The Computing Community Consortium: Stimulating Bigger Thinking

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http://www.cra.org/ccc/

Computing has changed the world

▋ Advances in computing change the way we live, work, learn, and communicate

▋ Advances in computing drive advances in nearly all other fields

▋ Advances in computing power our economy

  ▋ Not just through the growth of the IT industry – through productivity growth across the entire economy
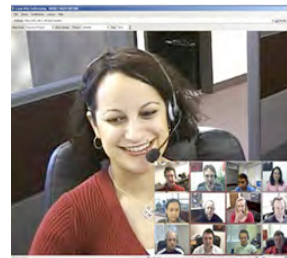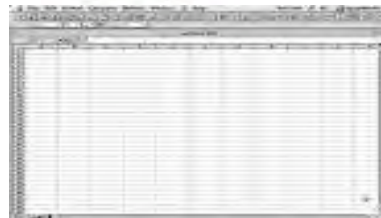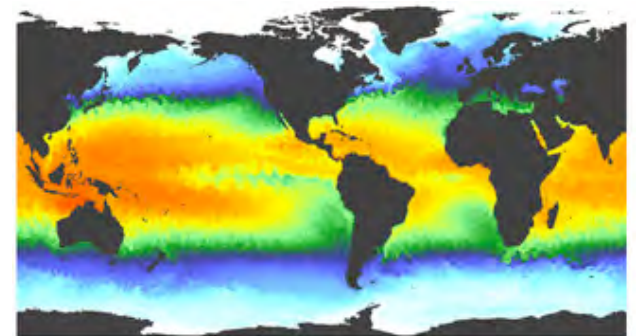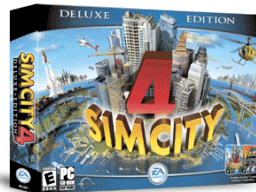
Research has built the foundation

- Timesharing
- Computer graphics
- Networking (LANs and the Internet)
- Personal workstation computing
- Windows and the graphical user interface
- RISC architectures
- Modern integrated circuit design
- RAID storage
- Parallel computing
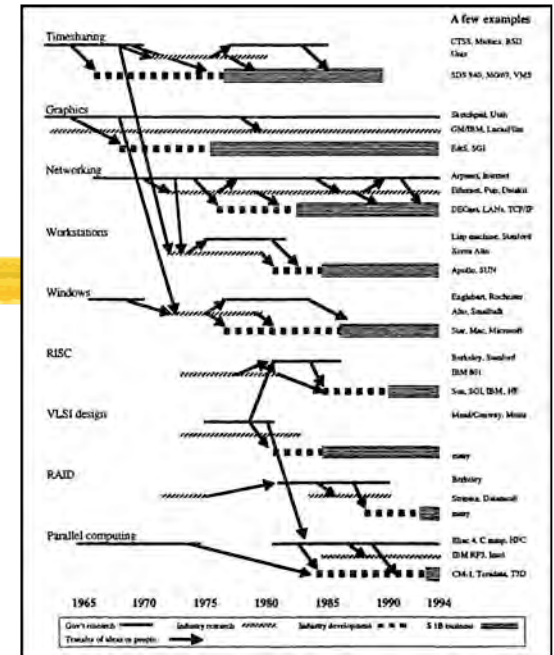
Much of the impact is recent

- Entertainment technology
- Data mining
- Portable communication
- The World Wide Web
- Speech recognition
- Broadband last mile
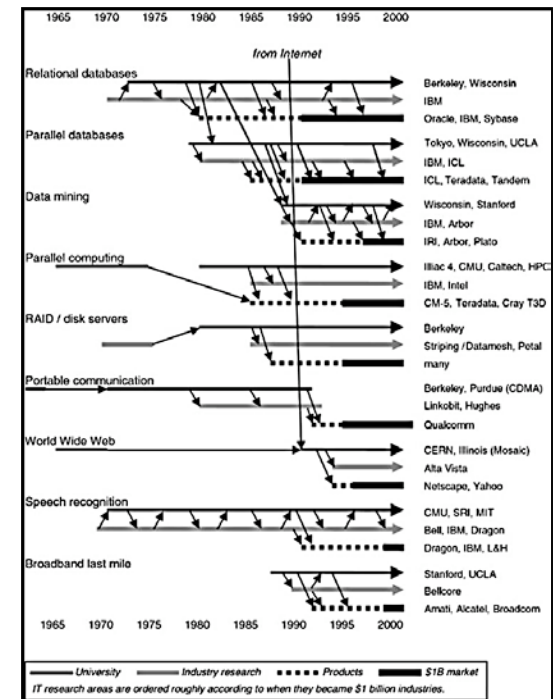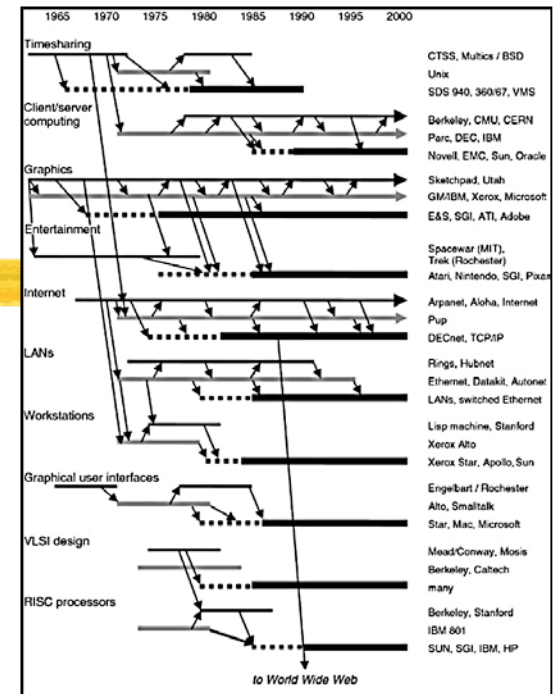
The future is full of opportunity

- Creating the future of networking
- Driving advances in all fields of science and engineering
- Wreckless driving
- Personalized education
- Predictive, preventive, personalized medicine
- Quantum computing
- Empowerment for the developing world
- Personalized health monitoring => quality of life
- Data-intensive scalable computing
- Neurobotics
- Synthetic biology
- The algorithmic lens: Cyber-enabled Discovery and Innovation
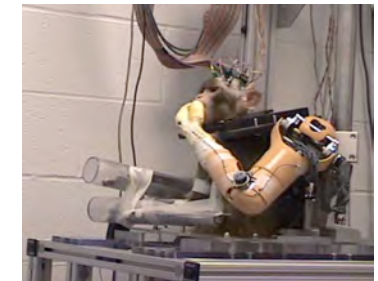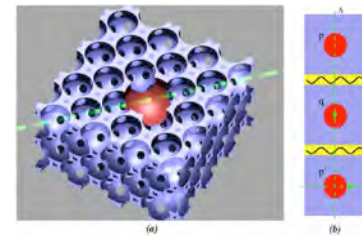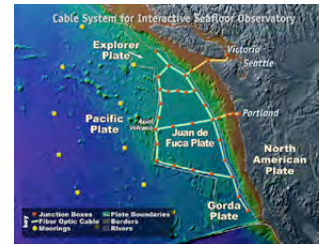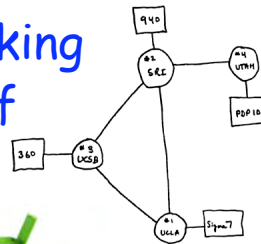
We must work together to establish, articulate, and pursue visions for the field

- 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

To this end, NSF asked CRA to create the Computing Community Consortium

- 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 structure

- **CCC is all of us!**
  - This process *must* succeed, and it *can't* succeed without broad community engagement
- **There is a CCC Council to guide the effort**
  - The Council *stimulates* and *facilitates* – it doesn't "own"
  - Inaugural Council appointed through an open process led by Randy Bryant
- **The Council is led by a Chair**
  - Ed Lazowska, University of Washington
    - Susan Graham, UC Berkeley, serves as Vice Chair
  - 50% effort – not titular
- **The CCC is staffed by CRA**
  - Andy Bernat serves as Executive Director

- **Those involved in shaping CRA's response to NSF's original challenge**
  - Andy Bernat
  - Randy Bryant
  - Susan Graham
  - Anita Jones
  - Dick Karp
  - Ken Kennedy
  - Ed Lazowska
  - Peter Lee
  - Dan Reed
  - Wim Sweldens
  - Jeff Vitter

- **Inaugural CCC Council**
  - Greg Andrews
  - Bill Feiereisen
  - Susan Graham (v ch)
  - Anita Jones
  - David Kaeli
  - Dick Karp
  - John King
  - Ed Lazowska (ch)
  - Peter Lee
  - Andrew McCallum
  - Beth Mynatt
  - Fred Schneider
  - Bob Sproull
  - Karen Sutherland
  - David Tennenhouse
  - Dave Waltz

Activities to date

- Definition and execution of a bootstrapping procedure for the CCC
  - Not straightforward, because community ownership was essential!
- Five plenary talks at the Federated Computing Research Conference (June 2007) to introduce CCC to the computing research community
  - Embracing and amplifying efforts that are already underway

Monday June 11, 6-7 p.m., Grand Exhibit Hall

Christos Papadimitriou, UC Berkeley

The Algorithmic Lens: How the Sciences are Being Transformed by the Computational Perspective

Abstract

Tuesday June 12, 6-7 p.m., Grand Exhibit Hall

Bob Colwell, Independent Consultant

Future of Computer Architecture '07

Abstract

Wednesday June 13, 6-7 p.m., Grand Exhibit Hall

Randal Bryant, Carnegie Mellon University

Data-Intensive Super Computing: Taking Google-Style Computing Beyond Web Search

Abstract

Thursday June 14, 6-7 p.m., Grand Exhibit Hall

Scott Shenker, UC Berkeley

We Dream of GENI: Exploring Radical Network Designs

Abstract

Friday June 15, 11:30 a.m. - 12:30 p.m., Grand Exhibit Hall (FCRC Keynote Talk)

Ed Lazowska, University of Washington and Chair, Computing Community Consortium

Computer Science: Past, Present and Future

Abstract

- Definition and execution of an RFP process to support visioning by the computing research community
  - Quarterly deadlines, but a rolling process
  - Three efforts launched thus far:
    - "Big Data Computing Study Group"
    - "Visions for Theoretical Computer Science"
    - "From Internet to Robotics: The Next Transformative Technology"

■ *Big Data Computing Study Group*

   | Topic:

   - • "The Big Data Computing Study Group will undertake efforts to explore and enable opportunities on the research and application of high-performance computing over very large data sets."

   | Leadership:

   - • Randy Bryant, CMU
   - • Thomas Kwan, Yahoo! Research

   | Initial activities:

   - • Hadoop Summit, March 25, Sunnyvale CA
   - • Data-Intensive Scalable Computing Symposium, March 26, Sunnyvale CA

❚ *Visions for Theoretical Computer Science*
  ❙ Topic:
    • "The purpose of the visioning workshop will be to identify and distill broad research themes within TCS that have potential for major impact in the future … The workshop will aim to produce compelling "nuggets" that can quickly convey the importance of a research direction to a layperson [and] could be used by the CCC or anyone else making the case for a sustained investment in long-term, foundational computing research."
  ❙ Leadership:
    • Richard Ladner, Washington
    • Bernard Chazelle, Anna Karlin, Dick Lipton, Salil Vadhan
  ❙ Initial activities:
    • Workshop prior to STOC, May 17, Seattle WA

❚ *From Internet to Robotics: The Next Transformative Technology*

  ❙ Topic:

    • "This study will generate a roadmap of applications for robotics across users, producers and researchers. The objective is to provide a comprehensive view of use of robotics, the main obstacles to deployment, and the key competencies required to facilitate the transformation."
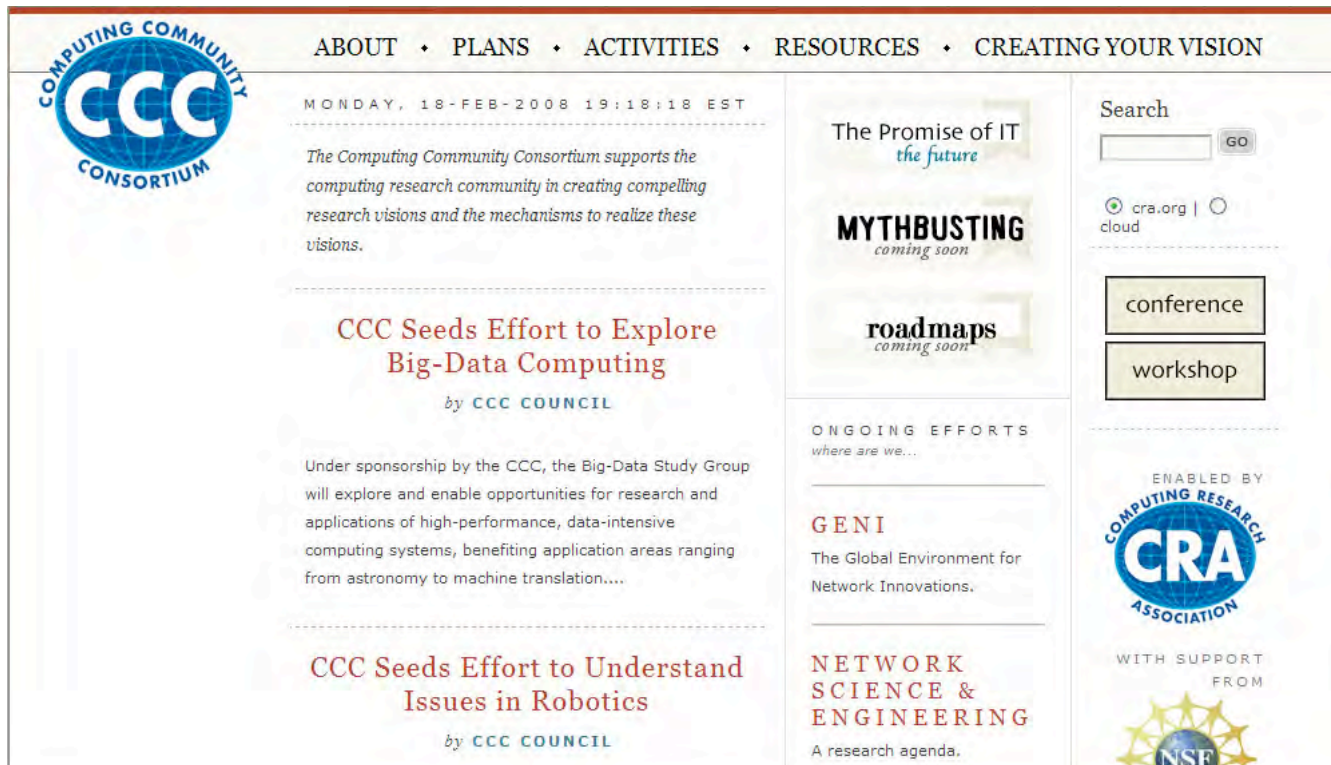
  ❙ Leadership:

    • Henrik Christensen, Georgia Tech

    • 10 others (Leslie Kaelbling, Sebastian Thrun, …)

  ❙ Initial activities:

    • Workshop schedule TBD

▮ **Creation of a website with lots of good intentions for the future …**

   ▮ Visioning blog … "Mythbusting" … "The Promise of IT"

- Extensive work with NSF and the computing research community related to GENI (the Global Environment for Network Innovations) and the broader NetSE (Network Science & Engineering) research agenda
  - GENI Community Advisory Board -> GENI Science Council -> NetSE Council
    - 19 members, chaired by Ellen Zegura of Georgia Tech

Anticipated interactions

■ Close coordination with the CISE AC and CISE leadership

  ■ CCC is a cooperative agreement, not a grant!

■ Engagement with a wide range of other research agencies (e.g., NIH, DARPA, NIST, DoE), leadership groups (e.g., CRA, CSTB, ACM), and research organizations (e.g., industrial research labs, national labs)

The Computing Community Consortium supports the computing research community in creating compelling research visions and the mechanisms to realize these visions.

The desired outcomes

- Broad community engagement in establishing more audacious and inspiring research visions for our field
  - Some may require significant research infrastructure (e.g., NetSE); some will be new programs (e.g., CDI)
- Better public appreciation of the potential of the field
- Attraction of a new generation of students
- Greater impact!