Project Overview

Mark McKinnon
Project Manager
Outline

- Overall Project Goals
- Organization
- Budget
- Accomplishments in FY 2007
- Schedule
- Project Goals for FY 2008
Project Goals

- Key goal: Improve the observational capabilities of the VLA (except for angular resolution) by a factor of ten or more. Achieve by:
  - Adding new, wide bandwidth receivers
  - Upgrading or replacing current receivers
  - Replacing the data transmission system
  - Replacing the correlator
- Provide a new monitor and control (M&C) system, which must also allow operation of new and old antennas in transition.
- Perform careful astronomical observations to verify that EVLA hardware and software function properly.
- Provide new data management software, to include data post processing, for better access to array data products (a deliverable for NRAO, not the project specifically).
- Contribute to EPO to advance public science education (descoped).
Project Organization

Numbers refer to WBS level 2 tasks.
Budget

- Funding = $93.8M (FY06)
  - NSF project funds $58.7M
  - NRAO contributed effort $16.3M
  - Canadian partner $17.0M
  - Mexican partner $1.8M
### NSF Funding Profile

<table>
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<tr>
<th>Year</th>
<th>Initial ($K)</th>
<th>Current ($K)</th>
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Table entries in dollars of year, Finalized August 31, 2006.
# Budget:
Distribution by WBS Element

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<th>WBS Element</th>
<th>Description</th>
<th>% of Total Cost</th>
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<td>Systems Integration</td>
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<td>612</td>
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Budget: Contingency Status

- Financial health of project is good
- Project contingency, measured as percent of cost to complete, has improved in past year
  - Cost savings through bulk purchases
  - Better understanding of actual costs
  - Efficiency in antenna retrofitting
- Current contingency: $3.40M (14.6%)
  - Does not include work on the correlator, which is supported by Canadian funds
- Sum of weighted risks: $2.75M (McKinnon management talk)
Accomplishments: Antennas

- Original project plan called for antenna retrofit rate of 5 per year
- In August 2006, started antenna retrofits at rate of 6 per year as a schedule recovery measure
- On track to achieve project goal of retrofitting a total of 12 antennas to the EVLA design by September 30, 2007
  - 11 antennas used in routine scientific observations
    - Account for 39.2% of total antenna hours
  - 12th antenna in electronics outfitting
  - 13th antenna in mechanical overhaul
Accomplishments: M&C Software

• Achieved goal of retiring VLA Modcomp control computers by June 27, 2007.
  – Replaced suite of M&C software
  – Built new correlator controller so EVLA M&C system could control correlator
  – Developed hardware and software for a “visibility pipeline” that allows EVLA M&C to write correlator data to archive
  – Reduces operations cost and minimizes reliability risks
  – Allows M&C staff to focus on system integration and testing of prototype WIDAR correlator

• Conducted critical design review of EVLA transition M&C system on December 5-6, 2006 (Sahr/Butler)
Accomplishments: Civil

- Civil construction WBS element is basically complete
  - First WBS element in project to be completed
  - Installed -48 VDC power plant in new correlator room
  - Installed new uninterruptible power supply in EVLA operations area

- All modules for local oscillator, intermediate frequency, and data transmission systems are in full production, except for:
  - round-trip phase module
  - some power supplies
  - 3-bit digitizer (Jackson)
- Wideband (2GHz) signal path, including new gain slope equalizer, shown to meet project specifications.

- Completed installation of fiber pads at all 72 antenna stations
  - Allows antennas to be connected to array optical fibers
  - Provides complete flexibility in locating antennas on the array
- 3-bit, 4Gspss sampler shown to meet performance specifications
  - Will be an EVLA board designed around a commercially-available digitizer chip (Jackson)
Accomplishments: Receivers

- Excellent progress on fabrication of receiver feed horns (Hayward)
  - 22 L-band (1-2 GHz) horns fabricated (goal for FY 2007 was 20)
  - All Ka-band (26.5-40 GHz) and C-band (4-8 GHz) horns fabricated
  - Prototype S-band (2-4 GHz) horn fabricated and tested.
- Will initiate production procurement in early FY 2008, one year ahead of schedule
- Prototype Ka-band receiver assembled.
  - Undergoing cryogenic RF tests
Accomplishments: Receivers

- Good progress on design and fabrication of orthomode transducers (OMT)
  - Resolved cool-down issues with L-band OMT and selected fabrication method
  - C-band OMT expected to meet design specifications
  - RF design of S-band OMT completed recently at Green Bank
- Adjusted approach to OMT design & development for schedule recovery
  - L, C and S design & development now proceeding in parallel instead of sequentially
- Addressed staffing shortage
Accomplishments: Correlator

- Resolved problems with board fabrication and chip testing (Dewdney)
- Conducted critical design review for chip production on June 6, 2007.
  - Chip order placed

Test board for WIDAR correlator chip

Correlator baseline board
Accomplishments: Software for Science Support Systems

- Proposal submission tool (PST)
  - Used for all VLA and GBT proposals for last two proposal deadlines
  - Maintenance and further development undertaken by E2E Operations Division (EOD)
- Developed observation preparation tool (OPT)
  - Replacement for VLA JObserve
  - Tested by NRAO staff in AOC and Charlottesville (Butler demo)
  - Supplemented with tool that accesses calibrator data bases
- Observation scheduling tool (OST) under development
  - Demonstrated to ALMA software group
  - Alpha release in June 2008
- Archive access tool (AAT) will be common with ALMA’s
  - Working with ALMA to standardize binary data format and science data model
  - Development managed by EOD
- CASA (McMullin)
  - Extensive user testing underway
  - Beta release scheduled for September 30, 2007
Accomplishments: Management & Operations

- Developed plans for risk management and earned value
  - Updates conducted with semi-annual updates of WBS cost data sheets. (McKinnon)
- Held inaugural meeting of the Science Advisory Group for the EVLA (SAGE) on May 22-23, 2007 (Lo)
- Issued proposal call in April 2007 for new tuning capability at C-band
  - First two EVLA-only papers submitted for publication (Chandler)
Schedule: Milestone Completion

As of July 13, 2007
Schedule

• Increase in antenna retrofit rate has helped to recover schedule. Maintain rate to achieve project goal of completing antenna retrofits by Q3 2010
• Understaffing and delay in OMT designs have extended installation of last receiver (X-band) into 2013
  – Observing capability still available at 8.0-8.8 GHz. Complete X-band coverage (8-12 GHz) is what is delayed into 2013.
• Correlator status improved:
  – Problems with circuit board fabrication and chip testing have been resolved
  – Steps taken by Canadian partner to merge production stages for schedule recovery
  – Delivery dates:
    • Prototype correlator scheduled for July 2008
    • Installation of final correlator begins May 2009
    • Final correlator installation complete April 2010
    • First science with correlator subset, December 2009
Summary

• The EVLA project team has made a number of significant accomplishments in FY 2007.

• Budget
  – Financial health of the project is good
  – Project contingency, as a percent of cost to complete the project, has improved over the past year

• Schedule
  – On track to complete antenna retrofits in July 2010 as originally planned
    • Efforts to recover project schedule have been successful
  – Installation of last X-band receiver delayed into 2013, but still have interim X-band capability
  – Correlator status has improved over last year
    • Will have observing capability with correlator subset in late 2009
Project Goals FY2008

- Start production of M302/303 utility modules, 10/2007
- Start production of gain slope equalizers, 10/2007
- Relocate deformatter racks to new correlator room, 10/2007
- Finalize joint definition of binary data format, 10/2007
- Develop detailed plan for joint software development, 11/2007
- Start production of Ka-band receiver, 11/2007
- Start production of RTP module, 11/2007
- Fabricate prototype S-band OMT, 11/2007
- Fabricate prototype Ku-band feed horn, 12/2007
- Finalize joint definition of Science Data Model, 12/2007
- Start production of C-band OMT, 12/2007
Project Goals FY2008

- Start production of 3-bit, 4Gsps samplers, 1/2008
- Start production of S-band feed horns, 1/2008
- Complete design of X-band OMT, 2/2008
- Complete fabrication of L-band feed horns, 2/2008
- Conduct science support systems design review, 3/2008
- Conduct correlator critical design review, 6/2008
- Make alpha release of observation scheduling tool, 6/2008
- Conduct on-the-sky tests with prototype correlator, 7/2008
- Complete prototype of S-band receiver, 7/2008
- Start production of L-band receiver, 8/2008
- Retrofit a total of 17 antennas to the EVLA design, 8/2008