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

Microprocessor Performance “Expectation Gap” over Time (1985-2020 projected)

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

Microprocessor Performance “Expectation Gap” over Time (1985-2020 projected)

The Expectation Gap

Parallel Alg. Research (measured in number of papers)

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

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