

VLT-PAC Report September 2003

I. Introduction

The VLT-PAC met for one and a half days on September 4 and 5, 2003 at the MIT Plasma Science and Fusion Center. A list of attendees and the agenda are attached to the end of the report for reference. The purpose of the meeting was to review the past and future operations of the VLT. The specific charge to the PAC is given below:

The VLT has been functioning for about three years and it is timely to stand back and take a look at the overall VLT concept and present methods for doing its business. The VLT PAC should review the current VLT Management Plan and U.S. Fusion Enabling Technology Program Plan; and obtain input from key OFES staff, key members of the VLT community and the broader fusion community. Based on this review and input, the PAC should provide advice on whether the present VLT mission, concept, approach and management plan are suitable for the next five years, and make recommendations for improvements.

The PAC addressed the charge as follows. First, the PAC heard presentations from members of the fusion technology community including Charlie Baker, Ned Sauthoff, Dale Meade and Joel Schultz concerning the past operation and future issues facing the VLT. Second the PAC solicited input from senior members of the technology community and OFES concerning their views on the operation and effectiveness of the VLT. Specifically these members were asked the four questions listed below.

In your opinion has the VLT carried out its mission satisfactorily during the past 3 years in terms of scientific quality and administrative function?

Does the present VLT mission satisfy the current and future (5 year) needs of the base US fusion technology program?

ITER is likely to appear on the near term fusion landscape. What role should the VLT assume in meeting the future technological needs of ITER?

Please give any general comments, recommendations, or critiques that can help the VLT organization in the future.

Based on this information the VLT-PAC reached a number of conclusions, which are summarized as follows. (1) There is very strong support for the concept and mission of the VLT among the members of the technology community. (2) The community is strongly supportive of the VLT Director, Charlie Baker and the VLT Deputy Director Stan Milora. (3) As Director, Charlie Baker has done, and continues to do, an outstanding job in terms of his leadership and in his role as the primary representative of the technology community to OFES, the US fusion community, and the international fusion community. (4) The PAC believes that the VLT should continue its mission into

the future with the Director also continuing to coordinate the many diverse components of the base fusion technology program.

The main issue raised during the deliberations concerns the future of the US base technology program in view of the possible overwhelming impact of a burning plasma experiment, (ITER or FIRE) on the VLT and the technology community. As a result, the PAC spent considerable time discussing the proper role of VLT with respect to ITER. Several recommendations are made below describing a suggested role for the VLT in the context of the overall ITER project.

There are two final points worth noting in the summary. First, there is a high level of frustration among VLT community members concerning the large decrease in fusion technology funding in FY-04. However, it was recognized that these budget cuts were imposed externally and were not the fault of the VLT or its leaders. Second, we point out that most of the issues contained in the charge are addressed in the detailed discussion presented below. The one exception is the review of the VLT Management Plan. We were presented with an overview of the VLT's goals, organization, process, and relation to OFES. We did not review the management plan, or plasma technology plan documents in great detail in order to confirm consistency with the way business is actually conducted. Even so, this issue did not seem as critical as the VLT-ITER/FIRE issue and thus was not pursued any further.

II. The role of VLT in the base technology program

A. Findings

- The VLT concept has worked very well. It has integrated and coordinated the overall US technology efforts. It has struck a proper balance between (1) near term needs for existing experiments, (2) long term needs for the development of an attractive fusion energy source, and (3) system studies to help identify areas that must be addressed with current research. Even so, the relatively low overall funding level for fusion technology has impacted in a direct way (i.e. caused delays) some of the critical short term work required for existing experiments.
- Success of VLT has in large part been due to the dedication, enthusiasm, objectivity, and ambassadorial skills of the present Director and Deputy Director. In particular its Director, Charlie Baker, has provided excellent leadership to the US fusion technology community.
- The PAC believes that the organizational structure of the VLT has enabled its management to be an effective spokesman for the technology community to the larger fusion community and to DOE. This has improved the visibility of the technology community and their work.
- It was reported to the PAC by Charlie Baker that the technical peer reviews of the program elements during the past 3 years have been successful in both

demonstrating and improving the quality of the work. Follow-up on action items was also reported to be effective in successfully applying the input from the reviews. While the PAC did not review this finding in great detail there was only supportive and not contrary input from the technology community.

- The monthly VLT conference calls have been successful in establishing a broad fusion community in place of a set of disconnected programs. This has strengthened the coordination needed to present the VLT successfully in DOE and other fusion forums.

B. Recommendations

- The PAC believes that the VLT process has worked quite well during the past three years with respect to its primary mission in the US base technology program. Therefore, in terms of the base technology program, it is our recommendation that the VLT continue to operate under its present structure for the forthcoming three year period. Stated differently, we have no major recommendations for changes in the format or operations of the VLT.
- One area where improvements should be made is in the interaction between the VLT and ICC communities. Although both communities are highly receptive to external input and outside help, it has been basically a lack of resources that have prevented a stronger interaction between these two communities. Our recommendation is that the VLT and ICC communities work closer together to identify technology needs and opportunities for the smaller ICC experiments. One suggestion is to arrange a technology session at each annual ICC meeting.

III. The role of VLT in the ITER project

A. Findings

- A burning plasma experiment such as ITER or FIRE will require a major new technological effort with a large component of project-specific R&D. The VLT-PAC strongly believes that additional funds for both direct support of ITER/FIRE and for expansion of the base physics and technology efforts are essential to maintain a healthy US fusion science and technology program and to enable the US to utilize the results of the burning plasma experiment. However, to the extent that funding for ITER and project-specific R&D are marginal, additional resources from the base fusion technology program may be needed to meet the project goals satisfactorily. This would set up a possible conflict between the needs of the base technology program and the ITER/FIRE project.

- During the time between now and the formation of an ITER/FIRE project board, perhaps a period of a year or so, the VLT is the appropriate organization to carry out short term project-specific research.
- The short term project-specific research is highly leveraged. A relatively small investment now could substantially reduce the risks and/or lower the contingencies for some of the highly desirable, high tech components that the US would like to contribute to the project. Even so, the timing is such that even with strong funding for such short term R&D, it may still be too late to seriously impact the ITER negotiations.
- Assuming that the ITER project moves forward, the technology community has expressed a range of opinions concerning the depth, or lack thereof, to which the VLT should be involved in the coordination of the overall project or even just the project-specific R&D.

B. Recommendations

- The PAC believes that a separate project board needs to be established for ITER/FIRE that is independent of VLT. That is, the PAC recommends that the VLT should *not* be responsible for coordinating the activities of the ITER/FIRE project, or even only the project-specific R&D.
- The PAC recommends that the mission of the VLT be focused on the US base technology program.
- The PAC recommends that even with the advent of ITER/FIRE, the VLT must focus on maintaining a reasonable balance between the (1) enabling technologies for the existing experiments, (2) long-term technologies and materials needed for attractive fusion energy, and (3) systems studies for providing guidance for present activities.
- ITER/FIRE will require significant, highly focused, project-specific technology R&D. Consequently, the PAC recommends that until an ITER/FIRE Director is appointed, the related R&D should be carried out by the VLT. During this time there is critical, short-term R&D with high leverage that should be done to reduce or identify significant risks.
- In the unfortunate event that the requested funds for ITER/FIRE do not fully materialize, it is quite likely, based on past history, that additional support will be sought from the base program, perhaps targeting the base technology program. Should this situation arise, the PAC recommends most strongly that the impact not be born disproportionately by the technology program. The impact must be spread out over the entire US fusion program. Without a strong base technology program there is little sense in participating in an ITER/FIRE burning plasma program.

- With a burning plasma experiment on the horizon, the PAC recommends that the VLT start to develop a strategic plan setting out the long term needs of the base technology program. A time scale on the order of one year is appropriate for this plan.

PAC Members Attending:

Don Batchelor

Jill Dahlburg

Bick Hooper

Tom Jarboe (not attending)

Arnie Kellman (replacing Ron Stambaugh)

Joe Kwan

Per Peterson (not attending)

John Schmidt (sitting in for Rich Hawryluk)

Scott Willms (sitting in for Kirk Schoenburg)

John Sethian

Jeff Freidberg (Chair)

VLT-PAC Agenda

Thursday Sept. 4

- 9 a.m. Welcome and Introduction - Freidberg
- 9:10 a.m. DOE Comments - Willis (via video hookup)
- 9:20 a.m. VLT Overview of Mission, Organization, Methods and Issues - Baker/Milora
- 10:15 a.m. break
- 10:30 a.m. ITER Activities with Emphasis on Technology Needs - Sauthoff
- 11:15 a.m. FIRE Activities with Emphasis on Technology Needs - Meade
- 11:45 a.m. PAC Executive Luncheon Session (Bag Lunches)

- 1:00 p.m. ITER magnet issues - Schultz
- 1:30 p.m. FY04 Budget Status - Baker
- 2:00 p.m. General Discussion - Freidberg leader
- 3:00 p.m. break
- 3:15 p.m. PAC Executive Session
- 5:30 p.m. Adjourn

Friday Sept. 5

- 8:30 a.m. PAC Executive Session
- 10:30 a.m. Closeout Session
- noon Adjourn

