

Socorro ALMA SW Management Meeting

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1. Introduction

This document contains the minutes of a meeting the authors held in Socorro from Sept. 27-30 to discuss ALMA SW management issues. It must be understood that the activities discussed are for Phase 1. Phase 2 activities are to be discussed at a later time, although we of course expect there to be some continuity of activities.

2. Draft Software Management Plan

2.1. Mission Statement

The mission of the ALMA Software Group during Phase I is to:

- ◆ Provide support required to enable antenna evaluation tests; and
- ◆ Engage in analysis, design, and prototyping activities to be prepared for Phase 2; and
- ◆ Evaluate technology for suitability for use in implementing software systems in phase 2.

2.2. Organization and Resources

This section describes the joint organization of the software effort. In general management structures that occur in only Europe or the US are not described here. For example, members of the European Software group who are not able to participate actively on a continuing basis are not shown on this diagram since they are expected to be a part of the European organization only. Similarly the various US oversight committees are not shown. On the chart most boxes contain the primary institute responsible for its activities. Individual names are shown for the top-level management, and for the chair of the Science Software Requirements Committee. TBC means, "to be confirmed."

In general we wish to consider ourselves a single software group, more dispersed than we would like. When practical we wish to encourage technical exchanges to promote this view.

US:

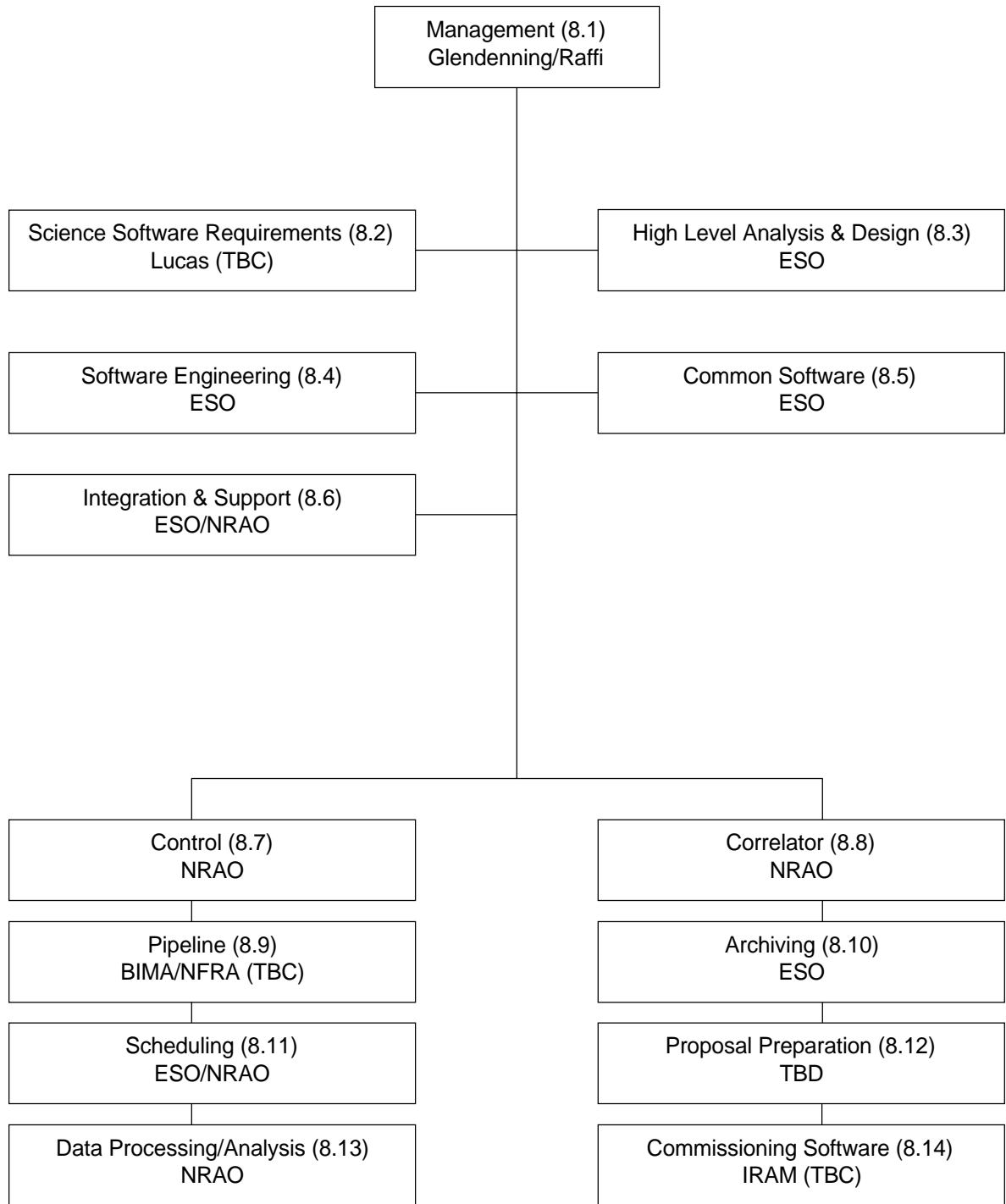
- ◆ NRAO: 6 FTEs SW group, 0.5 FTW Webmaster, 1 FTE from AIPS++ available for ALMA
- ◆ OVRO: 0.15 (Steve Scott)
- ◆ BIMA/NCSA: ~2 for image pipeline project, very loosely coupled.
- ◆ Science Software Requirement: 0.5 distributed amongst several institutes.

Europe (all TBD):

- ◆ ESO 4
- ◆ IRAM 0.6
- ◆ NFRA 0.2
- ◆ Science Software Requirement: 0.5 distributed amongst several institutes.

Planning will be done around main Milestones for next year. Responsibilities will be defined on the basis of what US and European Institutes have suggested so far. (Gianni intends to discuss responsibilities, but to confirm this later after discussion with Dick and cross-checking interests at European meeting).

We think it would be useful to set up regular (monthly?) phone meetings



2.3. WBS, Milestones, and Deliverables

The following WBS is chosen so that level 2 corresponds directly to the joint organization.

WBS	Description	Deliverables	ESO ¹	NRAO	Other	Total	Est. ²
8.1	Management	99Q4: SW Management Plan ³ 00Q1: European/US joint meeting 00Q3: European/US joint meeting	0.7	0.7		1.4	1.4
8.2	Science Software Requirements	99Q4: Kickoff meeting 00Q1: Requirements v1 ⁴ 00Q3: Requirements v2 ⁵	0.3		1	1.3	1.3
8.3	High Level Analysis & Design	00Q1: Joint Design Concept ⁶ 00Q2: 1 st Analysis 00Q4: Design	0.6	0.15	0.15	0.9	1.5
8.4	Software Engineering	99Q4: SE Practices Review ⁷ 00Q1: Setup SW repository 00Q2: Test bench setup 00Q4: Setup final procedures	0.2	0.1		0.3	1
8.5	Common Software	99Q4: Requirements v1 ⁸ 00Q1: Design 00Q2: CORBA feasibility 00Q3: ACS v. 0 00Q4: KP prototype	1.8	1		2.8	3
8.6	Integration and Support	00Q4: Implementation plan ⁹	0.05	0.05		0.1	0.1
8.7	Control Software ¹⁰	99Q4: KP VCS test 99Q4: Antenna interface 99Q4: M&C interface review 00Q1: Analysis & Requirements PDR (VCS) 00Q2 CDR (VCS) 00Q3 Release (VCS) 00Q4 KP Holography tests (VCS) 00Q4: Design (ACS)	0.2	3		3.2	3.2
8.8	Correlator Software	99Q4: Test correlator requirements & analysis PDR 00Q1: Deliver test correlator SW		1		1	1

¹ Effort in FTEs.

² Estimate (crude) of the effort required for the anticipated activities.

³ Initial draft by Brian.

⁴ Feature list, some use cases.

⁵ More detailed, complete use cases.

⁶ Brian & Gianni take responsibility, however may be the work of others.

⁷ NRAO Draft should be finished and become initial document.

⁸ Feature list, initial draft by Gianni.

⁹ Phase 1 (single dish tests) only.

¹⁰ Discussion on M&C sub-group role clarified that it should produce HW and HW related standards and drivers for control and electronics. They would then be contributed to the common SW distribution, to encourage/force common use. As such it is an example of common software done outside the Common software group.

		00Q2: Prototype correlator HW interface design 00Q4: Prototype correlator analysis PDR					
8.9	Pipeline Software	00Q2: Concept 00Q3: Pipeline requirements 00Q4: Pipeline prototype evaluation	0.1		0.5	0.6	0.6
8.10	Archiving	00Q2: Concept 00Q3: Pipeline requirements	0.1			0.1	0.5
8.11	Scheduling	00Q2: Evaluate SW 00Q3: Scheduling requirements 00Q4: Dynamic scheduling studies	0.1	0.2		0.3	0.6
8.12	Observing Preparation/Support	00Q3: Concept 00Q4: Requirements				0	0.2
8.13	Off-line Data Processing/Analysis	00Q2: Requirements 00Q3: Reuse analysis 00Q4: Performance specifications		0.5		0.5	0.5
8.14	Commissioning Software	00Q1: Requirements 00Q2 Reuse analysis 00Q3: Release 0 ¹¹			0.2	0.2	1
			4.15	6.7	1.85	12.7	15.9

3. Science Software Requirements Committee

We decided that the time is not right, and this is probably the wrong committee, for operator requirements.

The enclosed was sent to the AEC 1999-09-27:

Gentlemen -

Gianni and I discussed the Science Software Requirements (SSR) committee today and came to the following conclusions. Please let us know of any objections or comments you might have.

1) The SSR committee should be a joint committee between Europe and the US (much like the science committee is becoming).

2) We both agree that Robert Lucas would be an appropriate chair, but perhaps the chair should be chosen by the committee itself. We ask for your advice on this issue.

3) Joe Schwarz of ESO would act as the committee editor (and make sure documents get produced in a timely way). He would later be the person linking the requirements to the Use cases and to the Analysis and Design phase.

4) If the committee chair is Robert he should send out the first committee email. Otherwise Joe should proceed with his request, taking into account the input of this e-mail.

5) The committee should meet by phone before the ESO face to face meeting. Brian thinks that an "operational concept" 1-2 page document

¹¹ Support required for Tucson holography tests.

is needed before serious requirements work can start. Perhaps this is just a collection of a few of the highest-level requirements. Detailed requirements shall follow. Existing documents (e.g., requirements, memos) shall be used as a basis to start where possible.

6) Late January would be a good date for a first draft of high-level science requirements, and then reviewed according to the procedure we will have defined.

8) The process in Joe's Sept. 23 email message (included for Bob and Peter) looks good to Brian, except that he would add that the whole committee should try to meet by phone regularly, perhaps once per month. If Robert is the chair he should try to attend the US face-to-face meeting.

9) The committee is advisory to Brian and Gianni, not an oversight committee.

To: guillote@iram.fr
CC: graffi@eso.org, rkurz <rkurz@eso.org>, mperon@eso.org, gchiozzi@eso.org
Subject: ALMA Software Requirements -- First Step?
Content-Type: text/plain; charset=us-ascii
Content-Transfer-Encoding: 7bit

Dear Stephane,

Gianni, Michele, Gianluca and I have discussed how to proceed with the collection of software requirements for ALMA, and we have come up with the following idea:

1. We send out an e-mail to the European SSR and to the five Americans (Barry Clark, Mark Holdaway, Jeff Mangum, Steve Scott, Mel Wright) who have agreed to fill a similar role on the US side asking for operational requirements, i.e., operations concepts and implementation considerations.
2. I try to put these together into a coherent document, identifying those areas where there is disagreement or where obvious questions have been left open. This document should be ready for distribution at the seminar in Garching at the end of October. We would send copies to everyone who doesn't come to the seminar (probably some/all of the Americans; it doesn't seem worth it to ask them to make a long and expensive trip for a meeting that discusses mostly UML, software engineering practices, and other things which are mostly of interest to the software developers).
3. We discuss the document at a session during the seminar.
4. After working the results of this discussion into the document, I go to the US to discuss it in more detail with the Americans.
5. Goal: a first draft of a requirements document in January or February.

I very much want to work in the two weeks in Grenoble that you suggested when we talked last week, but I have been reminded that the requirements can't wait for me to get smart.

I would like your opinion of this plan, and your suggestions for the way to phrase the first e-mail so as to elicit the best possible response. Should it come out from more than one of us, for instance from you, Robert Lukacs and myself?

If you would like to discuss this by phone, please let me know a good time for me to call you (other than tomorrow morning).

Thanks for your help.

Regards,

Joe Schwarz

4. Documentation

4.1. Formats

MS Word and PDF appear to be suitable and not controversial. Use of DOORS and other UML tools must be investigated.

4.2. Review Procedures

Principle: All items of significance will be reviewed according to agreed upon review procedures. At least one US and European reviewer will be chosen – this will help keep all groups informed about activities. Note that travel should not be necessary – we anticipate being able to handle this with phone meetings or perhaps video-conferencing.

Procedure:

- ◆ Document available 2 weeks before on Web. (May require more than two weeks in advance for the first few reviews).
- ◆ Author announces it to the whole SW group and requires comments.
- ◆ Some people are explicitly asked by B&G to comment
- ◆ Comments are sent by e-mail within 10 days. Replies are appended by author and circulated before meeting.
- ◆ Only controversial comments are discussed at the review (max 2 hours - if more then it is split in parts).
- ◆ The author circulates final acceptance or rejection of comments. A new version of the document is produced with change bars.

The whole process should last 3 weeks from when the document was put on the Web as a draft for review. It is advisable that some comments be elicited before the review so that the document to be reviewed has already had one round of comments. For example, B&G could send comments or designate one/two people to do so. This is to make the review more effective and to try to head off big controversial issues.

This procedure shall be described in the SE document (to be reviewed).

Putting these procedures into place may slow down the NRAO PDR schedule. Setting the right precedent makes this worthwhile.

5. Antenna Interfaces

We had a long discussion about antenna interfaces. One possibility is that we negotiate with the vendor to use an approved RTOS and computer platform (e.g., VxWorks, VME, PPC) and use an API rather like the Heald et. al. draft. Another possibility would be to define a physical connection (e.g., CAN, Ethernet) and a series of messages we will exchange. This latter is what the RFP assumed. No final conclusions were reached.

If the API formed the basis of an ICD for the contractors, Gianni would possibly like to add a database interface so that information can also be retrieved from there and make a convenient interface for a Common SW layer on antenna CPU. The whole area is still vague and more discussion is needed.

The contractor would not be required to know anything about the common software, although he could make use of it if he so chose.

The API should become a precise ICD with lists of commands etc and be reviewed, possibly at the European meeting.

In a later meeting we decided that there are essentially four models of antenna interface that we could specify:

1. We take whatever the vendor offers and adapt to it on the assumption that they have made many such controllers and this is significantly less risky.
2. We could specify a command list and physical interface (e.g. CAN, Ethernet). This is essentially what the RFP specifies. There are varying opinions about whether we should specify platform (RTOS, HW platform) under this scenario.
3. We could specify an API and RTOS – i.e. we would run in the vendor's computer. Some argued there was a risk of finger pointing (e.g. if our software misbehaves).
4. We could specify an API and platform, but allow the vendor to implement this by communicating via his favored bus to his "real" ACU.

6. Computer Architecture

We had a small group meeting on this issue. The NRAO concept has all devices except for the video camera and possibly the total power data on the CAN bus. Raffi argues that devices that are sufficiently complex, which would include the ACU, should be as visible as possible, which he argues means that those devices should be on a general-purpose LAN.

7. Common Software

Raffi and Glendenning agree that an ALMA Common Software (ACS?) effort which would (nearly) simultaneously analyze and design high-level (alarms, logging, etc) services and do a feasibility study of CORBA makes sense. Both sides could put effort into this, perhaps ESO at the ~2 FTE level and NRAO at the ~1FTE level. This would be a completely new software base.

Both of us agree that this approach is too risky to rely entirely upon for the test antenna. We should "bank" one safe solution (VLT SW based if the current project goes well) even though we might never deploy it if the new ACS proceeds at a good pace.

Discussion on CORBA feasibility project, within the Alma Common SW (ACS)

- Feasibility of technology mainly. Performances can be tested later.
- In fact the main activity will be to prototype first components of ACS on CORBA, like message passing (and values retrieval), errors and logs.
- Afterthought: to close feasibility study of an ACS version 0 based on CORBA one could use the idea of repeating test with KP TCS, as will be done now with VCS (VLT common SW). As this will be done with the prototype of ACS, it could be at soonest June next year. This would keep also the two main teams ESO/NRAO linked to this project).

8. Design Concept

It was agreed that the work done on this by the control group should be generalized. This should become a top-level joint NRAO/ESO document and be formally reviewed. B&G would have to take responsibility for its content (functional spec of the project, HW architecture, and SW breakdown). They will submit it for comments to the SRR and Gianni to the European SW group.

This document will be a top-level document, cross-checked with requirements as they come along. It will be also the basis for a re-evaluation of the FTEs needed for the whole project, so that one can see how far we are from objective (limited now to Phase I). It will also be of use for disseminating the computer network concept.

9. Actions

- ◆ Brian and Gianni to take responsibility for producing high-level design concept.
- ◆ Brian and Gianni to produce software management document.
- ◆ Gianni to clarify with Dick the role of interested people at European institutes who are not able to spend a significant amount of time on the project. Advisory committee that meets ~2x per year?
- ◆ Brian and Gianni to set up phone meetings (management and joint).
- ◆ Brian to produce SW management plan draft.
- ◆ Gianni to produce ACS requirements draft.