

Report of the European ALMA Science Advisory Committee meeting

OAN Madrid, September 1, 2003

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Other participants: P. Diamond (Jodrell Bank), M. Garrett (JIVE), M. Guélin (IRAM), R. Kurz (ESO), D. Silva (ESO), M. Tarengi (ALMA)

Apologies: A. Benz, P. Schilke (not present at meeting, but provided written and oral comments on report)

Executive summary: This ESAC meeting was devoted to a discussion of the European ALMA Regional Support Center (RSC), and focussed on three areas: (i) an inventory of user support experience at other facilities of comparable size or nature, and comparison of the manpower involved; (ii) further definition of the RSC core and additional functions from the user's perspective; and (iii) comments on the ESO proposal to become the central node of the European RSC, as indicated in the draft ESO Long Range Plan. Concerning the comparison with other facilities, the ESAC concludes that manpower estimates for ALMA proposal preparation and archival research support are comparable to those at other major facilities, but that support for ALMA data reduction may be lower depending on the fraction of science time of the support astronomers.

Concerning the RSC functions, the ESAC has made a detailed, prioritized list of proposed core and additional functions, as seen from the user's perspective. It strongly recommends that the RSC core functions are co-located in one single place — the central node. Most of the additional functions are best carried out by a distributed network of institutes coordinated with the central node. Face-to-face user support is identified as a key additional RSC function not covered in the core functions.

Concerning the ESO plan to become the central node of the European RSC, the ESAC recognizes several strong points of this proposal but has a number of concerns which need to be addressed for it to be viable. These include the current lack of millimetre interferometry expertise at ESO, the level of data reduction support provided for in the proposal, the management structure of the RSC, and the involvement of community expertise. The ESAC urges ESO to develop a more detailed written plan within the next few months. Regarding the additional functions, the ESAC proposes that a working group is set-up to investigate possible models for their management and financing.

I. Introduction

The ESAC met face-to-face at the Observatorio Astronómico Nacional in Madrid on September 1, 2003. The main charge to the committee was to (i) provide a recommendation on the draft ESO Long-Range Plan regarding the European ALMA Regional Support Center (RSC); and (ii) give advice on how best to involve the community expertise in millimetre observations and interferometry in the European RSC.

The agenda (see Appendix A) was structured in three main parts consisting of (1) an overview of experiences with user support at current facilities and associated manpower; (2) a detailed discussion of the RSC core and additional ('science enabling') functions; and (3) a discussion of

the ESO proposal to become the central node of the European RSC as expressed in the draft ESO Long Range Plan, and possible organizational models for involving community expertise.

II. The need for an European ALMA RSC

As stated in Chapter 6 of the ALMA Project Plan, the Regional Support Centers form the primary interface between the user communities and ALMA, by providing key services such as proposal handling, support for data reduction and enabling archival research. The ESAC firmly believes that the RSCs are critical in assuring the success of ALMA and its scientific return.

One particular feature of Europe compared with North America is that many countries are involved, with each country bringing specific expertise in (sub)millimetre astronomy or past/present experience in large international programs. Some European countries have a strong tradition in interferometry at (sub)millimetre, radio and/or optical wavelengths, others have none. ALMA is expected to attract significant numbers of non-expert users from the optical, infrared and high-energy communities, in addition to expert millimetre and radio scientists. Sharing and maintaining the available expertise and providing adequate user support are essential to build a strong European community around the ALMA project.

III. Experiences in user support at other facilities

Three experts from European radio interferometry facilities were invited to the meeting and gave oral presentations on the experience at the IRAM Plateau de Bure interferometer (M. Guélin), MERLIN (P. Diamond) and the European VLBI network (M. Garrett). An overview on ESO's experience with the VLT was provided by D. Silva. In addition, several other major optical and space facilities were contacted and a comparison of manpower estimates for the different user support functions was made (see Appendix B). The main conclusions of this discussion and comparison are as follows:

- (i) Current radio interferometers — VLA, MERLIN, Plateau de Bure, EVN and others — have taken a long time to mature, up to 10 yr. The ESAC therefore stresses the importance in utilising the extensive experience that already exists in the community in order for ALMA to mature on a shorter timescale.
- (ii) A fraction of radio interferometer observers continues to visit the facility support center for face-to-face data reduction and analysis support even after 10 yr experience, in contrast with current optical telescopes and some space facilities. Experience at the VLA suggests this fraction is higher in the early years of operation, when a majority of users visited Socorro, but even after 20 years of operation a smaller fraction of experts still chooses to visit occasionally to interact with observatory staff to 'top-up' their knowledge.
- (iii) Support astronomers need to be expert users of the instrument and actively engaged in its science to be effective. There also needs to be a close interaction of the support facility with the instrument, with the hardware builders, and with software developers.
- (iv) Support distributed over different locations is only successful if there is sufficient critical mass at each location and continuity in key-personnel.
- (v) The amount of support needed is strongly related to the quality of the software: high quality proposal preparation and pipeline reduction software significantly reduces the burden on support staff. This argues for a strong focus on software quality and testing during the construction of ALMA to reduce support costs later on.

(vi) The FTE manpower estimates for ALMA user support are comparable to those of other major facilities which attract typically 1000 proposals per year; however, the number of people involved in ALMA data reduction support may be up to a factor of 2 less depending on the fraction of science time of the astronomers.

IV. RSC core and additional functions

IV.1. Core functions

The second part of the meeting focussed on a detailed discussion of the RSC core and additional functions (see Appendix C). The RSC core functions are to be funded and controlled by the ALMA Observatory, and are outlined in the Project Plan. However, these need to be ratified by the ALMA Board as many details of the operations plan remain to be clarified.

For operational and management reasons, the ESAC concludes that the core functions need to be co-located in one single place (called the ‘central node’) which has relevant expertise and recognized know-how in (sub-)millimetre astronomy and radio interferometry. This conclusion is consistent with the community’s desire for a strong degree of concentration of the user support functions expressed at the November 8 2002 meeting.

IV.2. Additional functions

Appendix C also contains a prioritized list of additional (‘science-enabling’) RSC functions identified by the ESAC. These functions are not funded by ALMA. Nevertheless, many of them are seen by the ESAC as critical to achieving the successful scientific exploitation of ALMA by the European community. A better name for these is required, which expresses their vital role in enabling and enhancing the scientific exploitation of ALMA.

A key issue identified at the meeting is support for regular user visits to the RSC to plan high-quality proposals, reduce and (re-)calibrate data and discuss results with expert astronomers. The ESAC considers this an essential RSC function for both novice and expert users, but it is currently not labelled as a core function by ESO and the ALMA project, nor is it included in budget estimates.

Given the lack of central funding, it is likely that most of the additional RSC functions will by nature be distributed. A network of institutes coordinated by the central node and operated in a collaborative spirit offers the opportunity for optimally involving the expertise in the community. The ESAC proposes that a working group is set up to investigate the management and possible ways of financing these functions (see also §V).

V. ESO Long-Range Plan concerning the European RSC

The ESAC heard a presentation by D. Silva on the proposal by ESO to become the central node of the RSC as indicated in the draft Long Range Plan. In this proposal, ESO would carry out the core functions described in Appendix C, and act as the coordinator of the additional functions with a network of institutes. The ESAC has the following recommendations:

- (i) The ESAC recognizes ESO’s expertise in user support of large international projects, in particular in the handling of large numbers of proposals and programmes which is required to support ALMA, and in archival operations. In addition, the ESAC could see benefits in having the European RSC located close to a strong public outreach and PR team: this would help maximise the impact of ALMA. Because much of the ALMA science will inherently be

multi-wavelength, there could also be a positive feedback by having the RSC in close contact with optical and infrared expertise. However, the ESAC has a number of concerns, which need to be addressed for the ESO proposal to be viable:

- ESO needs to strengthen its in-house expertise in millimetre interferometry as soon as possible if it is to provide high-quality user support by the time early science observing starts. The ESAC also stresses the benefits of having a strong science team in millimetre astronomy at ESO for attracting RSC personnel.
- The manpower estimates for user support should be carefully reviewed, taking into account that support astronomers are more effective if they are actively involved in ALMA science (cf. §III).
- The proposed RSC management at ESO needs to be clarified. The ALMA RSC should be a visible and clearly identifiable entity to the outside community with a single leader.
- Ways for involving the expertise from the community and disseminating it back should be clarified, both in the early and mature phases of the project. Proposed schemes in which ESO-ALMA fellows rotate back into the community for their final year are good examples. Other options include secondments of experts to and from institutes, and regular workshops organized jointly by ESO and the community on data reduction experiences, especially in the early operational phases when the learning curve is steep and software may still be incomplete.

The ESAC strongly recommends that ESO develops a detailed written plan on the organization of the core functions within the next few months, in particular outlining how the activities will be ramped up in time for the various levels of ALMA science support activities.

- (ii) The ESAC has identified a number of additional functions of high priority, most notable the daily face-to-face user support and continued software development. Their financing and management are unclear. The ESAC proposes that a working group consisting of members from expert institutes, ESO and the ESAC is set up to explore possible models for management and financing of the additional functions. The organization needs to assure that the functions are open to participation from any interested institute and accessible to use by astronomers from all ESO member states and Spain. ESO needs to play an active role in encouraging national funding. The ESAC stresses the importance of maintaining strong expertise in millimetre hardware, software and operations within the community in the ALMA era.
- (iii) The ESAC notes that the RSC core functions could also be carried out in other locations, some of which have a long tradition in millimetre or radio interferometry. Without detailed written plans, however, the ESAC cannot judge whether these alternative options would be more effective in providing ALMA user support compared with ESO.

- Appendix A: Agenda
- Appendix B: Comparison of user support at various facilities
- Appendix C: RSC core and additional functions: user’s perspective