

National Science Foundation Advisory Committee for Cyberinfrastructure (ACCI)

Spring Meeting, April 10th-11th, 2019

Meeting Minutes

Day 1 (April 10, 2019)

ACCI Welcome and Committee Introductions

Gwen Jacobs, Chair, ACCI

Gwen Jacobs began the meeting, went through the agenda, and allowed current members to introduce themselves. Five new members were welcomed to the Committee, Deborah Dent, Susan Gregurick, Ruth Marinshaw, Ellen Rathje, and Valerie Taylor. Dr. Jacobs also notified the Committee and members of the public who were present that the proceedings would be audio-captured. The transcript is used to create the minutes and resolve questions of fact from the AC members. The transcript is not retained as part of the record of the meeting and is purged after the minutes were created and approved by the AC.

Updates from the Office of Advanced Cyberinfrastructure

Manish Parashar, Office Director, Office of Advanced Cyberinfrastructure (OAC)

Manish Parashar gave an overview of activities carried out by OAC. Manish began by pointing out the recent image capture of a black hole by the Event Horizon Telescope, along with the NSF-funded CI that contributed to it. After going through an overview of OAC activities, several OAC program directors gave programmatic updates related to Learning and Workforce Development, High-Performance Computing, Software and Data Services, Networking and Cloud, Public Access, and Strategic Engagements. He concluded the update by discussing his OAC Vision and Blueprint, the Future of Facilities' Science and CI, CI and AI, as well as Strategic Partnerships across NSF and toward national priorities.

Committee Discussion and Q&A covered Committee interest in translational CI research, partnerships with commercial cloud services, demographics of Cybertraining proposer domains, and software services.

Working Group Breakouts

Gwen Jacobs, Chair, ACCI

Gwen Jacobs led a discussion on the two working groups discussed last Fall (Sustainability and Reproducibility) along with a new possible working group (CI Research Innovation). After the discussion, the Committee split into three groups, one for each proposed working group, to discuss their charges and plans of action.

Update on CISE Directorate Activities

Jim Kurose, Assistant Director, Computer & Information Sciences & Engineering (CISE) Directorate

Jim Kurose gave an overview of recent updates within the directorate. He began by showing the alignment of CISE activities with Administration and Congressional Priorities; the recently signed executive order on Artificial Intelligence being called out specifically. He went through a breakdown of the CISE budget by programmatic areas, including infrastructure investments and research investments across all CISE divisions. He discussed the overlap of computer science and cyberinfrastructure with several of the NSF Big Ideas, focusing on some examples within Multi-messenger Astrophysics and Navigating the New Arctic. Five of the big ideas (Harnessing the Data Revolution (HDR), Future of Work at the Human-Technology Frontier (FW-HTF), Quantum Leap (QL), and Mid-Scale Research Infrastructure) have released CISE-focused solicitations so far in FY 2019. Some time was given to the Convergence Accelerators, meant to be more mission driven, use-inspired, transition to practice activities. In addition to the Frontera acquisition described earlier in the day, the Exploring Clouds for Acceleration of Science (E-CAS) partnership with Internet2 was briefly described. Two CISE research infrastructure solicitations were highlighted: CISE Community Research Infrastructure (NSF 19-512) and Cloud Access (NSF 19-510). Several education and workforce activities, including CSforAll and Computing in Undergraduate Education, were described.

Panel with Consortia Representatives

Sharon Broude Geva, Coalition for Academic Scientific Computation (CASC)

Thomas Cheatham, Campus Research Computing Consortium (CaRCC)

John Towns, Practice and Experience in Advanced Research Computing (PEARC)

Gwen Jacobs introduced a session to hear from three community consortia representatives. Three questions were posed to each consortia representative:

- 1) Who are your members?
- 2) What is your scope?
- 3) What is your contribution to our role in provisioning advanced cyberinfrastructure and cyberinfrastructure services?

Sharon Broude Geva began with an overview of the mission of CASC, which is to “further the development of a national infrastructure of advanced scientific computing, communications and education resources. CASC will cultivate the funding of, and support for, high performance computing and communications initiatives in support of academic institutions.” CASC’s constituency was described as “People whose role focuses on strategy, vision, policy, funding, and advocacy of advanced research computing within their institution or organization.”

Thomas Cheatham described the Campus Research Computing Consortium (CaRCC). This consortium came from the previously NSF funded Advanced Cyberinfrastructure Research & Education Facilitators (ACI-REF) program. System administration professionals, software professionals, CI engineers, campus champions etc., wanted to collaborate. Currently about 35 universities are involved in CaRCC. The vision of CaRCC is “to advance the frontiers of research at academic institutions by supporting on-campus awareness and facilitation services related to computation for researchers, including inter-institutional

resources and knowledge sharing among research computing professionals, and continuous innovation in research computing (and data) capabilities.” Framework for research computing and data work categorized into Researcher facing, Systems facing, Software/Data facing, and Sponsor/Stakeholder facing roles. Current model focuses on what CaRCC “does” vs what CaRCC “is.”

John Towns discussed the roles of the Practice and Experience in Research Computing (PEARC) consortium. PEARC mission is “providing a forum owned by the community to foster exchanges around the ‘state of the practice’ in advanced research computing – discussing challenges, opportunities, solutions, and best practices.” Main activity is an annual conference planned by a steering committee with sessions targeted at the interests of the practitioner community. The annual conference also includes student programs, with 75-100 students involved each year. The annual conference was originally run by XSEDE. Since then there have been two PEARC Conferences, PEARC17 – New Orleans, LA and PEARC18, Pittsburg, PA. This year PEARC19 will be held in Chicago, Ill. PEARC20 will be held in Portland, OR and is now sponsored by ACM SIGHPC.

Outstanding Issues from Day 1

Gwen Jacobs, Chair, ACCI

Gwen Jacobs began the second day of the meeting with approval of the Fall meeting minutes. Dates for next Fall were discussed and tentatively agreed to September 18-19, 2019. Manish Parashar provided the required annual update on steps OAC has taken to address recommendations in the 2017 Committee of Visitors (COV) assessment of OAC activities from 2013-2016.

An overview of expectations for ACCI working groups was discussed. Each of the three working groups (reproducibility/replicability, sustainability, and CI research) gave presentations going over the previous day's discussion.

Preparation for visits by NSF Assistant Directors and Office Heads

Gwen Jacobs, Chair, ACCI

Members of ACCI prepared questions and logistics for the visit from Assistant Directors and Office Heads

Visit by NSF Assistant Directors and Office Heads

Kelli Craig-Henderson, Deputy Assistant Director, Social, Behavioral, and Economic Sciences Directorate (SBE)

Stephen Meacham Section Head, Section Head for Integrative Activities, Office of Integrative Activities (OIA)

Deborah Lockhart, Deputy Assistant Director Mathematical and Physical Science Directorate (MPS)

Sam Howerton, Deputy Office Director, Office of International Science and Engineering (OISE)

Jim Kurose, Assistant Director, Computing and Information Science and Engineering Directorate (CISE)

Bill Easterling, Assistant Director, Geosciences Directorate (GEO)

Karen Marrongelle, Assistant Director, Education and Human Resources Directorate (EHR)

Joanne Tornow, Assistant Director, Biological Sciences Directorate (BIO)

Dawn Tilbury, Assistant Director, Engineering Directorate (ENG)

Douglas Maughan, Office Head, Convergence Accelerator (C-Accel)

Kelly Faulkner, Office Head, Office of Polar Programs (OPP)

- Bill Easterling of the Geosciences (GEO) directorate, discussed the challenges facing the Geosciences, such as how modeling the atmosphere necessitates including ocean, land, and space weather into some calculations. He noted the Cheyenne machine, a 5.34PF supercomputer, was recently inaugurated at the National Center for Atmospheric Research (NCAR). He also discussed the Earthcube program, which has many CI focused projects and activities.
- Jim Kurose (CISE) highlighted the updated CISE Community Research Infrastructure (CCRI) program.

- Dawn Tilbury (ENG) discussed a large need among engineering disciplines for standards, such as data structures, data storage, and software.
- Douglas Maughan (C-Accel) discussed the new convergence accelerator at NSF and the transition of research activities to applications and to market.
- Samuel Howerton (OISE) highlighted the challenging issue of providing good domestic policy and how it fits in internationally.
- Deborah Lockhart (MPS) described the diversity of the MPS directorate, with different computational and cyber needs. Stakeholders range from single investigators to large teams, including large facilities with unique CI needs. As an example, the LHC high luminosity upgrade is a current large facility project with an estimated completion in 2026. This project will come with a huge influx of data. The cost of data transfer to the various centers was noted as a big concern. One example of partnering with OAC is the recently awarded Institute for Research and Innovation in Software for High-Energy Physics (IRIS-HEP), but several challenges remain. Other examples with large data challenges include the Laser Interferometer Gravitational-Wave Observatory (LIGO) and Large Synoptic Survey Telescope (LSST).
- Stephen Meacham (OIA) discussed his office's role in coordinating crosscutting efforts, including Major Research Instrumentation (MRI) and Science & Technology Centers program, which include cyberinfrastructure. OIA also has a large focus on EPSCoR.
- Joanne Tornow (BIO) discussed her directorate's large span from molecular to ecosystem science. Such research is rich in multi-dimensional data. One major challenge mentioned was the integration of heterogeneous datasets. While software is needed in many fields, the question is whether it needs to be written from scratch for every case. Large scale recapitulates the same problem: software and data developed from scratch. Data integration challenges are not unique to BIO, so OAC plays a great role in identifying parallel efforts that could be learned from.
- Kelly Craig-Henderson (SBE) highlighted the broad range of disciplines supported under SBE with different CI needs. One role of the directorate is support of large nationally representative surveys. Effectively using administrative data and survey data is a large data challenge. Investigators within SBE that rely on data coming from psychological, neural, and behavioral research face unique interoperability issues. One program in SBE particularly relevant to CI is RIDIR: Resource Implementation for Data Intensive Research in SBE sciences. SBE also has a large role in artificial intelligence research. One last point: in addition to the challenge of workforce itself, there is a problem of lack of access to high-performance computing by SBE researchers.
- Kelly Falkner (OPP; relayed by Patrick Heimbach) highlighted a successful collaboration between OAC and OPP on the development of a very high resolution model of Arctic and Antarctica elevation maps.

A common refrain across virtually all the discussants was the challenge of attracting and retaining highly skilled research staff given the opportunities available in industry.

Preparation for visit by NSF Chief Operating Officer

Gwen Jacobs, Chair, ACCI

Members of ACCI prepared questions and logistics for the visit from the Chief Operating Officer of NSF, Fleming Crim.

Visit by NSF Chief Operating Officer

Fleming Crim, Chief Operating Officer, National Science Foundation

Fleming Crim began by highlighting the recent construction of an image of a black hole by the Event Horizon Telescope; especially the photos of palettes full of hard drives being shipped to data processing facilities. Fleming was complemented by members of the Committee for the NSF role on the breakthrough as well as the public press surrounding the discovery.

Fleming discussed the NSF budget. The new budget of 8.1B dollars will be the first time over \$8B for NSF funding. Budget discussions started the previous spring/summer. In the fall, NSF submits their budget to the Office of Management and Budget (OMB). Several iterations ensue over the next few months. After all such “passback,” the NSF budget is folded into the President’s budget proposal. Current budget request for the following year is \$7.1B and is currently being considered by congress.

Of note beyond NSF within the government, Kelvin Droegemeier was recently confirmed to the Office of Science & Technology Policy (OSTP) and integrating himself into the process. NSF has always worked closely with OSTP, such as the recent rotation Jim Kurose served over several months.

Regarding Convergence Accelerators: the idea is to build public-private partnerships and produce deliverables from research. Two main big ideas for focus of this effort is HDR and Future of Work. NSF is delighted to welcome Douglas Maughan as Director of the accelerator office.

The positioning of OAC within CISE remains strong and critical to NSF as a whole. Any future leader of CISE require the understanding of this positioning.

OAC blueprint document has been getting a lot of feedback.

Collaboration with BIO on a CI center of excellence.

During large facilities meeting in Austin, recent OAC investments in Stampede 2 and Frontera were showcased.

Discussion

The challenge of employing CI professionals was discussed at length. The incentive structures of national labs, university applied science labs, and other retention efforts were pointed out by members of the Committee. Cybertraining initiatives recently put forward by OAC were noted as positive by members of the Committee. Sometimes faculty dedicated to cybertraining as not seen as “rewarded” as other faculty getting funded for “core” research. Sometimes the faculty doing cybertraining are females or other minorities, and it is important to ensure they are recognized for their contributions.

Can NSF fund the transformation of public education? NSF can fund specific *research* that can transform education, though it is hard to support the effort directly. Jim Kurose interjected that NSF *can* inject something in a scalable way. For example, in the NSF CS4All activity resulted in 60,000 students taking the new CS AP exam. The question is what can be done with a relatively small scale of funding.

Wrap up, next steps, and adjourn

Gwen Jacobs, Chair, ACCI

The logistics of working group activities was discussed. Gwen Jacobs went over options for agendas in future meetings, including inviting speakers of interest to the Committee. Feedback on the meeting was requested, and members praised the agenda structure and materials.

The meeting was adjourned at 2pm.

APPENDIX: ACCI Member Attendee List

Tilak Agerwala

Deborah Dent

Daniel Goroff

Patrick Heimbach

Gwen Jacobs

Ed Lazowska

Rich Loft (remote)

Ruth Marinshaw

Valerio Pascucci

Kristin Persson (Day 2)

Michela Taufer

Valerie Taylor (remote)