

**Computing Community Consortium  
Quarterly Activities Report  
1OCT08 - 31DEC08**

The activities summarized in this report are categorized by the five CCC goals.

**Goal: Bring the computing research community together to discuss, prioritize and envision our future research needs and thrusts.**

**Activities: Visioning workshops, talks and articles, CCC blog, CCC website, Computing research highlight, visionary talks, NetSE**

**Visionary workshops funded through the RFP process**

Continuing:

Robotics

1. Three status reports received: A Research Roadmap for Medical and Healthcare Robotics, Roadmap for Service Robotics, From Internet to Robotics - An Update
2. Synthesis meeting held
3. Heading towards a March 2009 congressional robotics caucus final report presentation

Cyber-physical systems

1. Industry workshop approved (with PI Sztipanovits); Anita Jones is CCC shepherd

Theory

Big-Data computing

1. Progress report received and posted

Newly approved:

1. Research One Learning Community per Student: Global Resources for Online Education (Woolf, PI)

Computing technology plays an increasingly important role in the advancement of education through computational models, reasoning, experimentation and implementation of mobile and ubiquitous pedagogical software. Computation is also growing as a basis for education in core ideas as well as simulations and data management. GROE will influence computing research funding strategies in all these areas, with the intention of accelerating improvement in education at all levels.

Immediate topics of interest include: partnerships, services and tools for learning based on improved understanding of human cognition; improved human-computer interaction for individual productivity (e.g. incorporating

human speech and gesture); networking, mobile and ubiquitous computing to support collaboration and create seamless social learning; predictable and robust repositories of learning services and assessment tools; and enhanced software and hardware for personal computer literacy. This process will also address such issues as the business case for education, strategies for distributed intelligence that can be coordinated into common learning activities, means for blending real and virtual worlds, and open questions about how people learn.

2. System-level, Cross-layer Cooperation to Achieve Predictable Systems from Unpredictable Components (André DeHon lead)

The Cross-layer Reliability (RelXLayer) visioning process will address the fact that we will no longer be able to reliably design or manufacture fault-free hardware systems. As the critical dimensions of devices, such as transistors and wires, used to implement computer systems shrink to only a few nanometers, rates of transient faults, permanent defects, and variation between devices on the same die are expected to increase to the point where today's fault-tolerant approaches will no longer be practical. Instead, computer systems will need to adopt a model in which each layer in the abstraction hierarchy - applications, O/S, architecture, circuits - is prepared for the layer below to transmit bad data and in which all of the layers in the hierarchy cooperate to deliver correct operation in spite of faults, variations, and other effects. Exacerbating this challenge is the need to continually reduce net energy per operation while providing this protection.

3. Envisioning National and International Research Infrastructures for Multidisciplinary Empirical Science of Free/Open Source Software (Scacchi PI)

We propose within one year to hold an international workshop and supporting meetings focused on developing a strategy for establishing and sustaining a national and international research infrastructure supporting empirical studies of free/open source software (FOSS, or sometimes FLOSS) by academic and industrial researchers in different disciplines. This proposal describes our vision for such a research infrastructure, along with the activities we propose to conduct in order to develop such a strategy. The activities build from recent research meetings on FOSS repositories and the emergence of shared research infrastructures that support multi-disciplinary studies of FOSS development. We also identify our goals, assessment method, activities, outcomes, and results from recent meetings giving rise to this proposal. Following this is a specification of proposed meetings and workshop, budget, budget rationale, and brief biographical description of the proposal organizers.

**Broader-themed workshops**

1. *Computing Out of the Box* November 10, 2009

The meeting was organized by Martha Pollack, Dan Reed and Ed Lazowska. CCC

provided the funding. The initial outcomes from the meeting include a preliminary article appearing in *Computing Research News* for January 2009.

2. *Computing Research that Changed the World: Reflections and Perspectives* (renamed from *Advances in Computing Research*)

Scheduled for March 25th at the Library of Congress in conjunction with Congressman Bart Gordon. Agenda, speakers and arrangements proceeding.

## Talks and Articles

- a. Ed Lazowska (University of Washington), Susan Graham (UC Berkeley), and Andrew Bernat (CRA), "The Computing Community Consortium: An Update," NSF CISE leadership (Arlington VA), July 2008.
- b. Ed Lazowska (University of Washington) and Susan Graham (UC Berkeley), "The Computing Community Consortium: Stimulating Bigger Thinking," Plenary Session, CRA Conference at Snowbird (Snowbird UT), July 2008.
- c. Richard Ladner (University of Washington), "Visions for Theoretical Computer Science," Plenary Session, CRA Conference at Snowbird (Snowbird UT), July 2008.
- d. Randal E. Bryant (Carnegie Mellon University), "Data-Intensive Scalable Computing," Plenary Session, CRA Conference at Snowbird (Snowbird UT), July 2008.
- e. Ellen Zegura (Georgia Institute of Technology), "Network Science and Engineering Update," Plenary Session, CRA Conference at Snowbird (Snowbird UT), July 2008.
- f. Chip Elliott (BBN Technologies), "GENI," Plenary Session, CRA Conference at Snowbird (Snowbird UT), July 2008.
- g. Ed Lazowska (University of Washington), "Envisioning the Future of Computing Research," invited "Viewpoint," *Communications of the ACM*, August 2008.
- h. Andrew Bernat (CRA), "CRA and the Computing Community Consortium," Edith Cowan University (Perth, Western Australia), August 2008.
- i. Andrew Bernat (CRA), "CRA and the Computing Community Consortium," University of Melbourne (Melbourne, Australia), September 2008.
- j. Ed Lazowska (University of Washington), "The Computing Community Consortium: Stimulating Bigger Thinking," GENI Engineering Conference (Palo Alto CA), October 2008.
- k. "CCC Update," *Computing Research News*, November 2008.

## CCC Blog

- 02 May 2008 Big Data Computing Group
- 10 June 2008 CCC Robotics Connects with Industry and Government
- 17 June 2008 LSST Science Requirements
- 04 Jul 2008 A Brief Report from the CCC Robotics Workshop
- 11 Jul 2008 Computer Science Enrollments: The Real News
- 14 Jul 2008 CCC Web Site Design Snafu

25 Jul 2008 CCC at the 2008 CRA Conference at Snowbird  
 26 Aug 2008 The Multicore Challenge  
 12 Sep 2008 Science and Nature: Where's the Computing Research?  
 22 Sep 2008 The Multicore Challenge, Part 2  
 07 Oct 2008 Multicore: It's the Software  
 13 Oct 2008 Update on NetSE  
 20 Oct 2008 The Data-Centric Gambit  
 31 Oct 2008 CRA and CCC Promote "Research Highlight of the Week"  
 04 Nov 2008 Game-Changing Advances from Computing Research  
 12 Nov 2008 Computer Science Outside The Box  
 18 Nov 2008 Multi-core and Parallel Programming: Is the Sky Falling?  
 30 Nov 2008 Game-Changing Advances from Computing Research —Followup  
 02 Dec 2008 Department of Defense S&T video\_  
 19 Dec 2008 Computing Research Initiatives for the 21st Century\_  
 02 Jan 2009 Nominations Sought for New CCC Council Members  
 03 Feb 2009 Action Alert! Urge Your Representatives to Support Science  
 09 Feb 2009 Today's Research is Tomorrow's Infrastructure  
 11 Feb 2009 Update on CCC Robotics

**CCC Website** has been redesigned and more fully fleshed out with content. For each workshop sponsored by CCC, we are collecting and posting:

1. Lead for effort
2. CCC Council liaison for this effort
3. Lead(s) for this workshop (may be same as overall lead, may not be)
4. CCC Council liaison for this workshop (may be same as overall liaison, may not be)
5. Vision for this workshop (one-pager)
6. Local Arrangements (location, dates, etc.)
7. Agenda/speakers
8. Meeting Materials (slides, talks, webcasts)
9. Participants
10. Highlights (one-pager or so)
11. Blog post to highlight these highlights
12. Final Report including next steps and any requests to CCC for additional support/effort

### **Computing Research Highlight of the Week**

24 Oct 2008 New Algorithm Significantly Boosts Routing Efficiency of Networks  
 12 Nov 2008 Turning 2D Images into 3D Models  
 20 Nov 2008 Algorithm Estimates Geographic Location of Photos  
 04 Dec 2008 Zeotrope Searches the Historical Web  
 11 Dec 2008 Create Program To Calculate Body Shape  
 18 Dec 2008 Cell Phones with Sensors aid Fitness, Environmental Awareness  
 09 Feb 2009 MIT's Sixth Sense

## **Visionary talks at October 29th Council meeting**

1. Sebastian Thrun, Stanford & Google (robotics)
2. Vladen Koltun, Stanford (virtual worlds)
3. Luis Barroso, Google (green computing)
4. Mark Moir, Sun (transactional memory)

## **NetSE update**

Four workshops took place during the time for this report:

1. Behavior, Computation and Networks in Human Subject Experimentation July 31-August 1
2. Workshop on Network Design in the NetSE Context August 17-18
3. NetSE Informational Meeting September 5
4. Network Design and Societal Values September 24-25

The available workshop reports are available on the web at <http://www.cra.org/ccc/netse.php>. The goal continues to be a report that can be used by the community to motivate research thrusts.

**Goal: Communicate these challenges, needs and thrusts to the broader national community.**

**Activities: CCC blog, Computing research highlight, communications support, essays highlighting the promise of computing research**

### **CCC Blog**

See above

### **Computing Research Highlight of the Week**

See above

### **Communications support**

CCC and CRA have jointly engaged Xenophon, a communications consulting firm, to advise us on ways to create a bolder public presence for the computing field.

### **Promise essays**

A set of essays produced under CCC leadership to highlight the promise of computing research is available at <http://www.cra.org/ccc/initiatives>; all of these were provided to (*and actually read by!*) members of the transition team.

**Goal: Create within the computing research community more audacious thinking.**

**Activities: Visioning workshops, talks and articles, CCC blog, CCC website, Computing research highlight, visionary talks**

These activities, each of which was discussed above, are each designed to encourage participants and others to think about deep visions within computing research.

**Goal: See the ideas developed in (1) and (3) turn into funded research programs and/or instruments.**

**Activities: working with the Cyber-physical infrastructure effort, working with Big-Data activities**

The cyber-physical systems effort is the furthest along in engaging with other federal agencies due to its connection across all areas. The big-data effort continues to be a collaboration of NSF with companies.

**Goal: Increase the excitement within computing research and use that excitement to attract students of both genders and all ethnic groups into computing research careers.**

**Activities: CCC blog, Computing research highlight**

**CCC Blog**

See above

**Research Highlights**

See above

## **Assessment Activity**

We have begun the process of assessing the performance of CCC and improvements in that performance towards meeting the goals of the project. We are currently moving forward with both self-assessments and a forward-looking strategic plan but both are outside the time scope of this report.

During this time period, however, we did begin to gather data of which a sample is:

Council member Andrew McCallum surveyed a number of strong researchers who had not participated in any of our activities. To summarize key points from what he heard:

- The promise of CCC is a long-term one: build a community, define an agenda, pursue programmatic support. But with CISE funding rates in the 10% range, DARPA missing-in-action, and industrial research support hard to come by, researchers are strapped for resources *now* – they are so busy scrambling for immediate funding that it is hard to find time to invest in the future.
- The activities of the CCC tend to benefit the computing research community as a whole, not the specific individuals who contribute their time to those activities. Why should one believe, for example, that those who contribute to defining the NetSE research agenda will reap rewards commensurate with their contributions? (There is considerable evidence to the contrary!)
- The lack of instrumentation / infrastructure / facilities is not perceived of as being as great a barrier to research success in our field as is lack of funding for people: faculty, postdocs, and graduate students. The successes of other fields (e.g., Physics and Astronomy) and the past successes and current foci of our field (supercomputer centers, GENI, Big Data Computing) are perceived as being about instrumentation / infrastructure / facilities rather than about people.

## **Strategic Plan Development**

Considerably progress was made on a Self-Assessment document during December, and on a very substantially revised Strategic Plan in January and early February. This progress was thwarted by the need to focus intensively on issues related to broadband stimulus (coordination of a white paper to NTIA from the research and education sector), cybersecurity (coordination of a 30-person teleconference with Melissa Hathaway), establishment of a Postdoc program using stimulus funds, and the March 25th Library of Congress symposium. Each of these activities repeatedly required very substantial leadership and engagement by most of the key members of the CCC Council, particularly Ed Lazowska, Susan Graham, Peter Lee, Fred Schneider, and Andy Bernat. We reviewed the Strategic Plan at our Council meeting on March 9, and expect to have a draft ready for review shortly after the dust has settled from the Library of Congress symposium.

## **Network Science and Engineering Research Plan**

We have been closely involved with NSF in moving the NetSE report towards conclusion. Here is our current best estimate of a plan and schedule:

- There will be two documents: a NetSE Research Plan and a NetSE Facilities and Instrumentation Requirements document.
- The NetSE Research Plan will consist of a short executive summary, a single chapter currently being written by Ellen Zegura, and five appendices that are the as-submitted

reports of the five NetSE working groups:

- NetSE Network Design
- Network Science and Network Design
- Behavior, Computation and Networks in Human Subject Experimentation
- Network Design and Societal Values
- Theory of Networked Computing

Chip Elliott is actively revising the first draft of the “NetSE Facilities and Instrumentation Requirements” document based on discussions with several parties. He, too, expects to deliver by April 1.

The “chapter” and the “requirements” will initially be distributed to the workshop chairs for comment, hopefully during very early April. We will need some sort of organized mechanism for collecting comments and ensuring that they are responded to.

We are on the home stretch here.

### **Council Membership**

When the Council was originally constituted, the newly appointed members were randomly assigned one-year, two-year or three-year terms in order that there be overlap as individuals roated off/on. At the end of December, the terms of Jones, Karp, Sproull, Andrews and Sutherland expired. Following CRA Bylaws Reed appointed a committee (Grimson, Chien, Sadve) which solicited nominations from the committee and then passed a recommended slate to Reed and Lazowska. This latter took place in January, outside the scope of this report.

### **Operational Matters**

1. Council conference calls took place generally bi-weekly for discussion of issues.
2. Calls between the CCC leadership and NSF CISE leadership took place generally bi-weekly for discussion of issues.
3. A team from NSF Division of Grants and Awards visited CRA in November 2008 to review CRA procedures and records. We have not received their written report but the exit interview was quite positive. The only comments were focused on including more details in the existing CRA procedures.