



## Scientific Oversight and Testing of Software

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May 8-9, 2006

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## Keeping Track of Software



- Software issues
  - deliverables and requirements
    - what exactly is an “acceptable” user interface?
    - research problems (e.g., dealing with RFI)
  - requirement creep
  - written by software professionals
    - can no longer assume astronomical outlook or knowledge
    - most experienced/demanding users do not write code

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## Keeping Track of Software



- Recent NRAO approach: tie software to projects/telescopes (GBT, ALMA, EVLA)
  - immediate positive effects (vs. old “independent contractor” model) in meeting requirements & deadlines, and in getting the code used
- EVLA approach: embed scientists in software development, at all levels
  - from overall priorities, to targeted testing

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## High-level Requirements & Priorities



- EVLA Project Scientist for Software: Rupen
  - responsible for requirements, timescales, project book, inter-project interactions, ...
- EVLA SW Science Requirements Committee
  - Rupen, Butler, Chandler, Clark, McKinnon, Myers, Owen, Perley, (Brogan, Fomalont, Hibbard)
  - consultation for scientific requirements
  - source group for more targeted work

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## Subsystem Scientists



- scientific guidance for individual subsystems
- day-to-day contacts for programmers
- interpret scientific requirements for programmers
- oversee (and are heavily involved in) tests
- heavily involved in user documentation
- consult with other scientific staff
- duties vary with subsystem status

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## Subsystem Scientists



- Currently:
  - Proposal Submission Tool: Wrobel
  - ObsPrep: Chandler (“daughter of JOBSERVE”)
  - WIDAR: Rupen/Romney
  - Post-processing: Rupen/Owen
  - TBD: Scheduler, ObsMon, Archive

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## Less Formal Contacts



- Less formal, more direct contacts
  - e.g., Executor (e.g., ref. ptg. priorities and testing)
  - e.g., Greisen developing plotting programs based on Perley hardware testing
- Testers
  - On-going tests: small in-house group (fast turn-around, very focused)
  - Pre-release tests: larger group of staff across sites and projects
  - External tests: staff + outside users

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## Why Test?



- Set priorities & deliverables
  - tied to scientific and hardware requirements
- Check (and force) progress on long-term goals
  - wide-field, wide-band, low-noise, high dynamic-range, full polarization imaging
  - user interface
- Sign off on finished products
- Public reports
- ***Planned opportunities for scientist/programmer collaboration***

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## Scientific Support Systems: Prop. Submission Tool



- Feb 10: post-mortem based on user comments
  - set timetable and requirements for releases
- Mar 1: internal test-I (van Moorsel, Butler, Rupen)
  - overall functionality and ease-of-use
- Mar 20: internal test-II (+Frail)
  - “delta” test: bug fixes and “easy” new requirements
- Apr 18: NRAO-wide test (14, incl. CV/GB)
  - suitability for general release; **documentation**

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## Scientific Support Systems: Prop. Submission Tool



- May 3: internal test-III
  - sessions; documentation
- May 10: public release
- late May: test post-submission handling (“proposal wrangling”)
- Early June: gather user comments, set next goals and schedule

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## Scientific Support Systems Tests: Summary



- short initial “pure software” period followed by testing and interaction
- size and scope of test group grows from a few locals, to NRAO staff, to outside users
- subsystem scientist responsible for documentation
- subsystem scientist + ProjSci/SW + operations decide on public release

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## Post-Processing: Monthly Checks



- NRAO “AIPS++” Users’ Group (NAUG)
  - progress reports & most recent internal release
  - requests for testing and comments
  - e.g., first look at python interface
- NRAO Algorithms Working Group (NAWG)
  - high-level discussion of algorithms and progress
  - e.g., Urvashi reports on wide-band imaging tests
- Includes Myers, *Briskin*, Brogan, *Chandler*, Fomalont, *Greisen*, Hibbard, *Owen*, *Rupen*, Shepherd, *Whysong*, + developers

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## Post-Processing: Leveraging ALMA



- EVLA participation in ALMA formal tests
  - outside testers with VLA expertise (e.g., Testi)
  - ALMA2006.01-4 (python + single baseline calibration) included Brisken, Owen, Rupen
  - goals
    - CASA experience
    - influence common development (e.g., interface)

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## Post-Processing: Leveraging ALMA



- Joint development of common 2/3 of requirements
  - User Interface Working Group (Apr 06)
    - refine requirements for user interface
    - Myers, Brogan, *Brisken, Greisen, Hibbard, Owen, Rupen, Shepherd, Whysong*
    - draft results on Web
- Joint planning
  - draft proposal for gradual shift of CASA from development to user support, including scientific staff use, documentation, and hand-holding

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## Post-Processing: EVLA Tests



- May-July 2005: w-projection
  - first step in the Big Imaging Problem
  - generally good performance (speed, robustness) but lots of ease-of-use issues
  - Myers, Brisken, Butler, Fomalont, van Moorsel, Owen
- Currently concentrating on
  - long lead-time items (e.g., high DR imaging)
  - H/W driven items (e.g., proto-type correlator)
  - shift to user-oriented system

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## Post-Processing: EVLA Fall 2006 Test



- User interface
  - revised UI (tasks etc.)
  - revamped module organization
  - new documentation system
- Reading and writing SDM
  - ASDM → CASA MS → UVFITS → AIPS
- Basic calibration, incl. calibration of weights
- “Testers’ choice” of data sets, plus a couple common

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## Post-Processing: EVLA Fall 2006 Test



- Data examination
  - basic plots (mostly a survey of existing code)
  - first look at stand-alone viewer (qtview)
- Imaging
  - widefield imaging (w term, multiple fields)
  - full pol’n imaging
  - pointing self-cal “for pundits”

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## Post-Processing: Winter 2006/7



- NOT a formal test
- NAUG and “dedicated” staff
- user interface discussions/testing
- documentation
- “EVLA stress test:” basic calibration and imaging of a many-channel data set, both in CASA and in AIPS

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## Post-Processing: EVLA Spring 2007 Test



- Focus on calibration and data examination
  - flexible, simple-minded, quick displays
  - wideband issues
- Driven by need to support initial basic modes (e.g., big spectral line cubes), and to learn from the new hardware (e.g., WIDAR + wide-band feeds)
- Currently working on associated requirements

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## Involving Outside Users



- Scientific Support Systems
  - currently mostly at end of testing/release cycle
- Post-processing
  - algorithmic development: publications, discussions, interactions, student involvement
  - focus shifting to user interactions
    - as this happens, we will involve more non-NRAO astronomers

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