National Science Foundation (NSF)

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

Minutes

Monday, May 16, 2022 (all times Eastern)

11:02 AM **Welcome, introductions, review of agenda, and approval of minutes**

Dr. Magdalena Balazinska, CISE AC Co-Chair, opened the meeting. Minutes were approved without objection.

11:06 AM **New members welcome and introductions**

The CISE AC members introduced themselves, including the two newest members, Dr. Raja Kushalnagar and Dr. Amy McGovern.

11:09 AM **NSF and CISE update**

Dr. Margaret Martonosi, Assistant Director for CISE, gave an update entitled, "The CISE Landscape: A Look Forward." Dr. Martonosi discussed the foundational, translational, and societal impacts of CISE, as well as how CISE advances national priorities, including economic drivers and emerging industries, cybersecurity and open-source security, information integrity, pandemic preparedness, and diversity, equity, and inclusion. Dr. Margaret Martonosi gave some key statistics for CISE, as well as the fiscal year 2022 and 2023 budgets. She also presented on five technical themes: a post-Moore's law world; the transcendence of AI; designing beneficial sociotechnical systems; climate and sustainability; and equity and broadening participation. Members of the CISE AC asked about collaborations between CISE and TIP, data repositories, collaborations across agencies, ethics curriculum, the CSGrads4All program, and the CISE core programs.

12:38 PM **Break**

1:45 PM **NSF activities towards geography of innovation**

Dr. Alicia Knoedler, Head of the Office for Integrative Activities, gave a presentation entitled, "Broadening Participation Related to Geography." Dr. Knoedler discussed the history of geographic participation at NSF, the EPSCoR (Established Program to Stimulate Competitive Research) program, and the geographical distribution of awards in select major programs. Dr. Knoedler then discussed the Committee on Equal Opportunities in Science and Engineering (CEOSE) and their biennial reports to Congress. The CISE AC members asked about how eligibility for Regional Innovation Engines will be measured, how minority serving institutions can be involved in these engines in a way that changes the dynamic with R1 universities, and the potential to embrace hybrid formats to encourage geographic diversity.

2:18 PM **CISE AC liaison status reports**

Dr. Charles Isbell Jr gave the update on the Advisory Committee on Environmental Research and Education (AC ERE). Dr. Isbell discussed two main themes from the committee relevant for computing: high performance computing (HPC) and machine learning. He then discussed two reports from the committee: one on the environment and human health and another on environmental change and human security.

Dr. Timothy Pinkston gave the update for the Committee on Equal Opportunities in Science and Engineering (CEOSE). Dr. Pinkston held a moment of silence for those slain in New York. He then discussed the future of

EPSCoR and *National Center for Science and Engineering Statistics data* and how to make populations which are less visible more visible, specifically with relation to intersectionality.

Dr. Padma Raghavan gave the update for the Advisory Committee on Cyberinfrastructure (ACCI). Dr. Raghavan discussed movement towards building ecosystems, looking more holistically, thinking translationally, and balancing innovative new machines with better understood hardware models. Dr. Raghavan stated that the ACCI will produce a report on workforce development in the fall, and that a workgroup on reproducibility had recently finished a report.

3:00 PM CISE AC Breakout discussions

Dr. Rob Rutenbar, CISE AC Co-Chair, introduced the two breakout sessions.

BREAKOUT 1: Climate Research

Dr. Magdalena Balazinska noted that the question for the group to consider during the breakout session concerned how CISE can contribute to and engage with research on environmental questions. Participants discussed a draft document being produced by a working group. Dr. Balazinska asked for the breakout participants' ideas about ways that the CISE community can help address climate change. Holding a summit and improving ways for disciplines in this area to access data stored on outdated equipment were discussed. Participants also considered the benefits of increasing interdisciplinary efforts and the barriers preventing these collaborations. Efforts focused on finding connections between technology and climate-focused publications were also discussed. The participants considered what NSF can do to encourage the enthusiasm that younger generations are showing about addressing climate change issues. Dr. Balazinska requested feedback regarding other ways that the community could contribute to addressing climate change. Roadblocks, such as owners not sharing data, as well as opportunities, including a project that collects and makes climate data available, and efforts to create benchmarks like ImageNet to facilitate learning and contributions in this area, were discussed as well. Participants noted several other ways that the computing community can contribute to addressing climate change, including building/operating data centers more sustainably, providing incentives for generating/using green energy, and using computing to support discoveries in many areas (e.g., using machine learning to train algorithms to control building cooling systems and reduce power consumption). Other suggestions included collecting a list of best practices for sustainability in computing, constructing a reading list for researchers wanting to learn more about climate change and computing, having a list of materials to read that go with a solicitation in this area, hosting a workshop on the subject, and NSF hosting a speaker series on this topic.

BREAKOUT 2: CISE Community Organization

Dr. Margaret Martonosi opened the breakout with questions on which cross-cutting societal challenges the CISE community is organized to address, which areas it is not, and who the stakeholders are. The CISE AC members discussed how physicists organize and come together, the importance of hiring, promotion, and tenure processes, and how the reception to diverse interests varies by institution. There was a discussion on whether computing is too broad of a community to come together and is potentially best thought of as multiple communities. Dr. Azer Bestavros mentioned a relevant report entitled, "Bridging the Computer Science – Law Divide." The CISE AC members discussed how institutions vary in their support for interdisciplinarity and how interdisciplinary work often needs a dynamic, evolving network structure as opposed to a hierarchical structure. The geography of inclusion was mentioned as a potential barrier to interdisciplinarity. Some institutions may easily facilitate bringing together researchers in different disciplines while others may not have the resources or breadth of expertise. Co-design and creation were mentioned as being important. The committee also discussed shared facilities, resources, and infrastructure as a way to bring people from different disciplines together. Members of the CISE AC discussed how more interdisciplinarity may be able to be introduced or encouraged at various career stages. For graduate education, the National Research Traineeship program (NRT) was mentioned. The replication model of many PhD programs was discussed, where programs are often focused on producing more professors. This replication model is not necessarily what CISE students need. The postdoc level was

then discussed, and fellowships that allow an individual to expand beyond their discipline were mentioned (example: https://www.bwfund.org/funding-opportunities/interfaces-in-science/career-awards-at-the-scientific-interface/). There was a discussion on junior faculty feeling interdisciplinary work is risky from a promotion and tenure perspective. Midcareer faculty may feel more empowered to work in interdisciplinary areas, and the Mid-Career Advancement (MCA) program that some directorates participate in was mentioned. There are trade-offs when deciding whether to support midcareer faculty on this transition versus focusing on ensuring early career faculty feel safe doing interdisciplinary work. Joint appointments and institutional culture were discussed as tools to encourage interdisciplinarity.

4:02 PM Reports following breakout discussions

Dr. Beth Mynatt summarized the CISE Community breakout. Time was spent discussing what a grand meeting of the field would look like, as well as whether or not it was scalable. Dr. Mynatt then broke up how to make interdisciplinarity possible into structures, mechanisms, and processes. On the point of structures, interdisciplinarity does not connect well to hierarchical structures and instead best flourishes under dynamic and evolving network structures. For mechanisms, Dr. Mynatt discussed the role of shared infrastructure as a means of encouraging collaboration. For processes, Dr. Mynatt discussed design methods and the importance of co-designing with others, rather than designing for others. Dr. Mynatt then discussed educational opportunities available to encourage interdisciplinarity at various career stages including graduate, postdoctoral, and midcareer, as well as the need to support individuals pre-tenure.

Dr. Magdalena Balazinska gave the summary for the climate change breakout. Dr. Balazinska summarized three ways for CISE to engage in environmental topics: improving the environmental footprint of computing systems themselves, using computing to decrease the negative environmental human impact of systems, and leveraging computing for the domains that focus on environmental and climate disciplines. She also discussed four possible lines of effort: (1) help bring communities together to build more integrated, multidisciplinary communities, (2) do a better job of percolating ideas in a bottom-up fashion, (3) build better infrastructure for benchmarks and data, and (4) partner with others working in this space. Dr. Balazinska went further into some of these, including how the software lifecycle creates complication for data longevity, the need for impactful interdisciplinary journals, the importance of creating pathways for students to get involved, and the potential need to examine how infrastructure is funded and maintained to better encourage sustainability.

4:43 PM Recap of Day 1 and look-ahead to Day 2

Dr. Rob Rutenbar went over the agenda for the next day.

4:45 PM Adjourn for the day

CISE Advisory Committee (AC) Meeting Minutes: Tuesday, May 17, 2022 (all times Eastern)

11:04 AM Welcome and overview of day

Dr. Balazinska reviewed the agenda for the day.

11:07 AM NASEM report on responsible computing research

The session began with a review of the summary of the NASEM report on responsible computing research. After the AC's internal discussion, the session was joined by Dr. Barbara Grosz, the chair of the NASEM report committee. She began her presentation with an overview of the scope of the study and its primary motivations. Next, she reviewed the ethical and societal impact concerns of computational research and advances, and the interactions between the ecosystems (technology innovation and computing research)

that drive advancements in the field. She reviewed Chapter 2 of the report, which covers the value and need for computer scientists to engage with expertise in ethics and sociotechnical systems. Following this, she reviewed the contents of Chapter 3 of the report, which identifies the roots of ethical and societal impact challenges for computing research and technologies. She concluded the presentation reviewing each of the eight recommendations in the report and the responsibilities for recommended actions of various stakeholders involved in computing research. The presentation was followed by a discussion session.

12:40 PM Break

1:46 PM Departing CISE Division Director reflections

Dr. Rob Rutenbar and Dr. Margaret Martonosi opened the session and introduced Dr. Henry Kautz and Dr. Rance Cleaveland. Dr. Henry Kautz was not in attendance but a pre-recorded video of his reflections on serving as a division director in CISE was played to the AC, during which he shared his proudest NSF-related impacts and accomplishments, like the AI Institutes and sunsetting of programs such as Big Data, SaAS, and NRI. He concluded his reflections by sharing the advancements in AI that make him optimistic about the future. Following Dr. Kautz's video, the AC heard from Dr. Rance Cleaveland. Dr. Cleaveland also shared his proudest NSF-related impacts and accomplishments, which included the people hired by CCF during his tenure and the launch of new programs such as Design of Accountable Software Systems (DASS). He shared that NSF's great workplace culture makes him optimistic for the future.

2:15 PM Prep for visit by the NSF Chief Operating Officer (COO) and Brian Stone (Chief of Staff)

The committee decided on discussing CISE's role in climate research, CISE community organization, ways of providing adequate support for mid-career researchers, and the NASEM report on responsible computing research.

2:45 PM Break

3:00 PM Meeting with NSF COO and Chief of Staff

The session started with remarks from NSF COO Dr. Karen Marrongelle. The first point of discussion covered the climate research breakout from the first day and how the CISE community can contribute to climate research. Dr. Balazinska shared the AC's thoughts on this topic such as how to make computing more sustainable and environmentally friendly, how computing advancements can reduce the environmental impacts of large-scale systems such as transportation and agriculture, and leveraging computing as a tool in climate research. Next, Dr. Rutenbar talked about the CISE community organization breakout session, which focused on addressing issues of how the CISE research community can more interdisciplinary. Dr. Karen Marrongelle shared her perspective that both topics of breakout discussion have a lot of overlap, highlighting that CISE's efforts to address climate challenges will require interdisciplinary approaches.

Next, AC member Dr. Amy McGovern discussed career challenges for mid-career computer science researchers, who are not as well supported as early-career researchers by NSF. She highlighted that industry is increasingly a more lucrative option for mid-career computer science researchers, which can lead to their exit from academia. NSF Chief of Staff Brian agreed that we should work towards making it easier and more transparent for researchers to move between industry and academia.

The final topic of discussion was the NASEM report on responsible computing research. Dr. Vint Cerf provided an overview of the report, including its primary motivation and recommendations, and how innovative hiring mechanisms at NSF could enable a greater flow of talent and expertise from industry to address ethical and sociotechnical challenges in computing research.

3:30 PM Discussion among AC members following meeting with NSF COO and Chief of Staff

The CISE AC continued the discussion from the previous session, which included the problem of PI's increasingly leaving academia for industry as they approach mid-career, addressing equity issues around access to resources such as high-quality datasets, enabling industry experts to serve at NSF and in CISE, and the future of NSF and CISE budgets. To close the meeting, the AC discussed if the next AC meeting in December should be hybrid with in-person attendance, which received enthusiastic support from several AC members.

4:04 PM Departing Members' reflections

Departing member of the AC, Dr. Charles Isbell, Jr., shared his reflections on serving on the CISE AC since 2009.

4:11 PM Closing remarks

4:13 PM Adjourn