

ALMA Board Response to ASAC Report of October, 2005

PREFACE: We are deeply grateful for the ALMA Scientific Advisory Committee's (ASAC) comprehensive and timely report from their 1-2 October 2005 meeting, as well as for the preliminary material that they submitted for consideration by the ALMA Cost Review Committee. The information played key roles during the Board's November, 2005 meeting in Santiago, where ASAC Chair Dr. Leonardo Testi clearly presented the ASAC recommendations and participated very effectively in discussions of many complex issues that occurred during that meeting. In combination with the quantitative, detailed analyses from the Science IPT, the ASAC fulfills very well its role as envisioned in the international agreements, thereby constituting a key strength of the ALMA project.

Below we summarize the Board's major findings upon review of ASAC's report.

***Charge 1:** The Board's most urgent need is for ASAC to review critically the materials on rebaselining being prepared by the JAO and comment upon the impact of the proposed options on the scientific capabilities of ALMA.*

The Board notes ASAC's reaffirmation of their October 2004 and March 2005 assessment "that an array with 50 simultaneously operating antennas, four receiver bands (3, 6, 7 and 9) plus WVRs on each antenna, two IF chains and full polarization would be a superb instrument, which would achieve many of ALMA's scientific goals. It would also have a very high scientific impact and strong community support." Every effort is being made to achieve the 50 antenna array, with the antenna procurement contracts formulated to allow achievement of a 64 element array should funding be possible. ASAC's careful, detailed comments on the proposed BCPs guided the Board decisions during the extensive discussions in Santiago of rebaselining in the context of the Cost Review Committee report. Decisions adopted conformed to all of ASAC's specific recommendations in response to this charge.

***Charge 2:** Please review the revised Science Requirements Document and make recommendations concerning its adoption by the Board.*

We thank you for reviewing the document and recommending its acceptance once ALMA's calibration requirements are sufficiently clear. The Board notes that ASAC emphasized that the repeatability of ALMA calibrations needs to be significantly better than the accuracy of ALMA's absolute calibration. Additional clarification is also needed for polarization and primary beam calibration accuracy. The Board agrees that these issues should be clarified and that the SRD should be revised further to be brought into agreement with the rebaselined array of 50 antennas.

***Charge 3:** Following thorough assessment of the pros and cons of policies in use at existing ground- and spacebased facilities, including those currently operated by the ALMA executives, ASAC is invited to consider policy recommendations on:*

- 1. how to facilitate joint projects between scientists of different partners*
- 2. how to handle large proposals with significant scientific duplication, and*
- 3. whether provision needs to be made at this time for legacy projects and, if so, what mechanisms should be used for such projects.*

These complex, often-contentious issues should be addressed in the spirit of demonstrating how ASAC believes their recommendations, if adopted, would maximise ALMA's scientific impact.

The Board is grateful that ASAC conducted a study of existing models for observing time allocation at various observatories, and respects that, "The ASAC still believes a project-wide programme review committee is a good model for time allocation, based on sound scientific judgment and input from all partners." However, the Board notes that if regional program review committees (RPRCs) are established, ASAC recommends that the RPRCs submit through their respective Executives, a ranked list merged across all scientific areas, to a central international program review committee (IPRC) which will meet annually to recommend a final merged, ranked list of projects for scheduling. The ASAC also believes that to the greatest degree possible, proposers from multiple partners should be free to ask for time in chosen fractions from different partners, and set their own project size, and that no special provisions are required for large or legacy projects in the early years of operations. Finally, the Committee recommends that a small fraction of non-partner applications should be supported, subject to the review by the IPRC, especially as the ALMA project matures, and that an easy-to-use, powerful and open archive be implemented to ensure wide access to ALMA's output and reduce accidental proposal duplications.

While sharing many aspects of weather and configuration constraints with existing optical and radio observatories that are now predominantly queue scheduled service facilities, ALMA is a complex facility and partnership with unique aspects. The Board recommends that the Science IPT (supported by operations personnel) perform detailed simulations of ASAC's proposed model and logical variants thereon to enable ALMA to evaluate objectively the pros and cons. We note that it will be vital for mechanisms to be in place to ensure that partner shares are accounted for accurately according to algorithms that will ultimately have to be approved by the Board. Several existing observatories have established procedures for dealing with different observing conditions which should be folded into the simulations. The simulations should include a target of opportunity mechanism, as well as a dynamic scheduler that ensures that the best weather is utilized for high priority programmes that require those conditions. Such simulations might include for comparison purposes a few existing systems (e.g., VLA, VLT, Gemini).

The Board accepts ASAC's recommendation "that no special provision is required for large or legacy projects in the early years of operations."

Charge 4: *Following from your Sept. 2004 discussions, the ASAC is invited to continue developing proposed "demonstration science" guidelines or policies. The ultimate goals include:*

- 1. providing a proposed framework (rationale, principles) that establish the value to the astronomical community of accomplishing demonstration science as you envision it during the early operations era; and*
- 2. facilitating evaluation of the concept, its proposed timeline and the planning for its implementation during a period when demand for ALMA construction and operational resources will likely be high*

The Board concurs with ASAC's recommendations to replace the term "demonstration science" as used in earlier ASAC reports with two definitions with different requirements and posing different constraints on ALMA:

1. Science verification (SV) = end-to-end test of an ALMA mode done using a science project proposed by an external user; this usage is consistent with the draft CSV plan.
2. ALMA Public Image (API) = large-scale project whose primary intention is to convince wider community/public of the value of ALMA.

The Board agrees with ASAC that a single international group with a broad array of scientific interests should work jointly with the science verification team to select suitable projects for SV observations. Equally, the Board agrees that, even with a limited number of antennas, careful selection of sources, together with the appropriate correlator setup and band selection, should produce spectacular images without a significant impact upon scarce ALMA resources. Thus, the Board recommends that ASAC's sensible advice in responding to this charge be taken into account as plans for commissioning and operations are developed.

Having a professional science writer associated with release of APIs will increase their impact.

Additional Recommendations:

The ASAC is concerned about the slow start-up of all ALMA Regional Centers (ARCs) and the danger that the lack of coordination among regions could result in duplication of efforts. The ASAC encourages that the ARC director positions and the JAO's science operations head, as defined in the ALMA Operations plan, be filled as soon as possible. Their recommendations are fully consistent with advice from the Cost Review Committee and the intentions of the Board and ALMA Project. The Board anticipates that during 2006 ALMA will experience significant improvement in these areas.

While in Santiago, the Board approved ASAC's recommendation that Christine Wilson become Chair for the next six months, with John Richer serving as Vice Chair. The Board would like to see an organized rotation scheme established for ASAC membership.

ASAC's proposed date for their next meeting, 28-29 January 2006 in Los Angeles will be on the agenda for approval at the Board telecon on 8 December 2005.

We express our gratitude to Leonardo Testi, the ASAC and the Science IPT for their excellent work which played such significant roles during the challenging months leading up to the historic ALMA events of September-November 2005.