highest priority programs, especially for some including Band 9 observations, were unfinished, most of the highest priority programs have been successfully completed, fulfilling practical requirements such as APRC priorities under the regional balancing.
- The ASAC feels that the quality of the delivered data looks excellent. These are producing groundbreaking science outcomes covering a wide range of science areas, including astro-chemistry, the Solar system, star and planet formation, the life cycle of stars, nearby galaxies, active galactic nuclei, and the high redshift Universe.

- The ASAC congratulates JAO, ARCs, and all those who involved with these high level achievements despite of the difficulties of the early science operation during its major construction phase.

Charge 1: The Board agrees with the ASAC response and would also like to add our congratulations to the JAO and all the ARC scientists for bringing so many programs to successful completion in Cycle 0.

Charge 2: (cycle 1 process and feedback to cycle 2)

- The consensus is that the majority of the community is satisfied with the overall proposal process. The JAO have identified some of the more serious concerns raised by the user community and plan appropriate changes for Cycle 2 (notably, with the approach to technical assessment).
- The two primary limitations in designing observing programs in Cycle 1 were the number of allowed targets and spectral tunings. These will be addressed in Cycle 2. We applaud the JAO for removing these constraints to address the needs of the community.
- For Cycle 2, the JAO indicates that the technical assessments on all non-triaged proposals will occur before the panel review stage, which will allow the panels to fold in the technical comments. The ASAC wholeheartedly supports this decision. We recommend that clear and precise guidelines be prepared by the JAO to be followed by the technical assessors.
- Because projects are only accepted on “best efforts” basis, successful Cycle 0 proposers who have not yet been delivered the data will submit a Cycle 1 proposal to ensure the data are obtained. This is a drawback to the proposer, the panels, and the observatory. The ASAC therefore recommends that beginning in Cycle 2 calls should not be considered as “independent”.

Charge 2 : The Board agrees with the ASAC’s response, but adds a cautionary note regarding the last recommendation because it believes it may be premature to rule out “independence” for the next cycle until duplication is better defined. In practice, proposers may not have the data before they have to submit for the next cycle. The Board is giving ASAC a new charge to define when two or more observations would be considered duplications of each other.

Charge 3: (scientific priorities for Cycles 2 and 3)

- For Cycle 2 capabilities, the ASAC suggests:
 - Implementation of longer baselines is the highest priority, although the risk and effort levels are evaluated to high due to difficulties such as software testing loads and permanent power supply issues.

- Offering on-axis polarization, two new bands (Band 4 and 8), and spectral surveys will be expected with relatively low or medium risks and efforts. The ASAC endorses the implementation of these capabilities as proposed.
- Remaining fundamentally new observing modes for Cycle 3 will be solar observations, single dish continuum observations, and pulsar observations. Several extensions of existing modes also remain, such as pushing to longer baselines and more polarization capabilities. Implementation of Band 10 receivers is also expected to give the highest frequency in ALMA.
- The ASAC made recommendation on scientific prioritization of some planned Cycle 3 capabilities, based on the specific questions given by the CSV scientist (see text for details).

[Charge 3: The Board agrees with the priorities as listed by ASAC, subject to the overriding priority of completing construction.](#)

Charge 4: (large proposals, legacy projects, and time-series observations)

- The first “Full ALMA” Call is likely to be the first point at which Large proposals should be requested. JAO should monitor how the proposal size distribution develops.
- With regard to Legacy proposals at this developing stage, the ASAC recommends a user-driven process, where tensioning of proposals is maintained.
- We recommend that the following statement be added to the Call for Cycle 2:
 - Proposals of any size which demonstrate that their requested data offer clear, lasting value to a wide community, and are of the highest scientific caliber, may offer to waive their proprietary period. In such circumstances, the APRC will be encouraged to give preference to these proposals over competing proposals of similar scientific quality that do not waive the proprietary period.
 - The time accounting for this type of proposal can be shared across regions, in a manner that needs to be outlined succinctly and unambiguously in the proposal.
 - We stress that scientific quality remains the primary criterion for the ranking of proposals.
- On the time-series observations: since strong demand has yet to become apparent for long-term monitoring campaigns, we recommend that there is currently insufficient justification for adding complexity to the proposal process.

[Charge 4: The Board agrees with the ASAC that an appropriate time to start large](#)

programs would be in the first full science call for proposals, and that cycle 2 is still too early. For time series proposals, the Board recommends that the array reproducibility must first be tested before scientifically reliable time series observations can be carried out. The Board is drafting a charge to the ASAC to comment on a set of observations that the JAO will propose to make on a regular basis to test calibration stability and reproducibility of the array. The Board assesses that it is also too early to start legacy programs, that further discussion is needed on the best way to implement such programs, and awaits a proposal from the incoming ALMA director. The Board is of the unanimous opinion that the APRC should rank proposals on scientific value only, with no consideration as to whether or not a proposer offers to waive the data proprietary period, at least until a plan for legacy programs is defined.

Charge 5: (public information on projects)

- The ASAC urges that abstracts of all accepted proposals be made publicly available as soon as the proposal reviews are completed. We do not think that users will object to this. The ASAC is unanimous to recommend that at a minimum, all abstracts should be made available as soon as their first SB is observed and it passes QA0. Waiting over a year more, until QA2 is complete and the proprietary period ends, is too late.
- We recommend that the JAO define a policy for what constitutes a duplicate or overlapping observation.
- We recommend that users be provided with the tools necessary to flag duplications. A user should be able to run an automated tool to identify duplications before submitting a proposal.
- The ASAC is pleased to see that an archive query tool is now available, as it is an essential element in maximizing use of ALMA data. The tool should of course provide any metadata that are useful in identifying overlapping observations.

Charge 5 : The Board agrees with ASAC that abstract information be released when the proposals are approved. This is for the purpose of getting information out to the community as soon as possible, in order to improve on the science proposal process in the following cycle. This process to release the abstracts would be announced with Cycle 2 and implemented with Cycle 2 and all succeeding cycles. The Board also agrees with ASAC to ask the JAO to define duplications in proposals. The ASAC offered to help JAO with this effort and the Board welcomes this offer and is giving them a charge to this effect.

Charge 6: (standing charge, long-term development plan)

- Most of the members of the ASAC enjoyed the opportunity to participate in the ALMA Development Meeting organized at NAOJ on the day prior to the ASAC f2f. The ASAC members were pleased to see the range of projects under development, and were impressed by their visit to the receiver cartridge production and testing labs.

- We are extremely concerned about the increasing fuel costs, which will clearly have a long-term impact on ALMA science. Activity of the Sustainable Energy Working Group was hampered due to the lack of the primary technical expert on key practical aspects. We strongly encourage the JAO to find an individual who is willing and able to fill this role as soon as possible. In addition, we suggest that the JAO may wish to consider broadening this working group to contain 2-3 additional members with the goals of 1) bringing additional expertise to bear on the relevant issues, 2) helping to distribute the work load, and 3) increasing the cross section of community involvement and external ties.
- Based on the description of “Principles for ALMA Development Program” document, the ASAC would like to suggest a set of simple, broad scientific principles to use as guidance in the evaluation of ALMA Development proposals to be done at the regional level. These principles could be incorporated to the calls for development proposals and used as a general scientific framework for the process.
- We recommend that the selection of development projects and studies be pursued primarily considering: 1) their scientific merit and promise to advance astronomy, 2) their impact on the ease of use of ALMA observations, productivity, and the broadening of the ALMA community, and 3) an analysis that weighs the previous points against the full cost of implementing the development into the project.
- We emphasize the importance of an ambitious, coordinated vision for ALMA long-term technology development with a forward-looking R&D program to carry the instrument well into the 2020s.
- The ASAC is concerned about the proper allocation of continuous commissioning resources at the observatory. The first step is to accurately evaluate the additional effort in earliest possible stages of the development selection process, to avoid surprises at later stages. It is also important to secure involvement of the JAO at the PDR/CDR stage of the development.

Charge 6 : The Board agrees that ASAC should continue to assess development studies with regards to their scientific merits. Their inputs to the Board are much appreciated. A charge to assess the scientific value of current development studies will be made to the ASAC.

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The ASAC met in Tokyo at NAOJ-Mitaka on February 15th and 16th of 2013, following the ALMA development plan meeting on February 14th in Tokyo. The ASAC would like to thank the NAOJ staff for coordinating these meetings. We also express our gratitude to the number of staff who presented material, provided information, and attended the face-to-face meetings. The receiver laboratory tour in the Advanced Technology Center of NAOJ on February 15th was also very impressive to know the current achievement of ALMA receiver development and production.

The ALMA Board gave the ASAC five temporal charges. In addition, the ASAC discussed on the long-term development plan, i.e., one of the standing charges, in reaction to the ALMA development plan meeting.

The ASAC proposes to hold its next face-to-face meeting (Oct. 2013) in Europe (i.e., a place preferable for the new ASAC chair from ESAC), based on the policy of holding alternate face-to-face meetings in Chile and at the regional science centers. The committee members agreed to keep the current frequency of the telecons and face-to-face meetings, given the fact that the observatory is still rapidly evolving. We will revisit this issue in the near future, because less frequent meetings will be naturally expected in a steady phase of the project.

The ASAC wishes to express our deepest gratitude to Director Thijs de Graauw and Deputy Director Lewis Ball for their exceptional service and commitment to the ALMA project. We wish them good luck and success in their future endeavors.

Charge 1: Evaluate the outcomes of Cycle 0. This should include an evaluation of the high-profile science results as well as the fidelity of the implementation of Cycle 0 observing to the APRC priorities, the user experience, consistent with the best efforts approach to early science. Coordinate with the JAO and the regional SACs to collect information.

ALMA Cycle 0 observations started on 30 September 2011, and completed at the beginning of 2013. Although some of the highest priority programs, especially for some including Band 9 observations, were unfinished, most of the highest priority programs have been successfully completed, fulfilling practical requirements such as APRC priorities under the regional balancing. The data have been delivered or will be delivered soon after the completion of QA2. The ASAC congratulates JAO, ARCs, and all those who involved with these high level achievements despite of the difficulties of the early science operation during its major construction phase.

The evaluation of Cycle 0 outcomes was made based on the feedbacks from the users and members of ASAC/regional SACs in all executives. The ASAC feels that the quality of the delivered data looks excellent. These are producing groundbreaking science outcomes. The first year of ALMA science, held at Puerto Varas, Chile, on December 2012, was one of the very representative opportunities to view such Cycle 0 outcomes. The conference covered all area of ALMA Cycle 0 science, with emphasis on new results for astrochemistry, the Solar system, star and planet formation, the life cycle of stars, nearby galaxies, active galactic nuclei, and the high redshift Universe. Throughout the conference, the transformational power of ALMA data, even with the limited capabilities available so far during SV and Cycle 0, were emphasized many times. The enormous progress in sensitivity and image quality provided by ALMA, even at these early stages, was clearly demonstrated. These views were also shared in the Hakone conference on the New Trends in Radio Astronomy in the ALMA era, held on December 2012. We thank Dr. Akihiko Hirota for his nice presentation on his cycle 0 outcomes.

The ASAC feels that issues on the long overhead before the delivery of the data to PIs look improved. Readiness of pipe-lines will be a remaining item to be watched closely.

Charge 2: Evaluate the Cycle 1 process through the proposal review and feedback to proposers. Is the feedback from the Cycle 1 review process to the PIs satisfactory or should different information be provided to proposers? This should be considered in consultation with the JAO, the ARC Managers, and the Chair of the APRC for Cycle 1, Francoise Combes.

The Cycle 1 proposal process was evaluated based on comments from the Chair of the ARPC, the ALMA User Survey, and feedback from the community through the regional SACs as well as ASAC members who participated in the PRP.

The consensus is that the majority of the community is satisfied with the overall proposal process. The JAO have identified some of the more serious concerns raised by the user community and plan appropriate changes for Cycle 2 (notably, with the approach to technical assessment).

The ALMA User Survey provides the broadest assessment of the user satisfaction (365 users across all regions). Note that the Survey was conducted before the results from Cycle 1 were announced, and therefore does not include feedback on the proposal evaluation. The Survey indicates that between 70 and 83% of the Users give an above-average (good or better) rating for the Cycle 1 Call for Proposals, the proposal preparation process, the ALMA community days leading up to Cycle 1, and the proposal submission process. As importantly, the survey indicates these percentages are all improvements over Cycle 0.

Feedback from the community as well as the User Survey indicates that the two primary limitations in designing observing programs in Cycle 1 were the number of allowed targets and spectral tunings. These limitations will be addressed in Cycle 2, when the constraints on the number of science goals will be removed, and a mode for spectral surveys will be offered that allows investigators to specify a range of tunings. We applaud the JAO for making these changes to address the needs of the community.

APRC Chair Francoise Combes reported that the Cycle 1 proposal review went smoothly. The ASAC members who served on the panel review concur, but do recommend that the JAO prepare and present a list of duplicate sources to the panel chairs in advance of the panel review. This will enable the panel chairs to better coordinate their discussions of similar proposals, which is best done if they are assigned to the same panel.

Complaints were received about the feedback comments for the panel reviews, although the number of such comments is down from Cycle 0. The importance of

constructive feedback should again be emphasized to the review panels, but the ASAC also recognizes that some complaints are perhaps inevitable and not unique to the ALMA proposal process.

A significant number of proposals that were highly ranked scientifically were later rejected for technical reasons. Some users complained that the technical rejection was based on a misunderstanding of the proposal. For Cycle 2, the JAO indicates that the technical assessments on all non-triaged proposals will occur before the panel review stage, which will allow the panels to fold in the technical comments. The ASAC wholeheartedly supports this decision. We note that consistency among technical reviewers was a concern in Cycle 0, and we encourage the JAO to take the necessary steps to assure the highest level of consistency for Cycle 2. We recommend that clear and precise guidelines be prepared by the JAO to be followed by the technical assessors.

Finally, the JAO noted that some approved Cycle 1 proposals are essentially resubmitted highly ranked projects from Cycle 0. We note that this is a problem not easily avoided in the current approach, which treats each call as independent (this is also the current plan for Cycle 2). Because projects are only accepted on “best efforts” basis, successful Cycle 0 proposers who have not yet been delivered the data will submit a Cycle 1 proposal to ensure the data are obtained. This is a drawback to the proposer (who has to invest effort and roll the dice again), to the panels (who have to discuss a project that has already been highly ranked and are explicitly disallowed any “memory” from past cycles), and to the productivity of the observatory (due to essentially duplicate observations). The ASAC discussed several possible approaches to solving this issue (for example, having proposers voluntarily disclose that a proposal is a repeat with a tick-box, or have them list a proposal history), but each of them has potential problems. In the end, the ASAC concludes that the final solution to this problem involves starting to consider calls as “not independent” and carrying highly ranked projects from one cycle to the next. This process could start as early as Cycle 2, if information is included in the call for proposals. Consequently, the ASAC recommends that beginning in Cycle 2 calls should not be considered as “independent” so that panels are not preempted from discussing Cycle 2 proposals in the context of Cycle 1 projects.

In this context, we also recommend the JAO develop clear definitions on what

ALMA will consider “duplicate observations,” in preparation for full operations. We make further recommendations in our response to Charge 5 below.

Charge 3: Comment on the scientific priorities relating to the Cycle 2 capabilities and advise on the scientific priorities for Cycle 3.

The ASAC appreciates the effort and progress on commissioning and science verification (CSV) activities on planned Cycle 2 and 3 capabilities led by the CSV scientist, although it has been suffered from successive difficulties such as software testing loads, weather conditions, and permanent power supply issues. We want to stress that it is also important to continue the efforts to resolve known issues, to build the future capabilities of the cycles 2 and 3 on a solid foundation.

Cycle 2

Cycle 2 capability decisions will be made after two upcoming critical deadlines; all capability decisions require demonstration of its basic capabilities by the end of May 2013.

On the specific prioritization of the capabilities, the ASAC believes that implementation of longer baselines as proposed by JAO is the highest priority, although the risks and efforts are evaluated to high. Software issues seem to impose significant restrictions on implementation of new capabilities for future cycles including longer baselines. “Evaporating human resource” on CSV activities is another concern, because the current CSV plan implies that most of the remaining CSV staff will have left the project by September 2013.

Offering on-axis polarization, two new bands (Band 4 and 8), and spectral surveys will be expected with relatively low or medium risks and efforts. The ASAC endorses the implementation of these capabilities as proposed.

Regarding the prioritization on the total power modes, the ASAC feels that the continuum total power should be prioritized over a single dish mode for Band 9 spectral lines.

Cycle 3

Potential Cycle 3 capabilities will be extensively studied from July 2013, and final decision points on Cycle 3 offerings will be presented by the middle of 2014. Remaining fundamentally new observing modes will be solar observations, single dish continuum observations, and pulsar observations. Several extensions of existing modes also remain, such as pushing to longer baselines and more polarization capabilities. Implementation of Band 10 receivers is also expected to give the highest frequency in ALMA.

Based on the specific questions on scientific prioritization of some of planned capabilities given by the CSV scientist, the ASAC suggests the followings:

- The ASAC give a strongest support to the prioritization of the commissioning of the longer baselines up to 10 km (for Band 3 to 8) and 5 km (for Band 9 to 10). This mixture approach naturally satisfies the growing expectations from science communities and can be a feasible step toward the implementation of the longest baselines in the full ALMA, although it must be highly dependent on the progress of the permanent power supply and antenna pad acceptance, as well as the improvement of the phase correction method including fast switching and WVR correction.
- A consensus on the nutator approach for the total power measurements of continuum has also been obtained.
- The ASAC also strongly supports the idea to offer a request for SV programs from the broader solar community, which is coherent with the past ASAC recommendations emphasizing the importance of transparency to the community.
- On the polarization capabilities, the ASAC agrees that wide field polarimetry is the highest, followed by spectral line capabilities.

In addition, the ASAC endorses the subarray implementation because it must be beneficial to add and test new capabilities, such as adding new antennas and studying the longer baselines.

Charge 4: Advise the Board on scientific issues relating on the timing of the implementation of Large proposals (defined to be projects requiring more than 100 hours) and nature of possible Legacy (no proprietary time) proposals and possible time-series proposals that would extend across cycle boundaries. This should be done in consultation with the JAO and the chair of the APRC. Some specific questions follow. If there are to be Legacy (no proprietary time) projects, should the time accounting not be assigned to any region? Should such proposals be allowed in Cycle 2? How much time (or what fraction of the array time) should be possible for such proposals?

The timing of Large, Legacy and multi-cycle proposals was discussed in the context of post-meeting discussion with the APRC Chair, existing documentation outlining Board policy (AEDM 2011-078-O-rev4 'Principles of ALMA Proposal Review Process') and previous ASAC-related work ('The ALMA Proposal Review Process' by Richer, Testi, Mardones, Yamamoto & Carpenter, 2007).

Large Proposals

The tremendous increase in observational capability provided by ALMA has meant that even the most ambitious proposals have rarely exceeded a request of 20hr for Cycles 0 and 1. Small, high-impact proposals are still capable of over-subscribing the facility. Also, the fraction of the community with experience of real ALMA data is still small. For these reasons, there was a broad consensus that the first "Full ALMA" Call is likely to be the first point at which Large proposals should be requested. JAO should monitor how the proposal size distribution develops.

Legacy Proposals

With regard to Legacy proposals, it was felt that rigorous tensioning of proposals that purport to have legacy value against all other varieties of proposal should be the over-riding philosophy. It should not be assumed that Legacy proposals are always "Large" (>100hr) or must always involve large teams.

During Cycles 0-1, and likely during Cycles 2-3, the current method of allocating all of the time to the PI's region (alongside the limited availability of science time) is

acting as an unnatural brake on the ambition of proposals with legacy value in the ~10-100hr range.

Care is needed to avoid the kind of overt encouragement (e.g. a specific “Legacy Call”, with a ring-fenced allocation) that can lead to the politicization of proposal submission. Following the release of a Legacy Call, some in the community would rather join a large proposal than compete with that proposal or risk being left out. The even larger proposal is then portrayed as “embodying the wishes of the community”. One might hope that the ALMA Proposal Review process is capable of dealing with such instances, but this has not always proved the case elsewhere.

Instead, a user-driven process should be encouraged. We recommend that the Board approves a recommendation that will give a subtle but effective nudge in this direction. To deal with this situation, we recommend that the following statement be added to the Call for Cycle 2:

Proposals of any size which demonstrate that their requested data offer clear, lasting value to a wide community, and are of the highest scientific caliber, may offer to waive their proprietary period. In such circumstances, the ARPC will be encouraged to give preference to these proposals over competing proposals of similar scientific quality that do not waive the proprietary period. The time accounting for this type of proposal can be shared across regions, in a manner that needs to be outlined succinctly and unambiguously in the proposal. We stress that scientific quality remains the primary criterion for the ranking of proposals.

The APRC Chair had hoped a policy along these lines would be in place for Cycle 1, and very much hopes that it can be implemented for Cycle 2.

We also note that the Director and/or Project Scientist(s) can help to “seed” certain disciplines, where such behavior is perhaps not the custom, either by careful use of Directors Discretionary Time, or by catalyzing the necessary community interactions in some other manner. In this context, we note that it may be advisable to broaden the current definition of DDT.

Time-series proposals

It is difficult to balance the effects of “proposal fatigue” (when proposals requiring time in multiple cycles are required to be assessed multiple times by a review panel with memory) against the desire to properly tension such proposals against all other time requests.

Since strong demand has yet to become apparent for long-term monitoring campaigns, we recommend that there is currently insufficient justification for adding complexity to the proposal process, and that proposals needing multiple Cycles must, for now, rely on the appropriate use of the “proposal history” part of the proposal form.

If there are to be Legacy (no proprietary time) projects, should the time accounting not be assigned to any region? Should such proposals be allowed in Cycle 2?

We recommend that a Legacy call should not be made. Instead, several more subtle strategies should be adopted, as outlined earlier, including the sharing of time across regions for <100hr proposals, and the “seeding” of certain disciplines or collaborations by the Director and/or Project Scientist(s).

How much time (or what fraction of the array time) should be possible for such proposals?

At this stage of ALMA’s development, we are opposed to ring-fencing time for Legacy proposals and would seek to encourage a more natural user-driven process, where tensioning of proposals is maintained, leading to proposals of the highest quality and value for money.

Charge 5: Advise the Board on the adequacy of public information currently provided on proposals that are identified as high priority or fillers, those that have been completed, and those for which the data are publically available from the archive. What kind of information should be available to minimize duplication of effort and on what timescale? Include a full scientific rationale for recommendations for release of information.

This charge was discussed in the context of feedback from the regional SACs, as

well as information from the JAO. The ASAC believes that the guiding principle should be to maximize ALMA's scientific output by avoiding duplication of observations, and by keeping the user community informed about the scientific programs ALMA is doing.

ALMA is a publicly funded instrument that represents a very significant scientific investment for the partner regions. Considering this, we believe that it is better to err on the side of transparency. Moreover, users should have enough information to avoid wasting significant effort in creating proposals that duplicate or considerably overlap previous observing programs.

On the topic of adequacy of public information, the ASAC discussed the usefulness and perils of making abstracts public before the proprietary period of observations in the archive expires (current observatory policy for Cycle 1). That timeline postpones abstract publication for essentially two proposal cycles. Early publication of abstracts is very likely to improve the scientific output and impact of the observatory, and provide impetus for earlier publication of results. Users and potential users will be informed of the scientific thrust in their areas, and collaborations may be spurred and conflicts avoided. It will reduce user frustration, as proposers will be more aware of the ongoing work in an area before they put significant effort into a proposal. It may also increase the chances of CoIs obtaining external funding, as they can point to a fuller set of public proposal information (they can point now to just the title, and experience indicates that funding panels want as much information as possible to document that relevant telescope time has been indeed awarded). Lastly, if the only information available is titles, it is not tenable for an ARP to downgrade a proposal on the basis that a comparable project on a similar topic was awarded in a previous cycle. This may not be a consideration as long as cycles are kept "independent," but it is likely to hurt the long-run scientific productivity of the instrument.

On the perils side, the obvious drawback of early abstract publication is the risk of "stolen ideas." Because observations are not guaranteed even if projects are accepted, there is a potential risk that a competitor could use information in an abstract to improve the chances of their proposal, rather than the original, obtaining time in the following cycle. Because the original proposers will be aware of the policy, however, the sensitive information in abstracts will be kept to a

minimum and the possibility of such situation ever arising appears rather low. We note that NASA's great observatories as well as Herschel have had the policy of making abstracts immediately public upon acceptance. It is clear that policy has not resulted in a groundswell of "stolen ideas," and there is no outcry from their user community to postpone abstract publication. Note also that for Cycle 0 users were asked whether it was OK to publish their abstracts after their proposals were accepted, and not one of the PIs objected to doing so. This is an important datum that should not be ignored.

Based on this discussion, we urge that abstracts of all accepted proposals be made publicly available as soon as the proposal reviews are completed. We do not think that users will object to this. The ASAC is unanimous to recommend that at a minimum, all abstracts should be made available as soon as their first SB is observed and it passes QA0. Waiting over a year more, until QA2 is complete and the proprietary period ends, is too late.

The ASAC also discussed the availability of metadata, and whether the information and the tools are in place to check for duplications. Note that the explicit policy of the observatory, which the ASAC endorses, is that ALMA should not repeat observations.

Currently no explicit policy exists to define duplicate observations. We recommend that the JAO define a policy for what constitutes a duplicate or overlapping observation. The ASAC is willing and able to provide advise on the criteria. For example, an observation might not be considered to duplicate a previous one if it provided a factor of 3 improvement in angular resolution, spectral resolution, size of the mapped region, or noise per channel. The decisions on what observation metadata is to be publicly available should be made based on the definition of duplication: in short, the data necessary for duplication identification should be publicly available.

We recommend that users be provided with the tools necessary to flag duplications. A user should be able to run an automated tool to identify duplications before submitting a proposal (ideally as part of the OT). The tool should also provide the reason for the duplication. At a minimum, the tool should identify duplication of observations in the archive. Ideally, it would also identify duplications of "A-rated"

proposals that are accepted but have not yet been observed. The observatory should run all proposals through the tool before they are reviewed. A proposal should not be rejected as a duplicate if the tool does not flag it.

Furthermore, we recommend that a mechanism should be provided to allow exceptions. If the tool identifies a possible duplication, the proposer should be asked to explain, in the proposal, how the new observations improve upon the old ones. The time allocation committee may then overrule the duplication.

Finally, the ASAC is pleased to see that an archive query tool is now available, as it is an essential element in maximizing use of ALMA data. The tool should of course provide any metadata that are useful in identifying overlapping observations.

Charge 6 (STANDING CHARGE): Consider and comment on the scientific importance of development plans.

Most of the members of the ASAC enjoyed the opportunity to participate in the ALMA Development Meeting organized at NAOJ on the day prior to the ASAC f2f. The ASAC members were pleased to see the range of projects under development, and were impressed by their visit to the receiver cartridge production and testing labs. This opportunity allowed us to discuss the plans for future developments. The ASAC was extremely pleased to learn that both NA and EU will have a call for development studies this year (and further, NA will also have a call for development projects). This presents the project with an opportunity to improve the coordination of developments across regional boundaries.

Next to these extremely positive developments, we were presented with the dire financial picture related to the raising fuel costs. We are extremely concerned about the increasing fuel costs required to provide energy to the observatory, now grown to 25% of the budget. They already have had an impact on the Development Program, with a part of the future NA development funding allocated to fuel expenses. This will clearly have a long-term impact on ALMA science.

We would like to restate our interest in the investigation of sustainable energy use applicable to ALMA, as presented in numerous previous ASAC reports and

endorsed by the Board. The Sustainable Energy Working Group was constituted in the summer of 2012 with five members, chaired by Antony Schinckel of CSIRO. The working group began their investigations in the Summer/Fall of 2012, but was hampered when the primary technical expert on key practical aspects, Matthias Vetter of the Fraunhofer Institute in Germany, subsequently declined participation. Without a suitable replacement for Vetter on the working group their investigation has come to a stand still. We strongly encourage the JAO to find an individual who is willing and able to fill this role as soon as possible. In addition, we suggest that the JAO may wish to consider broadening this working group to contain 2-3 additional members with the goals of 1) bringing additional expertise to bear on the relevant issues, 2) helping to distribute the work load, and 3) increasing the cross section of community involvement and external ties.

The ALMA development process is currently guided by the “Principles for ALMA Development Program” document, which outlines the practical and organizational aspects of the process. Quoting the first paragraph, Section 2 of the document:

“The key principle is that the ALMA Development Program must be driven by science – its purpose is to enhance the scientific capability and or impact of ALMA, within the bounds imposed by the availability of resources both for the development projects and for the ongoing operation of the observatory. It is also important that there is a single, coherent Program comprising a set of projects that are agreed to by the JAO and by all three Executives (and not three independent regional ALMA Development Programs). It is imperative that the Program involves the scientific and technical communities, and industries, of the partner regions, and competitive proposals for development projects will be welcomed.”

Taking this as a base, the ASAC would like to suggest a set of simple, broad scientific principles to use as guidance in the evaluation of ALMA Development proposals to be carried out at the regional level. These principles could be incorporated into the calls for development proposals and used as a general scientific framework for the process.

Consequently, we recommend that the selection of development projects and studies be pursued primarily considering: 1) their scientific merit and promise to advance astronomy, 2) their impact on the ease of use of the ALMA observations, increasing

ALMA's productivity, and the broadening of the ALMA community, and 3) an analysis that weighs the previous points against the full cost of implementing the development into the project.

We interpret point 1 above as:

- The science case of a project should make clear that it has the potential to deliver a scientific payoff in terms of the guiding goals of ALMA (see below), or offer a breakthrough in an area of science not directly included in them (e.g., dark energy, astrochemistry, etc).

The guiding goals of ALMA are: to detect normal galaxies at cosmological redshifts, to image protoplanetary disks at a few milliarcseconds resolution, and to deliver images matching in quality those from space optical observatories.

These were the original goals for the ALMA design, and despite the elapsed time they are scientifically still extremely relevant.

We interpret point 2 above as:

- In addition, the science case of a project should show, if applicable, how it would enable the users to better and/or more easily analyze ALMA observations, new or archival.

We interpret point 3 above as:

- The benefits and costs of a particular project should be weighed in a realistic manner, including, if applicable, the commissioning and operational costs to the observatory (for example, whether a development would increase substantially the observatory power consumption, or its manpower requirements).

The ASAC has started discussing whether more explicit scientific guidance would be possible or desirable. We believe that guidance is valuable insofar as it avoids stifling the desirable bottom-up process of generation of new ideas. We suggest that

the Executives closely involve their regional SACs in the process of selecting the best proposals. Proposals should be ranked by their ability to enable new science or to improve the productivity of the array. It is appropriate and even desirable to have a mix of proposals, including studies of more speculative ideas (new types of detectors, or new phase correction algorithms, for example) that might someday lead to big improvements in array performance. Software that would speed data reduction or that would allow users to more easily utilize the archive also is worthy of support. It is important, however, that all ideas be explicitly justified and judged in terms of gains for astronomy.

Finally, we emphasize the importance of an ambitious, coordinated vision for ALMA long-term technology development with a forward-looking R&D program to carry the instrument well into the 2020s.

The ASAC is concerned about the proper allocation of continuous commissioning resources at the observatory. We have expressed in our previous report concern about the impact that the transition from construction to operations has on the commissioning team. This is compounded by the need to allocate appropriate commissioning (and operation) resources for new developments. The first step is to accurately evaluate the additional effort in earliest possible stages of the development selection process, to avoid surprises at later stages. It is also important to secure involvement of the JAO at the PDR/CDR stage of the development.