THE COMPUTING COMMUNITY CONSORTIUM (CCC)
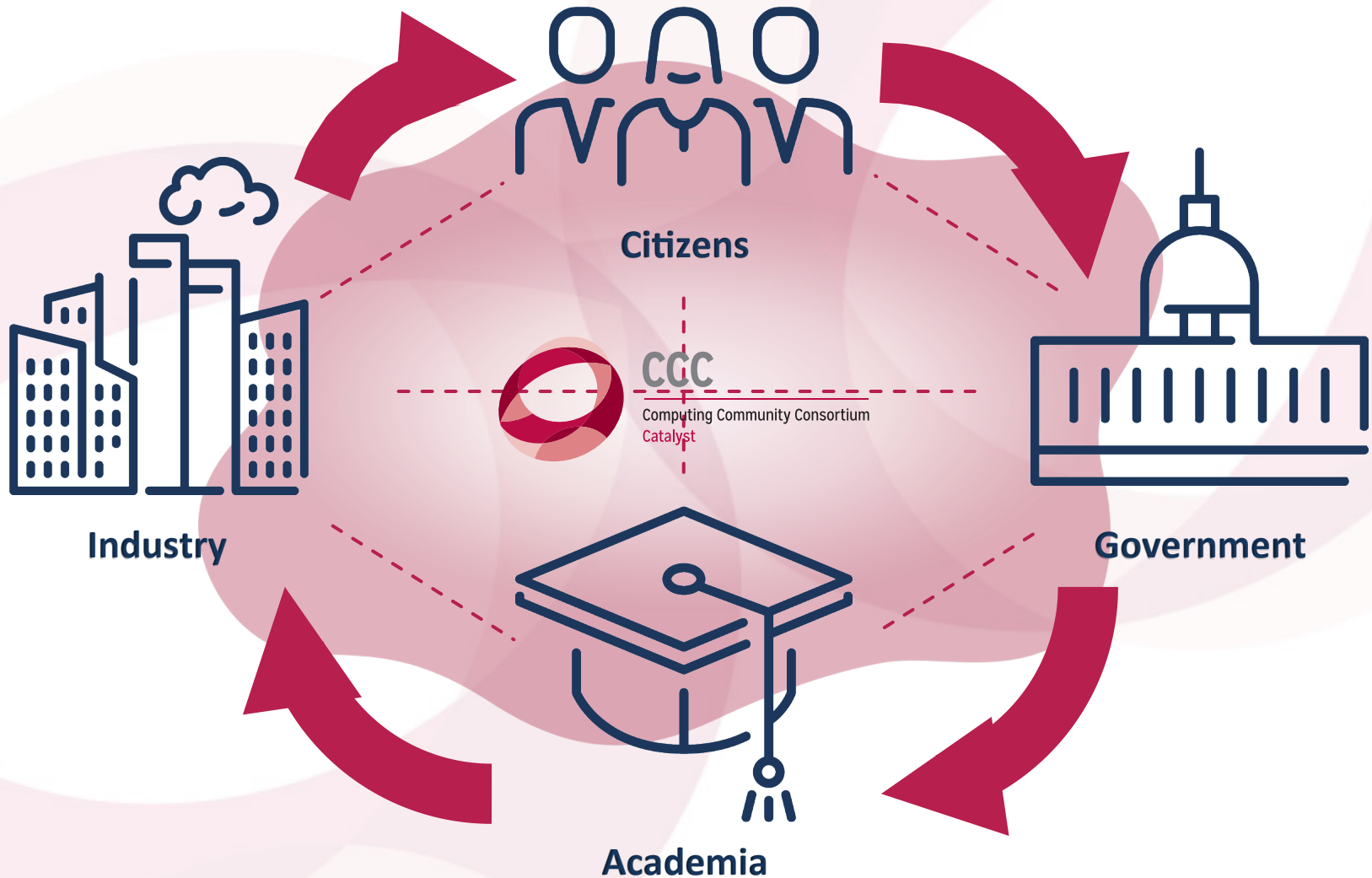
University of Hawaiʻi at Manoa
January 7th, 2019
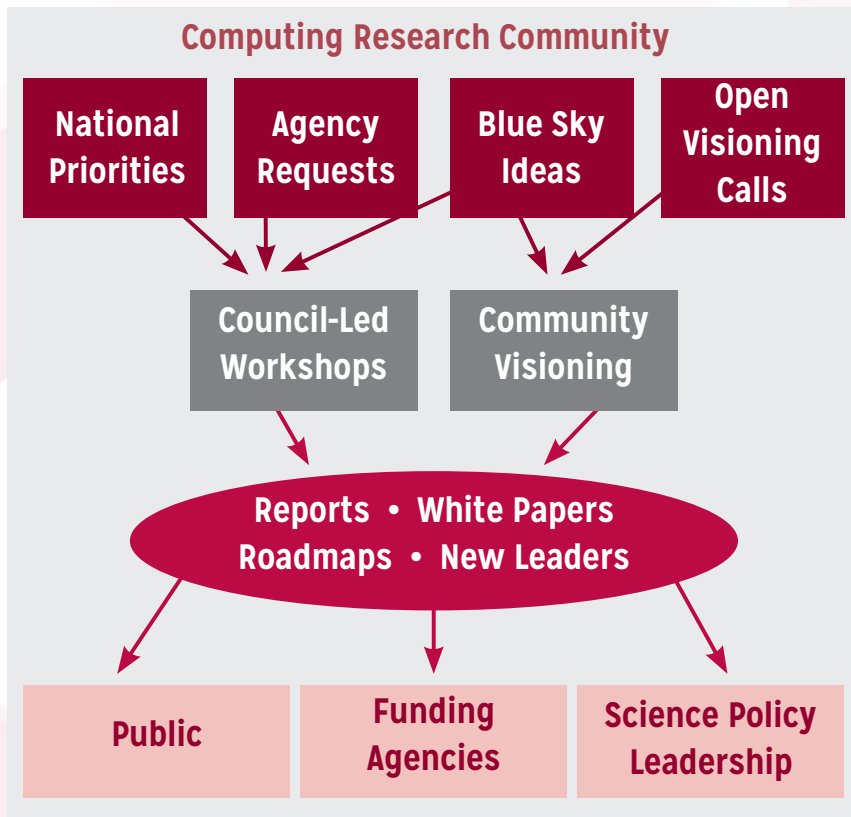
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Catalyst

CCC: CATALYZING I.T.'S VIRTUOUS CYCLE

Citizens

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Industry

Government

Academia

Icons modified from Zlatko Najdenovski, Flaticon

COMPUTING COMMUNITY CONSORTIUM

The **mission** of Computing Research Association's Computing Community Consortium (CCC) is to **catalyze** the computing research community and **enable** the pursuit of innovative, high-impact research.

Computing Research Community

National Priorities • Agency Requests • Blue Sky Ideas • Open Visioning Calls

→ Council-Led Workshops • Community Visioning

→ Reports • White Papers • Roadmaps • New Leaders

→ Public • Funding Agencies • Science Policy Leadership

Who
- **Council – 20 members**
- **CCC/CRA Staff**
- **Chair, VC, & Director**

Inputs: Bottom-up, Internal, & Top-Down

What:
- **Workshops & Conf. Blue Sky Tracks**
- **Whitepapers & Social Media**
- **Reports Out (esp. to government)**
- **Biannual Symposium**

Professional Development
- **Early Career Workshops & Participation**
- **Council Membership**
- **Leadership w/ Gov't (LISPI)**

AN OVERVIEW OF THE COMPUTING COMMUNITY CONSORTIUM

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

- Funded by NSF under a Cooperative Agreement
  - Third award began in April 2018

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

- Led by a broad-based Council

- Staffed by CRA

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MAJOR STAKEHOLDERS

- Computing Research Community
  - CRA members
  - CSTB (Computer Science and Telecommunications Board, part of National Research Council)
  - Professional societies
  - Academic units
  - Research labs
- Industry
  - Computing industry, Major users of IT
- Public
- Government

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GOVERNMENT STAKEHOLDERS

Agencies that are particularly important to us

- NSF – strong ties with CISE
- NIH – growing ties with folks interested in Health IT
- DARPA – ties come and go
- DoE – ties with ASCR; interest in ARPA-E
- NITRD – entre to interagency working groups

Others that are relevant

- NIST
- HHS/ONC
- IARPA
- DoT
- DHS
- OSTP

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THE CCC COUNCIL

Chair: Mark Hill

Vice Chair: Liz Bradley

Terms ending June 2021
- Ian Foster, University of Chicago
- Ronitt Rubinfeld, MIT
- Suresh Venkatasubramanian, Utah
- Daniel P. Lopresti, Lehigh University
- David C. Parkes, Harvard
- Shwetak Patel, Univ. Washington
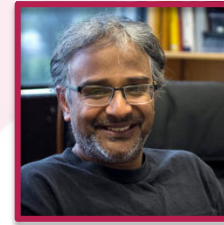
Terms ending June 2020
- Nadya Bliss, Arizona State
- Juliana Freire, NYU
- Keith Marzullo, Maryland
- Greg Morrisett, Cornell
- Jennifer Rexford, Princeton
- Manuela Veloso, Carnegie Mellon
- Ben Zorn, Microsoft Research

Terms ending June 2019
- Sampath Kannan, UPenn
- Maja Mataric, USC
- Elizabeth Mynatt, Georgia Tech
- Nina Mishra, Amazon
- Holly Rushmeier, Yale
- Kevin Fu, Univ. Michigan

CRA STAFF WITH CCC RESPONSIBILITIES

CCC Director: Ann Drobnis

Senior Program Associate: Helen Wright

Program Associate: Khari Douglas

CRA Executive Director: Andy Bernat

Additional CRA Staff:

- Peter Harsha, Director of Government Affairs
- Sandra Corbett
- Sabrina Jacob

ACTIVITIES

Events for the Community

- – Visioning Workshops
- – Blue Sky Ideas Conference Tracks

Aligning with National Priorities

- – Short Reports / White Papers
- – Task Forces

Website Features

- – CCC Blog (http://cccblog.org/)
- – Great Innovative Ideas

Leadership Opportunities

- – Industry – Academic Collaborations
- – Leadership in Science Policy Institute (LiSPI)

VISIONING ACTIVITIES

- Over 45 visioning activities in 11-year history

- Eight in 2018 ==>

- Research areas include:
  - Smart and Pervasive Health
  - Beyond Moore's Law
  - Robotic Materials
  - Privacy by Design
  - AI
  - Fairness
  - Personalized Education

- 19 workshop reports and 37 additional white papers released in past four years

- **Over 300 community members annually participate in visioning workshops**

Workshop	Date
Fair Representations and Fair Interactive Learning	March 18-19, 2018
Sociotechnical Interventions for Health Disparity Reduction	April 9-10, 2018
Robotic Materials	April 23-24, 2018
Digital Computing Beyond Moore's Law	May 3-4, 2018
Next Steps in Quantum Computing: Computer Science's Role	May 22-23, 2018
Early Career Researcher Symposium	August 1-2, 2018
Leadership in Embedded Security	August 13, 2018
Artificial Intelligence Roadmap – Integrated Intelligence	November 14-15, 2018

IMPACT: ARCHITECTURE

Workshop on Advancing Computer Architecture Research (ACAR-1)

Failure is not an Option: Popular Parallel Programming

2010

Workshop on Advancing Computer Architecture Research (ACAR-II)
Laying a New Foundation for IT: Computer Architecture for 2025 and Beyond

2010

21st Century Computer Architecture
A community white paper
May 25, 2012

2012

Exploiting Parallelism and Scalability (XPS)
PROGRAM SOLICITATION
NSF 13-507

2013

Josep Torrellas
UIUC

Mark Oskin
Washington

Mark Hill
Wisconsin

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IMPACT: ARCHITECTURE

Exploiting Parallelism and Scalability (XPS)

PROGRAM SOLICITATION
NSF 13-507
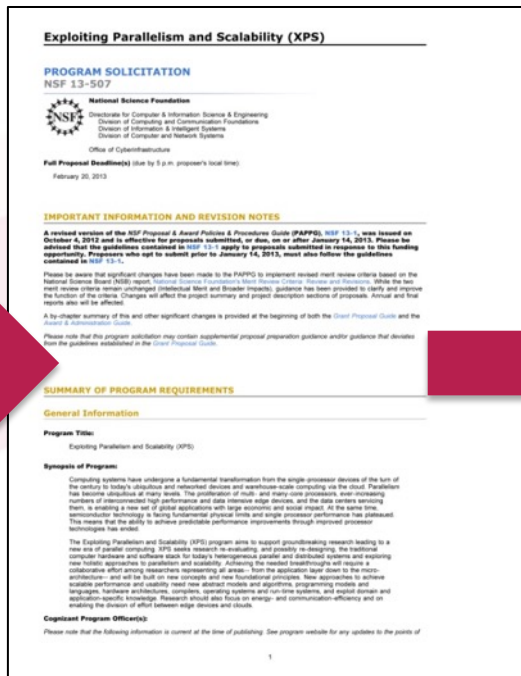
2013

Architecture 2030 Workshop @ ISCA 2016

CCC report out: Read the final report here.

Video recordings: Watch the video recordings here.

2016

Arch2030: A Vision of Computer Architecture Research over the Next 15 Years

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2016

Luis Ceze
Washington

Tom Wenisch
Michigan

Mark Hill
Wisconsin
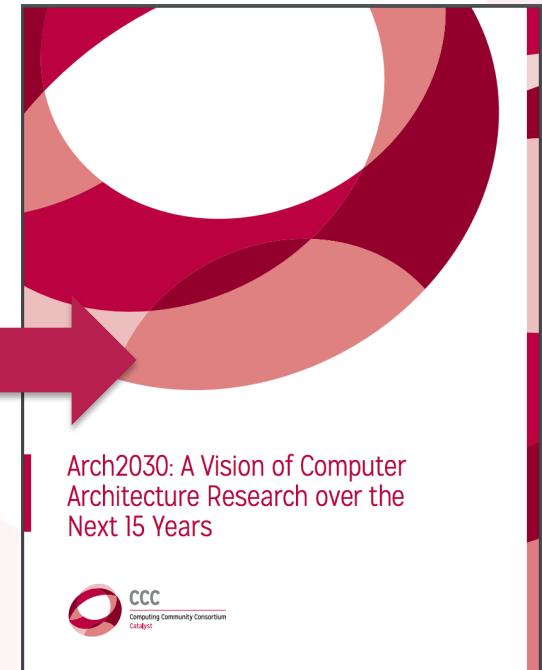
BLUE SKY

Goal - Help conferences reach out beyond the usual research papers. Papers are opened ended and possibly "outrageous" or "wacky."

- 17 different tracks at ten different conferences in the last four years

- On average, 13 papers submitted per track at a conference

- Winners are asked to submit Great Innovative Ideas

Past CCC Chair Gregory Hager with AAAI-16 Blue Sky award winner Francesca Rossi

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BLUE SKY

Conferences may request CCC sponsorship of such tracks along with a CCC grant that provides prize money to be awarded as travel grants for the top 3 papers:
- First prize $1000
- Second prize $750
- Third prize $500

Learn more: https://cra.org/ccc/visioning/blue-sky/

Send proposals to blueskyideas@cra.org

BLUE SKY

ACM SIGSPATIAL 2018

- 1st Place- *Understanding the Human Brain Via its Spatio-temporal Properties* Ouri Wolfson (University of Illinois at Chicago)
- 2nd Place- *Geofences in the Sky: Herding Drones with Blockchains and 5G* Tamraparni Dasu (AT&T Labs-Research) Yaron Kanza (AT&T Labs-Research), and Divesh Srivastava (AT&T Labs-Research)
- 3rd Place– *Vision Paper: Reinforcement Learning in Smart Spatio-Temporal Environments Sebastian Schmoll* (Ludwig Maximilian University of Munich), Matthias Schubert (Ludwig Maximilian University of Munich)

GREAT Innovative IDEAS

Identifying optimal navigation schemes by merging tools from computer science, physics, and biology

June 7, 2018 / in Great Innovative Ideas /

The following Great Innovative Idea is from Orit Peleg an Assistant Professor of Computer Science from the University of Colorado Boulder. Peleg was one of the participants at the recent Computing Community Consortium (CCC) Robotic Materials workshop.

The Idea

Animals use a combination of egocentric navigation driven by the internal integration of environmental cues, interspersed with geocentric course correction and reorientation. These processes are accompanied by uncertainty in sensory acquisition of information, planning, and execution. Together with L. Mahadevan (Harvard University) and M. Dacke (Lund University), we consider the question of optimal reorientation rates for the navigation of an agent moving along a preferred direction in the presence of multiple sources of noise. This is inspired by observations of dung beetle navigational strategies that show switching between geocentric and egocentric strategies [1].

We address this using a model that takes the form of a correlated random walk at short time scales that is punctuated by reorientation events leading to a biased random walks at long time scales [2]. This allows us to identify optimal alternation schemes and characterize their robustness in the context of noisy sensory acquisition as well as performance errors linked with variations in environmental conditions and agent–environment interactions.

LEADERSHIP IN SCIENCE POLICY INSTITUTE (LISPI)

- Intended to educate computing researchers on how science policy in the U.S. is formulated and how our government works
- Two day workshop with presentations from and discussions with science policy experts, current and former Hill staff, and relevant agency and Administration personnel about mechanics of the legislative process, interacting with agencies, advisory committees, and the federal case for computing
- The CCC provides funds for hotel accommodations for two nights of local expenses (hotel, meals)

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LEADERSHIP IN SCIENCE POLICY INSTITUTE (LISPI)

- LiSPI participants are expected to have the experience and flexibility in current positions to engage with government
- University faculty members should be from CS or IS departments and be post-tenure; industrial researchers should have comparable seniority
- The nomination process is as follows: A chair or department head proposes a LiSPI candidate by providing the name and institution of the nominee, along with a letter of recommendation. The candidate will then be contacted by the CCC and asked to submit a CV and a short essay detailing their interests in science policy

CCC BLOG

Read it at https://www.cccblog.org/

Ten Most Recent Blog Posts:

- Young Researchers: Apply for Seventh Heidelberg Laureate Forum, September 22-27, 2019
- Nominations Sought for New CCC Council Members
- Great Innovative Idea: Building up Speaking Skills in an online learning community
- 2020 Census and Differential Privacy
- 2018 ACM Fellows Announced
- Connecting and Securing Communities through Digital Technologies: A Guide for Federal Agencies
- NAS Quantum Computing: Progress and Prospects — Report Release Webinar
- Blue Sky Ideas Conference Track held at ACM SIGSPATIAL 2018NSF DCL- Fairness, Ethics, Accountability, and Transparency: Enabling Breakthrough Research to Expand Inclusivity in Computer and Information Science and Engineering Research
- NSF DCL- Early-concept Grants for Exploratory Research on Artificial Intelligence (AI) and Society – Supported Jointly with the Partnership on AI
- CCC Quantum Computing Workshop Report and NSF Quantum Solicitation

CCC BLOG

Read it at https://www.cccblog.org/

Ten Most Read Blog Posts This Year:

- The Surprising Security Benefits of End-to-End Formal Proofs (2018)
- What Computer Science Can Teach Us About Robotics (2012)
- Where The Jobs Are – 2016 Edition (2016)
- Two Hardware Security Design Flaws Affect Billions of Computers (2018)
- FOCUS identifies "The Best Jobs in America" (2010)
- PECASE Awards Announced (2017)
- First Person: "Life as a NSF Program Director" (2011)
- DARPA Broad Agency Announcement- Lifelong Learning Machines (L2M) (2017)
- 2016 Robotics Roadmap and the National Robotics Initiative 2.0(2017)
- A Primer on the Meltdown & Spectre Hardware Security Design Flaws and their Important Implications (2018)

CCC BLOG

You can write a guest blog post!

The Surprising Security Benefits of End-to-End Formal Proofs

June 13th, 2018 / in **research horizons** / by **Khari Douglas**

The following is a guest blog post by Adam Chlipala, associate professor of computer science at the Massachusetts Institute of Technology.

Many discussions of computer security adopt metaphors from war or biology. There is an arms race between attackers finding new ways to compromise systems, defenders implementing new mitigations, attackers figuring out how to breach them, and so on. Our systems must be prepared for great varieties of different attacks, each handled with its unique antibodies, which unfortunately can only be cooked up by surviving earlier, related attacks. What's essential is constant vigilance, and we never quite know what could go horribly wrong the next time.

The game could change if we rethink the way we design and build computer systems. This post is meant as a short pitch for how formal methods might enable that kind of major shift. That is, we are talking about rigorous mathematical proofs that code behaves as expected. The concept may summon images of lovely foundational work by Dijkstra and others that

Adam Chlipala

became associated with significant over-promising in the 1980s. However, though it may seem paradoxical, in the 21st century, the ambition of formal methods has increased in ways that make practical application more achievable. Specifically, a significant community has sprung up around proofs that are machine-checked, that establish full functional correctness, and that apply in an end-to-end way to real, runnable code.

HOW CAN YOU GET INVOLVED?

- Reach out to the CCC with your ideas!
  - Email Khari Douglas (kdouglas@cra.org) or CCC Director, Ann Drobnis (adrobnis@cra.org)
  - Come to a CCC visioning workshop
    (See upcoming events: https://cra.org/ccc/events/)
  - Submit a Great Innovative Idea https://cra.org/ccc/great-innovative-ideas/)
  - Request a Blue Sky Idea Conference Track
    https://cra.org/ccc/visioning/blue-sky/)

- Tell your community about CCC!
  - Workshop RFP posted at the beginning of each year, please share
    (https://cra.org/ccc/visioning/rfp-creating-visions-for-computing-research/)
  - CCC is seeking nominations for new Council Members
    (https://cra.org/ccc/call-for-council-nomination/)
  - Read and share our blog (http://www.cccblog.org)
  - Have a colleague who you would recommend for a visioning workshop? Let us know!

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SPECIAL THANKS TO SUSANNE STILL