

MEMORANDUM

DIVISION OF ASTRONOMICAL SCIENCES

Date: January 6, 1999
Reply to
Attn of: Unit Coordinator for Radio Astronomy Facilities
Subject: Draft Organizational Plan for International MMA
To: M. Haynes, P. Vanden Bout, R. Brown, DD/AST, UC/OIR, EO/AST
Via:

This version incorporates revisions to the late December drafts, but omits the draft MOU. Note that the joint array is referred to as the Large Millimeter Array (LMA) – the term BFA prompted too many curious questions.

Comments appreciated.

DRAFT
PARTNERSHIP MODEL FOR THE LARGE MILLIMETER ARRAY (LMA)
December 1998

I. INTRODUCTION: The Large Millimeter Array (LMA) project is the result of merging the U.S. Millimeter Array (MMA) and European Large Southern array (LSA) projects. The goal of the fused project is to create a single instrument more sensitive, flexible, and powerful than either the MMA or LSA. Current plans envision an array consisting of between 50 and 60 antennas, each 12m in diameter, operating in the atmospheric windows lying between 30 and 900 GHz, and situated on the Llano de Chajnantor in northern Chile. It is understood that at a later date, the LMA project may be expanded to include Japan's Large Millimeter and Submillimeter Array (LMSA) project as a third major component.

The LMA partnership will be made up of the following members:

United States:

The National Science Foundation (NSF).

The project will be carried out by the Foundation's National Radio Astronomy Observatory (NRAO). The NRAO is managed for NSF by Associated Universities Inc. (AUI).

Europe:

The European Co-ordination Committee (ECC), representing the following organizations:

European Southern Observatory (ESO)
Centre National de la Recherche Scientifique (CNRS)
Max-Planck-Gesellschaft (MPG)
Netherlands Foundation for Research in Astronomy/Nederlandse Onderzoekschool Voor
Astronomie (NfRA/NOVA)
United Kingdom Particle Physics and Astronomy Research Council (PPARC)

The ECC was established through a Memorandum of Understanding signed by the above parties . The Committee is made up of 4 representatives of ESO, and one each from CNRS and PPARC.

Chile:

Comision Nacional de Investigacion Cientifica y Tecnologica (CONICYT)

Chile will host the LMA site and will receive 10% of the observing time on the array.

II. JOINT PROJECT: The LMA project will be established by a Memorandum of Understanding (MOU) between the NSF and the ECC (hereafter, the major partners). The MOU will initially cover a common 3-year design and development program, but will be extended,

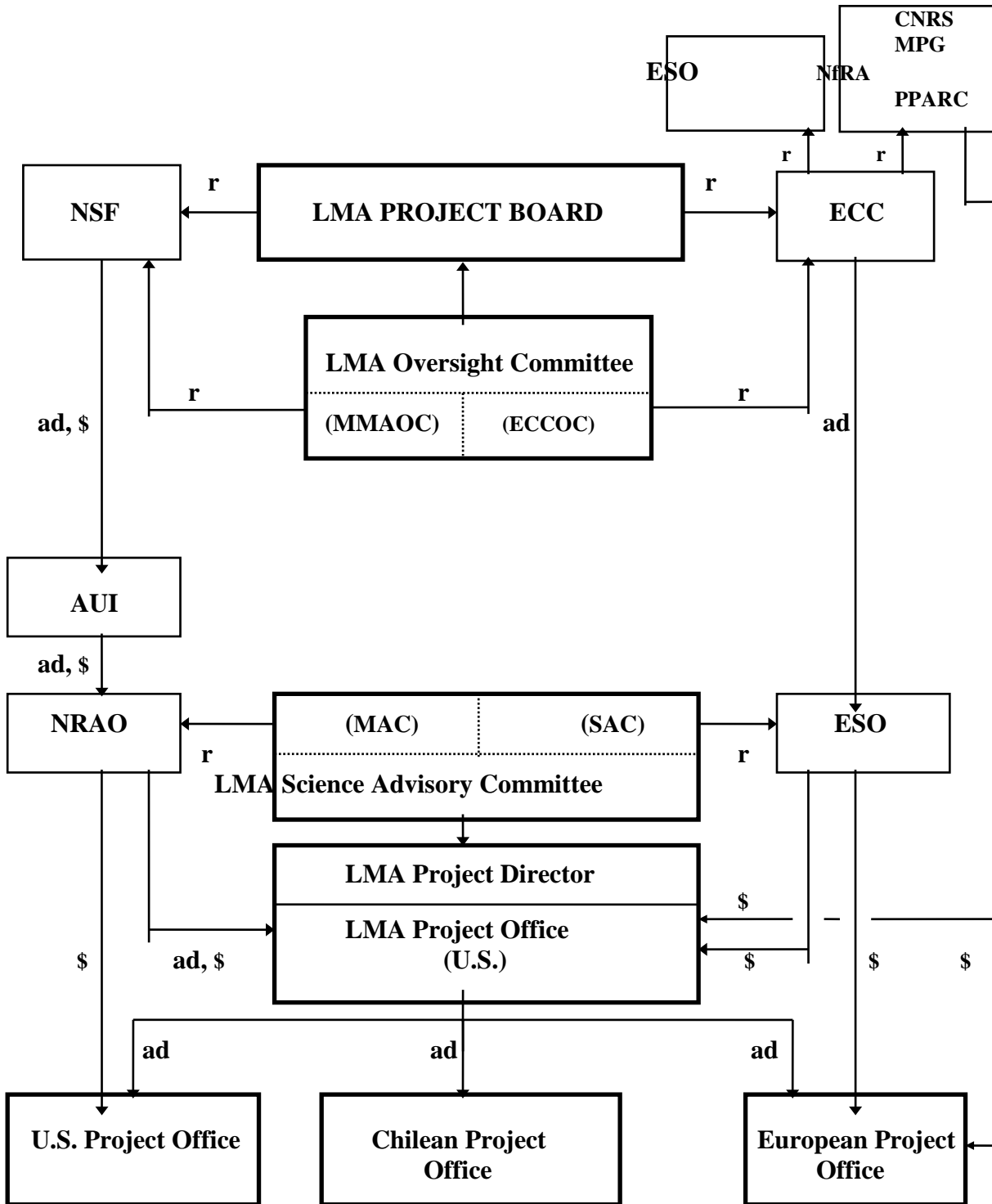
upon mutual agreement by the major partners, to encompass the capital construction and operating phases of the project. A draft U.S.-European MOU is attached to this document as Appendix I.

Separate use agreements will be signed, as required, between LMA project representatives and CONICYT to enable the construction and operation of the array to be carried out.

III. ORGANIZATION: A successful organizational structure for the LMA project should embody the highest possible degree of integration of the scientific, administrative, fiscal, and technical aspects of the project; in this way the efficiency of the project will be maximized and redundancy and expense minimized.

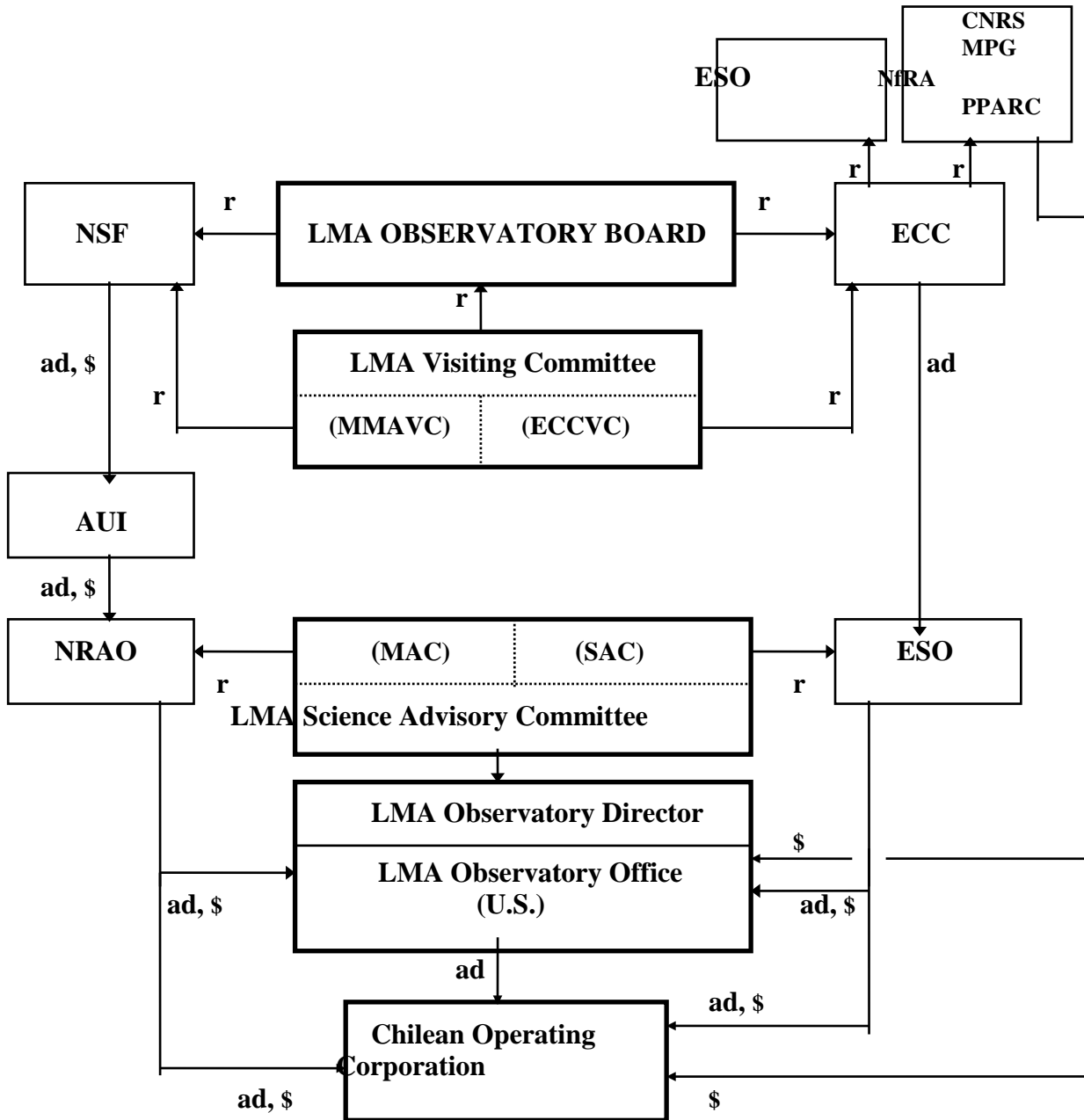
Schematic proposed organizational diagrams for both the development/construction and operations phases of the LMA project follow. Lines of responsibility are labeled as administrative (**ad**), reporting/advisory (**r**), and financial (**\$**).

**IV. LARGE MILLIMETER ARRAY ORGANIZATION:
DESIGN AND CONSTRUCTION PHASES**



V. LARGE MILLIMETER ARRAY ORGANIZATION:

OPERATIONAL PHASE



VI. DESCRIPTION OF PROJECT ORGANIZATIONAL ELEMENTS

LMA Project/Observatory Board

The LMA board will be established by the MOU and charged with the governance of the project. The LMA Project Board will function as the Executive Board for the design and construction project and will transition into the project's operational successor, the LMA Observatory Board. The Board will be composed of members from the NSF and the ECC, with numbers in proportion to financial contributions. The LMA Board will also include one representative from the Republic of Chile. Board members are charged with defining the annual budget for the project, ideally to be split 50/50 between the two major project partners (NSF and ECC). The Board will provide agency-level oversight and in the operational phase will respond to initiatives, opportunities, or special needs brought to its attention by the Project Director (*e.g.*, for new hardware). The constitution of the group from both the NSF and the ECC will include individuals responsible for agency programmatic and individuals with responsibility for the commitment of funds. The position of Board Chair will rotate annually between a member appointed by the ECC and a member appointed by NSF.

LMA Oversight/Visiting Committee

The Oversight Committee will serve at the pleasure of the LMA Board and will provide independent oversight of the management of the project for the NSF and ECC. Specifically, they will review the Project Office and provide an assessment of the project management, technical achievements, and the scientific operations. The LMAOC will be composed of members appointed by the NSF and the ECC, with numbers in proportion to financial contributions. The LMAOC will combine the membership of the NSF's Millimeter Array Oversight Committee and its European counterpart; because there may be instances in which NSF or the ECC desire or require separate advice relating to their part of the project, the appropriate members of the LMAOC will be convened to function in their original oversight committee capacity.

During the operations phase, the Oversight Committee will become the LMA Visiting Committee. The VC will advise the LMA Observatory Board on broad operational, managerial, and policy-level issues associated with the LMA. The LMAVC will be composed of members appointed by the NSF and the ECC, with numbers in proportion to the financial contributions of the two major partners. As in the case of the LMAOC, the VC will be able to split into two separate committees to advise the individual major partners on an as-needed basis.

LMA Project/Observatory Office and Director

The Project Office, to be located in the U.S. and established by the NRAO, will provide the overall management of construction, and later, operation of the joint array. The chief administrative officer is the Project Director, to be nominated by AUI, and confirmed by the LMA Board. The Project Director will be assisted by two deputies, the U.S. Project Manager and the European Project Manager. The Project Director has the responsibility to coordinate and manage the efforts of the U.S. Project Office and the European Project Office. The Project

Office will include the project management staff that will define all project interfaces and procedures.

During the operations phase of the project, the Directorship will rotate every 5 years between candidates proposed by AUI and the ECC. Successful candidates will require approval by a majority of the LMA Board, will serve at the pleasure of the Board, and will be subject to annual performance review by the Board.

LMA Science Advisory Committee: The LMAC provides advice to the LMA Project Director, and later the Observatory Director, on issues related to the scientific mission and technical capabilities of the LMA. It will function as a vital communications channel to the scientific community which will use the LMA. The LMA will combine the personnel and functions of NRAO's Millimeter Array Advisory Committee (MAC) and the ECC's Science Advisory Committee. As in the case of the LMAOC, if need be the LMAC can split to offer advice to either side of the project.

U.S. Project Office and Project Manager: The U.S. Project Office, headed by the U.S. Project Manager, has the responsibility to manage the resources provided by the NSF for the U.S. share of the project design and development and construction. This will include management of the fabrication of all the array instrumentation (hardware and software) assigned to the U.S. Project and delivery of that equipment to array operations in Chile. In the operations phase, the office will be subsumed within NRAO; its functions will include the scientific management of the U.S. proposal process and use of the array by the U.S. scientific community. The U.S. Project Manager will be appointed by the NRAO Director.

European Project Office and Project Manager

The European Project Office is the European image of the U.S. Project Office. The European Project Manager will be appointed by the Director General of ESO.

Chilean Project Office

The Chilean Project Office will be responsible for carrying out all Chile-related aspects of the project; this will include site-development work, as well as dealing with all civil permits, labor, and importation issues. The head of the Chilean project office will report to the LMA project office.

Chilean Project Foundation

A not-for-profit Foundation will be chartered under the law of the Republic of Chile to operate the array in Chile. The Board of Directors of this Foundation will include equal representation by NRAO and ESO representatives. A Chilean representative will also serve on the Board of Directors; this representative is to be appointed by CONICYT. The purpose of the Foundation is to provide a legal entity in Chile that can formally operate the array, contract for services and employ people.

Director of Chilean Operations (Operations Phase)

The Director of Chilean Operations is appointed by the Board of Directors of the Chilean Foundation. This individual has the responsibility for all aspects of construction and operations of the array in Chile, and will serve as deputy to the Project Director. The Director of Chilean Operations will develop the observatory in Chile by hiring a staff, seeing that they are trained, providing all needed facilities, and in the operational phase is responsible for the proper execution of the scientific program according to the needs of the scientists whose research is scheduled on the array.

VII. PROJECT VALUATION

A number of factors make it challenging to define fair proportional contributions during the construction and operations phases of the project. These include fluctuations in currency exchange rates, differences in the way that European and U.S. institutions deal with procurement, different approaches to the valuation of labor rates, and the manner in which “in-kind” contributions are likely to be assessed. However, the inherent modularity of interferometers – *viz.*, antennas, receiver packages, and to a lesser extent, correlator capacity, can be added or subtracted to the core project with relative ease – suggests that many of these difficulties can be sidestepped by, as far as possible, denominating project contributions in deliverables rather than in currencies.

We propose that the U.S. and European LMA partners (i) agree upon a baseline project (*i.e.*, number of antennas and their diameter), (ii) negotiate a breakdown of project costs for this design, and (iii) thereby assign a proportional breakdown of contributions. (The project work breakdown structure, which will be jointly established by the European and NRAO project management teams, should be regarded as the final authority in defining the total project.) The breakdown of deliverables can be made in any manner, so long as the overall division is proportional to the contributions of the major partners (it would not, for example, be reasonable to divide responsibility for the correlator between the two major LMA partners; rather one or the other should carry out the entire task).

It is expected that this approach will enable the costs for perhaps 80% of the project to be valued and assigned proportionally to the two major partners. The remainder of the work, (including, for example, the site development costs) will unavoidably require currency valuation. These items, which should be readily extracted from the project work breakdown structure, will require probably separate discussion to establish the requisite currency contributions. These should be set at the start of the project, and denominated in a commonly-agreed-upon currency, thus ensuring the maximum stability of the partnership’s share values.

Annual operating budgets will be established through negotiations between the LMA Board and the NSF and ECC. Currency contributions from the two partner entities will be necessary to support the Chilean LMA corporation. Non-Chilean operational tasks for the LMA (such as receiver repair) will be the responsibility of ESO or NRAO. The apportionment and valuation of these tasks should be made according to delivered outcome, not end-user cost. The total of

the currency and task contributions will define the partnership allocations (and thus, annual observing fractions).

VIII. FUNDING FLOW

During the design and development and construction phases of the LMA project, all funding for deliverables will flow through the NRAO and ECC partnership facilities. Funds for the ~25% of common operating functions will flow to the LMA Project Office via NSF. Cash flow for the operations phase of the project will be determined once the actual operating parameters of the Chilean LMA corporation have been established.

R. L. Dickman
January 6, 1998