Setting Research Agendas at the National Level

Dr. Erwin Gianchandani
Director, Computing Community Consortium
Computing Research Association

UVa Sources for Scholars
Sept. 10, 2010, Alumni Hall
Today's topic

“The place of research at R1 universities in their mission as educators as well as creators and discoverers of new knowledge from your perspective directing CCC.”
My background...
A Triple ‘Hoo goes to Washington

B.S., computer science, 2005
M.S., biomedical engineering, 2007
Ph.D., biomedical engineering, 2009

AAAS Science & Technology Policy Fellow
Directorate for Computer & Info. Sci. & Eng. (CISE)
“Smart health & wellbeing” initiative
Fall 2009 & spring 2010

Director, Computing Community Consortium
Since April 2009
Basic research is the bedrock of our future
Advances have changed the world...

How we live, work, learn, and communicate.
Research has built the foundation...
Driving advances in all fields of science and engineering
Pursuing digital scholarship
Improving quality of life through personalized health monitoring
Revolutionizing transportation
Personalizing education
Creating a smart grid
Assessing and mitigating the effects of climate change
Empowering the developing world
But we must work together...

to establish, articulate, and pursue audacious visions

- The challenges that will shape the intellectual future of the field
- The challenges that will catalyze research investment and public support
- The challenges that will attract the best and brightest minds of a new generation
So how do we do it?
Audacious visioning requires...

- Aligning ourselves with Federal government interests
- Being agile and flexible
- Bringing leading researchers together
- Being willing to take risks & fail
- Let's take a look at a couple examples...
Computing was at a crossroads...

- In the mid-2000s, NSF leaders and computing research leaders had similar deep concerns
- The Federal commitment to research in general, and to computing research in particular
- Public and policymaker perception that “computer science” is “yesterday’s news”
- Failure to articulate and coalesce around exciting research visions in computer science that could galvanize the public, policymakers, researchers, and students
- Need to groom the future leadership of the field
- Decrease in student interest
Increased focus by NSF leaders and computing research leaders in academia & industry

A Computing Community Consortium solicitation & proposal

“[NSF] will support the CCC as a community proxy responsible for facilitating the conceptualization and design of promising infrastructure-intensive projects...”

“The purpose of the CCC is to provide a voice for the national computing research community. The CCC will facilitate the development of a bold, multi-themed vision for computing research and education... [communicating] that vision to ... major stakeholders.”
To catalyze the computing research community to consider such questions

To envision long-range, more audacious research challenges

To build momentum around such visions

To state them in compelling ways

To move them towards funded initiatives

To ensure “science oversight” of large-scale initiatives

A “cooperative agreement” with NSF

Close coordination
The CCC Council: *a broad slice*

**Director:** Erwin Gianchandani

**Chair:** Ed Lazowska

**Terms ending 2013**
- Randy Bryant
- Lance Fortnow
- Hank Korth
- Eric Horvitz
- Beth Mynatt
- Fred Schneider
- Margo Seltzer

**Terms ending 2012**
- Stephanie Forrest
- Chris Johnson
- Anita Jones
- Frans Kaashoek
- Ran Libeskind-Hadas
- Robin Murphy

**Terms ending 2011**
- Bill Feiereisen
- Susan Graham *(vice-chair)*
- Dave Kaeli
- John King
- Bob Sproull

**Ex-officio**
- Andrew Bernat

**Rotated off**
- Dick Karp, 2010
- Andrew McCallum, 2010
- Dave Waltz, 2010
- Greg Andrews, 2009
- Peter Lee, 2009
- Karen Sutherland, 2009
Major continuing activities

- Presentations
- Articles
- CCC Blog
- Computing Research “Highlight of the Week”
- Community visioning exercises
Major special initiatives

“Transition Team” white papers

Computing Research Initiatives for the 21st Century

- Fundamental Research in Engineering (Word version)
  (Ed Lazowska, University of Washington and Peter Lee, Carnegie Mellon University)
- Information Technology R&D and U.S. Innovation (Word version)
  (Peter Hanke, Computing Research Association, Ed Lazowska, University of Washington, and Peter Lee, Carnegie Mellon University)
- Re-Envisioning DARPA (Word version)
  (Peter Lee, Carnegie Mellon University and Randy H. Katz, UC Berkeley)
- Unshackling Waves of Innovation: Transformative Broadband for America’s Future (Word version)
- Infrastructure for Science and eLearning in Higher Education (Word version) (Undistributed PDF)
  (Ed Lazowska, University of Washington, Peter Lee, Carnegie Mellon University, Chip Elliott, BBN Technologies, and Larry Smarr, UCSD)
- Security is Not a Commodity: The Road Forward for Cybersecurity Research (Word version)
  (Robert Davey, UC San Diego, and Fred S. Scheidler, Cornell University)
- Information Technology and America’s Energy Future (Word version)
  (David Waltz, Columbia University, and John King, University of Michigan)
- Surface Transportation 3.0 (Word version)
  (Columbia Thrive, Stanford University, and Henry Kelly, Federation of American Scientists)
- “Smart Grid” R&D for an Intelligent 21st Century Electrical Energy Distribution Infrastructure (Word version)
  (Randy H. Katz, UC Berkeley)
- Synthetic Biology (Word version)
  (Chris Eppich, Stanford, and Ed Lazowska, University of Washington)
Sensed and seized an opportunity to influence Federal science policy through the Presidential Transition Team

19 papers produced in late 2008 & early 2009
30 separate authors
Many highly influential:
- Re-envisioning DARPA -- Peter Lee, Randy Katz
- Infrastructure for eScience & eLearning/Unleashing waves of innovation -- Ed Lazowska, Peter Lee, Chip Elliott, Larry Smarr
- Security is not a commodity -- Stefan Savage, Fred Schneider
- Synthetic biology -- Drew Endy, Ed Lazowska
- Big-data computing -- Randy Bryant, Randy Katz, Ed Lazowska
- The ocean observatories initiative -- John Delaney, John Orcutt, Robert Weller
- Cyber-Physical Systems -- Janos Sztipanovits, Jack Stankovic

A role in FY 11?

NSF budget numbers, by Directorate
Major special initiatives

- “Transition Team” white papers
- Library of Congress Symposium
- Computing Innovation Fellows (CIFellows)
- Landmark Contributions by Students
- NetSE Research Agenda
- Health IT
## Encouraging participation

<table>
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<tr>
<th>Community visioning activities</th>
<th>Participants</th>
<th>Organizations</th>
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<tbody>
<tr>
<td>NetSE</td>
<td>109</td>
<td>44</td>
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<td>Cyber-physical systems</td>
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<tr>
<td>Robotics</td>
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<td>Big data computing</td>
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<td>Theoretical CS</td>
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<td>Global development</td>
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<td>Education technology</td>
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<td>Health information technology</td>
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<td>Cross-layer reliability</td>
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<td>45</td>
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<tr>
<td>Free and open source software</td>
<td>42</td>
<td>35</td>
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<tr>
<td>Advancing computer architecture</td>
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<td>New in 2010</td>
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<td>Interactive technologies</td>
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<td>New in 2010</td>
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<table>
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<tr>
<th>Selected other activities</th>
<th>Participants</th>
<th>Organizations</th>
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<tbody>
<tr>
<td>Library of Congress Symposium</td>
<td>128</td>
<td>71</td>
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<tr>
<td>CIFellows Project (2009)</td>
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<td>Selection committee</td>
<td>36</td>
<td>28</td>
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<tr>
<td>Applicants</td>
<td>526</td>
<td>145</td>
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<td>Prospective mentors</td>
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<td>198</td>
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In the 2012 Budget, agencies should focus on:

- Economic growth and job creation
- NITRD — "inferences from enormous quantities of data"
- Achieving better health outcomes
- Moving toward a clean energy future
- Impacts of global climate change
- Improved sustainability and biodiversity
- National security
- Cybersecurity

OSTP’s FY 12 priorities...
In the 2012 Budget, agencies should focus on ... six challenges:

- Economic growth and job creation
- NITRD -- “inferences from enormous quantities of data”
- Achieving better health outcomes
- Moving toward a clean energy future
- Impacts of global climate change
- Improved sustainability and biodiversity
- National security
  - Cybersecurity

Where can we contribute?

- Data analytics WPs
- Big data visioning activity
- NSF CDI
- Health IT workshop
- ONC discussions
- NSF/CISE SHB
- NIH discussions
- Multiple WPs
- NSF CRI
- NSF SEES
- Multiple WPs
Signs of a health IT R&D initiative?

On Feb. 17, 2009, Congress passed the American Recovery & Reinvestment Act. The legislation included language specifically calling for Health IT research. And program staff at NSF immediately sought to run an interdisciplinary workshop.
“NSF’s investment in healthcare research is essential in order for the opportunities [to enhance wellness, healthcare, and the clinical sciences] to be realized.”

“The importance of collaboration between information technology researchers, social scientists, and biomedical researchers is an essential component of the research agenda we have laid out.”
The SHARP program

- Announced in December 18, 2009, with a late-January deadline for submission
- Run by Office of the National Coordinator for Health IT in HHS, not NSF
- Focused on “breakthrough advances ... to the adoption and meaningful use of health information technology”
- Four awards totaling $60 million announced in March 2010
But the seeds had been planted...

A program within NSF/CISE on “smart health & wellbeing” for FY 11.
...And there's hope for more yet

A cross-cutting initiative within NSF (including ENG, SBE, and CISE) for FY 12?

Involvement of other relevant agencies, such as NIH, AHRQ, CDC, FDA, and the Office of the National Coordinator for Health IT?
Astronomy’s decadal survey...

Every 10 years, astronomers release a “decadal survey” recommending which astronomy & astrophysics projects should be funded by the government.

The 2010 survey was the result of 9 appointed panels, 17 town hall meetings, and 324 white papers.
...Speaks with a unified voice...

- 2010 report not merely a “wish list”
- Identified 8 projects, all focused on the study of dark matter & dark energy
- Included independently vetted estimates of project costs
...And serves as another model

US survey sets cosmic priorities
Dark energy crisis is the top in decade report ranking future astronomy and astrophysics projects.

...other disciplines planning their own reviews should follow [astronomy’s] lead, as [its report] promises to be a steady guide for a bumpy decade ahead...
Some lessons learned
1. We need to be vocal

- Funding agencies rely on the research community’s voice when creating new funding programs
  - Does the community want to work on this problem?

- Workshops are important (not “just another workshop”)
  - Bring people together
  - Allow us to understand the issues

- White papers have a role
  - Language makes its way into solicitations!

- It’s not always about a new funding program, but rather fostering new links and connections
2. It’s about the next generation

- We have to educate today’s students to be tomorrow’s leaders.
- Scientific process, research, scholarship, innovation -- all very important.
- But so is policymaking and decision-making.
- Service and P&T cases.
3. Service is important
critical

- There’s value to serving as a program officer
  - Some fields view this role in higher regard than others

- Learning how DC works can make us better scientists, researchers, and educators
  - We know what to propose and how to propose it
  - We know the skills set required of our graduates

- We must make sure there’s a constant stream of people heading to DC -- they become “advocates” for a field

- Stay involved -- even if you can’t make it to DC
We must work together today...

...To ensure a brighter tomorrow

“People always say Britain took the nineteenth century, the United States of America took the twentieth century, and China will take the twenty-first century. Well, to those people I tell the story that my grandma used to tell me beside the fireplace in her tiny, inner city Detroit home:

“Grandma Friedman used to say, ‘Son, never cede a century to a country that censors Google’.”
Questions?

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