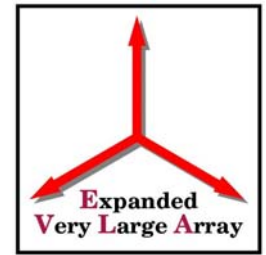# EVLA Computing

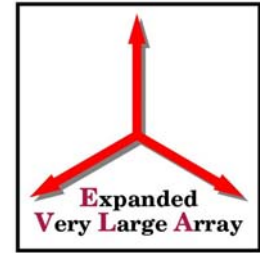## Schedule, Staffing, Testing, Tracking

Contents

- Software requirements & timescales

- Milestones

- Tracking and testing

- Staffing requirements

- Available staff

- Risks

Scientific Support Systems requirements

- Scientific requirements for SSS subsystems refined in 2005
  - Each requirement is assigned priority (1, 2, 3). Priorities:
    1. <u>Essential</u>
       - *Must be present*
       - *Must work with high efficiency*
    2. <u>Important</u>
       - *Should be present*
       - *There may have to sacrifices in performance*
    3. <u>Desirable, but not critical</u>
       - *Considered for upgrades or further development*
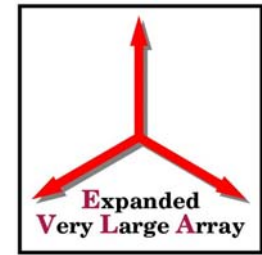 - … and timescale (A – E)

Illustration of Priorities: Scheduling
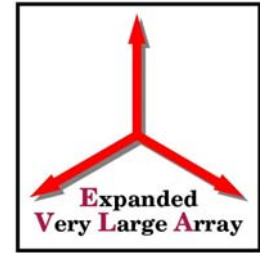
- **Priority 1**
  - Integrated with other tools; common look-and-feel
  - Supports Dynamic Scheduling, based on scientific priority and current conditions

- **Priority 2**
  - Upon request, tool observes provided list of calibrators, then chooses the best using pipeline results (based on heuristics)
  - Source-calibrator cycle time based on current conditions
  - Keep PI informed: e-mail; up-to-date project web page
  - Dynamic Scheduling priorities modified by u-v coverage, program completion pressure, and other influences

- **Priority 3**
  - Dynamic scheduling priorities modified by observations of targets themselves, or by contribution to "scientific value" of Scheduling Block

Time Scale and Major Milestones (1)

2006   2007   2008   2009   2010   2011   2012

Releases: A   B   C   D   E
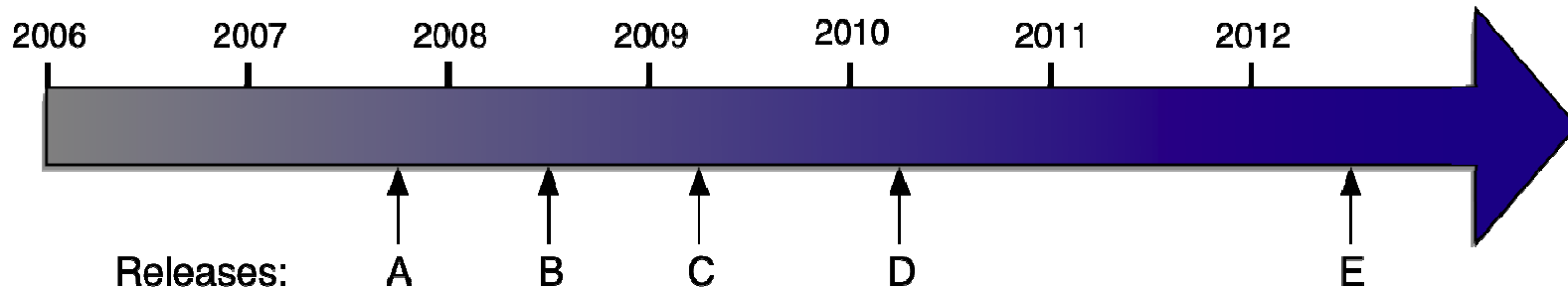
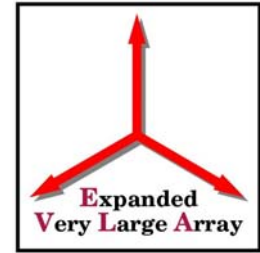| Release	Date	Event	Details
A	Q3, 2007	Arrival Prototype Correlator	4 SBs, 1 BB, some EVLA antennas
B	Q2, 2008	Arrival Production Correlator	16 SBs, 16 BBs
C	Q1, 2009	Science Commissioning/testing	Experiments of increased complexity
D	Q2, 2010	Shared Risk Observing	All station/baseline boards installed
E	Q2, 2012	Full Science operations	End of EVLA Project

Time Scale and Major Milestones (2)
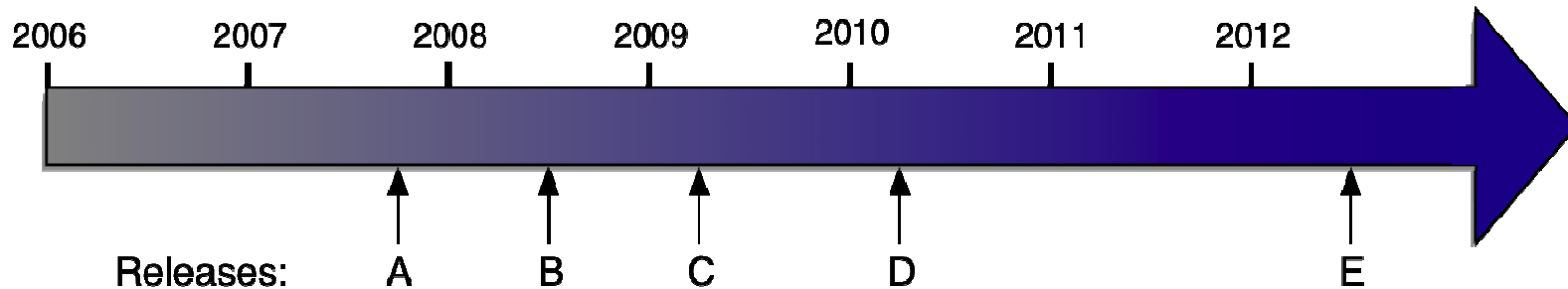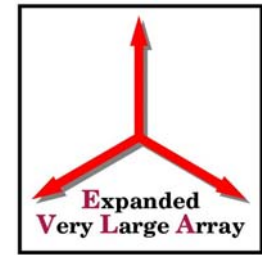
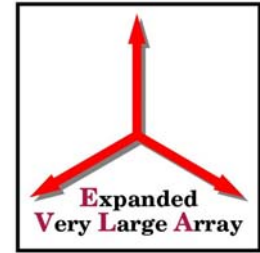| Release	Date	Event	Main Users
A	Q3, 2007	Arrival Prototype Correlator	Engineers, expert local scientists
B	Q2, 2008	Arrival Production Correlator	Engineers, expert local scientists
C	Q1, 2009	Science Commissioning/testing	Expert observers
D	Q2, 2010	Shared Risk Observing	Intermediate observers
E	Q2, 2012	Full Science operations	All users, including novices

Milestones and SSS Subsystems (1)

- **Release A (Q3, 2007)**
  - Archive: basic storage functions for monitor data and raw visibilities, simple data retrieval

- **Release B (Q2, 2008)**
  - Scheduling: basic scheduling; support scheduling block concept
  - Archive: add control scripts, program/scheduling blocks, some environmental data

- **Release C (Q1, 2009)**
  - Proposal: basic proposal preparation functionality
  - OPT: scheduling/program block generation; expert H/W setup
  - Archive: more environmental/project data; improved search/retrieve; support proprietary/public data

Milestones and SSS Subsystems (2)

- **Release D (Q2, 2010)**
  - Proposal: functionality of current GBT/VLA tool; sensitivity calculator
  - OPT: GUI, improved source list/calibrator selection for novice users
  - Scheduling: simple criteria to evaluate priority of scheduling block, simple feedback to observers
  - Archive: all project data stored, Web-based GUIs, improved search
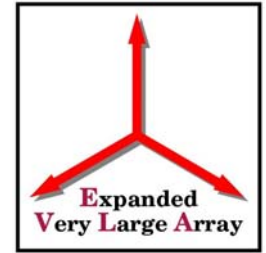
- **Release E (Q2, 2012)**
  - Proposal: Wizard mode capable of creating Scheduling Blocks from simple observing modes
  - OPT: Wizards for selecting standard observing setups
  - Scheduling: Full dynamic scheduling + heuristics. Full feedback to observers
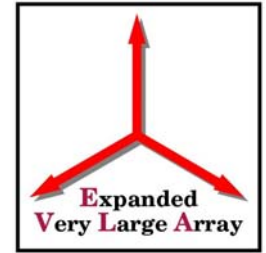 - Archive: Full support for VO and pipeline

High-level Milestones for 2006-2007

- **<u>Milestone A – support prototype WIDAR testing Q3, 2007</u>**
    - TelCal, delivery of delay models, embryonic CBE
    - Basic control of prototype WIDAR
    - Simple visibility archive in place by Q3, 2007
    - CASA filler, data path into AIPS, calibration/data examination tests
- Replace Modcomp computers Q4 2006/Q2 2007
- Early development of subsystems needed at a later date
- Conduct design reviews with participation outside NRAO
    - SSS PDR early fall 2006
    - M&C CDR late fall 2006
- Build experience with existing EVLA prototypes
    - Proposal tool for VLA/GBT
    - Dynamic Scheduling for VLA
- Support EVLA specific CASA tests

Tracking and Meeting Milestones

- ## Tracking milestones

  - Monitor & Control: at general weekly coordination meeting

  - Scientific Support Systems: at weekly SSS meeting

  - Post-processing: tracked separately by SSG

  - Major milestones: at weekly management meeting

    - Division Head, Deputy Division Head, Systems Engineer for Software, Project Scientist for Software, Project Manager

- ## Meeting milestones

  - Facilitated by involving scientists in the software development cycle, as they test and interact with the developers and managers
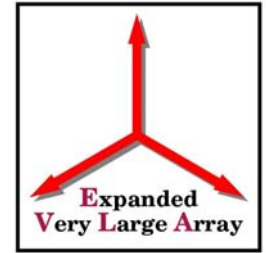
Testing – Role of Scientific Staff
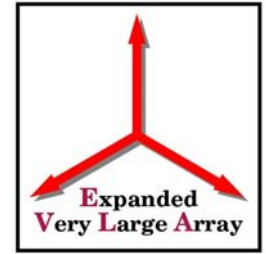
- Ensure scientific requirements are met

- Check progress on long-term goals

- Advise in revising priorities & deliverables

- Sign off on finished products

- Provide transparency – produce public reports

Subsystem Scientists

- Provide scientific guidance for individual subsystems
- Serve as day-to-day contact for programmers
- Interpret scientific requirements for programmers
- Recruit testers
- Oversee testing
- Take active part in testing
- Produce user documentation
- Consult with other scientific staff
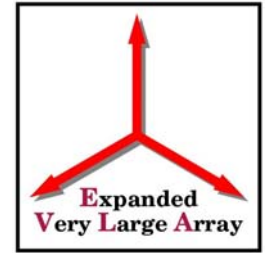- Emphasis varies with subsystem status

Subsystem Scientists
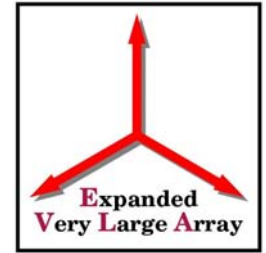
- <u>Current subsystem scientists</u>:
  - Proposal Submission: Wrobel
  - Observation Preparation: Chandler
  - WIDAR correlator: Rupen/Romney
  - Post-processing: Rupen/Owen
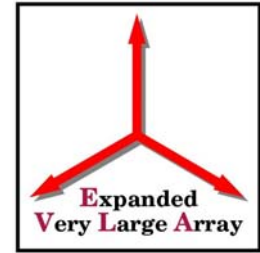 - TBD: Scheduler, Observation Monitoring, Archive

Other Scientific Involvement

- ## Less formal, more direct contacts
  - Executor functionality development driven by input from staff scientists (reference pointing)
  - AIPS plotting programs developed based on input from scientific commissioning testing

- ## Scientists involved in testing
  - Initial tests: small in-house group, fast turn-around, one or more cycles
  - Pre-release tests: larger group of staff across sites and projects
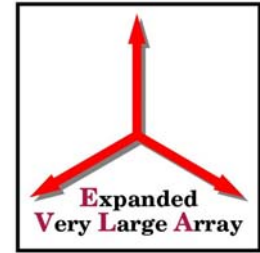 - External tests: staff + outside users

Scientific Support Systems: Prop. Submission Tool

- Feb 10: post-mortem based on user feed-back on recent release
  - set timetable and requirements for next release
- 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
- May 3: internal test-III
  - sessions; documentation
- May 10: public release
- late May: test post-submission handling
- Early June: gather user comments, set next goals and schedule
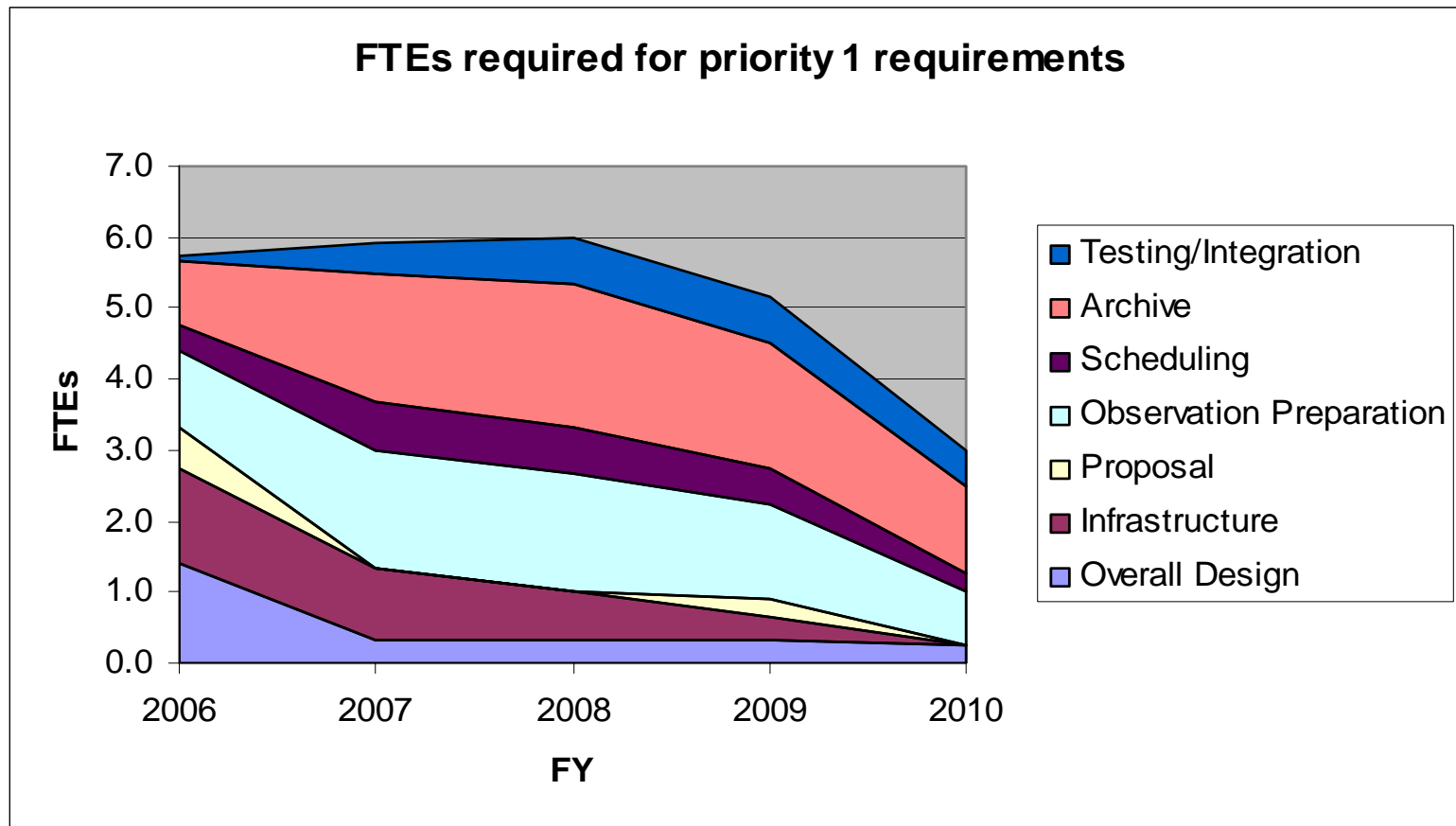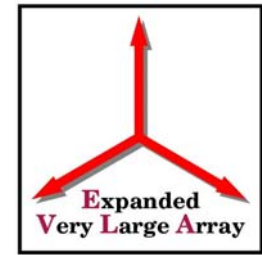
SSS priority 1 staffing requirements

- Staffing estimates based on SSS requirements were made
  - For Priority 1 and 2 requirements
  - Assuming borrowing from ALMA where expedient
  - Will be refined when subsystem designs available
- Combined with SSS milestones into software development plan
  - *Priority 1* requirements have to be delivered by their due date according to time scales A – E
  - May be scheduled to be worked on ahead of time, to make efficient use of staff or when non-project considerations require an earlier release
- Shows how much effort needed in each subsystem for each year
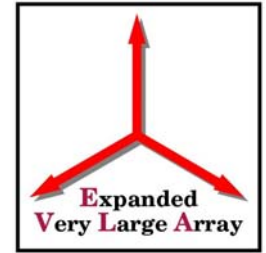- Does not include staff scientist involvement

Required SSS staffing
(for priority 1 requirements)

FTEs required for priority 1 requirements

Legend:
- Testing/Integration
- Archive
- Scheduling
- Observation Preparation
- Proposal
- Infrastructure
- Overall Design

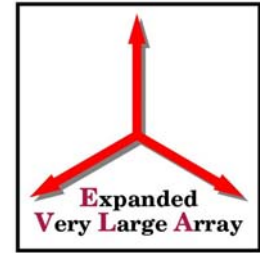(Y-axis: FTEs, 0.0 to 7.0; X-axis: FY, 2006–2010)

Computing Related Staffing (1)

- EVLA computing division (ECD)
  - Head – Gustaaf van Moorsel (0.9 EVLA)
  - Monitor & Control (M&C) : 9 staff members
    - 8.0 FTEs on EVLA (4.3 EVLA, 3.7 Contributed Effort)
    - 1.0 FTE on VLA/VLBA operations
    - In original EVLA budget
  - Scientific Support Systems (SSS) : 5 staff members
    - 3.3 FTEs on EVLA (2.2 EVLA funded, 1.1 Contributed Effort)
    - 1.7 VLA/VLBA operations (Web, NRAO User Database, VLA/VLBA archive, etc)
   - Effort funded out of EVLA contingency, concerns about staffing level

Computing related staffing (2)

- ## Systems Engineer for Software
  - Butler, 0.5 FTE
  - Reports to EVLA project manager

- ## Project Scientist for Software
  - Rupen, 0.5 FTE
  - Reports to EVLA project scientist

- ## Science Software Group
  - Headed by McMullin
  - Responsible for post-processing (CASA, AIPS)
  - Used to be jointly managed by EVLA and ALMA through Interferometry Software Division (ISD), now under E2E operations division
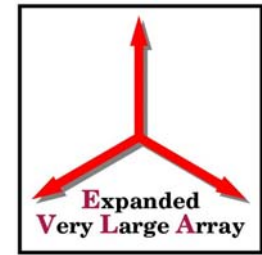 - 8 FTEs, 2.65 FTEs EVLA

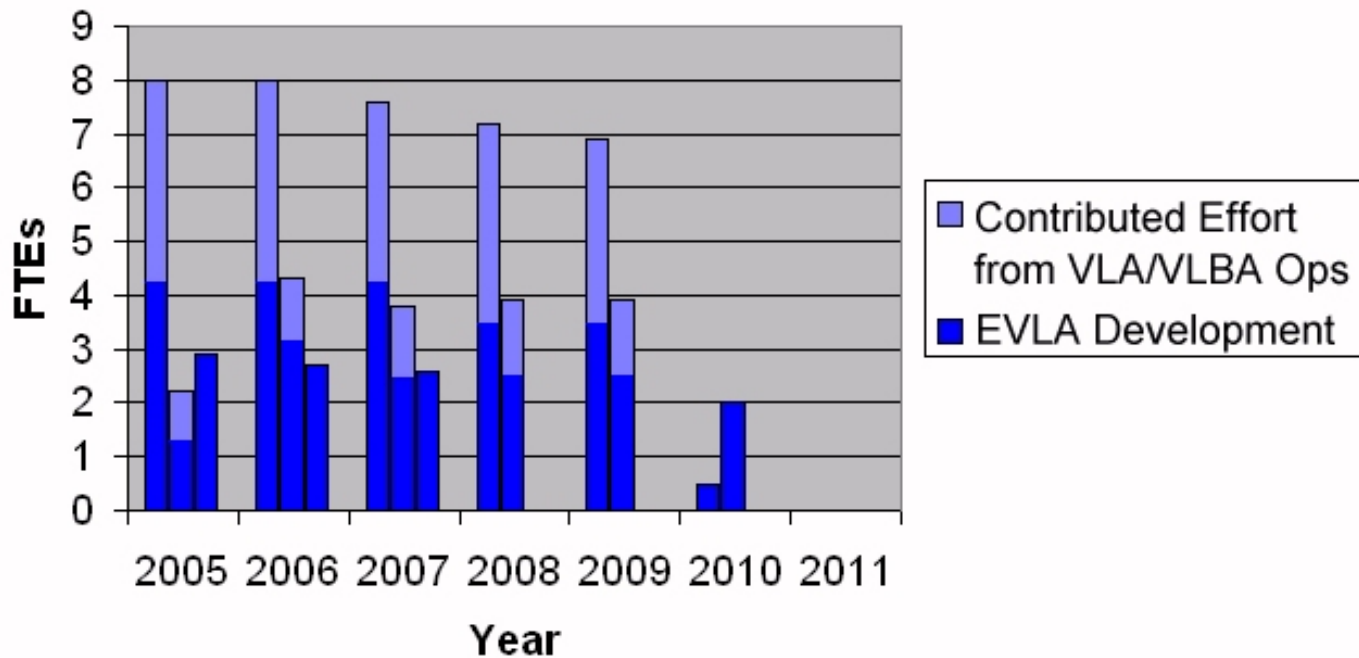# Staffing Profile
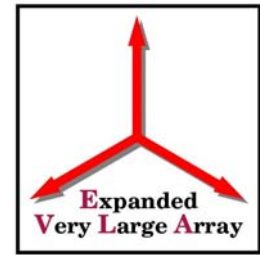
Allocation of Funded Effort
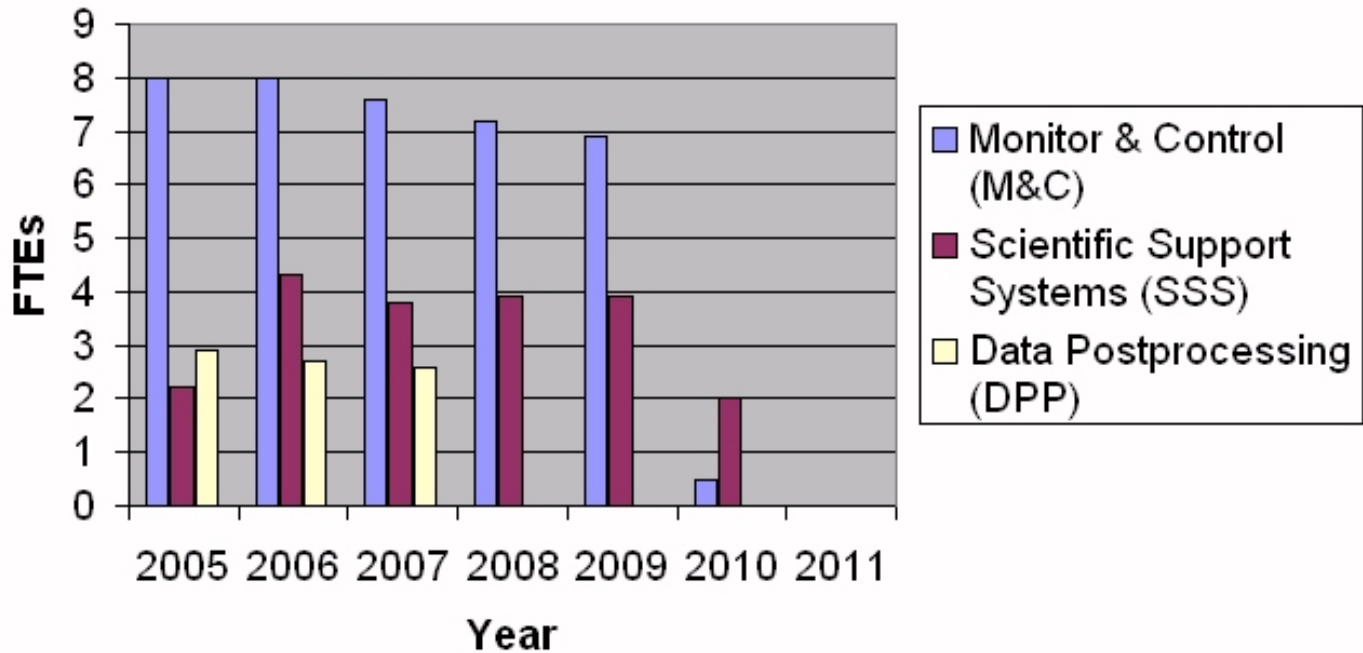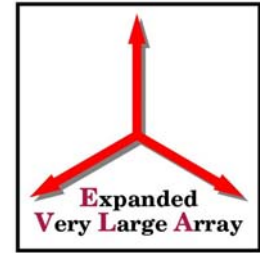
Staffing Profile

Distribution Between Budgets

Required vs. available staffing - SSS priority 1

- Budgeted staffing: 12.7 FTE-years (EVLA) + 4.9 FTE-years (contributed effort) = 17.6 FTE-years
- Required staffing: 25.8 FTE-years
- Shortfall 8.2 FTE-years, or ~2 FTEs through 2010
  - Assumes contributed effort funding continues at current level
- These two required positions will now be provided through the NRAO E2E Operations Division, allowing us to deliver a system which:
  - Lowers barriers to non-radio astronomers/novice users
  - Provides easier access to an archive with a wider selection of products
- Again, this will deliver priority 1 items only!

Risks
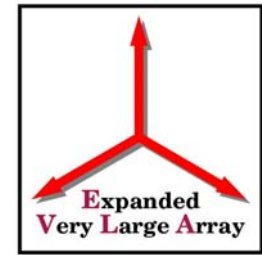
Relative Risk = Severity x Probability x (Scaled) First Time of Problem's Impact

Description	Severity	Prob.	First Impact	Rel. Risk	Mitigation Strategies, e.g.	E2E Ops support
Insufficient communications bandwidth within M&C System	80%	20%	C	10%	Purchase more hardware	X
Insufficient throughput of data from correlator	100%	50%	C	24%	Purchase more hardware	X
Unavailability of fully automated user-friendly systems for novice users	60%	100%	E	12%	Offer easy *or* automated, defer	Later
Scientific and technical opportunities missed due to late participation in VO	50%	70%	C	21%	Accelerate effort via other channels	Now
Modern hardware unable to support project requirements (Moore's law breaks down)	100%	60%	D	24%	Pursue parallel processing	X
CASA not accepted by users due to lack of functionality (for easier problems)	30%	50%	A	15%	Use other systems	Now
CASA not accepted by users due to lack of functionality (for more difficult problems)	100%	40%	C	24%	Provide data analyst support	Now
CASA not accepted by users due to difficulties with user interface/usability	80%	60%	D	19%	Provide data analyst support	Now