Cloud for Computing Research and the CCC

March 21, 2022
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Lehigh University
Vice Chair, CCC

CCC
Computing Community Consortium
Catalyst

The Computing Community Consortium (CCC)

- Established in 2006 as a standing committee of the Computing Research Association (CRA).

- Funded by NSF under a Cooperative Agreement.

- Facilitates the development of a bold, multi-themed vision for computing research and communicates that vision to stakeholders.

- Led by a small but broad-based Council.

- Staff based at CRA.
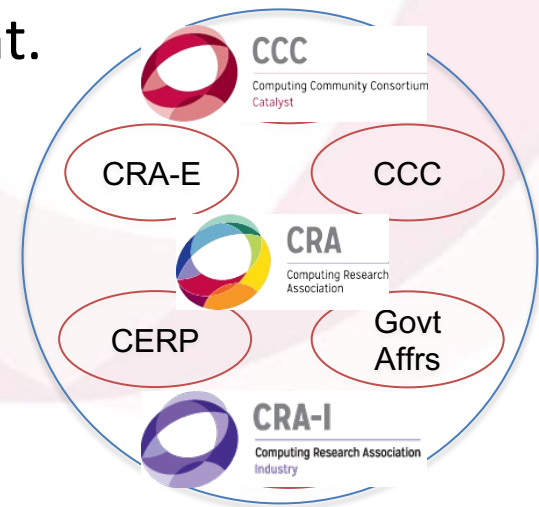
CCC's Mission

"A catalyst and enabler for the computing research community"

- Respond rapidly to requests and opportunities.
- Bring the community together to help shape the future of the field.
- Provide leadership for the community, encouraging revolutionary, high-impact research.
- Encourage the alignment of computing research with pressing national priorities and national challenges (many of which cross disciplines).
- Work with policymakers to facilitate the translation of these important research directions into funded programs.
- Give voice to the community, communicating to a broad audience the many ways in which advances in computing will create a brighter future.
- Help develop new leaders for the computing research community.

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How We Do This

- ❖ Visioning workshops
- ❖ Activities at conferences
- ❖ White papers & social media
- ❖ Roadmaps & reports
- ❖ DC symposia
- ❖ Human development

Communication is Key

- Visioning Workshops
  - reports, slide decks, briefings, ...
- White Papers
  - informs policymakers and the broader community about issues that are apropos of national priorities
- CCC Blog
  - Provides a continuous stream of information on advances in computing research, opportunities for community to get involve, forum for community discussion
- Website
  - Collection of resources
- Great Innovative Ideas
  - Showcases the exciting new research and ideas generated by the computing research community
- "Catalyzing Computing" Podcast
  - Features interviews with researchers and policy makers about their background and experiences
- Blue Sky Conference Tracks
  - Encourages submissions that are open-ended and possibly "outrageous" or "wacky"
- Events
  - CCC Symposium, CRA Snowbird, Early Career Researcher Symposium, ...
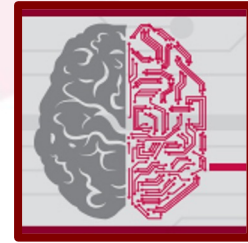
Evolving Methods for Evaluating and Disseminating Computing Research

The CCC Blog

BLUE SKY IDEAS
CONFERENCE TRACKS

CATALYZING COMPUTING

COMPUTING RESEARCH
ADDRESSING NATIONAL PRIORITIES AND SOCIETAL NEEDS

Early Career RESEARCHER SYMPOSIUM

The CCC Council

Chair: Liz Bradley, University of Colorado Boulder
Vice Chair: Dan Lopresti, Lehigh University

Terms ending June 2024
- David Danks, UC San Diego
- Sven Koenig, University of Southern California
- Chandra Krintz, UC Santa Barbara
- William Regli, University of Maryland
- Mona Singh, Princeton University
- Ufuk Topcu, University of Texas at Austin

Terms ending June 2023
- Nadya Bliss, Arizona State
- William D. Gropp, Illinois Urbana-Champaign
- Brian LaMacchia, Microsoft Research
- Melanie Moses, University of New Mexico
- Holly Yanco, University of Massachusetts Lowell

Terms ending June 2022
- Sujata Banerjee, VMware
- Elisa Bertino, Purdue University
- Tom Conte, Georgia Tech
- Maria Gini, University of Minnesota
- Chad Jenkins, University of Michigan
- Melanie Mitchell, Portland State University
- Katie Siek, Indiana University
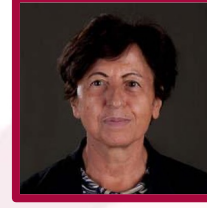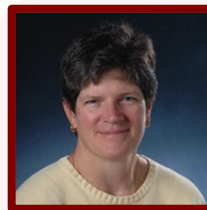
CCC White Papers

CCC-Led White Papers

General	Intelligent Infrastructure	Toward a Science of Autonomy for Physical Systems

Big Data and National Priorities	2020 Quadrennial Papers	Pandemic Informatics Addendums

screenshot

National Discovery Cloud 2021

April 2021

Ian Foster, Daniel Lopresti, Bill Gropp, Mark Hill, Katie Schuman

For citation use: Foster I., Lopresti D., Gropp B., Hill M., & Schuman K. (2021) *National Discovery Cloud 2021.* https://cra.org/ccc/resources/ccc-led-whitepapers/

[BibTeX] [Download PDF]

A National Research Agenda for Intelligent Infrastructure: 2021 Update

December 2020

CCC by CS Area
Ongoing CCC Activities
Recent CCC Activities
Workshop Reports
CCC-Led Whitepapers
Catalyzing Computing Podcast
CRN Articles
Presentations
Computing Research in Action
Computing Research Highlights
CCC Responds to the Community
Event Videos

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Pandemic Informatics / Infrastructure

Pandemic Informatics: Preparation, Robustness, and Resilience
Elizabeth Bradley, Madhav Marathe, Melanie Moses, William D Gropp, and Daniel Lopresti
A National Research Agenda for Intelligent Infrastructure: 2021 Update
Daniel Lopresti and Shashi Shekhar

- … critical need to strengthen the National Pandemic Informatics Infrastructure by modernizing the public-health databases and information systems as well as provisioning of high performance computing resources to support simulation of disease transmission dynamics models and analysis of disease big data.

- … next generation computational simulation leveraging AI and spatially-detailed Digital Twins (big-data and physical/social science driven computational models of our world and society), which can help preparation and planning by projecting the impact of disaster scenarios and comparing benefits from alternative interventions.

https://cra.org/ccc/wp-content/uploads/sites/2/2020/11/Pandemic-Informatics_-Preparation-Robustness-and-Resilience.pdf
https://cra.org/ccc/wp-content/uploads/sites/2/2021/01/A-National-Research-Agenda-for-Intelligent-Infrastructure_-2021-Update-FINAL.pdf

Evaluating / Disseminating Research

Evolving Methods for Evaluating and Disseminating Computing Research
Benjamin Zorn, Tom Conte, Keith Marzullo, and Suresh Venkatasubramanian

- … Also, important research contributions in some areas, such as AI, come increasingly from industrial research efforts that have the compute, data, and engineering resources to conduct experiments at much larger scale compared to their academic counterparts.

- Another … positive impact on computing research is the degree to which major technology shifts, including the Internet, cloud computing, and teleconferencing, have greatly enhanced the computing research process.

- … much broader global participation in the computing research process and an explosion of new research results.

- Factors include: shared implementations and data sets, free compute resources via web-enabled infrastructures, virtualization technology, etc.

https://cra.org/ccc/wp-content/uploads/sites/2/2020/06/Evolving-Methods-for-Evaluating-and-Disseminating-Computing-Research.pdf

Academia / Industry Relations

Evolving Academia/Industry Relations in Computing Research
Shwetak Patel, Jennifer Rexford, Benjamin Zorn, Greg Morrisett

- With AI deep learning research being both data and compute hungry, it becomes increasingly challenging for CS faculty to do cutting-edge research without partnering with companies. Such incentives will lead faculty to seek out collaborations and joint relationships with companies. At the same time, companies benefit from making dataset and cloud computing resources available to academics because encouraging academic research can drive marketplace competitiveness, especially when innovative research using the shared data aligns with the company's business goals.

- But also, regarding joint appointments: The increase in joint appointments reduces the time a faculty member spends at the university and has implications on many aspects of their academic responsibilities.

https://cra.org/ccc/wp-content/uploads/sites/2/2019/06/Evolving-AcademiaIndustry-Relations-in-Computing-Research.pdf

Future Computing Platforms

Democratizing Design for Future Computing Platforms
Luis Ceze, Mark D. Hill, Karthikeyan Sankaralingam, and Thomas F. Wenisch

- Without hardware-software co-design, software-only designs will be relegated to less effectiveness due a "specialization gap." … These barriers are there because current design--with largely separate software and hardware--is insufficient and technology improvement to hardware has slowed dramatically.

- Unfortunately, hardware-software co-designers must currently eschew many of the benefits of open-source, because the hardware aspects of systems are decidedly propriety.

https://cra.org/ccc/wp-content/uploads/sites/2/2015/01/DemocratizingDesignforFutureComputingPlatforms-v2.pdf

Support for Citizen Science

Imagine All the People: Citizen Science, Artificial Intelligence, and Computational Research
Lea A. Shanley, Lucy Fortson, Tanya Berger-Wolf, Kevin Crowston, Pietro Michelucci

- Open science is research that is collaborative, transparent, and reproducible and where the outputs, including data, software, and publications, are made publicly available. To align citizen science and crowdsourcing with Open Science and Open Data objectives, Federal Agencies will need to integrate citizen science into their cloud strategies. Citizen science data are scattered in small ponds across projects. Providing and maintaining cyberinfrastructure and cloud computing for citizen science data, along with ontological, exchange, and metadata standards, could increase open data access and use for distributed volunteers, scientific organizations, and the public, as well as ensure the long-term sustainability and scalability of projects.

https://cra.org/ccc/wp-content/uploads/sites/2/2021/03/CCC-TransitionPaperImagine-All-the-People.pdf

Analytics at the Edge

Artificial Intelligence at the Edge
Elisa Bertino and Sujata Banerjee

- Conventional approaches upload data to a cloud or other centralized servers; however such approaches may not be suitable due to the large volumes of data, response-time, privacy, and security requirements, especially when dealing with mobile systems and applications. Analytics at the edge may address such issues. … privacy-preserving analytics at the edge require adaptive frameworks able to dynamically select the most suitable privacy technique(s) based on the specific communication contexts and edge devices involved, the tasks to be carried out, and the specific tradeoff among degree of privacy, response time, and resource and energy costs.

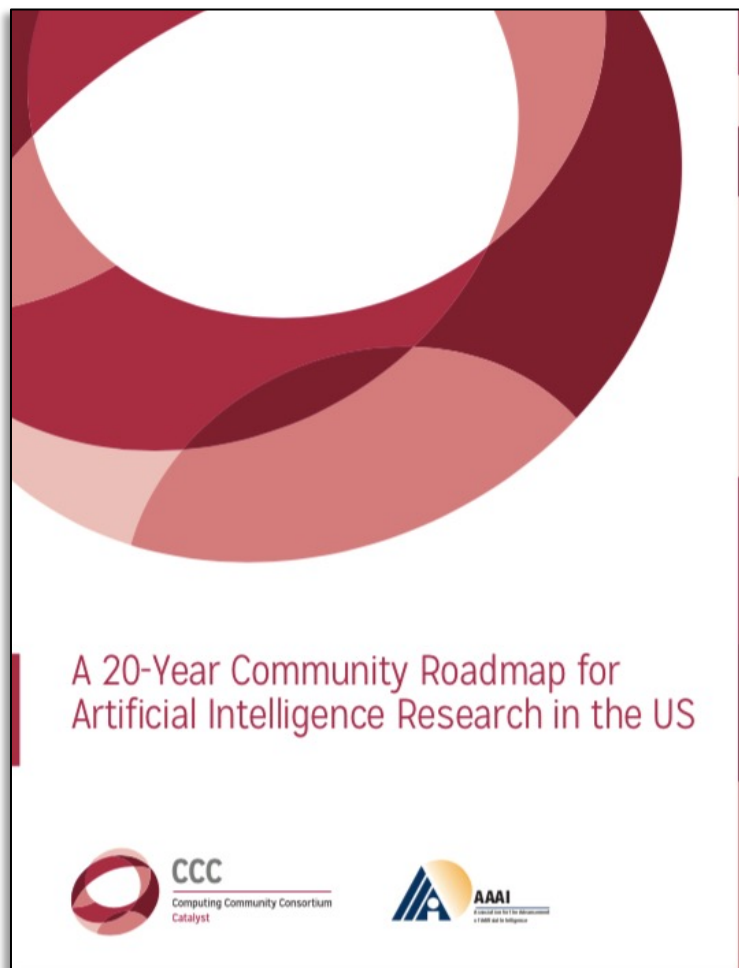https://cra.org/ccc/wp-content/uploads/sites/2/2020/11/AI-at-the-Edge.pdf

Disinformation Research

An Agenda for Disinformation Research
Nadya Bliss, Elizabeth Bradley, Joshua Garland, Filippo Menczer, Scott W. Ruston, Kate Starbird, and Chris Wiggins

- We need a common research infrastructure to access data from technology platforms under ethical guidelines that protect user privacy and transparent administrative rules that protect intellectual property. ... Such a collaboration with technology platforms cannot be left to individual researchers without harming reproducibility and replicability. Incentives must be provided for platforms researchers to collaborate across institutions and fields while respecting the motivations of the different sectors. In addition, we need to develop protocols and large-scale infrastructures that allow citizens to contribute data for research in a secure and privacy-preserving manner.

https://cra.org/ccc/wp-content/uploads/sites/2/2020/11/An-agenda-for-disinformation-research.pdf

Also notable …

A National Discovery Cloud: Preparing the US for Global Competitiveness in the New Era of 21st Century Digital Transformation
Ian Foster, Daniel Lopresti, Bill Gropp, Katie Schuman

A 20-Year Community Roadmap for Artificial Intelligence Research in the US

A National Discovery Cloud: Preparing the US for Global Competitiveness in the New Era of 21st Century Digital Transformation

https://cra.org/ccc/wp-content/uploads/sites/2/2019/08/Community-Roadmap-for-AI-Research.pdf
https://cra.org/ccc/wp-content/uploads/sites/2/2021/04/CCC-Whitepaper-National-Discovery-Cloud-2021.pdf