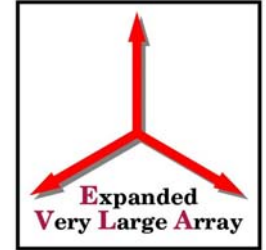


Baseline Project Definition

Mark McKinnon
Project Manager



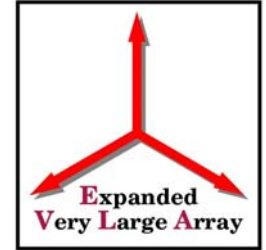
Outline



-
- Project Goals
 - Budget
 - Schedule
 - Metrics for Completion
 - Management structures
 - Technical oversight and testing
 - Procedures for evaluating system performance
 - Problems encountered and resolution
 - Project Goals in FY06 and FY07



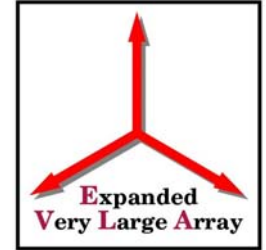
Project Goals



- Key goal: Improve the observational capabilities of the VLA by a factor of ten or more. Achieve by:
 - Adding new frequency bands
 - 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 for better access to array data products (part of project scope, but not its budget).
- Contribute to EPO to advance public science education.



Budget

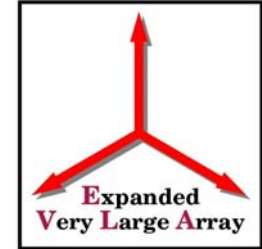


- Funding = \$93.8M (FY06)
 - NSF project funds \$58.7M
 - NRAO contributed effort \$16.3M
 - Canadian partner \$17.0M (C\$20M)
 - Mexican partner \$1.8M

See the Project Cost Summary in the Project Information Summary handout for information on expenditures in labor, travel, and M&S by WBS level 2.



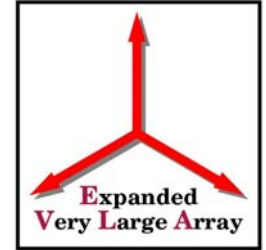
NSF Funding Profile



Year	Proposed (\$K)	Approved (\$K)	Current (\$K)
2001	1,110	1,106	3,000
2002	6,883	6,900	5,000
2003	7,592	5,322	5,322
2004	8,537	5,434	9,340
2005	7,661	5,548	5,340
2006	6,178	5,665	5,440
2007	5,710	5,835	5,835
2008	4,684	6,010	6,010
2009	3,079	6,190	6,190
2010	0	6,376	6,376
2011	0	4,597	1,130
Total	51,434	58,983	58,983



Schedule: Key Milestones -1

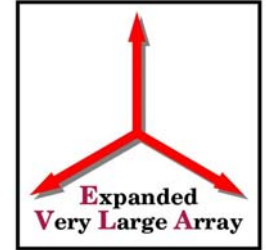


	Orig.*	Actual/Plan
• Start installation of fiber optics	Q3 02	Q4 02
• Install prototype system on antenna	Q2 03	Q2 03
• Start electronics production	Q4 03	Q2 04
• Start retrofitting antennas	Q2 04	Q4 04
• Test prototype correlator	Q4 05	Q3 07
• Start installing parts of final correlator	Q2 06	Q1 08

* Original schedule refers to baseline 9 year plan



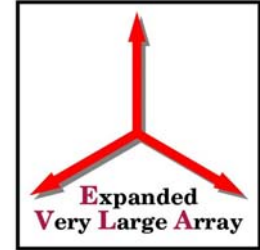
Schedule: Key Milestones - 2



	Orig.	Actual/Plan
• Start commissioning of correlator subset	Q4 06	Q2 08
• Start first science with correlator subset	Q2 07	Q1 09
• Full correlator becomes available	Q1 08	Q3 09
• Retrofit last antenna to EVLA design	Q1 08	Q3 10
• Install last receiver	Q1 10	Q2 12



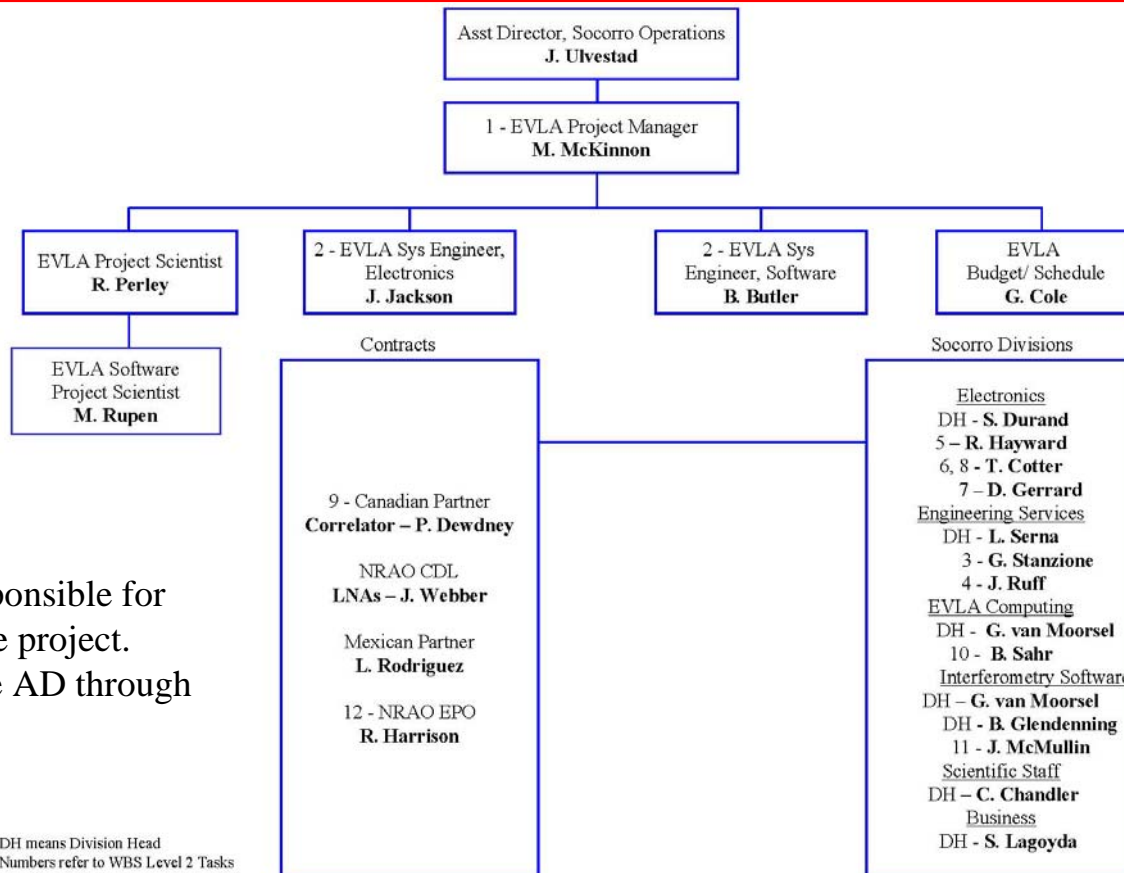
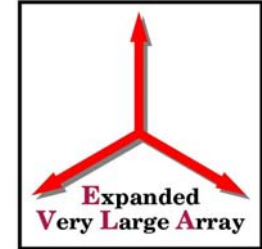
Metric Completion: Management



- Metrics are milestones taken from project schedule
- Plan for metric completion requires project structures that enable progress and allow monitoring of progress
- Structures
 - Project organization
 - Work breakdown structure (WBS)
 - Cost and scope control
 - Methods for tracking progress



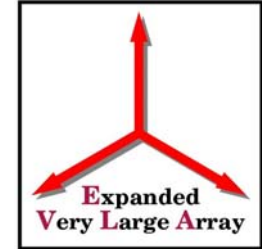
Project Organization



Divisions are responsible for deliverables to the project. They report to the AD through line management.



Work Breakdown Structure

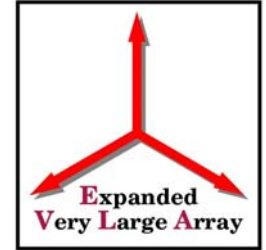


WBS Element	Description	% of Total Cost
601	Project Management	4.7
602	Systems Integration	6.6
603	Civil Construction	2.7
604	Antennas	4.9
605	Front End Systems	20.7
606	LO Systems	6.0
607	Fiber Optic Systems	10.8
608	IF Systems	6.0
609	Correlator	17.5
610	Monitor & Control	12.6
611	Data Mgt. & Computing	7.5
612	Education & Outreach	0.0

162 CDS



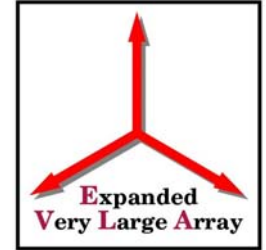
Cost & Scope Control



-
- Project book: defines scope (www.aoc.nrao.edu/evla/pbook.shtml)
 - Semiannual updates of work breakdown structure (WBS)
 - Changes to the project book or changes resulting from WBS updates (> \$50K) must be brought before the change control board (CCB) for approval. Membership:
 - Project Manager – McKinnon
 - Project Scientist – Perley
 - Hardware Systems Engineer – Jackson
 - Software Systems Engineer – Butler
 - Assistant Director for NRAO-NM Operations – Ulvestad
 - Correlator Project Manager – Peter Dewdney
 - Budget status summarized monthly
-



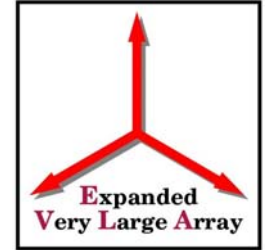
Track Progress



-
- Weekly milestone update (see handout)
 - Reporting
 - Quarterly reports to AUI/NSF
 - Semiannual progress reports to NSF
 - Annual Government Performance and Reporting Act (GPRA) report to NSF
 - Annual reports to AUI Visiting Committee and NRAO Users Committee
 - Bimonthly status updates to NRAO Director's Office
 - EVLA Advisory Committee



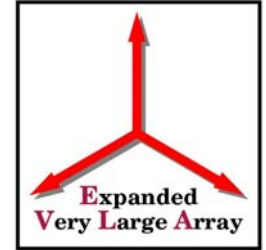
Metric Completion: Technical



- Technical oversight and testing are needed to verify performance of subsystems
- Oversight:
 - All WBS level 2 elements must complete preliminary and critical design reviews.
 - All PDRs are complete. Delta-PDR needed for data management (611).
 - All CDRs are complete except for M&C and data management.
- Testing:
 - Hardware
 - Bench testing of individual electronics modules
 - Testing of integrated subsystems in a laboratory mockup of a subset of all antenna electronics
 - M&C software: longstanding test and integration procedure used to verify that new control software works properly with existing array.



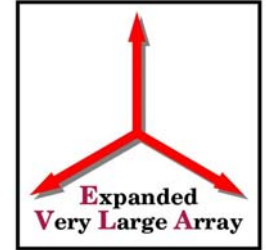
Metric Completion: Procedures



- Set of procedures must be in place to evaluate the performance of integrated system (antennas).
- Specific procedures include:
 - Hardware performance tests
 - Operations acceptance tests
 - Antenna performance assessment with on-the-sky astronomical observations
- To date, procedures have occurred iteratively. In the future, procedures will proceed serially.



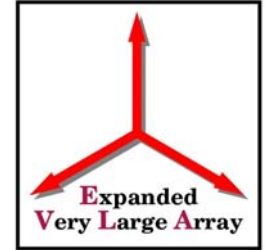
Changes to Baseline Definition



- No changes in scientific and technical goals of the project
- Most changes are budget-related
 - At request of NSF, duration of original funding profile changed from 9 years to 11 years (2001)
 - \$3.9M advanced from funding profile to accelerate project (2004)
 - \$2.1M diverted from project contingency to address overrun in contributed effort (2005).
 - \$1M diverted from contingency to support e2e software effort (2005)
 - EPO (\$0.5M) descoped from project to bolster contingency (2005)



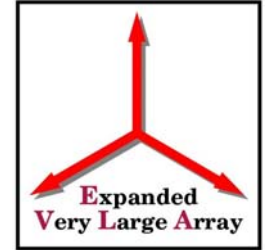
Problems



- Sensitivity limited by aliasing problem in baseband downconverter (T304).
 - New filter designed and installed.
- Spurious correlation.
 - Redesigned 8-bit digitizer in data transmission system (DTS) and updated formatter/deformatter software.
- Reliability of some electronics modules
 - More emphasis on laboratory tests
 - More intensive on-the-sky testing
- Phase stability and phase jumps in baseband downconverter (L302)
 - Redesigned hardware and software



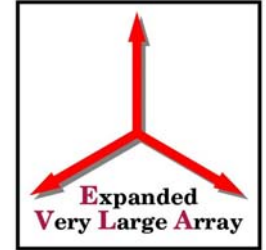
Project Goals FY06



-
- Retrofit 6 antennas to EVLA design and return to array for science observations
 - Complete identification of first science observing modes and prioritize project tasks to complete them
 - Refine project schedule to ensure close coupling between hardware and software deliverables where appropriate
 - Repeat contingency and risk analyses with finer level of detail
 - Finalize design of L-band orthomode transducer (OMT)
 - Provide software support for board tests of prototype correlator



Project Goals FY07



-
- Retrofit 6 more antennas to EVLA design and return to array for transition observations (for a total of 12 EVLA antennas)
 - Install prototype WIDAR correlator and begin test observations
 - Initiate production of L-band OMT
 - Decommission VLA control computers (Modcomps)