

Structure of an ALMA Program Committee

Background

The ALMA Board has expressed interest in investigating the implications of a single Program Review Committee (PRC). The structure of such a committee is open to discussion. The Board has asked the regional Project Scientists to prepare a short report with some details of the set up of a single PRC.

The following is a summary of the structure of other PRC's for comparable instruments.

Within any PRC model, there must be a set of **panels** for evaluation of specific categories, and a **Time Allocation Committee (TAC)** responsible for overall rankings. The sub-panels meet separately, then these results are submitted to the TAC.

As an appendix, the relevant section of the ASAC report of 2004 October is included. The general opinion of ASAC was already transmitted to the ALMA Board: A single PRC is very much more useful than separate committees.

Operations Plan

The Operations Plan of ALMA, pages 46, states that 'All proposal and observation preparation material shall flow from external users to the central archive via...the Internet. This information shall then be replicated immediately to the OSF and ARC archive nodes.' That is, observing proposals are sent to JAO, and JAO distributes these to the local ARCs, who then deal with the proposers. In the case of a single PRC, either the JAO or one of the ARCs might handle all of the Phase I and II processing of the proposals (and be reimbursed), or a number of ARCs might share this work under the guidance of the JAO.

PRC's Elsewhere

The following schemes are for 'normal' programs. This excludes 'legacy', 'treasury' or 'public survey' types of programs.

At ESO, the PRC is referred to as the 'OPC'. The rankings are given for a specific telescope, since ESO operates many telescopes. There are 2 proposal submission deadlines per year. There are about 850 proposals submitted per deadline. There are 4 panels with a total of 60 members, none from ESO, whose members meet in face-to-face meetings. Each of the panels is divided into a set of topics. The topics are given in the following with the number of topics in parentheses. These areas are: (1) Cosmology (8 categories), (2) Galaxies and Galactic Nuclei (9 categories), (3) Interstellar Medium, Star Formation and Planetary Systems (8 categories), and (4) Stellar Evolution (11 categories). After each panel ranks proposals within each category, the final ranking for a telescope is determined by software, without ESO staff intervention. An important input for the determination of the overall ranking of a proposal in a certain category is the time

pressure per category. More information is available at <http://www.eso.org/observing/proposals/index.html>.

Another example is the Space Telescope Science Institute (STScI) PRC. There is one submission deadline per year. There were 733 proposals submitted in 2006. There are 5 Extragalactic panels, 5 Galactic panels and 1 Solar System panel. There are 108 panel members who meet face-to-face to assess the reviews. None are from STScI or the HST European Coordinating Facility. The balance between directions of research in a given area is done within the panel. Each panel is given a number of orbits to allocate, depending on time pressure. There is a subsidy in the allocation to each panel, to ensure that the proposal success is evenly distributed between scientifically worthwhile larger and smaller proposals. The panels rank programs with 100 orbits or less. The TAC consists of the panel chairs plus 3 other members. The TAC is occupied mostly with larger programs, but may adjust the ranking of panels. For more information, see <http://www.stsci.edu/hst/proposing/docs/proposingOverview>.

Finally there is the example of the scheduling of NRAO Telescopes, which accept proposals from anyone anywhere under an 'open skies' policy. As NRAO operates various telescopes, details vary, but policies are guided by four principles¹. Most similar to ALMA is the Very Large Array (together with the Very Long Baseline Array) operated by NRAO. There are 3 proposal deadlines per year, at fixed dates announced in the NRAO Newsletter. The VLA receives about 150 proposals each deadline. The VLA/VLBA PRC uses an email system with >65 referees divided among 17 categories. Each proposal is sent to 4 or more referees. Each referee is to evaluate up to 25 proposals within 4 weeks of receipt. The referees grade on originality, significance and quality of the observations. Grades from each referee are normalized. The referee responses are examined by a seven member TAC. The TAC consists of two schedulers, the assistant

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¹ These principles were elucidated by Hogg (2006):

- The observatory selects proposals based on reviews by peers whose identities are neither disclosed to the proposer nor to each other.
- Acceptance of a proposal is not conditional on the institutional affiliation of the proposer. A corollary of this is that the staff of the NRAO does not receive preferential treatment of their proposals. Access to NRAO telescopes by foreign scientists with good observing programs has typically been judged in the same way as with US observers. AUI, NRAO, and the user community believe that this "open skies" policy benefits science because the best proposals are scheduled.
- There is no charge for the telescope time. The costs of building, operating, and upgrading the telescopes and associated instrumentation have been borne by the funding agency, the US National Science Foundation. In certain instances instrumentation has been provided by a university or another funding source, but such instrumentation typically is subsequently assigned to NRAO for use by the user community.
- There is no tie between observing time and grants (or other funding). In fact, NRAO instituted procedures to partially support certain visitor travel and publication costs of the papers resulting from the observing sessions of US-based observers.

director for New Mexico operations, one scientist from the Socorro staff, two NRAO scientists from other sites, and one external member. This is usually a F2F meeting. Usually the TAC follows the rankings and time recommendations. There may be deviations if significant issues are found. A detailed description of the selection process is at <http://www.aoc.nrao.edu/epo/ad/scheduling.shtml> and a written description is given in Heck, A. (2006, in press).

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Details for ALMA

For ALMA proposers will generate a 'cover sheet' using the 'Observe Tool' or OT. This will be accompanied by a scientific justification, etc. The proposers will have to specify a category for their measurements; this will determine which panel will review the proposal.

For any PRC, a number of parameters need to be specified: (1) Number and categories of sub-panels in the PRC, (2) Type of evaluation process, and (3) Frequency of meetings. These parameters are interrelated.

Number of Panels

First, any committee would have to consist of groups of experts for specific research areas. These make up the panels of the PRC. From the three examples listed above, there should be at least 4 panels. For example, the categories could be Cosmology, Extragalactic, Galactic, and Solar System. A consideration is the number of proposals which panel members must referee. ALMA is expected to generate ~1000 proposals per call; if there were four categories each panel should have 10-15 members to spread the load evenly over the panel—in this minimalist model each proposal would have one expert reviewer. If each proposal were to have four expert reviewers, each panel would need 40-60 members, an unwieldy number. Panels should be subdivided into 1-2 dozen topics or subcategories.

Type of PRC

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Second, there are two extremes for a PRC. These are either a committee that deals with proposals in **face-to-face meetings**, or via **email**. In both schemes, there would have to be a PRC secretariat to handle the details of scheduling, distribution of proposals and collection of referee's grades. With either scheme there would have to be a **Time Allocation Committee (TAC)** that is responsible for rankings among the proposals from different panels. As videoconferencing becomes more available, an intermediate mode could be envisioned, in which a virtual face-to-face meeting were held. This has obvious advantages for a geographically diverse project such as ALMA, though the number of time zones encompassed by ALMA member countries poses problems for very long meetings, as PRC meetings are likely to be. For a face-to-face PRC with panels, the TAC could be made up of panel chairs, a TAC chair (the JAO Director) and some members-at-large, or one could use the computer program approach of ESO. In their October 2005 report, the ASAC detailed one model, simplified for the case of a unified PRC/TAC.

An attractive model could be to hold the TAC meetings contemporaneously with workshops to be held at the various ARCS and in Santiago. Beneficial aspects of this would be:

- To provide attendee members of the TAC with an up-to-date view of the most pressing problems in the field amenable to ALMA observation;
- To acquaint local communities with the facilities available at the ARCs;
- To calibrate the personal equations of individual TAC member rankings;
- To provide all with the most current picture of ALMA capabilities.

Workshops could focus on particular areas of ALMA science, consisting of a group of topics under a particular category; they should not attempt to cover all areas of transformational science to be done by ALMA.

Frequency of Meetings

Third, is the frequency of the meetings. These might be either once or twice per year. This is dependent on the number of referees and the type of PRC. The argument for two meetings per year is based on the pace of scientific advance. This is fast, and if ALMA science were to keep in tempo, two meetings per year would be favored. If the meetings were held in conjunction with annual workshops, as proposed above, the burden could be lessened. Alternatively, one meeting per year could be held via telecon, attended by the leaders of the groups focusing on particular subcategories within the main four Categories.

Pros and Cons of Models for an ALMA PRC

Email System

For an email-only system, the final ranking must be made by a TAC, usually at a F2F meeting. The TAC must evaluate the referee reports, to eliminate contradictory evaluations, decide which proposals are technically feasible, and rank the proposals from different categories. There would have to be a single, international TAC for this purpose. Such a system should be run by the JAO in Santiago. This system works for a small community in which referees and proposers are well-known to one another but may suffer for a large international user community such as ALMA will entertain.

Face-to-Face

For a F2F-only system, disagreements between referees would be eliminated within the panel by its members. However such a system requires a large amount of travel for referees. At HST and ESO, meetings require at least 2 days. A meeting of panel chair alone would lessen the travel while providing expertise on a finer scale. The panel chairs might hold telecons in advance of a face-to-face meeting to provide for airing of differences by members of the panels.

Intermediate Solutions

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There could be PRC schemes between these extremes. One possibility would be email inputs from a number of referees. These would be sent to a set of panels which meet for a F2F or videoconference. Then the number of referees in any F2F would be smaller than a system involving only a F2F evaluation of proposals. The discussions in the panels could concentrate on proposals for which the email evaluations show large differences, or which have rankings near the cutoff value.

Comparison of Models

Any arrangement to bring a large group of referees together for a face-to-face is a challenge. More than one F2F meeting per year will be difficult, but having F2F meetings helps to remove uncertainties in ranking proposals. Such meetings require a great deal of referee's time, for some large projects such as HST the PRC meetings are F2F. An email system could lead to misunderstandings, and these will be more difficult to eliminate. A hybrid system, in which group leaders meet F2F after a group telecon might prove more workable while addressing misunderstandings.

The makeup and number of panels is an important point. There could be finer divisions of categories, but then there are more panel chairs and members. This adds complexity and cost to this part of the project.

Fine Tuning of Rankings

It is very desirable to have the observing time roughly balanced between partners for each meeting of the PRC.

For proposals from different partner countries, the time could be divided according to the home institution of each proposer or it could be wholly assigned to the Principal Investigator. For observers on sabbatical leave, the observing time would be allocated to the country of the host institution. For observers outside the ALMA partner countries, a larger portion of time would be charged to those observers listed on the proposal from the ALMA partner countries.

Sharing the Work

With any model of a single PRC the administrative work will be large. For many reasons, this work must be shared. For Phase I work, arranging proposals could be done at one organization, while the other organization arranges TAC meetings. The meetings could be alternated between Europe, East Asia, Chile and North America. The arrangement would be set up to share work so that costs are equalized.

APPENDIX

**Excerpt: Report from the ALMA Science Advisory Committee
September 2004 meeting**

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1 Executive Summary

On the issue of time allocation policies, topic of Charge 2, the ASAC concluded that the best way to handle large programs is to have a single International Program Review Committee that is empowered to rank and/or choose between large proposals. For smaller projects involving collaborators from more than one partner, the ASAC suggests that a Joint Proposal mechanism similar to the one currently used by the Gemini observatory may be appropriate.

4 Charge 2: Time Allocation Policies

The second charge from the ALMA Board reads as follows:
Following thorough assessment of the pros and cons of policies in use at existing ground- and space-based 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 maximize ALMA's scientific impact.

The ASAC approached this charge from the perspective that both joint programs and large programs (whether joint or from a single partner) are important for maximizing the science return from ALMA. It is important that ALMA's proposal policies do not place barriers in the way of these kinds of proposals. ALMA will carry out both small and large programs, as they are both essential tools in producing dynamic, high-impact science. For example, smaller programs can produce very important new results or unexpected discoveries, while many high-impact science projects can only be achieved with a large investment of observing time.

The ASAC reviewed the procedures currently in use at three different observatories (ESO, Gemini, JCMT). One of these (ESO) operates with a single TAC while the other two are multi-partner observatories with multiple TACs plus a combined international TAC. Most of the possible difficulties that we considered would not be an issue were ALMA to adopt a structure based on a single Program Review Committee (probably divided up into sub-committees by scientific area). A single Program Review Committee (PRC) places no barriers to proposals with collaborators from more than one partner, makes it easy to limit duplication (either of sources or, if necessary, of science goals), and

would be able to produce a single ranked list of proposals that could be passed to the observatory for scheduling. However, given the current plan for ALMA, which is based on one PRC for each partner, as well as presumably separate PRCs for Japan and Chile, we feel the following items will provide a good framework to allow ALMA to do the best science possible, and to do that science efficiently.

4.1 Large proposals

The ASAC feels that the best way to handle all large programs (both joint programs and those from a single partner) is to have an International PRC (IPRC) that is empowered to rank and/or choose between large proposals submitted to ALMA in a given semester.

Each partner PRC will review all the large proposals that involve them and pass on their comments to the IPRC; however, the PRC will not rank the large proposals, either relative to each other or relative to the smaller programs.

Having a single IPRC which evaluates all large proposals helps in a number of ways:

1. there is no need to distinguish between large proposals from a single partner and large proposals from multiple partners, as they all go to the same committee for evaluation and, ultimately, ranking
2. since the same committee sees all the large proposals, it is in the best position to arbitrate between cases of scientific duplication

The ASAC feels that scientific duplication in large proposals is to be discouraged. Large proposals use up large amounts of resources (ALMA observing time) and scientific duplication in such programs will limit ALMA's ability to carry out other scientific programs, which may be equally exciting and valuable. For example, it is a clear waste of ALMA resources to have three teams (one from North America, one from Europe, and one from Japan) each spend one month of observing time to map the Hubble Ultra Deep Field at 350 GHz!

For this system to function well, the IPRC must have the necessary broad scientific expertise to provide a good evaluation of large programs. (The IPRC cannot simply be the sum of the chairs of the partner PRCs, for example.) In addition, we suggest that, as is currently done with ESO, there be a cap on the percentage of ALMA time that can be allocated to large proposals in any semester. For ESO, the current fraction of time is 30%; for ALMA, this is TBD. The definition of what constitutes a "large" program is also TBD; however, clearly any program requiring a month of ALMA observing time would be classified by anyone as a "large" program! The minimum observing time required to be classified as "large" may also change from the period of Early Science to full operation. The question of when to start large programs with ALMA is one that needs further consideration, particularly as the capabilities of the array will grow rapidly for the first two years of operation, and the time to execute a given set of observations will diminish considerably.

4.2 Legacy programs

The ASAC sees no need to invoke a special mechanism for legacy programs at this time with ALMA. Legacy programs are distinguished from large programs by having a short (even zero) proprietary period. Having good mechanisms for handling large proposals will allow legacy-style science to proceed in the longer term.

In the short term, demonstration science may be viewed as an early version of a "legacy"-style program, as it will have a short proprietary period and will likely involve observations of targets of interest to many different researchers, although they will neither have the completeness nor the impact of a fully grown legacy project.

4.3 Facilitating joint proposals between partners

Issues relating to large proposals with collaborators from more than one partner are addressed in section 4.1. Large joint proposals will be facilitated by the IPRC review structure discussed in that section.

For smaller projects involving collaborators from more than one partner, the ASAC suggests that ALMA adopt a Joint Proposal mechanism similar to the one currently used by the Gemini observatory. In this system, identical versions of joint proposals are submitted to the PRCs representing all partners involved in that proposal. Each partner PRC would then evaluate and rank the joint proposals at the same time and in the same way as they would proposals involving collaborators from only a single PRC. The final ranking would be done by the IPRC as a weighted average of the partner PRCs. The possibility of a proposal being submitted to just the PRC of the PI (and the time allocated by only that PRC) should also be allowed.

Source duplication

The ASAC feels that duplicate observations of a given position in the sky should be discouraged unless there are good scientific reasons (variability studies are an obvious exception to this rule).

The ASAC suggests that duplication might be defined as:

1. same sky position
2. similar sensitivity
3. similar angular resolution
4. for continuum observations, similar frequency
5. for line observations, same frequency
6. for line observations, similar velocity resolution and bandwidth

where in all cases above the exact meaning of the word "similar" remains

TBD. For example, new continuum observations of the same, non-variable source might be allowed if they required a sensitivity a factor of two

better and/or a frequency more than 20% different from the sensitivity and frequency of existing or scheduled observations.

Scientific duplication

The ASAC is not concerned about duplication of scientific goals by two or more small programs. There is some merit in having, for example, two teams studying small samples of debris disks, each being allowed to work on their own sample (subject to the caveat of no direct source duplication). The issue of scientific duplication in large proposals is discussed in 4.1, the subsection on large programs.

Excerpt: Report from the ALMA Science Advisory Committee
October 2005 meeting

1 Executive Summary

Time Allocation Policies The ASAC still believes that a single international Programme Review Committee would best serve the ALMA project, minimizing several of the concerns on joint programmes and scientific duplication of programmes. Nevertheless, the ASAC has sketched a possible programme review model, based on Regional Programme Review Committees and an International Programme Review Committee, that may minimize the adverse scientific effects of adopting a region-based review model. Regional PRCs, each with identical science sub-panels structure and policies, may review and rank the proposals from the respective regions and then pass the ranked lists to an international PRC, of which all the Chairs of the regional science sub-panels are members, for merging lists and solving conflicts. We suggest that proposers should be free of indicating which fraction of the requested time should be allocated by which partner (in this case all involved RPRCs would see and rank the proposal). We believe that, at this stage, there is no need to set up special procedures for Large or Legacy-type projects. Policies, procedures and structure of ALMA time allocation should be periodically reviewed to ensure the best scientific output of the project.

Demonstration Science The ASAC proposed concept of "demonstration science" has been discussed within the framework of current plans for Commissioning, Science Verification and Early Science. We suggest to split demonstration science in two different concepts: Science Verification and ALMA Public Images.

Science Verification (SV) will be an end-to-end test of an ALMA mode using science projects proposed by external users. We suggest that SV activities could start as soon as a new ALMA mode is fully commissioned and prior to any standard call for proposals that includes that particular mode: the scientific proposals for SV should be reviewed by an international proto-TAC under strict control from the observatory staff. It is expected that SV activities will start before Early science and that will continue, at a reducing pace, throughout the ALMA construction period.

ALMA Public Images (API) will be large scale projects selected by the ALMA project, whose primary goal will be to convince the community and the public of the value of ALMA. It should be possible to select a very limited number of southern sources (e.g. Eta Carinae and Centaurus A) for which data could be accumulated during Commissioning and Science Verification without imposing an additional burden on

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construction, technical and first scientific activities. The images of these sources could be used to show the improvement in ALMA capabilities as it grows to completion.

Charge 3: Large Programs, Legacy Programs, and Joint Programs with ALMA

Charge 3: Time Allocation

Following thorough assessment of the pros and cons of policies in use at existing ground- and space-based 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.

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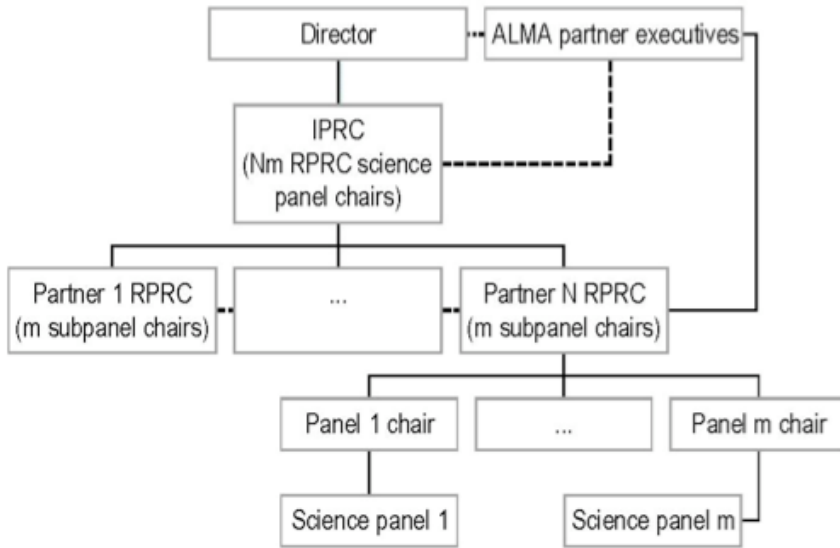


Figure 1. Proposed time allocation structure for ALMA. Each of N partners m science panels receive and rank proposals. The N Regional Program Committees (RPRCs) merge them and submit a single ranked list of their regions proposals to the International Program Committee (IPRC), which resolves duplications and conflicts and submits a final recommended program to the director.

The ASAC considered the full range of time allocation policies at work in existing international facilities and discussed this important issue extensively in Santiago. ASAC still believes a project-wide program review committee is a viable model for time allocation, based on sound scientific judgement and input from all partners. However, we recognizing the desire from the board to maintain the sovereignty of partners' individual time allocation policies. Wanting to maximize the efficiency of the time allocation process and the quality of approved ALMA proposals across the project, while minimizing the administrative burden on both project staff and the user community, we make the following recommendations.

We propose that partners work with a common proposal system, and each partner's executive appoints a regional program review committee (RPRC), made up of a certain project-wide set of chaired subject-specific subpanels under an overall RPRC chair. Different partners may have different distributions of numbers of subpanel members, reflecting their communities' size and scientific interests. RPRCs would have flexible relationships with and support from their partners' ARCs. Each RPRC will meet to submit a ranked list of programs merged across all science areas to a central international program review committee (IPRC), to consist of the RPRC members.

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The IPRC will meet to recommend a final merged ordered list of projects for scheduling. This process allows regional autonomy in program definition, while leaving major issues of duplication and conflict to be resolved by the IPRC, a scientific body which carries the memory of the allocation priorities, concerns and discussions of all the RPRCs. The possibility of allowing RPRCs to rank projects so highly that they will be scheduled automatically from that partner's share of ALMA time should be left open, but we hope that such programs could be shepherded through the IPRC by that partner's representatives. ASAC expects that on average the IPRC will allocate time to reflect the partner's shares in the project, and supports leaving the process and procedures to be followed by the IPRC to resolve conflicts as flexible as possible. Owing to the wide community of users expected for ALMA, ASAC recommends that the project should maximize the quality of feedback returned, especially to unsuccessful proposers and in the early phases of the project.

ASAC 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. We believe that ALMA will be sufficiently revolutionary that no special provision is required for large or legacy projects. Should investigators wish to offer some of the features often found in legacy projects, for example to waive proprietary rights, supply additional data products, or work more closely than usual with project/ARC staff then we would encourage them to submit these offers in the proposal to the scientific judgement of their RPRCs and IPRC in their proposals.

To make best use of ALMA's status as a world facility, ASAC recommends that a small fraction of non-partner applications should be supported, subject to review by the IPRC, especially as the ALMA project matures. Individual partners should be free to open their time to non-partner investigators at the discretion of their executives and RPRCs. We also recommend that a very easy to use, powerful and open archive be implemented to ensure wide access to ALMA's output and reduce accidental proposal duplications.

The international, two-phase nature of the process, and the reconfiguration timescale of the array favors an annual proposal cycle. ASAC supports annual reapplication (with progress reports in case of long-term projects) for all projects.

The effectiveness of the implemented time allocation procedures must be kept under review at all levels of the project to ensure the maximum scientific promise of ALMA is realized.