National Science Foundation (NSF)

Computer and Information Science and Engineering (CISE)
Advisory Committee (AC)

Meeting Minutes

Meeting Summary

The Advisory Committee (AC) for the National Science Foundation's (NSF) Directorate for Computer and Information Science and Engineering (CISE) convened on June 13 and 14, 2024. The meeting was held in person and virtually.

Thursday, June 13, 2024 (all times Eastern)

12:00 PM Welcome, introductions, review of agenda, and approval of minutes

CISE AC co-chair Dr. Enrico Pontelli opened the meeting. All members of the AC were asked to think about the challenges facing CISE in the future. Attending AC members and NSF staff gave introductions to the group. Minutes from the December 2023 meeting were approved unanimously.

12:15 PM New member welcome and introduction

New AC member Dr. Scott Acton (University of Virginia) introduced himself and discussed his research and previous work at NSF. He highlighted his excitement about several CISE programs, including Smart and Connected Health, Foundational Research in Robotics, and the AI Institutes.

12:30 PM NSF and CISE update

Dr. Greg Hager, the incoming Assistant Director for CISE, gave his first update for the AC. He covered his background in computer science and the role that federal funding has played in his career. He gave an update on the CISE budget and also discussed the strong progress made by CISE to comply with the 2023 AI Executive Order, including the launch of the National AI Research Resource pilot, several new AI Institutes, the introduction of several new programs (Future of Semiconductors 2, Chip Design Hub, Accelerating Computing-Enabled Discovery), and projects through the Expeditions in Computing program. He concluded by pointing to two key themes for the future of CISE: 1) catching up with rapid technology process, and 2) building NSF potential through creating and scaling partnerships.

1:45 PM Break

2:30 PM Update on Broadening Participation in Computing

Dr. Enrico Pontelli reported on the work of a new subgroup formed after the December 2023 AC Meeting focused on Broadening Participation in Computing (BPC), an initiative to increase the participation of women, persons with disabilities, African Americans, Hispanics and Latinos, American Indians, Alaska Natives, Native Hawaiians and other Pacific Islands in computing. The subgroup has been reviewing the previous strategic plan for BPC written in 2012. Because the field of computing has changed significantly in the past 12 years, the subgroup discussed the need to reassess the plan and to consider best practices. Planned actions for the near future include several roundtable discussions with stakeholders throughout summer 2024, which will inform a report to be written in the fall and presented at the next AC meeting in December 2024.

2:45 PM Update on Computing and Sustainability

Drs. Roch Guerin and Klara Nahrstedt reported on the NSF Workshop on Sustainable Computing for Sustainability held in April 2024. The workshop developed out of a report from the AC on "Computing for the Environment" and was designed to bring together researchers to explore how computing can deliver solutions to sustainability issues. The hybrid workshop had more than 250 attendees and included a session on team science for interdisciplinary research and two plenary panels with breakout sessions on the topics of sustainable computing and computing for sustainability. The results of the workshop are summarized in a draft report which should be released to the public by August. The report emphasizes several themes, including the importance of the human factor in sustainability, the role of multidisciplinary research in developing sustainable computing, and the need to elevate sustainability as a stand-alone research topic.

3:15 PM Break

3:30 PM CISE AC breakout discussions

1) Broadening participation in computing

This breakout session consisted of an information conversation led by Dr. Enrico Pontelli, focused around four topics: 1) General impressions of the BPC plan, 2) What is computing today?, 3) Suggestions for how to organize future roundtables, and 4) Other actions that could be taken to collect information to inform revision of the BPC plan.

AC members emphasized that the existing BPC plan is outdated, so updated data are needed to understand current demographics. Additionally, dramatic changes in computer science, such as the rise of AI, the importance of users and consumers, and new ethical concerns also impact students and training programs. The impact of enrollment caps on underrepresented groups was also discussed, as well as the demographics of bridge programs, which often include greater numbers of underrepresented people. Another challenged discussed was balancing the role of fields like computer science in sustaining the enrollment of men in college with the

desire to increase gender parity in the field. Other topics discussed include the role of micro-credentials and whether they create or mitigate further marginalization. The group also weighed the merits of organizing roundtables around specific topics vs. particular stakeholder roles and settled on trying to include both approaches.

2) Computing and sustainability

This breakout session discussed the need for better understanding and communication between computer scientists and environmentalists, the need to understand the computing costs of different models and processes (e.g., environmental costs of digital twins), and the costs of maintaining (or failing to maintain) research software, as well as the energy costs of data-centers. Some of the central questions discussed from the "Sustainable Computing" half of the workshop were how to fund sustainable computing and the potential for international collaboration on sustainability, as well as how to facilitate avenues for scholarly discourse on this topic. On the "Computing for Sustainability" side of the workshop, key topics included climate modeling, agriculture and food systems, and smart infrastructure/buildings and materials.

4:30 PM Reports following breakout discussions

The breakout session leaders summarized the major discussion point in each of the breakout sessions. The discussion included the importance of cross-directorate collaborations.

4:50 PM Recap of Day 1 and look-ahead to Day 2

Co-Chair Dr. Enrico Pontelli provided an overview of Day 1 and asked attendees to prepare their thoughts for the Day 2 discussion with NSF COO.

5:00 PM Adjourn for the day

Friday, June 14, 2024 (all times Eastern)

11:00 AM Welcome and overview of day

AC co-chair Dr. Klara Nahrstedt provided an overview of the day's agenda. The AC also approved the draft of the sustainability report presented on day 1, subject to possible further editorial changes.

11:15 AM CISE management response to the Committee of Visitors for Computing and Communication Foundations, Computer and Network Systems, and Information and Intelligent Systems

Deputy Assistant Director of CISE Joydip Kundu reviewed the 2023 Committee of Visitors (COV) report on the work of three divisions of CISE (CCF, CNS, and IIS) between 2019 and 2022 and reported on CISE leadership plans to address the COV's recommendations. Overall, the COV was impressed with the quality and integrity of CISE's work, but reported concerns about the sustainability of the current staffing and budge levels. The COV also had specific recommendations regarding how to best fulfill NSF mission's, increase access and inclusion, updates to programs and portfolios, training of reviewers, and communicating project outcomes.

12:00 PM CISE impacts

Leading directly from the discussion of the COV recommendations, Dr. Nina Amala and the AC discussed ways to engage the research community and communicate the long-term impact of CISE-funded projects, such as creating a "Test of Time" award or another activity to highlight how sustained funding in the field has led to transformative change over time. The AC also discussed the difficulties of tracking progress and impact after a grant had ended and possible mechanisms for continued contact with PIs.

12:15 PM CISE AC liaison status reports

Dr. Andrew Chien, the CISE AC liaison to the NSF Advisory Committee for Cyberinfrastructure (ACCI), reported on the spring meeting of the ACCI and the recent activities of the Office of Advanced Cyberinfrastructure (OAC). The ACCI is forming a subcommittee on the NAIRR to support the pilot and to address issues of concern, including funding, access, industry partnerships, and intellectual property. The AC also discussed the need for inter-agency cooperation on cyberinfrastructure, as well as the need to develop regional scale academic partnerships to share infrastructure and expertise. The discussion also touched on workforce development and how best to support those working in cyberinfrastructure and computational sciences who may not be tenured professors.

12:30 PM Break

1:15 PM Challenges facing the computing research and education community

AC co-chairs Drs. Klara Nahrstedt and Enrico Pontelli led a discussion of the key issues facing computer science education and research. The discussion focused particularly on the need for students to receive training about the human and environmental impacts of computing, particularly the importance of systems thinking and ethics. Additionally, AC members advocated for thinking about computer science education broadly beyond just majors and instead as a fundamental literacy similar to writing. The AC also discussed the need for cross-directorate programs related to AI and the role of generative AI in both student-produced work and student assessment, but were also concerned about AI eclipsing other fundamental aspects of computing in both teaching and research. AC members also discussed the looming

demographic cliff facing colleges in the next decade, which is predicted to impact EPSCoR states disproportionately.

2:15 PM Prep for visit by the NSF Chief Operating Officer

The AC reviewed key themes to present to the COO, including computing and sustainability and broadening participation in computing. The AC also emphasized that CISE is now at the core of NSF's work because of AI and that this has placed demands on CISE from other directorates, but that CISE is more than AI. The AC also discussed the importance of the NAIRR and the need for additional investment in that project.

2:45 PM Break

3:00 PM Meeting with NSF Chief Operating Officer

The AC presented their work to Dr. Karen Marrongelle, the Chief Operating Officer of NSF, beginning with a review of the recent workshop on computing and sustainability by Dr. Roch Guerin. Dr. Marrongelle agreed that computing plays a large role in tackling issues of sustainability and climate and recommended that the AC get in touch with the environmental justice group at NSF. Dr. Beth Mynatt presented the BPC plan and the need for updated data regarding demographics and impact, as well as the goal of looking more holistically at how students are engaging with computer science by including a wide range of types of institutions, majors, and types of training programs. Dr. Vint Cerf discussed responsible AI and the impact of technology on society, especially in the realm of software.

Dr. Marrongelle responded by noting that this is an exciting time in computing, with both a ripeness and responsibility for innovation in the curriculum. She notes that the status quo is not serving all students or the needs of the public, so innovation is necessary. She would like to support ways to think about next steps across the Foundation, including possibly developing a workshop on these topics.

The discussion then turned to the increasing demands on CISE and the looming demographic cliff facing all universities in the next decade, which will have greater impacts in EPSCoR states. Dr. Marrongelle acknowledged these issues and will follow up with incoming CISE AD Greg Hager.

3:30 PM Discussion among AC members following meeting with NSF COO

The AC continued the discussion about changes in higher education and the need for innovation in curriculum design in computing-related fields. They also made note of Dr. Marrongelle's suggestion of convening a workshop on broadening participation in computing. They suggested a further action item of reaching out to the NSF environmental justice group on the topic of sustainability and computing.

4:00 PM Departing Members' reflections

Three AC members, Terry Benzel, Muriel Medard, and Carla Gomes were invited to reflect on their time on the AC. Benzel and Medard attended virtually and Gomes sent a written statement. Dr. Benzel highlighted the challenges of the last 6 years, including the COVID-19 pandemic, but also the great successes, including the convergence accelerator, the BPC pilot, and cross-directorate collaboration. Dr. Medard echoed these sentiments and reflected that the magic of NSF is about alchemy between science and students. She believes there is a deep educational mission to train the next generation, not just about transition to practice. Gomes noted that this is an exciting time for computer science and urged NSF to support interdisciplinary collaboration. Greg Hager expressed thanks to the departing members for all of their hard work over their tenure on the AC.

4:30 PM Closing remarks

AC co-chairs Drs. Pontelli and Nahrstedt expressed appreciation for the challenges raised and solutions offered during the discussions. They also expressed excitement for the upcoming work that will be generated from this meeting, including potential new working groups. AD Greg Hager thanked co-chairs for attending in person and noted that the December AC meeting will be in person

4:45 PM Adjourn

Meeting attendees

Scott Acton
Annamalai Annamalai
Terry Benzel (departing reflections on day 2 only)
Vint Cerf (day 2 only)
Andrew Chien
Gabriela Cruz Thompson
Antonio Delgado
Brittany Duncan
Roch Guerin
Kinnis Gosha
Christopher Johnson
Raja Kushalnagar
Ran Libeskind-Hadas
Jeanna Matthews
Amy McGovern (day 1 only)
Muriel Medard (departing reflections on day 2 only)
Elizabeth Mynatt
Klara Nahrstedt

Timonthy Pinkston
Enrico Pontelli
Weisong Shi