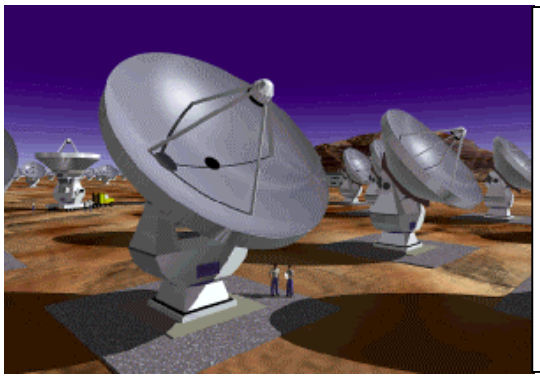

Atacama Large Millimeter Array	ALMA-SW-NNNN Revision: 2 2001-05-15

ALMA Software Management Plan – Phase 1

Software Plan

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1 Introduction

1.1 Purpose

This document contains the joint European/US management plan for software activities in Phase 1 (concluding at the end of 2001) of the ALMA development effort. This document will be followed by a document describing the Phase 2 activities.

1.2 Mission statement

The mission of the ALMA software (computing) groups during phase 1 is to:

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

1.3 Glossary

It should be noted that a Project Glossary for terms relevant to software is available at

http://www.alma.nrao.edu/development/computing/docs/joint/draft/Glossary.htm

1.4 References

[1] ALMA-SW-Draft, 2000-07-28, Software Development Process, Methodology and Tool, G. Chiozzi, R. Karban, P. Sivera

2 General Description

2.1 Project overview

The software project has been split in a first level WBS structure. Responsibility for WBS elements at the first level has then been assigned to teams.

The teams activated are:

Management (Mgmt) (Chair: Glendenning, Raffi)

Science Software Requirements (SSR) (Chair: Lucas – participants: alma-sw-ssr)

Analysis and design (A&D) (Chair: Schwarz - participants: alma-sw-analysis)

Software Engineering (SE) (Chair: Filippi – participants: alma-sw-practices)

Alma common software (ACS) (Chair: Chiozzi – participants: alma-sw-common)

Control software (CS) (Chair: Glendenning – participants alma-sw-control)

Correlator software (COS) (Chair: Pisano – participants:alma-sw-control)

Telescope calibration (Chair: Lucas – participants TBD)

The Teams which were not yet activated are:

Pipeline (PS)

Archiving (ARC)

Scheduling Proposal preparation (PP)

Off-Line Data Processing and Analysis (DP&A)

Integration and support (I&S) (ESO/NRAO)

Operations (not to be activated in Phase 1)

2.2 Organization (2nd level WBS)

The organization chart shown in Figure describes the organization of the software effort. The numbers refer to the (second-level) WBS number for that activity. Gray boxes do not yet have any identified significant (greater than 0.3 FTE) resources supplied for them (see Figure 1,below). Clear boxes have allocated effort, perhaps inadequate. Allocated resources are only counted in this figure if they come directly from an ALMA budget or in-kind contribution.

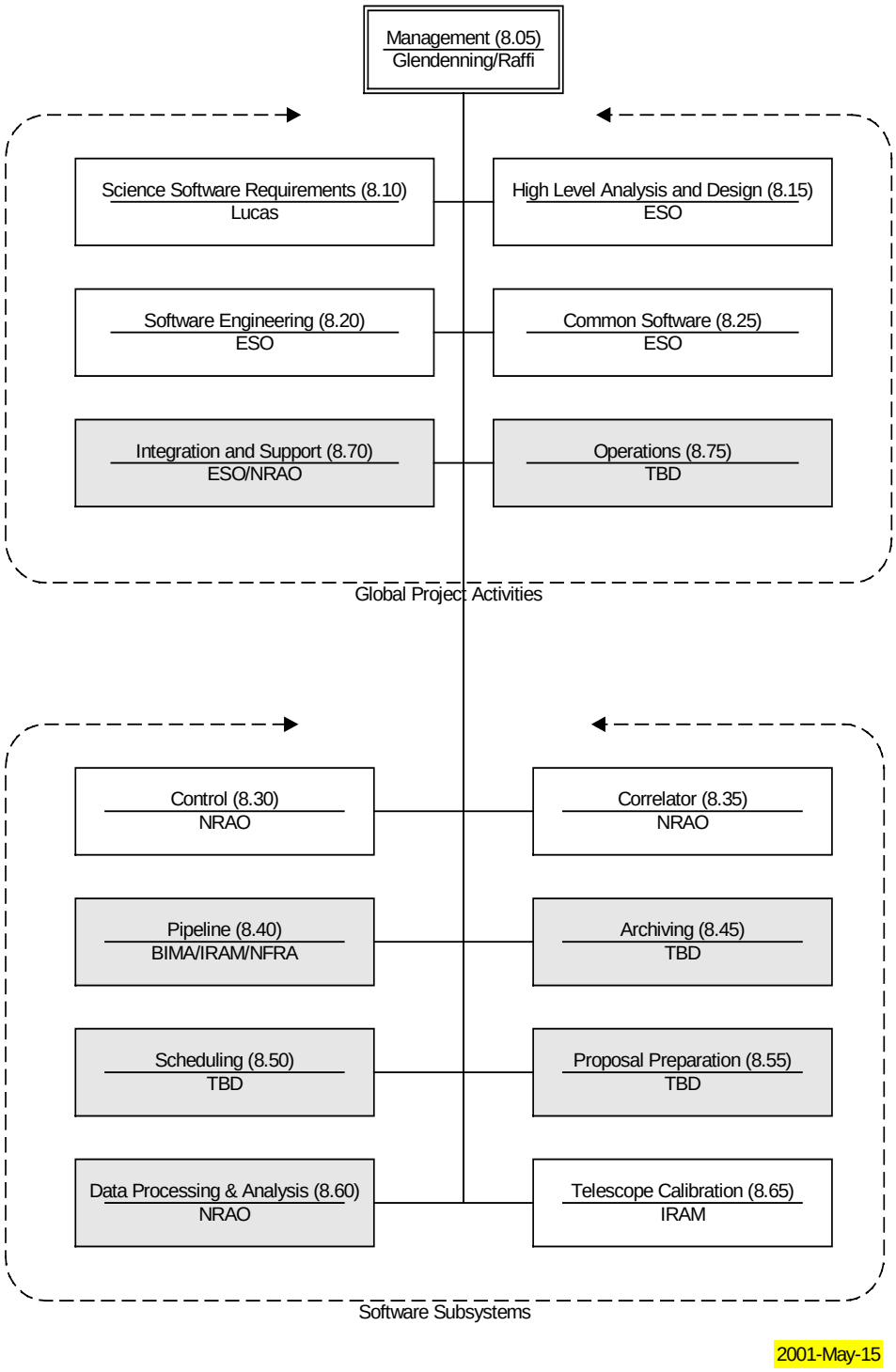


Figure 1. ALMA Software Organization

3 Project Procedures

3.1 Development Plan

It was assumed that Phase 1 should arrive to the architectural design level for those areas where no prototypes are involved. Where prototypes were involved, this work shall be completed. In areas where preparatory work should better be done in Phase 1 (like the ALMA common software) this has been put into account in this planning.

3.2 Review and Reporting Plan

A system of formal reviews for software documents is in place and is applied systematically. This will force the software team to reach explicit agreement in all areas before development occurs. The Procedure for review is in short:

- The document is brought to a stage where Software Management agrees that it is mature for review. This normally implies that a number of iterations with comments/ replies and editing of the document have already occurred. In this phase comments are solicited normally by the author.
- The document is announced to alma-sw-announce for review and a panel of reviewers is nominated by Software Management. Reviewers can also represent System Engineering and Science, particularly for PDR documents.
- Comments are sent to the main author and he replies collectively to all reviewers and people who commented. Normally two weeks are needed for this.
- A telephone review meeting occurs, where only controversial replies are discussed. The meeting is chaired by one of the Software Managers or a person delegated by them. Minutes are circulated after this meeting. It should be clearly indicate if the review was passed.
- When a document is approved, nevertheless a final editing is needed to include the replies to the comments received and the outcome of the review meeting. Once this is done by the author, the document is listed as a reviewed document on the Web.

3.3 Test Plan

(TBD by Software engineering team)

3.4 Documentation Plan

This is defined in [1]

3.5 Change management Plan

A system to submit change requests and problem reports has been installed under

http://support.eso.org/ars/cgi-bin/arweb?go=Login+into+the+ALMA+SPR+System

It is based on Action Remedy and allows to enter proposals and send them to the concerned developers. Proposals are called Software Problem Reports (SPR) in this system, even if they are change or upgrading requests.

The first step after submission of an SPR, is that the person responsible for the software module concerned should append a comment. The comment should not only indicate how the change can be done, but also indicate an opinion on urgency and feasibility of the change. It could also be a conclusive remark, typically a clarification, with a recommendation to close the SPR.

The authority to decide on SPRs is the Software Configuration Control Board (SCCB) that for the time being is formed by the Software Managers. The software developers responsible for the various changes should also take part to the SCCB meeting, so that a conclusion can be reached within the meeting for a large number of open SPRs.

3.6 Training Plan

This is applicable to Phase 2. There is no formal training foreseen for Phase 1.

3.7 Installation and Operation Plan

A Test Interferometer Software Installation plan will be defined as a separate document.

4 Project Planning

4.1 Milestones and Schedule

These are provided on the attached sheets which are filtered directly from the same Microsoft Project file that senior project management uses for tracking software milestones

4.2 Staffing

4.2.1 Overview

The following table lists the staff available for ALMA software development by institute. It considers only software development staff, excluding, for example, Web site administration. It also only considers staff directly managed paid for, or contributed in-kind, to ALMA.

It is our belief that individuals must be devoted to a single area at about the 25% level before they can be counted on to accomplish any original development. The number in brackets lists the staff effort available if this correction is made. That is, an institute that has one person at 50% and five people at 10% would be listed as: 1.0 (0.5). We recognize that such limited efforts are useful in the context of meetings and reviews.

	1999	2000	2001
ESO	1.0 (0.6)	3.0 (2.5)	5.8 (5)
IRAM		1.9 (1.1)	2.2 (1.1)
MPIfR		0.8 (0.8)	0.8 (0.8)
RAL/ATC		0.3 (0)	0.3 (0)
NRAO	4.5 (4.5)[1]	6 (6)	7.5 (7)
OVRO	0.1 (0)	0.1 (0)	0.25 (0.25)

4.2.2 Detailed

See the following table, where the FTEs estimated and committed for Phase 1 can be compared, relative to Year 2000.

For Year 2001 the estimated resources are given as a total in the last column, in a second row.

	Description	EU	US	ESO	NRAO	Other	Total	Est.[2]
	Management (ESO,NRAO)	0.9	0.9	0.7	0.7	0.4	1.8	1.8 1.0 (2001)
	Science Software Requirements (Lucas - IRAM)	0.9	0.6	0.3	0.3	0.9	3.5	1.5 0.5
	High Level Analysis & Design (ESO)	0.7	0.2	0.6	0.15	0.15	0.9	1.5 (-0.6) 1.5
	Software Engineering (ESO)	0.6	0.2	0.4	0.1	0.3	0.8	1.4 (-0.6) 1.0
	Common Software (ESO)	1.9	1.1	1.7	1	0.3	3.0	3.0 3.5
	Control Software (NRAO)	1.2 1.5	3	0.6	3	0.6	4.2	4.2 4.5
	Correlator Software (NRAO)	0.3	1		1	0.3	1.3	1.3 1.3
	Pipeline Software (BIMA,NFRA,IRAM)	0.2	0.2			0.4	0.4	0.4 0.5
	Archiving (TBD)						0	0.1 (-0.1) 0.3
	Scheduling (NRAO)						0	0.6 (-0.6) 0.5
	Proposal Preparation (TBD)	0.2		0.2			0.2	0.2 0.3
	Off-line Data Processing/		0.5		0.5		0.5	0.5

[1] Authorized positions is 6.0. Reflects the staffing-up of the group over the year.

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

	Analysis (I/F) (NRAO)							0.2
	Telescope Calibration Software (IRAM)	0.2				0.2	0.2	0.4 (-0.2) 0.4
	Integration and Support (ESO,NRAO)	0.1	0.1	0.1	0.1		0.2	0.2 0.4
	Operations							0.0
		7.2	8.0	4.6	7.0	2.8	15.2	17.1 15.9

4.2.2.1 Summary conclusions on estimated effort

The planned number of FTEs to be reached in 2000 was estimated to 17.1. Out of this it had been anticipated that Institutes would commit to 15.2 FTEs and therefore there would be a mismatch of 2 FTEs. In reality it turned out that the anticipated commitments by Institutes (e.g. ESO) were not at the level expected and the level of FTEs contributed was in the order of 12 FTEs, with 5 FTEs missing. However if one would consider effective FTEs (people working at least 25% of their time) as one should, the mismatch was as high as 6.7 FTEs (more than one third missing).

Even accepting a large tolerance in the planned FTEs, it is clear that such big mismatch could not be absorbed. This, together with the overhead involved in getting the US/Eu groups integrated, explains why Milestones had to be rescheduled and simplified, leading to a less ambitious Phase 1..

The planned (estimated) FTEs for 2001 have now been estimated in a more conservative way, cutting effort down to a minimum. Under this hypothesis and foreseeable extrapolations of contributions for 2001, while we seem to be able to match FTEs in terms of total contributions (sum of all the committed FTEs, even if they correspond to a low level of effort), this is not the case for effective FTEs (the sum of contributions above 25%). In the latter case we will probably still be 2.5 FTEs below what we would need. The impact of this is particularly visible in the activities that have not been started yet, in particular the data flow ones.

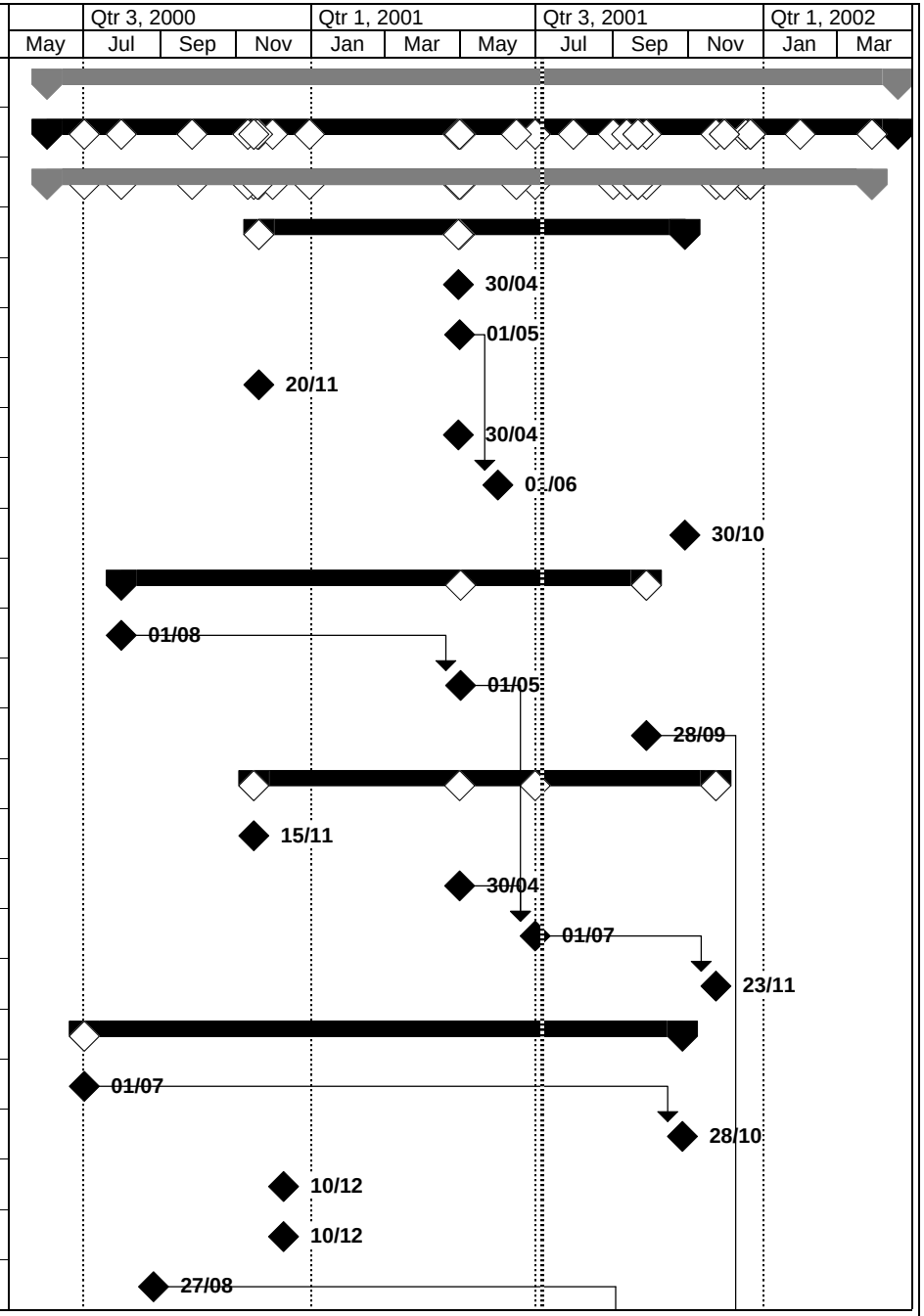
4.3 Budget

In this section we only consider travel and equipment. People are paid for through a combination of direct ALMA founding and institutional contributions to ALMA.

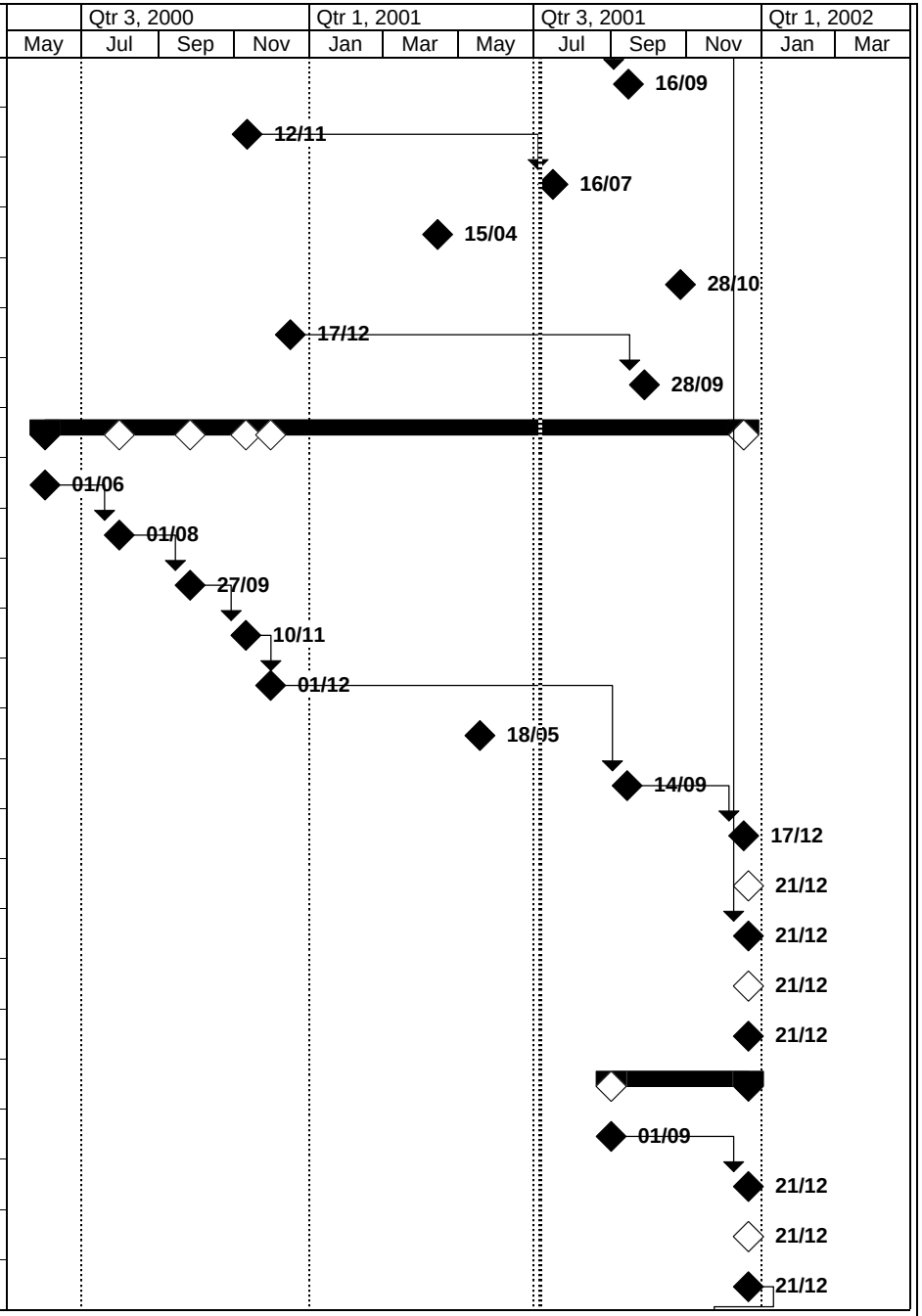
Equipment should include: money for prototypes and computer models (the latter at least at NRAO and ESO). The cost for software licenses for products to be used by all developers should be foreseen by all participating Institutes(e.g. for Rational Rose licenses). Global agreements for this will be put in place whenever possible.

Travel budget should also be foreseen to allow participation to all software workers (above 25% FTE threshold) to two joint software meetings per year (one in Europe and one in the US). To the above list of people the trips to participate to the SSR committee activities should be added. Specific travel within the context of other WBSs above should also be considered.

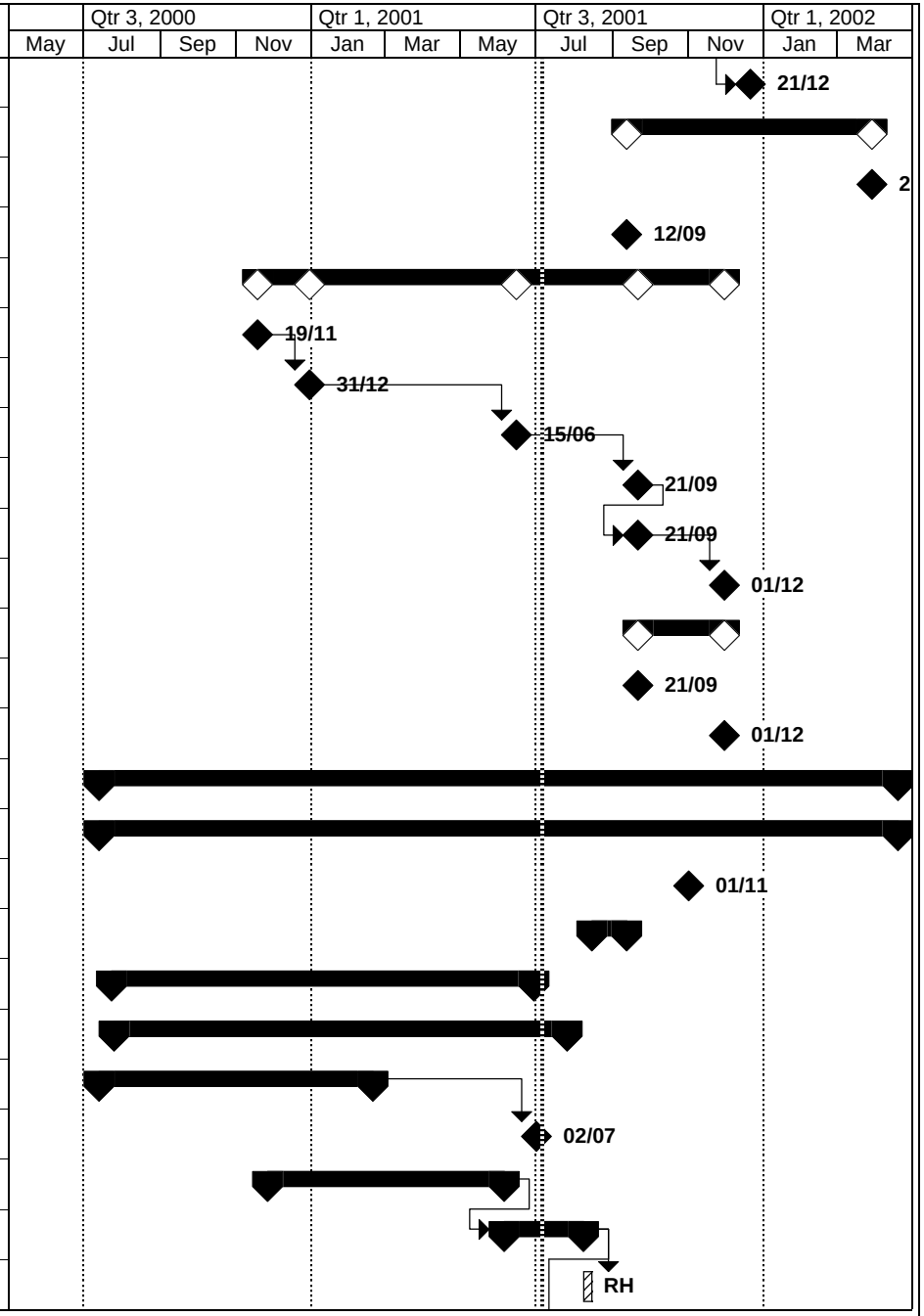
ID	Task Name	Milestone Type	Finish
0	**Computing Subsystem**		**Fri 19/04/02**
1	**Computing Development (Phase 1)**		**Fri 19/04/02**
2	**Computing Subsystem**		**Fri 29/03/02**
1	**Management**		**Tue 30/10/01**
2	Phase 1 Software Management Plan	Division	Mon 30/04/01
3	Phase 2 DRAFT Software Management Plan	Division	Tue 01/05/01
4	US/European Joint Software Meeting	Project	Tue 21/11/00
5	European/US Joint Software Meeting	Project	Mon 30/04/01
6	Deliver Phase 2 DRAFT Computing Plan	Major	Fri 01/06/01
7	US/European Joint Software Meeting	Project	Tue 30/10/01
8	**Science Software Requirements**	**Major**	**Fri 28/09/01**
9	Feature List	Group	Tue 01/08/00
10	Science Software Requirements Vers.2	Project	Tue 01/05/01
11	Pipeline and Off-line Data Proc.Requirements	Division	Fri 28/09/01
12	**High Level Analysis and Design**		**Fri 23/11/01**
13	Computer Design Concept	Major	Wed 15/11/00
14	Initial Analysis	Project	Mon 30/04/01
15	High Level Analysis and Architecture	Division	Sun 01/07/01
16	High Level Design	Project	Fri 23/11/01
17	**Software Engineering**		**Sun 28/10/01**
18	Temporary Software Engineering Practices	Project	Sat 01/07/00
19	Software Engineering Practices	Division	Sun 28/10/01
20	Document Template	Division	Sun 10/12/00
21	Coding Standards	Division	Sun 10/12/00
22	Software Process 1.0	Division	Tue 29/08/00



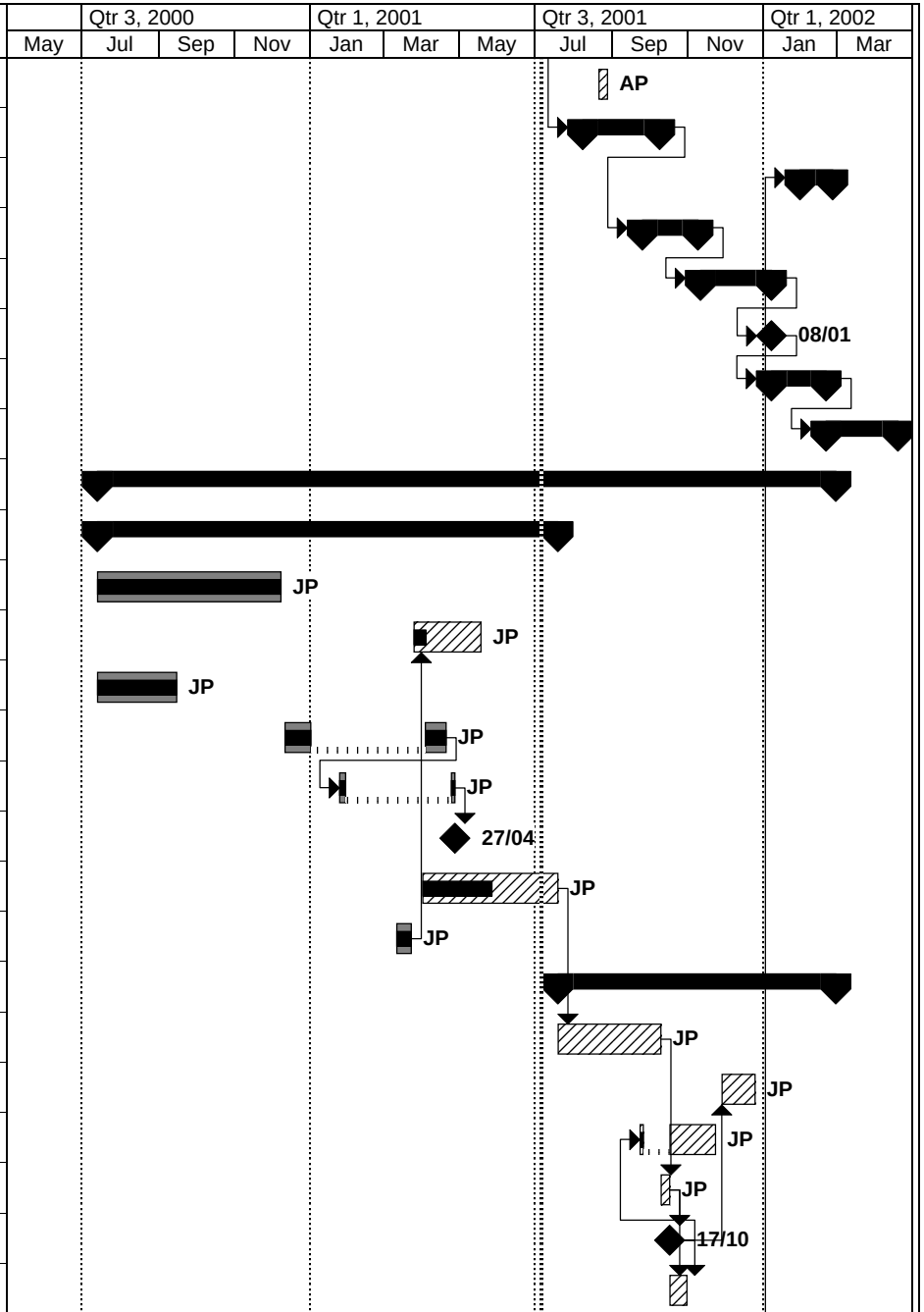
ID	Task Name	Milestone Type	Finish
23	Software Development Process 2.0	Division	Sun 16/09/01
24	Setup Software Repository	Division	Sun 12/11/00
25	Review CMM Usage	Division	Mon 16/07/01
26	Document Review Procedure	Division	Sun 15/04/01
27	Interface Control Procedure	Division	Sun 28/10/01
28	Change Request System	Division	Sun 17/12/00
29	Review Change Request System	Division	Fri 28/09/01
30	**ALMA Common Software**		**Mon 17/12/01**
31	ACS Technical Requirements		Thu 01/06/00
32	Design for ACS v. 0	Group	Tue 01/08/00
33	CORBA Feasibility	Group	Wed 27/09/00
34	Release, v. 0	Project	Fri 10/11/00
35	Kitt Peak ACS test	Major	Fri 01/12/00
36	ACS PDR: Architecture Review	Division	Fri 18/05/01
37	ACS Release 1.0	Project	Fri 14/09/01
38	ACS upgrades for TICS	Major	Mon 17/12/01
39	**Pipeline**		**Fri 21/12/01**
40	Design Concept	Division	Fri 21/12/01
41	**Archiving**		**Fri 21/12/01**
42	Design Concept	Division	Fri 21/12/01
43	**Scheduling**		**Fri 21/12/01**
44	Dynamic Scheduling Prototype	Division	Sat 01/09/01
45	Design Concept	Division	Fri 21/12/01
46	**Proposal Preparation**		**Fri 21/12/01**
47	Design Concept	Division	Fri 21/12/01



ID	Task Name	Milestone Type	Finish
48	Prototype Proposal Presentation Tool	Division	Fri 21/12/01
49	**Data Processing & Analysis**		**Fri 29/03/02**
50	Demo Project	Project	Fri 29/03/02
51	Reuse Analysis	Division	Wed 12/09/01
52	**Telescope Calibration**		**Sat 01/12/01**
53	Requirements	Project	Sun 19/11/00
54	Reuse Analysis	Division	Sun 31/12/00
55	Data Formats for Test Interferometer	Division	Fri 15/06/01
56	Prototype Holography Demonstration	Division	Fri 21/09/01
57	Integration with Control Software	Division	Fri 21/09/01
58	Release for Test Interferometer	Major	Sat 01/12/01
59	**Integration and Support**		**Sat 01/12/01**
60	Implementation Plan	Division	Fri 21/09/01
61	Software Installation for Test Interferometer	Project	Sat 01/12/01
3	**Control Software**		**Fri 19/04/02**
4	**Test Interferometer Control Software**		**Fri 19/04/02**
5	Readiness Review of TICS	Project	Thu 01/11/01
6	**Management**		**Thu 13/09/01**
9	**Data Formats**		**Fri 29/06/01**
16	**ICD Preparation**		**Thu 26/07/01**
78	**TICS 0.0: Design Concept**		**Mon 19/02/01**
91	TICS Design Review	Project	Mon 02/07/01
92	**TICS 0.1: General Lab M&C**		**Tue 05/06/01**
118	**TICS 0.2: Mount Control (with simulator)**		**Wed 08/08/01**
133	Conduct Vertex In-House Tests		Wed 15/08/01



ID	Task Name	Milestone Type	Finish
134	Conduct EIE In-House Tests		Tue 28/08/01
135	**TICS 0.5: Optical Pointing Tests**		**Tue 09/10/01**
145	**Antenna Testing in NM**		**Tue 26/02/02**
149	**TICS 0.6: Holography**		**Fri 09/11/01**
156	**TICS 1.0: Single Dish/Total Power**		**Tue 08/01/02**
164	Release to Test Interferometer	Major	Tue 08/01/02
165	**TICS 1.5: Single Dish/Test Correlator**		**Wed 20/02/02**
171	**TICS 2.0: Interferometry**		**Fri 19/04/02**
178	**Correlator Software**		**Fri 01/03/02**
179	**Test Correlator**	**Major**	**Thu 19/07/01**
180	TC Design Document Revision from PDR		Fri 08/12/00
181	Test Correlator/Control Software ICD		Fri 18/05/01
182	Test Correlator Use Cases		Fri 15/09/00
183	Implement TC Release 1.0		Fri 20/04/01
184	Test TC Release 1.0		Fri 27/04/01
185	TC Release 1.0	Project	Fri 27/04/01
186	Integrate TC Software with ACS		Thu 19/07/01
187	TC Installation in Socorro		Fri 23/03/01
188	**Prototype Correlator**		**Fri 01/03/02**
189	Prototype Correlator Design		Wed 10/10/01
190	CAN interface support		Tue 25/12/01
191	Data Processor Studies		Fri 23/11/01
192	PDR Preparation		Wed 17/10/01
193	PDR: Prototype Correlator Software	Division	Wed 17/10/01
194	CDR Preparation		Wed 31/10/01



ID	Task Name	Milestone Type	Finish
195	CDR: Prototype Correlator Software	Major	Fri 01/03/02
196	**Other ALMA Project**	**Dependent**	**Wed 01/08/01**
197	Lab Interferometer Assembled in Tucson	Dependent	Wed 01/08/01
198	**External Milestones**	**Dependent**	**Thu 31/01/02**
199	Antenna CDR (Vertex)	Dependent	Thu 16/11/00
200	Antenna Arrival in NM (Vertex)	Dependent	Thu 31/01/02