

**National Science Foundation
Directorate for Computer and Information Science and Engineering
Advisory Committee (CISE AC)**

December 7-8, 2016

**National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230**

Meeting Summary

The winter meeting of the National Science Foundation's (NSF) Directorate for Computer and Information Science and Engineering (CISE) Advisory Committee (AC) was held at NSF on December 7-8, 2016.

Wednesday, December 7, 2016

Welcome, Introductions, Review of Agenda, and Approval of Minutes

Drs. Fran Berman and Rob Rutenbar, CISE AC co-chairs, opened the meeting at 12:30 p.m. Three new members were introduced: Andrea Goldmith (Stanford University), Greg Hager (Johns Hopkins University), and Patricia "Pat" Teller (University of Texas at El Paso). After introductions of all members in attendance, Dr. Berman reviewed the meeting agenda, and the CISE AC members unanimously approved the minutes from the May 2016 meeting.

NSF and CISE Update

Dr. Jim Kurose, Assistant Director (AD) of NSF for CISE, welcomed the AC members. Dr. Kurose provided an update on recent activities for the agency and directorate. As part of his update, Dr. Kurose mentioned that the Division of Advanced Cyberinfrastructure had been renamed the Office of Advanced Cyberinfrastructure, an outcome of the realignment review that was described at the November 2016 meeting of the National Science Board. He also announced Dr. Lynne Parker's departure to become the Associate Dean of Engineering at the University of Tennessee at Knoxville. Dr. Kurose announced new programs that NSF and CISE had launched since the preceding CISE AC meeting, including Platforms for Advanced Wireless Research (PAWR), Smart & Connected Communities (S&CC), Computer Science for All: Researcher-Practitioner Partnerships (CSforAll: RPP), and Transdisciplinary Research in Principles of Data Science (TRIPODS). He provided updates on the Big Data Regional Innovation Hubs and Spokes (BD Hubs and Spokes) program and CISE's Mid-Scale Research Infrastructure investments. He ended by discussing the recent trends of increased enrollments, including among women, in computer science and engineering programs across the U.S.

Updates on National Priorities and Industry Collaborations

Dr. Ken Calvert, Division Director for Computer and Network Systems, provided an

update on PAWR and S&CC, noting that these new activities were enabled by strong foundational research supported by CISE over the last several years. He also described a number of new programs in partnership with industry, including the NSF-Intel Partnership on Information-Centric Networking in Wireless Edge Networks (ICN-WEN) and NSF-VMware Partnership on Software Defined Infrastructure as a Foundation for Clean-Slate Computing Security (SDI-CSCS) programs. The CISE AC members expressed their enthusiasm for the participation of industry in CISE activities, particularly in the PAWR program, where a consortium of 24 leading companies and associations is contributing \$50 million in cash and in-kind contributions to support the envisioned research platforms.

Dr. Rao Kosaraju, Division Director for Computer and Communication Foundations, described TRIPODS, as well as another new program, Scalable Parallelism in the Extreme (SPX), which aligns with CISE's efforts in the National Strategic Computing Initiative (NSCI). He also provided an overview of new programs joint with industry, such as Energy-Efficient Computing: from Devices to Architectures (E2CDA), which includes participation from the Semiconductor Research Corporation (SRC), and the NSF/Intel Partnership on Computer Assisted Programming for Heterogeneous Architectures (CAPA).

Presentation and Discussion of the CISE AC Data Science Subcommittee Report

Dr. Rutenbar, co-chair of the CISE AC Subcommittee on Data Science, opened the discussion of the report by the subcommittee, introducing the process, charge, and motivation. The report identified areas for potential NSF investment, including data science research, education and training, and infrastructure in support of research and education, each with specific recommendations.

Dr. Kurose expressed his appreciation for the subcommittee's work and the report's connection to NSF's Harnessing the Data Revolution (HDR) Big Idea.

A vote approving the report was held the following morning.

NSF Big Ideas Updates and Discussion

The discussion of NSF's Big Ideas began with an overview of the Work at the Human-Technology Frontier (W-HTF) Big Idea. Dr. Fay Lomax Cook, the AD of NSF for Social, Behavioral, and Economic Sciences (SBE), described the motivation and key research areas underlying this Big Idea. Co-chairs for the W-HTF Working Group, Drs. Howard Nusbaum (Division Director for Behavioral and Cognitive Sciences in SBE) and Lynne Parker (Division Director for Information and Intelligent Systems), joined Dr. Cook, leading an engaging discussion of some of the emerging research challenges and opportunities. Topics included human-robot collaborations, virtual interactions, autonomous system decision making and recommender systems, incentivizing public good/ethics, and workforce training.

The meeting adjourned for the day at 5:30 p.m.

Thursday, December 8, 2016

Welcome

Drs. Berman and Culler reconvened the meeting at 8:30 a.m. for its second day. A vote on the report from the CISE AC Data Science Subcommittee was held, and the CISE AC members unanimously approved it.

NSF INCLUDES Discussion

Drs. Suzi Iacono (Head, Office of Integrative Activities), Sylvia James (Division Director for Human Resource Development in the Directorate for Education and Human Resources), and Barry Johnson (Acting Deputy AD of NSF for Engineering) joined the CISE AC for an overview and discussion of another Big Idea, NSF INCLUDES (Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science).

NSF INCLUDES seeks to diversify the composition of the science and engineering workforce to better reflect the diversity of the U.S. This Big Idea comprises three principal stages:

1. Design and Development launch pilots: plan activities and lay the foundations for potential partners with an emphasis on scaling;
2. Alliances: support local/regional and discipline-specific or crosscutting multi-stakeholder partnerships and networks to scale broadening participation challenges; and
3. A backbone organization: provide cohesiveness across all projects (launch pilots and alliances).

Discussion enabled many of the CISE AC members to clarify questions about the effort and help to relay specific challenges within the CISE community in broadening participation.

Meeting with Dr. Richard Buckius, NSF Chief Operating Officer

Dr. Richard Buckius, NSF Chief Operating Officer, joined the CISE AC, thanking the members for their work, and in particular, their thoughtful input on the realignment review for NSF's investments in advanced cyberinfrastructure as well as their thorough report from the CISE AC Data Science Subcommittee. Dr. Buckius mentioned the increased need and importance of educating Congressional members about NSF-funded activities within their districts. The discussion also spanned the rising undergraduate enrollments in computer science, growing collaborations with industry, and increased demands on NSF funding.

CISE AC Retiring Members' Reflections

Dr. Kurose thanked retiring CISE AC member Dr. Alex Szalay, who offered a short reflection about his time on the CISE AC, stating that, despite his background in physics and astronomy, he felt very much at home with the CISE community.

Looking Forward

Dr. Kurose noted that this was Dr. Berman's last meeting as co-chair and that a new co-chair would be announced soon.

Reflecting on the meeting, he mentioned another issue that the CISE community faces: the growing demand for computer science faculty in a time when many Ph.D. graduates are going on to work in the private sector. He also mentioned the need to better recruit program officers who come on temporary Intergovernmental Personnel Act (IPA) appointments to NSF/CISE; he suggested that the community could facilitate such recruitment by developing testimonials about the experiences of past NSF/CISE IPAs.

Closing Remarks and Wrap-up

In closing, Drs. Berman and Rutenbar thanked Dr. Kurose, CISE staff, and the CISE AC members for a successful meeting.

The meeting adjourned just before 12:30 p.m.

Appendix 1: Attendance

CISE AC Members Present:

Francine Berman, Rensselaer Polytechnic Institute
Thomas Cortina, Carnegie Mellon University
David Culler, University of California, Berkeley
Deborah Estrin, Cornell Tech
Michael Franklin, University of California, Berkeley
Andrea Goldsmith, Stanford University
Greg Hager, Johns Hopkins University
Brent Hailpern, IBM Research, Almaden
Charles Isbell, Jr., Georgia Institute of Technology
Margaret Martonosi, Princeton University (*participated December 8, 2016*)
Craig Partridge, Raytheon BBN Technologies
Padma Raghavan, Pennsylvania State University
Rob Rutenbar, University of Illinois at Urbana-Champaign
Robert Schnabel, Indiana University (*participated via phone December 8, 2016*)
Victoria Stodden, University of Illinois at Urbana-Champaign
Alex Szalay, Johns Hopkins University
Pat Teller, University of Texas at El Paso

CISE AC Members Absent:

Vijay Kumar, University of Pennsylvania
Peter Lee, Microsoft Research
Bob Sproull, University of Massachusetts, Amherst