The Computing Community Consortium and You

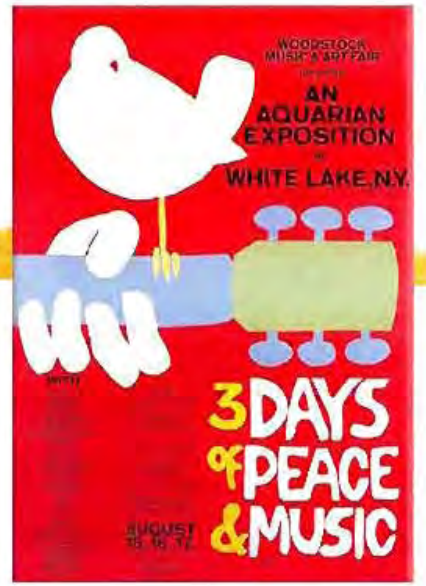
Ed Lazowska

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

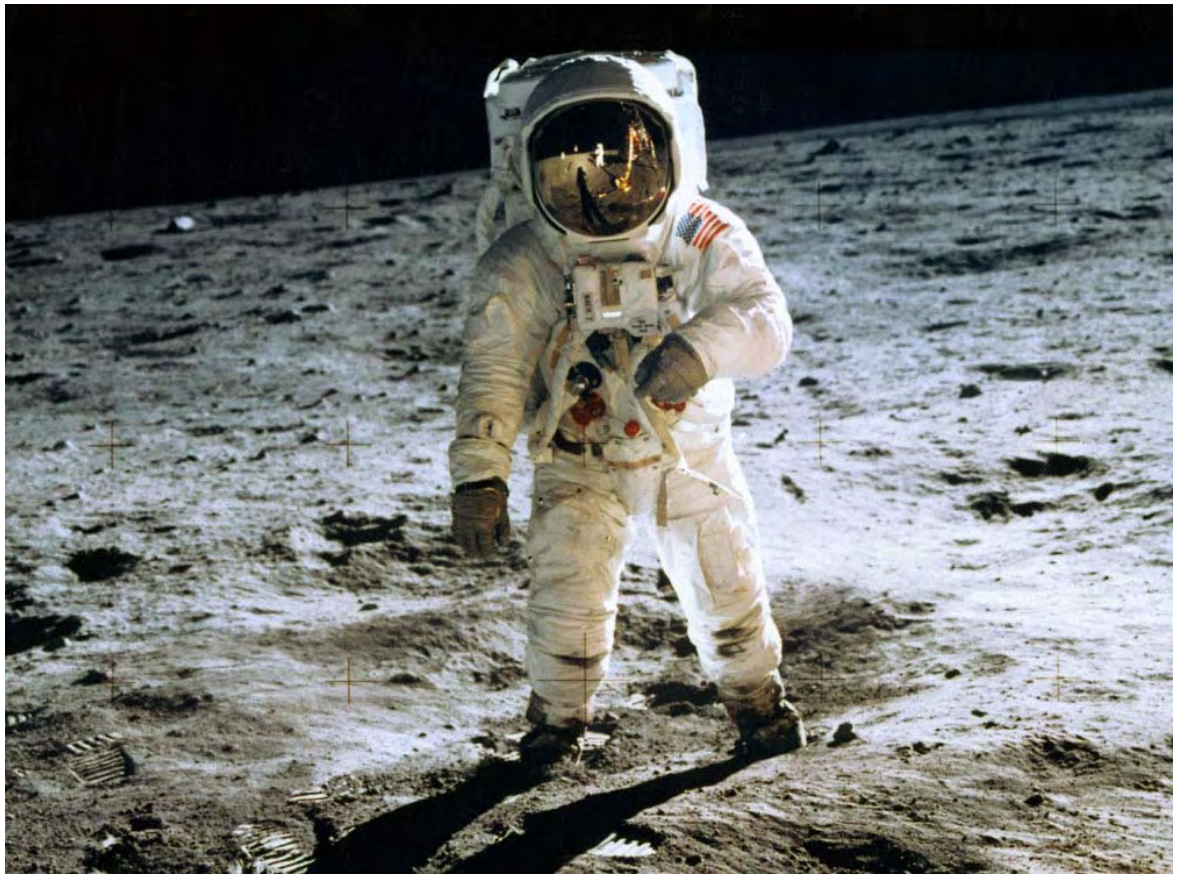
Chair
Computing Community Consortium

http://www.cra.org/ccc

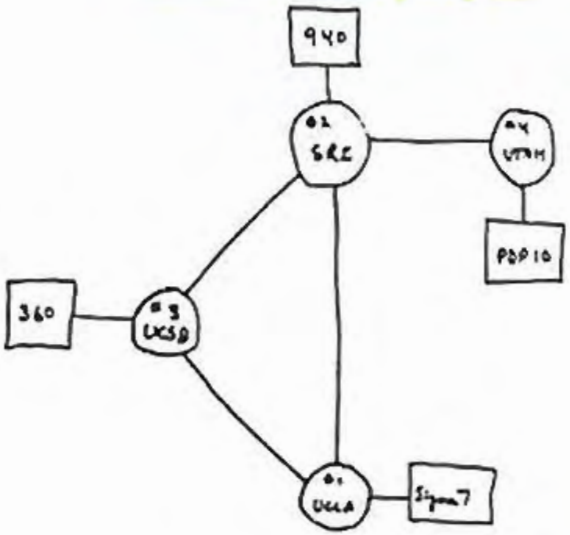
Forty years ago …


WOODSTOCK
MUSIC & ART FAIR
AN
AQUARIAN
EXPOSITION
WHITE LAKE, N.Y.
3 DAYS
of PEACE
& MUSIC


1969



[Peter Lee, DARPA, and Pat Lincoln, SRI]



THE ARPA NETWORK
DEC 1969
4 NODES

29OCT69	2100	LOADED OP. PROGRAM FOR BEN BARKER BBN	CSK
	22:30	Talked to SRI Host to Host	CSK
		Left imp program running after sending a host dead message to imp.	CSK

With forty years hindsight, which had the greatest impact?

- Unless you're big into Tang and Velcro (or sex and drugs), the answer is clear …

- And so is the reason …

EXPONENTIALS R US

The past thirty years …

THE COUNT

Internet, Mobile Phones Named Most Important Inventions

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

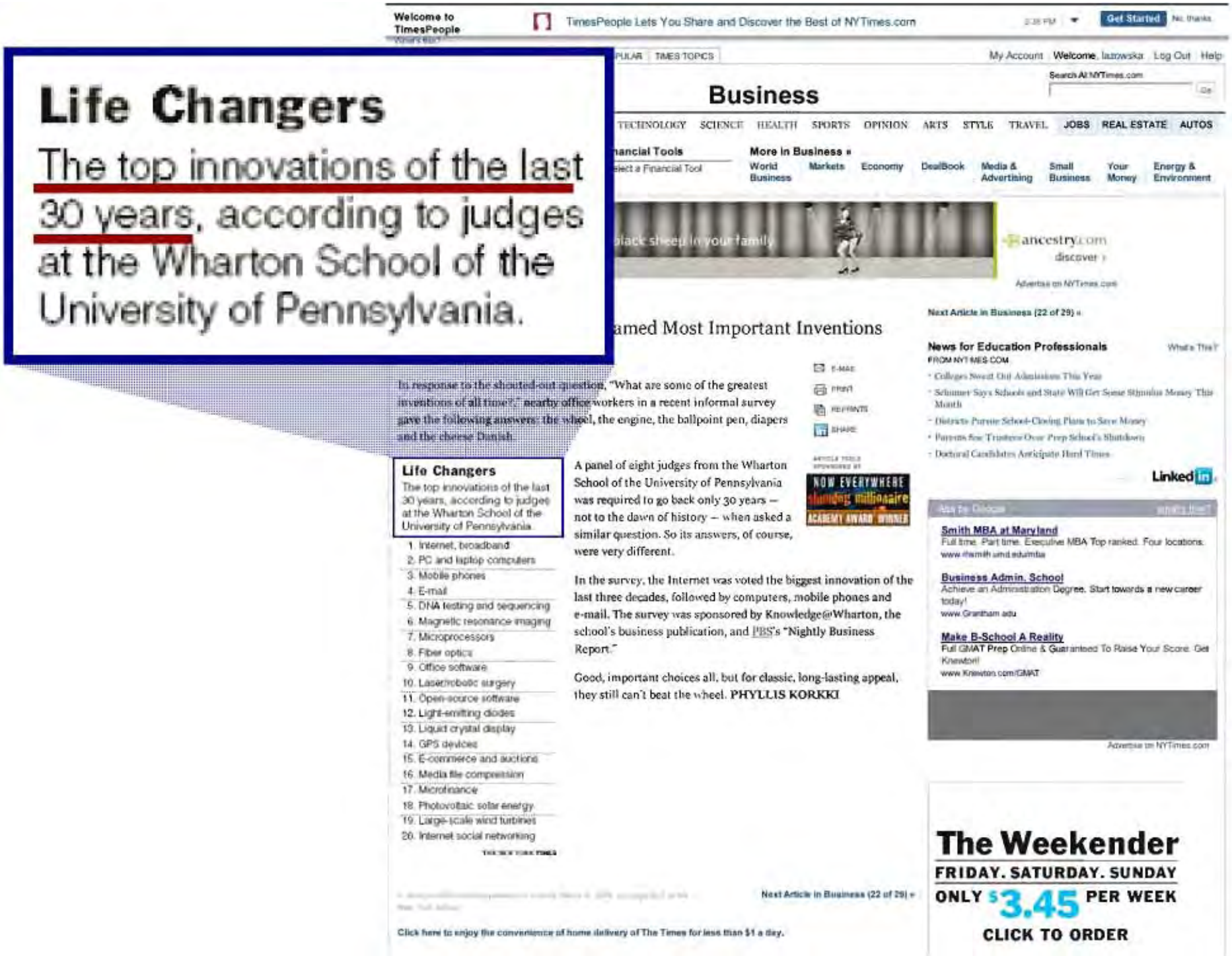
A panel of eight judges from the Wharton School of the University of Pennsylvania was required to go back only 30 years — not to the dawn of history — when asked a similar question. So its answers, of course, were very different.

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

Next Article in Business (22 of 29) »

Next Article in Business (22 of 29) »



Life Changers

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

Welcome to TimesPeople

TimesPeople Lets You Share and Discover the Best of NYTimes.com

Get Started No, thanks

My Account Welcome, lazowska Log Out Help

Search All NYTimes.com

Business

TECHNOLOGY SCIENCE HEALTH SPORTS OPINION ARTS STYLE TRAVEL JOBS REAL ESTATE AUTOS

More in Business »

World Business Markets Economy DealBook Media & Advertising Small Business Your Money Energy & Environment

ancestry.com discover

Advertise on NYTimes.com

amed Most Important Inventions

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.

E-MAIL PRINT REPRINTS SHARE

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

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

NOW EVERYWHERE slumdog millionaire ACADEMY AWARD WINNER

Next Article in Business (22 of 29) »

News for Education Professionals

FROM NYTIMES.COM

What's This?

- Colleges Sweat Out Admissions This Year
- Schumer Says Schools and State Will Get Some Stimulus Money This Month
- Districts Pursue School-Closing Plans to Save Money
- Parents See Trustees Over Prep School's Shutdown
- Doctoral Candidates Anticipate Hard Times

LinkedIn

Ads by Google What's this?

Smith MBA at Maryland
Full time. Part time. Executive MBA Top ranked. Four locations.
www.rhsmith.umd.edu/mba

Business Admin. School
Achieve an Administration Degree. Start towards a new career today!
www.Grantham.edu

Make B-School A Reality
Full GMAT Prep Online & Guaranteed To Raise Your Score. Get Knewton!
www.Knewton.com/GMAT

Advertise on NYTimes.com

Next Article in Business (22 of 29) »

Click here to enjoy the convenience of home delivery of The Times for less than $1 a day.

The Weekender
FRIDAY. SATURDAY. SUNDAY
ONLY $3.45 PER WEEK
CLICK TO ORDER

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

THE COUNT

Internet, Mobile Phones Named Most Important Inventions

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

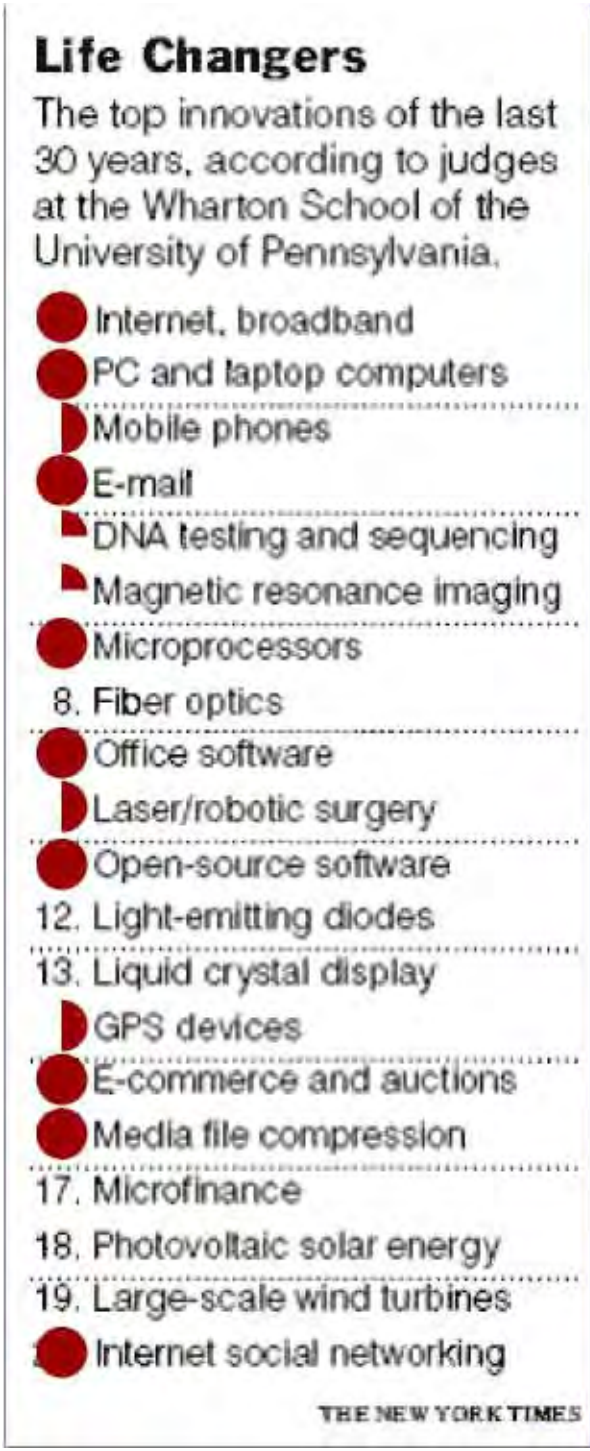
The top innovations of the last 30 years, according to judges at the Wharton School of the University of Pennsylvania.

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

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



THE COUNT

Internet, Mobile Phones Named Most Important Inventions

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

Next Article in Business (22 of 29) »

The most recent ten years …

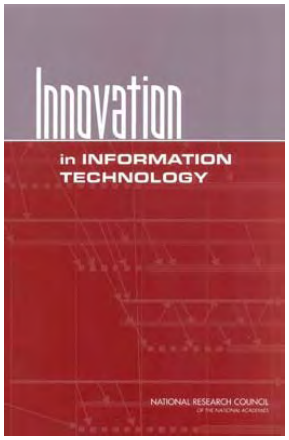
- Search
- Scalability
- Digital media
- Mobility
- eCommerce
- The Cloud
- Social networking and crowd-sourcing

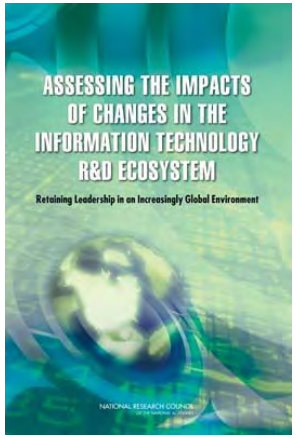
Xconomy
Business + Technology in the Exponential Economy

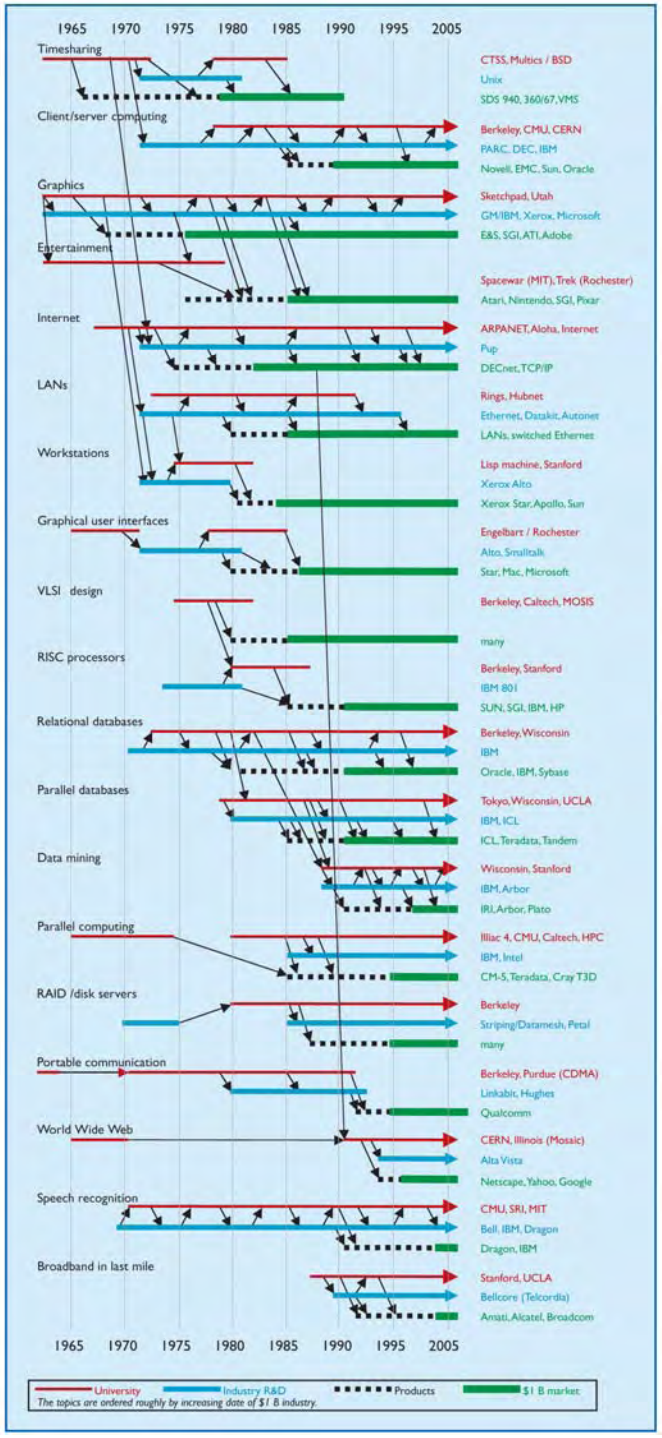
Our field is unique in its impact and importance

- Computing has a rich intellectual agenda
- Advances in computing accelerate the pace of discovery in nearly all other fields
- Advances in computing drive economic growth
  - Not just through the growth of the IT industry, but through productivity growth across the entire economy
- Advances in computing touch everyone's lives – they change the way we live, work, learn, and communicate
- Advances in computing are inextricably linked to our ability to address our major national challenges
- Advances in computing have major policy implications
  - Ranging from e-voting and identity management to the nature and global spread of democracy

Research has built the foundation

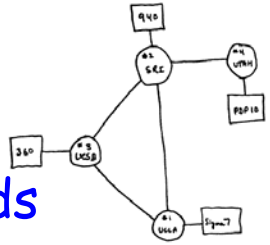


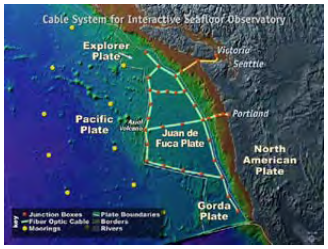


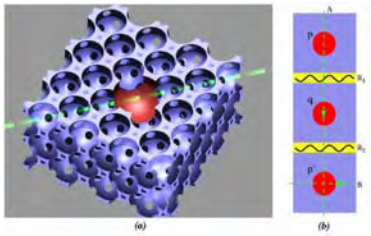


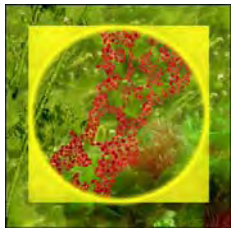
The future is full of opportunity

- 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 for the developing world
- Personalized health monitoring => quality of life
- Harnessing parallelism
- Neurobotics
- Synthetic biology

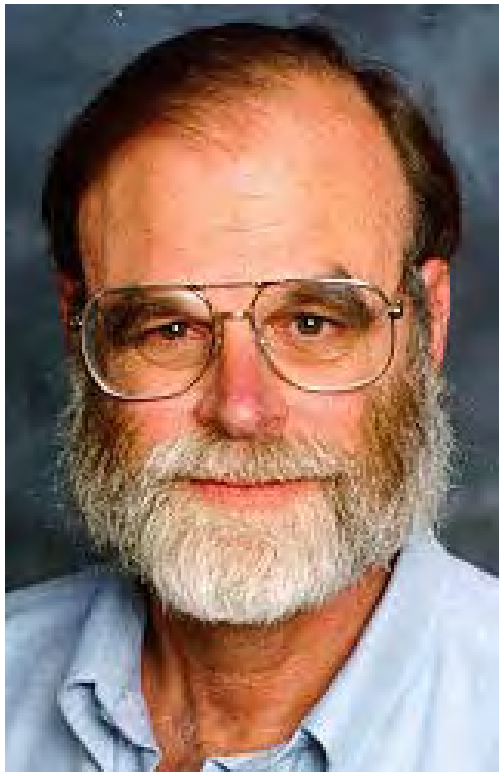








eScience: Sensor-driven (data-driven) science and engineering



Jim Gray

Transforming science (again!)

Human computation, and the wisdom of crowds

Luis von Ahn

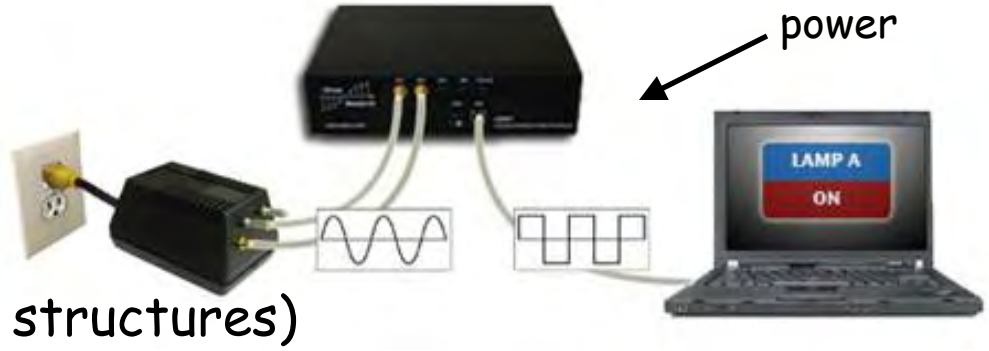
Hours per year, world-wide, spent playing computer solitaire: 9 billion

Hours spent building the Panama Canal: 20 million (less than a day of solitaire)

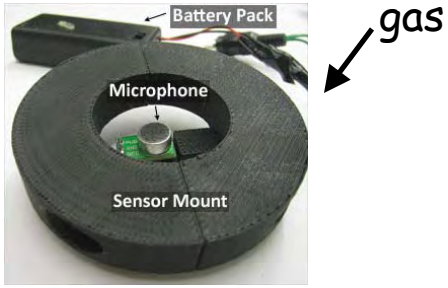
Revolutionizing transportation

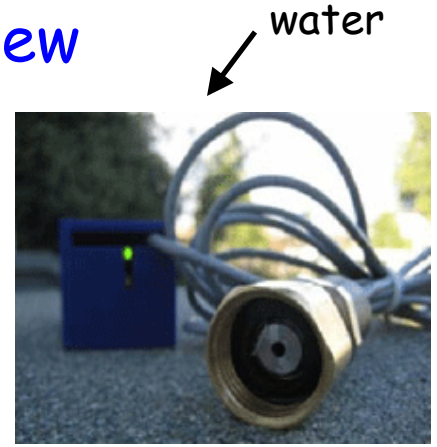
Revolutionizing energy

- The smart grid
  - Engineering
  - Control
  - Conservation (intelligent structures)



- IT as a substitute for energy-intensive goods and services
- IT as a tool for discovering and designing new energy sources
- Improved energy efficiency in computation





[Shwetak Patel, UW]

Revolutionizing health

Personalized health monitoring

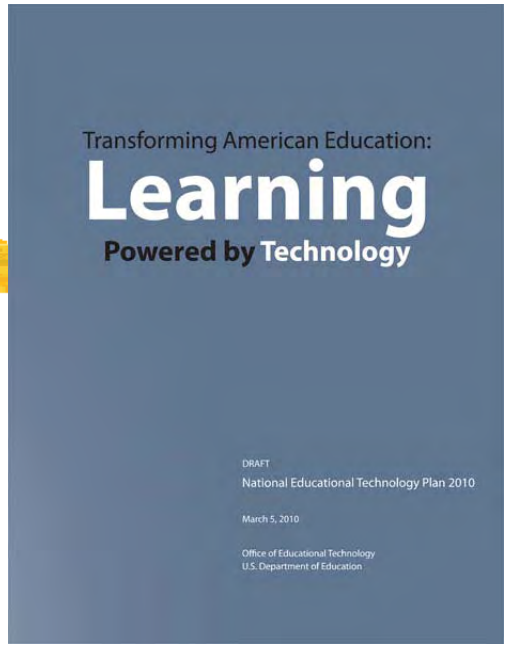
Evidence-based medicine

Neurobotics

P4 Medicine

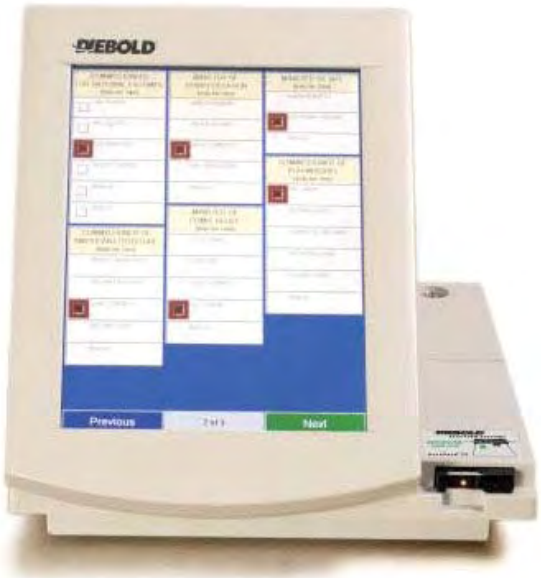
INSTITUTE FOR Systems Biology

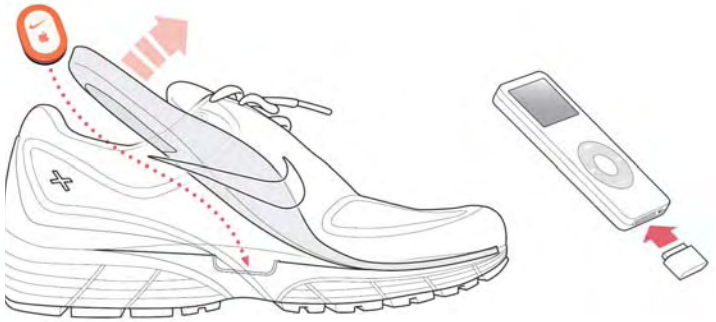
Personalized education



Empowering the developing world

Security, privacy, anonymity, selective disclosure





[Yoshi Kohno, UW]

We will put the "smarts" in …

- Smart homes
- Smart cars
- Smart bodies
- Smart robots
- Smart science (confronting the data tsunami)
- Smart crowds and human-computer systems
- Smart interaction (virtual and augmented reality)

xconomy
Business + Technology in the Exponential Economy

NSF asked CRA to create the Computing Community Consortium …

- to catalyze the computing research community to establish, articulate, build momentum around, and pursue visions for the field
  - Visions that will shape the intellectual future of the field
  - Visions that will catalyze research investment and public support
  - Visions that will attract the best and brightest minds of a new generation

The Computing Community Consortium is …

- A standing committee of CRA
- Funded by NSF under a Cooperative Agreement
- Focused on empowering the computing research community to pursue more audacious research visions

- Led by a broad-based Council
- Chaired by Ed Lazowska (Ch.) and Susan Graham (V.Ch.)
- Staffed by CRA (Erwin Gianchandani and Andy Bernat)

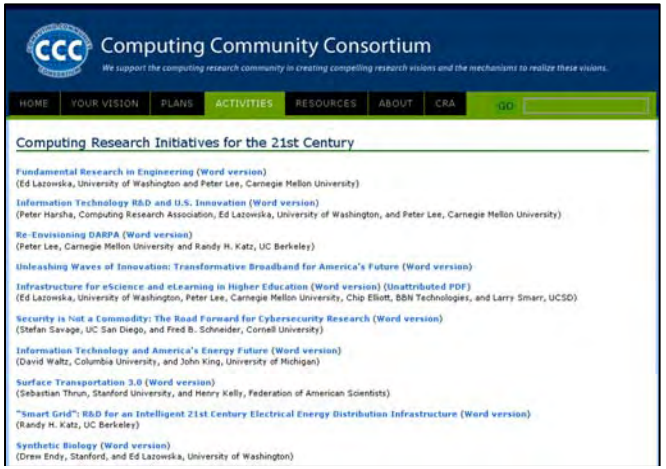



The CCC Council

- Chair
  - Ed Lazowska
- Terms ending 2013
  - Randy Bryant
  - Lance Fortnow
  - Hank Korth
  - Eric Horvitz
  - Beth Mynatt
  - Fred Schneider
  - Margo Seltzer
- Terms ending 2012
  - Stephanie Forrest
  - Chris Johnson
  - Anita Jones
  - Frans Kaashoek
  - Ran Libeskind-Hadas
  - Robin Murphy
- Terms ending 2011
  - Bill Feiereisen
  - Susan Graham (v ch)
  - Dave Kaeli
  - John King
  - Bob Sproull
- Ex Officio
  - Andy Bernat
  - Erwin Gianchandani
- Rotated off
  - Dick Karp, 2010
  - Andrew McCallum, 2010
  - Dave Waltz, 2010
  - Greg Andrews, 2009
  - Peter Lee, 2009
  - Karen Sutherland, 2009

CCC's activities include …

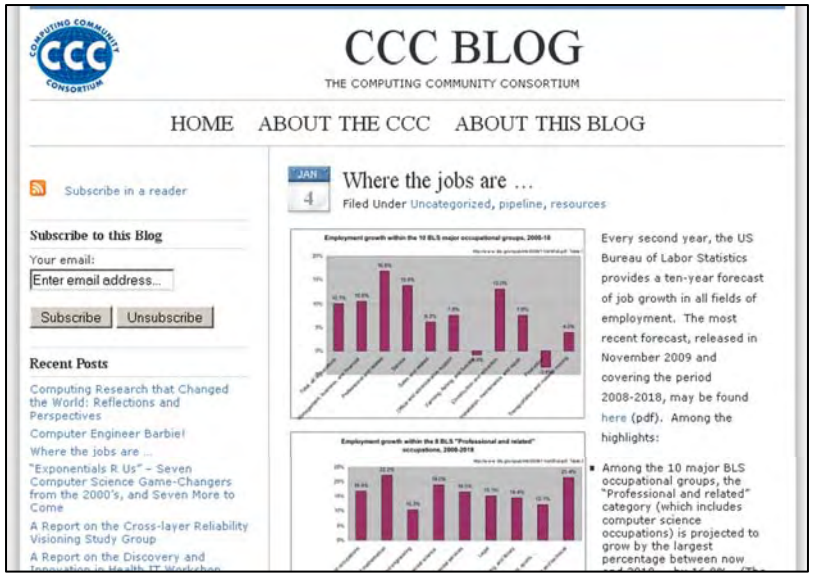
- Activities to increase funding of computing research; community-initiated workshops to define new research directions; computing research white papers for the White House and other groups
  - Dozens, including the future of robotics, health IT, educational technology, IT for development, broadband infrastructure, the role of large-scale data analysis in all fields, IT and energy/sustainability, …



- The Computing Innovation Fellows project
  - A stimulus-motivated project
  - Has placed more than 100 new graduates with postdoctoral mentors in the past 2 years
  - "Max 2 rule" ensures broad institutional participation

- Library of Congress Symposium for policymakers
  - 13 presentations
  - A great set of videos and overview papers for students!

- CCC blog
  - Discussion of research-related topics
- Computing Research Highlight of the Week
  - Exposure for your research-related press releases!



Landmark Contributions by Students in Computer Science

- Prepared as part of the DARPA leadership transition

Landmark Contributions by Students in Computer Science

Version 11: September 15, 2009

There are many reasons for research funding agencies (DARPA, NSF, etc.) to invest in the education of students. Producing the next generation of innovators is the most obvious one. In addition, though, there are an impressive number of instances in our field in which undergraduate and graduate students have made truly game-changing contributions in the course of their studies.

The inspiring list below was compiled by the following individuals and their colleagues: Bill Bonvillian (MIT), Susan Graham (Berkeley), Anita Jones (University of Virginia), Ed Lazowska (University of Washington), Pat Lincoln (SRI), Fred Schneider (Cornell), and Victor Zue (MIT).

We solicit your suggestions for additional student contributions of comparable impact – post them on the Computing Community Consortium blog, http://www.cccblog.org/2009/08/28/landmark-contributions-by-students-in-computer-science/, or send them to Ed Lazowska, lazowska@cs.washington.edu.

Current initiatives

- Computing research and health care
- Computing research and sustainability / energy / transportation
- From Data to Knowledge to Action:
  - Enabling Evidence-Based Healthcare
  - Enabling the New Biology
  - Enabling 21st Century Discovery in Science and Engineering
  - Enabling Advanced Intelligence and Decision Making for America's Security
  - Enabling a Revolution in Transportation
  - Enabling a Transformation of American Education
  - Enabling the Smart Grid

- PCAST review of federal NITRD program
  - Not a CCC activity!
  - But fully consuming CCC Council members Randy Bryant, Susan Graham, Anita Jones, Ed Lazowska, and Bob Sproull, along with 9 others
  - An opportunity to recommend new initiatives, through PCAST, to the President

Is this a great time, or what?!?!

COMPUTING COMMUNITY CONSORTIUM