FEDERAL SERVICE FOR COMPUTING RESEARCH: A LOVE STORY

Kevin Fu
Associate Professor, CSE, University of Michigan
Member, Computing Community Consortium

CSE Faculty Meeting, 4/21/2017

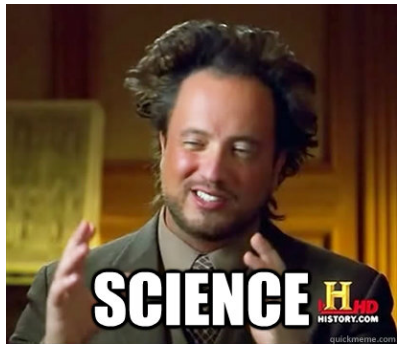
MARCH IS FOR SCIENCE, BUT IT'S APRIL…

Why The Fu Cares

1. Erosion of public trust in science
2. Legislators need scientists for good decisions
3. Federal support for research and education
4. Tenure enables risk taking to benefit society
5. Many of you could make a difference in DC

Vannevar Bush, MIT professor,
Memex Analog Computing, Created NSF

Chuck Vest, U-M COE Assoc. Dean, MIT President
national science policy, OpenCourseWare, NAE



What the public
thinks of us

Opportunities For You

- Federal advisory committees

- Congressional testimony

- CCC (where did your NSF program come from?)
- Advocate for science and engineering

of

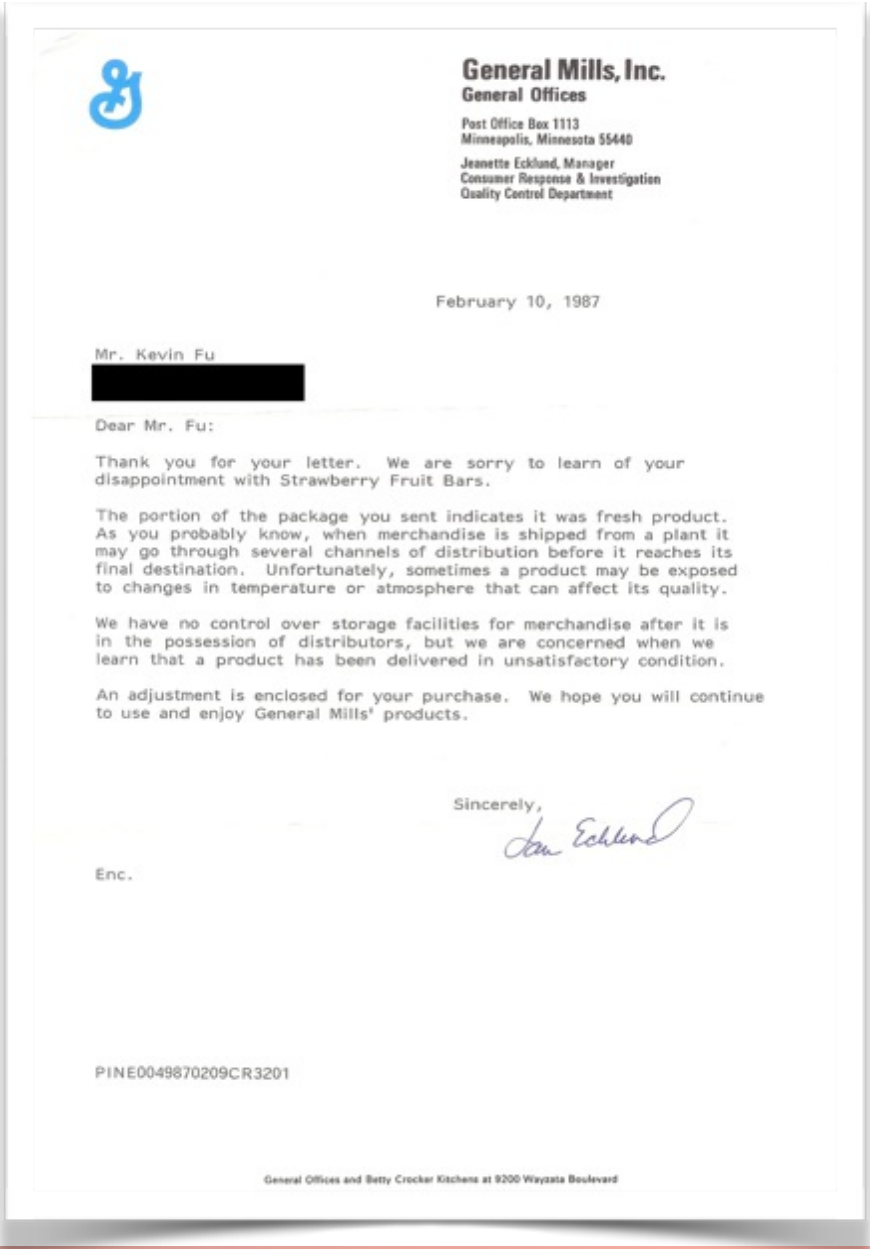
Images: indiamart, clker.com, despair.com

Roles of Advisory Committees

Will You Prosper on a FACA?

- If you like to write letters and are willing to persist for years until bureaucrats give up their resistance for the public good
- Then you'll enjoy it.

- If you just want to write your next research paper
- You won't.



General Mills, Inc.
General Offices

Post Office Box 1113
Minneapolis, Minnesota 55440

Jeanette Ecklund, Manager
Consumer Response & Investigation
Quality Control Department

February 10, 1987

Mr. Kevin Fu
[redacted]

Dear Mr. Fu:

Thank you for your letter. We are sorry to learn of your disappointment with Strawberry Fruit Bars.

The portion of the package you sent indicates it was fresh product. As you probably know, when merchandise is shipped from a plant it may go through several channels of distribution before it reaches its final destination. Unfortunately, sometimes a product may be exposed to changes in temperature or atmosphere that can affect its quality.

We have no control over storage facilities for merchandise after it is in the possession of distributors, but we are concerned when we learn that a product has been delivered in unsatisfactory condition.

An adjustment is enclosed for your purchase. We hope you will continue to use and enjoy General Mills' products.

Sincerely,

Jean Ecklund

Enc.

PINE0049870209CR3201

General Offices and Betty Crocker Kitchens at 9200 Wayzata Boulevard

Al

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General Offices

Post Office Box 1113
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NIST ISPAB

(Information Security & Privacy Advisory Board)

Theory: Aggressiveness $\propto 1/\text{Dressiness}$

MEMBERSHIP

Links are provided for those board members that submitted their biographies. All bios are in .PDF format.

Matthew W. Thomlinson*, *Chairperson
General Manager, Trustworthy Computing Security
Microsoft
TEL: 425-706-9115 FAX: 425-706-7329
Email: Matthew Thomlinson

Christopher Boyer
Assistant Vice President, Public Policy
AT&T Services Inc.
TEL: 202-457-2132
Email: Christopher Boyer

Julie Boughn
Acting Deputy Director for Operations,
Center for Medicare and Medicaid Innovation DHHS/CMS
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Greg Garcia
Principal
Garcia Cyber Partners
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Email: Greg Garcia

Brian Gouker
NSA Visiting Professor
U.S. Army War College
TEL: 717-245-4727
Email: Brian Gouker

Toby Levin
(Retired)
Email: Toby Levin

Edward A. Roback
US Department of Treasury
Email: Edward Roback

Phyllis A. Schneck
McAfee, Inc.
TEL: 703-463-2300
Email: Phyllis Schneck

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Email: Peter Weinberger

DESIGNATED FEDERAL OFFICER:

Annie W. Sokol
National Institute of Standards and Technology
TEL: 301-975-2006 FAX : 301-975-8670
Email : Annie Sokol

BOARD SECRETARIAT

Matthew Scholl – Alternate Designated Federal Officer
National Institute of Standards and Technology
TEL: 301-975-2941 FAX : 301-975-8670
Email: Matthew Scholl

ISPAB
Membership
Meetings
News & Events
Activities
Documentation

Quicklinks

- Request for Nominations
  2012 NIST Request for Nominations
- Federal Advisory Committee Act (FACA)

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INFORMATION SECURITY AND PRIVACY ADVISORY BOARD (ISPAB)

The Information Security and Privacy Advisory Board (ISPAB) was originally created by the Computer Security Act of 1987 (P.L. 100-235) as the Computer System Security and Privacy Advisory Board. As a result of Public Law 107-347, The E-Government Act of 2002, Title III, The Federal Information Security Management Act of 2002, the Board's name was changed and its mandate was amended.

Scope/Objectives:

- Identify emerging managerial, technical, administrative, and physical safeguard issues relative to information security and privacy;
- Advise the National Institute of Standards and Technology (NIST), the Secretary of Commerce and the Director of the Office of Management and Budget on information security and privacy issues pertaining to Federal Government information systems, including thorough review of proposed standards and guidelines developed by NIST.
- Annually report its findings to the Secretary of Commerce, the Director of the Office of Management and Budget, the Director of the National Security Agency and the appropriate committees of the Congress.

The Board's authority does not extend to private sector systems or federal systems which process classified information. Their objectives and duties include:

The membership of the Board consists of twelve members and a Chairperson. The Director of NIST approves membership appointments and appoints the Chairperson. The Board meets quarterly throughout the year and all meetings are open to the public. The Board invites public comments on its activities and the objectives the Board should undertake. Comments can be directed to Matthew Scholl.

ACTIVITIES

One of the major objectives and responsibilities of the Information Security and Privacy Advisory Board is to identify emerging managerial, technical, administrative, and physical safeguard issues relative to information security and privacy.

The focus of the Board's work for 2009 will be in the following areas:

- Privacy technology
- Essential Body of Knowledge
- Industry Security Officers Best Practices
- Trusted Internet Connection
- Federal Desktop Core Configuration
- Homeland Security Policy Directive 12
- IPv6
- Biometrics and ID management
- Security metrics
- Geospatial security and privacy issues
- FISMA reauthorization (and other legislative support)
- Information Systems Security Line of Business – (ISS LOB)
- National security community activities in areas relevant to civilian agency security (e.g., architectures)
- Supervisory Control and Data Acquisition (SCADA) security
- Health care IT
- Telecommuting Security
- Senior Management's Role in FISMA Review
- Use and Implementation of Federal IT Security Products
- Social Networking and Security
- The Einstein Program The role of chiefs (such as Chief Privacy Officer and Chief Security Officer)
- NIST's outreach, research, and partnering approaches
- Cyber security leadership in the Executive Branch

These work plans will be pursued within the bounds of the ISPAB charter.

Lifecycle of Issues

- Presentations and panels at public committee meeting
- Q/A with committee
- Ask **the question**
- Distill the problem
- Determine what action to take, if any
- If warranted, **write letter** to appropriate officials
- Some boring stuff...
- Consider follow-up and new topics for the next meeting
- Repeat

Example Letter

http://csrc.nist.gov/groups/SMA/ispab/documentation.html#correspondence

INFORMATION SECURITY AND PRIVACY ADVISORY BOARD

Established by the Computer Security Act of 1987
[Amended by the Federal Information Security Management Act of 2002]

March 30, 2012

The Honorable Jeffrey Zients
Acting Director, US Office of Management and Budget
Washington, DC 20502

Dear Mr. Zients,

I am writing to you as the Chair of the Information Security and Privacy Advisory Board (ISPAB or Board). The ISPAB was originally created by the Computer Security Act of 1987 (P.L. 100-35) as the Computer System Security and Privacy Advisory Board, and amended by Public Law 107-347, The E-Government Act of 2002, Title III, The Federal Information Security Management Act (FISMA) of 2002. One of the statutory objectives of the Board is to identify emerging managerial, technical, administrative, and physical safeguard issues relative to information security and privacy.

At the Board meeting of February 1-3, 2012, the Board discussed the issue of maintaining security in medical devices that are increasingly operated by software connected to the public Internet, possibly through wireless connections. The Board heard experts discuss how lack of cybersecurity preparedness for millions of software-controlled medical devices puts patients at significant risk of harm. Specifically, software-controlled medical devices are increasingly available through and exposed to cybersecurity risks on the Internet; examples range from desktop computers controlling radiological imaging to custom embedded software found in pacemakers. With increasing connectivity comes greater functionality and manageability, but also increased risks of both unintentional interference and malicious tampering via these communication channels.

Further complicating this picture, the economics of medical device cybersecurity involves a complex system of payments between multiple stakeholders -- including manufacturers, providers, and patients. At the same time, no one agency has primary responsibility from Congress to ensure the cybersecurity of medical devices deployed across this spectrum;

Board Secretariat: National Institute of Standards and Technology
100 Bureau Drive, Stop 8930, Gaithersburg, MD 20899-8930
Telephone: 301/975-2938 *** Fax: 301/975-4007

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agencies involved include Centers for Medicare and Medicaid Services (CMS) and Food and Drug Administration (FDA) in Department of Health and Human Services (HHS), as well as the Department of Defense (DOD), Department of Veterans' Affairs (VA), and Department of Homeland Security (DHS), among others. Given the complexity of the technical issues involved, the Board finds that diffusion of responsibility when it comes to cybersecurity of medical devices raises growing concern.

In addition, there is an economic disincentive for reporting of vulnerabilities and incidents – a hospital, for example, can incur liability by reporting a problem. A lack of meaningful data on medical device cybersecurity can lead to cybersecurity unpreparedness because cybersecurity problems that go unreported can increase a false impression of preparedness due to lower incident counts. This lack of reported incidents also results from a lack of effective reporting mechanisms from clinical settings to the Government about cybersecurity threats in medical devices.

The Board made the following observations from the panel discussion:

- There is a diffusion of Government responsibility for cybersecurity of medical devices, leading to lack of accountability and oversight.

- Current medical device reporting methods, primarily captured through FDA, are not designed to capture indicators of medical device cybersecurity problems.

- Medical devices used in the home raise additional cybersecurity risks, given the less trustworthy nature of the home environment.

- The Government has multiple ways to address cybersecurity for medical devices, including regulation through FDA, purchasing power through CMS, information distribution through numerous agencies, and education and awareness to home users and medical providers.

Based on the Board's discussion and findings, we offer a number of recommendations:

1. A single Federal entity (such as FDA) should be assigned responsibility for taking medical device cybersecurity into account during pre-market clearance and approval of devices, and during post-market surveillance of cybersecurity threat indicators at time of use.

2. FDA should collaborate with National Institute of Standards and Technology (NIST) scientists and engineers to research cybersecurity features that could be enabled by default on networked or wireless medical devices in Federal settings. For instance, a

medical provider should not have to download new software, such as an anti-virus product, to achieve an acceptable baseline of cybersecurity. Cybersecurity features in medical devices should be active at the time of purchase by the Government, and should be easily and transparently configurable by a provider at the time of use; this can translate into improved cybersecurity in device acquisition across a broad spectrum of buyers.

3. The Government should assign a lead entity (such as Health Resources and Services Administration (HRSA) or FDA in HHS) to establish better training and education that informs users, health care organizations, and manufacturers about the risks associated with networked and wireless medical devices. This lead organization should make information readily available to all parties upon receipt of a medical device, as well as part of the "instructions for use" for the users.

4. Because medical devices are increasingly Internet-based, United States Computer Emergency Readiness Team (US-CERT) should create defined reporting categories for medical device cybersecurity incidents. Coordination is necessary with US-CERT to establish mechanisms that incentivize Government, providers, and manufacturers to collect cybersecurity threat indicators so that the country is prepared for the inevitable growth in device incident reports.

5. Further study is needed to determine whether additional policy or legislative changes are necessary to promote medical device security.

The Board appreciates the opportunity to provide views on this emerging and important issue. We welcome further discussion at the Administration's discretion.

Sincerely,

Daniel J. Chenok
Chair, ISPAB

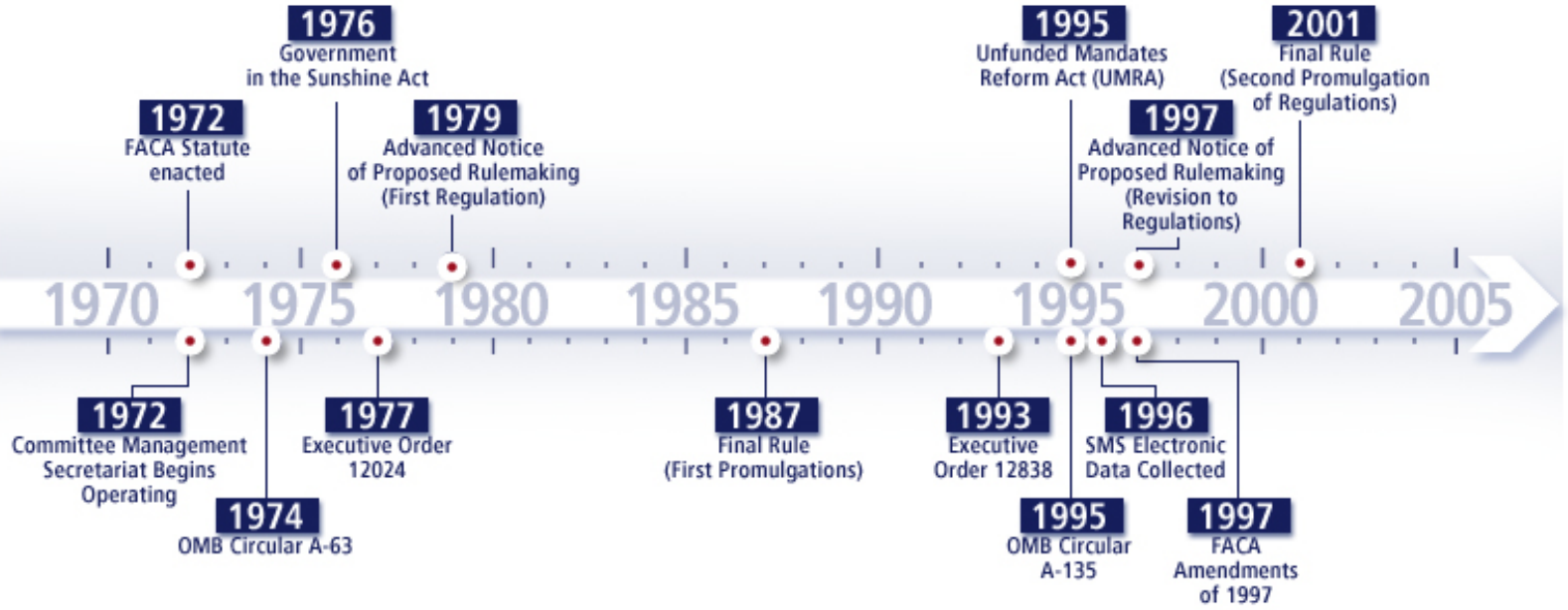
cc: The Honorable Kathleen Sebelius, Secretary, Department of Health and Human Services
Steven VanRoekel, Administrator of E-Government and Information Technology and CIO, OMB
Howard Schmidt, Cybersecurity Coordinator, National Security Council,
Mark Weatherford, Deputy Undersecretary for Cybersecurity, DHS
Patrick Gallagher, Director, NIST

Recent Speakers/Panelists

- Federal agencies
  - DHS, DOD, NIST, SSA, OIG, OMB, GAO, GSA, DOJ, Treasury, Agriculture, NSF, Peace Corps, Education, Federal Reserve Board, US Int'l Trade Commission, FDA, ONC, CMS, VA, ATF, State, Air Force Surgeon General, NSA, FDIC, FCC, National Academies
- The Hill
  - Senior Intelligence and Defense Advisor
  - Senate Committee on Homeland Security & Governmental Affairs
- The White House
  - Director of Cybersecurity
  - OSTP
- Stakeholders
  - Companies (mainly communications), academics, hospitals, etc.

Why Serve Under FACA?

- Learn about real-world problems outside the ivory tower
- Constructive criticism before ideas compiled to policy
- Meet interesting people with complex policy challenges
- Don't do it for merit badges, do it to make an impact



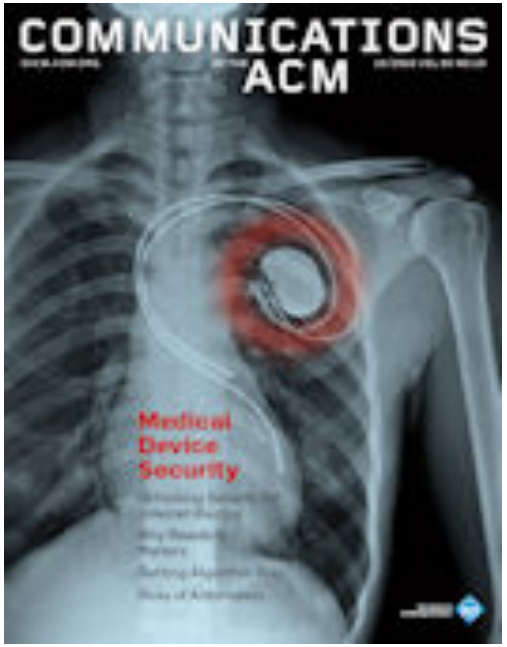
http://www.gsa.gov/portal/category/101111

Surprises

- A surprising number of
  - Smart people in government
  - Smart Congressional aides
- But occasionally…
- Acronym soup: FACA, EO, my!

Epilogue: Five Years Later

- Wrote cybersecurity advisory letter to HHS in March 2012
- Took 2 years for government to listen
- Took 3 years for White House to call
- Took 4 years to Congress to demand it
- Took 5 years to cycle back to research



How to Get Invited for Congressional Testimony

2012 House Hearing: Healthcare Fraud

US Senate Discusses How Phoneprinting Can Protect Americans from Another IRS Breach

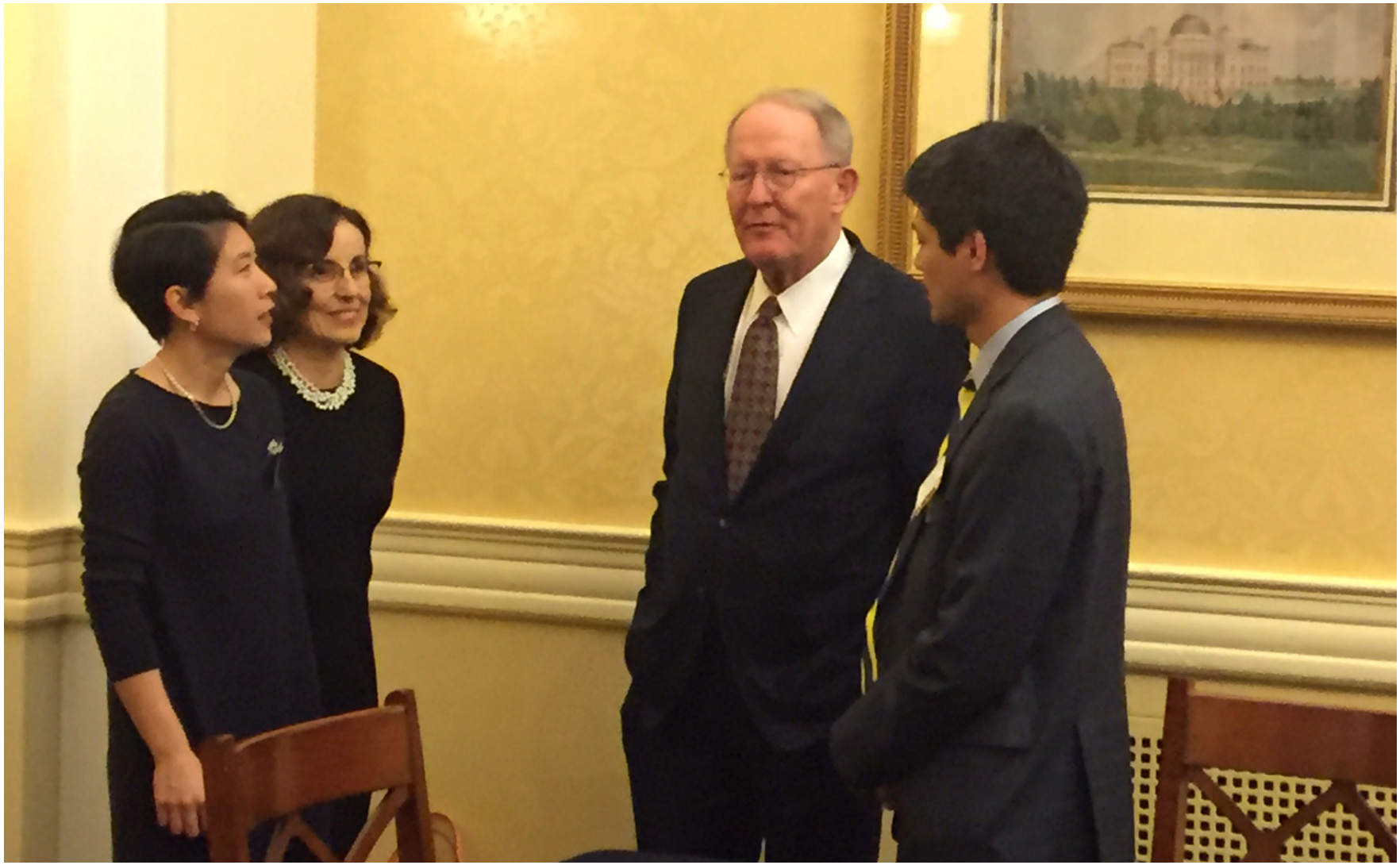
Last week, the IRS announced that, from February through mid-May this year, criminals accessed the past tax returns of 100,000 Americans using the IRS website. Yesterday, the US Senate Committee on Homeland Security & Governmental Affairs held a hearing to learn more about what went wrong at the IRS, and what steps could be taken to protect American's personal information going forward.

2015 Senate Hearing: IRS Data Breach

2016 House Hearing: IoT Hacking

Senate Science Forum

Prof. Teri Odom of Northeastern (Chemistry + MSE), NSF Director France Córdova (astrophysics), Senator Lamar Alexander (TN), Prof. Kevin Fu (cybersecurity), …



https://www.nsf.gov/news/mmg/mmg_disp.jsp?med_id=80974

COMPUTING COMMUNITY CONSORTIUM (CCC)

Kevin Fu
Computing Community Consortium

CCC
Computing Community Consortium
Catalyst

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.

Visioning
- Workshops
- Blue Sky Ideas Conference Tracks

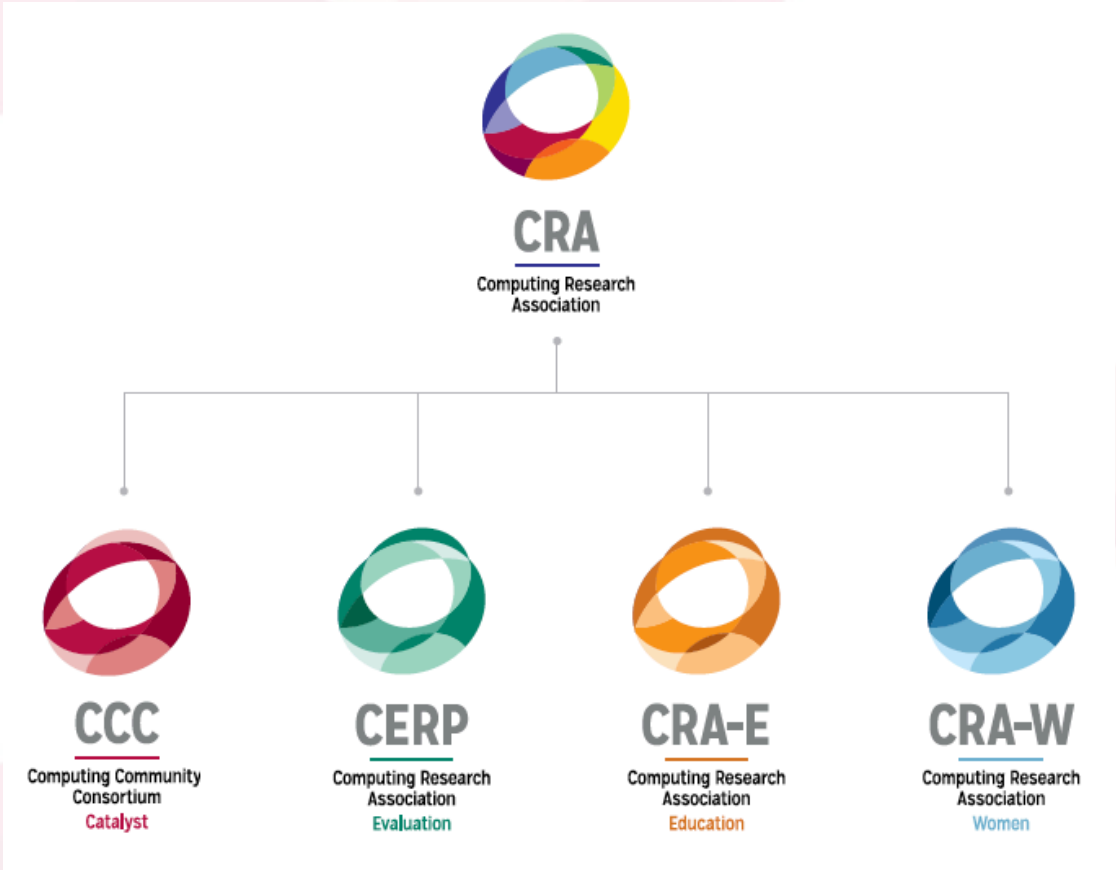
Outreach
- Outputs of Visioning Activities
- Short Reports / White Papers
- Task Forces

Communicating
- CCC Blog (http://cccblog.org)
- Great Innovative Ideas
- Computing Research: Addressing National Priorities and Societal Needs

Nurturing next generation of leaders
- Postdoc Best Practices
- Industry – Academic Collaborations
- Computing Innovation Fellows (CIFellows) Project
- Leadership in Science Policy Institute

COMPUTING RESEARCH ASSOCIATION

The CCC is a standing committee of the Computing Research Association, whose mission is to enhance innovation by joining with industry, government and academia to strengthen research and advanced education in computing by influencing leadership, policy, and talent development.



THE CCC COUNCIL








Terms ending June 2019
- Sampath Kannan, UPenn
- Maja Mataric, USC
- Nina Mishra, Amazon
- Holly Rushmeier, Yale

Terms ending June 2018
- Liz Bradley, (CU Boulder)
- Cynthia Dwork, Microsoft Research
- Kevin Fu, Univ. Michigan (Leave)
- Daniel P. Lopresti, Lehigh University
- Shwetak Patel, Univ. Washington
- Katherine Yelick, UC Berkeley
- Jennifer Rexford, Princeton
- Ben Zorn, Microsoft Research

Terms ending June 2017
- Lorenzo Alvisi, UT Austin
- Randy Bryant, CMU
- Vasant Honavar, Penn State
- Debra Richardson, UC Irvine
- Klara Nahrstedt, UIUC



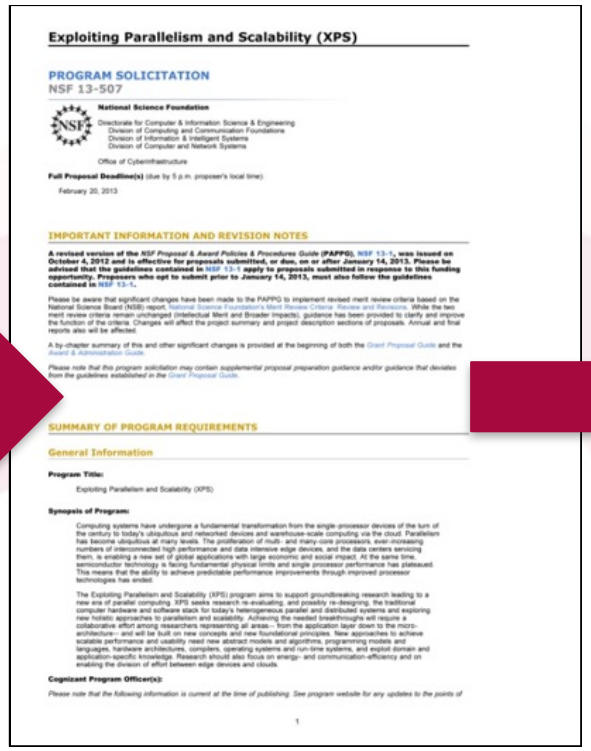




THE CCC COUNCIL – EXECUTIVE COMMITTEE

- Members:
  - Beth Mynatt, Georgia Tech (Chair)
  - Mark Hill, University of Wisconsin, Madison (Vice Chair)
  - Greg Hager, Johns Hopkins Univ. (Past Chair)
  - Ben Zorn, Microsoft Research
  - Jennifer Rexford, Princeton
  - Ann Drobnis, Director
  - Andy Bernat, CRA Executive Director
- Guide council activities
- Advise nominations committee

IMPACT: ARCHITECTURE



Exploiting Parallelism and Scalability (XPS)

PROGRAM SOLICITATION
NSF 13-507

National Science Foundation

Directorate for Computer & Information Science & Engineering
Division of Computing and Communication Foundations
Division of Information & Intelligent Systems
Division of Computer and Network Systems

Office of Cyberinfrastructure

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

February 20, 2013

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), NSF 13-1, was issued on October 4, 2012 and is effective for proposals submitted, or due, on or after January 14, 2013. Please be advised that the guidelines contained in NSF 13-1 apply to proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 14, 2013, must also follow the guidelines contained in NSF 13-1.

Please be aware that significant changes have been made to the PAPPG to implement revised merit review criteria based on the National Science Board (NSB) report, National Science Foundation's Merit Review Criteria: Review and Revisions. While the two merit review criteria remain unchanged (Intellectual Merit and Broader Impacts), guidance has been provided to clarify and improve the function of the criteria. Changes will affect the project summary and project description sections of proposals. Annual and final reports also will be affected.

A by-chapter summary of this and other significant changes is provided at the beginning of both the Grant Proposal Guide and the Award & Administration Guide.

Please note that this program solicitation may contain supplemental proposal preparation guidance and/or guidance that deviates from the guidelines established in the Grant Proposal Guide.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Exploiting Parallelism and Scalability (XPS)

Synopsis of Program:

Computing systems have undergone a fundamental transformation from the single-processor devices of the turn of the century to today's ubiquitous and networked devices and warehouse-scale computing via the cloud. Parallelism has become ubiquitous at many levels. The proliferation of multi- and many-core processors, ever-increasing numbers of interconnected high performance and data intensive edge devices, and the data centers servicing them, is enabling a new set of global applications with large economic and social impact. At the same time, semiconductor technology is facing fundamental physical limits and single processor performance has plateaued. This means that the ability to achieve predictable performance improvements through improved processor technologies has ended.

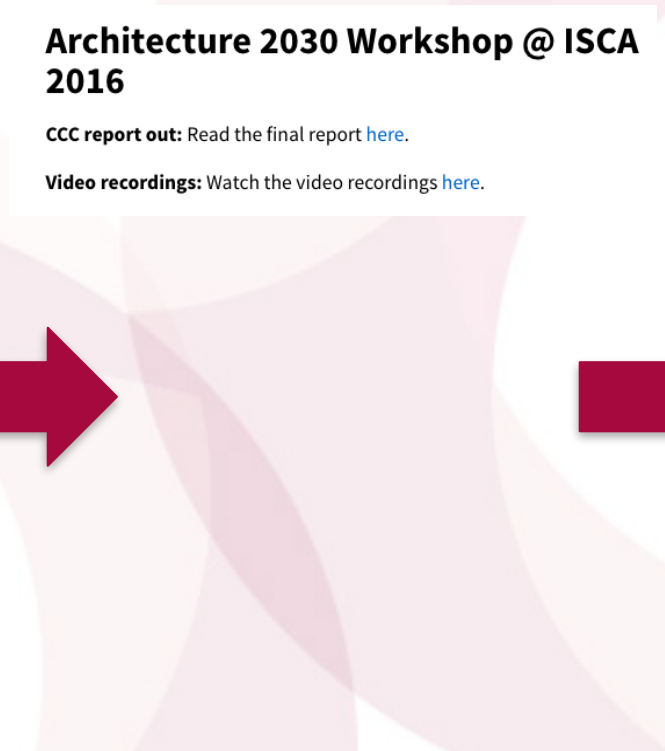
The Exploiting Parallelism and Scalability (XPS) program aims to support groundbreaking research leading to a new era of parallel computing. XPS seeks research re-evaluating, and possibly re-designing, the traditional computer hardware and software stack for today's heterogeneous parallel and distributed systems and exploring new holistic approaches to parallelism and scalability. Achieving the needed breakthroughs will require a collaborative effort among researchers representing all areas -- from the application layer down to the micro-architecture-- and will be built on new concepts and new foundational principles. New approaches to achieve scalable performance and usability need new abstract models and algorithms, programming models and languages, hardware architectures, compilers, operating systems and run-time systems, and exploit domain and application-specific knowledge. Research should also focus on energy- and communication-efficiency and on enabling the division of effort between edge devices and clouds.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of

1

2013

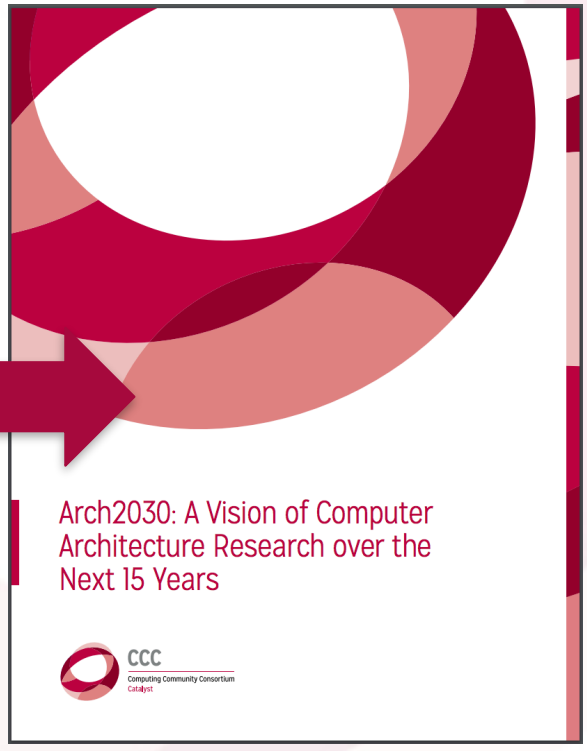


Architecture 2030 Workshop @ ISCA 2016

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

CCC
Computing Community Consortium
Catalyst

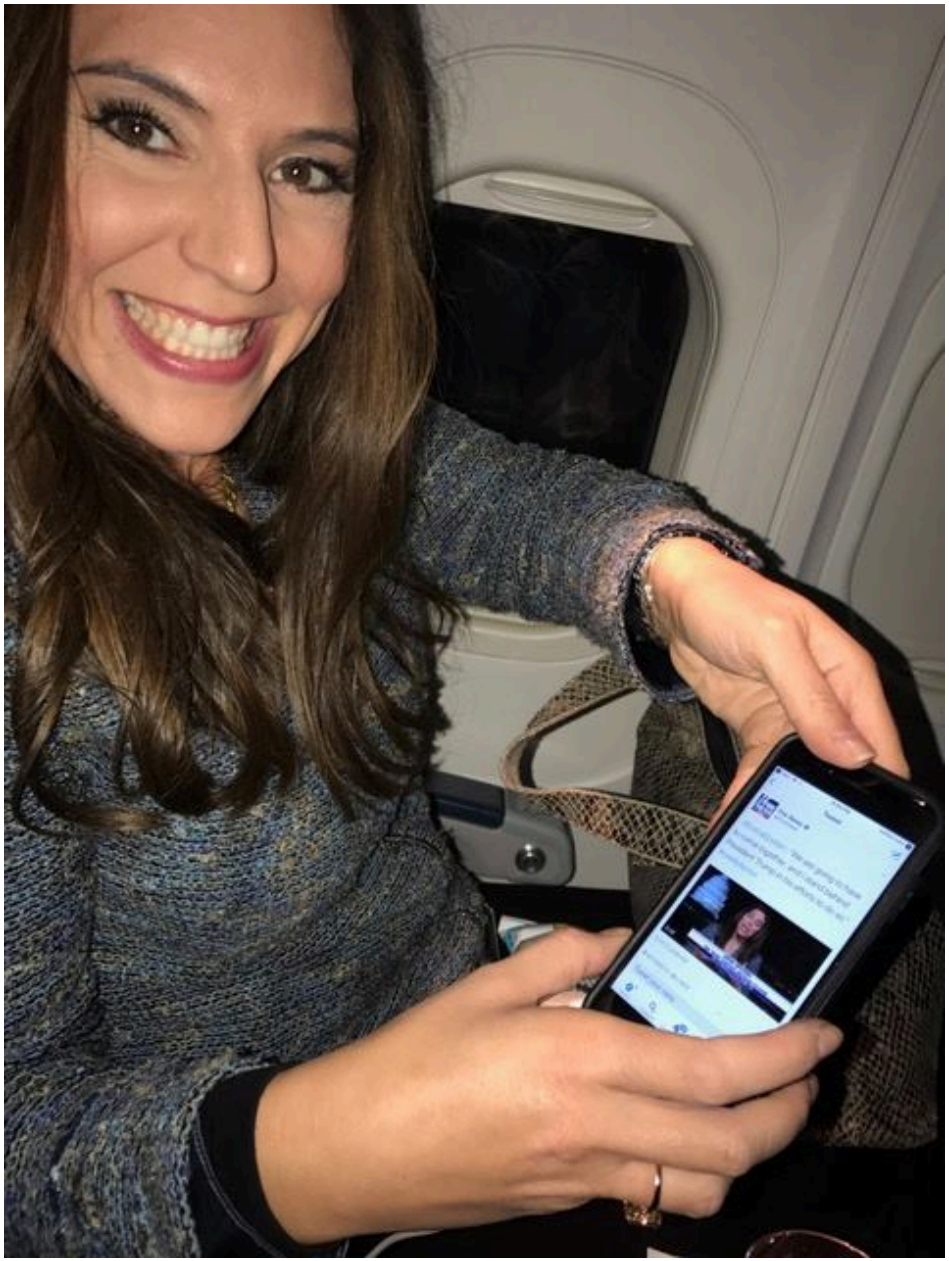
2016

Luis Ceze
Washington

Tom Wenisch
Michigan

Mark Hill
Wisconsin

A Funny Thing Happened On the Way to the Forum: A Policy, Tonight!



A Funny Thing Happened On the Way to the Forum: A Policy, Tonight!

A Funny Thing Happened On the Way to the Forum: A Policy, Tonight!

The Opinion Pages | OP-ED CONTRIBUTORS

The New York Times

By Investing in Science, Trump Can Strengthen the Economy

By MICHAEL S. LUBELL and BURTON RICHTER FEB. 16, 2017

Science and technology have powered America's economic engine for more than 70 years. But federal support has been getting leaner. The nation is spending about 60 percent of what it did 30 years ago on federal research and development as measured against the total economy. In other words, this spending is becoming a smaller percentage of the gross domestic product.

That's a big problem, because many of our global competitors in Europe and Asia have been ramping up their research spending with a goal of knocking us off our scientific and economic pedestal.

Now President Trump is in the position to do something about it.

During his campaign, he hammered away at the historically slow growth of the American economy during the Obama years. He repeatedly pledged to

Opportunities For You

- Federal advisory committees
- Congressional testimony
- CCC (where did your NSF program come from?)

- Advocate for science and engineering
- **More I can tell you over tea/beer/bread**
- **Think bigly**

"To extend our leadership during our third century, I want to help us disseminate our work and share our expertise in a more conspicuous and public manner," Schlissel says. "This will advance our mission as a public university by better connecting U-M's broad intellectual power to areas of society where research and understanding can make a difference in lives and communities."

April 19, 2017

"I believe greater faculty engagement outside the confines of the academy will also **help the public to better understand the full value of our activities**," Schlissel says.

Kevin: I WILL HOOK YOU UP!
Call me to get involved.

EXTRA SLIDES

CCC
Computing Community Consortium
Catalyst

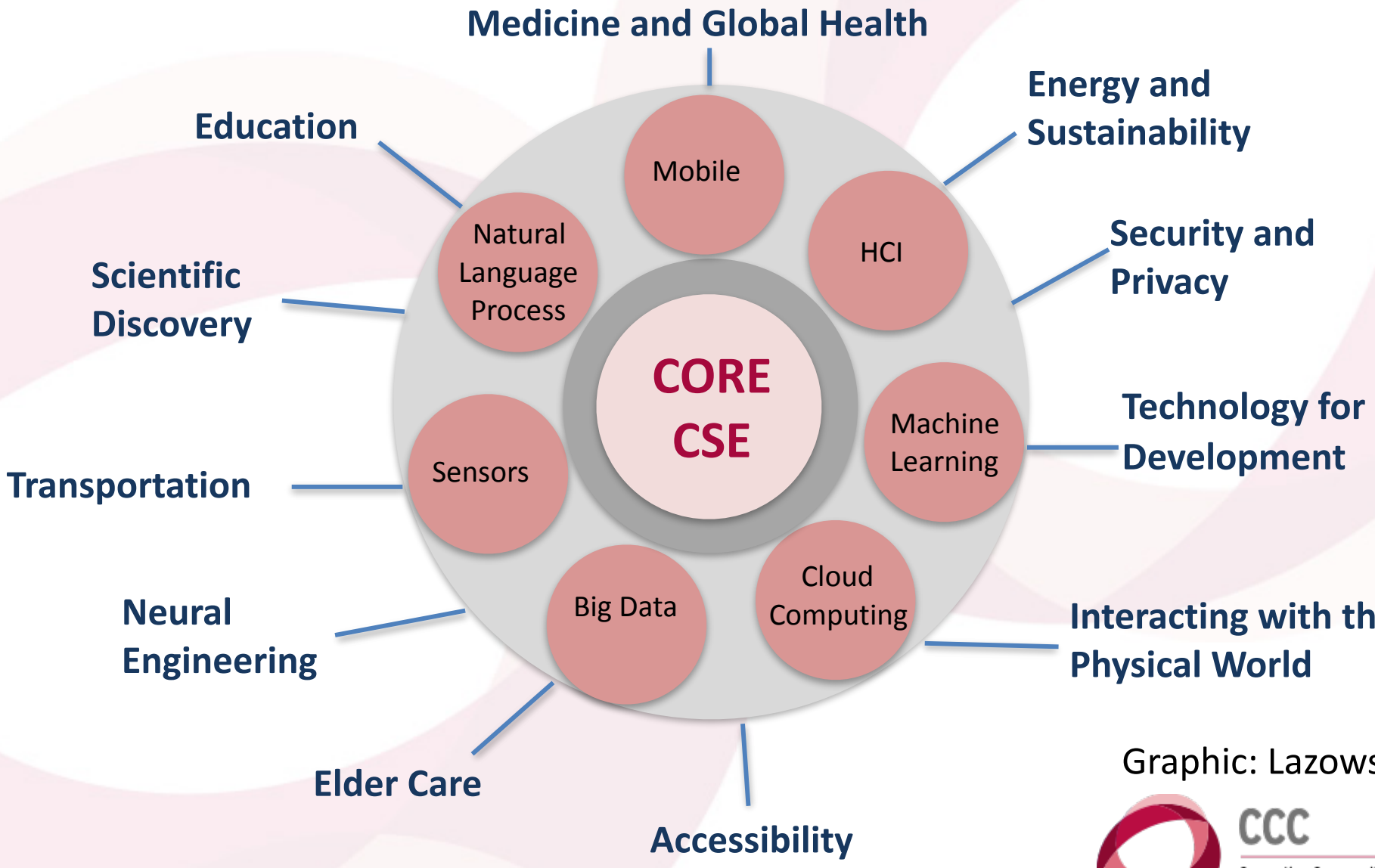
COMPUTING COMMUNITY CONSORTIUM

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.

CCC conducts activities that **strengthen** the research community, **articulate** compelling **research visions**, and **align** those visions with pressing **national and global challenges**.

CCC **communicates** the importance of those visions to **policymakers**, **government** and **industry stakeholders**, the **public**, and the **research community** itself.

THE RAPIDLY EXPANDING WORLD OF COMPUTING



Graphic: Lazowska

CCC
Computing Community Consortium
Catalyst

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
- Facilitates the development of a bold, multi-themed vision for computing research – and communicates this vision to stakeholders
- Led by a broad-based Council
- Staff based at CRA

CCC
Computing Community Consortium
Catalyst

THE CCC COUNCIL — PAST MEMBERS

- Greg Andrews, Univ. Arizona
- Debra Crawford, Drexel
- Susan Davidson, Univ. PA
- Joseph Evans, Univ. KS
- Bill Feiereisen, LANL
- Limor Fix, Intel
- Stephanie Forrest, Univ. New Mexico
- Lance Fortnow, Georgia Tech
- Susan Graham, UC Berkeley
- Eric Horvitz, Microsoft Research
- Chris Johnson, Univ. Utah
- Anita Jones, UVA
- Frans Kaashoek, MIT
- Dave Kaeli, Northeastern
- Dick Karp, UC Berkeley
- John King, Univ. Michigan
- Hank Korth, Lehigh
- Ed Lazowska, Univ. of Washington, CCC Founding Chair
- Peter Lee, Carnegie Mellon
- Ran Libeskind-Hadas, Harvey Mudd
- Andrew McCallum, UMass
- John Mitchell, Stanford
- Robin Murphy, Texas A&M
- Tal Rabin, IBM Research
- Daniela Rus, MIT
- Fred Schneider, Cornell
- Margo Seltzer, Harvard
- Shashi Shekhar, Univ. MN
- Bob Sproull, Formally Oracle
- Karen Sutherland, Augsburg College
- David Tennenhouse, New Venture Partners
- Josep Torrellas, UIUC
- Dave Waltz, Columbia
- Ross Whitaker, Univ. Utah

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CRA STAFF

CCC Director: Ann Drobnis

- 100% CCC, responsible for day-to-day management of the Organization

Senior Program Associate: Helen Wright

- 100% CCC, responsible for promoting the CCC mission through the website, blog, and social media

Program Associate: Khari Douglas

- 100% CCC, responsible for supporting CCC special programs, workshops, and communications

CRA Executive Director: Andy Bernat

- 20% CCC, responsible for general oversight

Other CRA Staff:

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





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ACTIVITIES

Visioning

- Workshops
- Blue Sky Ideas Conference Tracks

Outreach

- Outputs of Visioning Activities
- Short Reports / White Papers
- Task Forces

Communicating

- CCC Blog (http://cccblog.org)
- Great Innovative Ideas
- Computing Research: Addressing National Priorities and Societal Needs

Nurturing next generation of leaders

- Postdoc Best Practices
- Industry – Academic Collaborations
- Computing Innovation Fellows (CIFellows) Project
- Leadership in Science Policy Institute

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RECENT VISIONING WORKSHOPS

Cyber Social Learning Systems	August 29-30, 2016 November 2-3, 2016 January 23-24, 2017
AAAI Symposium on Accelerating Science A Grand Challenge for AI	November 17-19, 2016
Smart Health and Health IT	December 5-6, 2016
Sociotechnical Cybersecurity	December 12-13, 2016 August 8-9, 2017
Cyber Security for Manufacturers Workshop – Joint with MForesight	March 14-15, 2017
AAAI Symposium on AI for Social Good	March 27-29, 2017

CCC BLOG

Top 10 Posts in the Past Year

- Where the Jobs Are- 2016 Edition
- What Computer Science Can Teach Us About Robotics
- Another Perspective on the White House NSCI Workshop
- National Academy of Sciences Elects New Members
- White House National Strategic Computing Initiative Workshop
- Great Innovative Idea- Python Tutor
- Check out our new website!
- CCC White Paper- Systems Computing Challenges in the Internet of Things
- Understanding the Google computer, and making it better
- First Person: “Life as a NSF Program Director”

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GREAT Innovative IDEAS

Showcasing the exciting new research and ideas generated by the computing community

Automated In-Patient Monitoring in the ICU with Application to Septic Shock Prediction

May 17, 2016 / in Great Innovative Ideas /

The following Great Innovative Idea is from Katie Henry, a current PhD student in computer science at Johns Hopkins University. In addition to the department, Henry is also part of the Malone Center for Engineering in Healthcare, the Institute for Computational Medicine, and the Center for Language and Speech Processing. Henry presented her poster, *Automated in-patient monitoring in the ICU with application to septic shock prediction,* at the CCC Symposium on Computing Research, May 9-10, 2016.

The Innovative Idea

Traditional approaches to disease prediction involve a panel of experts selecting a small set of clinically meaningful measurements and using these to tabulate a score. While useful, these scores are limited because they require manual definition and testing for each new disease and are limited to features that are easy for a human to compute in their checklist. Instead, we can use machine learning techniques to automatically learn features from routinely collected data in electronic health records (EHRs) that predict which patients are at highest risk of developing a given adverse-event. As a test case, we developed TREWScore, a targeted real-time early warning score for septic shock, a whole body infection that causes organ dysfunction and dangerously low blood pressure. While best practices for treatment are still under debate, there is consensus that early intervention is critical. Current approaches to identify septic shock use checklists to detect septic shock at the actual onset of shock (systolic blood pressure < 90 mmHg); however, TREWScore was able to identify patients with a median 28 hours prior to septic shock onset at a sensitivity of 0.85 and corresponding specificity of 0.67. Additionally, over two-thirds of patients were identified prior to any sepsis-related organ dysfunction.

Impact

Septic shock is the 11th leading cause of death in the United States and with $15.4 billion in annual health care costs, it has the highest associated added costs of any ICU condition. While the true impact of a septic shock prediction score like TREWScore has to be validated in a

Embedding Ethical Principles in Collective Decision Support Systems

April 6, 2016 / in Great Innovative Ideas /

The following Great Innovative Idea is from Francesca Rossi from the University of Padova. Rossi and her colleagues Joshua Greene (Harvard University), John Tasioulas (King's College London), Kristen Brent Venable (Tulane University), and Brian Williams (Massachusetts Institute of Technology) published a paper called *Embedding Ethical Principles in Collective Decision Support Systems* which was one of the winners at the Computing Community Consortium (CCC) sponsored Blue Sky Ideas Track Competition at the 30th Association for the Advancement of Artificial Intelligence (AAAI) Conference on Artificial Intelligence (AAAI-16), February 12-17, 2016 in Phoenix, Arizona.

The Innovative Idea

We intend to model both ethical principles and safety constraints in (collective) decision making systems. We believe that current AI frameworks to model and reason with preferences, as well as risk-bound reasoning engines, can be adapted to achieve our goal.

Impact

Many AI systems are designed to work in real-life scenarios where ethical considerations are an important issue. Think of self-driving cars, elder care assistive technology, and social robots. Designing and building ethic-compliant systems will possibly impact all these application domains.

Other Research

I work on symbiotic environments for group decision making, where the environment (such as the meeting room) is essential in providing support for the group of people who need to make a decision. I also work on computational social choice, designing innovative frameworks to

TASK FORCES

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

- Computing in the Physical World
- Convergence of Data and Computing
- Artificial Intelligence and Robotics
- Healthcare
- Privacy and Fairness

Goal is for CCC to be **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.

COMPUTING IN THE PHYSICAL WORLD TASK FORCE

Chairs: Ben Zorn and Shwetak Patel

Ben Zorn
Microsoft Research

Shwetak Patel
University of Washington

Current Members:

Kevin Fu
University of Michigan

Daniel Lopresti
Lehigh University

Greg Morrisett
Cornell University

Beth Mynatt
Georgia Tech

Klara Nahrstedt
UIUC

Jennifer Rexford
Princeton University

Debra Richardson
UC - Irvine

White Papers:

- *Safety, Security, and Privacy Threats Posed by Accelerating Trends in IoT*
- *Embedding Computing Innovations into our Cities and Communities (in process)*

Recent Activities:

- *When Everyday Objects Become Internet Devices: A Science Policy Agenda* panel at AAAS 2017

Upcoming Activities:

- Response to NITRD Smart Cities and Community Strategic Plan
- White paper about key research investment in "Intelligent Infrastructure"
- Coordination with CRA Govt Affairs

CONVERGENCE OF DATA AND COMPUTING TASK FORCE

Chair: Vasant Honavar

Vasant Honavar
Penn State

Current Members:

Tom Conte
Georgia Tech

Mark Hill
Wisconsin, Madison

Klara Nahrstedt
Illinois, Urbana-Champaign

Holly Rushmeier
Yale

Kathy Yelick
UC - Berkeley

White Papers:

- *Challenges to Keeping the Computer Industry Centered in the US*
- *Democratizing Design for Future Computing Platforms*

Recent Activities:

- *Accelerating Science: A Computing Research Agenda* white paper
- Co-sponsor of the AAAI Symposium on *Accelerating Science: A Grand Challenge for AI*
- Discussions with DARPA
- White papers and coordination with PCAST

Upcoming Activities:

- *Accelerating Science: A Grand Challenge for AI* workshop report

AI AND ROBOTICS TASK FORCE

Chairs: Greg Hager and Eric Horvitz

Gregory Hager
Johns Hopkins

Eric Horvitz
Microsoft Research

Current Members:

Randy Bryant
Carnegie Mellon

Vasant Honavar
Penn State

Maja Matarić
USC

White Papers In Process:

- *An Actionable Agenda for AI*
- *Work Through Human Augmentation*
- *White Paper on Safe AI*

Recent Activities:

- Co-sponsorship of AAAI Symposium on *Artificial Intelligence for Social Good*
- *Advances in Artificial Intelligence Require Progress Across all of Computer Science* white paper
- Discussions with Partnership on AI
- AAAS Flash Talk and Panel on Socially-Assistive Robotics

Upcoming Activities:

- *Accelerating Science: A Grand Challenge for AI* workshop report

HEALTHCARE TASK FORCE

Chair: Beth Mynatt

Beth Mynatt
Georgia Tech

Current Members:

Kevin Fu
University of Michigan

Gregory Hager
Johns Hopkins

Maja Matarić
Penn State

Nina Mishra
Amazon

Shwetak Patel
University of Washington

White Papers In Process

- *Population Health Surveillance and Response*
- *Transforming Aging*

Recent Activities:

- Workshop and Executive Summary: *Discovery and Innovation in Smart and Pervasive Health*
- Workshop series on Cyber Social Learning Systems
- Attended the AAAS meeting in Feb 2017 and held a press briefing on *Health in Your Pocket: Diagnosing and Treating Disease with Smart Phones*

Upcoming Activities:

- *Discovery and Innovation in Smart and Pervasive Health* December, 2016 Workshop Report

PRIVACY AND FAIRNESS TASK FORCE

Chairs: Cynthia Dwork and Sampath Kannan

Cynthia Dwork
Harvard University

Sampath Kannan
University of Pennsylvania

Current Members:

Lorenzo Alvisi
University of Texas, Austin

Elizabeth Bradley
University of Colorado, Boulder

Vasant Honavar
Penn State

White Papers In Process

- *An Ontology for Fairness*

Recent Activities:

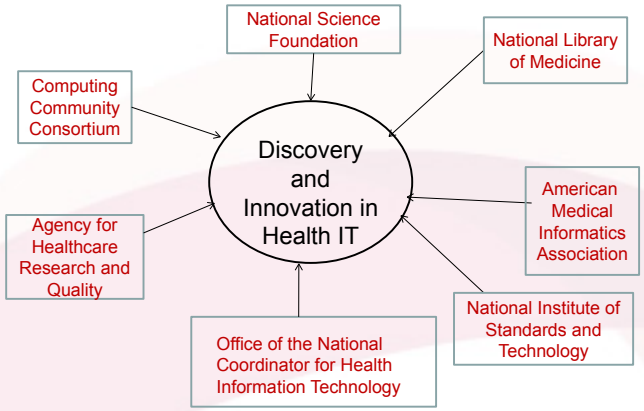
- Published a white paper called *Privacy-Preserving Data Analysis for the Federal Statistical Agencies* (joint with the Census Bureau)
- Visioning Workshop on Sociotechnical Cybersecurity- December, 2016

Upcoming Activities:

- Writing a white paper to encourage NIST to create a Standards Body
- Organizing four Fairness Workshops for late 2017 and early 2018

IMPACT: HEALTH IT

October 2009 Workshop



National Science Foundation
WHERE DISCOVERIES BEGIN

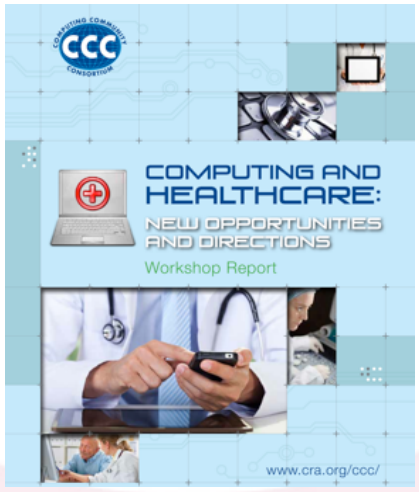
Directorate for Computer & Information Science & Engineering

SMART HEALTH AND WELLBEING (SHW)

CONTACTS

See program guidelines for contact information.

SYNOPSIS



Smart and Connected Health (SCH)

PROGRAM SOLICITATION
NSF 13-543

REPLACES DOCUMENT(S):
NSF 12-512

National Science Foundation

Directorate for Computer & Information Science & Engineering
Division of Computing and Communication Foundations
Division of Computer and Network Systems
Division of Information & Intelligent Systems

Directorate for Engineering

Directorate for Social, Behavioral & Economic Sciences

National Institutes of Health

October 2012 Workshop

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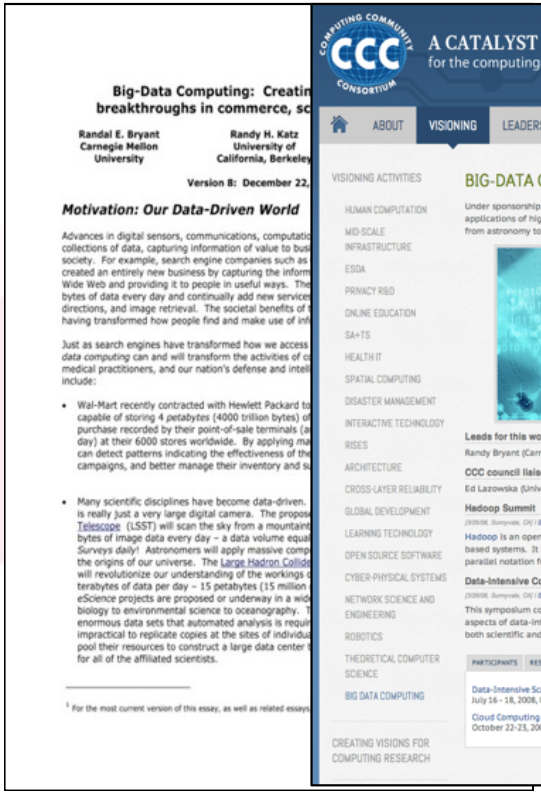
IMPACT: BIG DATA



Big-Data Computing: Creatin
breakthroughs in commerce, sc

Randal E. Bryant
Carnegie Mellon University

Randy H. Katz
University of California, Berkeley

Version 8: December 22,

Motivation: Our Data-Driven World

Advances in digital sensors, communications, computatio
collections of data, capturing information of value to busi
society. For example, search engine companies such as
created an entirely new business by capturing the inform
Wide Web and providing it to people in useful ways. The
bytes of data every day and continually add new services
directions, and image retrieval. The societal benefits of
having transformed how people find and make use of inf

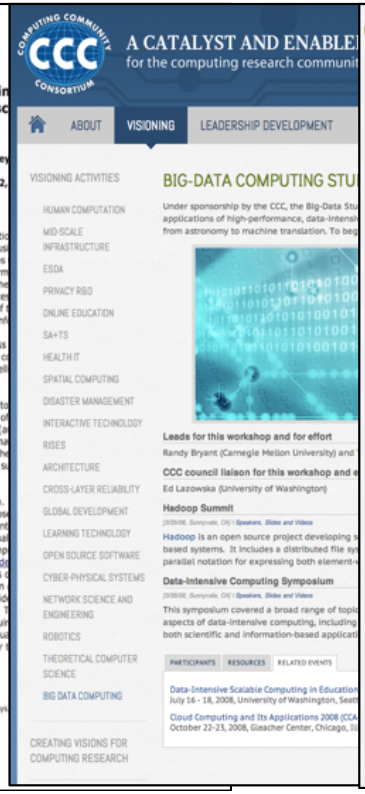
Just as search engines have transformed how we access
data computing can and will transform the activities of co
medical practitioners, and our nation's defense and intell
include:

- Wal-Mart recently contracted with Hewlett Packard to
capable of storing 4 *petabytes* (4000 trillion bytes) of
purchase recorded by their point-of-sale terminals (a
day) at their 6000 stores worldwide. By applying ma
can detect patterns indicating the effectiveness of the
campaigns, and better manage their inventory and s

- Many scientific disciplines have become data-driven.
is really just a very large digital camera. The propose
Telescope (LSST) will scan the sky from a mountaint
bytes of image data every day – a data volume equal
Surveys daily! Astronomers will apply massive comp
the origins of our universe. The Large Hadron Collide
will revolutionize our understanding of the workings
terabytes of data per day – 15 petabytes (15 million
eScience projects are proposed or underway in a wid
biology to environmental science to oceanography.
enormous data sets that automated analysis is requir
impractical to replicate copies at the sites of individua
pool their resources to construct a large data center
for all of the affiliated scientists.

[1] For the most current version of this essay, as well as related essays

2008



CCC
COMPUTING COMMUNITY CONSORTIUM

A CATALYST AND ENABLE
for the computing research communit

ABOUT | VISIONING | LEADERSHIP DEVELOPMENT

VISIONING ACTIVITIES

- HUMAN COMPUTATION
- MID-SCALE INFRASTRUCTURE
- ESDA
- PRIVACY R&D
- ONLINE EDUCATION
- SA+TS
- HEALTH IT
- SPATIAL COMPUTING
- DISASTER MANAGEMENT
- INTERACTIVE TECHNOLOGY
- RISES
- ARCHITECTURE
- CROSS-LAYER RELIABILITY
- GLOBAL DEVELOPMENT
- LEARNING TECHNOLOGY
- OPEN SOURCE SOFTWARE
- CYBER-PHYSICAL SYSTEMS
- NETWORK SCIENCE AND ENGINEERING
- ROBOTICS
- THEORETICAL COMPUTER SCIENCE
- BIG DATA COMPUTING

CREATING VISIONS FOR COMPUTING RESEARCH

BIG-DATA COMPUTING STU

Under sponsorship by the CCC, the Big-Data Stu
applications of high-performance, data-intensi
from astronomy to machine translation. To beg

Leads for this workshop and for effort

Randy Bryant (Carnegie Mellon University) and

CCC council liaison for this workshop and e

Ed Lazowska (University of Washington)

Hadoop Summit

Hadoop is an open source project developing s
based systems. It includes a distributed file sy
parallel notation for expressing both element-

Data-Intensive Computing Symposium

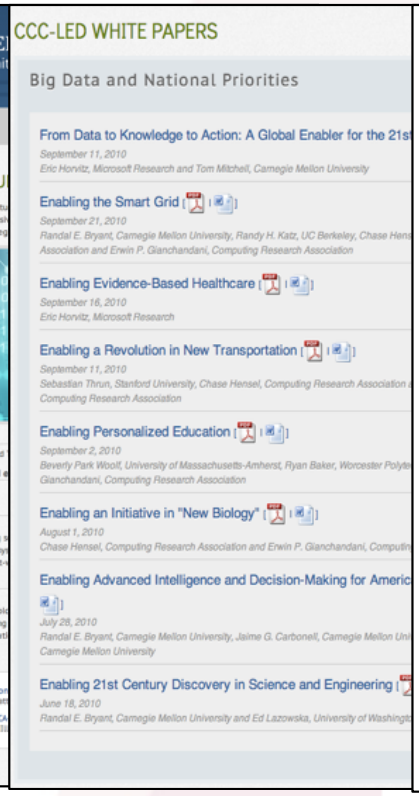
This symposium covered a broad range of topi
aspects of data-intensive computing, including
both scientific and information-based applicati

PARTICIPANTS | RESOURCES | RELATED EVENTS

Data-Intensive Scalable Computing in Education
July 16 - 18, 2008, University of Washington, Seatt

Cloud Computing and Its Applications 2008 (CCA
October 22-23, 2008, Gleacher Center, Chicago, Il

2008



CCC-LED WHITE PAPERS

Big Data and National Priorities

From Data to Knowledge to Action: A Global Enabler for the 21s
September 11, 2010
Eric Horvitz, Microsoft Research and Tom Mitchell, Carnegie Mellon University

Enabling the Smart Grid
September 21, 2010
Randal E. Bryant, Carnegie Mellon University, Randy H. Katz, UC Berkeley, Chase Hens
Association and Erwin P. Gianchandani, Computing Research Association

Enabling Evidence-Based Healthcare
September 16, 2010
Eric Horvitz, Microsoft Research

Enabling a Revolution in New Transportation
September 11, 2010
Sebastian Thrun, Stanford University, Chase Hensel, Computing Research Association
Computing Research Association

Enabling Personalized Education
September 2, 2010
Beverly Park Woolf, University of Massachusetts-Amherst, Ryan Baker, Worcester Polyte
Gianchandani, Computing Research Association

Enabling an Initiative in "New Biology"
August 1, 2010
Chase Hensel, Computing Research Association and Erwin P. Gianchandani, Computin

Enabling Advanced Intelligence and Decision-Making for Americ
July 28, 2010
Randal E. Bryant, Carnegie Mellon University, Jaime G. Carbonell, Carnegie Mellon Uni
Carnegie Mellon University

Enabling 21st Century Discovery in Science and Engineering
June 18, 2010
Randal E. Bryant, Carnegie Mellon University and Ed Lazowska, University of Washingt

2010

FOR IMMEDIATE RELEASE
March 29, 2012

Contact: Rick Wee
Lisa-Joy

**OBAMA ADMINISTRATION UNVEILS "BIG
ANNOUNCES $200 MILLION IN NEW RA**

Aiming to make the most of the fast-growing volume of
Administration today announced a "Big Data Research
improving our ability to extract knowledge and insights f
collections of digital data, the initiative promises to help
pressing challenges.

To launch the initiative, six Federal departments and ag
than $200 million in new commitments that, together, pr
tools and techniques needed to access, organize, and
volumes of digital data.

"In the same way that past Federal investments in infor
dramatic advances in supercomputing and the creation
are launching today promises to transform our ability to
discovery, environmental and biomedical research, edu
said Dr. John P. Holdren, Assistant to the President and
Office of Science and Technology Policy.

To make the most of this opportunity, the White House
Technology Policy (OSTP)—in concert with several Fed
agencies—created the Big Data Research and Develop

- Advance state-of-the-art core technologies need
manage, analyze, and share huge quantities of
- Harness these technologies to accelerate the pa
engineering, strengthen our national security, ar
learning; and
- Expand the workforce needed to develop and us

1

2012

THE FEDERAL BIG DATA RESEARCH AND DEVELOPMENT STRATEGIC PLAN

THE NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT PROGRAM

NITRD

MAY 2016

2016

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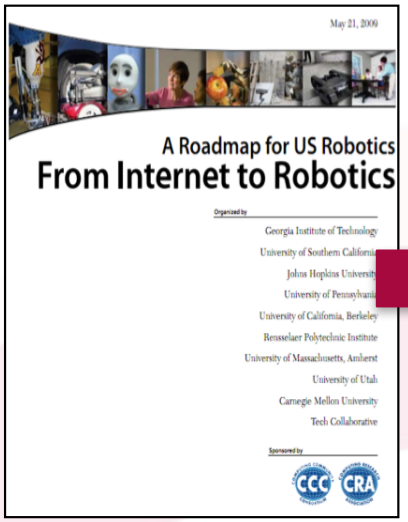
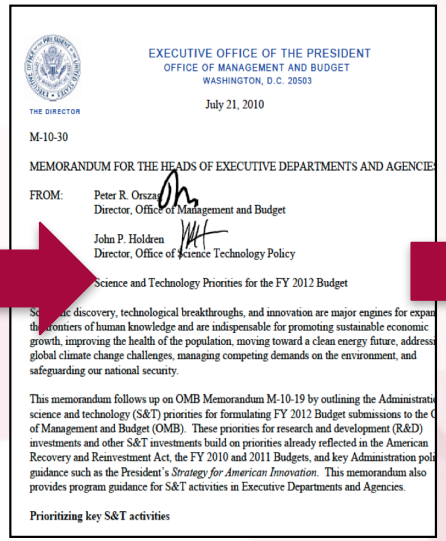
IMPACT: ROBOTICS



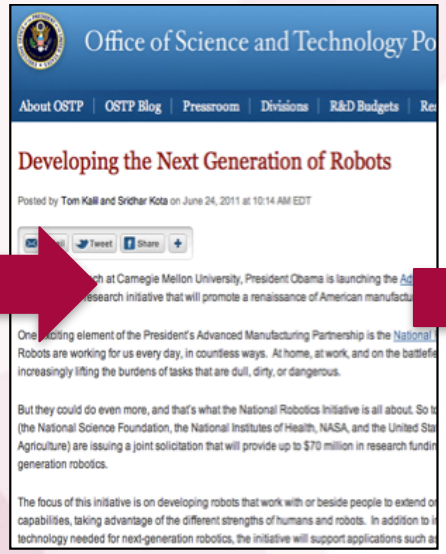
4 meetings during summer 2008

Roadmap published May 2009

Extensive discussions between visioning leaders & agencies



OSTP issues directive to all agencies in summer 2010 to include robotics in FY 12 budgets



National Robotics Initiative announced in summer 2011

2 meetings in Spring, 2016

Report and Congressional Briefing in June, 2016

Henrik Chistensen

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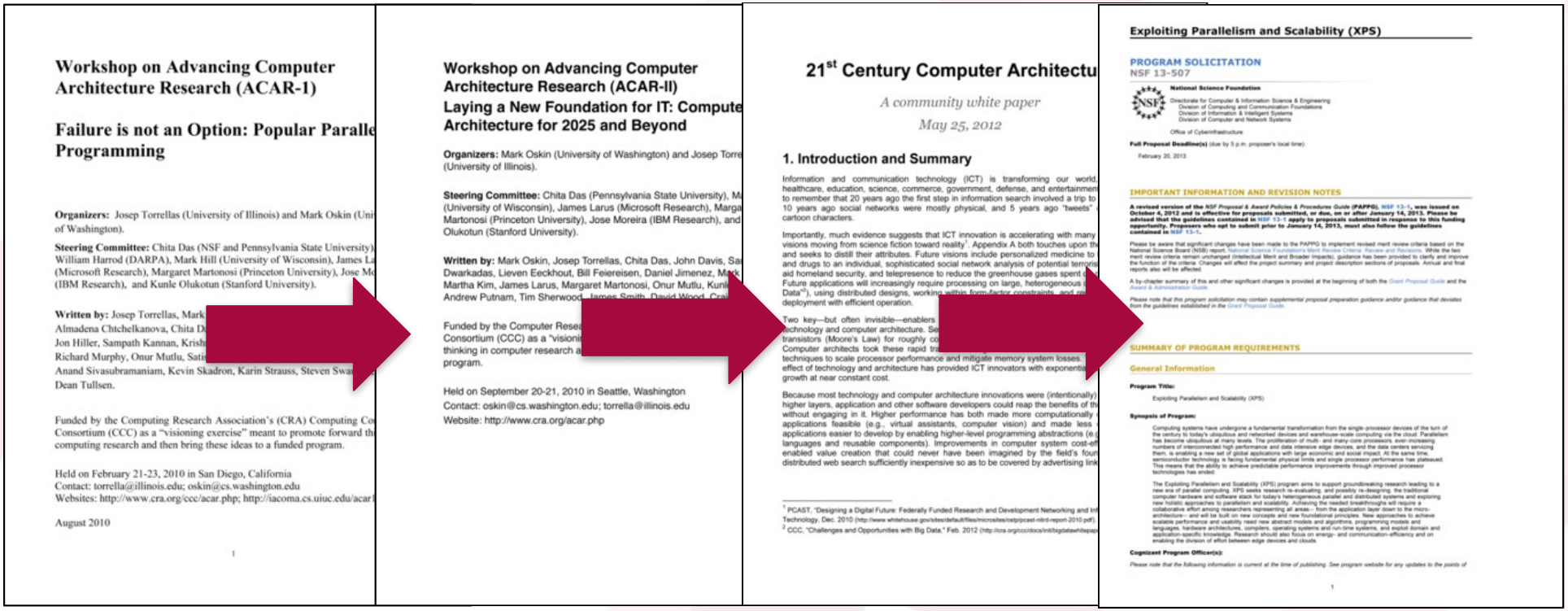
IMPACT: ARCHITECTURE



Workshop on Advancing Computer Architecture Research (ACAR-1)

Failure is not an Option: Popular Parallel Programming

Organizers: Josep Torrellas (University of Illinois) and Mark Oskin (Uni of Washington).

Steering Committee: Chita Das (NSF and Pennsylvania State University), William Harrod (DARPA), Mark Hill (University of Wisconsin), James La (Microsoft Research), Margaret Martonosi (Princeton University), Jose Mo (IBM Research), and Kunle Olukotun (Stanford University).

Written by: Josep Torrellas, Mark Almadena Chtchelkanova, Chita D Jon Hiller, Sampath Kannan, Krish Richard Murphy, Onur Mutlu, Sati Anand Sivasubramaniam, Kevin Skadron, Karin Strauss, Steven Swa Dean Tullsen.

Funded by the Computing Research Association's (CRA) Computing Co Consortium (CCC) as a "visioning exercise" meant to promote forward th computing research and then bring these ideas to a funded program.

Held on February 21-23, 2010 in San Diego, California
Contact: torrella@illinois.edu; oskin@cs.washington.edu
Websites: http://www.cra.org/ccc/acar.php; http://iacoma.cs.uiuc.edu/acar

August 2010

1

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

Organizers: Mark Oskin (University of Washington) and Josep Torre (University of Illinois).

Steering Committee: Chita Das (Pennsylvania State University), M (University of Wisconsin), James Larus (Microsoft Research), Marga Martonosi (Princeton University), Jose Moreira (IBM Research), and Olukotun (Stanford University).

Written by: Mark Oskin, Josep Torrellas, Chita Das, John Davis, Sa Dwarkadas, Lieven Eeckhout, Bill Feiereisen, Daniel Jimenez, Mark Martha Kim, James Larus, Margaret Martonosi, Onur Mutlu, Kunl Andrew Putnam, Tim Sherwood, James Smith, David Wood, Cra

Funded by the Computer Rese Consortium (CCC) as a "visioni thinking in computer research a program.

Held on September 20-21, 2010 in Seattle, Washington
Contact: oskin@cs.washington.edu; torrella@illinois.edu
Website: http://www.cra.org/acar.php

21st Century Computer Architectu

A community white paper
May 25, 2012

1. Introduction and Summary

Information and communication technology (ICT) is transforming our world healthcare, education, science, commerce, government, defense, and entertainmen to remember that 20 years ago the first step in information search involved a trip to 10 years ago social networks were mostly physical, and 5 years ago "tweets" cartoon characters.

Importantly, much evidence suggests that ICT innovation is accelerating with many visions moving from science fiction toward reality[1]. Appendix A both touches upon th and seeks to distill their attributes. Future visions include personalized medicine to and drugs to an individual, sophisticated social network analysis of potential terroris aid homeland security, and telepresence to reduce the greenhouse gases spent Future applications will increasingly require processing on large, heterogeneous Data"[2]), using distributed designs, working within form-factor constraints, and re deployment with efficient operation.

Two key—but often invisible—enablers technology and computer architecture. Se transistors (Moore's Law) for roughly co Computer architects took these rapid tre techniques to scale processor performance and mitigate memory system losses. effect of technology and architecture has provided ICT innovators with exponentia growth at near constant cost.

Because most technology and computer architecture innovations were (intentionally higher layers, application and other software developers could reap the benefits of th without engaging in it. Higher performance has both made more computationally applications feasible (e.g., virtual assistants, computer vision) and made less applications easier to develop by enabling higher-level programming abstractions (e.g languages and reusable components). Improvements in computer system cost-eff enabled value creation that could never have been imagined by the field's foun distributed web search sufficiently inexpensive so as to be covered by advertising link

[1] PCAST, "Designing a Digital Future: Federally Funded Research and Development Networking and In Technology, Dec. 2010 (http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-nitrd-report-2010.pdf)
[2] CCC, "Challenges and Opportunities with Big Data," Feb. 2012 (http://cra.org/ccc/docs/init/bigdatawhitepap

Exploiting Parallelism and Scalability (XPS)

PROGRAM SOLICITATION
NSF 13-507

National Science Foundation
Directorate for Computer & Information Science & Engineering
Division of Computing and Communication Foundations
Division of Information & Intelligent Systems
Division of Computer and Network Systems

Office of Cyberinfrastructure

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

February 20, 2013

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), NSF 13-1, was issued on October 4, 2012 and is effective for proposals submitted, or dou, on or after January 14, 2013. Please be advised that the guidelines contained in NSF 13-1 apply to proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 14, 2013, must also follow the guidelines contained in NSF 13-1.

Please be aware that significant changes have been made to the PAPPG to implement revised merit review criteria based on the National Science Board (NSB) report, National Science Foundation's Merit Review Criteria: Review and Revisions. While the two merit review criteria remain unchanged (Intellectual Merit and Broader Impacts), guidance has been provided to clarify and improve the function of the criteria. Changes will affect the project summary and project description sections of proposals. Annual and final reports also will be affected.

A by-chapter summary of this and other significant changes is provided at the beginning of both the Grant Proposal Guide and the Award & Administration Guide.

Please note that this program solicitation may contain supplemental proposal preparation guidance and/or guidance that deviates from the guidelines established in the Grant Proposal Guide.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Exploiting Parallelism and Scalability (XPS)

Synopsis of Program:

Computing systems have undergone a fundamental transformation from the single-processor devices of the turn of the century to today's ubiquitous and networked devices and warehouse-scale computing via the cloud. Parallelism has become ubiquitous at many levels. The proliferation of multi- and many-core processors, ever-increasing numbers of interconnected high performance and data intensive edge devices, and the data centers servicing them, is enabling a new set of global applications with large economic and social impact. At the same time, semiconductor technology is facing fundamental physical limits and single processor performance has plateaued. This means that the ability to achieve predictable performance improvements through improved processor technologies has ended.

The Exploiting Parallelism and Scalability (XPS) program aims to support groundbreaking research leading to a new era of parallel computing. XPS seeks research re-evaluating, and possibly re-designing, the traditional computer hardware and software stack for today's heterogeneous parallel and distributed systems and exploring new holistic approaches to parallelism and scalability. Achieving the needed breakthroughs will require a collaborative effort among researchers representing all areas – from the application layer down to the micro-architecture– and will be built on new concepts and new foundational principles. New approaches to achieve scalable performance and usability need new abstract models and algorithms, programming models and languages, hardware architectures, compilers, operating systems and run-time systems, and exploit domain and application-specific knowledge. Research should also focus on energy- and communication-efficiency and on enabling the division of effort between edge devices and clouds.

Cognizant Program Officer(s):

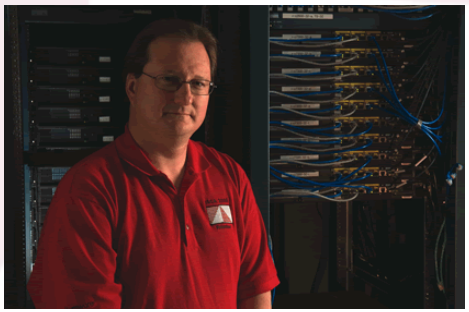
Please note that the following information is current at the time of publishing. See program website for any updates to the points of

1

2010 2010 2012 2013

Josep Torrellas
UIUC

Mark Oskin
Washington



Mark Hill
Wisconsin

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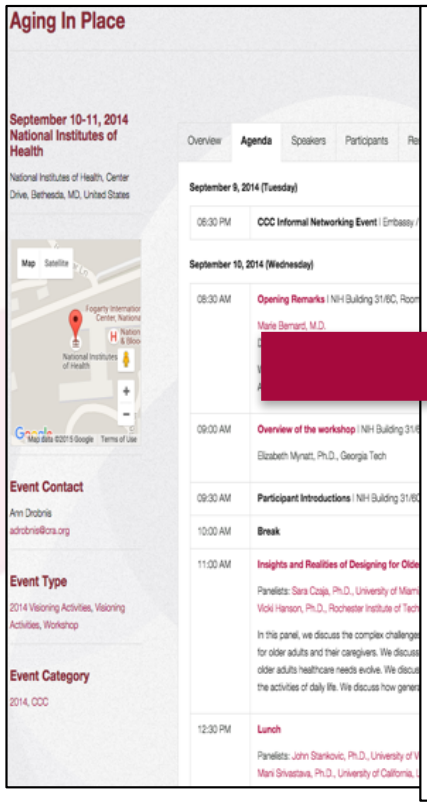
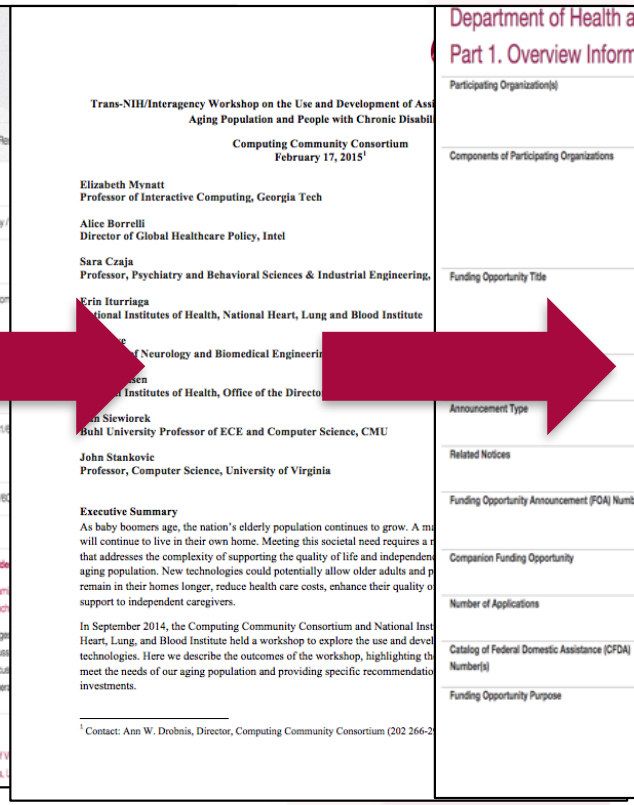
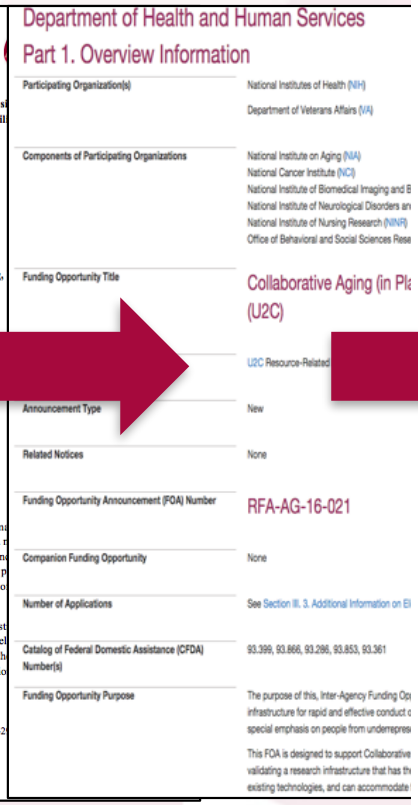
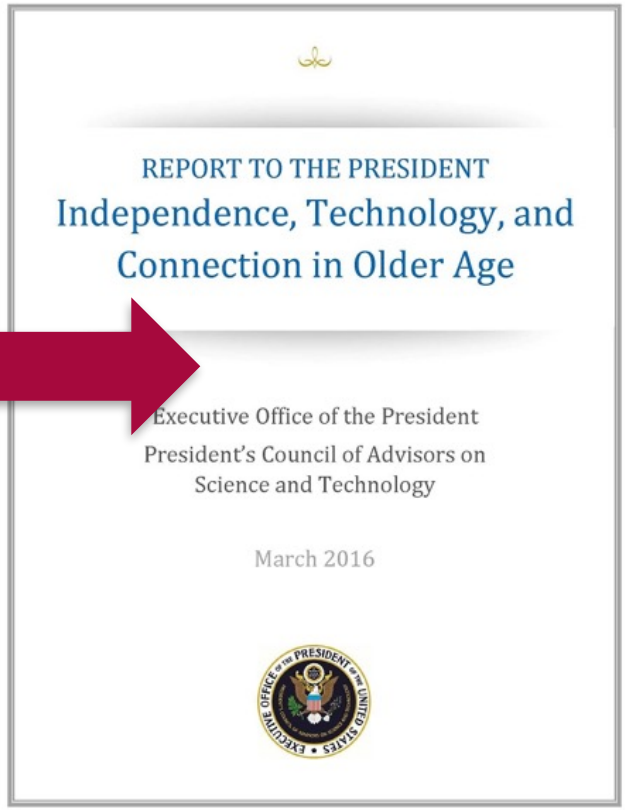
IMPACT: AGING IN PLACE









Joint NIH/CCC Meeting September 2014

Produced Workshop Report February 2015

NIH released new RFP informed by AIP Workshop October 2015

PCAST Report March 2016

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