EVLA Software

E2E Perspective
Topics

- What is E2E?
  - purpose
  - EVLA roadmap
- EVLA Design Review
- Next steps
  - Coordinated Development Strategy

Gustaaaf will cover later what EVLA E2E has actually done, and resource issues affecting what can be done
What is E2E?

- **History**
  - E2E oversight and architecture committee formed 1 year ago

- **Goals**
  - Coordinate E2E efforts for all NRAO telescopes including ALMA
  - Optimize the impact of limited resources across the Observatory
  - Provide a modern end-to-end data-flow and data management system for all NRAO telescopes.
  - Provide the user community with a common look and feel for observing with all NRAO telescopes

- **Constraints**
  - Delivering an operational telescope remains first priority
  - Schedule and budget
EVLA E2E Roadmap

- Develop common E2E system models
  - *Observatory model, Project model, Observing model, Science Data model*
  - Common system models required for consistent function and to enable software sharing
  - System modeling required for design in any case
- Develop EVLA system design conformant to E2E models
  - Subject of initial E2E review
- Identify common elements
  - Largely done
  - Issues of complexity and risk
- Coordinated development strategy and plan
- Subsystem design
• Design sound "to the level that it has been worked out"
  – Much improved coordination with ALMA and E2E
• Design mainly addresses control system and transition plan
  – Expertise of EVLA team lies primarily in control system
  – Transition plan looks good; EVLA unique in this respect
  – Dataflow through data capture well specified
  – Concern about communications infrastructure
• E2E and post-processing largely not addressed yet
  – Need to get "hooks" for post-processing into telescope system
  – Concept of observing modes absent
  – Uncertain support for project model (e.g., observers intent)
  – Online functionality, future scalability of archive unclear
Coordinated Development Strategy

- Primary focus of EVLA team should be on core telescope functionality
  - *What is the minimal core system we have to deliver?*
    - Anything required for basic telescope operations should be done directly by the EVLA team
    - Observe, produce quality raw observation data product for the archive
    - Enable if not achieve automated post-processing
- Leverage ALMA for advanced capabilities
  - e.g., observation planning and preparation, dynamic scheduling
    - Minimize risk
- Most post-processing is common
  - Data capture, archive, pipeline, offline
  - ISD in Socorro responsible for most of this for both EVLA, ALMA
Common Elements

• Scope of E2E is all NRAO telescopes, but for EVLA our main concern is the overlap with ALMA

• How much do ALMA and EVLA have in common?
NRAO End-to-End Dataflow

Observer

Proposal Submission And Handling

Observation Preparation

EVL A VLBA ALMA GBT

EVLA Sched

VLBA Sched

ALMA Sched

GBT Sched

EVLA Control

VLBA Control

ALMA Control

GBT Control

Telescope Data Model

Feedback to telescope

Data Capture

Telcal

Quick Look

Pipeline

Archive

Offline

VO

Scientist

Observer Domain

Mostly Telescope-Independent

Common Software

Telescope Domain

Mostly Telescope-Specific

Project Software

Science Domain

Mostly Telescope-Independent

Common Software
Common Elements

- Information Models
  - Project model
    - used to describe a project and track it through the system
    - proposal, project, observations, etc.
  - Science data model (SDM)
    - describes raw and calibrated science data
    - SDM defined separately from export data format
    - major interface to external community
    - basis for all post-processing
Common Elements

- Proposal submission
  - Proposal submission tool
  - Proposal database
  - Proposal handling
  - Telescope resources different (but similar)
- Observation preparation
  - Contains both generic and telescope-specific functionality
- Scheduling
  - Dynamic scheduling
  - Observing project management
Common Elements

• Data capture
  – Largely the same
  – Telescope models differ
  – EVLA requires parallel data streams
  – Telcal, quick look partly the same

• Archive
  – User interface, data access interface
  – Information and data models
  – Storage manager (e.g. NGAS)

• User database
  – Authentication, user information
Common Elements

• Pipeline
  – Mechanism the same
  – Heuristics differ

• Offline
  – Software largely the same
  – The most challenging algorithms differ
  – Scalability more important for EVLA

• VO interface
  – Largely the same
First Cut at a Minimal Core System

- Proposal submission
  - Produce digital description of project
- Simple observation preparation
  - Produce scheduling block
  - More than just a control script
- Simple scheduler
  - Main thing is to use project model
  - Dynamic scheduling capability can be minimal initially
- Control system
  - Takes scheduling blocks
  - Executes control script
  - Feeds metadata to data capture
  - Feeds bulk data to archive ingest store
First Cut at a Minimal Core System

• Data capture
  – Produces SDM, basic verification
  – Telescope calibrations (Telcal)
  – Minimal quick look capability

• Archive
  – Support for online system
  – Basic data store, data access

• Pipeline
  – Calibration pipeline
  – Support for 2-3 observing modes

• Offline
  – Focus initially on data processing functionality
  – Functionally complete, robust, efficient
  – Minimal user interface initially