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March 25, 2009

Changing the World!

Ed Lazowska

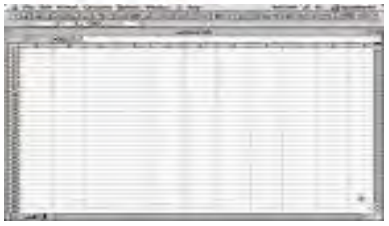
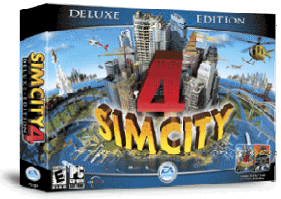
Bill & Melinda Gates Chair in
Computer Science & Engineering
University of Washington

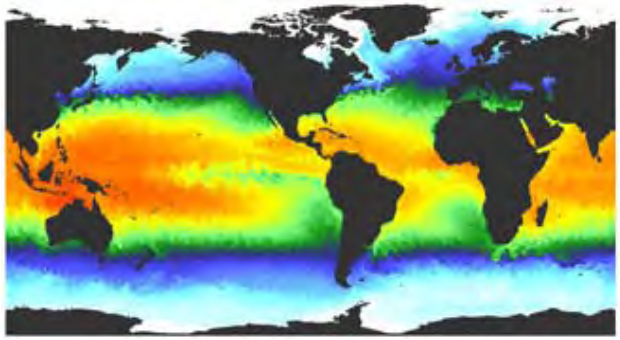
Chair, Computing Community Consortium

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



THE COUNT

Internet, Mobile Phones Named Most Important Inventions

By PHYLLIS KORKKI
Published: March 7, 2009

In response to the shouted-out question, "What are some of the greatest inventions of all time?," nearby office workers in a recent informal survey gave the following answers: the wheel, the engine, the ballpoint pen, diapers and the cheese Danish.

Life Changers

The top innovations of the last 30 years, according to judges at the Wharton School of the University of Pennsylvania.

1. Internet, broadband
2. PC and laptop computers
3. Mobile phones
4. E-mail
5. DNA testing and sequencing
6. Magnetic resonance imaging
7. Microprocessors
8. Fiber optics
9. Office software
10. Laser/robotic surgery
11. Open-source software
12. Light-emitting diodes
13. Liquid crystal display
14. GPS devices
15. E-commerce and auctions
16. Media file compression
17. Microfinance
18. Photovoltaic solar energy
19. Large-scale wind turbines
20. Internet social networking

THE NEW YORK TIMES

A panel of eight judges from the Wharton School of the University of Pennsylvania was required to go back only 30 years — not to the dawn of history — when asked a similar question. So its answers, of course, were very different.

In the survey, the Internet was voted the biggest innovation of the last three decades, followed by computers, mobile phones and e-mail. The survey was sponsored by Knowledge@Wharton, the school's business publication, and PBS's "Nightly Business Report."

Good, important choices all, but for classic, long-lasting appeal, they still can't beat the wheel. PHYLLIS KORKKI

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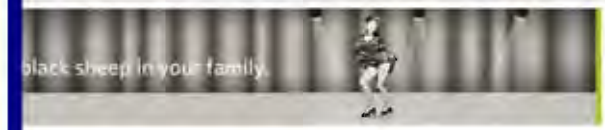

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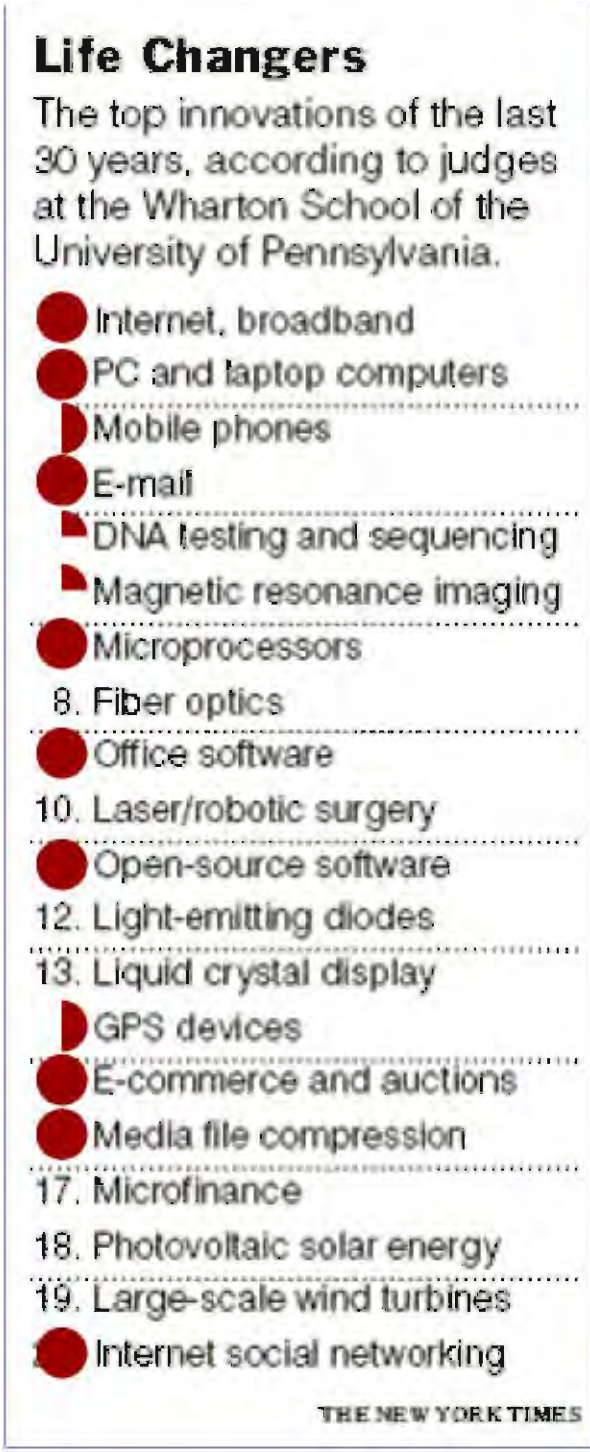

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Imagine spending a day without information technology

- A day without the Internet and all that it enables
- A day without diagnostic medical imaging
- A day during which automobiles lacked electronic ignition, antilock brakes, and electronic stability control
- A day without digital media – without wireless telephones, high-definition televisions, MP3 audio, DVD video, computer animation, and videogames
- A day during which aircraft could not fly, travelers had to navigate without benefit of GPS, weather forecasters had no models, banks and merchants could not transfer funds electronically, factory automation ceased to function, and the US military lacked technological supremacy

Imagine spending a day without information technology

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- A day without diagnostic medic
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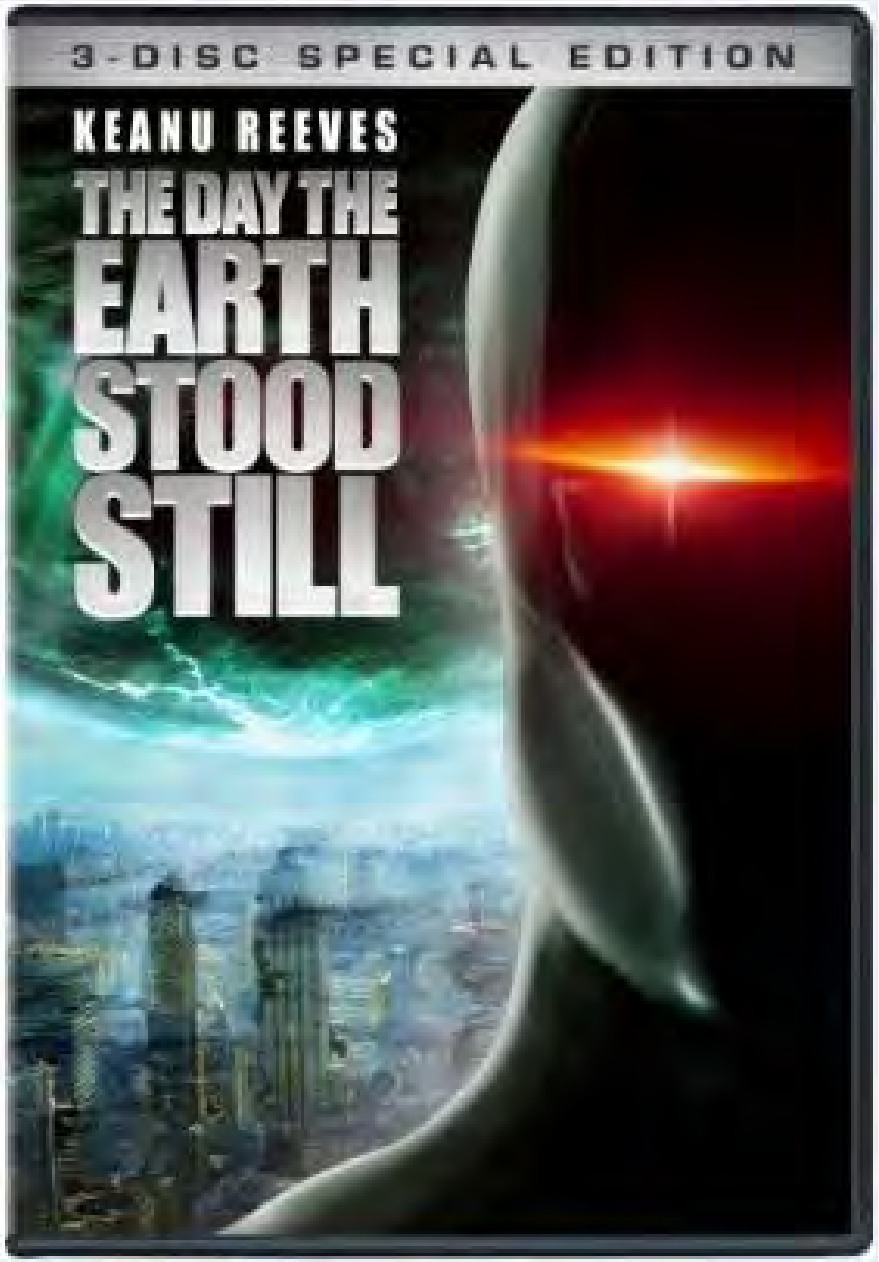
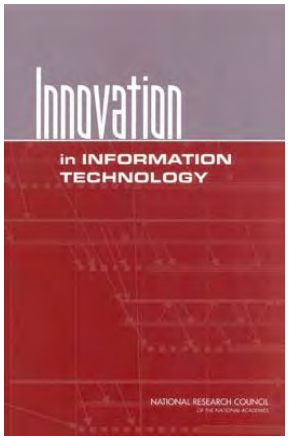
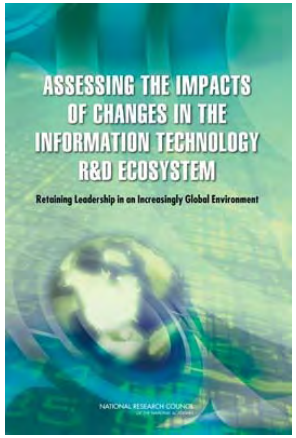
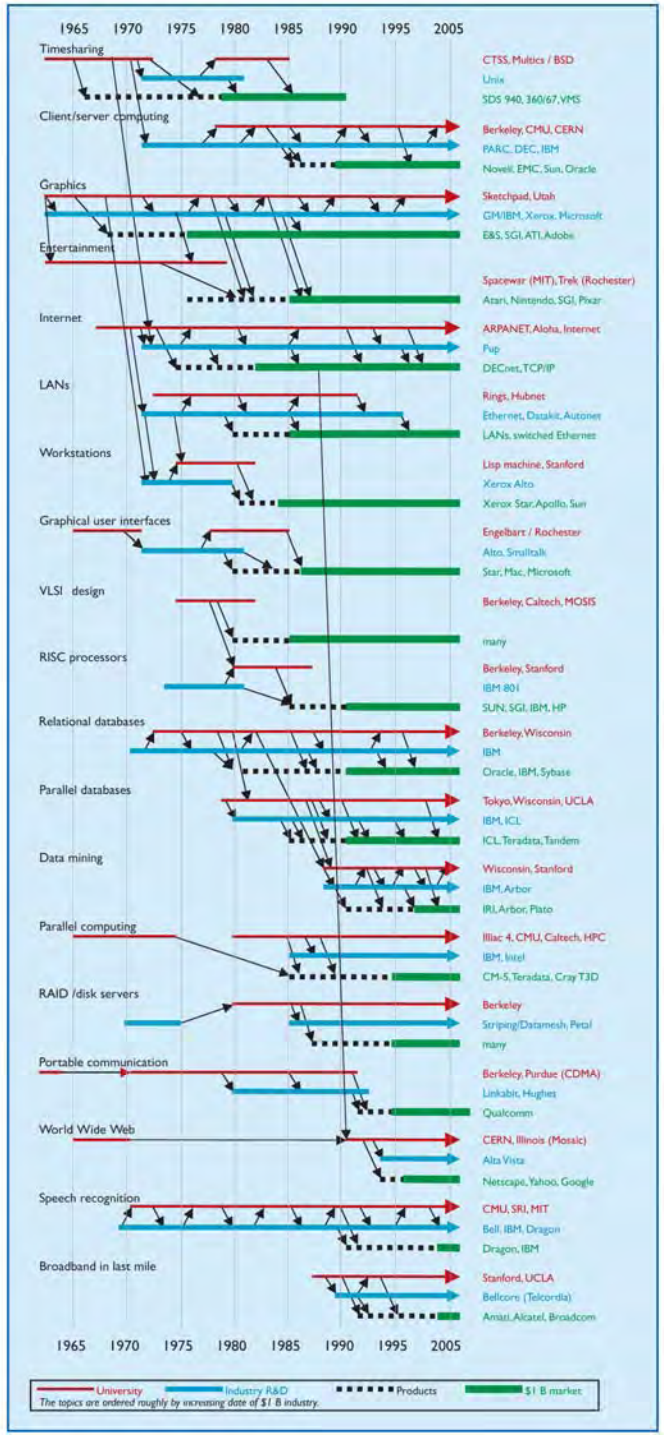


Research has built the foundation

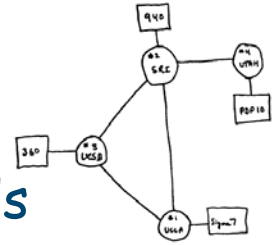


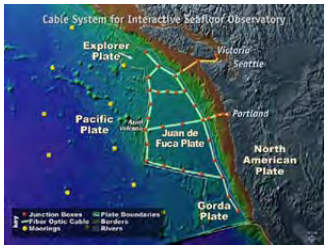


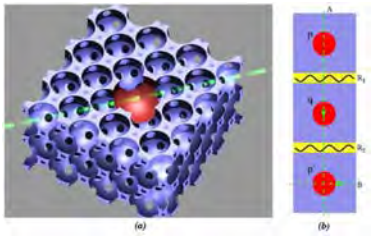


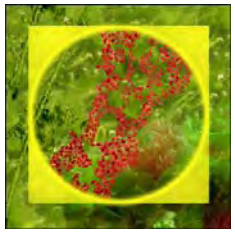
The future is full of opportunity

- Creating the future of networking
- Driving advances in all fields of science and engineering
- Revolutionizing transportation
- Personalized education
- The Smart Grid
- Predictive, preventive, personalized medicine
- Quantum computing
- Empowerment of the developing world
- Personalized health monitoring => quality of life
- Neurobotics
- Synthetic biology









Today

- Game-changing advances of the recent past
- Advances that are on the horizon, and what will be needed to achieve them
- Lessons that can further increase the already remarkable effectiveness of the IT R&D ecosystem
- Synthesis (and some demonstrations)

Session 1: The Internet and the World Wide Web 9:00 - 10:20

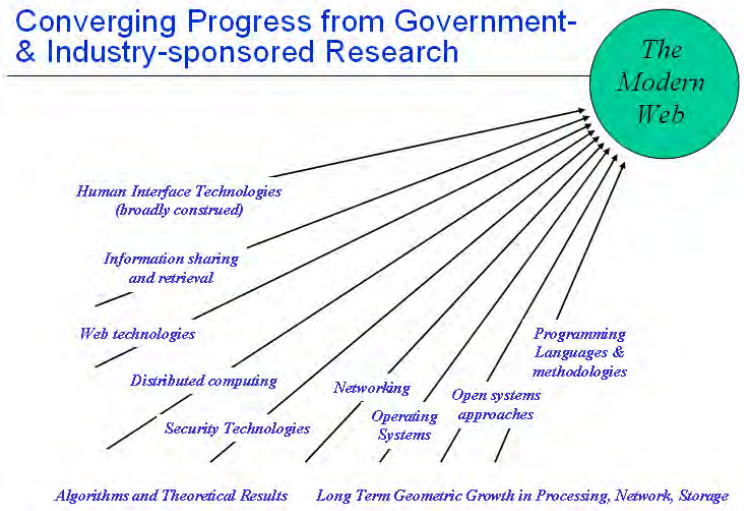
Why We're Able to Google
Alfred Spector (Google)

The Magic of the "Cloud": Supercomputers for Everybody, Everywhere
Eric Brewer (University of California, Berkeley)

Human Computation
Luis von Ahn (Carnegie Mellon University)

Discussion by the speakers of future challenges and synergies

Why We're Able to Google™



Dr. Alfred Z. Spector
VP, Research and Special Initiatives
Google, Inc.

Internet and the World Web Panel, March 25, 2009

Computing Research that Changed the World

The Magic of the Cloud:

Supercomputers for Everyone, Everywhere

Prof. Eric A. Brewer

UC Berkeley

Human Computation

Luis von Ahn

Carnegie Mellon University

Session 2: Evolving Foundations

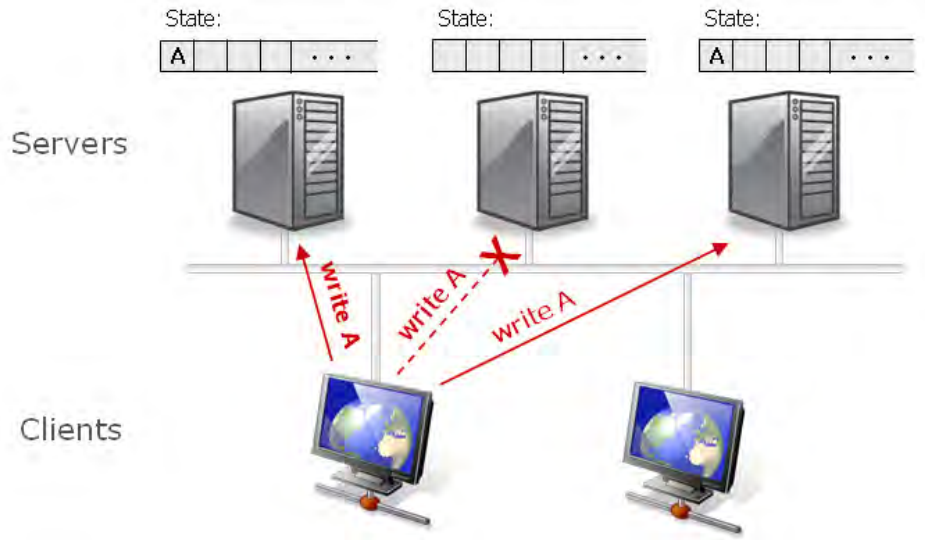
10:40 - 12:00

Security of Online Information
Barbara Liskov (Massachusetts Institute of Technology)

Learning to Improve Our Lives
Daphne Koller (Stanford University)

Global Information Networks
Jon Kleinberg (Cornell University)

Discussion by the speakers of future challenges and synergies

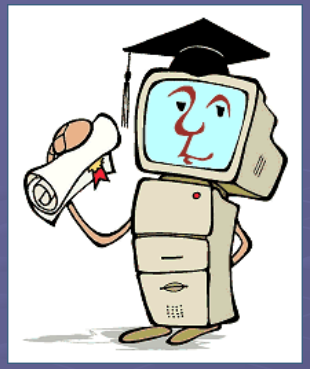


Security of Online Information

Barbara Liskov

MIT CSAIL

March 2009



Learning

to improve our lives

Daphne Koller
Stanford University

Global Information Networks

Jon Kleinberg

Cornell University

Crandall-Backstrom-Huttenlocher-Kleinberg (2009)

Session 3: The Transformation of the Sciences via Computation 1:00 - 2:20

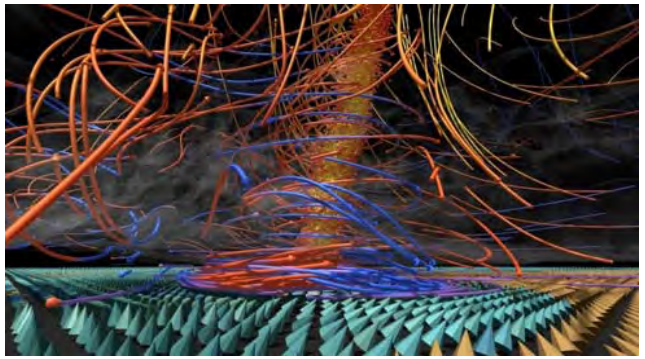
Supercomputers and Supernetworks are Transforming Research
Larry Smarr (University of California, San Diego)

Computing and Visualizing the Future of Medicine
Chris Johnson (University of Utah)

Zooming In On Life
Gene Myers (Howard Hughes Medical Institute)

Discussion by the speakers of future challenges and synergies

Supercomputers and Supernetworks are Transforming Research



Dr. Larry Smarr

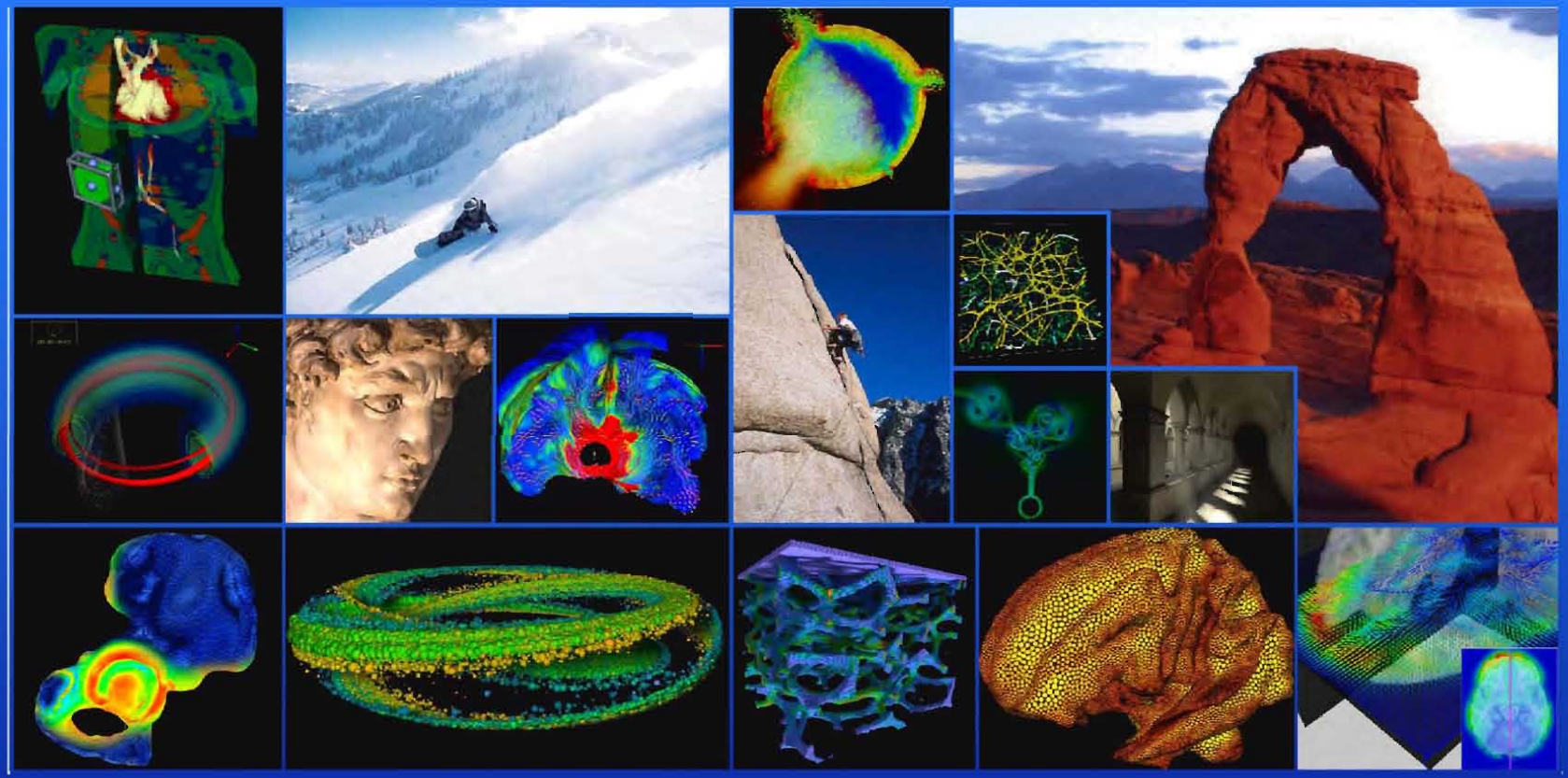
Director, California Institute for Telecommunications and Information Technology

Harry E. Gruber Professor,

Dept. of Computer Science and Engineering

Jacobs School of Engineering, UCSD

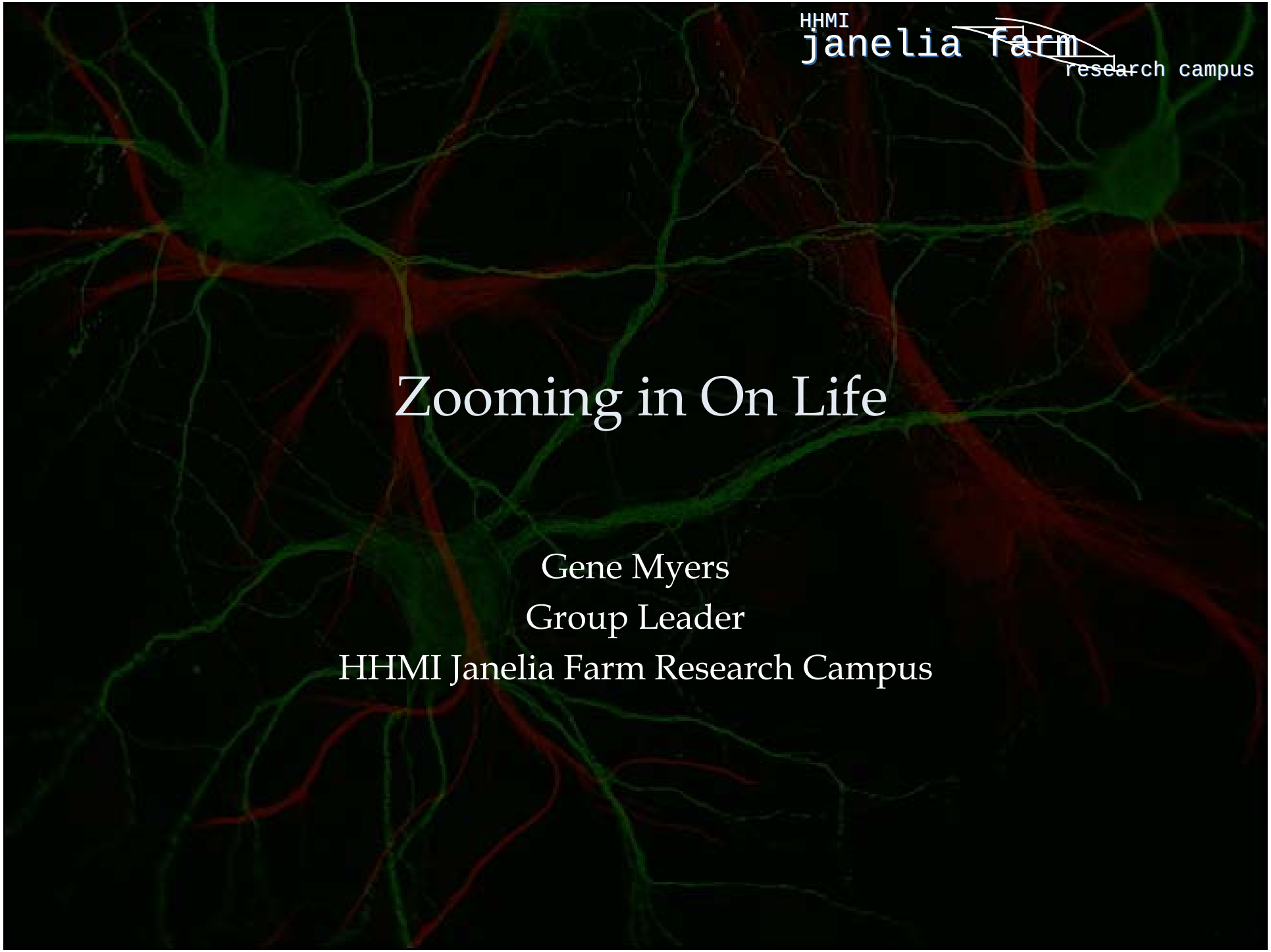
Computing and Visualizing the Future of Biomedicine



Chris Johnson

Scientific Computing and Imaging Institute

University of Utah



Zooming in On Life

Gene Myers
Group Leader
HHMI Janelia Farm Research Campus

Session 4: Computing Everywhere! 2:30 - 3:50

Sensing Everywhere!
Deborah Estrin (University of California, Los Angeles)

Pixels Everywhere!
Pat Hanrahan (Stanford University)

Robotics Everywhere!
Rodney Brooks (Massachusetts Institute of Technology and Heartland Robotics)

Discussion by the speakers of future challenges and synergies

Sensing Everywhere!
from ecosystems to human systems

Professor Deborah Estrin

NSF Science and Technology Center for Embedded Networked Sensing (CENS)

UCLA Computer Science Department

destrin@cens.ucla.edu

… in collaboration with faculty, students and staff at CENS

We gratefully acknowledge the support of our sponsors, including the National Science Foundation, Nokia, Intel Corporation, Cisco Systems Inc., Sun Inc., Google, Microsoft Research, UC Micro, Crossbow Inc., T-mobile, Conservation International, and the participating campuses.

http://urban.cens.ucla.edu

Pixels Everywhere

Media Tech and How it Changed the World

Pat Hanrahan

Department of Computer Science

Stanford University

Robots Everywhere!

Rodney Brooks

Massachusetts Institute of Technology

iRobot Corporation

Heartland Robotics

Evaluation Session: Moving Forward 4:00 - 5:00

Discussion by the speakers and the audience of what factors made these achievements possible and what factors will accelerate future advances.

Moderators: Susan Graham (University of California, Berkeley) and Peter Lee (Carnegie Mellon University)

Walk to Madison Hall, James Madison Building, Library of Congress	5:00 - 5:30
Closing Session	5:30

The origins of this symposium

- Built upon a history of attempting to better understand the IT innovation ecosystem
- Discussions with NSF
- Broad input from the computing research community
- Program committee chaired by Dan Reed synthesized this input into a set of recommendations
- Members of the CCC Council assembled the final program

With thanks to

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  - Congressman Rush Holt (D-NJ)
  - Senator Jay Rockefeller (D-WV)
- The general chairs
  - Greg Andrews (University of Arizona)
  - David Kaeli (Northeastern University)
- The session chairs and discussion moderators
  - Susan L. Graham (UC Berkeley)
  - Peter Lee (Carnegie Mellon University)
- The Computing Research Association
  - Andrew Bernat
  - Peter Harsha
- The program committee, speakers, and demonstrators