Draft Minutes
Advanced Scientific Computing Advisory Committee
January 21, 2014
Teleconference

ASCAC members present:

Vincent Chan   Juan Meza
Jacqueline Chen   John Negele
Roscoe C. Giles (Chair)   Linda R. Petzold
Gwendolyn L. Huntoon   Dean N. Williams

ASCAC members absent:

Marsha Berger   Sharon C. Glotzer
Vinton G. Cerf   Anthony Hey
Barbara M.P. Chapman   Vivek Sarkar
Jack J. Dongarra   Victoria White

Also participating:

Christine Chalk, ASCAC Designated Federal Officer, Office of Advanced Scientific Computing
    Research, Office of Science, USDOE
William Harrod, Office of Advanced Scientific Computing Research, Office of Science, USDOE
Barbara Helland, Office of Advanced Scientific Computing Research, Office of Science, USDOE
Robert Lucas, Director, Computational Sciences Division, Information Sciences Institute, University
    of Southern California
Frederick O'Hara, ASCAC Recording Secretary

About 15 others monitored the discussion via telephone or online.

The meeting was called to order by the Chairman, **Roscoe Giles**, at 11:00 a.m. A roll call was taken, and a quorum was recognized by the Designated Federal Officer, **Christine Chalk.**

This meeting was a follow-up to consider the Top-10 Report on challenges that will be encountered in pursuing the exascale. That report has been much improved since the November 18 meeting and review. There is a need to get a final version of the report to inform the process of going forward with high-performance computing initiatives. The government shutdown delayed the review of the initial draft. The Secretary of Energy Advisory Board (SEAB) has commissioned a task force to advise the Secretary on pursuing the exascale and on the future of high-performance computing. This final Top-10 Report should be available for the next task-force meeting on February 11. Giles sits on that task force.

Robert Lucas was asked to review the changes that had been made to the report since the previous meeting.

People stopped making technical contributions to the report at the time of Supercomputing 2013 (SC13). A chapter on codesign and other principles needs additional editing; it is currently too long. The body of the document is essentially done. The findings have been set. The abbreviated findings are included in the Executive Summary:

- The exascale is important to DOE.
- National leadership is at risk.
- The U.S. industrial base has the technical foundation to be able to build an exascale system.
- The exascale will not be achieved by evolution.
- Government action will be required.

Also included in the Executive Summary are the abbreviated recommendations:

- Initiate a program of continuous advancement.

- Invest, where needed, in the U.S. industrial base to ensure that the right components for scientific applications are developed.
- Invest in the mathematics, systems software, etc. that are unique at this scale and particular to the government mission.
- Create a design framework that would allow multiple people to contribute and evaluate their ideas.

Chan asked if it would be useful and possible to point out how the findings are related to the Top-10 challenges. Lucas replied, yes; it would be possible for most of them. He would do that.

Giles suggested defining what "exascale" means (i.e., distinguishing among a machine, results, systems, technology, etc.). Lucas said that he would add a definition to the Introduction.

Giles asked if the Committee had standing to make the assertions that this report makes. [There was general agreement that the Committee had the proper standing.]

Lucas asked if the Subcommittee had delivered all the messages that are needed. Meza replied that all the documents are there with good arguments.

Giles said that the "Findings and Recommendations" section at the end is where these statements will be fleshed out. He wanted to make sure that the document states the perspective of the Committee, which gives it standing to make these assertions.

Williams asked how these recommendations deviate from those past reports. Giles said that the recommendations do not deviate; the technical portion is updated. Lucas said that this report was built on top of earlier reports. This Subcommittee has dug deeper than but has not contradicted prior reports. This is an evolutionary process. Giles said that it would be helpful to say in the Introduction that this report is built on earlier reports but represents a more advanced understanding of the technical elements. Lucas agreed to add that to the Introduction, as well.

Chan suggested adding "giving opportunities for domain scientists to get experience with computer scientists" to the second to last paragraph of Recommendation 14.2.3. [Everyone was comfortable with this addition.]

Chen suggested (1) being consistent with the use of the term "codesign" in 1.2.4 and (2) adding the terms data and workflow to application algorithms. [Everyone agreed.] Lucas said that he would do that. Chan and Chen agreed to send Lucas the precise wording that they would like to see inserted.

Negele said that, when the Committee got the original charge, it was clear who the audience was. He asked whom the report is addressing now. Giles replied that the audience has not changed; it is the Director of the Office of Science. What has changed is the interest of the Department in exascale computing. The report now has a broader audience. Negele asked if the report was trying to talk directly to SEAB and to the Secretary and therefore needed to be more explicit. Giles said, yes; however, it also refers to all the previous reports to bolster the arguments. Chen suggested putting a mention of the other reports in the Introduction. Lucas said that that had been on his mind.

Giles noted that the Committee also has a report on big data. This Top-10 Report reviews technical advances and what is possible for the exascale and what is not. There are also 18 workshop reports and 4 prior Advanced Scientific Computing Advisory Committee (ASCAC) reports.

Giles called for a vote on the Findings and Recommendations. Negele said that he was nervous about using the term "investing in the U.S. industrial base" in Recommendation 2.2. Earlier attempts focused industrial talent on scientific computing's problems but did not provide a subsidy to industry. This recommendation should be expressed in a way that reflects that a similar approach is being taken. Lucas pointed out that there had been a time when the government subsidized advances in technology. However, more recently, IBM has contributed $20 million to the development of the Blue Gene series of computers. There is also a PathForward program that provides guidance on research investments. This report is not suggesting doing anything that the United States is not already doing. He suggested submission of alternative language for this recommendation. One could get rid of the term "invest" and replace it with something like "catalyze foundations and working with industry." Meza asked if the term partnership would be too strong. Giles said that he thought so. Lucas suggested using the term "work with" along

with an example (e.g., Blue Gene, FastForward, or Defense Advanced Research Project Agency High-Performance Computing Infrastructure).

Giles asked if people were comfortable with voting to accept these findings and recommendations. Negele asked if there were any fallback position if they were not accepted. Chalk noted that it would require another teleconference.

Negele pointed to Finding 14.1.4, U.S. technical foundation for exascale, and asked what that meant. Giles said that it meant that the technical capability exists to build such a machine. It does not say that anyone actually will build one. Lucas asked if the term should be changed to "has the capability" and offered to fix that. Negele said that it should be stated why the Subcommittee expects them to have such a capability. Giles responded that that is spelled out in the next paragraph. Harrod suggested that the term "U.S. industry should be capable." Negele said that the Committee needs to be very exact in its wording. Giles said that that was a good point.

Giles asked when the next time was that the Committee could meet again. Chalk said that it could meet again at the end of February. Giles said that he would like to have the report for the task force meeting, but that is not a driver. The Committee needs to be thoughtful and careful and the report needs to be vetted.

Meza asked if there were a decision that would be made that would need this report as input. Giles said that the task force is to produce a significant, preliminary report in April and a final one in June. Not having this report finalized by February 11 is not as important as having a solid report on technical issues, the feasibility, and the broader issues.

Meza suggested having a vote on the Top-10 Challenges and on the Findings and Recommendations. Giles pointed out that there certainly are draft findings and recommendations already part of the public record. He probably already has enough to work with for his dealings with the SEAB Task Force. He asked if ASCAC were ready to vote or should the matter be put off for more study and revision.

Meza said that he did not think that the Committee had enough to vote on. He sensed that there was a consensus that the Findings and Recommendations section is set. Chan noted that the Committee has enough time to have Negele change the language and bring his revisions to another meeting in February.

Giles suggested first working on the Findings and Recommendations and getting an amended version to Lucas. The Committee will consider another draft in February as soon as possible.

Chalk said that the earliest would be three weeks from today (i.e., the week of February 3–7). She would poll the members and set a date.

The meeting was adjourned at 12:03 p.m.

Respectfully submitted,
Frederick M. O'Hara, Jr.
Recording Secretary
January 21, 2014