Committee of Visitors
Report

Advanced Scientific Computing Research
August 2009

Date of COV:	June 30 – July 2, 2009
Program:	Computer Science
Fiscal Years Being Reviewed:	2006, 2007, 2008
Office:	Advanced Scientific Computing Research (ASCR)

Committee Membership:
Steven F. Ashby, Pacific Northwest National Laboratory
Dona L. Crawford, Lawrence Livermore National Laboratory
William Carlson, IDA Center for Computing Sciences
Tony Hey, Microsoft
Satoshi Matsuoka, Tokyo Institute of Technology

0.0 Executive Summary

The Committee of Visitors (COV) for the Office of Advanced Scientific Computing Research (ASCR) program in Computer Science met June 30-July 2, 2009 at the DOE facility in Germantown, MD.

The COV is grateful to the program officers and other ASCR staff who gave of their time and knowledge to help the committee in its deliberations.

Findings and Recommendations:

Based on presentations by, and interviews with program offices and management, and on examination of project folders in the computer science (CS) program, the COV considers the CS program to be generally effective and well managed.

Efficacy and quality of the processes used to solicit, review, recommend and document application and proposal actions:

> **Finding:** The solicitation and review processes appear to be effective and fairly administered. However, the documentation of these processes and associated summary statistics are not very readily available and this impedes effective presentation of the competitive nature of the CS research portfolio.
>
> **Recommendation:** The program should automate the archiving of material related to each of its solicitations, including the call, letters of intent, full proposals, reviewer comments, and selection/rejection statements, in a single easily-accessible repository. The program should also collect and maintain statistics related to each of its calls in a consistent format that would facilitate analysis of the number of responses, reviewed proposals and funded proposals

Efficacy and quality of the processes used to monitor active awards, projects and programs:

> **Finding:** The CS program managers use generally effective mechanisms, including site visits, meetings and progress reports, to monitor ongoing awarded projects. Control is provided by annual financial decision points.
>
> **Recommendation:** The program should exploit ASCR's team approach with its planned increased staff to improve the frequency and depth of monitoring efforts.

Within the boundaries defined by DOE mission and available funding, comment on how the award process has affected the breadth and depth of portfolio elements:

> **Finding:** The CS programs have broadly engaged the high end computing community. They have provided the depth necessary to facilitate research into effective use of leadership-class capability computing. There has not been a

comparable engagement with the data-intensive aspects of the CS mission. However, initial efforts to recruit talent in data management are commendable.

Recommendations:
The program should launch strategic initiatives in all mission relevant aspects of data-intensive computing, data management and analysis. The entire program should further engage the broader CS community in its reviews and workshops to define future research activities.

Within the boundaries defined by DOE mission and available funding, comment on how the award process has affected the national and international standing of the portfolio elements:

Finding: The program contributes to DOE's leadership role in capability computing and is internationally recognized for the impact of its research results. Its software libraries and tools are used worldwide. The program's support for the International Exascale Software Project (IESP) demonstrates global leadership.

Recommendation: The program should continue its leadership in high end computing and expand its collaborations broadly with the international community.

General Observation:

Finding: The committee found the number of permanent staff currently allocated to the CS program insufficient to the task at hand. In recognition of this, SC has approved three additional staff.

Recommendation: The COV recommends ASCR fill the approved CS vacancies as quickly as possible by working with HR to streamline the hiring process.

1.0 Introduction

The U.S. Department of Energy's Office of Science founded the Advanced Scientific Computing Research (ASCR) program to develop the algorithms, computer programs and hardware that advance scientific research. As computer simulation and modeling firmly takes its place with theory and experiment as a vital tool for understanding, ASCR drives progress in nearly every scientific area DOE has identified as a strategic theme:

Energy security – Computer simulation helps researchers understand combustion, develop fusion energy, improve fuel cells and discover other technologies important to ensuring America's security through reliable, clean and affordable energy.

Nuclear Security – High-performance computers let scientists simulate materials and designs important to the safety and reliability of the nation's nuclear deterrent, a critical part of the strategy to ensure America's nuclear security. ASCR-supported science contributes research tools and insights the National Nuclear Security Agency can use as steward of the nation's nuclear stockpile.

Scientific Discovery and Innovation – ASCR research and facilities support the most powerful openly available computers and programs in the world, strengthening U.S. scientific discovery and economic competitiveness, and improving the quality of life through innovation.

Environmental Responsibility – Computer calculations and simulations help scientists understand environmental contamination and develop cleanup technologies, helping protect the environment by resolving the ecological legacy of nuclear weapons production.

With ASCR support, scientists at DOE laboratories and at universities gain understanding of these and other issues at unprecedented scales of time and space – from nanoseconds to decades and from single atoms to global weather systems and supernovae. The scope and precision of this work is hugely demanding. Without powerful computers and precise programming, many simulations would take literally decades to run. The Department of Energy has long recognized that development of high-performance computers, the networks to connect them and the software to run them is crucial to America's research lead.

In this context, ASCR's mission is to discover, develop, and deploy the computational and networking tools that enable researchers in the scientific disciplines to analyze, model, simulate, and predict complex phenomena important to the Department of Energy. Nearly everything ASCR supports is directed at improving high-performance computers and the simulations they run. In particular, ASCR supports the federal government's largest and most active computer science (CS) research effort. DOE researchers, as well as university researchers, suppliers and companies, use system software and software tools developed as a result of ASCR CS to capitalize on the capabilities of high-performance computers.

Cutting-edge research and development underpin DOE's important mission areas. Its outstanding workforce, unique facilities, and multidisciplinary approach to science enable DOE to anticipate emerging national needs and devise innovative solutions. Sustained mission success requires continued reinvestment in leading edge research and development, providing the DOE the ability to react to technical surprises and to respond to critical national challenges. DOE's use-inspired research strives to provide potential real-world utility, but its investigators never lose sight of the desire to advance scientific understanding.

1.1 Method of Review

A charge letter from the Director of the Office of Science (SC-1) to the Chair of ASCAC, dated October 15, 2008, established the Computer Science Committee of Visitors (COV). The Associate Director of ASCR in consultation with the ASCAC Chair selected the COV chair, announced the formation of the COV at the March 2009 meeting, and assembled the COV members thereafter. The list of participants in the COV is provided in Attachment I and the charge letter is provided in Attachment II. The COV conducted telephone and email exchanges with CS program directors and had a site visit on June 30-July 2, 2009 (see Attachment III).

This report presents the findings and recommendations of the COV. The committee met with ASCR members the evening of June 30 for a working dinner to establish a base of understanding of the CS program and challenges. The on-site visit at the DOE Germantown location was held on Wednesday, July 1 and Thursday, July 2, 2009. COV Chair, Dona Crawford discussed the charge to the committee, and Dr. Christine Chalk discussed the DOE conflict of interest policy. Drs. Dan Hitchcock and Walt Polansky described the CS program goals and accomplishments along with the approach used to evaluate proposals. After the program summary, the COV and the ASCR CS office managers reviewed program folders that included documentation for both DOE national laboratory and university-led proposals. The COV met in executive session to discuss preliminary findings and sent email to request further information to aid in the development of this report. On the second day of the review, the requested additional information was presented and discussed by the program managers. Two independent interviews - one within CS with Dr. Osni Marques and one within Applied Mathematics with Dr. Sandy Landsberg - confirmed that the proposal evaluation processes were followed, not only within CS but across ASCR. At the end of the second day, a synopsis of the COV's findings and recommendations was discussed with the program managers. The final report was prepared using subsequent e-mail exchanges with COV members. The COV is extremely grateful for the active and helpful engagement of the ASCR program managers throughout the review process.

1.2 COV Charge

The specific charge to the COV included the following four elements:

I. Assess the efficacy and quality of the processes used during the past three years to:

a. solicit, review, recommend, and document application and proposal actions and
b. monitor active awards, projects and programs.

II. Within the boundaries defined by DOE missions and available funding, comment on how the award process has affected:

a. the breadth and depth of portfolio elements, and
b. the national and international standing of the portfolio elements

2.0 Efficacy and Quality of the Program's Processes

The COV considers the CS program to be generally effective and reasonably well managed. The program officers are clearly dedicated and competent public servants who have considerable knowledge of their portfolios (even with such short tenure) and communities of practice. The CS program has achieved significant success, some of which is mentioned in section 3.0.

Charge I (a): Assess the efficacy and quality of the processes used during the past three years to solicit, review, recommend, and document application and proposal actions.

Finding: The solicitation and review processes appear to be effective and fairly administered. However, the documentation of these processes and associated summary statistics are not very readily available and this impedes effective presentation of the competitive nature of the CS research portfolio.

The Acting CS research program manager, Daniel Hitchcock, briefed the COV on ASCR's solicitation and review processes in general and spoke to the CS research program in particular. There are typically several topical solicitations throughout the year. These are open for at least thirty days and often longer. In addition, there is a general call for "good ideas" that is open throughout the year. Solicitations are advertised in the Federal Register, on grants.gov, and sent to the national laboratories and major research universities. In some cases, but not all, the solicitation requests or requires a Letter of Intent. The COV finds this to be a good practice, especially in light of the current limited staffing.

The "topical" proposals are usually evaluated together via a panel review. Each panel reviewer is asked to score the proposal but there is no consensus ranking of the proposals (as this is prohibited). The "general call" proposals, which may be received at any time, are sent out for mail reviews. In all cases, the program manager renders a decision based on several factors, including the various reviews, knowledge of the PI's past performance, relevance of the proposed research to ASCR priorities, and his or her expert judgment. (The program manager may now consult other "team" members, but this is a new construct that was not in place during the period covered by this COV report.) Proposals from universities and laboratories are held to the same standards. The COV interviewed two program managers, Osni Marques and Sandy Landsberg, and they confirmed that these were the processes they used.

Panel and mail reviewer scores are generally (but not always) entered into PeerNet. This web-based software tool, developed by ORISE, was demonstrated to the COV. It was intuitive and easy to navigate. The COV looked at several of the reviews associated with the recent Petascale Tools solicitation. In particular, the COV was able to read individual review comments and to see the scores assigned to each proposal. The COV looked at a few proposals that were funded vis-à-vis those that were not and the decisions seemed well founded. There were no obvious inconsistencies.

The COV was less impressed with the program's recordkeeping with respect to summary statistics and currently funded proposals. In particular, the relatively new program manager could not present a list of all solicitations during the period covered by this COV report, nor was he able to present summary statistics. Dr. Hitchcock and Acting Division Director Walter Polansky were able to produce such statistics for the Petascale Tools and Fast OS solicitations, but not for other solicitations or in aggregate across all solicitations. The COV was told this data existed in a spreadsheet maintained by the former, long-term program manager, but with his retirement, key data appears to have been lost. The COV understands that ASCR has been instructed not to develop its own tracking software, but nothing prevents ASCR management from requiring the use of a single tool (e.g., a spreadsheet or database) with consistent formatting. In fairness to Dr. Hitchcock, he only recently took over as acting program manager. The COV's recommendation addresses the demonstrated lack of institutional recordkeeping and the new ASCR team management approach removes the previously existing single point of failure with respect to the program.

ASCR should maintain a variety of summary statistics, including the following: (1) number of letters of intent received; (2) number of full proposals received; (3) number and percentage of proposals funded/rejected; and (4) number of participating researchers and institutions. (In this report, the term "proposal" refers to a single managed activity that may involve multiple researchers and institutions.) In addition, the program should keep track of the number of "fundable" projects that were rejected solely due to a lack of available funds. These statistics are useful not only in assessing the overall performance of the program, but more importantly, they can be used to help justify budget increases. Specifically, the statistics could be used to demonstrate the popularity of the program (large number of proposals) and the competitive nature of the program (high rejection rate). The COV suggests that these statistics (for all ASCR programs) be shared with the ASCAC annually.

Recommendation: The program should automate the archiving of material related to each of its solicitations, including the call, letters of intent, full proposals, reviewer comments, and selection/rejection statements, in a single easily-accessible repository. The program should also collect and maintain statistics related to each of its calls in a consistent format that would facilitate analysis of the number of responses, reviewed proposals and funded proposals.

Charge I (b): Assess the efficacy and quality of the processes used during the past three years to monitor active awards, projects and programs

Finding: The CS research program managers use generally effective mechanisms, including site visits, meetings and progress reports, to monitor ongoing awarded projects. Control is provided by annual financial decision points.

An important role of the ASCR office is to monitor progress of the efforts funded by the Program. Such monitoring is essential to ensure that the research conducted is achieving the desired results, that those results can be effectively applied to the mission of the Office of Science, and that those results are disseminated to the broader research community. Since the program has a history of sequential awards with a number of the institutions and investigators it funds, effective monitoring is especially important to insure that such relationships continue to be of value to the mission. The acting CS research program manager described the monitoring process in response to questions from the COV. In general, the program manager monitors active projects through frequent site visits, annual progress reports, an annual CS research PI meeting, and topical meetings. In addition, the program manager looks at the number of refereed publications and conference proceedings, including the quality of the periodicals and conferences. The COV was not, however, shown any statistics.

While the committee did not see detailed records of monitoring activity, it was clear that each proposal funded by the program takes a similar path. Upon selection, a letter is sent to the PI and a grant or cooperative agreement (in the case of universities) or Work Authorization (in the case of Laboratories) is issued. Due to the collaborative nature of the research proposals, there are usually several institutions funded for each proposal. Each year, individual institutions are required to submit progress reports that must be deemed acceptable by the Program Manager in order for the next year's increment of funding to be provided. The COV was told that on occasion reports were returned for further work before they were accepted.

In addition to the annual reporting, researchers from each funded institution were required to participate in joint PI meetings for the entire program or thematic subsets. Such meetings provided both a mechanism for the Program Manager to compare progress of the varied efforts, as well as a good forum for cross-fertilization of research ideas. Finally, the Program Manager conducted site visits to a number of the institutions conducting the research to further monitor activities.

The COV felt is was important to note that during the period reviewed a single Program Manager, Dr. Fred Johnson, was solely responsible for the Program. Dozens of efforts simultaneously needed monitoring, in addition to the major work of reviewing requests for new funding and developing the Program. All indications are that Dr. Johnson provided tireless efforts in these regards and was thought to be effective and fair. The COV also acknowledges that Dr. Johnson was exemplary in conducting site visits and was exceptionally well informed as to the performance of his PIs. Dr. Johnson has since retired and ASCR is developing a team-based approach to handling the CS portfolio.

Recommendation: The program should exploit ASCR's team approach with its planned increased staff to improve the frequency and depth of monitoring efforts.

It is clear to the COV that more than a single person's effort is required on a program of this scope and breadth and that the new ASCR team approach addresses this issue. Several positions are currently being filled and we feel that the team, as a whole, should make visits and attend PI meetings. This should allow both increased monitoring of the activities and increased outreach efforts. In addition, the COV feels that some of the increased program resources should be applied to increase the depth of the reviews and to document their results.

3.0 Effect of the Award Process on Portfolios

Charge II (a): Within the boundaries defined by DOE missions and available funding, comment on how the award process has affected the breadth and depth of portfolio elements

Compared to the strategies of countries such as Japan, where leadership-class computers consist of custom-built high-end hardware, the US has used commodity-based CPUs to build world-class machines (Jaguar), or slightly customized versions of these CPUs as is the case for IBM's BlueGene systems. This requires extreme scaling of the machines to several hundred thousands of CPU cores in order to achieve Petaflops performance. Extreme scaling problems have largely been resolved by new developments in advanced algorithms and software, at the application-level as well as the system-level. Program investments in software and its increased use at leadership computing sites have played a key role in sustaining US supremacy in high-end computing in the recent years. Recognizing this state-of-affairs, the COV presents the following findings and recommendations for maintaining US leadership in this era of exascale computing as well as better serving DOE mission objectives:

Finding: The CS programs have broadly engaged the high end computing community. They have provided the depth necessary to facilitate research into effective use of leadership-class capability computing. There has not been a comparable engagement with the data-intensive aspects of the CS mission. Software for extreme scale machines requires both innovations and persistent development efforts by top-level research groups. This has been reported in a significant number of publications. Also reinforcing this idea are research activities related to academic programs at world-class venues such as the annual ACM/IEEE Supercomputing , as well as widespread usage of the software deliverables in leadership-class machines at DOE labs and other systems around the world.

Another aspect of computing regarded as significant for DOE mission objectives is the effective management, processing, analysis, and visualization of massive amounts of data. The volume of data required for high-end science is increasing at explosive rates, often exceeding terabytes and sometimes reaching petabytes. This is fueled by the proliferation of advanced sensors in high-end instruments, as well as the results of large-

scale simulations on leadership machines. Even though computing goals are being achieved for complex simulations, multi-dimensional observation of multi-terabyte-scale data output in many mission critical areas is simply overwhelming scientists' ability to understand the information. This trend is expected to continue in the exascale era, when data volume will reach exabytes, and the resulting complexity could be simply unmanageable.

Recommendation: The program should launch strategic initiatives in all mission relevant aspects of data-intensive computing, data management and analysis. The program's emphasis on data-intensive computing needs to be increased to match the emphasis placed on compute-centric computing today. In this regard the COV **finds** that **initial efforts to recruit talent in data management are commendable.**

Assuming DOE aims to continue its leadership as machines move towards exascale, it is recognized that breakthroughs in machine architectures as well as in software's ability to utilize such machines will be needed. Such innovation might come from CS domains that were considered outside high-end computing in the past - such as utilization of low-power processors in the case of IBM BlueGene - but which are now becoming important.

Recommendation: The entire program should further engage the broader CS community in its reviews and workshops to define future research activities. Some of the areas include, but are not necessarily limited to: novel architectures for data-centric computing, energy-efficient/embedded computing for exascale; and interactions with large-scale mainstream IT infrastructures such as clouds.

Charge II (b): Within the boundaries defined by DOE missions and available funding, comment on how the award process has affected the national and international standing of the portfolio elements

Finding: The program contributes to DOE's leadership role in capability computing and is internationally recognized for the impact of its research results. Its software libraries and tools are used worldwide. The program's support for the International Exascale Software Project (IESP) demonstrates global leadership.

The ASCR CS program has clearly played a major role in supporting the leadership role of the DOE Office of Science in capability computing. The researchers funded by the program and their research are prominent in the international community and recognized as world-class. Software libraries and tools funded by the CS program are widely used not only in the US but also in Europe and Asia. The MPICH open source MPI implementation is ubiquitous and played a major role in ensuring acceptance of the MPI standard and providing users and companies with a well-implemented and well documented set of message-passing libraries. In addition, similar comments can be made about the LAPACK and ScalaPACK linear algebra libraries that have been so influential. The components of the Virtual Data Toolkit, notably the Globus Grid middleware and the Condor cycle-stealing software system, are also widely deployed around the world and form the basis for many international collaborations, such as the particle physicists' LHC

Grid. The Kepler workflow system is widely used but has perhaps lost some ground to Taverna as a result of the 'software hardening' investment made in the UK for Taverna by the UK Open Middleware Infrastructure Institute. The COV suggests that program managers monitor the progress of active projects to ensure that software is transitioned to a "hardening" team at the appropriate time.

The DOE CS program is now demonstrating leadership in the development of software and middleware for Petaflop and Exaflop systems by initiating the International Exascale Software Project led by Pete Beckman and Jack Dongarra, and which involves most major & senior high-performance community members worldwide. This initiative recognizes the need for international collaboration for the community to produce reliable and usable software for the new exascale machines.

It was not clear that the CS program had demonstrated leadership in the second theme of the program, namely data management. The new generation of experiments in many fields of science are generating a deluge of scientific data and scientists now face major problems in the curation, mining, visualization and preservation of this data. This challenge is linked to DOE's foucs on petascale and exascale computing systems and the fact that increasingly, simulations will form an important part of the multi-petabyte data sets that need to be managed and integrated with other data. Further investigation by the COV as to the reasons for the relative lack of focus on the CS challenges of data-intensive science revealed the difficulties that ASCR has had in recruiting staff to lead this area. The COV was pleased to learn that this lack of balance was being remedied and looks forward to the establishment of leadership programs in the area of data-intensive science and the extraction of knowledge from primary data.

Recommendation: The program should continue its leadership in high end computing and expand its collaborations broadly with the international community.

The CS program should continue its support and leadership of the International Exascale Software Project and its initiatives in support of new tools, architectures and technologies to support exascale systems. In addition, the ASCR program should consider taking on a similar international leadership role in database management, visualization, mining and curation of the multi-Petabyte heterogeneous data sets generated by experiments and simulations.

4.0 Overarching Observations and Summary

The ASCR CS program strives to address two fundamental questions:
-How to make today's and tomorrow's leading edge computers tools for science, and
-How to extract scientific information from petascale data from experiments and simulation.

The COV found the program to have focused on the first of its two fundamental questions to a greater extent than the latter. As a result the CS program has had a large

impact on making the leadership class computers useful tools of science. This is particularly impressive, given the size of the CS budget in comparison to other agency programs, and shows what a focused effort can achieve. It is also clear that to expand the focus of the CS program into its second question requires additional staff.

Finding: The committee found the number of permanent staff currently allocated to the CS program insufficient to the task at hand. In recognition of this, SC has approved three additional staff.

Recommendation: The COV recommends ASCR fill the approved CS vacancies as quickly as possible by working with HR to streamline the hiring process.

This recommendation goes beyond that which the CS program or even ASCR can take on alone. It requires the ASCR Associate Director, working with the other Associate Directors to further streamline the hiring process throughout SC. While this is a challenge, given the proclivities of the new DOE Secretary and the new administration, this might be doable and would serve the long-term needs of the entire department.

Assuming the new CS vacancies are filled and given the anticipated FY10 budget increase, it is expected the CS program could tackle the second fundamental question, while maintaining its high level of attention and results on the first fundamental question.

In summary, the COV found no instances in which the ultimate decision of the program manager was obviously incorrect or unjustified, nor any instances where the program was skewed in a questionable direction or where the process deviated markedly from the normal standards of peer review. It is clear the program is having a large impact on the mission of the DOE and more broadly on the national and the international HPC community. The COV found the review process to be both interesting and informative and were pleased with the accessibility of the key program managers.

Attachment I

ASCR Computer Science Committee of Visitors

Steven F. Ashby
Pacific Northwest Laboratory

William Carlson
IDA Center for Computing Sciences

Dona L. Crawford, COV Chair
Lawrence Livermore National Laboratory

Tony Hey, ASCAC Member
Microsoft

Satoshi Matsuoka
Tokyo Institute of Technology

Attachment II

Under Secretary for Science
Washington, DC 20585

October 15, 2008

Dr. Roscoe Giles, ASCAC Chair
Department of Electrical and Computer
Engineering
Boston University
8 St. Mary's Street
Boston, MA 02215

Dear Dr. Giles:

Thank you for the excellent Committee of Visitors (COV) review of the Innovative and Novel Computational Impact on Theory and Experiment (INCITE) program. The Office of Advanced Scientific Computing Research (ASCR) has already undertaken changes to respond to the recommendations of the COV and improve the management of this important program. The full program response and action plan is posted on the ASCAC website (http://www.sc.doe.gov/ascr/ASCAC/Reports.html).

To help the research communities utilize the capabilities of current and future supercomputers, ASCR supports a basic research program in Computer Science. To ensure the integrity of this research program, I am asking the Advanced Scientific Computing Advisory Committee (ASCAC) to assemble a Committee of Visitors (COV) to review the management processes for the Computer Science elements of the ASCR program. A report will be expected at the August 2009 ASCAC meeting.

The COV should provide an assessment of the processes used to solicit, review, recommend, and document proposal actions and monitor active projects and programs. The Committee should assess the operations of the Computer Science programs during the fiscal years 2006, 2007, and 2008. The panel may examine any files from this period for both DOE laboratory projects and university projects. The Committee will be provided with background material on the program prior to the meeting.

I would like the Committee to consider and provide evaluation of the following four major program elements:

1. For both the DOE laboratory projects and the university projects, assess the efficacy and quality of the processes used to:
   (a) solicit, review, recommend, and document proposal actions and
   (b) monitor active projects and programs.

2. Within the boundaries defined by DOE missions and available funding, comment on how the award process has affected:
   (a) the breadth and depth of portfolio elements, and
   (b) the national and international standing of the program with regard to other computer science research programs that are also focused on the demands of high performance scientific computing and analysis of petascale datasets.

If you or the COV Chair have any questions, please contact Christine Chalk, the Designated Federal Official for ASCAC at 301-903-5152 or by e-mail at christine.chalk@science.doe.gov.

I appreciate ASCAC's willingness to undertake this important activity.

Sincerely,

Raymond L. Orbach

Attachment III

ASCR Computer Science Committee of Visitors
June 30 – July 2, 2009

Tuesday, June 30, 2009

6:30	Committee Dinner at O'Donnell's in Kentlands

Wednesday, July 1, 2009

8:30-9:00	Introductions and continental breakfast
9:00-9:30	Discussion of Charge to the COV, Dona Crawford, COV Chair
9:30-10:30	Overview of Computer Science and Committee Questions, Dan Hitchcock
10:30-10:45	Break
10:45-12:00	Continue presentation, Dan Hitchcock
12:00-1:00	Question and answer session, COV members and ASCR staff
1:00-1:30	Lunch (pick up from Cafeteria or Rick's stand)
1:30-2:30	Organization of COV documents, Dan Hitchcock
2:30-2:45	Break
2:45-4:30	COV working session: Discussion of CS strategic plan and direction
4:30-6:30	COV working session: Discussion of CS process for solicitation development, proposal review and selection, and award monitoring
6:30	Adjourn until dinner
7:00	Committee Dinner

Thursday, July 2, 2009

8:30-9:00	Opening remarks and continental breakfast
9:00-9:30	Question and answer session, COV members and ASCR staff
9:30-10:00	COV working session: Continue discussion of CS process for solicitation development, proposal review and selection, and award monitoring
10:15-10:30	Break

10:30-11:45	COV working session: Discussion of the CS portfolio and standing with regard to other similar programs
11:45-12:30	Lunch (pick up from Cafeteria or Rick's stand)
12:30-2:00	COV working session: Report planning and outline development
2:00-2:30	COV Closing discussion and review of writing assignments and deadlines
2:30	Adjourn