Software Overview

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Software Deliverables

- Software to control and monitor antennas and correlator; includes software for operators, engineers, staff scientists (fully funded in original proposal)
- Software system to make access to instrument and data easy for astronomers (not funded in original proposal)
- Post-processing software to allow the instrument to reach its full potential (not funded in original proposal)

Development Philosophy I

- Functionality is the primary driver
- Ease of use is a secondary driver (astronomer and staff)
- The development schedule is tied to hardware delivery
- Requirements drive initial development, but further development is driven by interaction between programmers and scientists, engineers, and operators
- Heritage from the VLA is used heavily
- As much software is reused as is sensible (from elsewhere in NRAO, radio astronomy, other astronomy, software community in general)
- All tools are “online”, with graphical interfaces (and command line where needed)

Development Philosophy II

- Access is secure, but only where needed
- Enough information is stored and accessed so that any “project” can be easily accessed (by scientist and staff) and fully tracked (not manually!)
- Information is passed between subsystems by either reading and writing from or to one or more databases, or direct transfer of XML documents (loose coupling)
- These database entries and XML documents are well defined (“models”, or “schemata”, or “objects”, which are common & reused where possible)
- Every database is queryable in a well defined way - by **any** process (loose coupling)

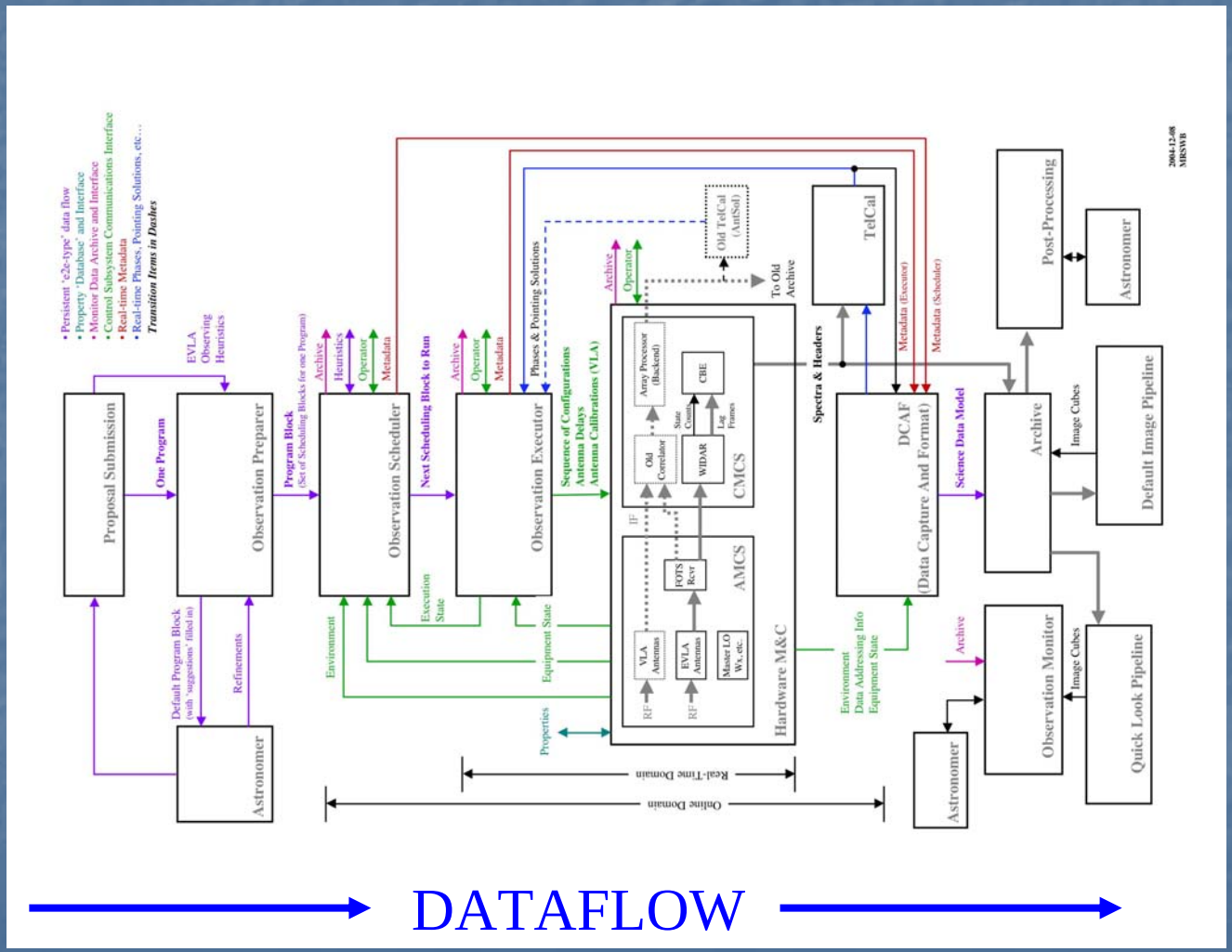
Requirements

We have detailed requirements documents (all available on the web as computing memos) in the following areas:

- Real-time (M&C)
- E2E (SSS)
- Post-processing
- Operations

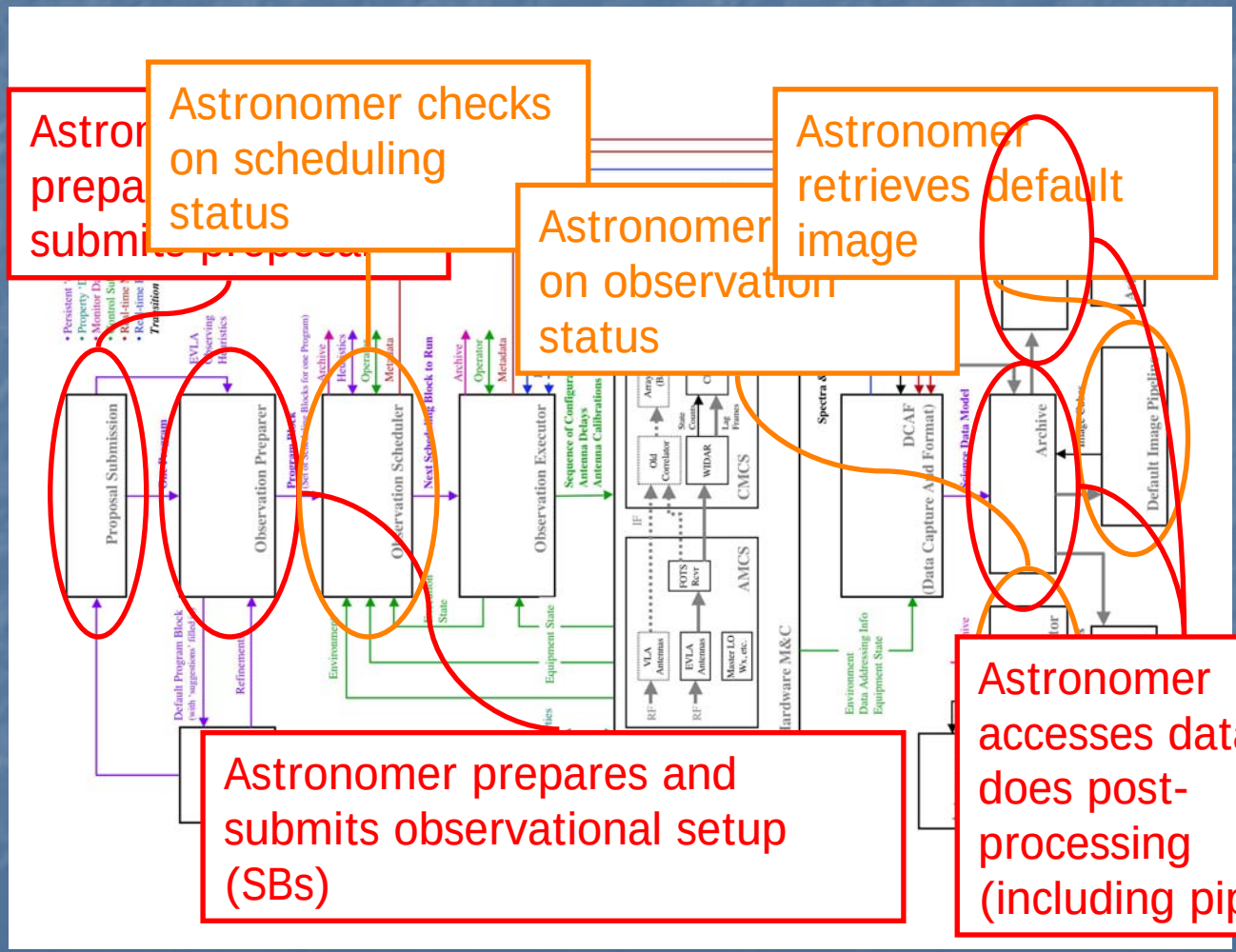
Requirements have priority and timescale

High Level Architecture



DATAFLOW

Astronomer Perspective

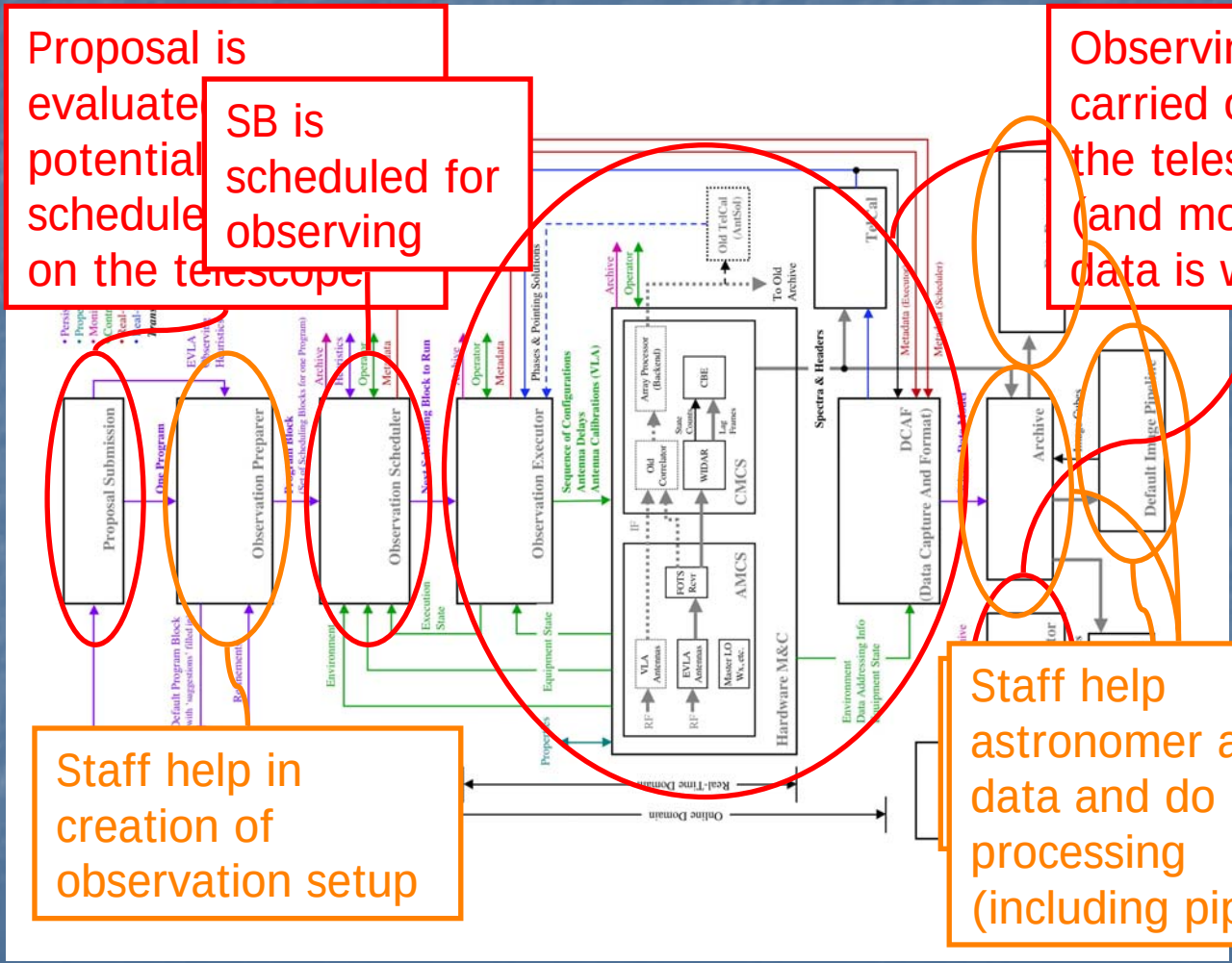


Observatory Perspective

Proposal is evaluate… potential… schedule… on the telescope

SB is scheduled for observing

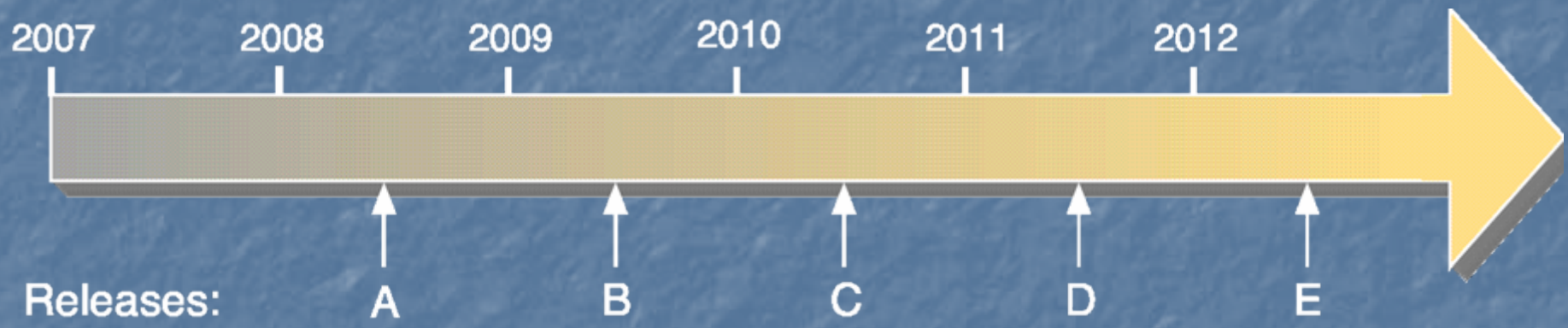
Observing is carried out on the telescope (and monitored); data is written



Staff help in creation of observation setup

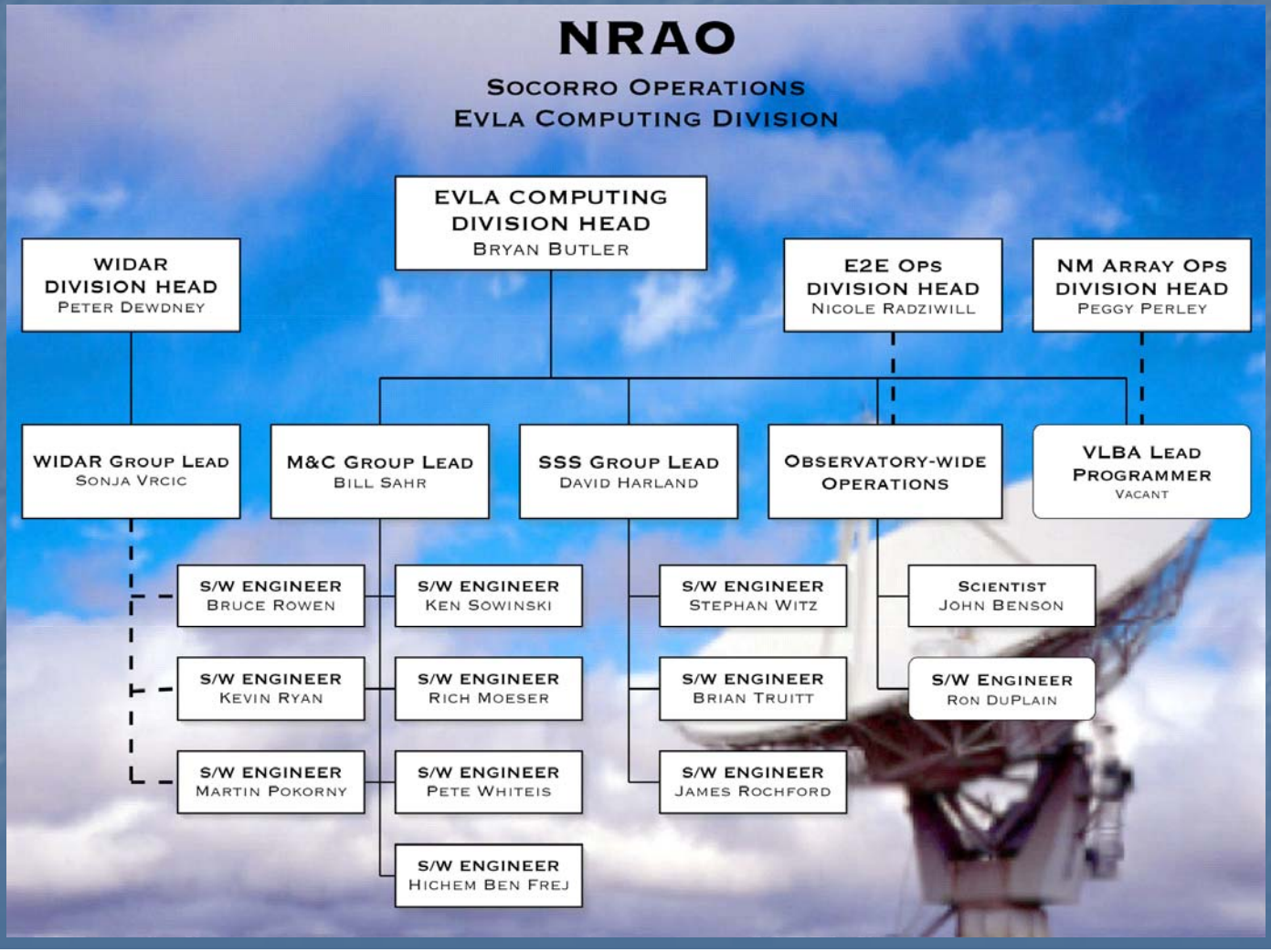
Staff help astronomer access data and do post-processing (including pipelines)

Schedule

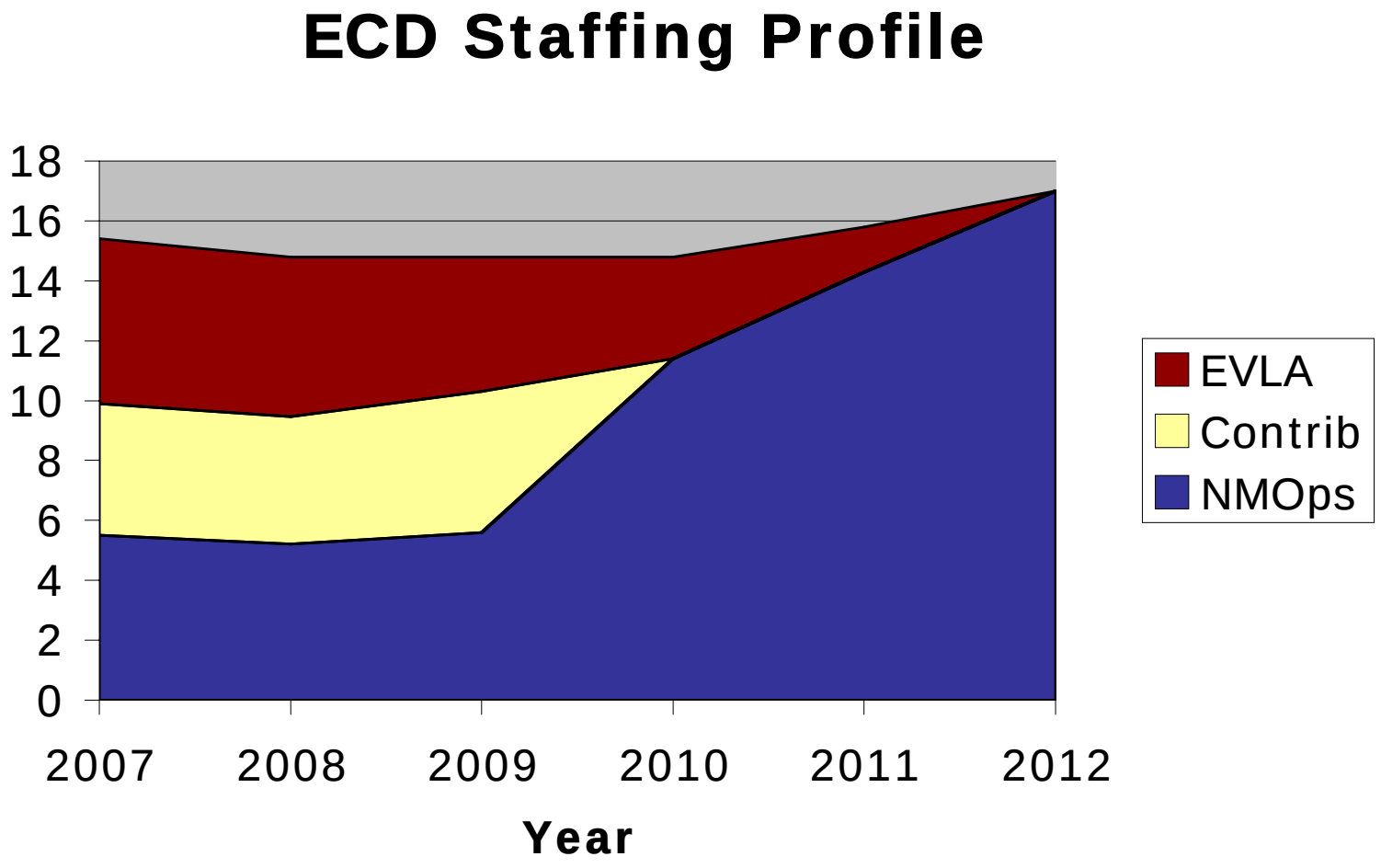


Release	Date	Event	Details
A	Q2, 2008	Arrival Prototype Correlator	10 Station Boards; 12 Baseline Boards
B	Q2, 2009	Arrival Production Correlator	Staged delivery of boards and racks
C	Q2, 2010	Science Commissioning/testing	Experiments of increased complexity
D	Q2, 2011	Shared Risk Observing	All station/baseline boards installed
E	Q2, 2012	Full Science operations	End of EVLA Project

Current Staffing

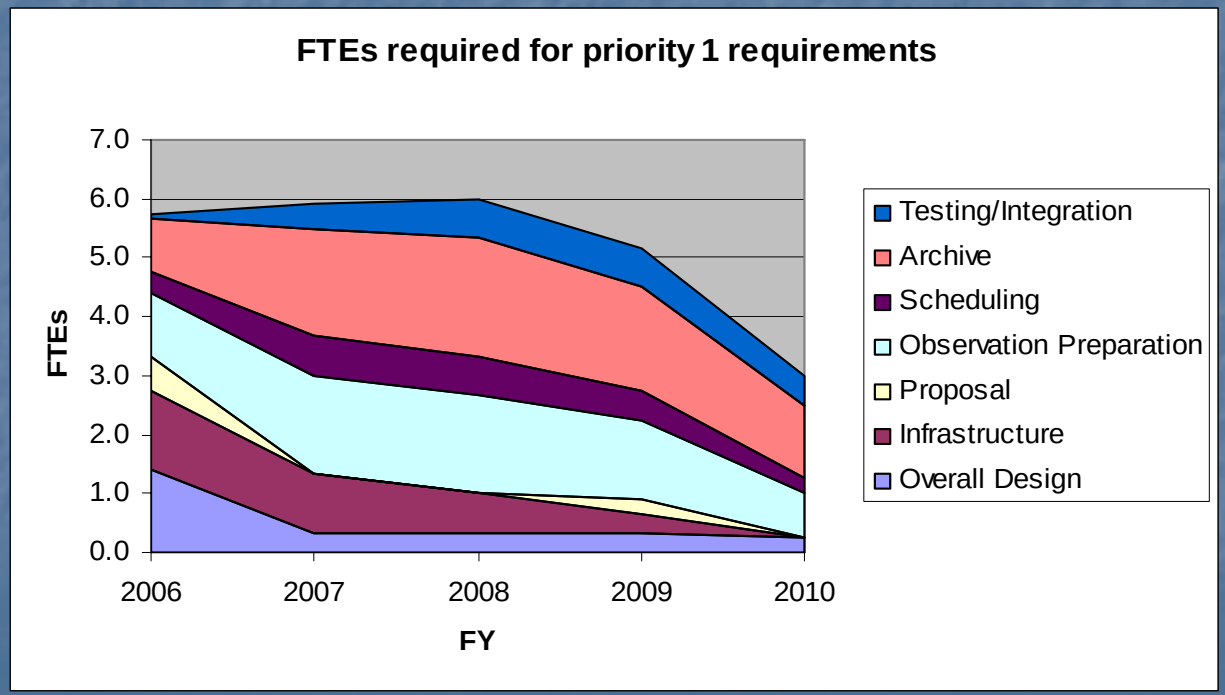


Staffing Profile



Required Staffing

We are not particularly concerned about M&C staffing, but have been concerned about SSS staffing in the past (because of the funding history). Based on a bottom-up analysis of time to complete individual "priority 1" requirements, the required SSS staffing is:



Our current SSS staffing is sufficient to meet priority 1 requirements.

Tracking

- We have a new quarterly planning/tracking mechanism for SSS, as of September 2006 (Nicole has helped significantly with this)
- Goals are determined roughly 2 weeks in advance of the beginning of the quarter
- Tracking of progress toward goals occurs at the end of the quarter
- A report is included in the quarterly project updates (not too formal yet, we could adopt that if deemed necessary)

Risks

The risk register is maintained by project management; some important elements for software are:

- Retention of key personnel
- Interface between EVLA M&C and VCI
- Lack of fully implemented “e2e” system (we will certainly get the priority 1 things done - this refers only to priorities 2 and 3)
- New requirements for common look and feel
- CASA (observatory-wide shared risk)
  - User interface
  - Algorithm development
  - Processing power

Current Status – M&C

- Passed the transition CDR with flying colors
- The old VLA Modcomp control system has been completely replaced by the new EVLA computing system
- 11 EVLA antennas, all VLA antennas, and the VLA correlator are all fully supported for scientific observing with this new EVLA system
- Development of WIDAR software is keeping pace with hardware development

Current Status – SSS

- The HLA and general models have been extensively refined
- The PST, PHT, and Portal subsystems were turned over to EOD/OpenSky [to be discussed by Nicole]
- The OPT is in early development
  - The Source Catalog Tool (SCT) is in good shape
  - Scans and sources are in good shape
  - “Resources” (hardware definition) need work (and are getting it)
- The OST is in alpha stage – it would have been deployed for VLA use by now if not for the departure of the key developer
- The AAT is in prototype (VLA/VLBA/GBT) [to be discussed by Nicole]

SSS – ALMA Collaboration

In order to have common look-and-feel between EVLA and ALMA, recently we have developed a document with ALMA, providing an initial framework for collaboration on SSS software between the projects. Key points:

- EOD manages development of Portal, PST, AAT, CASA
- EVLA manages development of OST
- ALMA manages development of OPT

Here, “manages” means is the primary producer of the software and manages the development process, but does **not** mean to the exclusion of the other parties.

Note that additional requirements to provide common “look & feel” software increases project scope and poses additional risk that will be jointly addressed by EOD, EVLA, and NRAO Operations

Software Reuse

Within EVLA computing, we reuse software from many places:

- General software community (JAXB, FACES, Hibernate, Eclipse, Tomcat, etc.)
- General astronomical software community (measures, timing, CALC, SLALIB, etc.)
- NRAO, notably ALMA:
  - Particular implementation of CALC
  - CASA
  - AAT
  - Models - Science Data; Binary Data; Project Data; Cal Data
  - Catalogs - spectral line; calibrators
  - Enumerations

Current Status - CASA

- NRAO has assigned management of CASA to EOD
- Concentration has been on intensive user testing over the last 18 months
- Beta release is scheduled for Sept. 30
- There will be much more in later talks