

Post-processing Overview

Bryan Butler, for Joe McMullin



Science Software Group



Mission:

- Primary purpose is to provide facilities for post-observational scientific reduction of ALMA and EVLA data

Facilities must be:

- Scientifically complete/correct
- Robust
- Acceptably fast
- Easy to use
- Able to support both scripted and interactive use



SSG - Requirements



Requirements Key Areas:

- General Requirements and Interaction
- Interface
- Data Handling
- Calibration and Editing
- Imaging
- Data Analysis
- Visualization
- Special Features

Driven by requirements documents:

- ALMA Offline Data Processing Requirements
- EVLA Data Post-processing Software Requirements
- **2/3 of requirements are common!**

Detailed tracking on the combined projects' requirements (common to both projects and the deltas between projects)



SSG - Organization



The SSG is a group within the Interferometry Software Division (ISD) - key personnel for ISD and SSG are:

- G. van Moorsel (EVLA), B. Glendenning (ALMA) - Heads of Computing; ISD Co-managers
- M. Rupen (EVLA), Debra Shepherd (ALMA) - Project Scientists for Computing
- J. McMullin, K. Golap - Group Management
- S. Myers - Group Project Scientist

ISD functions now in the new e2e Operations Division:

- N. Radziwill, E. Fomalont - manager and scientist



SSG - Staffing



- **NRAO:** 5.0 FTEs (including management; split 60/40 between ALMA & EVLA)
- **EVLA-specific:** 1.5 FTEs (Imaging algorithms, Data flagging)
- **ALMA-specific:** 5.5 FTEs (Application development, Data Model, Data Model Interfaces, Data Capture process)
- **NSF grant:** 1.0 FTE (visualization; concludes 2007.8)
- More detail on backup slide, if needed



SSG - Software Packages

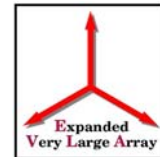


Packages:

- Legacy AIPS++ code base for development (changing to CASA - more on that later)
- AIPS used for validation, algorithm and display development (e.g., automated flagging), support of EVLA hardware tests



AIPS++ - Transition to CASA



- Users reluctant to embrace AIPS++ as a post-processing package, based on problems with robustness, speed, functionality, and the user interface
- Decision to halt public releases of AIPS++ made in 2004
- SSG now concentrating on above problems; also working on modularity of code, a change from Glish to Python as the binding scripting language, and help/documentation
- New package named CASA - Common Astronomical Software Applications
- Care being taken regarding releasing the new package openly, to avoid the problems of the past

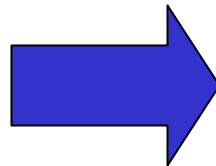


Framework Improvement



AIPS++:

- Glish interface; relatively unknown, unsupported outside of NRAO
- Tasking system based on Glish
- GUI system based on Glish/Tk; limited widgets, **not robust!**
- Difficult for external developers to contribute
- Multi-CD binary distribution
- Large monolithic libraries with cross dependencies
- Freeze 2nd half of 2006



CASA:

- Hierarchical set of small libraries with clearly defined dependencies
- Inherits all application code improvements in robustness and performance.
- Smaller memory footprint/startup time
- Python interface (community standard); IPython
- Binding to Python, ACS; other frameworks enabled



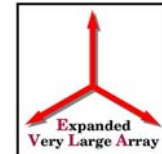
CASA Usage Status



- Has been tested internally by NRAO scientists in preparation for the 2006 ALMA test.
 - Early demos provided bi-monthly to the NAUG at:
 - <http://casa.nrao.edu/gettingstarted.shtml>
 - 6 scientists used and reported on it – enabled deployment for the ALMA test.
- Was deployed and reviewed by four ALMA testers
 - <http://projectoffice.aips2.nrao.edu/ALMA2006.01/ALMA2006.01.html>
- The user interface was reviewed and commented on by 8 NRAO scientists
 - User Interface is being refined/further developed based on the user interface report:
 - <http://projectoffice.aips2.nrao.edu/uiwg-report.pdf>
- Will be used exclusively by the ALMA Pipeline Heuristics Team (second half of 2006)
- CASA will have replaced AIPS++ within NRAO (developers and NAUG testers) this year.



CASA Development/Release Plan



2006

- NRAO: NAUG testing (AIPS++)
- Community: Project tests
- ALMA: external science testing: +single-baseline commissioning test) (*CASA*)
- ALMA: external science testing: +single dish reduction (*CASA*)
- ALMA: commissioning support (*CASA*)
- ALMA/*EVLA*: user interface review (*CASA*)
- *EVLA*: external science testing: +full polarization imaging; antenna pointing calibration
- **2006.5 AIPS++ frozen**
- ALMA: Pipeline Heuristics Use of *CASA*
- **NRAO: *CASA* initial beta deployment (internal)**

2007

- NRAO: User support (*CASA*)
- ALMA: commissioning support (*CASA*)

- *EVLA*: external science testing: + RFI/automated flagging (*CASA*)
- ***ALMA: P1 SSRs complete***
- **NRAO: *CASA* second beta deployment (internal)**

2008

- *EVLA*: external science testing: + wide band calibration imaging (*CASA*)
- ALMA: commissioning support
- ***EVLA: P1 SSRs complete***
- **Community: *CASA* mature - limited release to outside users**

2009-2010

- ALMA/*EVLA*: commissioning support
- **Community: *CASA* released/distributed for early ALMA/*EVLA* science**

2011

- **Community: *CASA* released/distributed; full user support (*ALMA/EVLA: P1/P2s*)**



SSG - Ability to Deliver



The SSG has demonstrated the ability to meet major milestones:

- Heavily reviewed in annual VC and UC meetings, as well as ALMA CIPT, ASAC and EAC reviews
- Of 21 major milestones presented at ALMA CDR2 in July 2004 for the period up until now, 15 were met on time, 2 were changed and met on time, and 4 were met, but late
- Over past three years, 3 formal ALMA CDRs, 4 formal ALMA releases, 3 formal ALMA tests, and 1 formal EVLA test have been successfully completed
- Note that EVLA benefits substantially from ALMA-driven development of CASA, since common requirements are met (remember that 2/3 are common), as well as the higher-level requirements of robustness, speed, and usability.



User Interface



Significant effort has been devoted to the developing the command line version of the UI. It was tested extensively in early April 2006, with the following results:

- Prototype IPython interface to functionality, parameter setting and in-line help are in the right direction but more development and user testing needed.
- Full needs are documented at:
 - <http://projectoffice.aips2.nrao.edu/uiwg-report.pdf>

Other important (high priority) user interface issues:

- A revised interface prototype (similar to IRAF epar environment) is being developed
- There is much work needed to provide astronomer-level documentation (collaboration with NAUG to develop this)

Development progress will be reviewed with the Fall EVLA test, as well as less formal, on-going testing.



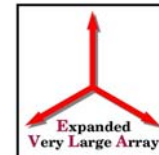
Risks



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- Any reduction in staffing levels within the SSG can impact delivery schedule
 - Staff retention is key; AIPS can potentially be used to bridge any delivery schedule gap
 - The necessity to do both software development and active user support stretch already thin resources
 - Convert to NRAO staff scientists being front-line user support, just as for AIPS
 - User interfaces are notoriously difficult to develop (and gain acceptance)
 - Extensive testing and feedback into development is critical
 - Significant scientific staff resources are required for testing, support, and documentation; not present currently
 - NRAO intends to redirect or hire new scientific staff to address this
 - Science Data Model complexity can impact delivery schedule
 - The SDM must be critically evaluated for propriety and agreed to by both ALMA and EVLA (and potentially GBT)
 - Algorithm development and data rates and computation
 - Algorithm development group (NAWG) work ongoing; data rate and computation problems addressed with additional hardware
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Resources - Details



	FTEs			Comments
NRAO (SSG)	4.75 [5.75]			Project Scientist: Steve Myers
Sanjay Bhatnagar	0.75	Astronomer	Algorithm Development (EVLA)	
Kumar Golap	0.75	Astronomer	Application Code	Application code: common to ALMA&EVLA
Joe McMullin	0.75	Astronomer	Management	
George Moellenbrock	0.75	Astronomer	Application Code	
David DeBonis	1.0	Software Engineer	System	Began 2004-05; depart:2006-01
Darrell Schiebel	1.0	Software Engineer	System	
Wes Young	0.75	Software Engineer	System	
ALMA	4.3 [5.3]			2.3 FTE in-kind
Gary Li	1.0	Software Engineer	Application Code	0.5 FTE in-kind; Began 2004-03
Raymond Rusk	1.0	Astronomer	Application Code	
Tak Tsutsumi	1.0	Astronomer	Application Code	1.0 FTE in-kind; Began 2005-03 (ACA)
Honglin Ye	0.5	Software Engineer	Application Code	Began 2005-07 (visualization)
Michel Caillat	0.8	Software Engineer	ALMA Data model, simulation	0.3 FTE in-kind
Francois Viallefond	0.5	Astronomer	ALMA Data model, simulation	0.5 FTE in-kind
Heiko Hafok	0.5	Astronomer	ALMA Data Capture	Began 2003-12
NSF grant	1.0			
David King	1.0	Software Engineer	visualization	(concludes 2006-05)
Other	0.5			
Urvashi Rao	0.5	Astronomer	Algorithm Development (EVLA)	Began 2004-09 (9 month appt)
Total	10.05 [12.55]			