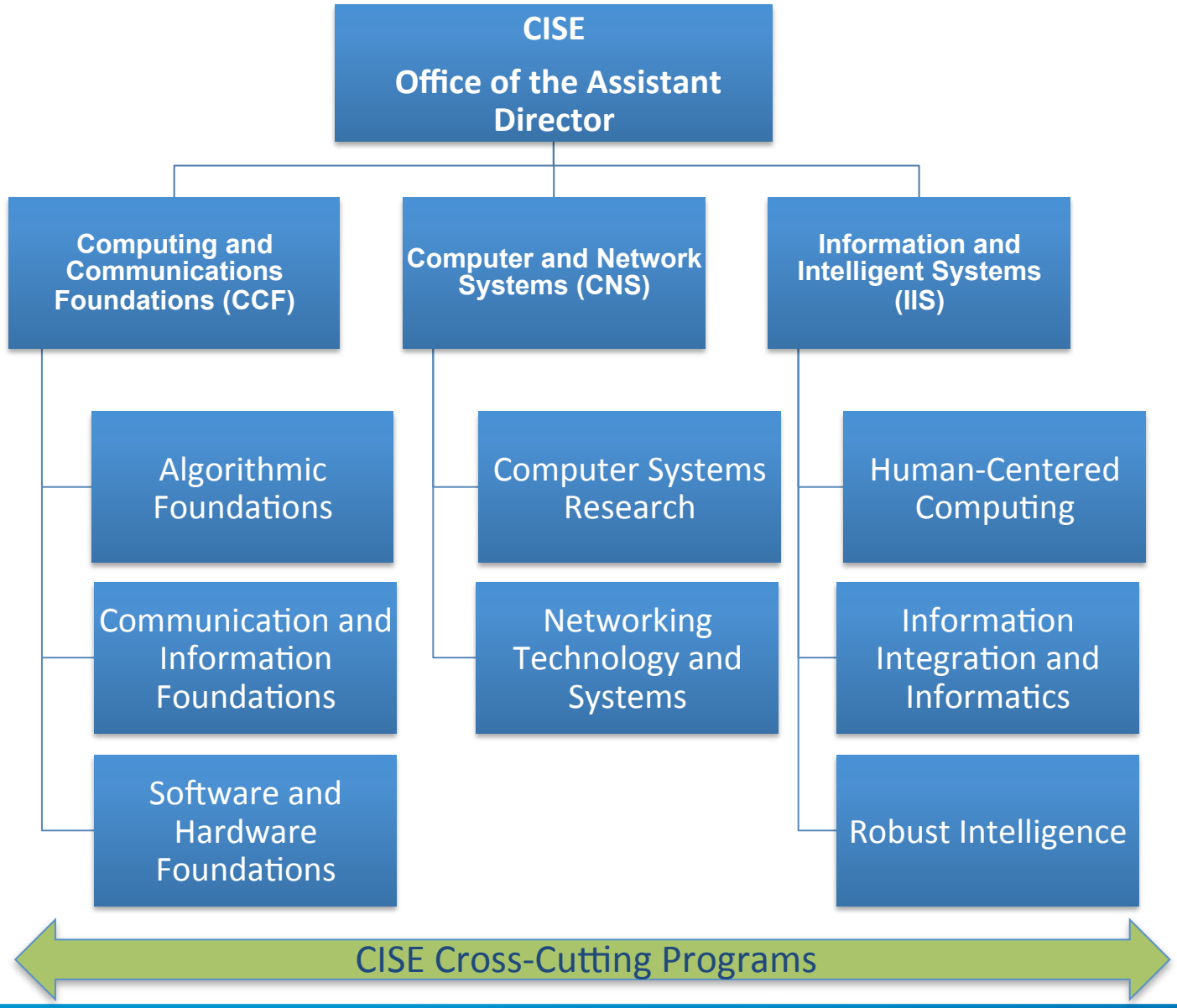
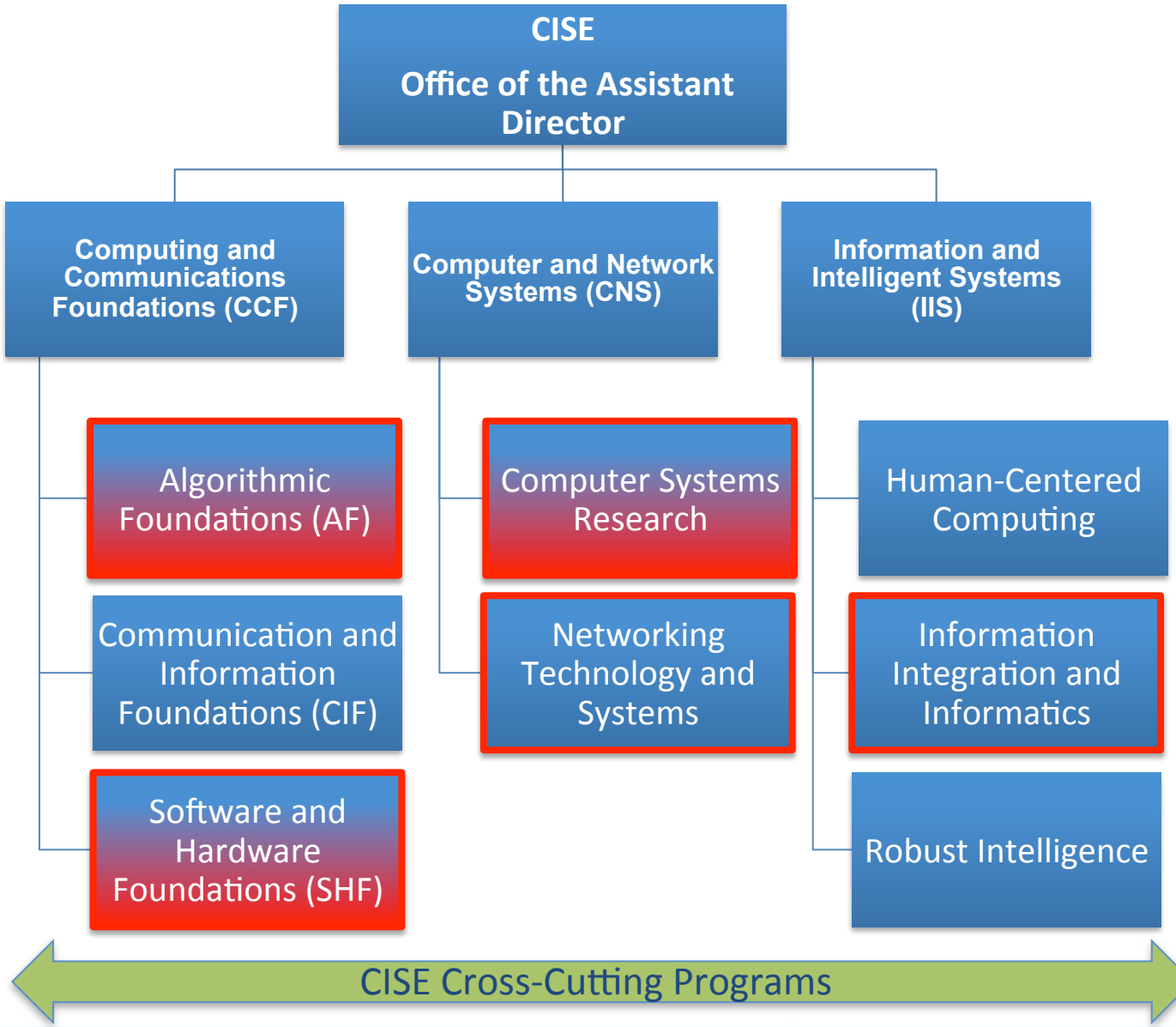
Susanne Hambrusch
Division of Computing and Communication Foundations (CCF)
CISE Directorate
National Science Foundation

June 28, 2012

CISE Organization and Core Research Programs



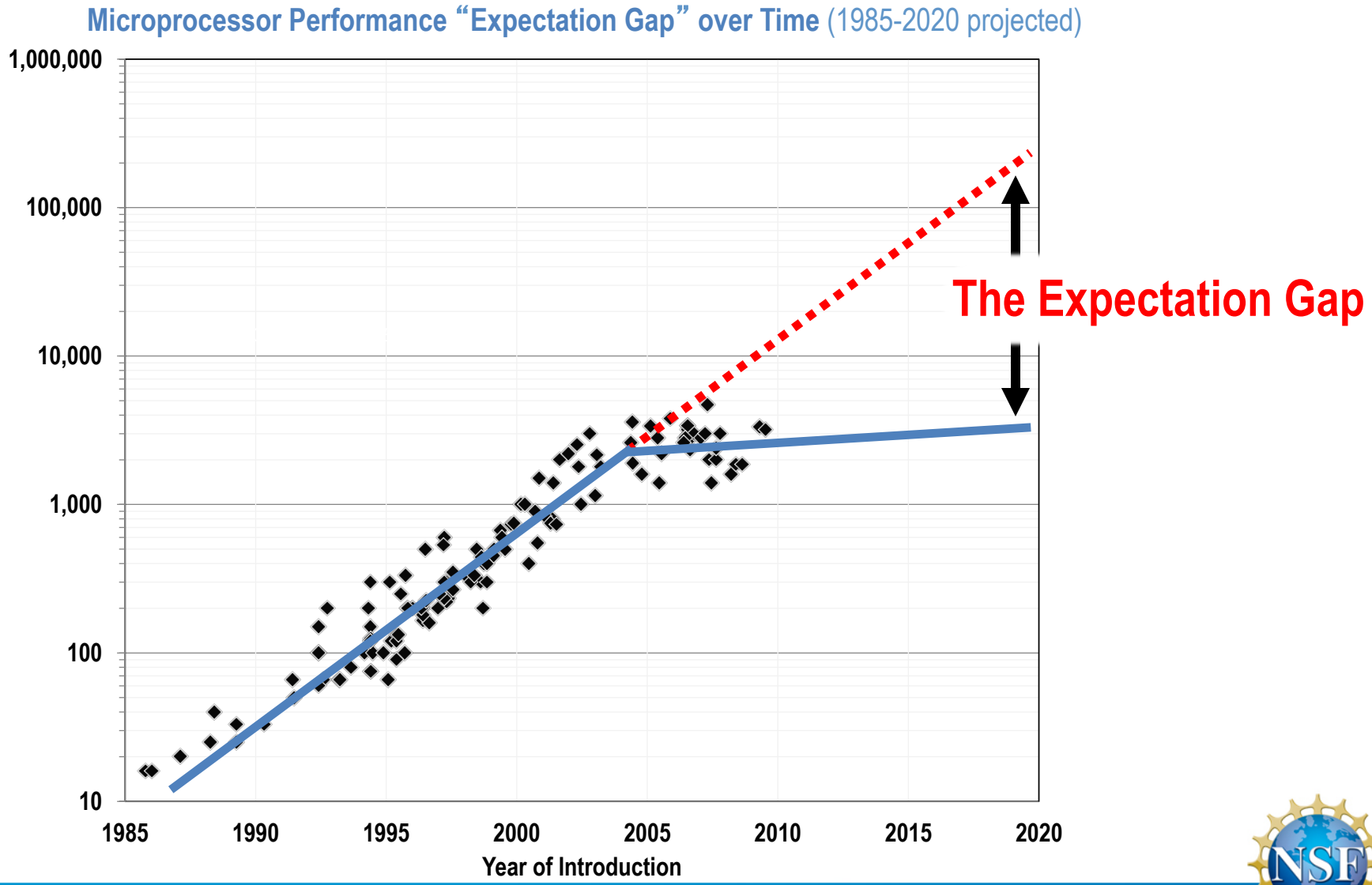
CISE Organization and Core Research Programs



Other NSF representatives at the workshop …

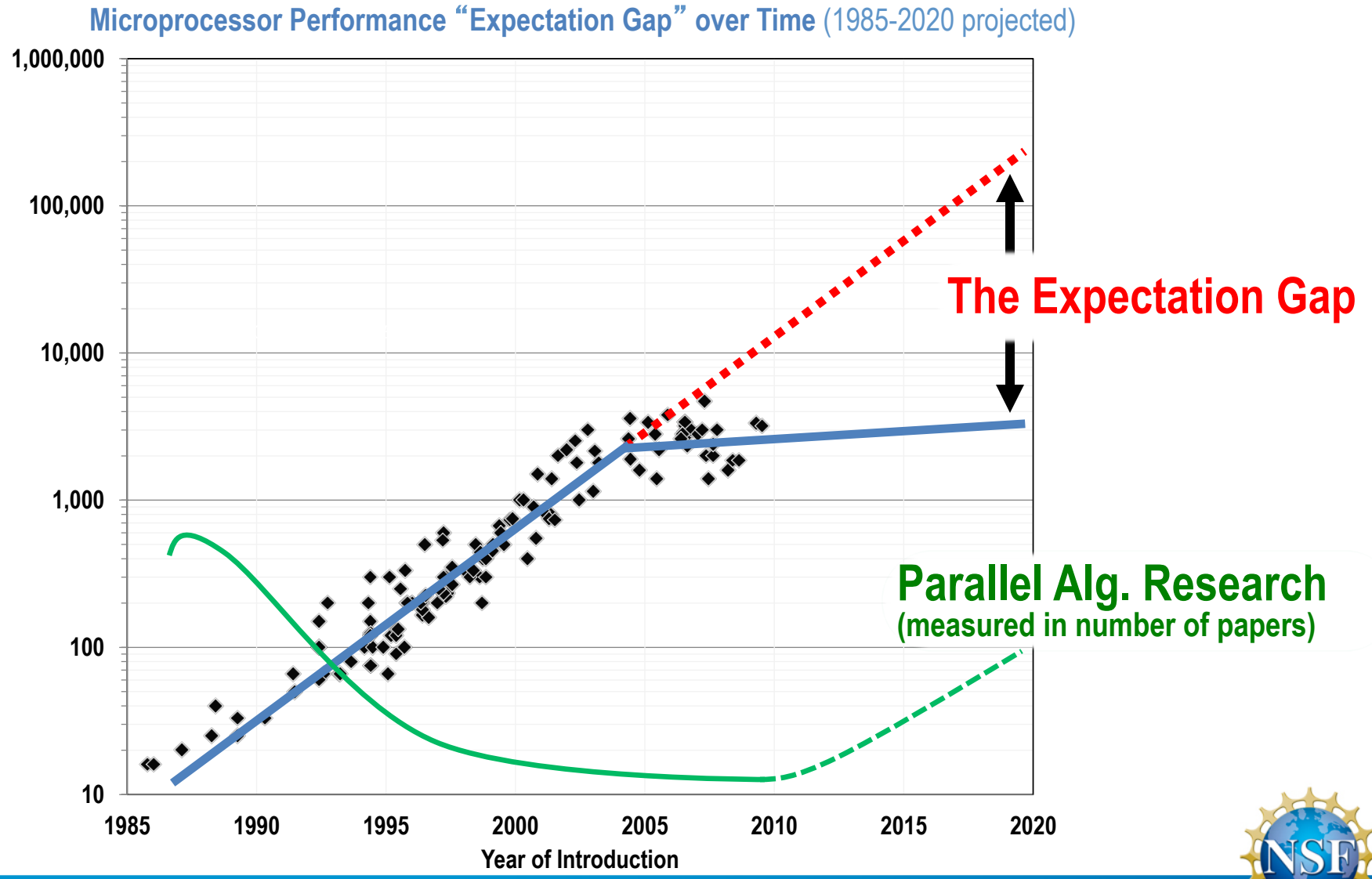
- **Tracy Kimbrel**, CCF's Deputy Division Director
- **Bala Kalyanasundaram**, Program Director, CCF/AF
- **John Reppy**, Program Director, CCF/SHF
- **Fen Zhao**, AAAS Fellow, CCF

Processor Performance Plateaued Around 2004



Credit: Graph reprinted with permission from *The Future of Computing Performance: Game Over or Next Level?* (2011) by the National Academy of Sciences.

Processor Performance Plateaued Around 2004



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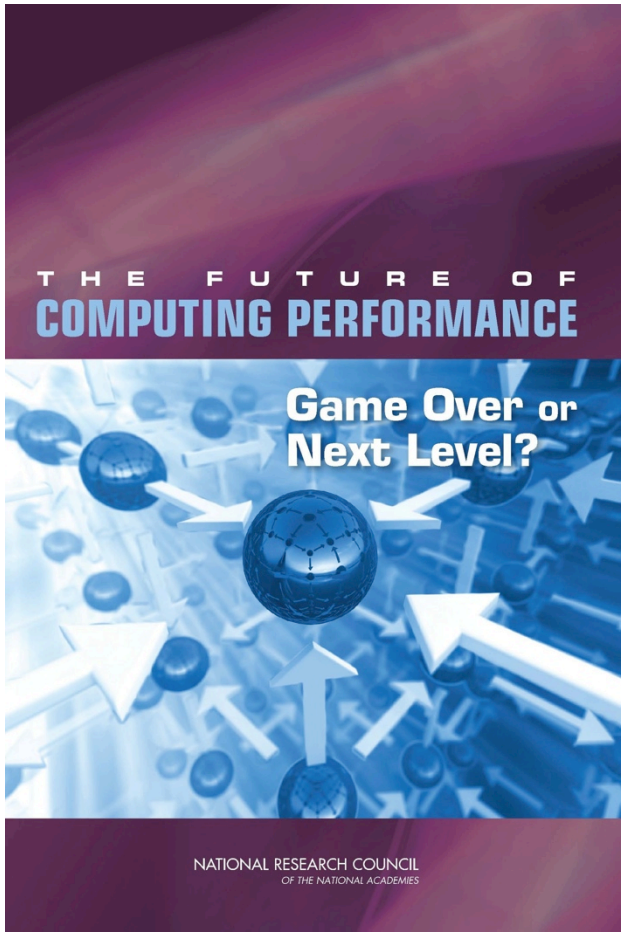
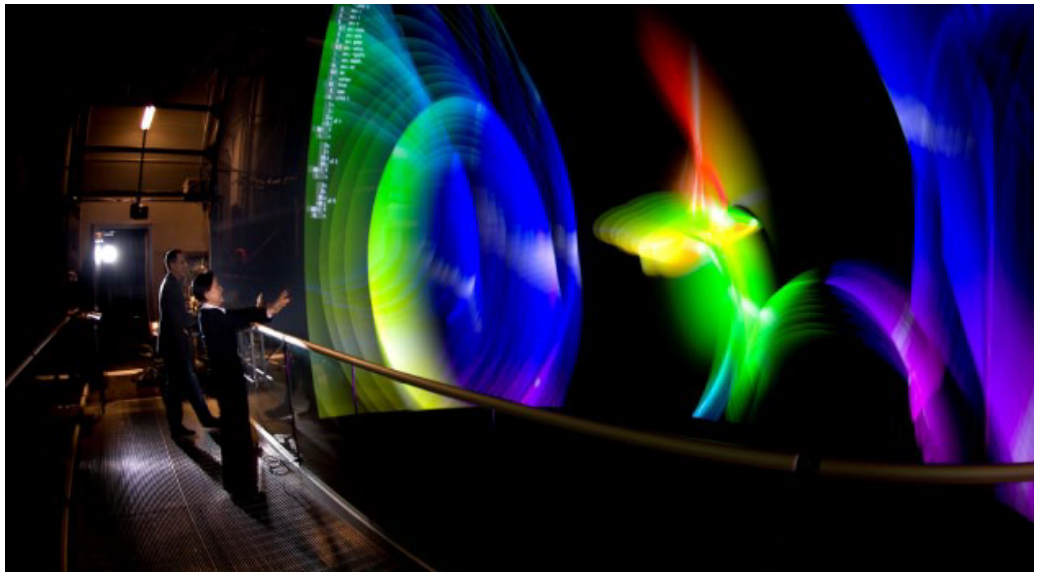
Game Over or Next Level?



"In the future, all software must be able to exploit multiple processors to enter into a new virtuous cycle with successive generations of parallel hardware that expands software capabilities and generates new applications."

The Future of Computing Performance: Game Over or Next Level?, National Academy of Sciences, 2011.

NSF's Advanced Computing Infrastructure Plan (February 2012)



http://www.nsf.gov/pubs/2012/nsf12051/nsf12051.pdf

ACI Strategy #1

Foundational research to fully exploit parallelism and concurrency through innovations in computational models and languages, mathematics and statistics, algorithms, compilers, operating and run-time systems, middleware, software tools, application frameworks, virtual machines, and advanced hardware.

21st Century Computer Architecture
A community white paper (May 2012)

A CCC effort led by Mark Hill, U of Wisconsin

- "Because most technology and computer architecture innovations were (intentionally) invisible to higher layers, application and other software developers could reap the benefits of this progress without engaging in it."

- "How can we enable the 21st century infrastructure, from sensors to clouds, adding value from performance to privacy, but without the benefit of near-perfect technology scaling?"
  - Architecture as Infrastructure: Spanning Sensors to Clouds
  - Energy First
  - Technology Impacts on Architecture
  - Cross-Cutting Issues & Interfaces

http://cra.org/ccc/docs/init/21stcenturyarchitecturewhitepaper.pdf

Workshop on Research Directions in the Principles of Parallel Computation (June 2012)

- What role should and can the algorithms/theory community play in an effort to exploit existing and future parallelism?
- How can effective cross-layer research collaborations between architecture and algorithm/ theory researchers happen?
- How about between parallel programming languages and algorithms/theory?
- What role should algorithms/theory researchers play in a redesign of the software stack?

NSF's message to you

- Get clarifications and guidance on solicitations from Program Directors, NSF workshops, meetings, webinars
- CCF needs your proposals
  - one submission every 3 years is not necessarily a good strategy
- If you are funded by NSF, serve on a panel once a year
- Help us identify junior faculty for panels
- NSF Highlights promote your research
  - If asked, please produce an effective one for a broader audience
- NSF needs researchers to serve as program directors
  - A great learning experience