Summary of Actions Taken on Recommendations
of the 2007 EVLA Advisory Committee
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Key: *Committee recommendations*
Actions

1. *Management, regarding schedule:*
    a. *Develop a science driven definition of the minimum capabilities at start of shared risk observations and for first full year.*
        i. The capabilities available at the start of shared risk observations are driven by the requirement to keep the (E)VLA operational during the construction phase.
        *ii.* The capabilities for shared risk science and the first full year of operations have been identified in a plan for shared risk observing. The capabilities concentrate on two WIDAR observing modes, pseudo-continuum and spectral line, that emulate VLA correlator capability, but with slightly larger bandwidth and improved frequency resolution.
    b. *Develop a more detailed schedule for post-processing software and tasks required for commissioning and the first full year of science operations.*
        i. As described in the plan for shared risk observing, the post-processing software needs for commissioning and the first year of science operations can be met with current capabilities within AIPS and CASA.
        ii. The EVLA requirements and a timeline for post-processing algorithms and computing beyond this initial period have been identified.
        iii. An integrated, resourced plan to achieve these requirements and match them with the growth of WIDAR capabilities is under development.
    c. *Generate and actively work to a top level Gantt chart of the full project that identifies a critical path and critical dependencies, and integrates the WIDAR development and delivery, the post processing software, and tasks required for commissioning and the first year of full science operations.*
        i. The Gantt chart was developed.
        ii. Currently, the critical path is tied to the production and delivery of the WIDAR circuit boards and the development of the low-level software that configures WIDAR.
2. *Management: The [CASA] software schedule and FTE resource allocation for the remaining development should be based on actual development performance in the past year or so.*
    a. Resource allocation within CASA is done on a semi-annual basis in support of its six month development cycle. The available CASA resources (including ALMA augmentations) are matched to estimated work required to complete the EVLA requirements.

b. Over the past year, CASA personnel supported the beta release of the software package, completed further development of the package, and provided updates to the beta releases.
c. CASA was taught to approximately 50 students at the 2008 Synthesis Imaging Summer School. The software package has been downloaded by over 200 users.

3. *Management: For the remaining post-processing software development and commissioning planning, commitments should be obtained between the line and matrix manager, and the staff involved to ensure that the work can be completed.*
    a. The CASA group was recently re-organized, with NRAO-NM Operations and EVLA having more oversight on CASA (see item 15 below). Thus, matrixing is now much less of an issue than when CASA was managed from Charlottesville.
    b. Most of the personnel involved in software development, including their line managers, are in Socorro, and their sense of priority to the EVLA project is well established. Thus, the resolution of priorities and task commitments have tended to happen naturally on an informal basis.
    c. Additional commitments for the delivery of specified sets of functions for CASA software based on EVLA schedule requirements will be established as part of the development of the resourced integration plan described in item 1b above.
4. *Management: The Panel assesses that the present cost estimate for development of the remaining software and implementing the commissioning plans is likely lower than what will be required. We strongly urge NRAO (and the NSF) to retain at least the present budget level for the EVLA program.*
    a. The EVLA project is one of the two highest priorities for the NRAO, and we are confident that the NRAO and NSF will retain the present budget level for the project.
    b. We are reevaluating the costs of software development and commissioning as part of the resourced integration plan described in item 1b above.
5. *Management: The project should include the correlator risks in the overall Program Risk Register*
    a. The EVLA Project Manager (PM) monitors correlator risks.
    b. The risks are not carried specifically on the EVLA risk register because they are managed by NRC/DRAO with input of the EVLA PM, and supported with NRC/DRAO contingency.
    c. A number of WIDAR risks have been retired through laboratory testing and design reviews, allowing the full production of station boards to commence.
6. *Management: If EVLA performance requirements are relaxed, an explicit assessment on the impact to science should be documented and made available to the community. Significant changes should be made in consultation with the community.*
    a. If a situation arises where we must contemplate a revision to a requirement, we will document an assessment of its impact on science and make that assessment available to the community.

b. Any significant changes will be made in close consultation with the community through the EVLA Advisory Committee, the Science Advisory Group for the EVLA (SAGE), and the NRAO Users Committee.

7. *Management: The project should identify and develop (a) the remaining Test and V&V plans required through construction completion, and (b) the plans required for commissioning and start of science phases.*
    a. The tests for commissioning and testing of the EVLA have been identified.
    b. The plans for prototype correlator testing and the installation of the final correlator were developed and followed.
    c. A plan for shared risk observing was developed.
    d. We will continue to identify and develop these plans.
8. *Hardware: The project should carefully coordinate the correlator lab tests, on the sky tests, and integration tasks across the whole project to minimize delays …*
    a. The lab tests, on the sky tests, and initial integration tasks have been completed.
    b. Production orders for the WIDAR station boards have been placed based upon the successful outcome of the tests and the production design review.
9. *Hardware: The practicality of doing the long integration tests [of the WIDAR prototype] in the lab should be investigated.*
    a. The long integration tests were completed during the critical on-the-sky tests with the WIDAR prototype.
10. *Hardware: The project should develop contingency plans to handle any further delays in the delivery of the correlator prototypes and also for delays in the delivery of the complete WIDAR system*
    a. Issues related to WIDAR delivery led to an internal management review of WIDAR in February 2008. The focus of the meeting was the resolution of management issues, as opposed to the technical issues that dominated discussions of past NRAO/DRAO meetings. Judging from the number of achievements of the WIDAR group over the last year, the meeting was highly productive and successful.
    b. The on-the-sky tests with the WIDAR prototype were completed on schedule.
    c. The delivery of the complete WIDAR system is on schedule for open shared risk observing (OSRO) that begins in Q1 CY2010.
    d. The installation of WIDAR infrastructure is complete. All that remains is to install the WIDAR's station, baseline, and cross-bar boards as they are produced and delivered.
11. *Hardware: Develop a plan that implements the set of the scientifically most useful receivers …*
    a. A plan for the development and installation of the "scientifically most useful" receivers has been in place for some time. The delivery of the highest priority receivers (e.g. Ka- and C-bands) was expedited for their early installation, and the installation of the lower priority receivers (e.g. X- and Ku-bands) has been scheduled for later in the project.
12. *Hardware : The availability of the 4Gsps digitizer chips should be carried as risk items with mitigation options.*
    a. The digitizer chips have been delivered and perform satisfactorily.

b. Some problems persist with the layout of the sampler board where the digitizer chip resides. The resolution of the sampler board layout is carried as a risk item.

13. *Hardware: The project should implement a repair and maintenance tracking system soon to avoid wasted effort and confusion while commissioning the EVLA.*
    **a.** Module repair and maintenance is being implemented within the VLA's existing tracking system (Mainsaver).
14. *Software: The plans for common software and reuse with ALMA should be finalized as soon as possible.*
    a. Some common software is being implemented within CASA, and NRAO continues to further develop a single-point of use and common "look and feel" for all users of its telescopes. Nevertheless, ALMA and EVLA are different projects at different stages of completion, and their software development priorities consequently differ. The ongoing need to keep the EVLA operational during construction and the increasingly critical need to have operational software developed and used in concert with increasing capability provided by the project have required the development of tools such as the Proposal Submission Tool and the Observation Preparation Tool by EVLA. As far as possible, these tools will form the basis of analogues for ALMA.
    b. The ALMA reuse plan presented to the Committee in 2007 attempted to leverage ALMA resources to achieve EVLA goals while also providing a common look-and-feel for users of all NRAO instruments. However, it did not properly account for the asynchrony of needs between EVLA and ALMA. As a result, the implementation of the plan presented an increase in the scope of work for the EVLA at a significant additional cost in budget and schedule.
    c. Instead of adopting that plan, we have therefore continued to pursue commonalities where possible, but where otherwise necessary, we have opted to use the project's software development resources "… to ensure that the main software components that enable EVLA operations can be completed first and on schedule", in accordance with the recommendations of the 2008 NSF Review Committee and the 2007 SAGE.
15. *Software: Great care should be taken in making changes to the CASA team staffing. If changes are required, careful transition planning is of great importance. Continued strong leadership for CASA is vital.*
    a. The team staffing has been significantly enhanced worldwide and within NRAO through ALMA funding. Given the commonality of requirements, most of the work accomplished by these personnel will be directly applicable to the EVLA.
    b. At the last meeting of the Advisory Committee, funding for the CASA team was provided by the Office of E2E Operations (OEO) and ALMA. In October 2008, the funding for the OEO portion of CASA was transferred to New Mexico Operations. The transfer allows the EVLA to participate more actively in the day-to-day management of the team.
    c. An extended search for Joe McMullin's replacement was made without success. The process of hiring a full time replacement continues. In the interim, a well-defined management team had to be put in place, and this was

done shortly after responsibility for CASA was ceded back to the ALMA and EVLA projects by E2E. Currently, the group is co-managed by Bryan Butler (EVLA) and Brian Glendenning (ALMA), with Glendenning having formal line management authority. Glendenning has assigned a deputy project manager (A. Hale) for administrative assistance. The search is continuing – we will interview two strong candidates in April 2009.

16. *Software: The Project should take a deeper look at its resources and plans for algorithm development and assign a clear leader for this area.*
    a. The CASA portion of algorithm development resided in the OEO until October 2008. That development remains in the group, but again, there are urgent and project-specific needs that EVLA cannot postpone. Accordingly, last fall the OEO also began putting together an algorithm development group that will initially work on EVLA-related algorithms. The organization of this group is nearly complete and a baseline plan has been developed.
    b. The EVLA project has identified the types of algorithms it needs.
17. *Software: Plans for engaging the community in algorithm definition and development should be better defined*
    a. A program for shared risk observing that is designed to attract and utilize the expertise within the community has been developed. Algorithm development can be conducted under the aegis of the program.
    b. Interest has been expressed in our resident shared risk observing (RSRO) program within the context of our working concept that observers will provide both algorithm development and CASA coding in exchange for peer-reviewed science time. This effort will be coordinated through the newly organized algorithm development group (see item 16 above).

18. *Software: Develop a clear scientifically based set of performance requirements for compute power that is integrated with the software and algorithm development plans.*
    a. Cooperation on this problem between ALMA and EVLA led to the purchase of a prototype computing cluster. We feel that until we have characterized the specific computational challenges (which require implemented algorithms running on a 64-bit version of CASA that supports multiprocessors – that's coming later this Spring) we cannot confidently address the end-to-end aspect of this recommendation.
    b. However, we have conducted preliminary analyses of the computing performance required for the post-processing of EVLA data. These analyses show that for straightforward observations, such as those of simple sources above 10 GHz, sufficient computing power exists in modern computers. We suspect that moving data, rather than reducing it, may place the most stringent requirements on computing power.
19. *Commissioning and Operations: Develop a detailed science driven task schedule with staff assignments from the start of correlator on the sky testing to the end of the first year of science operations.*
    a. This recommendation is very similar to the committee's recommendation in items 1a-c. We are currently implementing the recommendation as part of our

plans to integrate the schedules for the project, on-the-sky tests of the correlator, commissioning, and the initial science operations.

20. *Commissioning and Operations: In planning for commissioning, consider the impact of commissioning on science operations and adjust resources as needed; this may include reducing support to the community for a limited period.*
    a. We are evaluating the impact of commissioning on science operations as part of our effort to integrate commissioning and initial science operations with the work breakdown structure of the EVLA construction project. We are adjusting resources as needed. We agree that it may be necessary to reduce support to the community for limited periods in order to facilitate delivery of the EVLA.
21. *Commissioning and Operations: The Director and EVLA management should identify and develop those policies needed for the start of shared risk science phase. The policies should be developed in consultation with the SAGE committee, and be developed in time to support the call for the shared risk program.*
    a. A plan for shared risk science was developed and endorsed by the SAGE.
    b. The plan was announced in the February 2009 issue of the NRAO electronic newsletter, well in advance of the start of shared risk science in Q1 CY2010.
22. *The OMT development is still on the critical path and this development effort needs to be closely monitored*
    a. The technical and production issues with the L, S, and C-band OMTs have been resolved. We anticipate the final design of the X-band OMT will be selected in the next few months.