The Computing Community Consortium

NSF Reverse Site Visit
February 8, 2012

Andrew Bernat, CRA Executive Director
Erwin Gianchandani, CCC Director
Susan Graham, UC Berkeley and CCC Vice Chair
Anita Jones, University of Virginia and CCC Council
Ed Lazowska, University of Washington and CCC Chair
Fred Schneider, Cornell University and CCC Council

Today …

- A brief overview
- A discussion of the specific questions that you raised

CCC: A catalyst and enabler for the computing research community

- Bring the community together to contribute to shaping 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
- Grow new leaders for the computing research community

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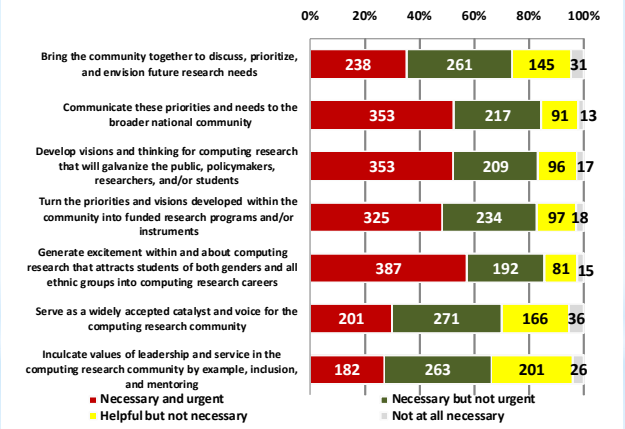
There is broad agreement that these are important roles

How necessary is it to have within the U.S. computing research community an organization designated to perform one or more of the following activities?



[From SRI assessment, completed December 2010, and p. 9 of proposal]

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Structure

- Operates as a "standing committee" of the Computing Research Association
- Funded by NSF under a Cooperative Agreement
  - Additional funding from NSF and other agencies for specific activities
- Led by a broad-based, continually refreshed Council
- Chaired by Ed Lazowska and Susan Graham
- Staffed by Erwin Gianchandani, Director

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The CCC Council

- Leadership
  - Ed Lazowska, Univ. Washington (Chair)
  - Susan Graham, UC Berkeley (Vice Chair)
  - Erwin Gianchandani, Director (ex officio)
  - Andy Bernat, CRA Executive Director (ex officio)
- Terms ending 1/2015
  - Liz Bradley, Univ. Colorado
  - Joe Evans, Univ. Kansas
  - Ran Libeskind-Hadas, Harvey Mudd College
  - Shashi Shekhar, Univ. Minnesota
  - TBD
- Terms ending 1/2014
  - Deborah Crawford, Drexel
  - Gregory Hager, Johns Hopkins
  - Anita Jones, Univ. Virginia
  - John Mitchell, Stanford
  - Bob Sproull, Sun Labs Oracle (ret.)
  - Josep Torrellas, Univ. Illinois
- Terms ending 1/2013
  - Randy Bryant, Carnegie Mellon
  - Lance Fortnow, Northwestern
  - Hank Korth, Lehigh
  - Eric Horvitz, Microsoft Research
  - Beth Mynatt, Georgia Tech
  - Fred Schneider, Cornell
  - Margo Seltzer, Harvard
- Former members
  - Stephanie Forrest, Univ. New Mexico, 2012
  - Chris Johnson, Univ. Utah, 2012
  - Frans Kaashoek, MIT, 2012
  - Bill Feiereisen, LANL, 2011
  - Dave Kaeli, Northeastern, 2011
  - John King, Univ. Michigan, 2011
  - Dick Karp, UC Berkeley, 2010
  - Andrew McCallum, Univ. Massachusetts, 2010
  - Dave Waltz, Columbia, 2010
  - Greg Andrews, Univ. Arizona, 2009
  - Peter Lee, Carnegie Mellon, 2009
  - Karen Sutherland, Augsburg College, 2009

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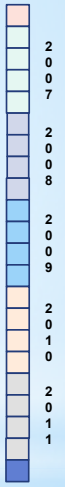
Organizational milestones

- Autumn 2006: Cooperative Agreement signed
- Spring 2007: Council appointed, activities begin
- Summer 2009: Major self-assessment conducted
- Winter 2010: Mid-term NSF review
- Spring 2010: Full-time Director begins
- Autumn 2010: SRI International assessment completed
- Spring 2011: Renewal proposal submitted
- Winter 2012: Reverse Site Visit



- (Council rotations in January 2009, 2010, 2011, 2012)

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Activities

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Activities

- Communicating with policymakers

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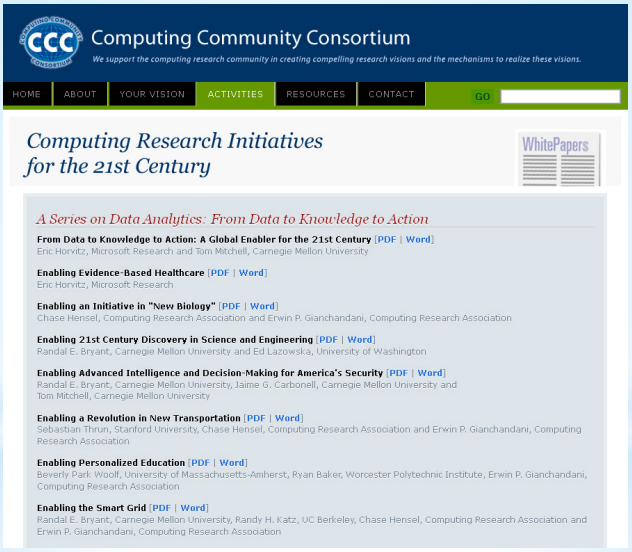
[Example: White papers]



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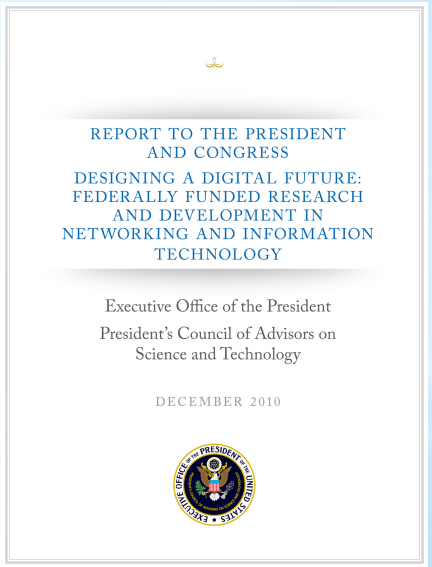
[… => PCAST NITRD Report]

- 1/3 of the PCAST NITRD Working Group members were CCC Council members (Bryant, Graham, Jones, Lazowska, Sproull)
- The report drew extensively on CCC White Papers
- An excellent roadmap for the field


REPORT TO THE PRESIDENT AND CONGRESS

DESIGNING A DIGITAL FUTURE: FEDERALLY FUNDED RESEARCH AND DEVELOPMENT IN NETWORKING AND INFORMATION TECHNOLOGY

Executive Office of the President

President's Council of Advisors on Science and Technology

DECEMBER 2010

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Activities

- Catalyzing the definition of – and providing exposure for – new research directions, including those that confront national and global challenges

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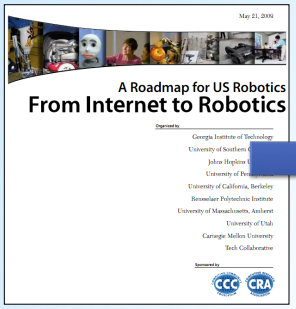
[Example: Visioning exercises]

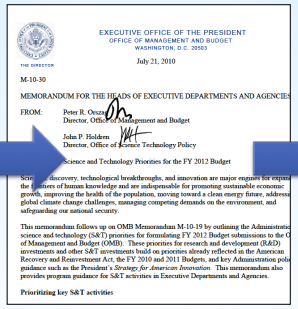
Community visioning activities	Participants	Organizations	Status
Network science & engineering	109	44	completed
"Big Data" Computing	81	46	major initiative pending
Theoretical computer science	39	26	completed
Global development (ICT4D)	56	37	completed
Cyber-physical systems	100	47	major initiative launched
Free & open source software	45	35	completed
Learning technologies	55	30	following up
Robotics	141	79	major initiative launched
Cross-layer reliability	121	45	DARPA program launched
Advancing computer architecture	38	25	following up
Interactive technologies	74	42	active
Health information technology	121	102	multiple programs launched
Sustainability & IT	72	43	CISE-centric SEES program pending
Emergency response and recovery			launching
Mobile cloud computing			in pipeline
Geospatial computing			in pipeline

[... Robotics]



4 meetings during summer 2008

Roadmap published May 2009



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

National Robotics Initiative announced in summer 2011

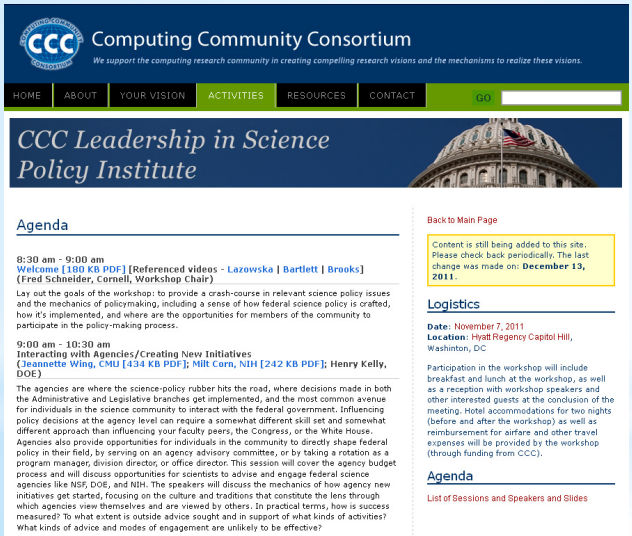
Extensive discussions between visioning leaders & agencies

Henrik Christensen
Georgia Tech

Activities

- Growing new leaders

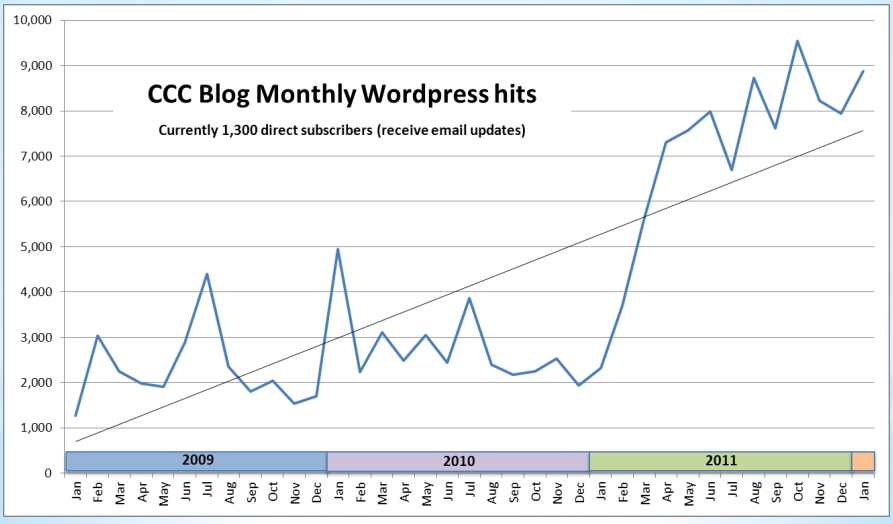
[Example: Leadership in Science Policy Institute]



Activities

- Inspiring and growing the community

[Example: CCC blog]



Activities

- "Just being there" – community leaders who can create and/or seize opportunities

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[Example: NITRD Symposium (February 16 2012)]

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[… NITRD Symposium (February 16 2012)]

TRANSFORMING THE WORLD, DRIVING THE NATION'S COMPETITIVENESS, LEADING INTO THE FUTURE

The Impact of NITRD

Two Decades of Game-Changing Breakthroughs in Networking and Information Technology — Expanding Possibilities Ahead

Welcome Remarks & the IT Innovation Ecosystem 8:15am – 8:45am
Farnam Jahanian, Assistant Director for Computer and Information Science and Engineering, National Science Foundation, & Co-Chair, NITRD Subcommittee
George Strawn, Director, National Coordination Office for NITRD, & Co-Chair, NITRD Subcommittee

"A Day in the Life" 8:45am – 9:00am
Jeannette Wing, Carnegie Mellon University

Information Technology and People 9:00am – 10:00am
Human Language Technology: What Machines Do with Text and Speech
Kevin Knight, USC Information Sciences Institute
As We May Think: The Legacy of Computing Research and the Power of Human Cognition
Beth Mynatt, Georgia Institute of Technology
Privacy, Information Technology, and Digital Media
Helen Nissenbaum, New York University

Break 10:00am – 10:10am

Information Technology in the Physical World 10:10am – 10:50am
Reinventing Mobility
Sebastian Thrun, Google
The Role of Sensors in Our Daily Lives
Shwetak Patel, University of Washington

The Economic Impact of NITRD 10:50am – 11:30am
The Economic Impact of Information Technology
Erik Brynjolfsson, Massachusetts Institute of Technology
The Modeling and Simulation Behind Improving Everyday Life
Tom Lange, Procter & Gamble

Luncheon and Keynote 11:30am – 1:00pm
Keynote
The Honorable Al Gore, 45th Vice President of the U.S.

Building Blocks of Information Technology 1:00pm – 2:00pm
NITRD and the Internet
Vint Cerf, Google
Software and Strategy
Bill Scherlis, Carnegie Mellon University
Successes and Challenges of Computer Security Research
Stefan Savage, University of California, San Diego

Information Technology for the Advancement of Science 2:00pm – 3:00pm
Chain Reactions: Information Technology and Biomedical Discovery
Russ Altman, Stanford University
High Performance Computing in Science and Engineering: The Tree and the Fruit
David Keyes, Columbia University & KAUST
More and Moore: Growing Computing Performance for Scientific Discovery
Kathy Yelick, University of California, Berkeley, & Lawrence Berkeley National Laboratory

Special Guest 3:00pm – 3:15pm
The Honorable Tom Davis, formerly U.S. House of Representatives (VA)

Break 3:15pm – 3:30pm

Information Technology and the World of Data 3:30pm – 4:30pm
This Research Made Watson Possible
Eric Brown, IBM
Data to Insights to Actions: Enabling Evidence-based Healthcare
Eric Horvitz, Microsoft Research
Data-Intensive Discovery in Science: The Fourth Paradigm
Alex Szalay, Johns Hopkins University

Future "Big Ideas" Panel Discussion 4:30pm – 5:15pm
Tom Kalil, White House Office of Science and Technology Policy (moderator)
Peter Lee, Microsoft Research
Beth Mynatt, Georgia Institute of Technology
Stefan Savage, University of California, San Diego
Chuck Vest, National Academy of Engineering

Closing Remarks 5:15pm – 5:30pm
Ed Lazowska, University of Washington & Computing Community Consortium
Susan Graham, University of California, Berkeley, & Computing Community Consortium

Reception & Agency Showcase 5:30pm – 7:30pm
On the 8th floor of the Newseum's Knight Conference Center, the NITRD agencies will present booths with flyers, posters, and/or demos highlighting NIT R&D research accomplishments and prospects.

AHRQ DARPA Homeland Security ENERGY Office of Science The Office of the National Coordinator for Health Information Technology NASA NIST NSA ONR

Major activities and emphases since submission of renewal proposal

- Continuation (and, in many cases, expansion) of most existing activities
- Specific new activities
  - Leadership in Science Policy Institute (November 2011)
  - NITRD Symposium (February 2012)
  - Special conference tracks on computational sustainability at AAAI, SIGDEV, CHI, ICML, Pervasive
  - Significant interactions related to US Ignite, Gig.U, and GENI

- Particular focus on four theme areas:
  - Health IT (building upon "Discovery and Innovation in Health IT" workshop and NSF Smart Health and Wellbeing program)
  - Computational Sustainability (building upon "Role of Information Sciences and Engineering in Sustainability" workshop and NSF Science, Engineering, and Education for Sustainability program)
  - Data Analytics (building upon multiple workshops and white papers; anticipating a new Federal initiative)
  - Education (building upon a community-initiated visioning exercise)

The bottom line

- The Computing Community Consortium has matured as an organization
- We are fulfilling important needs for the computing research community and for the nation
  - We are delivering, although not always in ways that were anticipated – flexibility and agility have been crucial
- CCC is a long-term, institutional enterprise – not a "project" or a "program"
  - CCC is providing an authoritative mechanism to channel energy in the field
  - Secondary effects (e.g., development of leadership, broadening and lengthening of vision) are important
- The various CCC roles cannot be filled by NSF, CSTB, the CISE AC, PITAC, PCAST

In response to your questions …

0) A crisp mission statement that will allow the committee to evaluate activities in relation to the mission.

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1.1) What are the 1-3 accomplishments that have had or will have the most impact? Part of this should include a discussion of why these things would not have happened without the CCC.

- Increased engagement between the computing research community and multiple agencies (e.g., Health IT, Computational Sustainability, Robotics). *While these activities were initiated in various ways, CCC coordinated and in some cases led these efforts, and marketed the results.*
- Strengthening the computing research community through mentoring (e.g., CIFellows, LiSPI, the many visioning exercises). *CCC initiated, coordinated, and in many cases led these efforts.*
- Visibility given to the centrality of computing research in addressing societal challenges and achieving mission agency goals, through interactions with OSTP and agencies (e.g., White Papers, Library of Congress Symposium, NITRD Symposium, PCAST report). *CCC coordinated these efforts, and marketed the results.*

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1.2) What have been the most important disappointments so far?

- "Small thinking" is a habit that is difficult to break
  - The quality of the community-initiated visioning proposals that we have received has been mixed
  - The depth of the leadership qualities that we seek to inculcate is not great enough
  - There have been some real bright spots – as just one example, Henrik Christensen's leadership of the Robotics visioning exercise, which shaped the NRI
  - However, most of our real successes have been initiatives that we ourselves have led
  - Sustained effort and extensive mentoring will be required to break out of this – a real culture change is necessary
    - CCC is a long-term, institutional enterprise – not a project or a program
- It took a while to generate awareness
  - CIFellows helped greatly – in the first round, 1,209 senior computing researchers from 198 institutions registered as prospective mentors, and 526 graduating students from 145 institutions applied, proposing 929 postdoc/mentor pairs
  - So did the blog – on a good trajectory

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1.3) What would you have done differently, knowing what you do now?

- We had a slow ramp-up, due to two factors: the desire for an inclusive process, and Ed Lazowska's illness. We could not have avoided the latter, and a side-benefit is that Susan Graham stepped up as Vice Chair, which has had great value. But we should have been less conservative with the former, and we should have instituted the Vice Chair position from the outset.
- We were overly optimistic regarding community-initiated visioning. It's important for openness and inclusiveness, but we have learned that we must be a leader and an initiator – a doer as well as an enabler. We have changed our approach – we are actively leading. (But we needed to gain acceptance by the computing research community before we could do this.)
- Our position on prioritization has changed. Our field does not want it, and more importantly, does not need it.
- We wish we had found Erwin a year or two earlier. We tried and failed. He has made an enormous difference in many ways, particularly in the strength of our ties to multiple agencies, and in overall coordination.

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1.4) What are the objective (i.e., quantifiable) measures that can be used to assess the CCC?

- Here are some measures that we feel have value:
  - The number of agencies and individuals with whom we have substantive interactions
  - The number of individuals engaged in our various activities
  - The number of programs launched where we have had significant engagement
  - The frequency with which agencies, offices, steering committees, etc., reach out to us
  - The number and quality of conferences that initiate "Vision" tracks, and the response to the papers in these tracks
  - The number and quality of researchers who initiate and participate in various visioning activities
- Many things can be "counted," but they don't tell the whole story – they tend to be "process indicators" rather than "outcome indicators."

2) A summary of interactions with NSF, the community, and other Federal agencies, including impact on what gets funded

- Many of our activities are extensive two-way "bridge-building" interactions: with Federal agencies (OSTP, NSF, and the mission agencies), and with the computing research community
  - Example: Robotics
  - Example: Health IT
  - Example: Computational Sustainability
  - Example: Data Analytics

  There is a clear path, in many cases, between these interactions and new Federal programs
- Some of our activities involve longer-range bridge building that can be expected to pay off in the long term
  - Example: Computing Research that Changed the World Symposium
  - Example: NITRD Symposium
  - Example: PCAST report
- Significant interactions with CISE leadership and with CRA members

3.1) Going forward, what organizational and management challenges, if any, does the CCC face? What are the plans to address them?

- Retaining Erwin
- Replacing Ed and Susan
  - We need to increase the weight on "potential successorship" in the selection of new CCC Council members. (Note that this conflicts with certain diversity goals such as youth, breadth of institutions, …)
  - We need to give leadership roles to more members of the Council: to actively engage them, to encourage and reward entrepreneurial action, and to cultivate successors. We have increased the emphasis on this:
    - Community-initiated visioning exercises: Greg Andrews -> Fred Schneider -> Lance Fortnow
    - Health IT subcommittee: Susan Graham, Greg Hager
    - Computational Sustainability subcommittee: Randy Bryant, Bob Sproull
    - Data Analytics subcommittee: Chris Johnson ->
    - CIFellows: Greg Andrews -> Peter Lee -> Frans Kaashoek
    - Postdoc assessment: Anita Jones
    - Leadership in Science Policy Institute: Fred Schneider
    - Industry roundtable: Greg Hager
    - Undergraduate website: Ran Libeskind-Hadas
    - Council nominations: Margo Seltzer
  - We need to consider possible alternative leadership structures
- Increasing communication/outreach
  - Included in our proposal

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3.2) What are the plans for bringing in new ideas, roles, and responsibilities?

- We are constantly inviting (through talks, articles, blog posts, email, …) community involvement (in visioning activities, conference visioning tracks, short videos for undergraduates, computing research highlight of the week, CCC Council membership, …)
- Council rotation provides continual re-invigoration – and this is a truly open process
- The community-initiated visioning process also is truly open
- Federal agencies (particularly NSF and OSTP) regularly request that we take responsibility for specific activities
- Council members have a good record of envisioning high-impact initiatives
  - Peter Lee and Ed Lazowska: CIFellows
  - Fred Schneider: LiSPI
  - Ran Libeskind-Hadas: URO Zone
- But the goal is *not* to keep getting bigger!
  - We must exercise restraint in what we choose to tackle

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4.1) What areas of research fall within the purview of CCC? Are there areas covered by CISE that do not fall within the purview? Are there areas not covered by CISE that do fall within the purview?

- Our purview includes research in the core of computer and information science and engineering, and also research in the enablement of its use to address national and global priorities
  - This includes CISE broadly
  - There are aspects of areas such as Health IT and IT for Sustainability that are traditionally beyond CISE but within our purview
  - But our goal is to help drive the expansion of computing research, and thus the scope of CISE
    - This may involve partnerships with other NSF Directorates and other Federal agencies, vs. growth of CISE
- We have explicitly decided to give short shrift to
  - International activities
  - K-12 education

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4.2) To what extent does the CCC plan to choose areas of CS to emphasize in your efforts? If you are going to prioritize, what areas will be emphasized?

- We emphasize – we do not prioritize
  - We do not pick winners and losers
  - The research communities that need a prioritization mechanism are those that rely on hugely expensive instruments to advance discipline knowledge, where the community must determine "what to build first."
- If we get a great community-initiated visioning proposal, we support it
- Our own energy is focused on national and global priorities, and attention to the core

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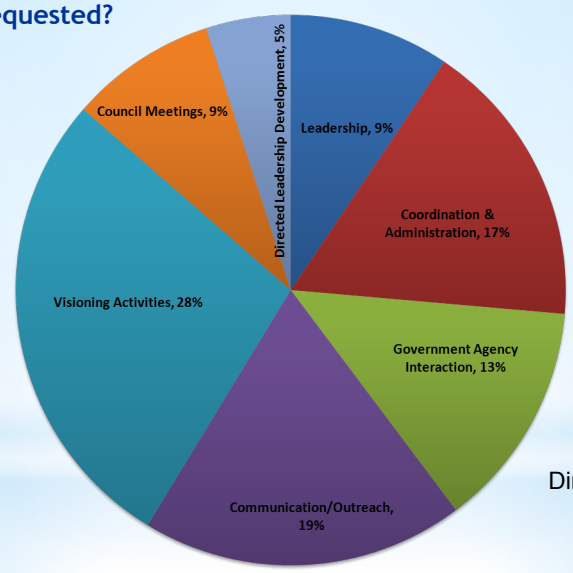
5) What would be sacrificed if the CCC were funded at lower levels than requested?



Direct Costs

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5 (cont.)

- We have proposed adding a Communication Specialist, and an Administrative Assistant to the Director. Both of these will dramatically increase our effectiveness and impact.
- The least painful reduction would be to cut the number of community-initiated visioning exercises. However, these are important to openness and to leadership development, and some have surfaced outstanding ideas (but, as with research, it's hard to predict impact in advance).
- Reducing the amount of time devoted by the Director, the Chair, and the Vice Chair (roughly 30% of the budget) would dramatically reduce the effectiveness and impact of the organization – people need to be available to respond.
- Reducing the focus on communication (roughly 20% of the budget) would have a similar effect.

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6) Provide a crisp summary of any aspects of the SRI report not covered in other parts of the presentation

- *Definition of new "research visions":* Covered in our proposal. In truth, there is no single goal for community-initiated visioning exercises. We attempt to ensure that each exercise has a clear set of goals. We have significantly increased the CCC Council engagement and follow-through with exercise – not everyone is a Henrik Christensen.
- *Diversifying sources of funding:* We have been successful at obtaining funding from diverse sources for specific activities, but not for our core.
- *Outreach concerning the value of computing research:* This has improved tremendously with Erwin's arrival, and we propose a significant uptick.
- *Growing leadership for the computing research community, and CCC succession strategy:* There have been many successes on the former. We are committed to addressing the latter, as discussed earlier.

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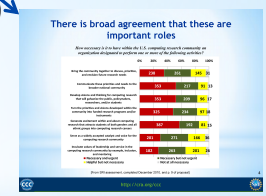
Summary: Benefits of CCC beyond the specifics

- *Somebody* needs to work these issues
- CCC is a source of energy for the community
  - We help re-focus existing fields (e.g., robotics)
  - We catalyze new fields (e.g., "big data" computing)
  - We highlight societal challenges (e.g., Health, Sustainability)
- CCC acts with agility and speed (e.g., CIFellows)
- We shepherd, we coach, we mentor, we nudge
- We are a place to turn. "Who ya gonna call??"



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Backup Slides

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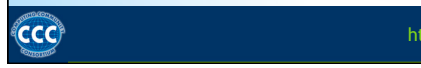
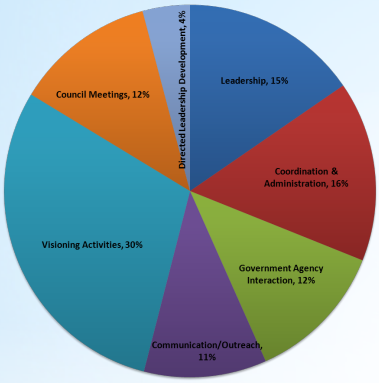
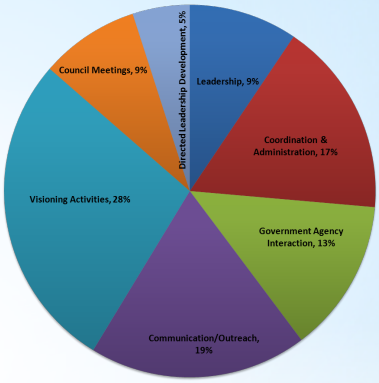


Initial Award (actual)



This Proposal (projected)



	Initial Award (actual)	This Proposal (projected)	Change
Leadership	15%	9%	-6%
Coordination & Administration	16%	17%	1%
Government Agency Interaction	12%	13%	1%
Communication/Outreach	11%	19%	8%
Visioning Activities	30%	28%	-2%
Council Meetings	12%	9%	-4%
Directed Leadership Development	4%	5%	1%

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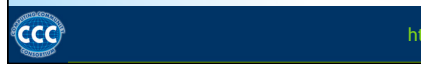

Allocation of personnel effort

	Leadership	Coordination & Administration	Government Agency Interaction	Communication/ Outreach	Visioning Activities	Council Meetings	Directed Leadership Development
Director	15%	30%	25%	15%	5%	5%	5%
Chair (0.5 FTE)	45%	10%	20%	5%	5%	5%	10%
Vice Chair (0.25 FTE)	45%	10%	20%	5%	5%	5%	10%
CRA Executive Director (0.25 FTE)	10%	80%	5%	5%			
CRA Government Affairs staff (0.65 FTE)			50%	50%			
CRA IT Support Staff (0.40 FTE)		25%		75%			
Administrative Assistant for Director		100%					

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