ALMA Offline Requirements Review Meeting
2002-Apr-10, 14:00 UT

Present:

W. Brouw
B. Glendenning   (Chair)
M. Gurwell
A. Kemball
R. Lucas   (Author)
S. Myers   (Principal Author)
G. Raffi
A. Wootten

Minutes:

1. Agenda approval

The agenda was adopted as distributed. Brouw noted that he had not been able to print the distributed PDF files. Glendenning believes this to not be a general problem as he has not heard similar complaints.

2. Requirement priorities

Glendenning noted that there had been several people questioning assigned priorities, usually in the direction of asking that items at priority "2" become "1". Myers informed the group that the priority "1" items are expected to be 100% available in an obvious fashion, priority "2" items are expected to be available at the 90% level with more latitude on how they are implemented, and priority 3 are desirable and will result in a higher score at audit time. He also noted that whereas most reviewers asked for priorities to be raised, most of his edits in fact reduced requirement priorities (i.e., 1→2 or 2→3). Kemball asked how the requirements were distributed by priority bin. Myers had not performed this count. Raffi noted that the scheme was different than the one used by the SSR in ALMASW-11. Myers replied that this was a deliberate choice of the SSR. For (largely) ALMA developed software we want a time-ordered priority scheme (as in memo #11), whereas for a (largely) non-ALMA developed software ordering by ultimate feature desirability seemed more appropriate.

ACTION: Myers to ensure that the description of priorities is sufficiently clear in the document.

3. Feature enumeration/TBD items

Kemball introduced the topic by noting that producing requirements is hard enough work already without requiring that it be at the level of a legal contract. What we require is that it be sufficiently specific that it clearly indicates to a scientific user what is intended to be

provided by a particular requirement, and that it is sufficient to guide the software development. He noted that the v4.0 draft (incorporating the replies to written comments for this review) largely fulfills this goal.

Myers noted that there is a difference between items which are defined as TBD (e.g., supported computer platforms and data formats), and areas in which the list enumeration was felt to be incomplete. The TBD items are generally outside the scope of purely scientific concerns, and the enumerations have been improved in the v4.0 draft.

Brouw believes that it is a mistake to be too explicit in the lists, since they are certain to be incomplete and out of date. These lists should be left for a specification document. Brouw also thought that some of the lists were not broadly enough based (e.g., 3D planetary imaging) or were not sufficiently carefully defined (e.g., heliocentric instead of barycentric). Myers noted that it is not too late to accept additions to the lists.

Raffi agreed with Brouw's contention that we should not aim to be too complete in the enumerated lists, but would not argue that the current items should be removed. Brouw added that the explanatory text should be expanded to make it clear that lists are not exhaustive. Lucas noted that priority "3" lists will be indicative, whereas lists for priority "1" items should be more complete. Brouw thought that the combination of priorities and lists was even worse than having incomplete lists.

Gurwell agreed that the lists will always be incomplete, but believes that the lists should be filled in to the extent that it is practical to convey the science requirements both to the community and the project. He also agreed that a caveat about the completeness of the lists in detail needs to be made. Kemball added that for current purposes, the important lists are related to scientific functionality, not, e.g., supported computer platforms.

ACTION: All to send Myers missing scientific enumerated list items by close of business 2002-04-12 (Friday).

ACTION: Myers to add received enumeration items and ensure that a general caveat about their completeness is added to the document. No change is required to the TBD items that do not directly address scientific functionality.

4. "Squishy" (imprecise) requirements

Glendenning noted that some review comments (e.g., by Butler) had commented that it would be difficult to evaluate requirements that were principally adjectives: "fast", "easy to use". Myers responded that he has already replaced the "fast" items. Brouw thinks that "easy to use" items are so subjective to be of no use – for example the standard "Windows" vs. "Linux" arguments. Myers noted that B.Clark has noted that the only important requirement is that the package "not suck." Glendenning opined that ALMA needs more resolution than this.

ACTION: All to send Myers suggestions for removing or clarifying "squishy" requirements by close of business 2002-04-12 (Friday).

ACTION: Myers to address received corrections to "squishy" requirements in the document.

5. Requirements weighting for package scoring

Glendenning noted that in discussion on the written review comments that Cornwell had suggested a weighting scheme for scoring the package:
> 50% Core Functionality
> 10% Human Interface
> 10% Documentation
> 10% Testing procedures
> 10% Optimization
> 10% Management

Myers believes this to be a useful addition to the document and intended to add it. However everyone else considered it to be inappropriate for the document hence it will not be added. (Clearly this is an important topic to be discussed in the context of auditing off-line packages. This is intended to be discussed at Granada).

6. Performance Benchmarks

Glendenning noted that the general topic of benchmarking is important for ALMA, but believes that it should be treated separately. If nothing else, it would introduce at least several months of delay into the approval of this document. The intent is that the SSR will determine how benchmarking is to be performed with initial discussions at their next face to face meeting in Granada.

Kemball commented that it is important that benchmark standards be tied to scientific requirements. Glendenning commented that he thought that this would be straightforward for the pipeline (the ensemble of pipelines must be able to process data faster than they are observed), but that it's not so clear what to do for interactive use. Kemball suggested that, for example, relating performance to the time required to set parameters might be an appropriate course for interactive use, and in any event the performances shouldn't be arbitrary but should be tied to some measure. In particular Kemball noted that requirement 1.1-R4 could be better defined, a sentiment with which Myers agreed.

Lucas suggested that the overall off-line performance be linked to the performance required for the pipeline. Myers responded that he thought it would be best to not tie this document to that (still TBD) performance benchmark.

ACTION: Lucas to organize a discussion of benchmarking strategy at the April Granada meeting, with recommendations to ALMA computing management.

ACTION: Myers to tie the performance requirement in 1.1-R4 to a more explicit underlying scientific need of users and the project.

7. Other
   a) Brouw stated that he thought that the off-line requirements document was too separated from the pipeline requirements. In practice they should be related very intimately, and there should at least be more of a general discussion that ties them together (for example, stating that their algorithms should be identical). The effort should also be reused. Kemball agreed with Brouw about the practical reasons for wanting to reuse effort between the off-line and pipeline developments. Glendenning noted that this is an economic, not scientific, argument. Myers stated that the SSR wrestled with this and decided in the end that it was not a scientific requirement that the off-line package and pipelines be tied together, although as a practical matter they are likely to be related. He also commented that he thought there was a pipeline requirement that pipeline reprocessing can be initiated by the user (i.e., from a regional support center (RSC)) [however this requirement is not explicitly noted in ALMASW-11].

   ACTION: Myers to introduce some general text (non-requirement) about the desirability of reusing effort between the pipeline and the off-line package.

   b) Gurwell reported that the ASAC has a particular interest in the simulation abilities of the off-line package, and consider it important that it have a broad range of simulation capabilities. In particular, the ASAC would favor stronger language than the current general description of "moderate simulation capability". Glendenning and Raffi stated that this interest in simulation has been noted, and that Lucas will organize with the SSR an effort to produce a prioritized list of simulation capabilities, to fit within an overall envelope of 2 FTE-years of effort. Myers noted that there is already a more extensive discussion of simulator capabilities in ALMASW-11.

   Brouw commented that he thought it would be best if the simulator was developed completely independently of the off-line package to provide an independent test. There appeared to be some difference of opinion on this point, but Myers pointed out that this discussion is about the off-line package requirements only, which does require some simulation capability in any event.

   Similarly, Lucas noted that it's important that any simulator, however it is developed, write the ALMA data format. Myers responded that this is a requirement on that simulator, not the off-line package.

   ACTION: Lucas and the SSR to produce a prioritized list of simulator capabilities.
   ACTION: Gurwell to consult ALMASW-11 language about simulator capabilities (initial email by 2002-04-12) and work with Myers as necessary to incorporate needed new language in this document.

c) Myers noted that more attention could profitably still be paid to solar system and pulsar sections of the document, although the latter is critically dependent on hardware outside the baseline scope of the project.
ACTION: All to send Myers suggestions improving discussion of solar system and pulsar requirements by close of business 2002-04-12 (Friday).

8. Summary and Conclusions

The document is accepted once it is revised according to the distributed replies to received comments and to satisfy the actions of this meeting. No further consultation with the SSR is required.

ACTION: Myers to update the document by 2002-04-23.
ACTION: Glendenning to arrange to publish final document and review report on the web.

Summary of Required Actions:

- Myers to update the document by 2002-04-23.
- Glendenning to arrange to publish final document and review report on the web.
- Myers to ensure that the description of priorities is sufficiently clear in the document.
- All to send Myers missing scientific enumerated list items by close of business 2002-04-12 (Friday).
- Myers to add received enumeration items and ensure that a general caveat about their completeness is added to the document. No change is required to the TBD items that do not directly address scientific functionality.
- All to send Myers suggestions for removing or clarifying "squishy" requirements by close of business 2002-04-12 (Friday).
- Myers to address received corrections to "squishy" requirements in the document.
- Lucas to organize a discussion of benchmarking strategy at the April Granada meeting, with recommendations to ALMA computing management.
- Myers to tie the performance requirement in 1.1-R4 to a more explicit underlying scientific need of users and the project.
- Myers to introduce some general text (non-requirement) about the desirability of reusing effort between the pipeline and the off-line package.
- Lucas and the SSR to produce a prioritized list of simulator capabilities.
- Gurwell to consult ALMASW-11 language about simulator capabilities (initial email by 2002-04-12) and work with Myers as necessary to incorporate needed new language in this document.
- All to send Myers suggestions improving discussion of solar system and pulsar requirements by close of business 2002-04-12 (Friday).

Collected Comments on Pipeline/Offline Requirements Document
V3.x

This document is online at

    http://www.aoc.nrao.edu/~smyers/alma/offline-req/olr-v3.0-comments.txt

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24-Jul-2001: V3.0

Date: Tue, 24 Jul 2001 17:27:13 -0600 (MDT)
From: Steven T. Myers <smyers@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: ALMA Science Software Working Group <alma-sw-ssr@cv3.cv.nrao.edu>
Subject: [alma-sw-ssr] Post-Berkeley draft of Offline Requirements

Based on discussions during the Berkeley meeting, I have generated a new
draft (v3.0) of the ALMA Offline Data Processing Requirements document.
This includes the removal of the Pipeline section (to be included in the
ALMA SW-11 Memo under 3.6), abbreviation of the Simulator requirements
(main simulator requirements to go to SW-11 under 3.1-R11 or new section),
and incorporation of assigned priorities. It appears we had completed
discussion of about 3/4 of the document, and this includes everything with
an assigned priority in this draft - the remainder remains as-is for now.
I will try to go through the remaining sections in the next week or so.

You can find this document at

    http://www.aoc.nrao.edu/~smyers/alma/offline-req/

as myers-report-3.ps

The LaTeX source is myers-report-3.tex

The removed Simulator section, with changes made as we discussed in
Berkeley, can be found as simulation-24jul01.tex
This would be a good start for what to include into the SW-11 doc. Note
that the priorities assigned here conform to the SW-11 priorities, not the
scheme Ive used in the Offline Reqs.

Comments welcome on this draft, though it might be best to focus on the
things with priorities and wait until I go through the rest before
commenting on those.

    -Steve

Date: Fri, 27 Jul 2001 17:44:21 -0600 (MDT)
From: Barry Clark <bclark@aoc.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu

Subject: Re: [alma-sw-ssr] Post-Berkeley draft of Offline Requirements

I think we need a specific requirement that the Package include an
antenna location analysis tool (I would say "baseline determining tool"
but "baseline" means many different things) and an antenna pointing model
parameter determination tool.

Date: Sun, 29 Jul 2001 13:44:46 -0600 (MDT)
From: Steven T. Myers <smyers@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Post-Berkeley draft of Offline Requirements

Do you think this should be more specific than in 2-4.2-R10 and 2-4.3-R5?
Or higher priority (these were at 3 because we felt these would mostly
be done in the Online or Pipeline software)? For example, I could break
all the instances out into sub-requirements as in 2-4.1-R6.x

 -s

Date: Fri, 3 Aug 2001 11:47:29 -0600 (MDT)
From: Barry Clark <bclark@aoc.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Post-Berkeley draft of Offline Requirements

There are two distinct things involved. One is the determination of
parameters from a single scan of interferometer data. This is what I
thought was covered by 2-4.2-R10 and 2-4.3-R5. The other is combining
a large set of such things to get a set of parameters for the phase and
pointing models, and maybe the focus model.

Date: Wed, 08 Aug 2001 21:57:28 +0900
From: K. Tatematsu <k.tatematsu@nao.ac.jp>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Post-Berkeley draft of Offline Requirements

Dear All,

At 11:09 01/06/26 -0600, Tim Cornwell wrote:
>"7.1-R4 The output of the display should be possible in many different
>formats..."
>
>No, I think you choose one and let other software (e.g. ImageMagick) do any
>conversion. That's what we do in AIPS++: we write xpm and recommend that people
>use a converter of which there are plenty.

In Berkeley, we did not have enough time to discuss the Visualization section.
The above requirement is still in new 2-7.1-R4 without priority.

I am afraid that "many" means 30 or more.
How about just saying...

2-7.1-R4
The output of the display should be possible in at least one
popular image format, from which one can convert to
various image formats by using a commercial or free graphic converter
software.

I think this is a minimum requirement, and I like to give a
high priority(1).

If we keep the original sentence, I suggest a lower priority (3?).

How do you think?

By the way, I think that FITS
(if you mean the Flexible Image Transport System) is
the data output rather than the display output, right?

Cheers,
Ken Tatematsu

>>>SMyers: This requirement has been updated to more or less what you
suggested in the latest version 3.1 (08Aug01, see below) as OL-7.1-R5.1
for at least one standard format (I chose fits but could be something else) at
Pri 1 and R5.2 for other formats at Priority 3.

FITS works as an image format (the "I" part originally meant image I
believe) and is supported by a number of viewers (e.g. xv).<<<

08-Aug-2001: Offline V3.1

Date: Wed, 8 Aug 2001 17:27:12 -0600 (MDT)
From: Steven T. Myers <smyers@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: ALMA Science Software Working Group <alma-sw-ssr@cv3.cv.nrao.edu>
Subject: [alma-sw-ssr] Version 3.1 of Offline Requirements - comments
    requested!

I have completed a full pass through the Offline Requirements document,
assigning priorities and beefing up the thin sections that we didnt
cover in Berkeley. You can find this version at

    http://www.aoc.nrao.edu/~smyers/alma/offline-req/myers-report-3.1.ps

with the TeX files there as myers-report-3.1.tex also.

This is the version you should read and comment on. Pay extra attention
to the sections we did not cover in Berkeley: 2.4.3 - 2.4.5, 2.5 - 2.7.

Note that its only 1 month to the ASAC meeting in Chile, so if we want to
get a draft to them by then we had better get this one turned around in
the next few weeks!

   -Steve

Date: Thu, 9 Aug 2001 11:25:01 -0600 (MDT)
From: Steven T. Myers <smyers@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: ALMA Science Software Working Group <alma-sw-ssr@cv3.cv.nrao.edu>
Subject: [alma-sw-ssr] Offline Requirements v3.1 in pdf

You can get the Offline Data Processing Requirements v3.1 (2001-08-08)
in PDF form also at

 http://www.aoc.nrao.edu/~smyers/alma/offline-req/myers-report-3.1.pdf

   -Steve

From schilke@mpifr-bonn.mpg.de Tue Aug 14 09:13:46 2001
Date: Tue, 14 Aug 2001 09:31:41 +0200
From: Peter Schilke <schilke@mpifr-bonn.mpg.de>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: [alma-sw-ssr] graphic formats

At present, programs like xv and ImageMagick seem to be able to do fits,
but without colors, but that may change. That as an aside.

I thought it would be important to have all kind of output formats, in
particular one should have postscript or pdf (capable of vector
graphics) and a bitmap format, but I'd like to see as many choices as
possible. The idea of course would not be to write as many graphic
drivers as output formats, but to let an existing program (such as
convert) do the conversion - but quietly, and without the user knowing
about it, unless he/she chooses to read the manual.

I can deal with these things (and most if not all of you can too), and
occasionally I have to hop through quite a few programs until I get what
I want, but I know very many people who are at sea with all this. We
should keep in mind that we have to design the thing not for the black
belt user, but for Joe Sixpack, as Jeff would call him. It should
always be possible to bypass these things, but the default should be
something that works out of the box as much as possible, with reasonable
defaults.

In the end this is implementors choice, but many good things are out
there, so why to try to reuse them?

    Peter

From wright@astron.berkeley.edu Tue Aug 14 11:47:06 2001
Date: Tue, 14 Aug 2001 10:32:00 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] graphic formats

Peter,

> The idea of course would not be to write as many graphic
> drivers as output formats, but to let an existing program (such as
> convert) do the conversion - but quietly, and without the user knowing
> about it, unless he/she chooses to read the manual.

- I agree; the users should not have to "hop through quite a few programs"
to convert to their preferred format.

Melvyn

From lucas@iram.fr Mon Aug 20 08:42:56 2001
Date: Mon, 20 Aug 2001 10:17:07 +0200
From: Robert Lucas <lucas@iram.fr>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1

Hi all:

I haven't seen many comments yet on v3.1.

I think the following requirements are missing, both for interferometric
and single dish data (-> n=4.2 ??).

Best regards

Robert

Rn.1 Atmospheric modelling shall be available in the data reduction
  package. The model shall be able to predict the absorption,
  emission and pathlength on the line of sight through the atmosphere
  at all ALMA bands. The prediction will be based on the following data:

  Rn.1.1 - measured atmospheric parameters at the site: temperature,
    pressure, humidity

  Rn.1.2 - measured atmospheric emission in the observed ALMA bands

  Rn.1.3 - measured FTS data

  Rn.1.4 - measured atmospheric profiles of temperature and water
  content if available from atmospheric sounders

prio 1

Rn.2 Atmospheric modelling shall be usable to derive by model fitting
   the system temperatures corrected for atmospheric absorption in all
   astronomical bands in use, in order to correct the observed
   amplitudes at various elevations.

prio 1

Rn.3 Atmospheric modelling shall be also usable to provide the
   conversion factors between WVR data and the water contribution to
   the astronomical phase in the astronomical bands.

prio 1

>>>SMyers: Agreed, add as subsection of 4 as new 4.2. Note that since many of
these are in the Pipeline requirements, the Offline package inherits
these also. Are these all really priority 1? This will mostly be
done in the pipeline.<<<

From wright@astron.berkeley.edu Mon Aug 20 14:29:34 2001
Date: Mon, 20 Aug 2001 12:12:00 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Cc: wright@astron.berkeley.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1

Hello Steve, Robert,

     I've worked thro' the requirements a few
times. Looks complete, but I'd put more emphasis on
efficiency and efficacy. If the package only does
priority 1 - it could be very inconvenient and inefficient.
e.g.

1. combining multiple data sets.

OL-3.1-R14 -R15
OL-5.1-R2

2. bloat
OL-3.2-R4

are given low priority.

>>>SMyers: Priority 2 is still high priority - I think these are fine.<<<

An analysis based on this document, could easily miss some
powerful features built into the low level
routines of the MIRIAD software which make it
efficient and convenient for the astronomer.

1. A powerful data selection mechanism with Boolean combinations

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----------------------------------------------------------------
e.g. these times and these antennes, and these times for those antennas.
e.g. this uv-range not shaddowed by more
than 10% and that uv-range not shaddowed by more than 50%
[I want to self-cal on the compact emission, and
to mosaic large scale structure.]

OL-4.1-R6 also applies to plotting and imaging.

>>>SMyers: Added "Boolean" as desirable feature.<<<

2. On-the fly spectral re-binning.
-------------------------------
. plot,  uv-data for these 10 velocity intervals for this spectral line.
 (amplitudes and/or phases, with or without the calibration
[gain, bandpass, polarization],applied).
. derive bandpass for averaged channels.
. image this spectral line in these 32 contiguous velocity intervals.

3. Bloat.
---------
OL-3.2-R4 is given low priority.

. when imaging a spectral line, the spectra can be processed
as a vector; much more efficient. (MIRIAD was 13x faster than aips
last time I tried) [1 day versus 2 weeks ?].

. only one beam per pointing is needed for most spectral imaging;
a huge saving in bloat. Sure, one can argue about precision, but
the final mosaiced image may only have 100:1 fidelity, and you
can always make one beam per channel if you want.

A large spectral line mosaic should be included in the test suite.

Melvyn


-------------------------------------------------------------------------------


21-Aug-2001: Pipeline V3.1 now available

-------------------------------------------------------------------------------


From bglenden@cv3.cv.nrao.edu Tue Aug 21 17:01:46 2001
Date: Tue, 21 Aug 2001 16:41:30 -0600
From: Brian Glendenning <bglenden@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: [alma-sw-ssr] Pipeline and offline comments

Not many - probably that means that I've read earlier drafts of the
documents too recently and am hence "blind" to them.

Cheers,
Brian

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Pipeline
=====

p.0 The Canadian proposal should be read with an eye to missing requirements
(which we might or might not agree with, but should be discussed)

p.6 2-0.0-R2 I would only require the reduction script for the science
operation. I can imagine the calibration pipeline might work in some direct
programmatic fashion (i.e., call subroutines!) and only record the results.

p.6 s-0.0-R3 should we say that the flagging must be reversible in a
post-processing system here?

p.7 s3 Shouldn't the third "dashed" point be handled by the science
calibration operation (rather than RT)

p.7 3-0.0-R1 Should "scan" be observation here?

p.11 s5 It should be mentioned (probably as a general requirement) that the
output goes in the archive. Similarly for s6.

Off-line
=====

(Sections 2.4.3 - 2.4.5, 2.5 - 2.7 only)

p.20 OL-4.5-R1 I don't understand this? I thought WVR (etc) was already
applied (or not) to the data, and hence would be impossible not to use
(other than by throwing a top-level switch: use/don't use) the corrected
data.

>>>SMyers: The WVR and/or FTS will provide monitoring data which can
be used, for example to flag bad stretches.  This is not meant to
replace the online phase correction!<<<

p.21 OL-5.1-R4.1 List the weightings? (Natural, Uniform, Briggs I assume).

>>>SMyers: done<<<

p.23 OL-5.3-R2.2 A standard set of ALMA primary beams must be distributed
with the package.

>>>SMyers: done<<<

p.24 OL-6.1-Rxx A line catalog should be distributed with the package and
used "appropriately"? Maybe this is covered by OL-6.2-R8.3 (although the
usefulness isn't just tied to data cubes)

>>>SMyers: done<<<

p.24 OL-6.2-R1 Cube rotations need not be orthogonal to cube faces.

>>>SMyers: add<<<

p.25 OL-6.2 R3.3 seems more like a priority 3 to me. Maybe because I don't
understand what it means.
```

>>>SMyers: e.g. slices or cuts. pretty basic<<<

p.25 OL-6.2-R4 It should be possible to calculate moments along any axis.

>>>SMyers: add<<<

p.25 OL-6.2-R7.1 (I'd say 1D & 2D are priority 1, ND is priority 2).

>>>SMyers: I dont think we need to distinguish<<<

p.26 OL-6.2-R7.13 I don't understand this.

>>>SMyers: define as objects, pass them, do math (eg. add cubes)<<<

p.26 OL-6.2-R8.3 I would have thought this to be at least priority 2 (at least for the listed examples).

>>>SMyers: agreed<<<

p.27 OL-7.2-R1 "immediate" isn't reasonable if there is a lot of data. More objective to say so many pixels or points per second. Similarly for R2 (unzooming might require going back to the data).

>>>SMyers: add benchmarks<<<

p.30 OL-7.5-R8 by "arbitrary" I assume you mean not aligned with a cube face (which should be priority 1).

>>>SMyers: add aligned as pri 1<<<

From scott@ovro.caltech.edu Tue Aug 21 22:11:27 2001
Date: Tue, 21 Aug 2001 16:42:03 -0700
From: Steve Scott <scott@ovro.caltech.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: [alma-sw-ssr] Re: Offline Requirements v3.1

General:

In total, a very nice but intimidating list of requirements. Worried about feasibility of realization (but maybe that's not important at this stage).

The use of "must, should, and desirable" instead of "shall" depending on priority results in redundant information. There are instances int the document where the priority has changed but the appropriate word has not. Perhaps it would be best to accept the style of the SSR Requirements ("shall", independent of priority) for consistency.

>>>SMyers: good idea, will try to do this in later version.<<<

p.21 5.1-R1
  "data" -> "calibrated data"

>>>SMyers: I dont think this matters in this context.<<<

"ALMA exported data" Has this been defined? Can we list what it is?
    "other instruments supporting common export formats" ; this is very
general; can we be more specific? Would a multiple detector single dish
data set be allowed (SCUBA like)?

>>>SMyers: these should be in a list maintained by project<<<

p.21 5.1-R5
   Really like the 2nd sentence with the emphasis on spectral cube. Maybe
it should be elevated to the intro?

>>>SMyers: done<<<

p.22 5.1-R6
   Is this for single dish (not needed for interferometry)? However, both
need to blank spectral channels.

>>>SMyers: add spectral channel<<<

p.22 5.1-R7
   This seems like a calibration or realtime requirement.

>>>SMyers: probably, I will leave in until I get ok to remove. might
be some implications for accuracy<<<

p. 24... Section 2.6.2
   The temporal (4th!) axis has been omitted. Driven by periodic and time
variable phenomena, e.g. solar, planetary, stellar science.
   Needs include (some of this may belong in Visualization section):
    Display of cube slices vs time
    FFT to temporal frequency of a stack of cubes or slices
    Periodic averaging or display of cubes
    Cube movie

>>>SMyers: already at some level in vis. Add explicit here. pri 2 ok?<<<

p.25 6.2-R7.1
   And resampling at lower resolution after the smoothing?

>>>SMyers: add<<<

p 26 6.2-R8.2
   "display for should" -> "display should"

>>>SMyers: done<<<

p.27 7.1-R7
   "edition" -> "editting"

>>>SMyers: done<<<

From wright@astron.berkeley.edu Tue Aug 21 22:13:01 2001
Date: Tue, 21 Aug 2001 17:58:42 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>

Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1

Robert, or others,

1> Phone number +1-434-972-7268 (NRAO/CV conference hub, Room 209)

Is there a toll free equivalent number ?

2. A lot of people using IDL or matlab in preference
to custom-built software. Should we re-visit OL-1.2-R6 ?

Melvyn

From scott@ovro.caltech.edu Tue Aug 21 22:13:11 2001
Date: Tue, 21 Aug 2001 18:54:11 -0700
From: Steve Scott <scott@ovro.caltech.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1

Excellent point. The requirement doesn't seem to reflect the Berkeley
discussion as I recall it. IMHO, commercial software should be an option
(even if it costs more than "nominal") unless, of course, the ASAC
mandates otherwise. It seems like there are quite a few options
available for smaller institutions, including reducing data remotely at
one of the regional data centers.

Steve

mel wright 456 wrote:
>
> 2. A lot of people using IDL or matlab in preference
> to custom-built software. Should we re-visit OL-1.2-R6 ?
>
> Melvyn

From twillis@drao.nrc.ca Tue Aug 21 22:13:17 2001
Date: Tue, 21 Aug 2001 19:23:23 -0700 (PDT)
From: Tony Willis <twillis@drao.nrc.ca>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: [alma-sw-ssr] RE: Offline Requirements

Most of those 'must be able to arbitrarily undo' any operation requirements
seem to have thankfully disappeared from the Offline Requirements
document; however the Pipeline Requirements still contains such
a requirement (2-0.0-R5).

Tony

From smyers@cv3.cv.nrao.edu Tue Aug 21 22:13:28 2001
Date: Tue, 21 Aug 2001 22:11:13 -0600 (MDT)
From: Steven T. Myers <smyers@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1

The current req text reflects what I thought we had decided (though the
parenthetical Comment may not) - it is allowed, for nominal cost. I would
say an IDL liscense as it stands is more than "nominal". My experience
(with MATLAB and IDL) is that you take a tremendous performance hit
using these packages, one I doubt we can afford given the processing
requirements. However, if it meets the benchmark specs (tbd) and the
rest then it would pass of course.

We may wish to dodge the question entirely by deleting this requirement
(OL-1.2-R6), though personally I think it is fine as-is.

>>>SMyers: I rephrased comment but left req as-is.<<<

From k.tatematsu@nao.ac.jp Wed Aug 22 07:54:35 2001
Date: Wed, 22 Aug 2001 18:15:31 +0900
From: K. Tatematsu <k.tatematsu@nao.ac.jp>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Post-Berkeley draft of Offline Requirements

At 11:08 01/08/13 -0600, Steven T. Myers wrote:
>This requirement has been updated to more or less what you suggested in
>the latest version 3.1 (08Aug01) as OL-7.1-R5.1 for at least one standard
>format (I chose fits but could be something else) at Pri 1 and R5.2 for
>other formats at Priority 3.

My bounced mail was sent just before version 3.1. Sorry about that.

>FITS works as an image format (the "I" part originally meant image I
>believe) and is supported by a number of viewers (e.g. xv).

Dear Steve, and all,

A late comment.
Isn't it good to produce one (or a few) in very popular format(s),
for which almost the all converter can read? Then we can convert in
a black-box way or manually to various formats at once.
If it is not popular enough, we will need two or more converters
to reach the destination format.
I am not sure whether FITS is one of the bests
for this purpose (priority-1 to hardcopy the display), although it is very
useful to
contain astronomical (n-dimensional or more) data.

Off course, we definitely need FITS. We may need to change the contour level
or coloring later. But, it is not just to hardcopy the display.

```
--------------------------------------------------------------------------------

From k.tatematsu@nao.ac.jp Wed Aug 22 07:54:45 2001
Date: Wed, 22 Aug 2001 18:18:37 +0900
From: K. Tatematsu <k.tatematsu@nao.ac.jp>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu, alma-sw-ssr@cv3.cv.nrao.edu
Subject: [alma-sw-ssr] Pipeline

Dear all,

I felt that 2-0.0-R6 in pipeline
"A manual, interactive mode of operations shall be available ..."
may fit more to the offline.
How do you think?

Cheers,
Ken Tatematsu


--------------------------------------------------------------------------------

From lucas@iram.fr Wed Aug 22 07:55:05 2001
Date: Wed, 22 Aug 2001 12:28:32 +0200
From: Robert Lucas <lucas@iram.fr>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] pipeline requirements

Some additional comments, on the pipeline draft. I'm orry, this comes
too late for our US colleagues to read befor the meeting.


Robert
----------------------------------------------------------------

Note:
-----
requirement numbers will change when introduced in general document
(all pipeline reqs prefixed with 6.)

p5. General Requirements : generally operation -> operations.  at many
    places 'Calibration Operation" -> "Pipeline"

p5. R T C Op : add WVR

p6: The first two are RTCal Operations as ...

p6. 2-0.0-R7 runnable

p7 3-1.0-R3 scan -> observation

p 9 4-0.0-R3.2 (natural weighting)

p 9 4-0.0-R3.5 from theory and actual system temperatures

p 9 4-0.0-R4.3 window automatically determined ?
```

p 9 4-0.0-R4.4 spectra on a rectangular grid (why pseudo?)

p 9 4-0.0-R6.3 baseline summation with and without shifting phases to
                specified position ?

p 9 4-0.0-R6.4 add: intensity (amp & Pha) as a function of frequency
and time
                (for a baseline)
                (useful to find out a strong delay error)

p 12 6-0.0-R1: after a breakpoint, or end of any `observing object'
                e.g. when all data for a given map has been obtained,
                but not necessary at end of each session. Valid also
                for Science imaging.

Sorry, one more comment.

p.5 on Quick Look Operation, Occurence: when requested,...

I feel that at least at OSF the quick look should be
automatically shown so that "Astronomer on Duty" can check
them without invoking, if service observing is common.

Ken Tatematsu

On 2001.08.21 22:11 Steven T. Myers wrote:
>
> The current req text reflects what I thought we had decided (though the
> parenthetical Comment may not) - it is allowed, for nominal cost. I would
> say an IDL liscense as it stands is more than "nominal". My experience
> (with MATLAB and IDL) is that you take a tremendous performance hit
> using these packages, one I doubt we can afford given the processing
> requirements.

i can confirm this. i did detailed tests of this a few years ago when
simulating holography errors - i.e., lots of FFT/DFTs. the difference
between optimized FORTRAN and IDL implementations was about a factor of

20 in speed. you can see more details at:
http://www.aoc.nrao.edu/~bbutler/work/nraomemos/holo_sim.ps.gz
if you want (see table 1).

while packages like IDL and matlab are very nice when visualizing things,
and for smaller problems, they just cannot deliver the speed we will need
(in my experience/opinion) for ALMA data processing.

From mholdawa@cv3.cv.nrao.edu Wed Aug 22 11:39:24 2001
Date: Wed, 22 Aug 2001 09:08:36 -0700 (MST)
From: Mark Holdaway <mholdawa@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1

> >
> > The current req text reflects what I thought we had decided (though the
> > parenthetical Comment may not) - it is allowed, for nominal cost. I would
> > say an IDL liscense as it stands is more than "nominal". My experience
> > (with MATLAB and IDL) is that you take a tremendous performance hit
> > using these packages, one I doubt we can afford given the processing
> > requirements.
>
> i can confirm this. i did detailed tests of this a few years ago when
> simulating holography errors - i.e., lots of FFT/DFTs. the difference
> between optimized FORTRAN and IDL implementations was about a factor of
> 20 in speed. you can see more details at:
> http://www.aoc.nrao.edu/~bbutler/work/nraomemos/holo_sim.ps.gz
> if you want (see table 1).
>
> while packages like IDL and matlab are very nice when visualizing things,
> and for smaller problems, they just cannot deliver the speed we will need
> (in my experience/opinion) for ALMA data processing.
>

I see some important uses of an IDL-like package:

  * prototyping imaging or calibration algorithms -- trying
    things out before you hard code them
  * display - visualization - problem-solving: if you don't
    know what is wrong with your data, IDL or something similar
    may be useful in exploring and understanding the data
  * post imaging analysis: the imaging will be the big time
    consuming step. After you make the image, you want to
    be able to perform some sort of quantitative analysis on
    the image -- and this analysis may be non-standard and
    experimental.

AIPS++'s glish seeks to do these jobs already, and will probably succeed
to a large degree. Glish is powerful in that it will already be
well-integrated with the data and other aspects of the data processing
(ie, efficiently coded tasks written with C++ and Fortran code), but is
not nearly as familiar to so many people nor as polished as something like
IDL.

So, I think much of the functionality you would get from IDL is there
in glish, so it comes down to a political choice: make people learn a
new package, or give them what some of them know already?

        -Mark

From bclark@aoc.nrao.edu Wed Aug 22 11:39:30 2001
Date: Wed, 22 Aug 2001 10:19:40 -0600 (MDT)
From: Barry Clark <bclark@aoc.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] pipeline requirements

Last minute thoughts.

OL 2.2. I occasionally use a GUI that displays the equivalent command that
one would type to the CLI, which I find a handy feature. I don't think we
should require this, but we might suggest it.

>>>SMyers: suggested wording?<<<

OL 4.2-R7. If the package supports full matrix polarization calibration,
why should it also be required to support the linearized version?

>>>SMyers: this may be moot in 2007 but it is still useful to be able
to reproduce standard recipes. I guess there have been enough comments
that I will remove this :-(<<<

From scott@ovro.caltech.edu Wed Aug 22 11:39:34 2001
Date: Wed, 22 Aug 2001 10:02:21 -0700
From: Steve Scott <scott@ovro.caltech.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1

I would like to explain why I'm quibbling over the "nominal cost"
wording in the offline requirements doc. It is not unusual for the cost
of commercial software to individual institutions to dominate the choice
of buy or build (for whatever reasons). These total costs may be
completely out of proportion to the cost of building software - say
saving 20 institutions a $3k license each verses building $10M of
software. The evaluation of an implementation should look at "total
cost", as well performance, convenience, operations, maintainability,
etc. Given the comments of Steve Myers and Bryan Butler, a commercial
option may not be adequate, but the evaluation should not be biased by
giving undue weight to the license costs for individual institutions.
There are administrative and operational alternatives available to deal
with this issue.

While there is nothing that meets the requirements better than writing
your own software, there is also nothing that is more expensive.

Cheers,
Steve (Scott)

From bglenden@cv3.cv.nrao.edu Wed Aug 22 11:39:37 2001
Date: Wed, 22 Aug 2001 11:06:34 -0600
From: Brian Glendenning <bglenden@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1

I personally think "nominal cost to the user" is a reasonable user
requirement. However this could be accomplished by having ALMA buy the
licenses on behalf of the user, saving the development effort.

My $0.02 (is that a nominal cost?!)

Cheers,
Brian

From wright@astron.berkeley.edu Wed Aug 22 11:39:41 2001
Date: Wed, 22 Aug 2001 10:27:21 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1

Mark's and Steve's comments express well what I've been
hearing from an increasing number of people, who
will take their data off into a familiar and versatile
environment to analyse it, whether of not ALMA spends
$10M writing code. ALMA should look at the total cost here.
I'm not an IDL or MATLAB person myself, so I have no bias
there. The performance issue could be addressed by providing
efficiently coded algorithms like the various flavors of
deconvolution and mosaicing, which could be used in the
user's favored package.

Melvyn

From bbutler@cv3.cv.nrao.edu Wed Aug 22 14:14:18 2001
Date: Wed, 22 Aug 2001 11:58:10 -0600
From: Bryan Butler <bbutler@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1

it's fine to do image (or spectral cube) analysis in whatever
package the user wishes to - *after* that image or spectral cube
has been created. IDL and matlab are very good at this. i would
not propose that this should not be recommended/supported.

but nothing really needs to be 'spec'ed in this respect does it?
all you have to be able to do is write out a FITS file of your
image/spectral cube. whether you want to say that the off-line
processing produced specifically for ALMA should *not* have to do
any type of image/spectral cube analysis (i.e., it is assumed that
it will *always* be done in other software packages) is a different
question...

IDL and matlab (and cohorts) are *not* very good at the creation
of these images/spectral cubes (i.e., they are not good for "various
flavors of deconvolution and mosaicing"). the problem is not that
it cannot be done (see, e.g., the LUCY procedure in IDL, and there
are various implementations in matlab as well - but note that they
all work with the dirty image and beam, not straight from the
visibilities [a'la the cotton-schwab CLEAN]) - the problem is that
to "provide efficiently coded algorithms", you have to actually
do alot of work (if it is even possible). you can, in principle,
provide your own extensions/procs to IDL or matlab which are C
(or C++, probably) code - but they are not easy. in general, the
add-ons to these packages (which is what you are proposing, essentially)
are just bundled up calls to the package functions themselves,
in which case you are still stuck with the speed issue. if you want
to code your own very efficient routine to do the entire deconvolution
process that hooks into IDL or matlab, i would guess that this is
a really major software undertaking (more so than making sure it works
properly in AIPS++, e.g.).

        -bryan

From twillis@drao.nrc.ca Wed Aug 22 14:14:23 2001
Date: Wed, 22 Aug 2001 11:18:28 -0700 (PDT)
From: Tony Willis <twillis@drao.nrc.ca>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1 (fwd)

I agree completely.

1) The aips++ consortium has invested something like 150 person-years
developing the aips++ class library for the processing of radio astronomy
data from visibilities to images. Even if extensive tuning and modification
of this library is necessary to meet ALMA requirements, the time spent will
be far less than would be required to do the equivalent in some
3rd party package.

However, once images exist, then indeed one should be able to transport
them into other packages for further viewing / analysis. Already the
offline document has this requirement in a rather fuzzy form - OL-7.1-R5.2.
If it becomes apparent over then next few years than some particular
commercial package with its own data format is particularly suited
for the analysis of astronomical images, then we could consider outputting
data in that format as an additional option.

>>>SMyers: should it be there in less fuzzy form?<<<

Tony

From wright@astron.berkeley.edu Wed Aug 22 14:14:30 2001
Date: Wed, 22 Aug 2001 11:40:08 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu, alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1

Hello Bryan,

        I guess I'm questioning whether ALMA should spend
a lot of money re-creating the things for which there are
apparently well liked and supported alternatives. For the
professional radio astronomer it would be nice to stay
within a custom environment, but for the optical/IR/etc
user it would be nice to use the package which they
are familiar with, and probably to analyse ALMA images
together with images from other instruments.

I understand that
"IDL and matlab (and cohorts) are *not* very good at the creation
of these images/spectral cubes (i.e., they are not good for "various
flavors of deconvolution and mosaicing")."

What I am suggesting is that the efficiently coded, radio-astronomy
specific algorithms could be provided with clean interfaces for
use (perhaps as externally called routines) from other packages
which the user might prefer to use. As Mark notes, using aips++
these algorithms are "well-integrated with the data", but the
IR astronomer may wish to work in a more familiar environment,
better suited to data from some other instrument.

The scientific potential of ALMA will be best realised by
making it easy for a wide community of users to analyse the
data in a wide range of packages, rather that by forcing them
to use a specific custom built environment. A corrolary is
the algorithms developed by the radio astronomy
community may have application in other fields if they are
available in other packages.

        just a though,

                Melvyn

From tcornwel@cv3.cv.nrao.edu Wed Aug 22 14:14:40 2001
Date: Wed, 22 Aug 2001 13:48:29 -0600
From: Tim Cornwell <tcornwel@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: RE: [alma-sw-ssr] Offline Requirements v3.1

Interoperability between packages has been talked about at ADASS for
a number of years (>5) with no substantial advances for the major
packages. It's a hard problem, made more so by data formats (it's
easy to agree cross package on images but not on visibility datasets)
and technology (e.g. many people argue that CORBA is too heavy weight
for what we need to do).

I'd recommend adding interoperability as a desired but not essential
feature, but I bet that the costs will rule it out.

>>>SMyers: is there a suggested text for a requirement?<<<

Exporting data to another package is much simpler but is covered
already by the requirement to write FITS.

Tim

> What I am suggesting is that the efficiently coded, radio-astronomy
> specific algorithms could be provided with clean interfaces for
> use (perhaps as externally called routines) from other packages
> which the user might prefer to use. As Mark notes, using aips++
> these algorithms are "well-integrated with the data", but the
> IR astronomer may wish to work in a more familiar environment,
> better suited to data from some other instrument.

From wright@astron.berkeley.edu Wed Aug 22 15:10:44 2001
Date: Wed, 22 Aug 2001 14:05:12 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: RE: [alma-sw-ssr] Offline Requirements v3.1

Tim,
      I'm not sure what 'Interoperability' means
so let me give an example:

Most image analysis packages have a module which can be executed:
CONVOLVE(image, beam, method, output_image)

Radio astronomers have developed algorithms we could supply:
DECONVOLVE(image, beam, method, output_image)

where method= clean[Hogbom,Clark,SDI,mfsclean,MRclean,maxen,maxempty,etc]

If these algorithms are written in an modular fashion, it should
not require much extra work to write the code so that
it can be incorporated into and invoked from other packages.
I think it is appropriate to state this as a high priority requirement.

The users have probably already imported the
image and beam into their favorite package via FITS.
ALMA could provide them with efficient code to do the appropriate

deconvolution.

I agree uv-data is a much harder problem. I see
ALMA as an imaging machine, and most users will not deal with uv-data.

Melvyn

From tcornwel@cv3.cv.nrao.edu Wed Aug 22 15:18:16 2001
Date: Wed, 22 Aug 2001 15:15:05 -0600
From: Tim Cornwell <tcornwel@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: RE: [alma-sw-ssr] Offline Requirements v3.1

Ah yes, BUT many (most) of the imaging and calibration algorithms will require
the uv-data. Even the Sault image-plane based mosaicing algorithm requires
a fair amount of extra contextual information to be passed on with the images.
Shoe-horning such information into another package is hard work.

If the deconvolution algorithm is "independent" of knowledge of radio
astronomy then another package probably already has it. If not, then
exporting the relevant contextual information (e.g. pointing centers
for mosaics) is a lot of work for relatively little gain.

Taking a slightly different tack, I thought that the ALMA model
was that all data are pipeline reduced. Accessing the images
can presumably be done from any package so the canonical
IR astronomer in your example wouldn't be that interested in
e.g. performing a mosaic deconvolution from inside IRAF or whatever.

Tim

From morita@nro.nao.ac.jp Thu Aug 23 08:10:37 2001
Date: Thu, 23 Aug 2001 15:34:59 +0900
From: Morita <morita@nro.nao.ac.jp>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline Requirements v3.1

Dear Mel,

I am using IDL for analysis of imaging results and
I like it very much. Such package is very convenient for
not only image analysis but also prototyping or test of new imaging
algorithms.

At Nobeyama we are using IDL for single dish continuum data
reduction. The manpower cost for the developments was very cheap.
Several outside people installed this system in their own computer
system. Most of the case, they already had IDL licences.
NRO does not prepare any money for such export of the system.
The software company often upgrade the package version and we need
to pay some money for each version up. So, the total cost is big

and our institute cannot give these expenses to every end users.
Fortunately, almost no people have blame us, because imaging
process of single dish continuum is simple and people only need
this system just after their observations.

> Most image analysis packages have a module which can be executed:
> CONVOLVE(image, beam, method, output_image)
>
> Radio astronomers have developed algorithms we could supply:
> DECONVOLVE(image, beam, method, output_image)
>
> where method= clean[Hogbom,Clark,SDI,mfsclean,MRclean,maxen,maxempty,etc]
>
> If these algorithms are written in an modular fashion, it should
> not require much extra work to write the code so that
> it can be incorporated into and invoked from other packages.
> I think it is appropriate to state this as a high priority requirement.

I like this concept. But, even for IDL, it is not simple to make
such external modules written with standard languages(Fortran, C, C++).
Memory interface between package and external modules is problem
and I think it depends on commercial packages.
Maybe, we need to develop individual libraries for every packages.

Regards,
Koh-Ichiro

From wright@astron.berkeley.edu Thu Aug 23 17:03:59 2001
Date: Thu, 23 Aug 2001 11:03:56 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: RE: [alma-sw-ssr] Offline and Pipeline Requirements

The ALMA model is that that all data are pipeline reduced,
including, probably, a deconvolution of the synthesised images.

The best calibration and imaging procedure are more easily
defined by the observing procedure and quality of the data
obtained, and can be optimised in the pipeline processing.
The most appropriate deconvolution is not so clearly defined,
and may need to be done in alternate ways offline.

In some cases, experts may wish to go back and re-process
the uv-data, but I think that most users will not, and that
ALMA will best serve the community by producing images.

The calibration and imaging, of course require the uv-data,
but almost all deconvolution algorithms do not.
I think that the offline package(s) will mostly be used
for analysis and display of sky images from ALMA and other telescopes.
Analysis of the images requires the user to try
deconvolutions with various methods and parameters
to match the structure in the source, compare with
other images, and extract the most information from

the images.

The deconvolution algorithms developed for aperture synthesis
are more generally useful. e.g. Multi-resolution clean can
be used to deconvolve other images with a point-spread function which
has an error beam.

It is in the best interests of ALMA, and science in general,
to make these deconvolution algorithms widely available.

It is a reasonable requirement that the offline software be
re-useable, so that it may be incorporated more easily into other
packages with which the users may be more familiar.

>>>SMyers: I think this is beyond the scope of what need be
required of the Package. Perhaps a suggestion, but need text.<<<

The design should be to avoid making:
> > Shoe-horning such information into another package is hard work."

Melvyn.

From tcornwel@cv3.cv.nrao.edu Thu Aug 23 17:04:26 2001
Date: Thu, 23 Aug 2001 13:33:06 -0600
From: Tim Cornwell <tcornwel@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: RE: [alma-sw-ssr] Offline and Pipeline Requirements

>
> The calibration and imaging, of course require the uv-data,
> but almost all deconvolution algorithms do not.

FYI, this used to be true before the advent of mosaicing but now
many of the highest quality deconvolution algorithms require
going back to the original data in a minor cycle/major cycle
mode.

In any event, I've sufficiently abused my lurker status that I'll
shut up now.

Regards,

Tim

From wright@astron.berkeley.edu Thu Aug 23 17:05:10 2001
Date: Thu, 23 Aug 2001 14:10:46 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: RE: [alma-sw-ssr] Offline and Pipeline Requirements

Tim,

        It's good to have your participation, and know what
to expect.

If there is a significant increase in image fidelity by
going back to the uv-data in the deconvolution of mosaiced
images, then this has a very significant effect on the operational
model for ALMA image analysis.

It remains to be demonstrated that there is a meaningful
increase in image fidelity with telescopes with real pointing
and other errors, and what the cost in performance is.

These tests should be done as soon as possible, and I would be happy
to provide some data. The attached MIRIAD script, takes
about 5 min to make images, 10 min for SDI and 20 min for Maxen
on a sun ultra 10 (93000 uv-points and 19 pointings and 64 channels).
 The numbers can be scaled appropriately for ALMA.

            cheers,

                Melvyn

```
#!/bin/csh

# multichannel mosaic imaging using MIRIAD
rm -r hcn.mp hcn.bm
invert vis=@hcn.data map=hcn.mp  beam=hcn.bm  line=channel,64,1,1,1
options=mosaic,double,systemp imsize=194 cell=1.4 robust=0.5

# SDI deconvolution
rm -r hcn.sdi  hcn.sdicm
mossdi map=hcn.mp  beam=hcn.bm    out=hcn.sdi  niters=100 'region=image(2,64)'
restor map=hcn.mp  beam=hcn.bm  model=hcn.sdi  out=hcn.sdicm

# Maximum entropy deconvolution
rm -r hcn.mem  hcn.memcm
mosmem map=hcn.mp  beam=hcn.bm    out=hcn.mem  niters=50 'region=image(2,64)'
restor map=hcn.mp  beam=hcn.bm  model=hcn.mem  out=hcn.memcm

end:
```

From wright@astron.berkeley.edu Thu Aug 23 17:05:35 2001
Date: Thu, 23 Aug 2001 14:44:27 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: bbutler@cv3.cv.nrao.edu
Cc: alma-sw-ssr@cv3.cv.nrao.edu, tcornwel@cv3.cv.nrao.edu
Subject: RE: [alma-sw-ssr] Offline and Pipeline Requirements

Hello Bryan,

        I intended that the test be done in aips++ by someone

who knows how. I'm sorry if this was not clear.

If the uv-data is essential in image analysis, this probably
precludes any commercial package.

        cheers,

            Melvyn

>If there is a significant increase in image fidelity by
>going back to the uv-data in the deconvolution of mosaiced
>images, then this has a very significant effect on the operational
>model for ALMA image analysis.

>It remains to be demonstrated that there is a meaningful
>increase in image fidelity with telescopes with real pointing
>and other errors, and what the cost in performance is.

>These tests should be done as soon as possible, and I would be happy
>to provide some data.
>

Mel,

I think the whole point is that we can't allow our experience with a 9
element interferometer with maximum dynamic range of 200:1 to limit our
understand of what is required of the data reduction on a 64 element
interferometer which will potentially have a dynamic range of many
thousands to one.

If there is any hope of correcting for pointing errors, it is through
algorithms which combine pointing self-calibration with the deconvolution,
ie, knowledge of the visibility data is directly tied together with the
process of imaging and deconvolution. This is the strength of AIPS++,
and it will be somewhat difficult for less developed radio-synthesis
software to deal with such problems and impossible for software such
as IDL to deal with them.

        -Mark

Hi Mark,

I would think that if you can measure the pointing errors then you
should correct the pointing in realtime and then not have to deal with
them in the imaging. From the science requirements you can infer how
often the pointing needs to be refined.

Steve

From wright@astron.berkeley.edu Thu Aug 23 17:05:57 2001
Date: Thu, 23 Aug 2001 15:16:08 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: RE: [alma-sw-ssr] Offline and Pipeline Requirements

Hello Mark,

        I think it is good to clearly say this.

However, the image fidelity of ALMA in the submillimeter
will probably be comparable to BIMA at 3mm.

I would still like to see a comparison with running
the test in aips++ and any other packages capable
of handling the mosaiced data.

        cheers,

            Melvyn

From tcornwel@cv3.cv.nrao.edu Thu Aug 23 17:06:04 2001
Date: Thu, 23 Aug 2001 16:42:17 -0600
From: Tim Cornwell <tcornwel@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: RE: [alma-sw-ssr] Offline and Pipeline Requirements

> I would still like to see a comparison with running
> the test in aips++ and any other packages capable
> of handling the mosaiced data.

Mel,

Isn't the ALMA calibration and imaging group working
on questions like this one? Your question has many
aspects, and finding an answer will be lengthy.

Cheers,

Tim

From Wim.Brouw@atnf.csiro.au Thu Aug 23 17:06:08 2001
Date: Fri, 24 Aug 2001 08:53:36 +1000
From: Wim Brouw <Wim.Brouw@atnf.csiro.au>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline and Pipeline Requirements

Mel,

At Thu, 23 Aug 2001 11:03:56 -0700 (PDT) mel wright 456 wrote:
 > The ALMA model is that that all data are pipeline reduced,
 > including, probably, a deconvolution of the synthesised images.
 >
 > The best calibration and imaging procedure are more easily
 > defined by the observing procedure and quality of the data
 > obtained, and can be optimised in the pipeline processing.
 > The most appropriate deconvolution is not so clearly defined,
 > and may need to be done in alternate ways offline.
 >
 > In some cases, experts may wish to go back and re-process
 > the uv-data, but I think that most users will not, and that
 > ALMA will best serve the community by producing images.
 >
 > The calibration and imaging, of course require the uv-data,
 > but almost all deconvolution algorithms do not.

This is certainly not true for most procedures and telescopes nowadays that
need a dynamic range of more than 20dB. Since the early 1980's deconvolution,
especially for mosaicing and the lower frequencies (with many sources) and
polarisation work, econvolution algorithms have been iterating between uv and
image plane.

Groeten,

Wim Brouw

From wright@astron.berkeley.edu Fri Aug 24 08:04:36 2001
Date: Thu, 23 Aug 2001 16:16:53 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline and Pipeline Requirements

Hello Wil,

      yes, but we are supposed to be designing software for
a multichannel mosaicing millimeter array, not a high
dynamic range cm array.

cheers,

            Melvyn

From lucas@iraux2.iram.fr Fri Aug 24 08:11:23 2001
Date: Fri, 24 Aug 2001 08:21:41 +0200
From: Robert Lucas <lucas@iraux2.iram.fr>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline and Pipeline Requirements

An interesting reading for getting a feeling of the fidelities expected
for ALMA with realistic errors is at:

http://iraux2.iram.fr/~alma/node1.html

Regards

Robert

From wright@astron.berkeley.edu Fri Aug 24 21:43:05 2001
Date: Fri, 24 Aug 2001 10:42:14 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline and Pipeline Requirements

Hello Robert,

      thanks for the support.

BIMA memo 73 discusses the imaging fidelity of the CARMA array
using heterogenous imaging with 6 and 10m antennas.
http://bima.astro.umd.edu/memo/abstracts.html#73

      good work,

            cheers,

                Melvyn

From gueth@iram.fr Fri Aug 31 12:49:50 2001
Date: Mon, 27 Aug 2001 08:48:10 +0200
From: Frederic Gueth <gueth@iram.fr>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Offline and Pipeline Requirements

In order to study the impact of the ACA on the imaging

capabilities of ALMA, there has been a considerable effort
this summer to get simulations of the whole imaging process
as realistic as possible.

At IRAM, we have developed a simulator in GILDAS. It
includes pointing errors, anomalous refraction and phase
errors induced by an atmospheric phase screen, amplitude
errors, etc. Mosaicing is the default mode. The deconvolution
is done with CLEAN or one of its variant. You can check the
(preliminary) results at: http://iram.fr/~alma

Frederic.

31-Aug-2001: Pipeline V3.2 now available

From schilke@mpifr-bonn.mpg.de Fri Aug 31 12:50:12 2001
Date: Tue, 28 Aug 2001 19:00:53 +0200
From: Peter Schilke <schilke@mpifr-bonn.mpg.de>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: [alma-sw-ssr] Pipeline Requirements new version

Hi everybody,

    here is a new version of the pipeline requirements, where we
(particularly Frederic) have tried to incorporate all the comments we
received both on the mailing list and in the telecon. We have added
priorities, but currently all of them are 1 - most of them will remain
this way, since the pipeline will be essential for ALMA and should be
functional from the beginning. The last section (Interface with the
Archive) is still very sketchy.

    Please give you comments until thursday evening, so that we have to
work them in on friday in order to meet the September 1 deadline for the
ASAC documents.

            Cheers,

                Peter

ftp://ftp.mpifr-bonn.mpg.de/outgoing/schilke/pipeline_3.2.pdf

ftp://ftp.mpifr-bonn.mpg.de/outgoing/schilke/pipeline_3.2.ps.gz

----

From lucas@iram.fr Fri Aug 31 12:50:38 2001
Date: Wed, 29 Aug 2001 16:08:22 +0200
From: Robert Lucas <lucas@iram.fr>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Pipeline Requirements new version

```
Peter, Frederic

I attach comments to pipeline v3.2; these are mainly minor (phrasing).

Regards

Robert

$Header: /home/lucas/ALMA/Software/SSR/Requirements/pipeline_3.2Comments.txt,v
1.3 2001/08/29 14:00:32 lucas Exp lucas $

p1. title: Mention DRAFT somewhere in title?

p4. s1.1

- 'four different groups'
- 'Each group should has lot of operations' -> plural in all following
- Each of these groups has different functions...

p4. real-time ... 4th level itemize: add side band ratio determination.
 astromical calibration: add somewhere:
  - preliminary phase and amplitude calibration calibration (for quick look)


p4. quick Look Operations
   o quick calibration
     - produces uv tables: this an implementation issue. say `apply
       preliminary phase and amplitude calibration'

p5.
 science imaging operations
   say: `final after completion of part of project'

p5.
 o "produces and archives uv tables of calibrated visibilities": this
 is in contradiction with archive section where we archive calibration
 data, not calibrated data.

p5. s1.2 astronomical source : arbitrary

p5. s1.3 3rd -
   will polarisation leakage calibration require a time interpolation?

p5. s1.3 last paragraph
   The third category will be handled partly as real-time calibration
   operations (...)  as Quick Look operations (...) and as final
   Science Operations.

p6. 2-0.0-R3 "All data processing shall operate ..." or "The pipeline ..."

p6. 2-0.0-R6 "any step" is difficult. At least add "an entire series
   of _previous_ operations" (I doupt we can avoid redoing the
   operations subsequent to the incriminated step). In fact it is a
   question of implementation of the software whether it is optimum to
   `compute backwards' steps, or go back to previous states.

p7. Real Time Calibration Operations
```

p7. 3-0.0-R1 Real Time calibration operations shall ...

p7. 3-0.0-R2 Whenever the results of the real time calibration allows ...

p7. 3-2.0-R1 The pipeline shall reduce, ...

p7. 3-2.0-R1.1 The receiver sideband ratios.

p7. 3-2.0-R1.2 The temperature scale calibration data, ...

p7. 3-2.0-R1.3 The bandpass calibration data.

p7. 3-2.0-R2 For all observations... the pipeline shall:

p7. 3-2.0-R2.1 This is not the only solution, one may also defer the
   actual conversion to later stages, and keep only the conversion
   factor (Tsys) as a function of frequency.

p7. 3-2.0-R2.2 Sorry I had missed this. The first is not a pipeline
   operation; it is part of the data acquisition (in anyway it is not
   the phase but the complex data).

p8. 3-2.0-R3 last paragraph:
   "they must also made available to later science calibration operations...

p8 3-3.0-R1 'The pipeline shall ...'

p8 3-3.0-R2 ditto
            and note contradiction with 3-2.0-R2.1 which does the same thing.
            ->same comment

p8. 3.4.0-R1 The Pipeline...
    delay measurements

p8. 3.4.0-R1 telescope parameter file: this is an implementation issue (may be
    in a data base). I would say `archived and made available ...'

p8. 3.4.0-R2/3/4 The Pipeline...

p9. 3-4.0-R5 The Pipeline...

p9. 3-4.0-R5 Add the same req. for point sources of known flux or
    small sources of known visibility model and aperture efficiency?

p9. 3-4.0-R6 Skydip already mentioned in R5 (I think it should be only
    here).
    - I'm not sure single dish (transmitter) holography can be
    handled by the pipeline as it will probably not be done on the
    site (?)

p10. s4: Quick Look Operations

p10. 4-0.0-R3 `various real time calibration results'

p10. 4-0.0-R3 last paragraph: replace `observer' by `staff astronomer'

p10. 4-0.0-R5.5 say '(from theory, using actual system temperatures)'

p11. 4-0.0-R6.3 AoD -> Staff astronomer (for consistency).

p11. 4-0.0-R6.5 or at actually observed positions
        (... not necessarily rectangular)

p11. 4-0.0-R8.5 phase and amplitude closure (useful to detect decorrelation).
                both really useful for calibrators only.

p11. 4-0.0-R9 resulting map shall be displayed

p11. 4-0.0-R9.2 AoD -> Staff astronomer (for consistency).

p12. 5-0.0-R2 The pipeline shall find ...

p12. 5-1.0-R1/2/3 The pipeline shall find ...

p12. 5-2.0-R2 AoD -> Staff astronomer (for consistency).

p13. s6 Science Imaging Operations

p13 6-1.0-R1/2/4/5 The Pipeline shall ....

p13 6-1.0-R2 ... find in the Archive the visibilities and calibration
    data obtained ...

p13 6-1.0-R4 ... , plus the continuum measurements, if required.

p13 6-1.0-R5 ..., as well as continuum emission, if required.

p14 6-1.0-R5 subtraction of continuum ... may be required.

p14 6-1.0-R8.4 combination of single-dish and interferometer data.

p14. 6-2.0-R1 For single dish data, the pipeline shall:

p14. 6-2.0-R1.1 it shall use calibration data produced by science
     calibration operations.

p14. 6-2.0-R1.2 find in teh Archive previous observations and
    calibration data, ...

From wright@astron.berkeley.edu Fri Aug 31 12:50:54 2001
Date: Wed, 29 Aug 2001 15:57:45 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Pipeline Requirements new version

Hello Peter,

The pipeline can be used to derive the antenna phasing
for vlbi. You could refer to ALMA vlbi memo 382, and use some
words:

\section{Array Phasing}

For VLBI the phase correction must be applied before the IFs are summed,
e.g. as a phase offset to the LO.
This is different from the data correction envisioned for ALMA observations.
The phase might be derived some combination of:
    i) WVR,
   ii) selfcal on strong target source,
  iii) rapid switching to nearby reference source.

        Melvyn

All, and hardware guys too,

Another thought about antenna phasing.
The "standard" model is a combination of WVR monitoring,
and rapid switching to nearby phase calibrators.

Some variations on this:

1. At the lower
frequencies, there may be a sufficiently strong compact
source within the primary beam which could be used as
a continuous atmospheric phase monitor. The pipeline
could derive the antenna phases.

2. At high frequencies, a suitable monitoring source
may be found in the offset beam corresponding
to a low frequency band. These
offset beams move w.r.t. the target source, so the
monitoring source will change with time, but one
is only interested the phase, not the source.
The simultaneous observation of the target at
high frequency and a monitoring source in an offset beam
at low frequency requires a few things, like
2 active receivers, sharing bandwidth and correlator,
but has the advantage of a continuous phase calibration
on a nearby source.

3. If one uses different frequencies for the target and phase calibrator,
then a calibration of the phase offset between the 2 bands is required
at an interval determined by the phase stability of the system. A

stronger calibrator can be used for this. The pipeline should
keep track of this phase offset, its interpolation and the
calibration interval required.

4. Suitable phase calibrators could be found from a quick
mosaic around the target source at the start of an observation
 This is a job for the pipeline too.

From mholdawa@cv3.cv.nrao.edu Fri Aug 31 12:51:05 2001
Date: Thu, 30 Aug 2001 08:34:22 -0700 (MST)
From: Mark Holdaway <mholdawa@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Pipeline Requirements new version

Mel wrote:

> 1. At the lower
> frequencies, there may be a sufficiently strong compact
> source within the primary beam which could be used as
> a continuous atmospheric phase monitor. The pipeline
> could derive the antenna phases.

I think this is the same as self-calibration.

> 2. At high frequencies, a suitable monitoring source
> may be found in the offset beam corresponding
> to a low frequency band. These
> offset beams move w.r.t. the target source, so the
> monitoring source will change with time, but one
> is only interested the phase, not the source.
> The simultaneous observation of the target at
> high frequency and a monitoring source in an offset beam
> at low frequency requires a few things, like
> 2 active receivers, sharing bandwidth and correlator,
> but has the advantage of a continuous phase calibration
> on a nearby source.

I think dual frequency observations have been ruled out by the systems
group.

> 3. If one uses different frequencies for the target and phase calibrator,
> then a calibration of the phase offset between the 2 bands is required
> at an interval determined by the phase stability of the system. A
> stronger calibrator can be used for this. The pipeline should
> keep track of this phase offset, its interpolation and the
> calibration interval required.

This is also a requirement of fast switching.

> 4. Suitable phase calibrators could be found from a quick
> mosaic around the target source at the start of an observation
> This is a job for the pipeline too.

This is also a requirement of fast switching.

-M

From bbutler@cv3.cv.nrao.edu Fri Aug 31 12:51:09 2001
Date: Thu, 30 Aug 2001 09:54:18 -0600
From: Bryan Butler <bbutler@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Pipeline Requirements new version

i agree with mark here - simultaneous dual-frequency operation has
been completely ruled out (if you don't count the WVR). i'm pretty
sure we are beyond the point at which this decision can be changed.
the current design is that there is one 'hot' receiver - i.e., the
one currently being used; there is one 'warm' receiver, which can
be switched to on short timescales (1 sec or so, i think is the
spec) - i.e., the low frequency Rx for fast switching calibration;
and one which is 'ready to be warmed up' - i.e., the next observing
frequency (it takes 10 or 15 secs for this to be ready, IIRC).

note that we are seriously considering this kind of a calibration
scheme for the EVLA, where all of the receivers are 'on' all of the
time. there are some difficulties with transferring the phase, but
it certainly looks promising.

        -bryan

From lucas@iram.fr Fri Aug 31 12:51:14 2001
Date: Thu, 30 Aug 2001 18:42:48 +0200
From: Robert Lucas <lucas@iram.fr>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Pipeline Requirements new version

mel wright 456 wrote:
>
> All, and hardware guys too,
>
> Another thought about antenna phasing.
> The "standard" model is a combination of WVR monitoring,
> and rapid switching to nearby phase calibrators.
>
> Some variations on this:
>
> 1. At the lower
> frequencies, there may be a sufficiently strong compact
> source within the primary beam which could be used as
> a continuous atmospheric phase monitor. The pipeline
> could derive the antenna phases.

Agreed. We had this before (6.3-R6) in sw memo 11. Self Cal should be
mentioned in the new reqs.

>
> 2. At high frequencies, a suitable monitoring source
> may be found in the offset beam corresponding
> to a low frequency band. These
> offset beams move w.r.t. the target source, so the
> monitoring source will change with time, but one
> is only interested the phase, not the source.
> The simultaneous observation of the target at
> high frequency and a monitoring source in an offset beam
> at low frequency requires a few things, like
> 2 active receivers, sharing bandwidth and correlator,
> but has the advantage of a continuous phase calibration
> on a nearby source.

I agree with the other replies that this appears now excluded by
hardware design; it seems to me unlikely in any case that there are
enough sources to do that kind of calibration in a significant number of
projects.

> 3. If one uses different frequencies for the target and phase calibrator,
> then a calibration of the phase offset between the 2 bands is required
> at an interval determined by the phase stability of the system. A
> stronger calibrator can be used for this. The pipeline should
> keep track of this phase offset, its interpolation and the
> calibration interval required.

This also is mentioned in our Observing Modes Use Cases and in the
OffLine Reqs.
OL 4.2 R4; it should be mentioned in the piline reqs.

> 4. Suitable phase calibrators could be found from a quick
> mosaic around the target source at the start of an observation
> This is a job for the pipeline too.

I'm not sure the pipeline reqs are at this level of detail yet (as there
is no very specific data processing here). Thi sis more at the
`observing mode' level.

Robert

From bbutler@cv3.cv.nrao.edu Fri Aug 31 12:51:23 2001
Date: Thu, 30 Aug 2001 10:25:01 -0600
From: Bryan Butler <bbutler@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu, mmaimcal@cv3.cv.nrao.edu
Subject: [bbutler@cv3.cv.nrao.edu: Re: [alma-sw-ssr] Pipeline Requirements
    new version]

On 2001.08.30 10:22 Bryan Butler wrote:

al is right here (i was thinking of the situation for only 1 antenna).
but sub-arraying is essentially the 'paired antennas' (or 'clustered
antennas') calibration concept, which is terribly inefficient for calibration.

-bryan

On 2001.08.30 10:19 Al Wootten wrote:
> Bryan Butler writes:
> > On 2001.08.30 09:34 Mark Holdaway wrote:
> > >
> > > Mel wrote:
> > >
> > > > 2. At high frequencies, a suitable monitoring source
> > > > may be found in the offset beam corresponding
> > > > to a low frequency band. These
> > > > offset beams move w.r.t. the target source, so the
> > > > monitoring source will change with time, but one
> > > > is only interested the phase, not the source.
> > > > The simultaneous observation of the target at
> > > > high frequency and a monitoring source in an offset beam
> > > > at low frequency requires a few things, like
> > > > 2 active receivers, sharing bandwidth and correlator,
> > > > but has the advantage of a continuous phase calibration
> > > > on a nearby source.
> > >
> > > I think dual frequency observations have been ruled out by the systems
> > > group.
> > >
> >
> > i agree with mark here - simultaneous dual-frequency operation has
> > been completely ruled out (if you don't count the WVR). i'm pretty
> > sure we are beyond the point at which this decision can be changed.
> > the current design is that there is one 'hot' receiver - i.e., the
> > one currently being used; there is one 'warm' receiver, which can
> > be switched to on short timescales (1 sec or so, i think is the
> > spec) - i.e., the low frequency Rx for fast switching calibration;
> > and one which is 'ready to be warmed up' - i.e., the next observing
> > frequency (it takes 10 or 15 secs for this to be ready, IIRC).
> >
> > note that we are seriously considering this kind of a calibration
> > scheme for the EVLA, where all of the receivers are 'on' all of the
> > time. there are some difficulties with transferring the phase, but
> > it certainly looks promising.
> The only way one can effect simultaneous dual-frequency operation is through
> the use of sub-arrays. One is using different antennas in that case, but
> depending on the configuration one may be observing a similar patch of
> atmosphere.
>
> Al

From lucas@iram.fr Fri Aug 31 12:51:46 2001
Date: Thu, 30 Aug 2001 18:51:57 +0200
From: Robert Lucas <lucas@iram.fr>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [bbutler@cv3.cv.nrao.edu: Re: [alma-sw-ssr] Pipeline
    Requirements   new version]

I would think the only wise use of that mode (for interferometry) is to

```
observe time-varying phenomena (e.g. next comet crash, solar flares,
...) at several frequencies simultaneously.

Robert


-----------------------------------------------------------------------------

From wright@astron.berkeley.edu Fri Aug 31 12:51:52 2001
Date: Thu, 30 Aug 2001 09:59:29 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Pipeline Requirements new version

Bryan,

> this appears now excluded by hardware design

too bad, EVLA looks more fun.

> unlikely in any case  that there are
> enough sources to do that kind of calibration in a significant number of
> projects.

Robert,
      you can check my numbers (maybe wrong ?)

 obsrms freq=40 antdiam=12 tsys=40 nants=60 bw=8000 inttime=.1 min
=> Rms Flux density:   0.142     mJy/beam in 6s.

Kellerman gives  N(S) = 60 S^{-1.5} Sr^{-1}
[at 5 GHz (?); I think Frazer had some better estimates at mm]

calc '60/.7e-3**1.5*2.1*2.1/3400/3400'
=>  1.2 sources in a 2.1' beam above  5 x RMS in 6s.

-----------------------------------------------------------------------------

From lucas@iram.fr Fri Aug 31 12:51:55 2001
Date: Thu, 30 Aug 2001 19:37:31 +0200
From: Robert Lucas <lucas@iram.fr>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Pipeline Requirements new version

mel wright 456 wrote:

> Robert,
>         you can check my numbers (maybe wrong ?)
>
>   obsrms freq=40 antdiam=12 tsys=40 nants=60 bw=8000 inttime=.1 min
> => Rms Flux density:   0.142     mJy/beam in 6s.
>
> Kellerman gives  N(S) = 60 S^{-1.5} Sr^{-1}
> [at 5 GHz (?); I think Frazer had some better estimates at mm]
>
> calc '60/.7e-3**1.5*2.1*2.1/3400/3400'
```

```
> =>  1.2 sources in a 2.1' beam above  5 x RMS in 6s.
>
Mel:

I think you're using the sensitivity for detecting a point source, while
you should use the sensitivity for getting the phase for each antenna
which is sqrt(60)~8 times  worse.

Robert


------------------------------------------------------------------------------

From wright@astron.berkeley.edu Fri Aug 31 12:52:01 2001
Date: Thu, 30 Aug 2001 11:20:50 -0700 (PDT)
From: mel wright 456 <wright@astron.berkeley.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Pipeline Requirements new version


Robert, Bryan,

>I think you're using the sensitivity for detecting a point source, while
>you should use the sensitivity for getting the phase for each antenna
>which is sqrt(60)~8 times  worse.

Agreed, this source could be used for continuous monitoring
 but not for deriving antenna phases every 6s.


Same calculation for EVLA looks promising for both.

Melvyn


------------------------------------------------------------------------------

From mholdawa@cv3.cv.nrao.edu Fri Aug 31 12:52:07 2001
Date: Thu, 30 Aug 2001 12:10:41 -0700 (MST)
From: Mark Holdaway <mholdawa@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@cv3.cv.nrao.edu
To: alma-sw-ssr@cv3.cv.nrao.edu
Subject: Re: [alma-sw-ssr] Pipeline Requirements new version


Other guys wrote:

> Robert,
>     you can check my numbers (maybe wrong ?)
>
>  obsrms freq=40 antdiam=12 tsys=40 nants=60 bw=8000 inttime=.1 min
> => Rms Flux density:   0.142      mJy/beam in 6s.
>
> Kellerman gives  N(S) = 60 S^{-1.5} Sr^{-1}
> [at 5 GHz (?); I think Frazer had some better estimates at mm]
>
> calc '60/.7e-3**1.5*2.1*2.1/3400/3400'
> =>  1.2 sources in a 2.1' beam above  5 x RMS in 6s.
>
>
```

I think you need to do better than this. This is a detection of 5 sigma
of the entire array in 6 seconds, which means the noise on each visibility
will actually be sqrt(n(n-1)/2) = 42 times worse, or the signal is 1/8
sigma per baseline, which is equivalent to phase noise spinning around all
360 degrees. In my simulations, 1 sigma detection per baseline is a good
rule of thumb, which puts you up by a factor of 8 in source flux.

        -M

31-Aug-2001: Offline V3.2 now available

02-Sep-2001: Offline V3.3 now available for ASAC meeting in Chile

----

From lucas@iram.fr Wed Dec 5 13:33:02 2001
Date: Tue, 06 Nov 2001 20:32:22 +0100

Steve:

The comments I got (orally) from A. Benz:

1.2-R3 Not only bug fixing should be provided but also improvements in
particular on the user interfaces, whenever needed.

>>>SMyers: agreed. Add new R4.<<<

2.2-R5: Priority 1?

>>>SMyers: I am inclined to keep this as Pri 2 as it is not crucial but
is important (and the package will be graded on this). We probably need
to downgrade items in priority, not upgrade them!<<<

5.1-R7: accuracy is at least 10 times better e.g. assuming S/N ratio
  larger than 10. But it is recognized that this is a placeholder.

>>>SMyers: I am removing this from the draft, as there seems little
justification.<<<

7.1-R5.1 Not that gif is out of fashion

>>>SMyers: Fashion is irrelevant. The question is whether it is useful
to be able to output gif as well as jpeg etc. I am removign jpeg and gif
from 5.1 and leaving them in 5.2. Are there other primary formats in
additon to FITS?<<<

7.1-R5.2 should be higher priority (e.g. 1); ps too is out of fashion

>>>SMyers: Fashion again? ps is useful. Do you actually publish?
But I dont think priority should be boosted to 1, 2 at most, and I will leave
at 3.<<<

7.2-R1 z-axis limits should be explicitly mentioned for color maps

>>>SMyers: I don't see why.<<<

I did not get any other from ASAC people.

The first one is the only which is really important.

>>>SMyers: agreed. Sigh.<<<

Cheers

Robert

06-Dec-2001: Offline V3.4 now available for review

Date: Fri, 14 Dec 2001 12:53:57 +1100
From: Wim.Brouw@csiro.au
To: smyers@cv3.cv.nrao.edu
Cc: graffi@eso.org, jschwarz@eso.org, Neil.Killeen@csiro.au
Subject: Re: ALMA offline DPR

Steve,

A few comments on the above. Some of them were made before I saw the answer
in a later part.
Hope you got back safely to Socorro.

Groeten

Wim

(I am not sure that page numbers are the same in A4...)

p6: 'C': Observational wise I agree. However, to get bandpass and other
calibrations, noise characteristics play a role if a lot of energy is in
parts of the overall band. Some kind of self-cal in the frequency domain
could be necessary in a spectral-line rich region

>>>SMyers: Hmmm, could be. I dont think that impacts this doc<<<

p6: 'F': I think the requirements are prefixed with 'OL'

>>>SMyers: Oops.<<<

p7
 1.1-R5: seems to me that this should be p1

>>>SMyers: there is some room for very special pipeline modes that may
be beyond the package.<<<

 1.2-R1: drop the (on Unix): NT certainly has 'root' ('administrator')

>>>SMyers: done<<<

p8
 1.2-R9 (and R8): if it is considered p2, changes are it will never be done.
Both these items need at the minimum some define 'hooks' in the software
from day 1. Therefore maybe better p1

>>>SMyers: I keep pointing out that the intention is that 90% of P2 items
will be done (i.e. the Package could fall short on only a couple of P2 items.
If we really think that only P1 will get done, then there is no reason
for prioritizing - or we should only have P1 and P2. Actually, we need
to *demote* more P1 items to P2, not the other way around. However, if
people really dislike putting some important things in P2 then we should
adjust the system.

On the subject of these specific 1.2-R8 and R9, these are not so critical
to the operation of the package that under the current scheme they go to
P1.<<<

p9
 2.1-R3 raises locking issues which should be mentioned at an early stage (I
noticed that later locking was mentioned, but should be up-front)

>>>SMyers: There is file-locking in 3.1-R12 as that is under data management,
where it should be. I will insert an "Operational Issue" as 1.2-R3
to mention locking and multi-task interference.<<<

p10:
 2.4-R1: always dangerous to try to make an inclusive list. E.g. the
'efficient vector and matrix': make it array, a lot of data is 3d
I also miss the, important, interrupts and error handling in this list.

>>>SMyers: Add interrupts and error-handling. Note there are special
vector and matrix operations that are not covered by general array
handling, but add array handling as a P1 general item.<<<

p12
 2.5-R6: full search is essential from start (and definition of
documentation). You do not want to have in this day and age a non-context
sensitive, html only based search...

>>>SMyers: again you seem unclear on how the priorities work. This is not
the scheme of SW11. P2 does not imply anything more than it is not critical
to the package, but very important.<<<

p13
  3.1-R2 is dualistic, or at least not precise enough. Do you always want to
make a copy from data in the archive into local datasets; or allow the use
of 'virtual' combination and virtual access (may save a lot of overhead). In
either case it will be difficult to be able to add all calibration tables
(if such beasts are used) and history coupled to the data in the archive.
Any idea on how to do that; what access to archive writing is needed in
those cases etc.

>>>SMyers: This is a tricky one indeed, not precise enough for a real spec,
but I do think we need some sort of placeholder list here. Any suggested
rewrites would be welcome, but we should probably not move closer than

this to implementation issues.<<<

   3.1-R3: you want to select on mosaic fields; SD pointings (OTF); probably
be able to do OTF (time, and maybe baseline) integration (for
[self]calibration)

>>>SMyers: Add pointings for mosaic and scanning modes<<<

   3.1-R6: really 2 points: 1. OTF integration; 2. creating a 'compressed'
new dataset.
       OTF is in generally much more efficient in computers (IO operations
are slower than Flops. In creating a compressed dataset you also have to
worry about the 'centre-of-gravity' of the averaged band (and/or time)

>>>SMyers: I don't understand what you are saying. The intent here is
really just averaging in time, band, channel. More complex compression
should probably go to another req (add as 3.1-R16 P3)<<<

   3.1-R8: 'A' flagging mask... (rather than 'the'?)

>>>SMyers: how about 'Any existing'?<<<

p14:
 3.1-R9: ... if requested... I hope they will always be preserved in the
original data, and only be omitted (if requested, not other way around) in
offline copies of data

>>>SMyers: I would imagine that is the default. Just need the possibility
to be built in.<<<

 3-1-R11: does manipulation include 'changing'?

>>>SMyers: yes - reword<<<

 3-1:R12: read locking should be possible (i.e. when changing a header
defining say a data length no reading should be active). Again the question:
should the default operation be working from archived data with no write
access? Most/all operations be done OTF (stops processing bloat) or through
auxiliary data files.

>>>SMyers: Dunno. That was my model for operation (read archive, fiddle,
write new stuff). As for other (read) locking, that might be considered
for a P3 item (Im not putting one in now however).<<<

 3.1-R14 and R14.1 should be reversed (I think), with 14.1 have p1 (if it is
what I call 'virtual concatenation')
 3.1-R14.1 -- what Boolean operations? Regular Expression maybe?

>>>SMyers: I think I disagree, though I don't quite understand what you
are getting at. I don't think this is P1 in any event. 14.1 is a request
on how it would look to a user (e.g. "file1 + file2 + file3"). Im tired
enough of explaining what this fairly obvious thing is (provided one thought
about it for even a moment), and since it is probably an irrelevant
implementation detail, I will delete 14.1<<<

 3.2-R4: I am all for making any type of bloat forbidden if it influences
the processing speed (overall). Having an external format of 8 bytes when

0.5 byte suffices makes processing 16 times slower than necessary (or probably 10 times or so due to added internal processing). However, internally, on fast processors, it would be much slower not to have the 8bytes for the data in a lot of processors with an 64-bit bandwidth and processor width. Cheaper to have 8 times the memory and speed (and if necessary an 8-way raid).
       Would rather say:
       ' The package should make sure that data is handled in such a way and format that the overall speed is optimised' Memory and speed bloat, if present, should be balanced to obtain the best overall throughput."

>>>SMyers: The intent here is for diskspace bloat. Speed and efficiency are other reqs like 3.3-R.1 and even more 1.1-R4.<<<

p15:
3.3-R3: ..larger than main and virtual memory of the host system.

>>>SMyers: Is this a relevant distinction? Use of the VM is part of this, and should be factored in of course. No change.<<<

3.4: what is the point of having -R2 and R3? There must be many other data that must be handled (now and in the future). If a list, make it complete (which is impossible), or no list, and say: all monitoring (engineering and astronomical) data must be handled. E.g. ...

>>>SMyers: more to the point, some of these are handled better in 3.1-R2 as per Bryan Butler's suggestion. 3.4 and 3.5 are now deleted, with 3.4-R3 into 3.1-R2.4.   3.4-R1 moved to after 3.1-R8.<<<

3.5: again a list

>>>SMyers: 3.5-R1 moved to before 3.1-R2.7, delete 3.5<<<

3.6-R1.1: random or along axes?

>>>SMyers: not relevant here, see 2.6<<<

3.6-R1.2: is images correct word? Could be misunderstood as excluding say v-ra planes

>>>SMyers: add "and arrays"<<<

3.6-R1.3: pol. cubes; RM cubes,...

>>>SMyers: pol not usually done as a "cube", and Im not sure what an RM cube is (I would think RM would be on the intensity axis of an image cube, though I guess adding an RM axis to a spectral cube might make sense). I would tend to leave the more complicated stuff to 2.6.<<<

p16:
3.7-R2: I am not sure that 'FITS' is a good example as 'standard', especially not for non-image data. I believe that fits-like but standard based (xml or so) will be the norm at that stage. But ok.
I would like to see added that ALMA produces also a standard output for use by other packages, and a standard that is understood by others.

>>>SMyers: leave this to the project<<<

3.8-R1: ... is run by ALMA staff, or a VO)...

>>>SMyers: Im not sure we want VO accessing the archive through the
offline package, but likely using archival retrieval tools. Dodge
this issue here by not mentioning VO.<<<

p17
4.1-R2: re-reading... why reading (I read that as 'copying') anyway?

>>>SMyers: meaning you don't have to read the data in again or have made
a backup copy just to change these things<<<

4.1-R21.: apart from definition of 'some sort of...', which is too vague, is
the question: where is the history table kept?

>>>SMyers: not our intent to dictate implementation, vagueness is intentional.
I don't care where the table is kept. Change 'sort of' to something less
colloquial.<<<

4.1-R3: and astronomical data

>>>SMyers: not the intention here.<<<

4.1-R5: ..., preferably OTF.

>>>SMyers: I dont understand the relevance of OTF here. I presume you mean
some "on-the-fly" manipulation of the data, not the OTF scanning mode,
but this is some buzzword that I think is too vague to be of use here<<<

4.1-R6.*: again a list; with missing, important stuff like vs. UV; vs. W;
vs. Tatm etc etc
    R6.&: monitoring data should be in that list
       what about closing errors; etc

>>>SMyers: uvw implied in R6.1, I dont see vs. Tatm as useful, but include
along with monitor data and closure in new items<<<

p18
4.2-R1: a list again. I would say ..would at the minimum take account of
.... Maybe in 2 years time the sodium layer reflections give some very
important additional atmospheric info..

>>>SMyers: Huh? I dont think we should include that much speculation
here, unless I am missing something really novel and important.<<<

4.2-R3: who provides the model -- ALMA scientist or the package providers?
(I think ALMA<MA, state it).

>>>SMyers: This is a policy issue - should we have ALMA provide the model
or at least a standard model? This is probably reasonable, given that
the Pipeline will need a model. Add text to this effect as a new R1.<<<

p19
4.3-R10: mentioning of multiple datasets here is wrong. I would suppose that
all calibration could work with multiple datasets; not just these ones.

>>>SMyers: I'm not sure what the intent of the "multiple datasets" stipulation was now. Delete.<<<

p20
4.6-R3: Environmental data .. supplied in an ALMA standard format shall be importable...
(why specify specifically FITS extension tables and ASCII tables...?)

>>>SMyers: I think ASCII tables are a minimum, I can see FITS tables as a useful thing to support. I really do not want to see some obscure format required.<<<

p21
5.1-R2.1: should be priority 1 (and I still do not understand Boolean operations on filenames)]

>>>SMyers: No - P2 I still think. Boolean gone now.<<<

5.1-R4.6/7: what are these??? Must be jargon I did not get..

>>>SMyers: they are standard modes of mosaic data reduction. I know of no better way to specify these (though example algorithm names would be useful).<<<

5.1-R4: since R5 is separated from this (and I read it as a looping/functional implementation of R4), I miss 'UV-plane subtraction'; UV-plane fitting' etc from list

>>>SMyers: I think those are non-imaging data analysis things, though I see this in 5.2-R5. Note, I am demoting R5 to P2 and switching with R6.<<<

p22
5.1-R8: You mean 'Image cubes' ?

>>>SMyers: yes<<<

5.2-R5: needs more I think: 'clean-like' for forests of spectral lines.

>>>SMyers: spectral deconvolution would probably be better placed in Data Analysis.<<<

5.2-R7: 'Imaging must deal seamlessly with mosaiced data'
     All the rest is superfluous, and makes it look as if these effects are only important for misaicing (and are the only important effects). Varying beams/pointing/polarization etc...

>>>SMyers: These are all exacerbated in mosaicing. Reword.<<<

p25

This list is basically standard image display/analysis stuff, available in umpteen packages; including commercial non-astronomical.

>>>SMyers: maybe true. However, we may assume we will be guaranteed to get only what we ask for specifically.<<<

p27

7.1-R5: why FITS plot output standard? pdf and/or ps are really creating an
output format (FITS is an image format)

>>>SMyers: that is what e.g. means (just an example), though FITS images are
now fairly convertible so can be though of as sort of an output format for
a strict pixel image. In this context, Im not sure what that means, I would
probably choose postscript - as a trial balloon I will do so.<<<

7.2-R7: There are other standards nowadays; and Unicode seems a much more
probable one than a Latex extension for 10 years from now.

>>>SMyers: Unicode?<<<

p29
7.4: ...will not likely be ... to assess .. Why not? Why create another
package (or at least package library) for online and offlien access?

>>>SMyers: there is the Pipeline which as stated at the start is not
necessarily the offline package.<<<

7.4-R1.6: 'all monitor (engineering and astronomical) points'

>>>SMyers: what the heck is an astronomical monitor point? A temperature
sensor on Mars?<<<

page 0:

The bottom line, what happens with this document? It is written as a kind of
RFP; is it going to be sent around with a cover letter asking for offers and
cost?

>>>SMyers: NMP!<<<

wnb 2001.12.14

Date: Fri, 14 Dec 2001 13:13:08 -0700 (MST)
From: Walter Brisken <wbrisken@aoc.nrao.edu>
Subject: Re: ALMA Solar and Pulsar requirements

Without taking the time to read the current document (bad me), I'll offer
just a little insight into the pulsar needs.

Alma's pulsar needs will be much easier to satisfy than those of EVLA
since dispersion smearing is a non-issue at these frequencies. I expect
the main out-of-the-ordinary requirement will be integration into multiple
phase bins. Probably 256 bins would exceed needs for anything
interesting. Even 16 would be interesting enough probably. Pulsars have
periods as short as 1.6 ms, so a minimum bin size of 0.1 ms would probably
suffice. I expect the main use of this binning capability will be
measuring the on-pulse and off-pulse brightness which can be used to
estimate or place bounds on the temperature of the NS. I think it would
be unlikely that pulsar timing will be done with ALMA. Its conceivable
that ALMA would be a great instrument for pulsar parallaxes, especially if
pulsars are detectable at 900GHz. Certainly it would be the best

instrument in the southern hemisphere for pulsar parallaxes, unless SKA
somehow slips way ahead of schedule. 16 pulsar phase bins would be
sufficient for this work.

Let me know if you want me to help further.

>>>SMyers: add a req on at least 16 pulsar phase bins, and add the above
flavor text as a header to that section.<<<

-W

From mgurwell@cfa.harvard.edu Wed Jan 23 13:19:37 2002
Date: Wed, 23 Jan 2002 15:15:50 -0500 (EST)
From: Mark A. Gurwell <mgurwell@cfa.harvard.edu>

Comments on "DRAFT ALMA Offline Data Processing Requirements"
(Rev 3.4; 6 Dec 2001)

Mark Gurwell, SAO
23 Jan 2002

p.7 OL-1.1-R5: While I'm unsure that 'all' functionality needs to be
    included, it seems to me that all functionality needed in order to
    process data into images, etc needs to be in the offline package at
    priority 1.

>>>SMyers: P2 is inline with our priority system. If the other P1 items
are followed then basic imaging needs will be met in any event.<<<

p.8 OL-1.2-R8 (and R6): This may need to be priority 1, depending on
    what the "standard functionality" really is. For example,
    observations of a fast moving comet will naturally need correction
    to a common distance, involving scaling of uvw coordinates and
    visibility amplitudes. If this is "standard functionality" then
    ok, but if not, it is imperative that users be able to manipulate
    the data through the use of his or her own supplied routines.
    Since there will be many many examples of this, it may be easier to
    define a core set of functionalities, and set the ability to
    include user developed routines to be priority 1. In a related
    matter, if source code for astronomical routines will be available,
    what about the ability to alter, recompile and include variants of
    the standard routines?

>>>SMyers: again P2 is sufficient here, and for these reqs would definitely
be fought for. There is much room for how this is implemented, so P2 is
a better match than P1.<<<

p.9 2.2.2 (the GUI): I personally would like to see a requirement that
    user resizing of all windows be robust and easy, priority 2 or 3.

>>>SMyers: add after R1.3<<<

p.11 OL-2.5-R2.7: Question...what is the difference between
    'application descriptions' (see 2.5-R2.2) and 'algorithm
    descriptions'? I would prefer that anything that alters the

visibility data get a full description at priority 1. But perhaps
that is what is written here?

>>>SMyers: "algorithm descriptions" is meant to be a technical description
of what the code does, probably beyond what the average user needs to
know.<<<

p.17 OL-4.1-R1: this doesn't have a priority, I'm assuming it is 1.

>>>SMyers: added P1 designation<<<

p.21 OL-5.1-R2: on combining multiple data sets, it seems to me that
there should be some automatic check to assure that the relative
amplitude calibration between data sets is consistent. for most
sources the SNR would hopefully be enough to just compare data at
low spatial wavelength to see if similar u,v points have similar
amplitude scales. The idea is to notify the user of possible
scaling conflicts, not make a blind change.

>>>SMyers: I don't see that this should be automatic, though it should
be available. This is a calibration issue, add req similar to 4.5-R3
after 4.1-R8 as P2.<<<

p.22 OL-5.2-R9: I don't understand what this particular requirement
means...perhaps someone could just fill me in?

>>>SMyers: Bryan Butler also commented on this. Im not sure what was
meant either. Now I can't find who originally sent this in (I think
it was either Al Wootten or one of our Japanese colleagues).
My guess is that it refers to painting onto the surface of a sphere
like planetary radar data, but Im not sure. Delete for now and
resurrect if someone comes forward. Probably better in the Data Analysis
section in any event.<<<

p.22 OL-5.2: Imaging of sources 'in the near field' should be allowed
by introduction of phase corrections based upon the sphericity of
the incoming wave front. This will be important for Venus at some
times and for comets and near-earth asteroids. This may fall under
calibration but perhaps best comes under imaging?

>>>SMyers: Indeed, the near-field seems to extend to millions of km
(e.g. 10km baselines at 500um = 2x10^8 km = 1.25AU), so should put
something in after 5.2-R8 at P2. Unless my D^2/lambda is wrong, this will be
important for all the prime inner solar system targets!<<<

p.24 OL-6.1-R1: OK, here the capability to create user-developed tasks
is given priority 1, but OL-1.2-R8 says priority 2...

>>>SMyers: True. It is more important here for data analysis, but I think
it would be best to demote to P2 here also.<<<

p.24 OL-6.1-R6: Units, units, what a pain...I will also point out that
for much of the frequency range of ALMA the distinction between RJ
and Planck brightness temperature will be important and necessary
to maintain. Clearly, RJ equivalent temperatures are easier to
carry, as they are linearly related to flux density. But for
understanding of the physical conditions of some objects, the

Planck temperature is a more direct measure. Some facility for
'seamlessly' converting images to and from Planck Tb should be
supported.

>>>SMyers: I assume by Planck temperature you mean the real thermal
temperature. Add these to list.<<<

p.29 OL-7.4-R1: In regards to plotting of ancillary data, I wonder if
there will be provision for tools that use the ancillary data to
estimate their effects on the visibility data? In particular, the
WVR data can be used to estimate coherence loss on certain
timescales and/or baseline lengths, etc. Similar effects could be
estimated for pointing offsets estimated from tiltmeter
measurements, etc.

>>>SMyers: These fall under the calibration tools, see 4.6-R1 and R4.<<<

p.31 OL-8.1-R1: Simulation. OK, this is an important issue and I
don't know where it falls in the Science Software regime. The ASAC
has in the past stated that the ability to do simulation will be a
vital part of ALMA, not only for proposal preparation, but also for
a good understanding of actual ALMA data (see the ALMA Science
Advisory Committee Report from Sep 2001, Appendix C). Under what
package the simulator resides is open to debate/interpretation, but
for ease of use it may be best to have it as part of the Offline
Analysis package, since that will be something distributable.

>>>SMyers: I something needed beyond the current 8.1-R1? If so, suggest
text.<<<

Date: Wed, 30 Jan 2002 10:12:26 -0700 (MST)
From: akemball@aoc.nrao.edu
Subject: ALMA offline requirements comments

Steve,

I've used "should" to be concise in many places, but I'm making
reviewer comments rather than issuing directives to ALMA. My
comments should be read in that way.

I've enclosed some lengthly comments on the comprehensive ALMA offline
requirements below. I reviewed the requirements primarily against the
following general software requirements criteria:

1) Prioritization: are all requirements ranked in priority ?
   This is true for all requirements.

2) Acceptance criteria: are there sufficiently clear acceptance
   criteria which can be used to assess compliance with any
   given requirement unambiguously (i.e. when is the work
   complete for a given requirement).

3) Costing: is there sufficient information provided to
   allow accurate costing of new development effort.

These conditions drive requirements towards greater specificity in
many cases, but more detail will mean a stronger user contract that is
more likely to be fulfilled as originally intended, with new features
for ALMA added in the correct priority order.

Some general comments:

1) Cases where examples are listed, as in "such as", "e.g.", "etc"
   or "..." should be enumerated in complete lists, so that the requirement
   becomes bounded and can be estimated in scope.

>>>SMyers: This has been a common comment, and we should probably do so.
However, this is beyond the scope of the current work that has gone into
this document, and will likely require another iteration at least. I am
uneasy with the current lists and feel they are woefully incomplete. I
would like some help on this if we decide to do this. For example,
I put subsubreqs into OL-3.1-R2.

Another point is that Athol suggests that we completely specify things
down to an extreme level of detail. In essence, he seems to want us
to do the design work. This is not a good idea, but our requirements should
be understandable enough to guide the design and to allow some evaluation
of the results.<<<

2) Non-functional requirements (e.g. usability, operational issues
   and performance) are best separated from functional requirements
   (e.g. reduction completeness). This separation does not imply
   lower importance for non-functional requirements, but they are
   better separated at the requirements level as most non-functional
   requirements apply globally.

>>>SMyers: How would we do this? As sub-reqs?<<<

3) All requirements, functional and non-functional, need to be
   quantified, again for costing, acceptance and in
   ensuring that user priorities are followed. In turn, the
   quantified measures should be dictated by science needs.

>>>SMyers: I think this is an overstatement. The major quantifiable things
I have tried to assign to the ALMA Project (like benchmarking, performace
specs) as I think it is beyond this document to specify. In the FtoF meetings
we had tended to try to steer this doc away from being a binding lawyer-ese
contract, and it appears Athol is sterring us back toward that. IMO, this
is not good, at least for us, but I can see how AIPS++ would want this.<<<

4) Although some detailed algorithms or processing options cannot
   be anticipated in advance for ALMA, the base requirements can
   enumerate specific lists with some accuracy. This has many
   advantages for ALMA in making sure capabilities are available in
   the correct priority order. It also does not restrict package
   changes; the base requirements could be augmented
   during commissioning, operations and maintenance phases, as
   required by ALMA project or science needs at that time.

>>>SMyers: Along with the previous points, it could be argued that everything
should be quantified in this single document. However, if we want to do this
then much more thought must be put into it - I would estimate that this

will be another 6 months of work (and would probably dominate the next FtoF
meeting in Granada). Is that what we want to do? I have mixed feelings on
this - I could see that it would be more efficient to have it all in this
document, but I am loath to commit myself to setting these important specs,
and would need committment from the SSR to have much more input to this
than they have done so far on this doc.<<<

5) It helps if the lowest level requirements have similar granularity.

>>>SMyers: I do not understand this statement.<<<

6) Adverbs and adjectives should be used judiciously in requirements
   specification; they usually mean a departure from quantifiable
   measures or imply some degree of subjectivity in interpretation.
   They may also lead a package away from the original user intent
   by an incorrect interpretation by the developers.

>>>SMyers: Some level of non-quantifiable specification is necessary.
I think we have a reasonable mix, perhaps not to the software lawyers
liking, but more to the liking of the average scientist. Perhaps the
standard measure should be something like "as understood by an average
post-doctoral observational radio astronomer".<<<

Comments on individual requirements are given below:

OL-1.1-R3: "reasonable number of supported platforms" - this needs to
           be quantified as a cost driver, and could be done so in terms of:
           a) fractional use of a given OS in the ALMA community
              before it needs to be supported (e.g. 5%)
           b) a maximum number of separate OS builds supported
              at any given time (e.g. 5), for each of which a
              separate release is required.
           c) a requirement regarding OS revision support (latest,
              last two revisions, or all within a fixed time frame
              (e.g. last two years)).

>>>SMyers: these should be designated by the project - add this to the Req<<<

OL-1.1-R4: The quantifiable benchmark requirement is clearly stated, but
           the performance level is unspecified for costing or acceptance
           purposes. This could be done in terms of the duration of the
           original observations (i.e. the pipeline should produce a reference
           image within a certain multiple (or divisor) of the total
           duration of the observations at the telescope). This is simplistic
           but can be tied to science drivers and would provide a
           performance metric which could be costed. An ancillary requirement
           is that the fiducial benchmarks be representative of the
           telescope usage pattern and, when run, should repeat the reduction
           paths typical at the telescope (e.g. x% mosiac, y% single-dish etc)
           at any given time. The performance compliance should also
           be specific in terms of applicable metric, ie. mean throughput,
           peak throughput etc.

>>>SMyers: I have put the setting of these off to "the ALMA Project" assuming
that all these will be quantified. See above comments.<<<

OL-1.2-R1: "non-specialized hardware" requires elaboration. It ties in

to the range of OS/revision/hardware choices supported by
the package at any given time in OL-1.1-R3. Is
"non-specialized hardware" in this context "commodity hardware"
or "almost any hardware" ?

>>>SMyers: Supported platforms designated in 1.1-R3. The intent here is
that you do not need something like a GRAPE processor or Cray. This may
be extraneous in light of 1.1-R3, so remove phrase "non-specialized hardware".
<<<

OL-1.2-R2: A plausible requirement on error reporting is that messages
           should be written for users rather than programmers.
           "User-understandable" is a difficult compliance/acceptance
           criterion. Non-destructive error handling is expensive if
           required in all eventualities as it often requires almost
           continuous state-saving. This criterion also needs to be
           more specific to be able to assess compliance. I might suggest:
           "Common failure modes (as enumerated: invalid application
            parameters, resource limits (disk/memory) and algorithm
            failure modes (e.g. no convergence)) should be handled
            gracefully".

>>>SMyers: that was the intent of "User-understandable". Rephrase, and
break into sub-reqs.<<<

OL-1.2-R3: This requires a definition of defect severity levels and
           a delineation of defect and enhancement requests. A
           strict defect definition will allow operational costing
           based on the package size and empirical defect rate.

>>>SMyers: I have no idea how to do this. I thought the current req was
sufficient.<<<

OL-1.2-R4: A strong user contract and user input is vital as stated.
           However, responsiveness to requirements changes always depends
           on available resources and the extent of the required
           change. This risk goes down inversely with the completeness
           of the base requirements (as these are).

OL-1.2-R5: I would re-phrase this as: "Backwards compatibility of
           core package components should not be broken without
           compelling scientific reasons. Tools should be
           provided to parse user scripts and warn of package
           changes". A blanket prohibition against breaking
           compatibility is difficult as a system evolves to
           support new ALMA observing modes for example, but
           this should not happen lightly.

>>>SMyers: done<<<

2.2.2: I would suggest phrasing GUI usability in terms of required training
       time to allow neophyte or power users to become productive
       at particular operations. The criteria that the GUI be "pleasurable,
       not frustrating" needs to be replaced by a quantifiable measure
       of this type rather, for the reasons listed above.

>>>SMyers: I think this statement needs to be here in the header - I think

most GUI designers forget this (remember these headers are explanatory
fluff, not requirements). Add a new 2.2-R1 with a statement to the above
effect with placeholder timescales.<<<

OL-2.2-R5: This requirement could be costly, and I find it difficult to cost
          or assess compliance as phrased. I would argue for more
          specificity here, perhaps broken down by the general requirements on
          basic and advanced reduction views. In practice this would need
          to be resolved by prototyping with strong user involvement.

>>>SMyers: I am not sure, but I think the intent of 2.2-R5 was that there
be GUIs that are easier for beginner, and more complex ones for experts?
Note Bryan Butler also has comments here that he was unsure what it meant.
A possible implementation is that the user selects from "Basic",
"Intermediate" and "Advanced" complexity from a "View" menu. Or possibly
that there are separate GUIs for novice and advanced users. Note that these
are design issues, and it is not our job to do the design work for the package
developers. However, it might be reasonable to use subreqs to break out
features we would want in the novice and advanced "views". It seems to
me that the "novice view" is the real issue, so focus the subreq items on this
- I have changed the text to do so. I put in a short list of items, we
might want more.<<<

OL-2.4-R1: I would suggest adding event-handling and I/O as additional
          UI programming capabilities.

>>>SMyers: process control and interrupts added already as per Wim's comments.
Anything else still missing?<<<

OL-2.5-R1: "User-comprehensible" is hard to quantify. I suggest
          linking OL-2.5-R1 directly to OL-2.5-R2, which is specific.

>>>SMyers: move 2.5-R1 to 2.5-R1 (making current R2 now R1) as just
up-to-date and complete<<<

OL-2.5-R3: If possible, it would help to specify document formats
          which should be supported specifically, as multiple interchangeable
          document formats are difficult to cost, unless enumerated. Also,
          some specification of document processing would be useful, such
          as the source (e.g. Word, Latex) and end-products (e.g. pdf,
          html) of processed documentation.

>>>SMyers: enumerate. Probably within our scope to give complete list here.
Added "popular proprietary formats (e.g. MS-Word)" as a P3 option, should
that be here? I think it may be a good thing, and is value-added but low
priority so should not impact costing.<<<

OL-3.1-R9: I would suggest elaborating "monitoring data", as they could
          be extensive and varied for ALMA.

>>>SMyers: Add examples, though an inclusive list is not relevant here
since as long as the monitoring data is in an ALMA standard format
(e.g. extension tables) it should be preserved. Rephrase to this effect.<<<

OL-3.1-R10: More specificity about the format or content would be
           helpful here, to replace "comprehensive and understandable".

>>>SMyers: again details are a design consideration for the package providers.
I think "comprehensive and understandable" says what we want. Basically,
the package should preserved existing history content and add history relevant
and useful to the user. Note that this is separate from other history info
from the package (such as that needed to generate scripts from a GUI session
like in the AIPS++ scripter) which is the subject of a Bryan Butler item which
I added as 1.2-R3.<<<

OL-3.1-R14ff: I would argue for separating usability issues such as
            "straightforward", "seamless" or "simple and robust"
            from all targets following OL-3.1-R14 from the
            underlying functional requirement (e.g. baseline
            subtraction), as discussed above.

>>>SMyers: In this case, make subreqs. Promote in list, as some subreqs
are P1 now. Did I go overboard here on subreqs? I dunno, merging of
data is likely to be important in ALMA processing.<<<

OL-3.1-R14.1: Which boolean operations are envisaged here ?

>>>SMyers: we had meant "file1 & file2 & file 3" for example (union of
files), but the "Boolean operations" is now deprecated and this subreq
was removed.<<<

OL-3.2-R1 and R1.1: These requirements would be improved by enumerating
                the data formats which should be supported in the
                base package. These may be augmented over time
                as enhancement requests but the initial set could
                be chosen now with some accuracy.

>>>SMyers: Make as subreqs. I will need some help on this, I currently
list only the ALMA Archive Data Format, and refer to a list of others.<<<

OL-3.2-R2: My comments here follow OL-3.2-R1 in terms of enumeration.

>>>SMyers: I currently leave this as a tbd project item. Computer types will
have to provide me a comprehensive list if we are to include it here.<<<

OL-3.3-R1: This requirement is implicit in OL-1.1-R4.

OL-3.3-R2: This requirement is implicit in OL-1.2-R2.

>>>SMyers: True. Remove 3.3-R1 and R2, move R3 to 3.2 (no more I/O
section)<<<

OL-3.4-R2 & 3:
OL-3.5-R2:   "must be handled" requires elaboration.

>>>SMyers: These items were included in 3.1 items. At this point, the
requirement is that the relevant data (e.g. autocorrelations) be read in,
the use is specified in imaging for example.<<<

OL-3.6-R2: I would argue for enumerated types here, rather
          than examples, for costing and compliance.

>>>SMyers: OK, break types into more subreqs. Note, by disks do we mean
circular disks on-sky, or projected spheres, or like protostellar disks?

I think we mean the former.<<<

OL-3.7-R2: Is this requirement targeted at images or data from which
           images could be produced ? Greater specificity here in
           terms of enumerated foreign formats would help to
           assess compliance and costing.

>>>SMyers: We might be able to list some formats now, but this really depends
on what standards groups like NVO develop. An archive expert might know
more.<<<

OL-4.1-R6: "User-definable setups" requires elaboration.

>>>SMyers: I don't know what was meant by this - delete. At least it should
appear as a subreq item if someone wants it back.<<<

OL-4.5-R1.1: "in the absence of an internal data scan-descriptor object"
             requires elaboration.

>>>SMyers: huh? It means when there isn't a scan description, like list
of pointing centers, included in the data the user can input one! Is
the meaning that unclear? Bryan had problems with this one too. Sheesh.
I'll just delete the "in the absence stuff" as I guess thats extraneous.
Actually, the main R1 is already in 3.1-R2, so make R1.1 a req and move
it to a P3 spot.<<<

OL-4.6-R2: "processable and dealt with appropriately" requires elaboration.

>>>SMyers: Rephrase to say "Calibration and
corrections based on pointing, focus, and subrefector status information
shall be available."<<<

OL-4.6-R4: Given the scope of engineering data, these cases should be
           enumerated and made specific.

>>>SMyers: It is possible that the project can enumerate these at some later
time when these are known BUT NOT HERE. Given that this is P3, I think we
can be a little flexible.<<<

2.5.1: I would argue against non-quantifiable criteria here such as
       "user-friendly, efficient and flexible", which are difficult
       to assess.

>>>SMyers: Well, I can easily assess AIPS++ as it stands as user-unfriendly,
inefficient (with some exceptions) but very flexible ;-) Besides, this
is not in a requirement but in the flavor-text header to the section.<<<

OL-5.1-R1: The export formats should be enumerated.

>>>SMyers: Do we wish to have an inclusive list here or tbd?<<<

OL-5.2-R7.1: These should be enumerated.

>>>SMyers: rephrase into subreqs. Im not sure my new version is right
though. Actually, remove in favor of 5.3-R2 below, and save some subreqs
as new 5.3 reqs if needed.<<<

OL-5.3-R1.1: The ACA implications should be elaborated.

>>>SMyers: ACA is now descoped, but we should keep a placeholder here.<<<

OL-5.3-R2: "Careful" merits elaboration.

>>>SMyers: actually this is a repeat of 5.2-R7.1, keep here<<<

OL-5.3-R3: This has to be more specific, both in terms of problems and
            solutions.

>>>SMyers: this is outside the scope of this document, but could be
forwarded to Imaging & Calibration as an exercise. This may, however,
be an already solved problem (e.g. ATCA) but the package developers
should still make it work.<<<

OL-6.1-R4: The line parameters should be enumerated.

>>>SMyers: I suppose this is a well-studied issue and thus can be
listed here. Make a first cut. Actually, line fitting seems like
an important enough item to make its own section (new 2.6.2).<<<

OL-6.1-R5.1: What range of catalog formats are envisaged here ?

>>>SMyers: I would say just ASCII table and the ALMA format should
be required.<<<

OL-6.2-R3: Image feature types should be enumerated.

>>>SMyers: this req overlaps with 6.2-R8 operations, keep this req for
the reporting of results. Add one before R3 for definition of regions.<<<

OL-6.2-R7.3: Blanking parameterization types should be enumerated.

>>>SMyers: this depends on the implementation of the blanking, and thus
need not be enumerated here<<<

OL-6.2-R8: These operations should be enumerated.

>>>SMyers: there are already 14 enumerated operations - I guess I could
enumerate further using subsubrequirements. Is this really necessary?
Sigh. Go ahead and break into subsubreqs.<<<

OL-6.2-R9.1: There need to be enumerated. Sophisticated astrophysical
            modeling could easily be envisaged which would fall into
            this category especially for multi-transition ALMA
            line data.

>>>SMyers: have subsumed these into long lists in R8. Removed rest of R9
as R9.2 was same as 6.1-R4 and R9.3 was same as 5.1-R7.<<<

OL-7.2-R8: "etc" needs to be expanded.

>>>SMyers: this is sufficiently unclear that I have removed it<<<

2.8.3 & 4: Could be large amounts of work, depending on scope.

>>>SMyers: indeed, thats why we need to specify these (authors?)<<<

From: "Arnold Benz" <benz@astro.phys.ethz.ch>
Sent: Thursday, January 31, 2002 11:21 AM
Subject: Re: ALMA Off-line requirements review (Deadline: January 22)

Dear Gianni and Brian,

I am sorry it took so long to answer. I have now read the new version
and have the following small comments:

Page 7, OL-1.2-R3:
          complement "bug-fixing" with "bug-fixing and improvements in
user-friendliness"

>>>SMyers: this is covered under R4.<<<

Page 31, 2.8.3 Solar Observing:

For the time being, I consider the following rather trivial details to
require as necessary for solar and planetary observations:

"Solar and planetary observations require a special effort in tracking,
considering the spatial resolution of ALMA:
  - the sources move in the sky relative to stars
  - the parallax relative to Earth center is considerable and variable
  - in addition to motion there is also rotation to be accounted for.
     In the case of the Sun the rotation amounts up to 3 mas/second."

It seems that these requirements are not exceedingly demanding. More may
appear, the more we think about it. I think the ALMA Software Team will
eventually have to include a solar person. He/she will be the first
person to use ALMA for the Sun. That may be incentive enough to find a
good person.

>>>SMyers: incorporate into Solar System Object section<<<

Best regards,

Date: Wed, 30 Jan 2002 17:33:31 -0500
From: awootten@cv3.cv.nrao.edu
Subject: Notes on offline analysis

Al provided his notes and an annotated markup of the draft in .pdf form.
My translation of the substantial items:

p.11 2.5-R3 add "searchable"

>>>SMyers: covered under R5<<<

p.15 3.3-R1 boldface

>>>SMyers: done<<<

p.24 6.1-R4 constrained fits (e.g. frequency separation of multi-component)

>>>SMyers: add<<<

p.26 6.2-R9.1 add optical depth from multiplet ratios

>>>SMyers: add<<<

p.31 8.3 Solar Observing (Tim Bastian or Arnold Benz)

>>>SMyers: see Benz's comments, I sent a request to Bastian in December
but no reply. Bryan Butler gave extensive comments on solar system objects.
<<<

p.31 8.4 Pulsar Observing (Ingrid Stairs)

>>>SMyers: good idea. I will ask her on the next draft.<<<

Bryan Butler - provided a marked-up hardcopy of the draft:
============
This was on a scribbled markup of a hardcopy, and was very difficult
to go through. Bryan owes me a beer or something :-)

I will list the significant items below. I have made a number of minor
corrections based on Bryan's markup which I do not list here, and also
many of Bryan's comments were addressed by other reviewers which I sometimes
do not mention below. I also used going through Bryan's list as an excuse
for making changes suggested by others, and will note those here.

General comments:

Lots of things are duplicated. Trimming these would save space and
improve clarity.

>>>SMyers: there are instances where more general requirements are
repeated with more detail later on. I will try to trim those where
no new substance is added in the repeat.<<<

This read alot more like a wish list than specs. Many of the items cannot
(realistically) be turned into a meaningful constraint (or selection
criterion) on the Package.

>>>SMyers: This is indeed more of a wish list, since these are the things
that we wish to be in the Offline Package. We are not pretending to give
specifications for something that must be designed from scratch. As for
the non-specificity of certain items, I think that the qualitative criteria
are as useful as the more quantitative specifications, as they express the
feel of what we want for the package. True, these will be harder for the
lawyers to check off compliance with, but we decided some time ago that
this document would not be for lawyers, but for scientifically literate
programmers (or programming literate astronomers).<<<

I see no spec on velocity frames supported (LSR, heliocentric, geocentric)

>>>SMyers: I guess we need it somewhere, but where? I would imagine
that there needs to be something in Data, Imaging, and Analysis under
the current scheme, though this is a case where we would just be
repeating. Maybe we should have a section under OL-1 for "overarching"
requirements. For now I will add one in OL-3.1 please look these
over, currently only heliocentric, geocentric and LSR are enumerated.<<<

Bryan seems to object to the boilerplate italicized headers to certain
sections as being self-evident and "motherhood and apple-pie"

>>>SMyers: I like these as they say what we are thinking when we
write the requirements. But remember they are not meant as requirements
themselves. Is that too unclear? I will add item in the Nomenclature
section after G to say this.<<<

1.1 add "archive user" to list of users in par 3.

>>>SMyers: done<<<

OL-1.1-R3 how easily? if you don't say it, its not really a spec since
all packages will meet it no matter how hard it is to install

>>>SMyers: Ease of installation is under OL-1.2-R1. This spec is meant
to require that the package be installabe at the home institution AT ALL.
One could envision a package that runs only on a cluster at the Data Center
and the users must access it remotely. None of the current contenders would
fit this so indeed its an easy one to pass.<<<

OL-1.2-R6,R7 Bryan objects to the allowed use of proprietary or commercial
code that is not open, and the possibility that not all source code
be available.

>>>SMyers: we had discussed this extensively in the SSR meetings. It was
decided that we should not prevent the Package designers from using
these components merely to have everything open source. The compromise
is that these components would probably be in special non-astronomical areas,
like the details of Pixons, and so the astronomical code should be open.<<<

add OL-2.4-R6 Inputs to a particular task (application? tool?) shall be
saved and recallable. The state of the package can be saved and recalled.

>>>SMyers: There is now session logging as an item in OL-1.2, but I think
this item is useful here also, as it pertains to parameter values for
tools. Add after OL-2.4-R5, but keep it P2. Im not sure saved and recalled
is necessary (a la TPUT/TGET and SAVE/GET in AIPS), but may be a desirable
option.<<<

OL-3.1-R2.10,2.11 list all items, do not use etc.

>>>SMyers: break these out as subsubreqs<<<

OL-3.1-R10 add "and executable by the UI"

>>>SMyers: that is actually a different item for session logging, which is
missing from either the Ops or UI sections. Add as 1.2-R3.<<<

OL-3.1-R14 Merging (concatenation implies only 1 type of merge)

>>>SMyers: list merging subreqs<<<

OL-3.2-R1.1 Why is this needed?

>>>SMyers: True, why should we support lots of formats beyond our standard.
Demote to P3, since it would be beneficial if the package supported more
than one format.<<<

OL-3.2-R2 I would scrap this

>>>SMyers: I think it is necessary (though realistically, the packages already
do this) to support a resonable choice of tape media. Or is this a driver
issue for the OS?<<<

OL-3.3-R1 The Package may have no control over this

>>>SMyers: has been scrapped, as it was covered in earlier req<<<

OL-3.4-R2,3 already in OL-3.1-R2.5?

>>>SMyers: yes, delete<<<

OL-3.5-R1 should be in 3.1-R2 also?

>>>SMyers: yes, done<<<

OL-3.5-R2 already in 3.4-R2 and 3.1-R2.5

>>>SMyers: yes, delete<<<

OL-3.6-R1.1-1.4 why not just put these into 1 as >4D images?

>>>SMyers: at this point we are interested in the specific items,
though could generalize here I guess. Keep as is.<<<

OL-3.7-R1 "standard data exchange format" -> ALMA raw, or FITS

>>>SMyers: make these the ALMA archive and supported formats. I also
demoted the Foreign Data reqs to P2, in the spirit of the intention
of the priority scheme.<<<

OL-4.1-R1 priority?

>>>SMyers: P1<<<

OL-4.1-R3 and other calibration, RFI, Tsys data. Any others?

>>>SMyers: probably should emumerate these. Make subreqs. People should
check my list for completeness.<<<

OL-4.1-R6.5, R7.1, R7.2 duplication

>>>SMyers: R6 is for interactive, R7 is for automatic. R7.2 does duplicate
R7.1 (delete 7.2). Should the items in 6.5 and 7.1 be enumerated separately?
Will bite the bullet and enumerate in subsubreqs items in4.1-R6.1, 6.5, 7.1,
7.3, 7.4. Also reduce R7 to allowing automated editing based on all critera

available in R6.<<<

OL-4.2-R1 add data from tipping radiometers at P2

>>>SMyers: yes, and from site test interferometers<<<

OL-4.3-R2 much of this is discussion, not specs

>>>SMyers: move to italicized header to section, make 4.3-R1,R2 as specs that these be available, and split out enumerated items as subreqs<<<

OL-4.5-R1 already in 3.1-R2, scrap R1.1

>>>SMyers: indeed R1 is a repeat of 3.1-R2 so delete. Promote R1.1 to R1 but demote to P3 (as R3)<<<

OL-4.5-R3,4 combine into R1

>>>SMyers: keep separate, as they are different priority (instead of making these subreqs)<<<

OL-5.1-R2 isnt this covered in R1 (and implied in 3.1-R14)? promote R2.1 to R2

>>>SMyers: done, though remove reference to Booleans, but as it is P2 it moves down the list<<<

OL-5.1-R4.3 list flavors Hogbom, Clark, Cotton-Schwab

>>>SMyers: done<<<

OL-5.1-R4.5 include WIPE

>>>SMyers: what is that?<<<

OL-5.1-R4.9 why just Gaussian and disk? can be many more

>>>SMyers: list point, Gaussian, disk. Are there more?<<<

OL-5.1-R??? also full linear deconvolution which is just a special kind of inverse filter as I understand it

>>>SMyers: I guess in some cases you can divide by transform of the PSF, as in Wiener filtering - if someone knows more about this and thinks it should be included, let me know.<<<

OL-5.2-R7.1 why do you need a variety of options for beam correction?

>>>SMyers: R7 removed to 5.3-R2 which was a duplication, see comment on Athol's comments.<<<

OL-5.2-R8 shouldn't 5.2-R4 be a subset of this?

>>>SMyers: 5.2-R4 is targeted toward multi-field and the FFT/DFT parts pertain to model subtraction. R8 is for the imaging part e.g. Fourier inversion using DFT. Is this too unclear?<<<

OL-5.2-R9 I don't understand this - what is it you wanted here?

>>>SMyers: I don't either. Deleted - see comments to Wim<<<

OL-5.3-R1,R2 are not these duplicates?

>>>SMyers: I don't see where they are duplicated in detail<<<

OL-5.3-R2.2 I wouldn't spec this as being distributed with the Package but
rather just that the Package must be able to import them, as in R2.3

>>>SMyers: I think we want the beams to be integral to the Package and
built in to the distribution (like gain curves in tst AIPS)<<<

OL-5.3-R3,R4,R5 duplicate

>>>SMyers: R3 can be assumed under R1 (delete R3). R4 and R5 pertain to
image-plane combination rather than uv-plane or joint imaging. I don't
know enough about this to decide what to do, I think this needs some
work (maybe R1 should enumerate uv-plane and image-plane and any other
ways of handling this) and I need some help on it.<<<

OL-5.3-R6 what is a stamp map?

>>>SMyers: This is actually an analysis or visualization spec and is duplicated
as R7.5-R8. Delete<<<

OL-7.5-R8 what is a stamp map?

>>>SMyers: we really need a better term for this, which refers to the
little thumbnail spectra I vs. v placed at grid cells in RA, Dec.<<<

OL-6.1-R2 what does this mean?

>>>SMyers: is there a problem here? suggested rephrasing?<<<

OL-6.1-R3 remove modifiers

>>>SMyers: I guess we can assume when we ask for something one can assume that
it be effective, robust and precise and not crappy.<<<

OL-6.1-R3.1 do you need to more fully describe this?

>>>SMyers: I think this one is OK (basically, just removal of Fourier modes
instead of polynomials). I will add poly fits as a subreq. Is there
anything else to add here? This does overlap with 5.2-R5 and 6.2-R8.9
in particular. Can we just delete this one (Im keeping it for now, but
adding Fourier modes to 6.2-R8.9)?<<<

OL-6.1-R4 "and are to be stored in a text format" why do we care as long
as the user can access this?

>>>SMyers: this req is now its own section, see comments to Athol<<<

OL-6.1-R6 "shall be straightforward" is squishy

>>>SMyers: just say "shall be available"<<<

OL-6.2-R1 duplicate

>>>SMyers: more to the point, the axes types should be enumerated.
Check to see if I missed something. Note R1.1 is duplicated in R8
and movies are for visualization 7.5-R5, so delete.<<<

OL-6.2-R3 "easy, accurate" squishy

>>>SMyers: say "available, and interactive (where...)", put exportable
in subreq<<<

OL-6.2-R4.4 not clear to me that this should be supported. Maybe
"SQL-like" should be "database"

>>>SMyers: thats why its P3. make "database (e.g. SQL)"<<<

OL-6.2-R8.10 smoothing, convolution, and filtering are all essentially
the same thing, right?

>>>SMyers: yes, but I'm not sure we would gain anything by lumping all
togther now that its a set of enumerated lists, but if there is a strong
opinion I can do so.<<<

OL-6.2-R8.14 given this, isn't 6.2-R8.6 unnecessary?

>>>SMyers: yes, except 8.14 is P3 while 8.6 is P1<<<

OL-6.2-R9 its not clear to me that the Package need be required to do these
things

>>>SMyers: these were duplicates or moved into R8. Now gone.<<<

OL-7.1-R2 what about good old X-Y plots?

>>>SMyers: oops<<<

OL-7.1-R3 why spec this? seems beyond our scope

>>>SMyers: huh? why? its seems relatively straightforward, e.g. an X-Y plot
with color denoting polarized flux. But drop to P2 (or P3?).<<<

OL-7.1-R5.2 "gif" is totally proprietary and we can't spec this

>>>SMyers: I don't know the details of this, if so then remove (though we
have room to request proprietary things also). Note that this is P3.
Do we want an enumerated list here?<<<

OL-7.1-R7 duplicate

>>>SMyers: yes, this is 4.1-R10. removed 7.1-R7 in favor of the one
in the editing section<<<

OL-7.2-R1,R2 "fast", "fast and intuitive" are squishy

>>>SMyers: the intent of the benchmark is that the speed has to be some
reasonable value. Split off interface speed to another req R3, need

comments on this new one.<<<

OL-7.2-R3 lots of squishy stuff "easily" "appropriate"

>>>SMyers: remove offending words<<<

OL-7.2-R5.7 what does this mean

>>>SMyers: I don't know. Remove.<<<

OL-7.2-R6 you can't spec this as part of the package, it depends on the
physical hardcopy device

>>>SMyers: the intent is that the quality of the drawing not the hardcopy
is the important bit. Though these days even pgplot is fine. I am
removing this req as it is virtually assured by R7.<<<

OL-7.2-R8 not clear you can spec this sensibly

>>>SMyers: agreed, deleted. See comments to Athol<<<

OL-7.3-R1 why not just spec that you can plot any one versus another and
then enumerate the BPARM(1) and BPARM(2) options to UVPLT

>>>SMyers: agreed, it is better to list the quantities. Someone should
check this.<<<

OL-7.3-R3 isnt this just a special case of R1?

>>>SMyers: delete<<<

OL-7.4 all duplicated

>>>SMyers: I don't see where this is duplicated, except it is asked to
handle these quantities in calibration. Do we assume that if you can handle
it during it you can plot it here? I dont think so.<<<

OL-7.5 all duplicated, aren't they?

>>>SMyers: This does have some overlap with the Data Analysis OL-6.2, but
if we want a visualization section, then they have to be here. No suggestions
for rewording were given, so I will wait until concrete suggestions are given.
<<<

OL-2.8.5 Solar System Observing ...

>>>SMyers: Bryan did give some suggested items, which I have put in.
Check these for completeness.<<<

Crystal Brogan - provided a marked-up hardcopy of the draft:
==============

My translation of the substantial items:

p.13 3.1-R2 Should be some equivalent of PRTAN and LISTR

>>>SMyers: Make a P2 3.1-Rx item for the easy access to header info, scan summaries, etc.<<<

p.13 3.1-R3 Qualifiers?

>>>SMyers: Add item for user-specified qualifiers etc.<<<

p.13 3.1-R8 transfer of a flagging mask to another dataset

>>>SMyers: I assume you are thinking in terms of a continuum mask transfering to a line set from the same data. Add something to this effect.<<<

p.17 4.1 Calibration - calibration should be scan-based

>>>SMyers: add after 4.1-R2<<<

p.17 4.1-R6.1 add elevation

>>>SMyers: done<<<

p.22 5.1 Imaging - add interactive boxing for IMAGR emulation

>>>SMyers: add item after 5.1-R4<<<

p.28 7.2 Display appearance - not just overlays but multiple image displays with synchronization, for spectral lines plots not just "images"

>>>SMyers: add item after 7.2-R5<<<

p.29 7.3-R1 add amplitude vs. elevation

>>>SMyers: add item after 7.3-R1.7<<<

```
Collected Comments on Pipeline/Offline Requirements Document
V4.x

This document is online at

   http://www.aoc.nrao.edu/~smyers/alma/offline-req/olr-v4.0-comments.txt

-------------------------------------------------------------------------------

06-Mar-2002: V4.0

-------------------------------------------------------------------------------

Date: Mon, 11 Mar 2002 18:55:42 -0800 (PST)
From: Tony Willis <Tony.Willis@hia.nrc.ca>

Hi all

A few comments on the 'ALMA Offline Data Processing Requirements' document
(I just attended a 2-day course entitled 'In Search of Excellent
Requirements' so I feel eminently qualified to stir up the pot. :-) )

>>>SMyers: My guess is that no 'Excellent Requirements' were found.<<<

Firstly, as the software industry would define the term, this document
is not a statement of requirements. It is still something more along
the lines of a statement of scope or statement of objectives. There's
nothing wrong with that - (Steve Myers admits as much in one of
his responses to someone's critique) - so let's call this document
what it really is: 'ALMA Offline Data Processing Objectives'.

>>>SMyers: We will not retitle this.  These are not objectives.  These
are requirements.<<<

How do we get from objectives to requirements? To quote from my course
manual:

What is a software requirement?

1) A condition or capability needed by a user to solve a problem or achieve
an objective

2) A condition or capability that must be met or possessed by a system or
system component to satisfy a contract, standard, specification, or other
formally imposed documents.

3) A documented representation of a condition or capability as in (1) or (2).

I might add that a statement of customer feature "wants" is not
necessarily the same as the user's task-related "needs".

The critical item here is number 2; in order to determine if a requirement
has been met it must be testable in some way. As a (partial) potential
'contractor' to develop components of the ALMA Offline system, I have no
way based on many of the 'requirements' in the current document of ever
reaching agreement with my customer (the ALMA Project) that I have produced
a system, or component that meets the specification.
```

1

>>>SMyers: #2 does not specify the manner in which the reqs are evaluated
or tested.<<<

This document is full of stuff that can be summarised into

"The system must be robust and intuitive and fast and reliable and easy
to use." Noble objectives, but untestable as requirements. How does
one quantify "easy to use"?

An interesting example which will allow me to make another point is
OL-2.2-R3 "It must be easy to run GUIs remotely from the host machine
(e.g. via X displays)." a) Can anyone tell me what "easy" means here?
b) A very good point made by the instructor in the course I attended was
that one should never agree to meet (or make) a performance requirement
that involves the use of the public Internet, because it is beyond
your control.

>>>SMyers: speed was not requested, only ease of use.<<<

Back into my bomb-shelter ...

Regards

Tony

Date: Tue, 12 Mar 2002 08:49:20 -0700
From: Brian Glendenning <bglenden@cv3.cv.nrao.edu>

I am sympathetic to the general point, it is obviously much easier to see if
a requirement/objective has been met if the success criteria are completely
specified (Athol had similar comments). However take your example:

> An interesting example which will allow me to make another point is
> OL-2.2-R3 "It must be easy to run GUIs remotely from the host machine
> (e.g. via X displays)." a) Can anyone tell me what "easy" means here?
> b) A very good point made by the instructor in the course I attended was
> that one should never agree to meet (or make) a performance requirement
> that involves the use of the public Internet, because it is beyond
> your control.

This would presumably have to become something like:

"An experienced (more than aa hours of use of the package) user must be able
to initiate a remote display to a networked machine with bb seconds of
effort either from a command line or via no more than cc clicks on a GUI. A
novice user (less than xx hours of use of the package) must be able to
determine how to initiate remote display after spending no more than dd
minutes reading online documentation. On a ee-Gb Ethernet with no other
traffic the display must be capable of ... [lots of performance
parameters]."

The trouble with this is apparent: assuming that we just don't want to
replace squishy "requirements" with completely arbitrary ones, some study of
aa-zz would be required, which would take a considerable amount of time for

all requirements.

I'm personally a bit skeptical that this is practical and instead we'll have
to rely on the judgment of people doing the "scoring", but perhaps this is a
false economy.

>>>SMyers: it is not an economy, it is a practicality. No lawyer-document
will protect us from a crappy package if the people involved in the evaluation
on both sides are not sensible and honest. Our effort is better spent in
ensuring this process than in writing excessive details in the reqs.<<<

Cheers,
Brian

Date: Tue, 12 Mar 2002 08:15:24 -0800 (PST)
From: Tony Willis <Tony.Willis@hia.nrc.ca>

> I am sympathetic to the general point, it is obviously much easier to see if
> a requirement/objective has been met if the success criteria are completely
> specified (Athol had similar comments). However take your example:
>
> > An interesting example which will allow me to make another point is
> > OL-2.2-R3 "It must be easy to run GUIs remotely from the host machine
> > (e.g. via X displays)." a) Can anyone tell me what "easy" means here?
> > b) A very good point made by the instructor in the course I attended was
> > that one should never agree to meet (or make) a performance requirement
> > that involves the use of the public Internet, because it is beyond
> > your control.
>
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>
> "An experienced (more than aa hours of use of the package) user must be able
> to initiate a remote display to a networked machine with bb seconds of
> effort either from a command line or via no more than cc clicks on a GUI. A
> novice user (less than xx hours of use of the package) must be able to
> determine how to initiate remote display after spending no more than dd
> minutes reading online documentation. On a ee-Gb Ethernet with no other
> traffic the display must be capable of ... [lots of performance
> parameters]."

Actually, yes it should.

>>>SMyers: I think the intent of the requirement is that if you start
up the Package on a remote machine after having redirected the display
(e.g. "setenv DISPLAY foobar.edu:0.0") the windows appear on your display,
and the speed depends upon the bandwidth you get from your connection.
"It must be easy to run GUIs remotely from the host machine (e.g. via X
displays)." pretty much says it - you dont press buttons or read documentation
or other nonsense.<<<

>
> The trouble with this is apparent: assuming that we just don't want to
> replace squishy "requirements" with completely arbitrary ones, some study of
> aa-zz would be required, which would take a considerable amount of time for
> all requirements.

Yes, up front investment of time is non-trivial.

>
> I'm personally a bit skeptical that this is practical and instead we'll have
> to rely on the judgment of people doing the "scoring", but perhaps this is a
> false economy.
>

On the other hand, if we actually spent the up-front effort to properly
define attainable requirements, we would almost certainly save ourselves grief
(and maybe a lot more time) later on. The history of the aips++ project
shows this. Astronomers made an effort back in 1991 to define
requirements in a manner somewhat similar to that done here (their
requirement specifications were even more nebulous than this document),
paid no more attention to the project, and then were surprised four or
five years later by a package that was rather different to what had been
anticipated.

Tony

Date: Tue, 12 Mar 2002 09:36:21 -0700
From: Tim Cornwell <tcornwel@cv3.cv.nrao.edu>

Tony and Brian both make very reasonable points concerning the
squishiness of some software requirements. I think the key dilemma is
made clearest by asking what the scoring system will be. Presumably this
reflects the relative weight given by the committee to the various
squishy terms, and should also drive the future development of any
adopted or constructed package. An example of a possible scoring system
is:

        Core functionality   50%
        Human interface   10%
        Documentation   10%
        Testing   10%
        Optimization   10%
        Training   10%

(this is just an example). Such numbers are also helpful to management
(ALMA and a software project) in determining the relative resource
allocations.

I believe that the committee would find setting these numbers to be both
useful and illuminating. In particular, it would more obvious how much
weight should be given to terms like "easy to use".

>>>SMyers: Good. I propose to put these as the first of the General
Considerations on 1.2 p6.<<<

Tim

Date: Tue, 12 Mar 2002 09:48:59 -0700 (MST)

From: Michael Rupen <mrupen@aoc.nrao.edu>

Or perhaps this is an argument for the end-users -- the astronomers -- being
heavily involved in the software throughout its design. If the requirements
are too painful to set in advance, and squishy requirements lead to strange
results in the end, then presumably one needs hands-on refinement of
requirements as the software development proceeds. Sounds horrible, no? But
in fact this is fairly standard for the engineering side of big telescopes,
where the astronomical desiderata might be more-or-less specified up front,
but the translation into technical or engineering requirements ramps up during
the design phase.

>>>SMyers: This is why we were sued for overruns on the GBT. Get it right
the first time. On the other hand, contrary to what Harvey said, we do
make the same mistake over and over again.<<<

Speaking as an outsider in all this, specifying at least a few usability
requirements in some detail sounds reasonable in any case. It's probably
impossible to specify _all_ of them, but just giving one or two well worked
out cases would provide what might be a very useful guideline to the
programmers.

>>>SMyers: a volunteer?<<<

                    Michael

Date: Tue, 12 Mar 2002 09:26:35 -0800 (PST)
From: Tony Willis <Tony.Willis@hia.nrc.ca>
Reply-To: alma-sw-ssr@donar.cv.nrao.edu
To: alma-sw-ssr@donar.cv.nrao.edu
Subject: Re: [alma-sw-ssr]SSR telecon tentative agenda

Michael Rupen writes:

>
>
> Or perhaps this is an argument for the end-users -- the astronomers -- being
> heavily involved in the software throughout its design. If the requirements
are
> too painful to set in advance, and squishy requirements lead to strange
results
> in the end, then presumably one needs hands-on refinement of requirements as
> the software development proceeds. Sounds horrible, no? But in fact this
> is fairly standard for the engineering side of big telescopes, where the
> astronomical desiderata might be more-or-less specified up front, but the
> translation into technical or engineering requirements ramps up during the
> design phase.

Yes, yes, yes! Absolutely! One of the best ways to ensure a successful
project is to have at least one interested and representative end
user, the 'project champion' actively participating in the project from
the beginning. (This, by the way is something I advocated for EVLA
software at the EVLA panel I participated in back in December.)

>>>SMyers: I think thats called the "Project Scientist". Both ALMA

and EVLA have them.<<<

The problem we've had in the past with astronomers is that they're
fundamentally rewarded for their research activities and production
of papers. They don't want to spend time on activities like software
specification and design that don't generate 'research' brownie points
that go toward promotion, tenure, etc.

>>>SMyers: Its probably more that this sort of stuff is boring and
unlikely to actually lead to better software. Truth is, it will depend
on the quality and insight of the people writing the software, and no
matter what we do we will not turn a sows ear into a useable package.
But maybe by hammering on the intangibles like useability we might
perturb it a bit toward the direction we want.<<<

If we can find astronomers that are interested in participating in
this project from the beginning, their employer should be made aware
that they are actually doing something useful and that employer should
reward them for participation in software development just as much as
for research contributions.

>>>SMyers: Who are these "astronomers" that are just waiting to help us
if only they would get some encouragement from their employers? And isnt
this *our* job?<<<

Tony

Date: Tue, 12 Mar 2002 11:23:42 -0700
From: Tim Cornwell <tcornwel@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@donar.cv.nrao.edu
To: alma-sw-ssr@donar.cv.nrao.edu
Subject: RE: [alma-sw-ssr]SSR telecon tentative agenda

Along these lines, in the e2e project at NRAO is using a spiral
development model in which development proceeds in 9 month chunks with
reviews of the scientific requirements, system architecture, design, and
implementation at the end of each chunk. This process is better suited
to the development of scientific software than the traditional waterfall
process (or at least we hope so!).

>>>SMyers: God help us all.<<<

Tim

Date: Tue, 12 Mar 2002 11:26:57 -0700 (MST)
From: Steven T. Myers <smyers@cv3.cv.nrao.edu>
Subject: [alma-sw-ssr]reality check

"Alright you primitive screwheads, listen up. See this?
This is my boomstick!" - Ash, "Army of Darkness"

1. Spend the same number of words on (re)writing actual requirements from
and for the document as we are on philisophical discussions. I am more

than happy to insert your versions of requirements into the doc. Rule
of Thumb - if you have time to take a boring 3-day course on
Requirements, you have time to actually write some :-)

2. The document will not be retitled "ALMA Offline Data Processing
Objectives". These are requirements, and are merely (poor) elaborations
on the original requirement "The Package shall not suck." Rule of
Thumb - the only requirements that matter (e.g. "shall not suck","easy
to use") are those that cannot be written as specific concrete items
that can be blindly checked off a list. Otherwise all software would be
perfect and wonderful to use. Another Rule of Thumb - oversight will not
let a team of 10,000 monkeys write Shakespeare. You still need that one
really smart monkey that understands feet, and meter, and uh, stuff like
that. How smart are our monkeys?

3. The SSR *is* the Astronomy Advocate for the software. And we are paid
by our institutions to do it (at least some of us). Rule of Thumb -
Don't pretend that this is Rocket Science. Remember that Rocket Science
uses obsolete hardware and software, because in space no one can hear
you scream when your GUI locks up.

4. This document will be finalized following the FtF in Granada. Keep
this in mind. Rule of Thumb - "Time is Money" (execpt on NRAO salaries)

5. The Pipeline requirement are far more critical for the project than
these offline requirements. Or are we happy with those as they stand?
Rule of Thumb - "The lower the stakes, the longer the debate."

 -s

ps. OK, so only #1, #4 and #5 matter...

pps. OK, I would be happy for just #1. Send me some text...

Date: Tue, 12 Mar 2002 14:52:07 -0500
From: Harvey Liszt <hliszt@cv3.cv.nrao.edu>

IFF by "off-line" software we intend "user-software" ...

"core functionality" already includes "testing" and "optimization"
of the code, and should basically be "pass/fail" with a fairly high
bar.

Then we can choose on the basis of "human interface", which
subsumes "training" and "documentation", where "documentation"
can be "tested" in terms of accuracy, completeness and
legibility. I would give no points for attempts at "training"
users to adapt themselves to a hostile environment.

The "programming interface" probably needs to be broken out,
or explicitly noted as part of the "core functionality" IFF
outsiders are to be allowed to contribute. Of course, in the
past, this goal has not been easily realized and this group
might choose not to recognize it.

regards, Harvey

ps: Alternately the software packages might be graded on
the basis of

"technical merit" (scale of 4..6),

"artistic merit" (scale of 4..6), and

"degree of difficulty" (scale of 0..4)

"Steven T. Myers" wrote:
>
> Tim - you get a cookie.
>
> I propose to put this as the first of the 1.2 General Considerations
> on page 6.
>
> Any feelings on the relative weights?
>
> I keeping with the SSR policy, the total should add up to 120%.
>
> On Tue, 12 Mar 2002, Tim Cornwell wrote:
>
> > OK: A suggested requirement:
> >
> > Candidate packages shall be evaluated using the following scoring
> > scheme:
> >
> >   Core functionality   50%
> >   Human interface   10%
> >   Documentation   10%
> >   Testing   10%
> >   Optimization   10%
> >   Training   10%
> >
> > This scheme reflects the values given by the SSR to these aspects of any
> > software package.
> >
>

Date: Tue, 12 Mar 2002 13:03:28 -0700
From: Tim Cornwell <tcornwel@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@donar.cv.nrao.edu
To: alma-sw-ssr@donar.cv.nrao.edu
Subject: RE: [alma-sw-ssr]reality check

> IFF by "off-line" software we intend "user-software" ...
>
> "core functionality" already includes "testing" and "optimization"
> of the code, and should basically be "pass/fail" with a fairly high
> bar.

No, I'd leave these as separate items. There is a choice in testing:
hire less developers but more testers. Similarly for optimization.

>
> Then we can choose on the basis of "human interface", which
> subsumes "training" and "documentation", where "documentation"
> can be "tested" in terms of accuracy, completeness and
> legibility. I would give no points for attempts at "training"
> users to adapt themselves to a hostile environment.

Human interface means command line, graphical user interfaces, web
interface, etc. I'd leave documentation as a separate item. As for
documentation/training, it's a useful choice: do you write lots of
documentation that no-one reads, or do you have a good training scheme?

>
> The "programming interface" probably needs to be broken out,
> or explicitly noted as part of the "core functionality" IFF
> outsiders are to be allowed to contribute. Of course, in the
> past, this goal has not been easily realized and this group
> might choose not to recognize it.

Programming interface is good. I'd add it at 10% and move core
functionality to 40%.

Tim

Date: Tue, 12 Mar 2002 15:50:58 -0700
From: Tim Cornwell <tcornwel@cv3.cv.nrao.edu>
Reply-To: alma-sw-ssr@donar.cv.nrao.edu
To: alma-sw-ssr@donar.cv.nrao.edu,
     'ALMA Science Software Working Group' <alma-sw-ssr@cv3.cv.nrao.edu>
Subject: RE: [alma-sw-ssr]reality check

> >
>
> OK: A suggested requirement:
>
> Candidate packages shall be evaluated using the following scoring
> scheme:
>
>   Core functionality   50%
>   Human interface   10%
>   Documentation   10%
>   Testing   10%
>   Optimization   10%
>   Training   10%
>

I forgot one item: management! The main issue is how well is the package
managed? Another issue is how would ALMA interact with current project
management. e.g. if ALMA were to write its own s/w completely then this
would be marked high, if ALMA were worried about working within the
AIPS++ consortium (say) then this would be lower.

```
      Core Functionality       50%
      Human Interface          10%
      Documentation            10%
      Testing procedures       10%
      Optimization             10%
      Management               10%
```

Tim

Date: Tue, 12 Mar 2002 19:56:33 -0800 (PST)
From: Tony Willis <Tony.Willis@hia.nrc.ca>

Hi Steve

> 2. The document will not be retitled "ALMA Offline Data Processing
> Objectives". These are requirements, and are merely (poor) elaborations
> on the original requirement "The Package shall not suck." Rule of
> Thumb - the only requirements that matter (e.g. "shall not suck","easy
> to use") are those that cannot be written as specific concrete items
> that can be blindly checked off a list. Otherwise all software would be
> perfect and wonderful to use. Another Rule of Thumb - oversight will not
> let a team of 10,000 monkeys write Shakespeare. You still need that one
> really smart monkey that understands feet, and meter, and uh, stuff like
> that. How smart are our monkeys?

Luckily, reasonably smart. They'll probably end up doing an OK job since
they already understand the application area. You really need highly
specified requirements if you're going to be handling them off to
outside contractors who really don't understand the application area
or don't really speak the language of the user. As seems to have been the
case with the Mars Lander where some monkeys clearly didn't understand
the difference between feet and metres.

Still I suggest that there are areas of the requirements document
in which especially some adjectives are meaningless because there
is no way, or apparent intention, to quantify them.

> \item There must be an Offline Data Processing Package that fulfills the
> requirements laid forth in this document. \reqpri{1}

> \item All standard observing modes supported by ALMA must be processable by
> the Package. \reqpri{1}

Are the standard observing modes defined anywhere yet? Are they the
ones you describe in the data rates document?

>>>SMyers: No, those will have to be set by us at such a time when
we have a better idea of what those are. Unless we want to do that now.<<<

> \item There shall be comprehensive handling of multiple users and
> multi-tasking with access and process control.
> \reqpri{1}

10

I would drop "comprehensive" for the reasons I've suggested in my
e-mail to the group.

>>>SMyers: could do<<<

> \item It must be easy to run GUIs remotely from the host machine
> (e.g. via X displays). \reqpri{1}

I've argued in my e-mail to the group that the above requirement is
meaningless. However I'll agree that your whole section 2.2.2 gives
a global impression of what your definition is for an "easy to use"
GUI (supplemented as well by section 2.2.5 for a good help facility).
So "easy to use" is at least quantifiable.

>>>SMyers: see comments above.<<<

> \item It is shall be easy for users to develop and include
> their own custom GUIs in the Package. \reqpri{3}

How easy is "easy"? Do we provide them with a GUI design toolkit?
(But it's priority 3 so will it ever get done anyway?)

>>>SMyers: its priority 3 so we will take what we are given<<<

> \item Calibration, editing, flagging, and correction of data shall be easily
> reversible within the Package (ie. not requiring re-reading of the data from
> the archive). \reqpri{1}

I've argued before that reversible processing can have a big impact
on software costs. I would suggest that the above condition is met if
I can read data from the archive into data set A. Processing should
convert A into B, but B should be a separate file (not overwrite) A.
So if you want to re-process you can just start at data set A.

>>>SMyers: true. As written this is a non-requirement. I would say that
reading in a saved file A is just as bad and to be nixed. What do we want to
do here? Just delete it, drop the pri to 3 and give up, or eat the cost?<<<

> \item Interactive data editing, calibration, and display of calibration
> quantities shall be largely graphical and intuitive.
> Specialized editing display tools should include:

Please define "intuitive". I would just end that sentence at
"largely graphical".

>>>SMyers: look it up in a bleedin' dictionary for gawd's sake. OK, so
maybe 'intuition' isn't the correct word for this, but for our purposes it
means that it is obvious from the layout and button design what to do without
resort to some obscure manual. I dont think it is unreasonable to qualify
this.<<<

> \item Efficient selection of subsets of the imaging data must be provided.
> \reqpri{1}

Please define or drop the "Efficient". Or how would you distinguish between
an efficient or inefficient selection?

>>>SMyers: I would use "easy" instead of "efficient", and would say a hard
or inefficient way would be to have to use a separate tool to split out
the bits you wanted to use in the imaging into a separate file, rather than
specifying the selection inside the tool.<<<

>>>SMyers: Do these specific instances really cause problems? Is this
where we are going to really run aground?<<<

Cheers

Tony

Date: Tue, 26 Mar 2002 19:21:34 +1100 (EST)
From: "Wim.Brouw@csiro.au" <wbrouw@atnf.csiro.au>
To: Steven T. Myers <smyers@cv3.cv.nrao.edu>
Subject: Re: ALMA offline Data Processing requirements Rev 4.0

Steve,

On Mon, 25 Mar 2002, Steven T. Myers wrote:

>
> Sorry, I see you were talking about the relevant new sections (the 2.x
> part threw me off).
>
> > > > p37 2.8.3
> > > >   Add the possibilty to create 3D images (3 space-D) for rotating
> > > > objects (rotating wrt observer) (as pioneered by Bob Sault for Jupiter)
> > >
> > > This *was* in there but took it out because it was not clear what was
> > > meant by it and others complained. Its still very obscure, and it
> > > will go to the Solar System section if I add it back.
> >
> > What is obscure about it? And why should people complain? It is very nice
> > tool if you have the data.
>
> This used to be a visualization item in the previous version.
> What is obscure it that from what is written it is not clear what you are
> asking for. Is this for line data (mapping velocity data) and just
> plotting it around a rendered sphere? Ive seen stuff like this for
> planetary radar, but that is irrelevant here. I would need a clearer
> requirement.
>

'Create 3D images of the radiation of solar system objects when possible'

For your info:
- line (corrected for rotation velocity of course, but detail for
implementors) and continuum.
- compare it to the rotating globe that Netscape had in the early days (
or news programs come up with)
- it is all simple tomography (like the X-ray and MR people do all the
time) or a full 3D solution to do it the 'seelfcal' way (again,
implementation detail)

- it is not visualisation (although visualisation should be able to handle
it, but in general knows how to do that, especialy commercial
visulisation, which can easily rendered opaque 3D objects.
- it can be done; gives information; so should be done I think

>>>SMyers: I will try to hunt down the referece (Sault,de Pater ???) and
figure out what to say. Note that this was in v3.4 and earlier as
5.2-R9, and Bryan Butler (and others) said they didn't understand this
and so I deleted it. I do think that it is not enough to list things,
I for one feel the SSR should know what they mean!<<<

>>>SMyers: wrote "The Package shall support the 3-D reconstruction of the
emission using observations of the target object at different aspect angles
and/or rotational phases." Also put in 3-D backprojection into the req
on projections.<<<

> > > > p 39 8.4-R1: support for high precision timing and 'phasing' of the bins
> > > > wrt the 'normal' time stamp must be supported as well.
> > >
> > > These are in the (new) pulsar section to some extent. What other use has
> > > this?
> >
> > I was commenting on the pulsar; but maybe I missed the (last) new section?
>
> No, but again just was is being asked for here given the ALMA system? It
> sounds like you would need special hardware for this.
>

The point I tried to make is that just binning is not sufficient. The bins
should be sybchronous with the pulsar period (hence the phase I mentioned
to correct wrt the 'standard' time block of the correlator; and the
bin size is not a rational fraction of the correlator period. Yes, special
hardware, but that is not relevant for the software (apart from maybe
mentioning that for the binning you need some special hardware). What I
wanted to say is that the software should be able to cater for these
special hardware issues.

>>>SMyers: Again, that is what is meant by phasing. The limitation for
the ALMA system will be the correlator integration times. I will try to
rephrase this.<<<

>>>SMyers: Split into 3 reqs now.<<<

Wim

After Review telecon 10 April 2002

Date: Thu, 11 Apr 2002 10:54:01 +0200
From: Robert Lucas <lucas@iram.fr>
To: Brian Glendenning <bglenden@cv3.cv.nrao.edu>
Cc: Steven T. Myers <smyers@cv3.cv.nrao.edu>
Subject: Re: 2002-04-10: ALMA Off-line requirements MINUTES - [DRAFT]

Brian:

7-a) I'm not sure whether Steve said `exportable' or at least I missed
it.
6.2-R8 is there in the new SW11 draft and was there in a very similar
form in the previously reviewed version (6.3-R4) so I definitely agree
with your bracketed note.

>>>SMyers: I see that there is no real requirement that Users be able to use
>>>the pipeline, so I guess that the Offline package is all that they
>>>are guaranteed. I still think that the pipeline be available, perhaps
>>>at the RDC (maybe by award of time on computers there).

Simulator: SW11 there is in fact not much about the simulator (3.1-R11,
3.1-R13 and a few notes in Use Cases) so may be the prioritized list we
define in Granada should be appended to SW-11?

Best regards

Robert

Date: Thu, 11 Apr 2002 13:41:16 -0400 (EDT)
From: Mark A. Gurwell <mgurwell@cfa.harvard.edu>
To: bglenden@cv3.cv.nrao.edu, smyers@cv3.cv.nrao.edu, lucas@iram.fr
Cc: mgurwell@cfa.harvard.edu
Subject: Re: Fw: 2002-04-10: ALMA Off-line requirements MINUTES - [DRAFT]

Hi Guys,

Alright, I'm starting to get confused about all the software aspects
of this project. So, I will start with a question:

We have the Online Pipeline Package, and the Offline Package.
Where do things like Proposal Preparation, etc, come in? It was my
(misguided?) understanding that the Offline Package would do all things
SMA: you could access and search the archive, you could prepare and
submit a proposal, you could analyze data, model data, do complete
simulation, write the paper and push submit to a GUI driven list of
favorite journals, etc. (Ok, that last is above and beyond...) Have I
completely overestimated the scope of the Offline Package? If I have,
then I apologize.

Now, on to the specifics about the simulator. This seems to be a
thread that is hard to trace back to a hard requirement, as Robert
mentioned in his email that Brian forwarded to me. The actual language
in SW11 is pretty sparse. It may be that
the simulator resides in some 'no mans land' between a proposal prep
package and the analysis package, but it is clear that it is needed
in both arenas, as the ASAC has suggested.

1) For proposal preparation, a powerful simulator is needed to help
   in the determination of appropriate configurations, frequencies,
   correlator setups, for a given project.

2) For data analysis, a powerful simulator is needed as a way to

understand ALMA data. Put in a source model, see what you get,
and what you don't get. How do the conditions under which
data was obtained affect the image that was made (e.g. take the
actual observed uvw points, Tsys, opacity, seeing, pointing, and
"observe" a model source for comparison to actual data, as an
analysis tool.

It is unclear if the simulator is separate from the analysis package,
and just writes data that is in the ALMA data format for subsequent
analysis, or if it is a genuine part of the package. The ASAC wording is
something like "will allow a complete end to end simulated observation
of a set of schedule blocks of an arbitrarily (but user provided) source".

References on ASAC language are from the September 01 (Santiago) report:
      Section 8.3 (pg 9)
      Section 9   (pg 11)
        Appendix C.2 (pg 25)

So, it may be that I'm barking up the wrong (requirements document) tree,
but the simulator must have specs set somewhere. Perhaps these should
be specified as Robert suggests at the Granada meeting, and appended to
SW11. Then the language in the current Offline Reqs is sufficient, in
that it will inherit those requirements.

Hope that helps,

Mark

Date: Thu, 11 Apr 2002 14:03:44 -0600
From: Brian Glendenning <bglenden@cv3.cv.nrao.edu>
To: Steven T. Myers <smyers@cv3.cv.nrao.edu>,
     Mark A. Gurwell <mgurwell@cfa.harvard.edu>
Cc: Robert Lucas <lucas@iram.fr>
Subject: Re: Fw: 2002-04-10: ALMA Off-line requirements MINUTES - [DRAFT]

My inclination would be to put some obvious functionality that users need in
this document along with some introductory text that states that a more
complete list will be in an upcoming revision of ALMASW-11. As we discussed
yesterday, in principle the simulation requirements could be split up into
items needed by users and items needed by ALMA for testing (although unlike
Wim I'm not convinced that doing the latter outside the off-line package is
the most effective thing to do), and only the first category needs to be in
this document.

Robert's opinion should probably be definitive here.

Cheers,
Brian

[I guess splitting this document off from -11 seemed like a good idea at the
time! In practice it seems to me it has been a pain.]

Date: Thu, 11 Apr 2002 16:31:19 -0400 (EDT)

```
From: Mark A. Gurwell <mgurwell@cfa.harvard.edu>
To: bglenden@cv3.cv.nrao.edu, smyers@cv3.cv.nrao.edu
Cc: mgurwell@cfa.harvard.edu, lucas@iram.fr
Subject: Re: Fw: 2002-04-10: ALMA Off-line requirements MINUTES - [DRAFT]


Steve, these are the most extensive reqs that I've seen, so yes they should
be resurrected.  The ASAC would be most interested in stuff as in 3-8.1R1.2,
which will be very useful, not only for staff and engineers, but in an
offline analysis sense for astronomers trying to understand their data.

Mark


> From: "Steven T. Myers" <smyers@cv3.cv.nrao.edu>
>
> FYI, there is a Simulation section 3.8 in the Version2.0 of the
> Requirements (July 2001) back before the Berkeley meeting when we split
> the Pipeline and Offline Parts.  See
>
> http://www.aoc.nrao.edu/~smyers/alma/offline-req/myers-report-2.pdf
>
> Are these items useful?  I guess I could see about repatriating some
> of these...
>
>   -Steve
>


-------------------------------------------------------------------------------

Date: Fri, 12 Apr 2002 10:54:34 -0600 (MDT)
From: Steven T. Myers <smyers@nrao.edu>
To: Robert Lucas <lucas@iram.fr>
Cc: Brian Glendenning <bglenden@cv3.cv.nrao.edu>,
     Mark A. Gurwell <mgurwell@cfa.harvard.edu>
Subject: Re: Fw: 2002-04-10: ALMA Off-line requirements MINUTES - [DRAFT]



On Fri, 12 Apr 2002, Robert Lucas wrote:

> Steve:
>
> I remember that draft - I think I should start from this and come to
> Granada with an updated version to be discussed and appended to memo 11.

Note - you can pick up the .tex files there in the archive

http://www.aoc.nrao.edu/~smyers/alma/offline-req/

for this and almost all previous versions.

> My opinion is that ALMA simulation is by definition ALMA-specific and
> thus should be under full ALMA responsibility, and thus the requirements
> should not be in the off-line package requirements. These should
> explicitly mention the fact that ALMA also produces simulated data that
> the user should be able to process as well as real data, using the same
> reduction tools and features; description of the simulator capabilities
> should refer to the new version of memo 11 (if we are too precise we run
> the risk oc ontradicting ourselves).
```

Its clear that we will expand the Simulation section of SW11 in the next
year, so I guess the questions for the Offline doc are:

1) How much of the ALMA Simulator functionality should also be required
   to be in the Offline Package? Currently, this is our single req 8.1-R1
   that says Levels 1 and 2 (I see there is a problem with the way my TeX
   refers back to prev section - I will fix that.).

2) Should there be general non-ALMA specific requirements (this might be
   useful to evaluate combined data)? What are they?

It sounds to me like the ASAC wants some expansion of the text to include
the obvious points from 1) that may also be in SW11, and maybe some extra
things from 2).

> It is not required that the simulation itself is developed in the
> framework of the off-line package (I think Wim even said that it would
> preferably be developed completely independently), but of course this
> would simplify things, at least for the user. This is a point that we'll
> discuss in Granada.

I think the Simulator used for ALMA development, testing, and probably
in the Observing Tool etc. will be more complicated than anything in
the Offline Package.

    -s

15-Apr-02: V4.1

I have tentatively numbered this as reviewed document SW-018 as that
seemed to be the next available.

Changes made:

Change header definitions for /reqlabel{} so that cross-references to
requirements look right (though I can't get them to link to the pages in the
.pdf like the section cross-references do).

Minor changes to intro

Minor changes to 1.1 Nomenclature

Note in 1.2 A that Pipeline and Archive Requirements are given in SW-11.

Point out in 1.2 E that our priority system is different to that in SW-11.

Add caveat to completeness of enumerated item lists to 1.2 F.

Add caveat on quantitativeness vs. squishiness to 1.2 H.

Add 1.2 J stating that the evaluation guidelines will be in a separate

document.

Add comments on Offline-Pipeline synergy to italic header to 2.1.1.

Added "science needs" to 1.1-R4

Changed 5400 baud to 14400 in 2.3-R4

New and expanded supported time, coordinate systems, coordinate frames,
velocity definitions, and position frames in 3.1-R8, R9, R10, R11, R12.
Refer to these later on (e.g. 5.1-R8, R9, 8.3-R1.2).

Add list of projections 3.3-R4, refer to in 5.1-R8

Delete 5.3-R4 as it is redundant with requiring that inf+sd work right!

Expanded list of subitems in 6.1-R3

Moved details of 7.5-R1 to 7.2-R6.3 of which it was a repeat

Added 3-D backprojection as 8.3-R5.4

Added 8.3-R8 on 3-D reconstructions, and refer back to 5.1-R9 for the others

Split 8.4-R1 into R1,R2,R3 and made more specific as to 'phasing'

Notes:

As per the reviewer's comments, Tim Cornwell's list of relative priorities
will not be included but will go into a separate Guidelines document to
be discussed (see item 1.2 J).

I also made a few demotions in priority. It looks like the ratios are
about 4:2:1 for priorities 1/2/3 respectively. This actually undercounts
the priority 1 since I just did a quick count counting blocks of subreqs all
at the same priority as one, and these were mostly P1.

Date: Thu, 18 Apr 2002 19:22:00 +0200
From: Robert Lucas <lucas@iram.fr>
To: Steven T. Myers <smyers@cv3.cv.nrao.edu>
Subject: Re: v4.1 of the Offline Requirements doc

Hi Steve:

You need also somewhere something like:

\includegraphics[width=63mm,height=42mm]{almaconcept-sm.pdf}
(file attached)

>>>SMyers: Thanks, I only had the .gif version. I will uncomment
the appropriate line in AlmaDocumentationStandard2.sty<<<

> Change header definitions for /reqlabel{} so that cross-references to
> requirements look right (though I can't get them to link to the pages in

> the .pdf like the section cross-references do).

This is a problem I had also in memo-11 (though it was working once but got broken at some point ...)

>>>SMyers: If you have any ideas, let me know! I think it is in our definition of /reqlabel{}.<<<

1.2-H:

"there are instances where where ..." delete one.
>>>SMyers: done<<<

> Added 3-D backprojection as 8.3-R5.4

I think you meant 8.3-R5.1
>>>SMyers: yes, sorry 'bout that<<<

> I think this is ready to go, if you agree with those changes,

I do

Cheers

Robert

Date: Thu, 18 Apr 2002 12:19:35 -0600
From: Brian Glendenning <bglenden@cv3.cv.nrao.edu>
To: Steven T. Myers <smyers@cv3.cv.nrao.edu>
Cc: Robert Lucas <lucas@iram.fr>
Subject: Re: v4.1 of the Offline Requirements doc

Sorry I didn't get what you were asking the first time.

. Yes, use #18.

. You didn't ask me to comment on this, but in general I don't like links from "official" documents to "personal" pages (in s1), but I would not bother changing this (it's supplementary info anyway).
>>>SMyers:I will actually delete those, since they were there for the interest of the SSR! I doubt if anyone else cares...<<<

. > Add list of projections 3.3-R4
   I would have said the first 3 are priority 1, the last 3 priority 3, but this level of detail is probably too fine.
>>>SMyers: for simplicity's sake I will not break out the priorities for all the different projections,times,reference frames,etc.<<<

That's it! -

Brian

>>>SMyers: And I removed the DRAFT designation...<<<