

Meeting Minutes
ADVANCED SCIENTIFIC COMPUTING ADVISORY COMMITTEE
(ASCAC)
December 20-21, 2017
Teleconference

ASCAC Members Present

Keren Bergman
Martin Berzins
Barbara Chapman
Jacqueline Chen
Silvia Crivelli
John Dolbow
Jack Dongarra
Thom Dunning
Tim Germann
Susan Gregurick

Anthony Hey
Gwendolyn Huntoon
Richard Lethin
David Levermore
John Negele
Linda Petzold
Daniel Reed (Chairperson)
Vivek Sarkar
Krysta Svore

ASCAC Members Absent

Vinton Cerf
Satoshi Matsouka
Dean Williams

Also Participating

Katerina Antypas, Lawrence Berkeley National Laboratory (LBNL)
Steve Binkley, Acting Director, Office of Science (SC), Department of Energy (DOE)
Christine Chalk, ASCAC Designated Federal Officer, Program Manager, Oak Ridge Leadership Computing (ORLC), Advanced Scientific Computing Research (ASCR), SC, DOE
T. Reneau Conner, Oak Ridge Institute for Science and Energy (ORISE), Oak Ridge Associated Universities

Jack Deslippe, LBNL
Lori Diachin, Lawrence Livermore National Laboratory (LLNL)
Barbara Helland, Associate Director, ASCR, SC, DOE
Brian Hitson, Office of Scientific and Technical Information (OSTI)
Robert Ross, Argonne National Laboratory (ANL)

Attending

Francis Alexander, Brookhaven National Laboratory (BNL)
Kathlyn Boudwin, Oak Ridge National Laboratory (ORNL)
David Brown
Richard Carlson, SC, DOE
Jonathan Carter, LBNL
Tom Conte, Georgia Institute of Technology
Claire Cramer, SC, DOE
Al Geist, ORNL

Richard Gerber, National Energy Research Scientific Computing Center (NERSC)
Michael Heroux, Sandia National Laboratory (SNL)
Paul Hovland, Argonne National Laboratory (ANL)
Peter Kogge, University of Notre Dame
Doug Kothe, ORNL
Alexander Lazelere, US Council on Competitiveness (USCOC)

Stephen Lee, Los Alamos National Laboratory
(LANL)
Steven Lee, SC, DOE
Robert Lucas, University of Southern California
Michael Martin, LBNL
Sandra McLean, SC, DOE
Lucy Nowell, SC, DOE
Michael Papka, ANL
Robinson Pino SC, DOE
Don Rej, LANL

Robert Ross, ANL
Sonia R. Sachs, SC, DOE
John Sarrao, LANL
James Stewart, SNL
Alex Tartakovsky on behalf of Nathan Baker
Valerie Taylor, ANL
Angie Thevenot, SC, DOE
John Wieland
Stefan Wild, ANL

Wednesday, December 20, 2017

OPENING REMARKS FROM THE COMMITTEE CHAIR

Dan Reed, ASCAC, called the meeting to order at 11:00 a.m. Eastern Daylight Time (EDT), confirmed a quorum was achieved, and introduced the first speaker.

VIEW FROM WASHINGTON – UPDATE ON THE OFFICE OF SCIENCE

Steve Binkley, Deputy Director, SC, shared that DOE's top level management has been reorganized and consists of three undersecretary positions in energy, science, and nuclear security. Lisa Gordon-Hagerty has been nominated as the Undersecretary for Nuclear Security, Paul Dabbar is the Undersecretary for Science, and Mark Menezes is the Undersecretary for Energy. SC and the Office of Environmental Management will report to the Undersecretary for Science. The applied energy programs, Energy Efficiency and Renewable Energy, and Office of Technology Transitions will report to the Undersecretary for Energy. Dabbar is fully engaged with SC having visited DOE laboratories and received detailed briefings on all SC programs.

A continuing resolution will be in effect through January 19, 2018. SC has finalized their budget formulation and transmitted it to the Office of Management and Budget (OMB). OMB is in the final stages of the reconciliation process which will lead to final numbers for Fiscal Year (FY) 2019. A guidance letter issued in summer 2017 laid out boundary conditions for the FY19 budget which is slated to be based on the FY18 President's Budget Request. SC is expecting the FY19 budget to be released in late January.

Discussion

None.

VIEW FROM GERMANTOWN – UPDATE ON ASCR

Barbara Helland, Associate Director, ASCR, reviewed budget information for FY18 and shared staffing changes. The Early Career Award Funding Opportunity Announcement (FOA) was released on December 18, 2017. Anticipated FOAs in 2018 include Exploratory Research for Extreme-Scale Science (EXPRESS), Quantum Testbed Pathfinder, Quantum Testbeds for Science, Mathematical Multifaceted Integrated Capability Centers (MMICCs), and Uncertainty Quantification for Enabling Extreme-Scale Science. There were 55 Innovative and Novel Computational Impact on Theory and Experiment (INCITE) projects awarded with 31 receiving time on Titan, 27 on Mira, and 14 on Theta. In November 2017, the Argonne Leadership Computing Facility (ALCF)-3 re-baseline review and the Oak Ridge Leadership Computing Facility (OLCF)-5 Critical Decision-1 review were held and the panels recommended approval. The Exascale Computing Project (ECP) Independent Project Review is scheduled for January 2018 in Oak Ridge, TN. Helland shared information on upcoming workshops in 2018 on Extreme Heterogeneity and Scientific Machine Learning (SciML).

Discussion

Lethin asked Helland to say more on the ALCF re-baselining. **Helland** said ASCR moved the planned 180 petaflop Aurora machine out to be the exascale machine by 2021. There is new technology in the exascale machine but it is under restricted Non-Disclosure Agreement (NDA) thus she could not share more information.

Dolbow asked about the timing for a MMICCs-like center call. **Helland** indicated the timing is related to the budget but a call might be released in February.

Hey asked if ASCAC could attend the workshops on Extreme Heterogeneity and SciML and **Lethin** inquired about the SciML call for position papers. **Helland** said she will ensure that Lucy Nowell invites ASCAC members to the workshops. SciML position papers were due January 5, 2018 and Helland will ensure the information is sent to ASCAC. **Reed** asked Helland to add ASCAC to the contact list for information on ACSR activities such as those requested from Hey and Lethin.

REPORT FROM THE SUBCOMMITTEE ON FUTURE COMPUTING TECHNOLOGIES

Vivek Sarkar, ASCAC, discussed the composition of the subcommittee on Future Computing Technologies, shared background and interpretation information, and relayed application issues, future High-Performance Computing (HPC) technologies, findings, and recommendations. The subcommittee chose three post-exascale and three post-Moore technologies to review. Five findings and six recommendations were discussed. Findings focused on a HPC roadmap, extreme heterogeneity, applications and system software (SW), early testbeds, open hardware (HW), and notable synergies. The recommendations focused on SC's leadership role in the post-exascale and post-Moore strategy, readiness of science applications, open HW ecosystem, SW technologies, testbeds and small-scale systems, and workforce members.

Discussion

Berzins asked about the challenges of resilience. **Sarkar** said the subcommittee discussed the existing SW base extensively, including observations about the timing of migrating or rewriting code and lessons learned from the vector to massively parallel processing (MPP) transitions. The subcommittee felt that while the community needs to be prepared to invest in writing new codes there are opportunities to reduce the cost such as using frameworks that include common abstraction, and moving to more modern SW engineering approaches. There is a lot of attention paid to resilience in the exascale context. Many of the exascale technologies and the algorithms for those technologies will require built-in resilience. The subcommittee's perspective is that resilience is part of the overall system design for the future.

Lethin asked if there were specific exemplars of the Thermo-dynamic Computers (TDCs) referred to in the report. **Tom Conte** explained there are several exemplars. The simplest is D:Wave which performs quantum annealing and Mitsubishi's analog annealer. Different models for TDCs have come from the neuroscience community as representations for how the brain operates. **Bob Lucas** mentioned TDC uses in performance-sensitive environments and that machine learning (ML) algorithms can manage with relatively little precision. **Lethin** suggested that the report include specific exemplars of the TDCs to clarify what machines are being referenced.

Lethin asked about open source (OS) and stated that the OS HW movement might be too strong in the report. **Sarkar** stated that the subcommittee was referring to open interfaces, illustrating that when a facility acquires a system there is a primary vendor who has proprietary technology and NDAs are very common. The subcommittee identified a risk of excessive dependency on a single vendor with proprietary interfaces. Open interfaces could make a difference. The subcommittee is not suggesting that post-exascale and post-Moore HW will all be open source. In terms of international competitiveness Sarkar thought the U.S. vendors would hold their primary intellectual property, but increased openness could foster innovation helping the U.S. continue to lead.

Levermore stated that during the transition from vector to MPP scientists found that transformed applications often required a total rethinking of the modeling. Applications had been done hydrodynamically but with the new capabilities kinetic equations played a larger role in simulations.

Additionally, non-Local Thermodynamic Equilibrium (LTE) physics could be performed meaning the non-LTE calculations dominated. With materials simulations and quantum regimes computing the material constitutive properties the theme continues but it is sparsely referred to in the report. **Michael Heroux** addressed Livermore's first point stating that a lot of ECP efforts are combining capabilities to multiple scales or multi-physics. The conditions described, moving from hydrodynamics, is seen now across domains of expertise. There is strong emphasis on interaction models in ECP because the expertise is not sufficient within one team. **Sarkar** added that Livermore's comments were very exciting; HPC capabilities lead to new modelling and new discoveries. He said the subcommittee would add more references to those opportunities in the report.

Levermore questioned recommendation 5 concerning the reduction of testbeds. He suggested using emulators/ simulators rather than testbeds because they are more cost-effective. **Sarkar** indicated that the term testbed was used very broadly in the report to reflect any kind of resource that could be supported by facilities for user groups. **Levermore** said those who write emulators must have a broad picture of what facilities might come in the future. He illustrated saying in the 1980s a large Defense Advanced Research Projects Agency (DARPA) program on parallelism funded eight machines and provided a spectrum of architectures. There were simulators that mimicked all of those architectures yielding much information about different architectures and their implications. **Sarkar** said the subcommittee would add the reference to simulators to compliment the point. **Peter Kogge** said that emulators/ simulators are good for design-space explorations of a single kernel. **Maya Gokhale** added that testbeds are needed to validate and design system SW. **Levermore** agreed with the comments and added that an emulator/ simulator can be delivered well before a testbed which is valuable for long-term planning.

Dongarra asked about the anticipated funding levels necessary for DOE to carry out the subcommittee's recommendations. **Sarkar** said the minimum funding required is close to the funding for future computing provided since 2010. In 2017 that funding was ~\$12M for computer science research projects. The challenge will be balancing other investments with the funding need. **Dongarra** added that the funding seems low relative to ECP.

Dunning commented that he supported the recommendations in the report; it is critical for DOE to continue to push forward the development of computing for advancing scientific discovery and engineering practice. DOE is a unique federal agency in this regard having the combination of leadership in computer science and applied math and scientific applications. Sustainability of the SW technologies that are developed and used by the applications needs to be considered. Tying into recommendation 6 is the National Science Foundation's (NSF) finding that future cyber-infrastructure needs consistent, critical expertise in SW development for new computing technologies. **Sarkar** stated he would check for any references the subcommittee can cite relative to the NSF findings.

Hey remarked that the report defines neuromorphic as spiking neural networks and deep learning (DL) and asked if the subcommittee had any thoughts about investing in the spiking neural networks. **Sarkar** said that the subcommittee noted a fundamental SC scientific endeavor was to advance neuroscience including the understanding of the human brain. The subcommittee saw that as a worthy goal in itself; the opportunities to leverage spiking neural networks for computing are being explored like many other opportunities. **Hey** was concerned about the robustness of the vision algorithms to adversarial noise saying that noise on images trained too strictly with DL causes instability; a similar thing happens in speech recognition when trained too closely on a particular data set. **Sarkar** added that the subcommittee would reinforce the need to consider the more realistic models.

Reed moved to vote on the report asking if there were any objections to accepting the report. **Lethin** requested more attention be put into the open HW section before the report is finalized. **Sarkar** said he will make edits to the report based on ASCAC feedback. **Reed** confirmed that the subcommittee will integrate notes and suggestions into the report. Based on the chairs prerogative and hearing no objections the report was accepted.

SCIENTIFIC DISCOVERY THROUGH ADVANCED COMPUTING (SCIDAC)-4 COMPUTER SCIENCE INSTITUTE

Robert Ross, ANL, discussed Resource and Application Productivity through computation, Information, and Data Science (RAPIDS). The objective of RAPIDS is to solve computer science and data challenges for SC applications teams to achieve scientific breakthroughs on DOE platforms. RAPIDS uses Tiger Teams to engage experts and outreach activities to connect with the community. RAPIDS focus areas are data understanding, platform readiness, and scientific data management.

Discussion

None.

SCIDAC-4 MATH INSTITUTE

Lori Diachin, LLNL, discussed Frameworks, Algorithms and Scalable Technologies for Mathematics (FASTMath). The objective of FASTMath is to reduce barriers facing application scientists by developing advanced numerical techniques for DOE applications, deploying high-performance SW on DOE supercomputers, demonstrating basic research technologies from applied mathematics, and engaging and supporting the computational science community. FASTMath is focused on eight core technologies: structured mesh spatial discretization, unstructured mesh spatial discretization, time integrators, solution of linear systems, solution of Eigenvalue problems, numerical optimization, uncertainty quantification (UQ), and data analytics. FASTMath is engaged in 18 SciDAC-4 partnerships and works with RAPIDS to improve math libraries and application experiences.

Discussion

Levermore asked if the structure of FASTMath supported synergies between numerical optimization and UQ. **Diachin** said a primary area of synergistic activities was how optimization and UQ can come together. FASTMath is interested in optimization under UQ as a new capability moving forward. **Levermore** suggested using these techniques to build models. **Diachin** said that was an area FASTMath could explore, but a lot of the work in FASTMath is driven by the application need as articulated via collaborations and partnerships.

UPDATE ON EXASCALE ACTIVITIES

Doug Kothe, ORNL, provided an update on ECP which is focused on significant mission-critical applications. There are three strategic goals: applications, SW technologies, and HW and integration. The outcome is accelerated delivery of a capable exascale computing ecosystem. Since October 1, 2017 the overall ECP design has been reformulated and documented, the approach to project management processes and tracking has been retooled, and there are plans for close integration with HPC facilities. Kothe detailed the ECP work breakdown structure, shared leadership team member information, and provided observations and recommendations from the December 5, 2017 Independent Design Review.

Discussion

Sarkar asked about future requests for proposals. **Kothe** mentioned that a request for information for applications in Data Analytics is still planned but is on hold for two reasons, preparation for the Independent Design Review and details of the FY18 budget.

Lethin asked if the Independent Design Review documents are available to ASCAC. **Kothe** said he would check with Helland first but believed they could be made available.

Dunning mentioned his concern, voiced during the September 2017 ASCAC meeting, about the portability requirement on the ECP applications. **Kothe** said that while portability is important performance portability is very difficult. ECP leadership changed one of the key performance parameters from portability to readiness. **Dunning** said that was an excellent decision, that clearly portability is desired but whether high levels of performance in all architectures can be achieved is a serious question. **Kothe** added that the other challenge is defining performance portability. ECP will lean heavily on the

facilities and the INCITE program because of their long history of conducting readiness reviews. This also gives ECP synergies with the facilities program.

OBSERVATIONS FROM USING FOREIGN HPC RESOURCES

Martin Berzins, ASCAC, provided an overview of Asynchronous Many Task (AMT) and Unitah, the runtime system portability approach, and porting to the Sunway TaihuLight machine. The porting strategy used works well; there is good scaling and reasonable peak performance. The new scheduler for Sunway required 400 lines of code. The Sunway SW environment is still at an early stage and tasks needed to be rewritten in C, Fortran, and the Single Instruction, Multiple Data (SIMD) vectorization calls. Porting a full Unitah package is daunting but use of a portability library, such as Kokkos, would solve the problem.

Discussion

Sarkar asked when porting a full application if the main burden is porting the code within a task. **Berzins** said it varies between the architectures; in some cases the runtime system has to be changed while the tasks will not change, but in other cases the tasks have to change. Kokkos will be relied upon heavily going forward.

PUBLIC COMMENT

None.

Reed adjourned the meeting at 3:25 p.m. EDT.

Thursday, December 21, 2017

OPENING REMARKS FROM THE COMMITTEE CHAIR

Dan Reed, ASCAC called the meeting to order at 11:05 a.m. EDT, confirmed a quorum was achieved, and introduced the first speaker.

CORI DATA STRATEGY AND UPDATE ON NERSC EXASCALE SCIENCE APPLICATIONS PROGRAM (NESAP) PROJECTS

Katie Antypas and Jack Deslippe, LBNL, shared updates on the NERSC data strategy and NESAP projects. On the 2017 call for proposals applicants were asked to share the primary role of their project. From the NERSC annual survey five issues were raised: the In/Out speed, real-time feedback, complex SW stacks, internal network limits, and SW for analytics. NERSC's solutions included burst buffers, SchedMD, Shifter, Software Defined Networking (SDN), and new analytics tools.

NERSC convened a Data Advisory Committee on October 4, 2017 to review their strategy. Three partnerships for a superfacility include Linac Coherent Light Source (LCLS), Large Synoptic Survey Telescope - Dark Energy Science Collaboration (LSST-DESC), and Joint Genome Institute (JGI) Facilities Integrating Collaborations for User Science initiative (FICUS).

Jack Deslippe discussed NERSC's user engagement strategy, the NESAP projects, and the NERSC Data Training strategy. User engagement includes superfacility partnerships, training, and documentation. Current NESAP applications are in Cosmic Microwave Background, Cosmology, Tomography, High Energy Physics, and ML/ Neurocomputing. Highlights of Data Advisory Committee report were also shared.

Discussion

Germann asked about real-time queues. **Antypas** explained two approaches to real-time queues, the current approach, which works because of low demand, is having 32 nodes dedicated to real-time. The future approach will use the scheduler and can become dynamic, however, at some point applications that can serve as backfill will need to be identified. **Germann** asked if the optimized code on Edison was

evaluated. **Deslippe** confirmed that the optimized code was evaluated. In most cases the code improved on Edison but it improved more on Knights Landing.

Gregurick asked for more information on the NERSC edge services. **Antypas** said the scalable edge services, or SPIN, are highly dependent on the supercomputer; they are part of the workflow. NERSC views SPIN as a tight coupling of the capabilities of the large scale systems.

UPDATE ON ACTIVITIES AT OSTI

Brian Hitson, OSTI, said OSTI's mission is to maintain publicly available collections of the Research & Development (R&D) information of DOE. The ASCAC Scientific and Technical Information (STI) subcommittee was established in early 2015 to evaluate OSTI's products and services, international standing, leadership, and future directions. Hitson provided a summary of the STI answers to questions in the charge. Recommendations for OSTI's future included more connections to DOE researchers, reinventing the Energy Science and Technology Software Center (ESTSC), creating a unified user environment, implementing public access, and considering OSTI's role in the DOE data landscape. Hitson concluded with the OSTI responses to and progress on the STI recommendations.

Discussion

Levermore noted that Congress asked DOE to make R&D information available but will need metrics such as user demographics, anecdotal pay-offs, and users beyond DOE. **Hitson** said OSTI's metrics show downloads have doubled especially from .edu and .com domains, but OSTI is looking for narrative anecdotes. **Levermore** suggested that OSTI disseminate metrics around DOE to share with professional societies.

Hey asked questions about the publishers' consortium Clearinghouse of Open Research of the United States (CHORUS) and the dark archive, DOE SW such as MPich, MAGMA, PETSci, buy-in from scientific communities, and commonalities with the NSF DataOne project. **Hitson** noted that CHORUS has complemented the level of comprehensiveness OSTI has reached, but OSTI is not allowed to dark archive their publications. Publishers' participation in CHORUS is sporadic. The onus is on the grantee author, the lab author, or the institution to ensure the accepted manuscript is submitted to OSTI. The central tenet of DOE's model, to submit the accepted manuscript to OSTI and DOE Pages, is what will ensure long-term preservation and access. OSTI has 55% of the author-accepted manuscripts from the labs. SW that was singled out in the report is now in DOECODE and more will be added in the coming months. Discipline-specific repositories like Archive and Inspire do not have 100% participation. Such repositories have a mix of pre-print and post-print content, which does not satisfy the public access objective. OSTI is partnering with and taking advantage of discipline-specific repositories. If the author provides a link OSTI will harvest a copy of the Archive or Inspire content and populate DOECODE with the external link. Hitson said that aggregating with DataOne is great suggestion; there are other analogs to DataOne and OSTI will work with the DOE labs to get the metadata and link out for access.

Hey asked for comments from ASCAC lab representatives about OSTI's progress and plans. **Crivelli** helped organize a workshop at LBNL and thought workshop participants should receive questions concerning OSTI's progress. **Hitson** offered to provide a synopsis for workshop participants about OSTI's accomplishments. **Crivelli** said her community is using BioArchive because the rapid developments in ML mean that community cannot wait for a full paper.

Hey asked if DOE, NSF, and Department of Defense (DOD) make up a large fraction of the U.S. funded research papers and NSF's view on OSTI's progress. **Hitson** said the three agencies account for 50-51% of the total R&D output. NSF submitted their open policy approximately one year after DOE and Hitson was aware that NSF is beginning to receive submissions from their principal investigators.

REPORT FROM THE COMMITTEE OF VISITORS (COV)

Susan Gregurick, ASCAC, summarized the COV charge which focused on the efficacy and quality of management and award processes for research programs in Applied Math, Computer Science, and SciDAC. The COV meeting was held October 31-November 1, 2017 in Rockville, MD and a draft report

was delivered to ASCAC December 15, 2017. The overarching recommendation of the COV was the creation of a strategic plan for the ASCR Research Division. COV recommendations focused on EXPRESS, Early Career Research awardees, Portfolio Analysis and Management System (PAMS), evaluation and tracking process, program staffing, provenance of ASCR program documents, and program oversight.

Discussion

Hey expressed concern that the COV was asking quite a lot of the ASCR office relative to program managers. He thought a strategic plan was worthwhile but noted such an activity takes time to develop and has to evolve. **Gregurick** said the committee thought ASCR would benefit from a strategic plan but recognized ASCR has to balance the recommendation with all other activities.

Reed asked if the COV had given thought to the tension between sustaining lab researchers and recruiting new people. **Gregurick** said the COV did not envision that all the young people must be academics. Younger investigators are the future of ASCR and the COV wants to see that pipeline enhanced and nurtured.

Chapman was interested in the COV comments on basic computer science research in labs. She said given the incredible changes in HW and SW it is a very important field.

Levermore asked if the COV addressed the tension between large versus small programs. **Gregurick** indicated the COV did not specifically address the pressure between funding large or small programs in the report and said they could discuss it further. **Levermore** added that bringing in younger people is a challenge because their main interests are aligned with established centers. **Gregurick** said the COV thought the balance was fair and appropriate for the levels of funding. **Dolbow** added that he thought the discussion was centered on young investigator awardees and ensuring the program is working well.

Hey was slightly concerned about the number of actions being put on ASCR and **Dunning** reinforced Hey's comments. **Dunning** suggested prioritizing the recommendations. **Gregurick** said the COV will discuss prioritizing and condensing the recommendations where appropriate.

Lethin asked if the COV felt the recommendations were current given the charge dates of 2013-2015, mentioned that the diversity recommendations would be based on current funding, and asked to what extent the COV was able to meet with the current program managers. **Gregurick** said most likely ASCR is aware of some of the recommendations but others, such as travel and staffing, remain a concern. She agreed it is possible ASCR already made in-roads in diversity enhancement. The meeting was very interactive, the program staff members made themselves completely available to the COV, opened PAMS for an additional week, and the COV had ample time to look at the proposals and ask questions of the program directors during the review.

Dolbow thanked Gregurick for her leadership on this COV.

Reed noted the feedback from ASCAC and said he was hearing much appreciation for what the COV did and strong support for the current report. The report was approved with appropriate editorial changes.

Helland thanked Sarkar and Gregurick for their leadership on the COVs and noted that ASCR is already working on some of the recommendations discussed.

NEW CHARGE

Barbara Helland, Associate Director, ASCR, explained the new charge requests ASCAC to assess and document ASCR's historical accomplishments over the past 40 years, highlighting examples and lessons-learned. Four questions to address focused on major scientific accomplishments, impacts on the DOE missions, investment strategy, and future research areas and funding strategies. Helland noted that ASCR grew out of Basic Energy Sciences (BES) in 1995.

Discussion

Hey noted **Alex Lazelere's** excellent work on the stockpile stewardship program. **Lazelere** said he would be happy to help.

Chen asked if there was coordination between SC offices to identify shared accomplishments. **Helland** said while there is no formal coordination she would advise the ASCAC committee on the BES committee chair to facilitate the conversation.

Reed asked ASCAC members to consider participating and said he will construct a subcommittee.

Levermore stated that proactive coordination between the BES and ASCR committees was warranted and expressed concern that there may be redundancy. **Helland** noted that BES is six months ahead but the two offices will coordinate as much as possible. Even though ASCR was part of BES, ASCR has roots in nuclear security; the ASCR program grew out of LANL.

Dunning said that HPC will be topic of discussion at the upcoming BES workshop on January 17, 2018. He indicated that BES is looking at the impact HPC has had on the BES mission as opposed to any significant development in HPC itself. **Chen** echoed Dunning's statement speculating that BES may focus more on the science and applications enabled by HPC. **Helland** stated that what she read did not address the work ASCR had done over the years, especially SciDAC and other programs.

Reed mentioned having presentations or an event at the SuperComputing conference. **Helland** also suggested the Computational Science Graduate Fellowship annual conference and thought this was a way to encourage young investigators. **Dunning** thought it wise to consider outreach efforts stemming from information gained for the charge.

PUBLIC COMMENT AFTER WHICH ASCAC WILL ADJOURN FOR THE DAY

None.

Chalk requested that all ASCAC members let her know of their attendance on the teleconference and announced the next ASCAC meeting will be in April 2018. **Reed** reminded ASCAC to send feedback on the virtual meeting and adjourned the meeting at 3:25 p.m. EDT.

Respectfully submitted,
January 10, 2018
T. Reneau Conner, PhD, PMP, AHIP
ORISE