

TRANSFORMING CITIES, TRANSPORTATION, AND AGRICULTURE WITH INTELLIGENT INFRASTRUCTURE

AAAS 2018:

Advancing Science Discovery to Application

February 16, 2018



CCC

Computing Community Consortium
Catalyst

COMPUTING COMMUNITY CONSORTIUM

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



Bring the computing research community together to envision audacious research challenges.

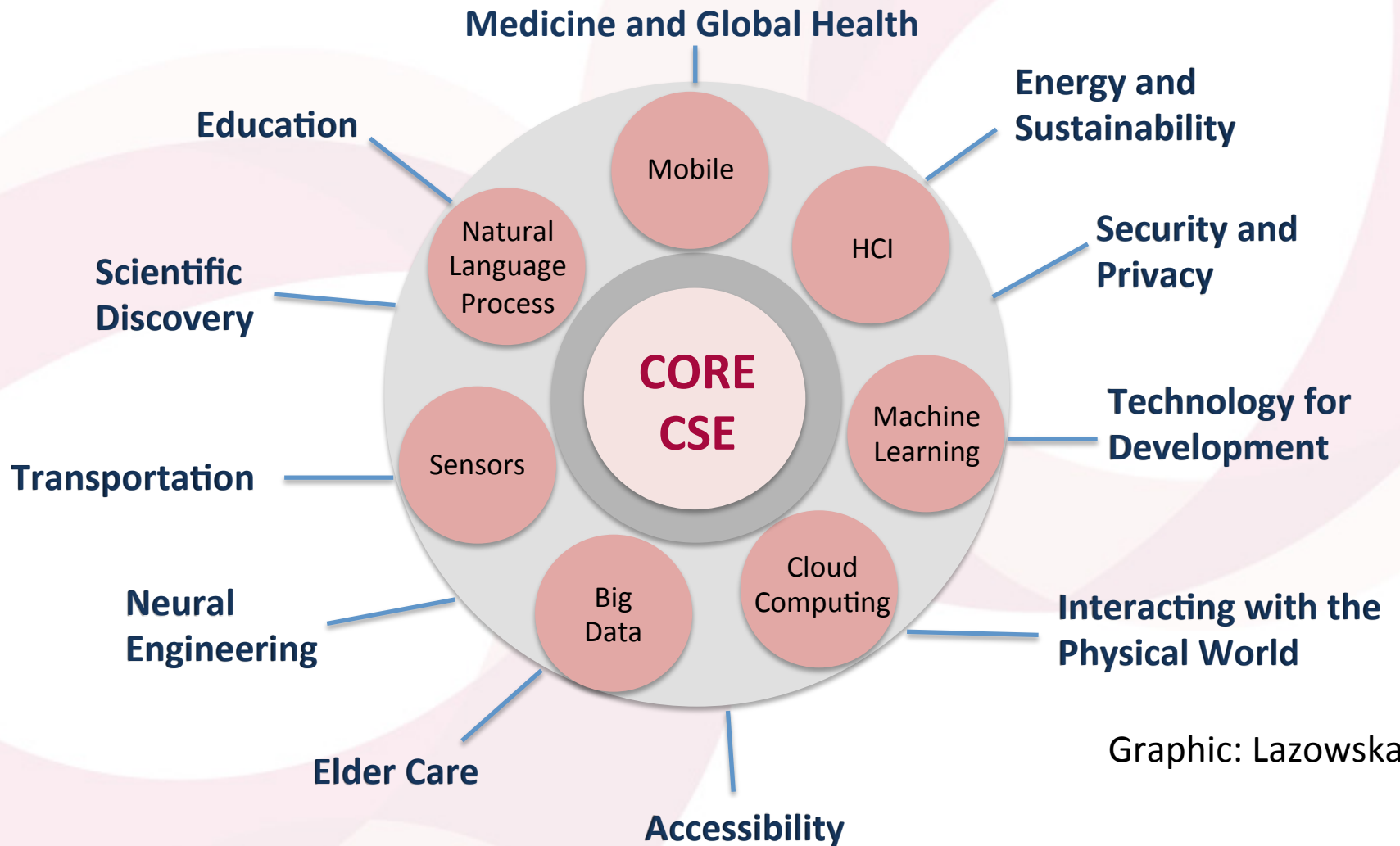
Communicate these challenges and opportunities to the broader national community.

Facilitate investment in these research challenges by key stakeholders.

Inculcate values of **leadership** and service by the computing research community.

Inform and influence early career researchers to engage in these community-led research challenges.

THE RAPIDLY EXPANDING WORLD OF COMPUTING



Graphic: Lazowska

CCC TASK FORCES

CCC task forces are organized around national priorities, community needs, and council member interests. Our current set of topics are:

- Artificial Intelligence
- Cybersecurity
- Human Technology Frontier
- Intelligent Infrastructure
- Post Moore's Law Computing
- Privacy and Fairness

CCC is **engaged in ongoing activities** around these topics, to **identify needs and opportunities** in the topic area, and to **identify actions** (generating white papers, convening a workshop, publicizing information, etc.) that have the possibility of “moving the needle” for these topics.

Annual process to determine topics, membership and priorities. Informed by stakeholders (agencies, industry), CCC workshops and council members)

INTELLIGENT INFRASTRUCTURE WHITE PAPERS

- Inform potential legislative agenda
- Make the case for basic research
- Draw out relevance for multiple domains / agencies
- Partner with ECEDHA
- Rapid authoring process (March 2017)
- Informed response to NITRD Smart and Connected Communities (SCC) (draft) strategic plan
- Informed Jan 2018 CRA Congressional Briefing

49 authors, 33 institutions

Papers on:

- Research Agenda for Intelligent Infrastructure
- Transportation and Mobility
- Energy (Smart Grid)
- Disaster Management, Community Resilience and Public Safety
- City Scale Intelligent Systems and Platforms
- Food, Energy, and Water
- Safety and Security for II
- Privacy
- Rural Intelligent Infrastructure
- Wireless

OVERVIEW

The Future of Mobility through Innovations in Intelligent Transportation Infrastructure

George J. Pappas is the Joseph Moore Professor and Chair of the Department of Electrical and Systems Engineering at the University of Pennsylvania. He also holds a secondary appointment in the Departments of Computer and Information Sciences, and Mechanical Engineering and Applied Mechanics. His research focuses on control theory and in particular, hybrid systems, embedded systems, hierarchical and distributed control systems, with applications to unmanned aerial vehicles, distributed robotics, green buildings, and biomolecular networks. He is a Fellow of IEEE.

City-Scale Intelligent Systems and Platforms

Charlie Catlett is a Senior Computer Scientist at Argonne National Laboratory. Catlett is also a Senior Fellow at the Computation Institute of the University of Chicago and Argonne National Laboratory, and a Visiting Artist at the School of the Art Institute of Chicago. His current research focus areas include urban data science, cyber security and privacy, mobile devices and social networks, and the use of mobile and embedded computing to create intelligent infrastructure. He served as Argonne's Chief Information Officer from 2007-2011.

Intelligent Infrastructure for Smart Agriculture

Shashi Shekhar, a McKnight Distinguished University Professor at the University of Minnesota, is a leading scholar in the area of Geographic Information Systems (GIS). He co-edited an Encyclopedia of GIS and co-authored a textbook on Spatial Databases. He received the IEEE-CS Technical Achievement Award and was elected Fellows of the IEEE and the AAAS. Shashi is a co-Editor-in-Chief of Geo-Informatica journal.

DISCUSSION

- Technical innovation needed
(e.g. edge computing, robo-bees, V2V / V2I wireless)
- Importance of curating data for diverse stakeholders and needs
- Workforce training needs across the board
- Addressing security / attack surfaces from the beginning
- Partnerships key to identifying problems, visioning and co-producing knowledge
- Current programs only partially address the need for transdisciplinary research and productive testbeds.



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Transforming Cities, Transportation, and Agriculture with Intelligent Infrastructure

Friday, February 16, 10:00 – 11:30 am

Synopsis: Intelligent infrastructure is the deep embedding of sensing, computing, and communications capabilities into traditional physical infrastructure such as roads, buildings, and bridges, in order to increase efficiency, resiliency, and safety. For example, embedding controllers, intersection schedulers, and sensors along roads creates new capabilities for controlling traffic signals and optimizing traffic flow. Across disciplines ranging from engineering to computer science to public policy, intelligent infrastructures are increasingly seen as solutions to the long-standing problems that face local governments. These include strained resources spread across ever-growing urban populations, aging infrastructures and public services systems, competitiveness in the global economy, and acute human and environmental stressors due to rapid growth and change. This session brings together speakers to discuss three critical areas of fundamental scientific research in intelligent infrastructure, and the challenges and barriers to realizing these advances as part of economically sustainable systems.

Speakers:

Charlie Catlett

Argonne National
Laboratory

City-Scale Intelligent
Systems and Platforms



George Pappas

University of Pennsylvania

Future of Mobility Through
Innovations in Intelligent
Transportation
Infrastructure



Shashi Shekhar

University of Minnesota,
Minneapolis

Intelligent Infrastructure
for Smart Agriculture



Moderator:

Elizabeth Mynatt

Georgia Tech



Related Links:

- *MOBILITY21: Strategic Investments for Transportation Infrastructure & Technology* white paper
- *City-Scale Intelligent Systems and Platforms* white paper
- *Intelligent Infrastructure for Smart Agriculture: An Integrated Food, Energy and Water System* white paper
- Intelligent Infrastructure white paper series
- *Agriculture Big Data (AgBD) Challenges and Opportunities From Farm To Table: A Midwest Big Data Hub Community* by Shashi Shekhar, Patrick Schnable, David LeBoer, Katherine Pavlis and Kim VanderWeal

www.cra.org/coc-aaas-2018/

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