Consultants Report on NSF/DOE Site Visit to the VERITAS Project in Tucson, AZ
Site Visit held on 2 & 3 Feb 2004

Consultants Reporting:

Paul H. LaMarche, Ph.D.
Princeton University
Physics Department
PO Box 708
Princeton, NJ 08544

Robert P. Johnson, Ph.D.
University of California Santa Cruz
Physics Department &
Santa Cruz Institute for Particle Physics
1156 High Street
Santa Cruz, CA 95064

Introduction

On February 1, 2004 the VERITAS Site Visit Team (SVT) assembled in Tucson Arizona. The team consisted of the authors of this report, and the project Joint Oversight Group (JOG) Vernon Pankonan, Richard Boyd, both from NSF, and Kathleen Turner from DOE. This consultant report assumes that the reader is familiar with the project and with the acronyms as defined in the VERITAS Project Execution Plan/Project Management Plan (PEP /PMP).

On 2/1/04, the VERITAS Project Manager, Steve Criswell took the team (except for LaMarche, who went on 2/3/04) to tour the field location of the facility at Horseshoe Canyon on Kitt Peak. It is our opinion that the site is more than adequate for the intended purpose and in many ways is an ideal site for this observatory. Closely located to the NSF facility and infrastructure on Kitt peak as well and quite optimal observing location make this a good location for the VERITAS facility. One noted drawback to this site location is the rather long commute for the Smithsonian Project Office personnel from the base of operation at the Whipple Observatory (about an hour or so). This, however, is not considered to be too detrimental.

On 2/2 and 2/3/2004, the team listened to a number of talks by the VERITAS Project Manager, Steve Criswell, Project Director, Trevor Weekes, and subproject leaders. These presentations gave a good snapshot of the technical and managerial status of the project. Prior to arriving in Tucson, the SVT received a copy of the Draft PEP/PMP. This document was reviewed and discussed by the SVT in executive session. In a meeting on 2/3/04, the PEP/PMP was fully discussed with the project management team Steve Criswell, Trevor Weekes and Gene Gardner, Project Administrator. Numerous recommendations were made to enhance the draft document at this meeting. We shall not cover every detail of the recommended changes, but will touch on the salient points that must be watched in order to help ensure a successful project.

One very important point to note is the highly advanced nature of the technical accomplishment of this project. At a very early stage, this Project has a working

prototype employing a significant number of detector channels and production-ready electronics, all working to within major specification limits. This leads to the conclusion that there is high confidence in overall technical success in this project. The Project Team should be commended for bring this Project as far as it has on very limited direct funding.

We make our comments and recommendations in the following categories: Project Organization, Personnel, Documentation, and Schedule and WBS Implementation.

Project Organization

The project has a Project Office, managed as part of the Smithsonian Astrophysical Observatory, consisting of a Project Director, Trevor Weekes; a Project Manager, Steve Criswell; a Deputy Project Manger, Kenneth Gibbs; Gene Gardner; Project Administrator; and a Project Engineer, J.T. Williams. This team was found by us to be fully competent to handle this project and see it through to completion.

The Project Office reports to the VERITAS Executive Committee, consisting of a group of about a dozen of high-level Principal Investigators associated with this Project. This group has a strong incentive to ensure a successful outcome for this Project and we believe that the Executive Committee will provide timely and adequate oversight.

The Project is divided up into 21 subprojects (including Outreach, not strictly part of this review) that comprise the top level of the WBS. Each subproject has a leader who is responsible for the effort associated with that subproject. This organization appears to us to be adequate to meet the needs of the Project. The 20 subprojects have been separated into four groups, Optics/Mechanics, Camera, Software and Management, with each group having a leader to coordinate the activity in and between the subprojects in their groups. This should help to alleviate possible interface issues that are normally associated with such a structure. A noted potential problem, one that seems to be a concern of the Project Office as well, is the diverse number of research groups and geographically remote make-up of the Project. Extra vigilance must be made to ensure that interface issues do not lead to delay and unanticipated costs.

The Project Office plans on holding weekly meetings (via telecon) of subproject leaders. There should be a formal checklist of items to discuss. We recommend using the tasks-in-progress or scheduled-to-be-started from the Project schedule. Items can be overlooked if a less formal (from memory) system is used. We strongly urge that the Project Team status the schedule no less than once a month, as this is a good investment in keeping track of items.

Personnel

It appears that fully more than 50% of the personnel are funded from other sources (NSF, DOE and others), as is recognized in the PEP/PMP and by the funding agencies. While making for a more difficult bookkeeping effort and some small concerns over project control, given the advanced state of the prototype, this is not considered to be a fatal flaw. It will lead, however, to the need for increase vigilance in monitoring progress (quantitative tools in the project will be less effective than one would like, as much of the spending both for personnel and materiel is off the books.) Another potential problem arises from the possible withdrawal of funding from individual groups responsible for parts of the project. An example of this has been already experienced. It is important for the Project Office to note that it is crucial to replace the funding lost in such circumstances from sources outside the Project. To fail to do so, will lead to pressures on the management reserve.

Documentation

PEP/PMP

The PEP/PMP was extensively discussed during the Site Review. Below are some points that we feel are important to highlight or enhance in the document:

- Add descoping plan to PEP/PMP

- Risk assessment results in PEP
    - Include mitigation path
    - Include estimates of cost/schedule impacts
    - Add schedule risks to risk assessment
    - Add funding delays to schedule risk assessment

- Quality Assurance
    - Include fact that written procedures/checklists are used for testing critical components
    - List critical components
    - Include database storage of test results
    - Identify the lead person responsible for oversight of QA
    - Non-Conformance (NCR) system –implement formal reporting of non-conformances

- Milestones (DOE rules will be the most constraining set of requirements to meet)
    - Develop list of level 1 MS (very hard to change)
    - Develop list of level 2 MS
    - Quarterly reports should contain status of milestones

- Change Control
    - Technical change control process

Quarterly Reports

Quarterly reports should have at least the following elements:

- Project status
    - Narrative report of progress of the Project by sub-project
    - Status Level 1 Milestones and compare to baseline.
    - Chart critical path, noting slack time to baseline End of Project (EOP.)
    - Report on next two paths that would be on the critical path, if the other paths came off the critical path, with slack times to EOP (giving a heads-up on near critical path items.)
    - Status of tasks by percentage complete for tasks in progress or scheduled to begin in that quarter.
    - Develop Actual Cost of Work Performed (ACWP) for at least top level of each subproject.
    - Compare ACWP to Budgeted Cost of Work Performed (BCWP) and report on variances.
    - Significant non-conformances or problems

- Report on significant changes
    - Key personnel changes
    - Significant design changes
    - Risk assessment changes
    - Significant off-budget changes (alternate funding sources being key to Project success.)
    - Report on usage of management reserve

Schedule and WBS Implementation

The Schedule and WBS as presented at the Site review were developed and maintained using two separate software tools (MS Project and Excel, respectively.) Although this may not be the optimal from a schedule maintenance and performance measurement standpoint, it is possible to manage the Project in this fashion. Excel is superior as a budget management tool for ease of use and flexibility over the financial portion of MS Project. However, this bifurcation of the schedule and budget will lead to more work when statusing the schedule/budget for budget variance (e.g. BCWP/ACWP.) This can be achieved using Project/Excel by comparing the percentage of work accomplished for each subproject versus percentage of budget spent. Extra analysis (justification) will be needed, as large variances may be anticipated due the large amount of off-budget work being performed in this Project.

As new tasks are uncovered, as they are in all Projects, it is important that these tasks are added to the schedule and dependent logic developed. These schedule changes are important to track, in their own right, but also as an indicator of potential problems.

We are concerned that there may be a problem with funding profile needs as developed in the schedule and the ability of the funding agencies (esp. DOE) to meet those needs in a timely fashion. Schedule risk is evident from this possible timing mismatch in funding.

Summary

It is our opinion that the VERITAS Project has a high probability of success. This confidence is based upon the track record of the personnel involved and to the high level of performance of the advanced-stage prototype. Our general overall recommendation is that the Project Office employs a more formal routine to the management of the Project. By documenting and listing tasks, status, quality and performance, together with monthly statusing of budget and schedule, the management team has a greater chance of staying on top of the situation and avoiding some of the unanticipated events that frequently occur in complex projects.