

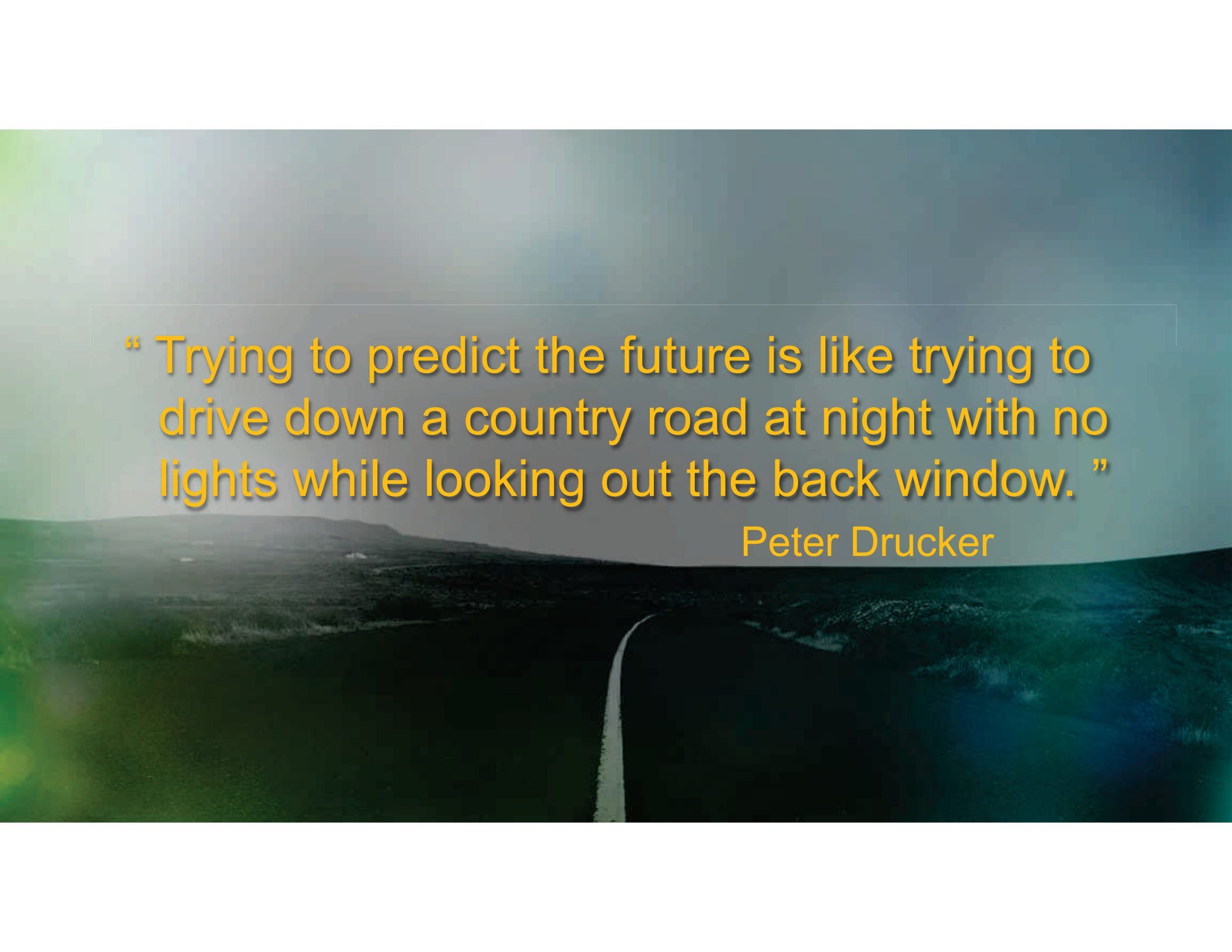


What Drives the Future?

6th Seminario de Acercamiento Tecnológico Calama

Howard Charney, Senior Vice President, Cisco

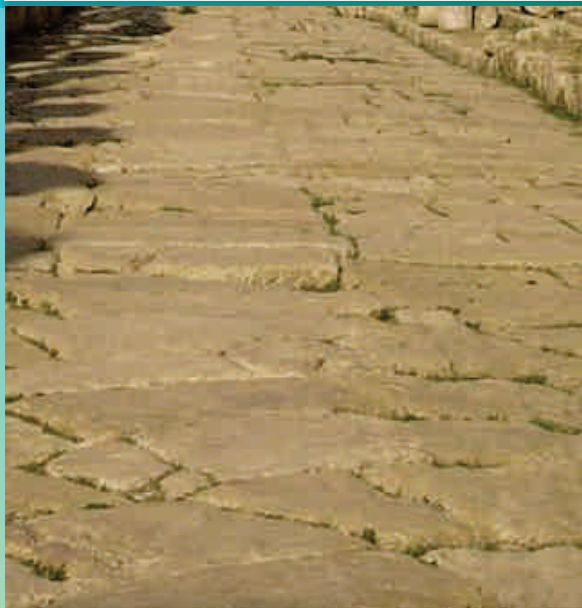
5 July 2012



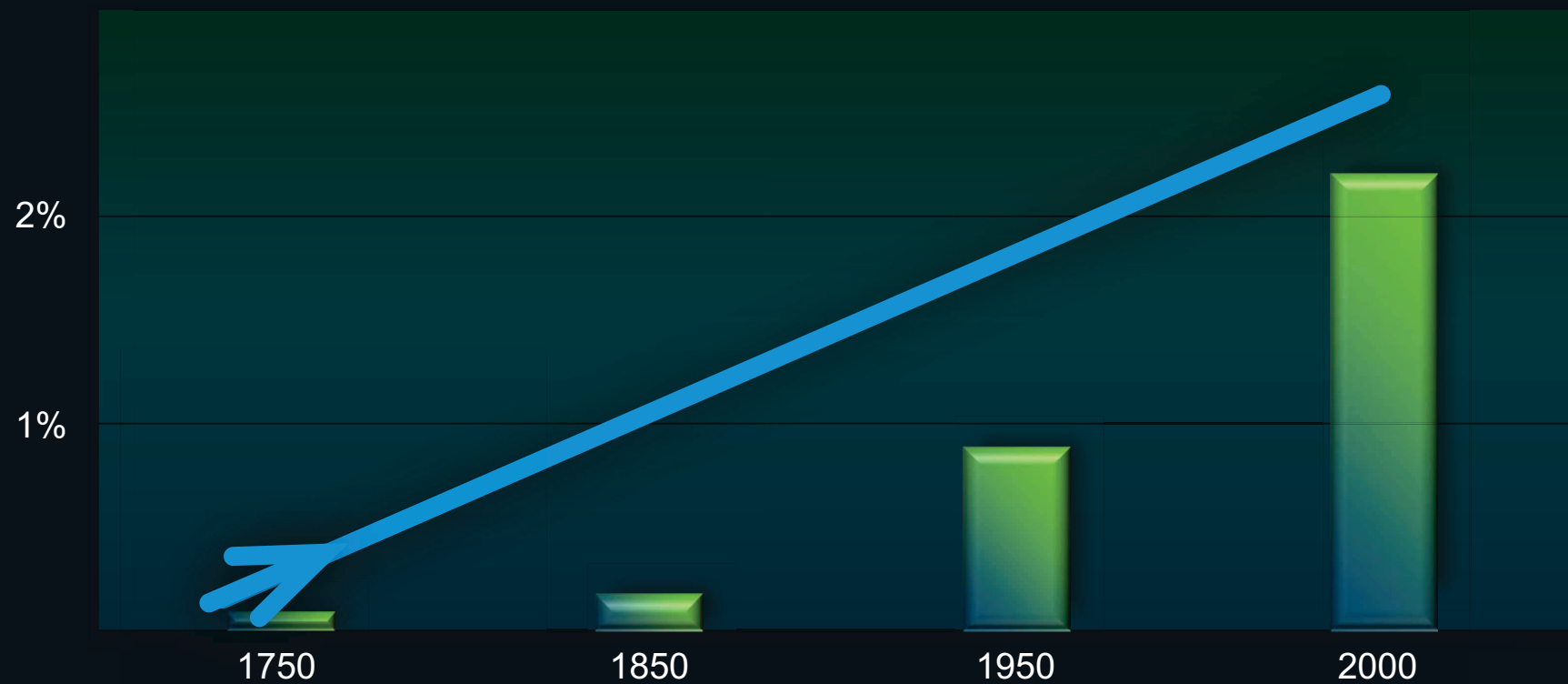
“ Trying to predict the future is like trying to drive down a country road at night with no lights while looking out the back window. ”

Peter Drucker

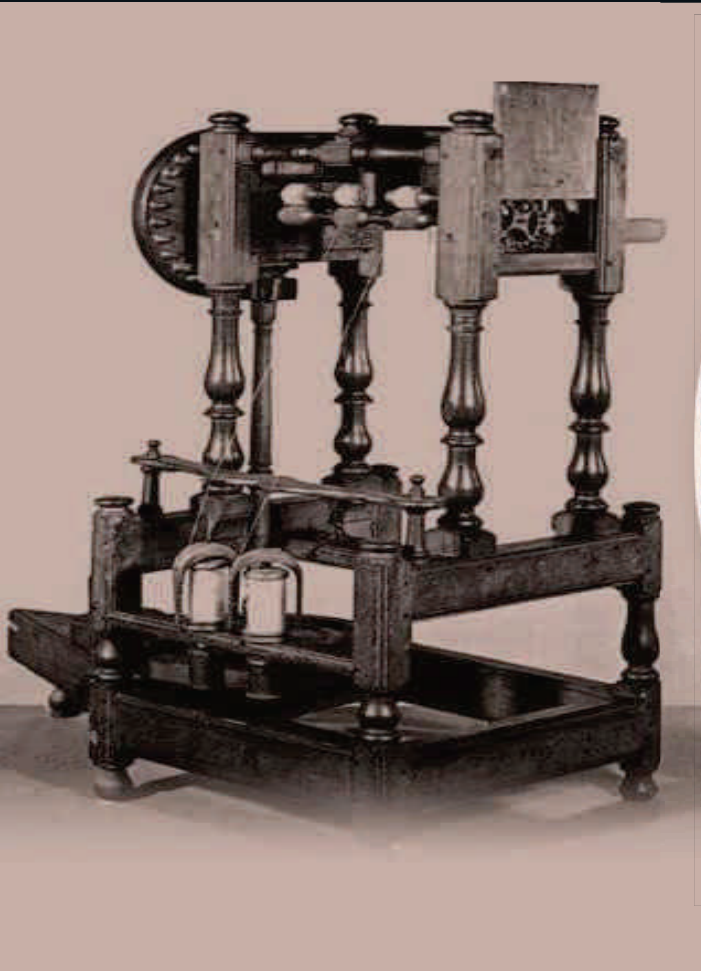




GDP Per Capita Spiked After Industrial Revolution



Arkwright Mechanized Cotton—Spinning Process



Carlota Perez Model

Industrial Revolution



1771

Age of Steam and
Railways



1830

Age of
Steel



1875

Age of Oil and the
Automobile



1908

Age of IT and the
Internet



1971

2030?

The Fifth Great Technology
Revolution of Modern Times



Carlota
Perez

Every 50 to 60 Years Since 1771, a Technology Revolution Has Transformed Society



WORK



LIVE



PLAY



LEARN

Carlota Perez Model

Industrial Revolution



Age of Steam and Railways



Age of Steel



Age of Oil and the Automobile



Age of IT and the Internet



1771

1830

1875

1908

1971

2012

2030?

The Fifth Great Technology
Revolution of Modern Times



Carlota
Perez

Famous Last Words

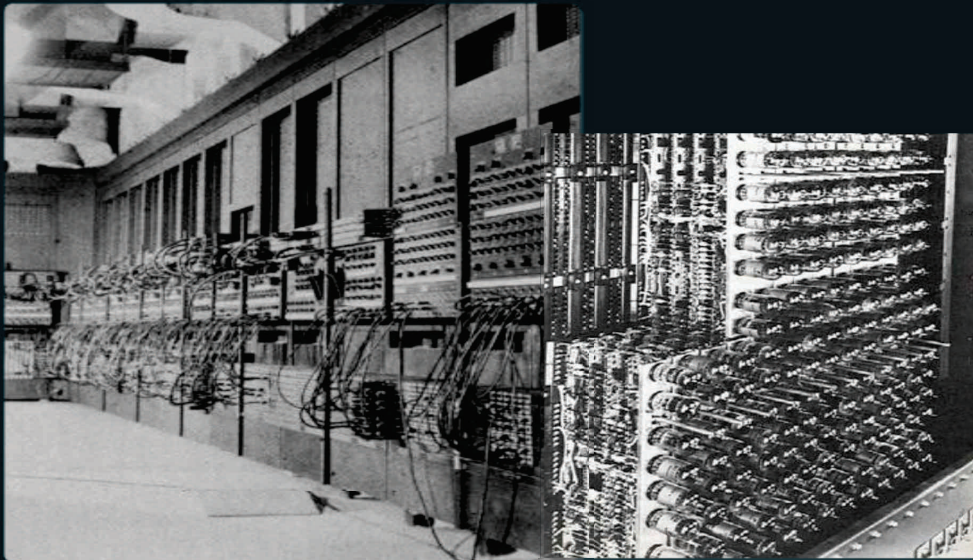


“By 1960, work will be limited to three hours a day.”

John Langdon-Davies
British journalist and Fellow of the Royal
Anthropological Institute

Famous Last Words

“Where a calculator on the ENIAC is equipped with 18,000 vacuum tubes and weighs 30 tons, computers in the future may have only 1,000 vacuum tubes and perhaps weigh 1.5 tons.”



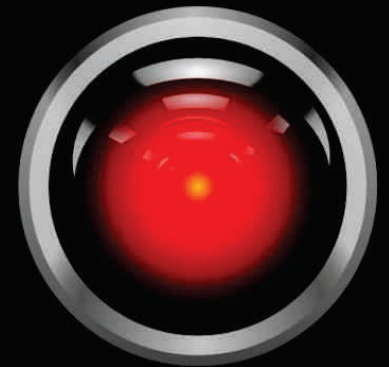
Popular Mechanics, 1949

Famous Last Words





Dave... I'm afraid I can't
let you do that...



HELLO DAVE

1984

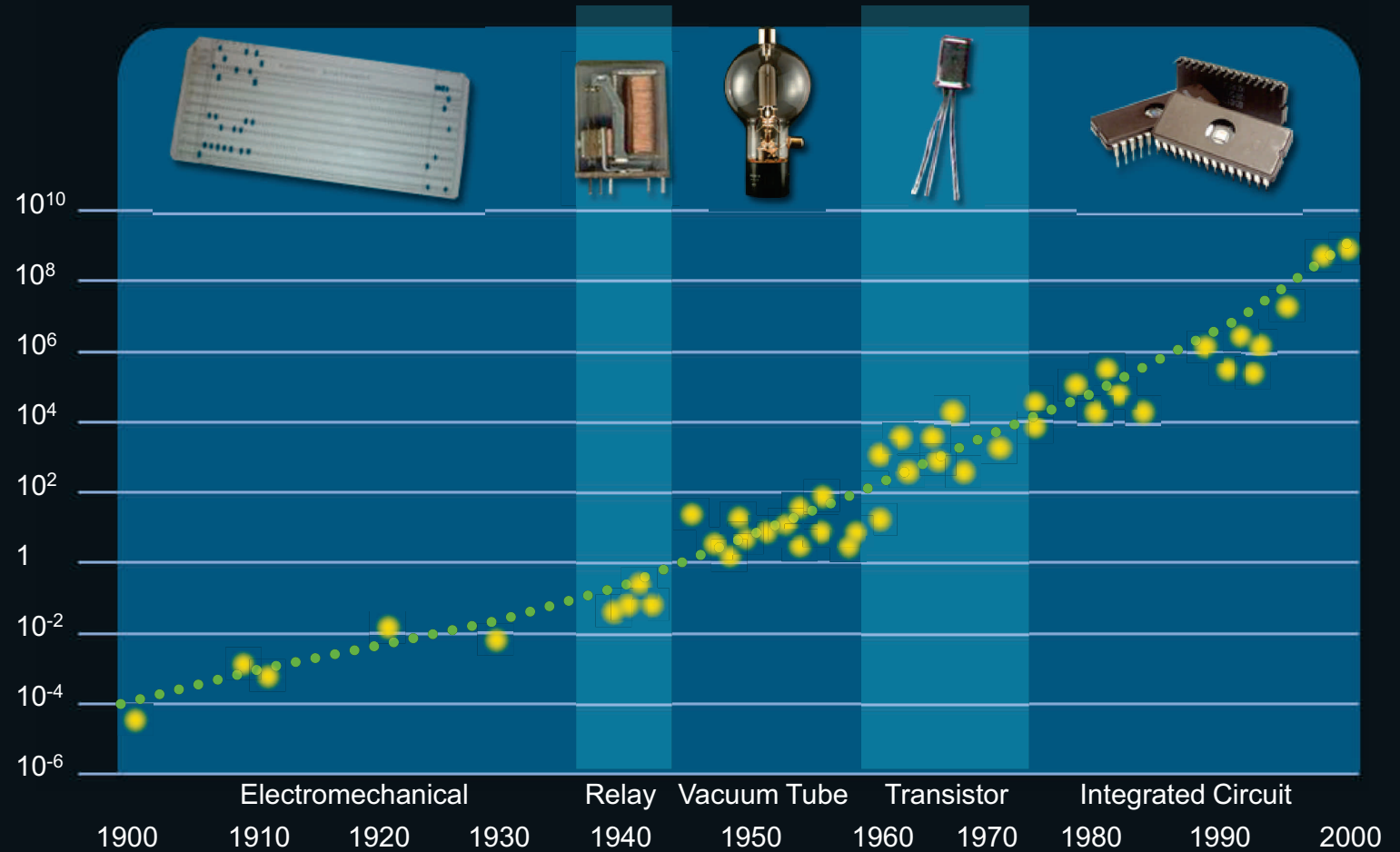


The First Multi-Protocol Router Helped Launch an Era



1980s to 2012: Internet users increased to 2 billion-plus

Exponential Growth of Information Technology

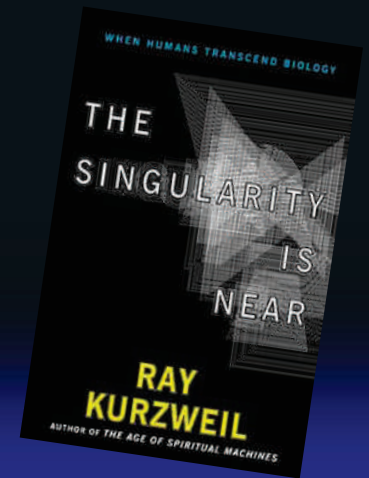


From *The Singularity Is Near*, by Ray Kurzweil

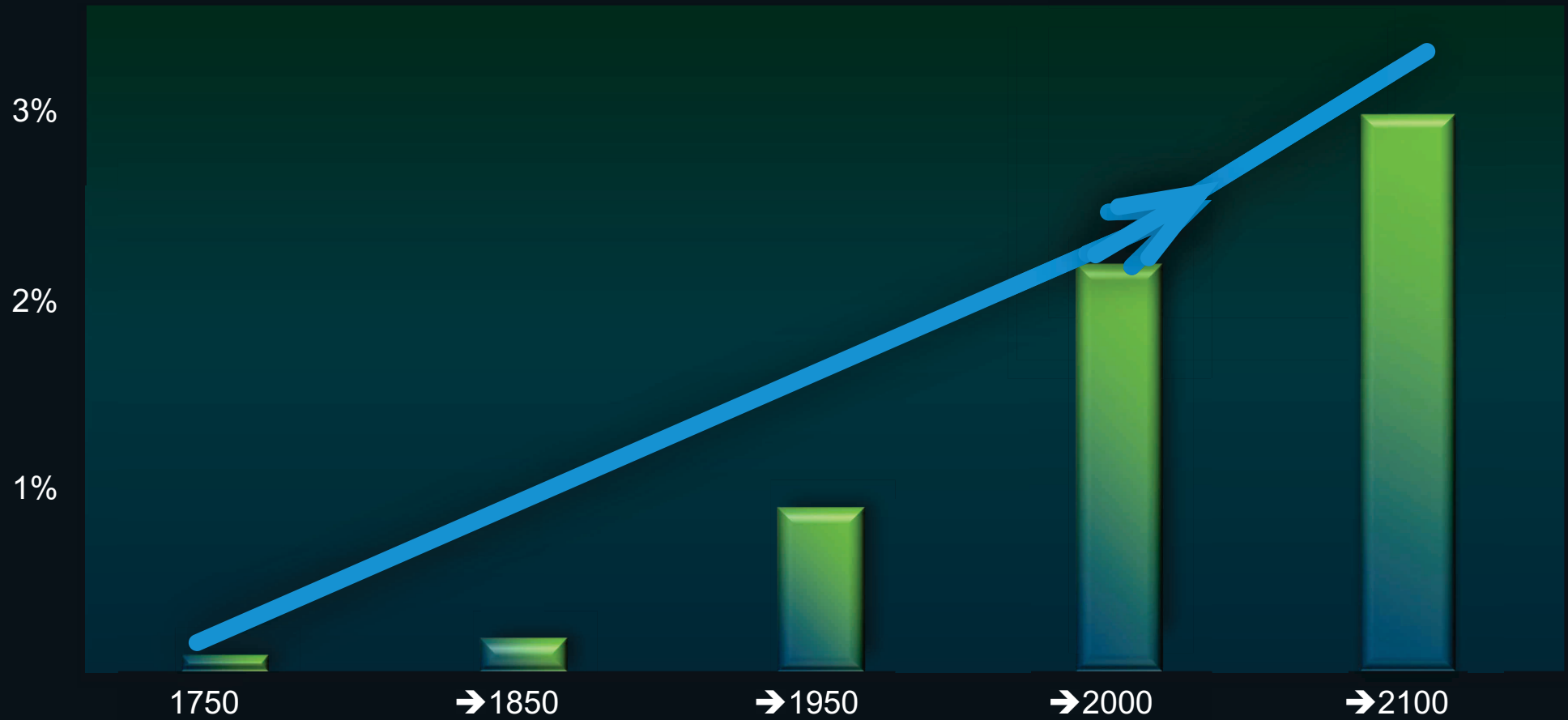
When Machines Start Learning and Become Self-Aware

“What, then, is the Singularity? It's a future period during which **the pace of technological change** will be so rapid, its impact so deep, that human life will be irreversibly transformed.”

– Ray Kurzweil



Even More Exponential Growth Ahead?



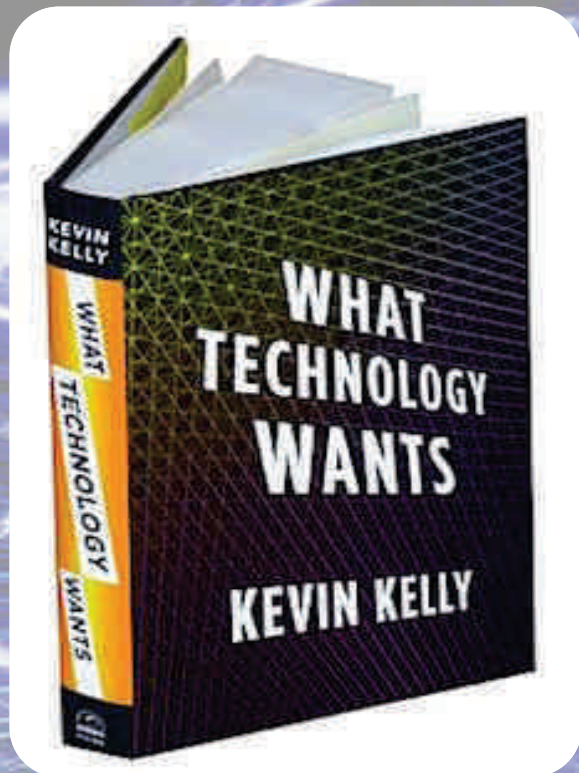
**“The factory of the future will
have only two employees, a
man and a dog.**

**The man will be there to
feed the dog.**

**The dog will be there to
keep the man from
touching the equipment.”**



IT Extends Human Capabilities



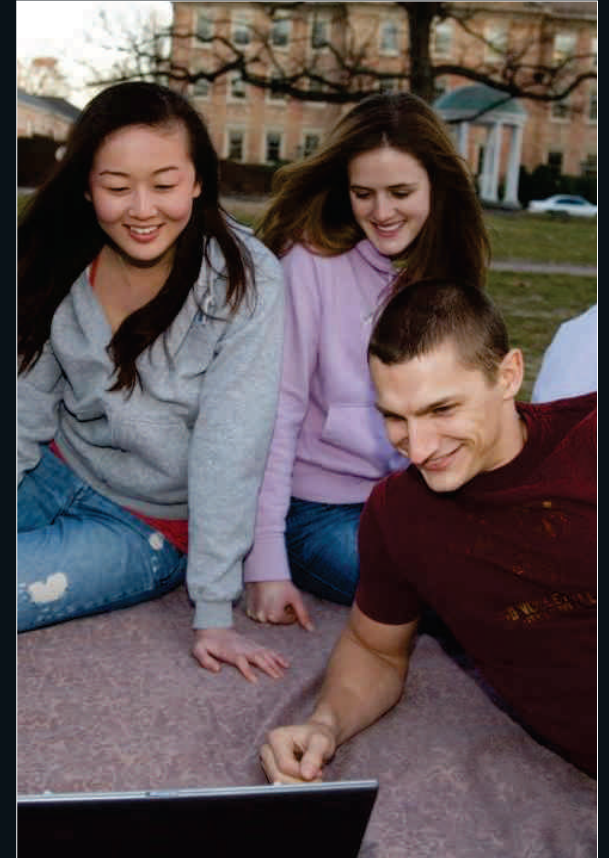
OUR Ideas



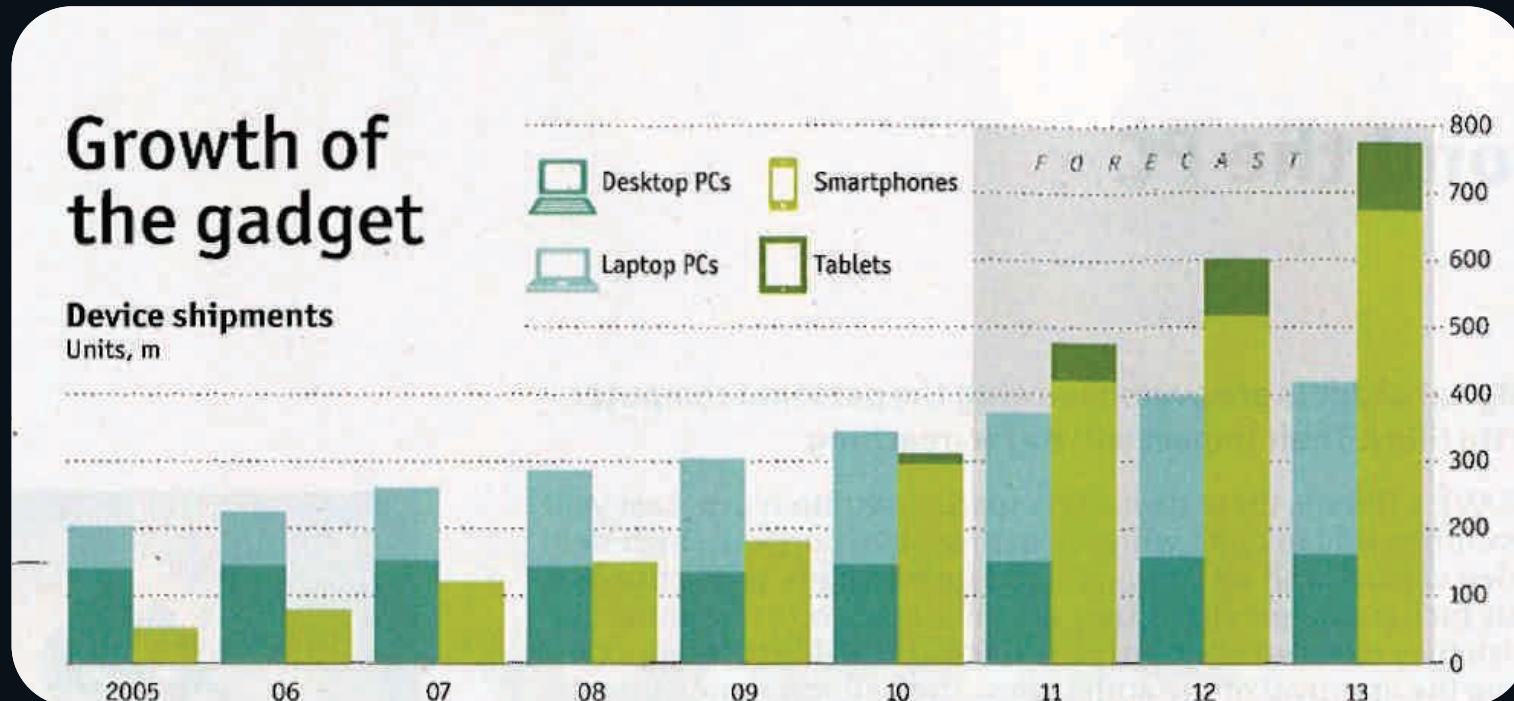
OUR Innovations



OUR Creativity



The Consumerization of IT

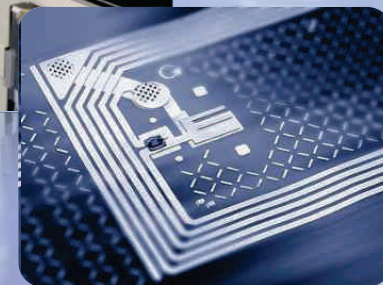


Last year ~ 7.5B devices were connected to the Internet.
Cisco believes that will double by 2015 – to about 15B.

Source: *The Economist*

Exponential Increase in Computing Power

According to ARM, a British company that designs chips for the iPhone and other portable devices, chips today are 40 times more powerful than in 2000.

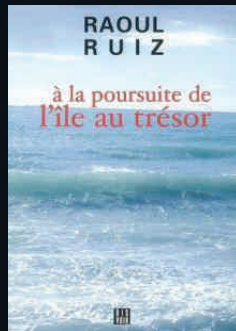


Source: *The Economist*

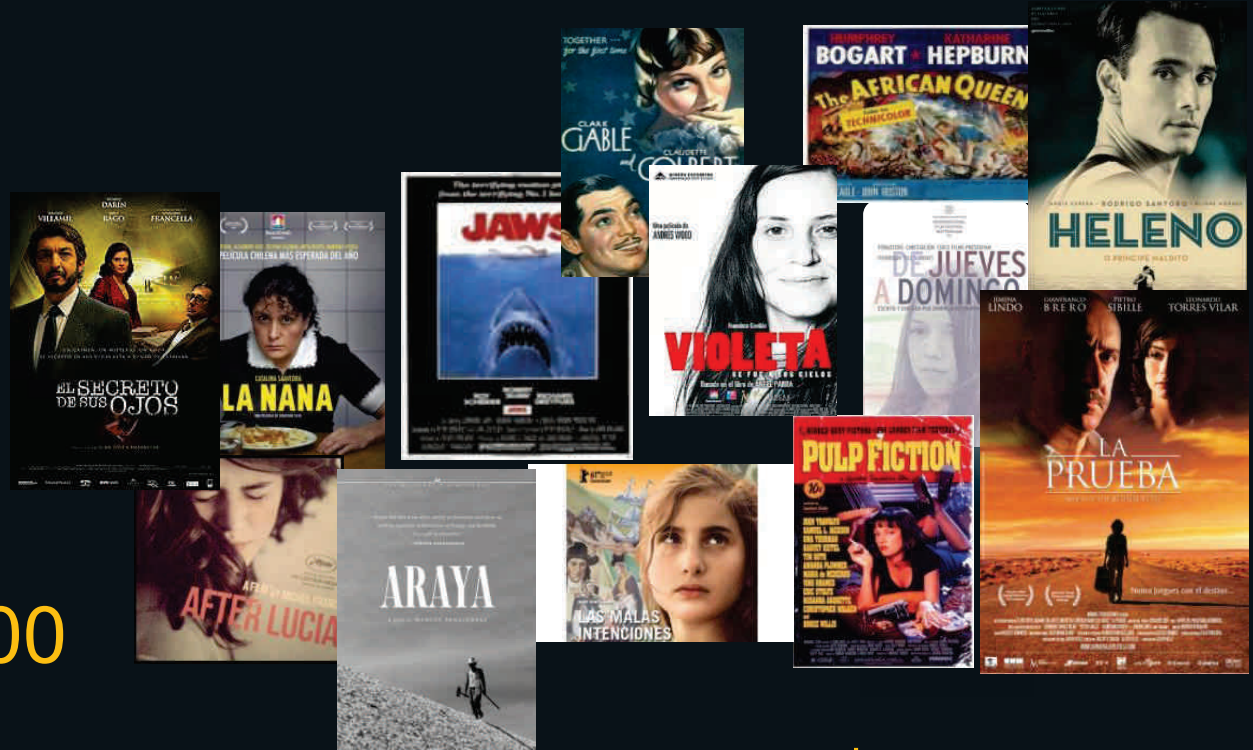
Exponential Improvement in Storage

By 2011 one TB (1,024 GBs)

In 1980 one GB



cost U.S. \$200,000



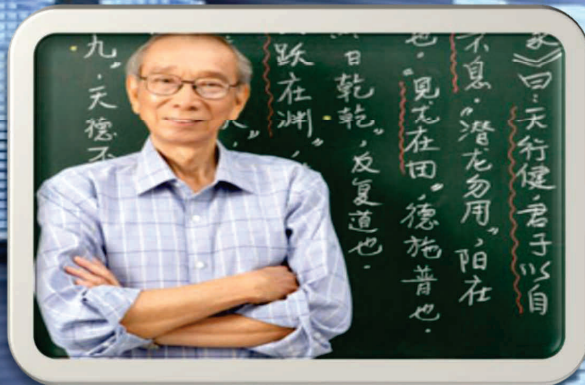
cost about U.S. \$100

Global Shortage of Teachers

Needed: 10 MILLION more teachers in Indonesia, China, India, and Nigeria alone



Can We Extend Our Reach?



“Blended Learning” Most Effective?



Shortage of Rural Healthcare Providers

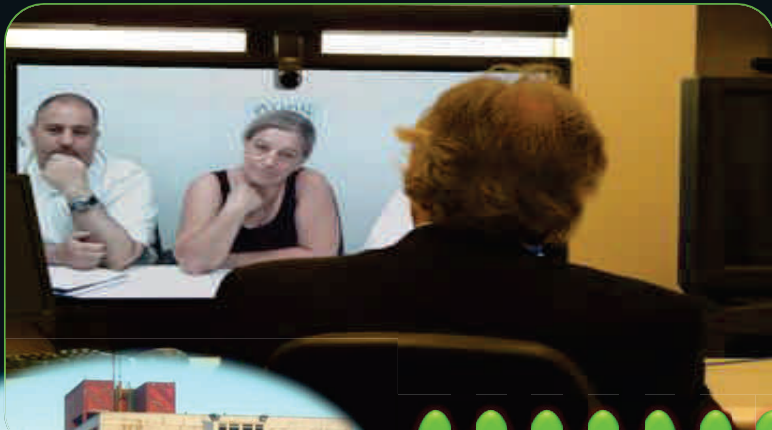


Gap: 4.25M Healthworkers

**50% of people
are rural**

**but only 25%
of medical
workers**

TelePresence Between Pediatric Hospitals



Buenos Aires



Rendon



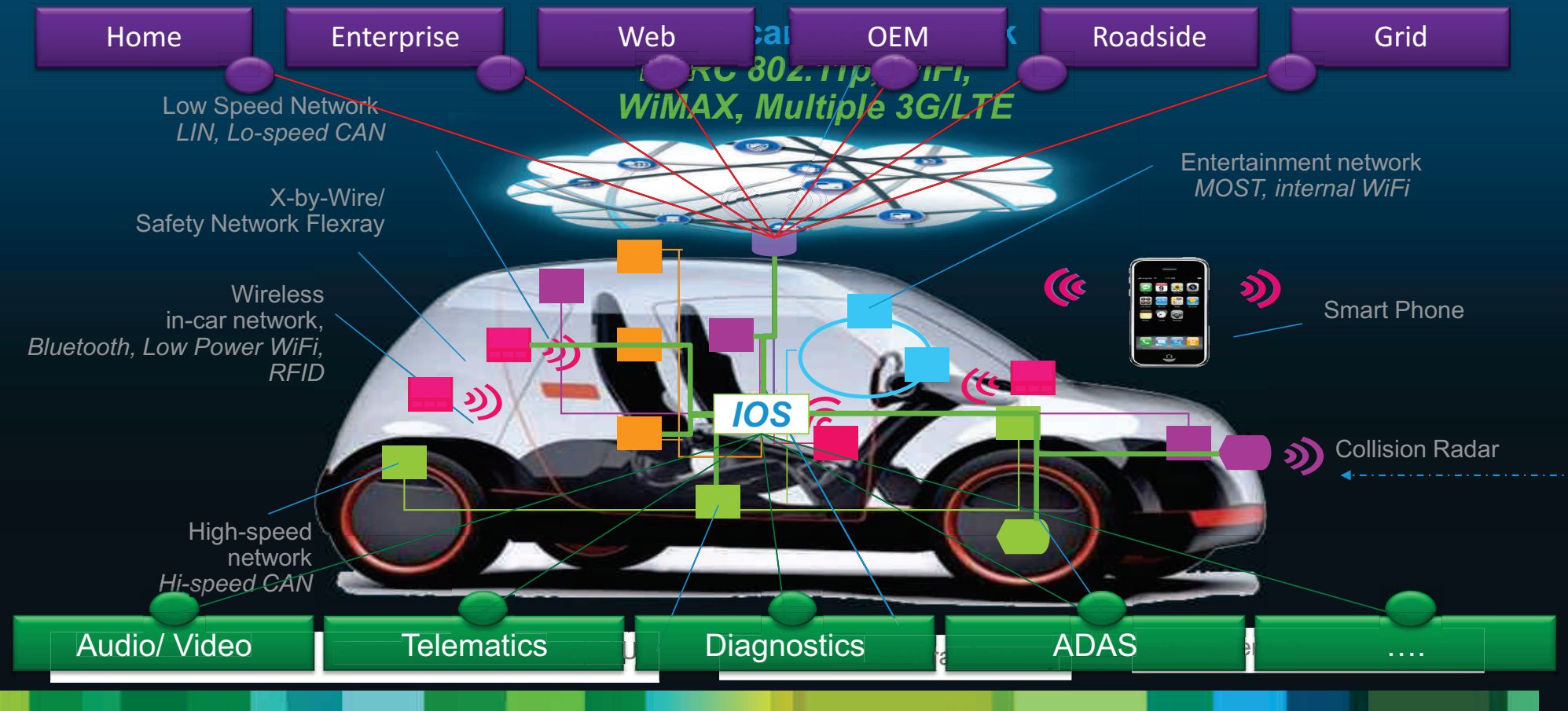
Remote Dispensing of Medications

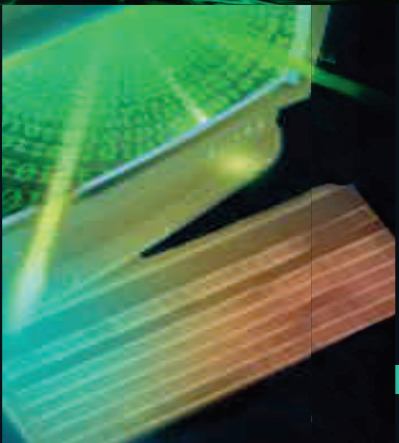






The Vehicle Is Becoming a Node on the Network





Traffic on the Network Is Increasing Exponentially



A world map with a blue grid overlay. Various electronic devices are placed across the map, including smartphones, tablets, and desktop computers. Some devices display video feeds of people. Three circular insets with green borders show specific scenes: a warehouse with boxes, a city skyline at night, and a grocery store produce section. The text "50 Billion Devices Connected to the Internet by 2020" is at the bottom in a glowing blue and green font.

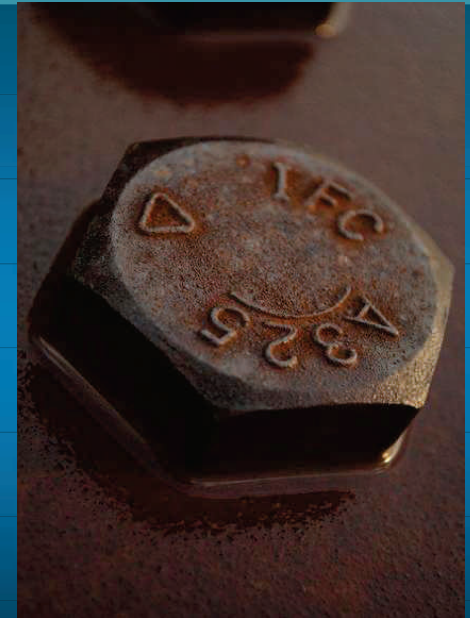
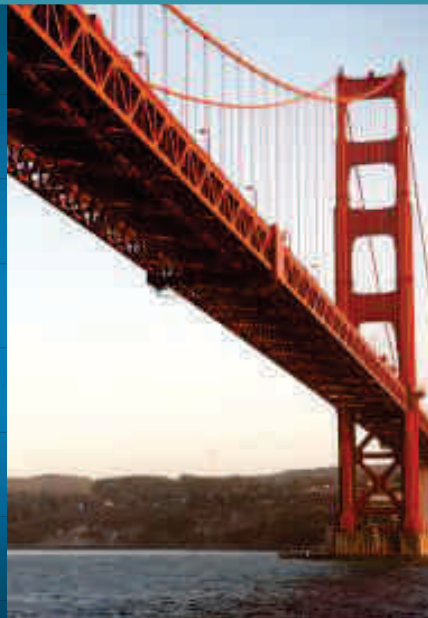
50 Billion Devices Connected to the Internet by 2020



**340 undecillion
IP addresses
(340 trillion
trillion trillion)**

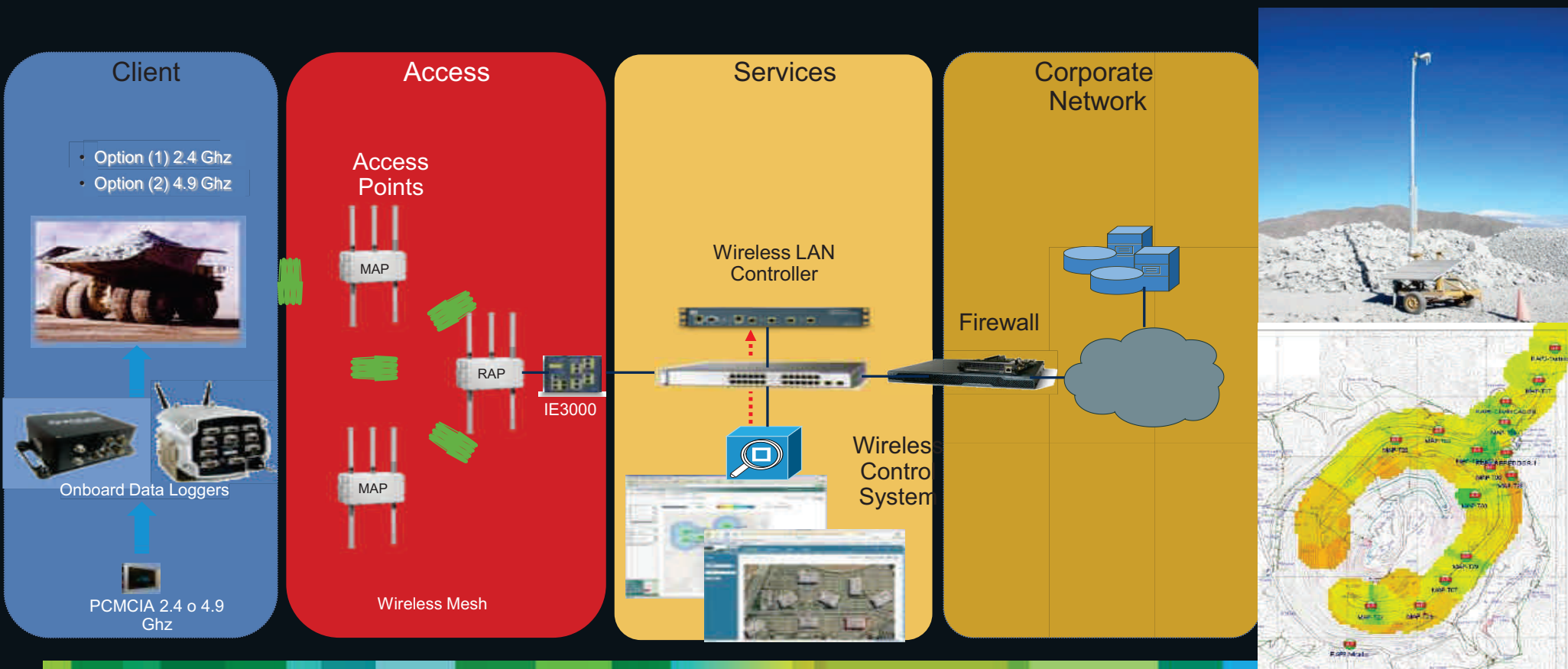


Real-time Info from RFID and Wireless Mesh Sensors

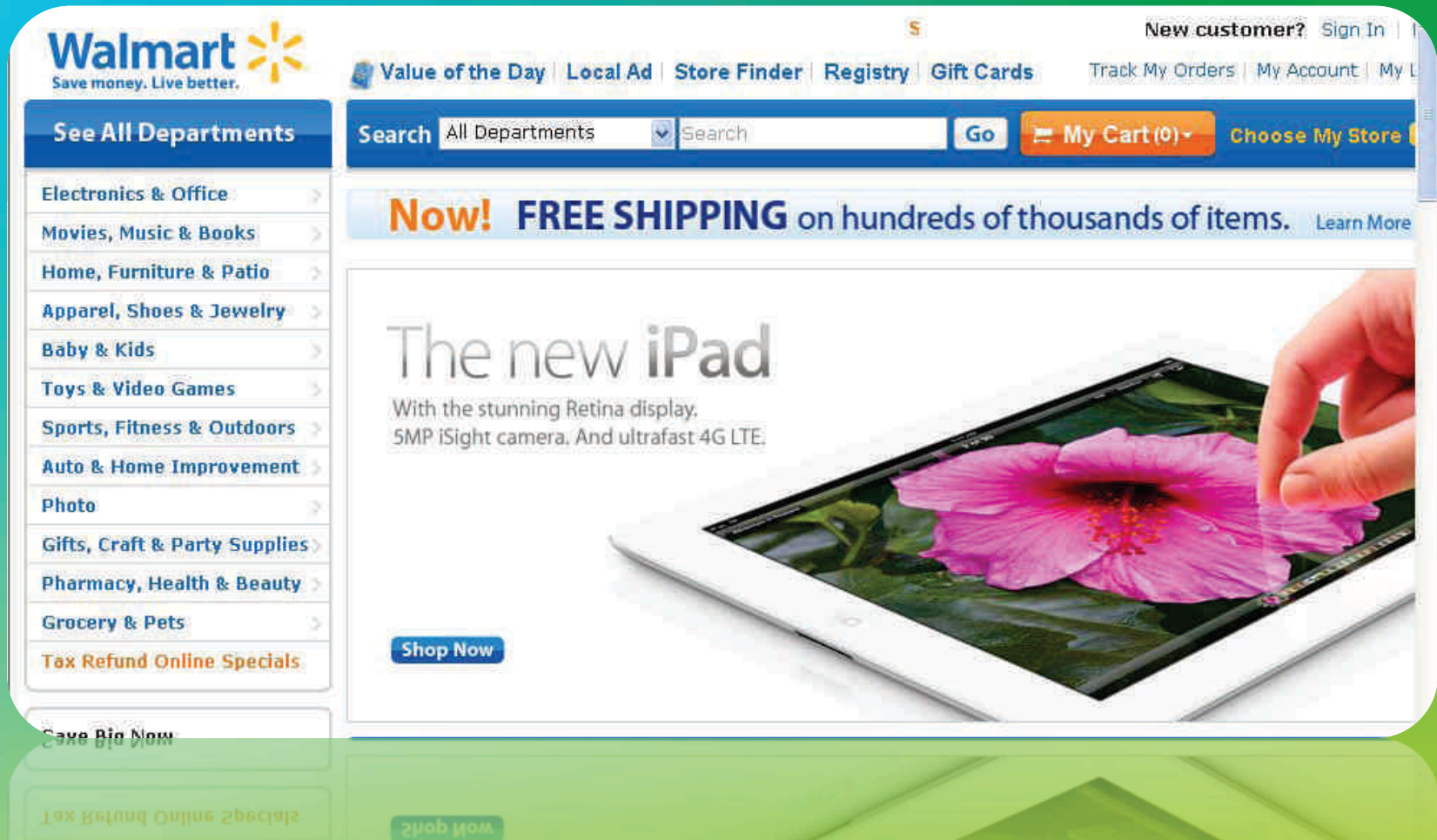


Secure Wireless and Mesh in Mining

Logical Overview



One Million Customer Transactions Every Hour





The Sloan Digital Sky Survey

More data in first few weeks than had been collected during the *entire history* of astronomy



Home



Downloads



Projects



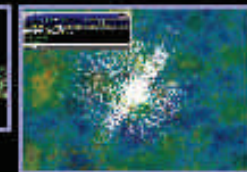
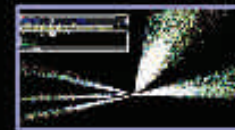
Tech Notes



About Us

The Universe as mapped by SDSS and WMAP

The **Sloan Digital Sky Survey** is a huge and important project to map, in a quarter of the sky, as much of universe as is visible from earth. The SDSS releases data periodically, and will hopefully be complete in a few more years.

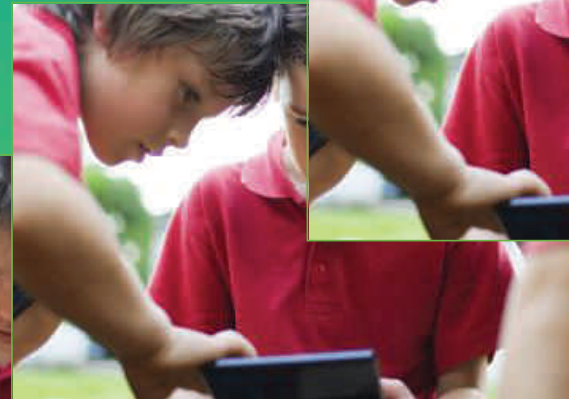


Download: [sdss4wmap.zip](#) (for Windows and Linux) [sdss4wmap_mac.tar.gz](#) (for Macs) :

Forty Billion User Photos



Every week people spend
three billion hours playing
games online



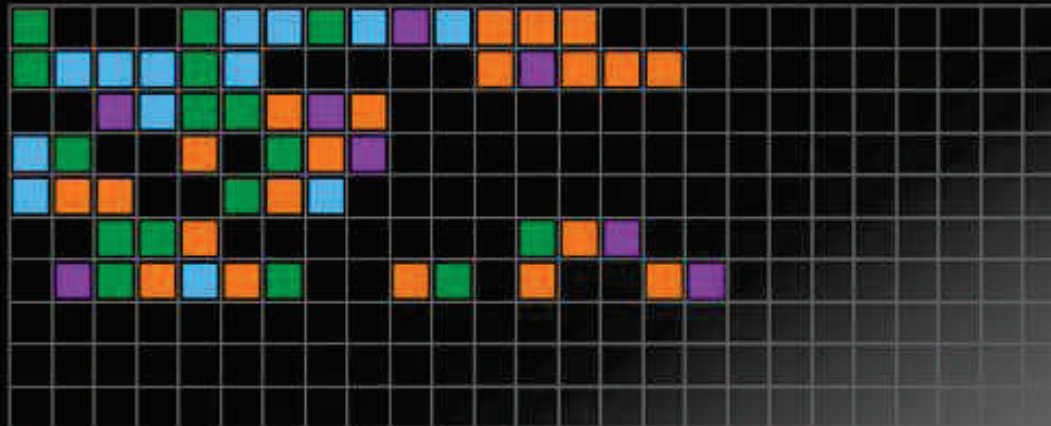
phylo

Play

Tutorial

About

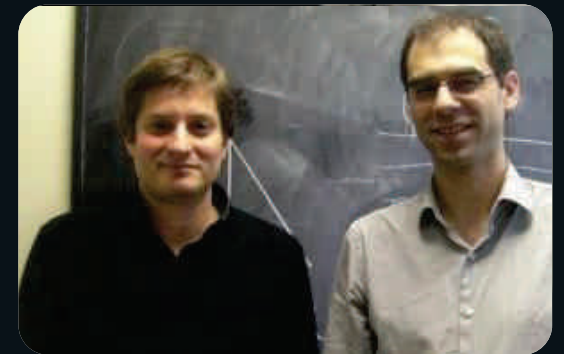
Credits



live ranking

Score Now
Best: 15
Stats Score: -115

McGill's New Spin on the Game of Life



How Connected We Will Be by 2016

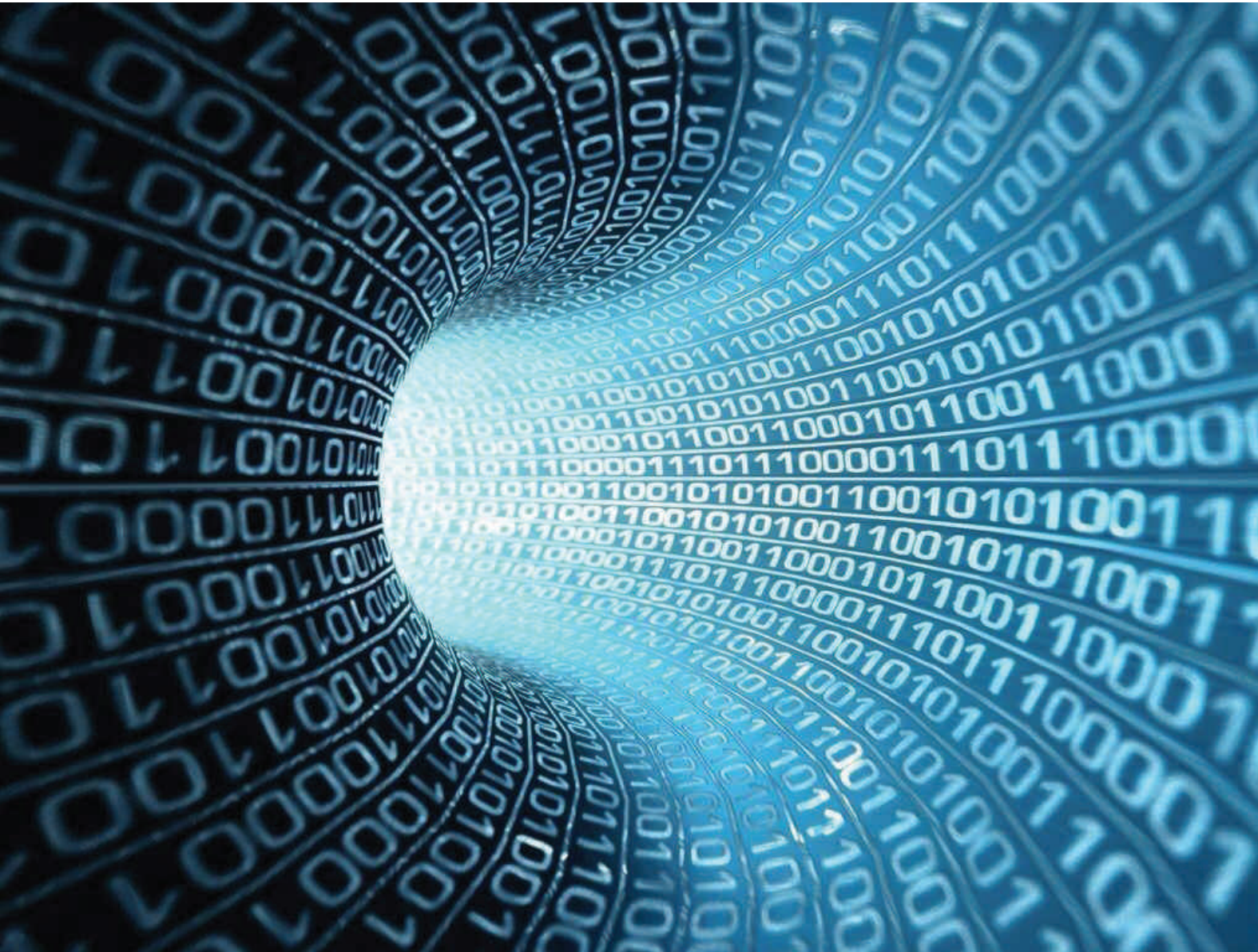
Every **three minutes** the gigabyte equivalent of **every film ever made** will be sent across the networks

There will be **three times as many devices** connected to the Internet as people on the planet

More data was created during any 48-hour period last year than by ALL of humanity during the past 30,000 years.



By 2020 it will be every *hour*



Big Data

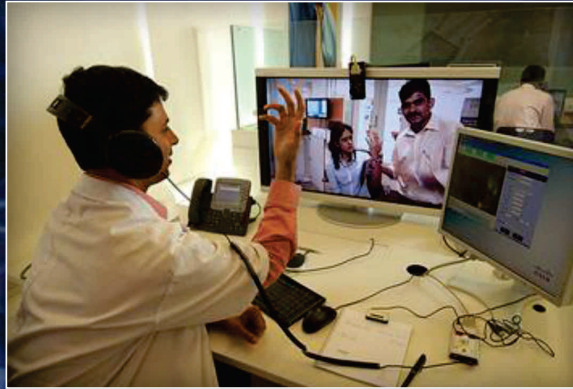
data sets:

Very big

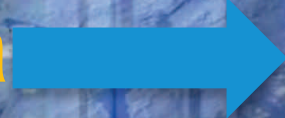
Time-sensitive

Many formats

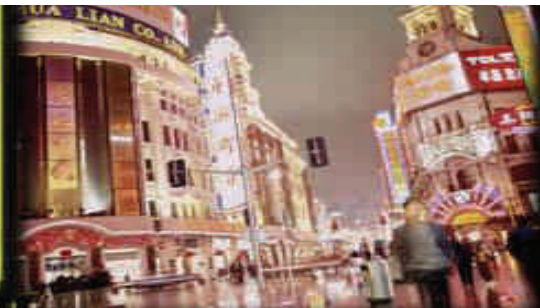
Many sources



Big Data



Big Knowledge



We Are Reaching a Tipping Point

**Hardware, software
and intelligent
networks are giving
us an explosion of
startling new
capabilities**





• New York •



• London •



• Frankfurt •



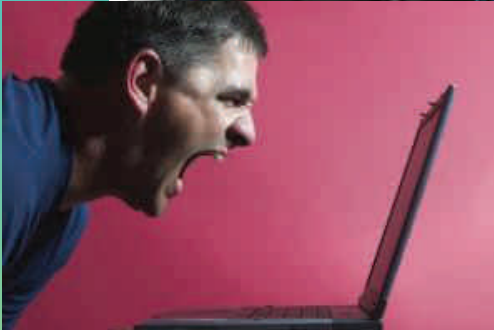
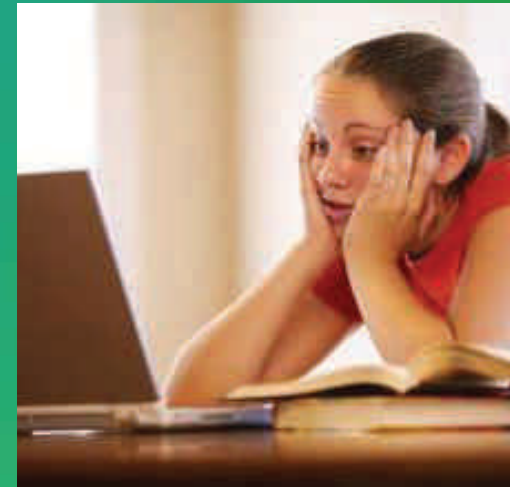
• Hong Kong •



• Tokyo •

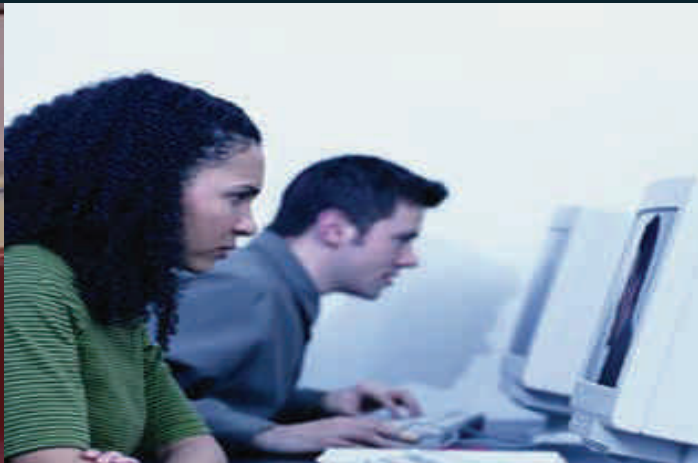
“Slow
magic
ain’t
magic”

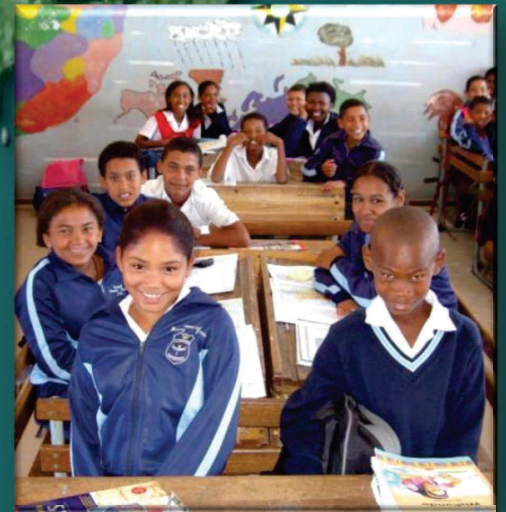




The New York Times:
**250 milliseconds
is too long.**

Every Sector Has to Transform Itself





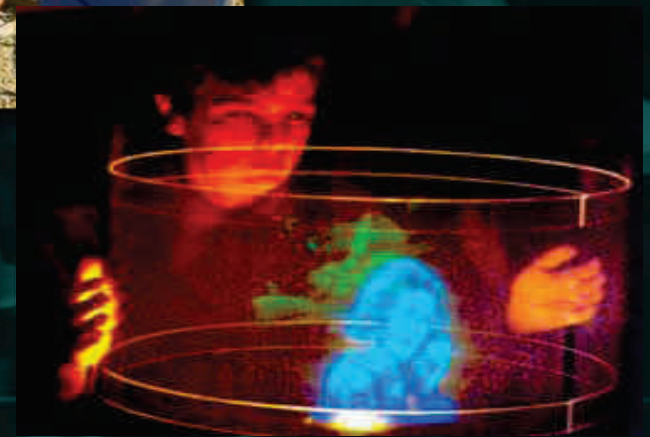
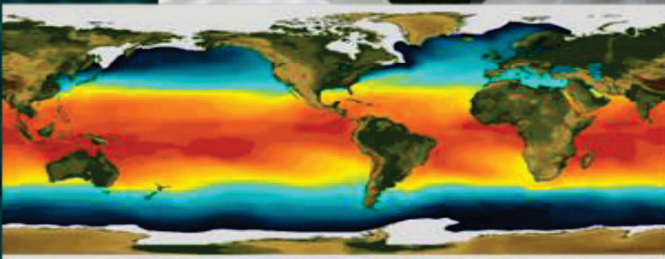
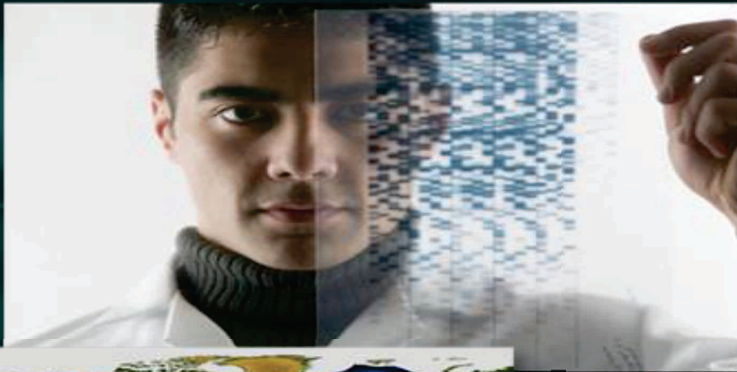


Pervasive Communications is the new paradigm

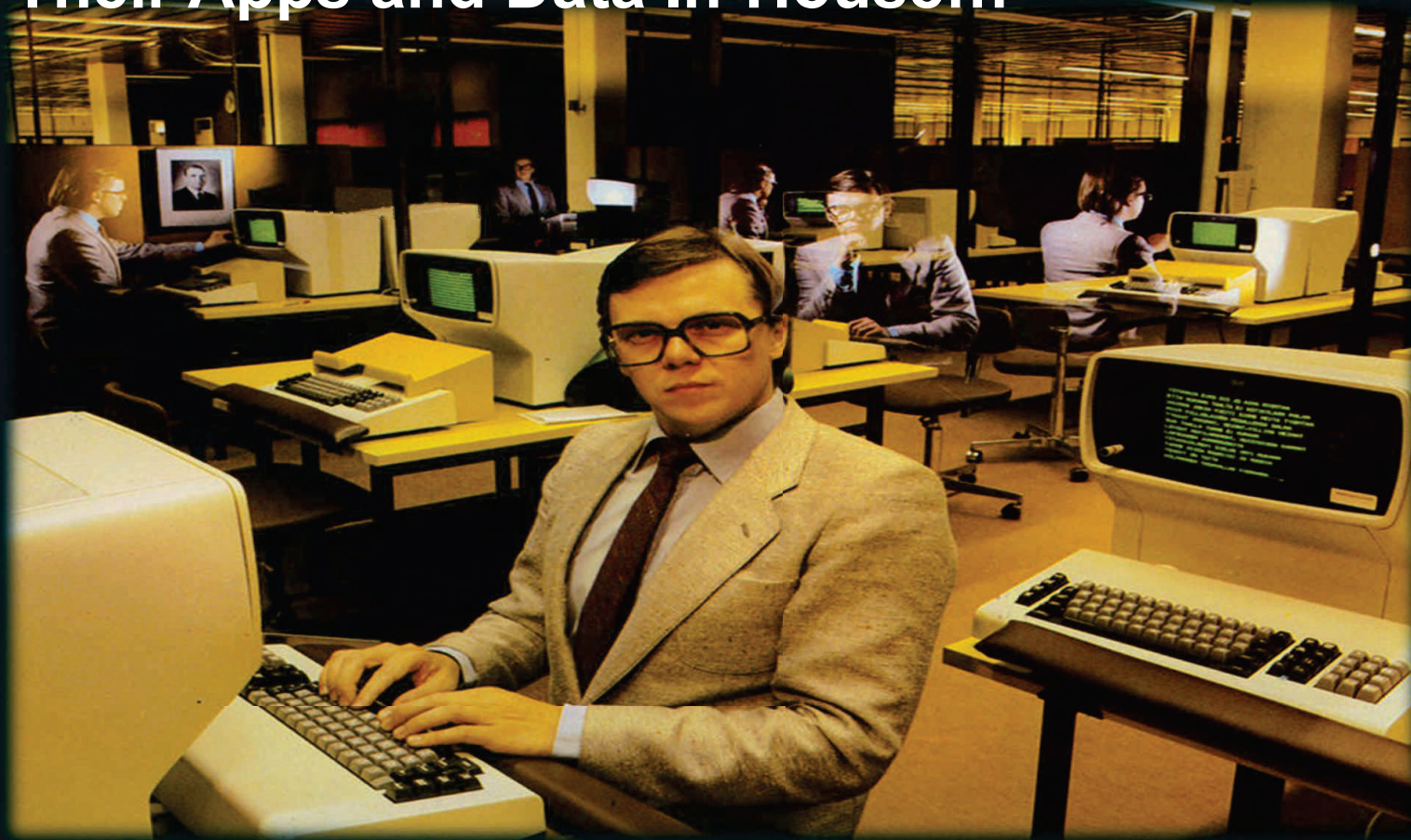
The Network Is Now Critical Infrastructure

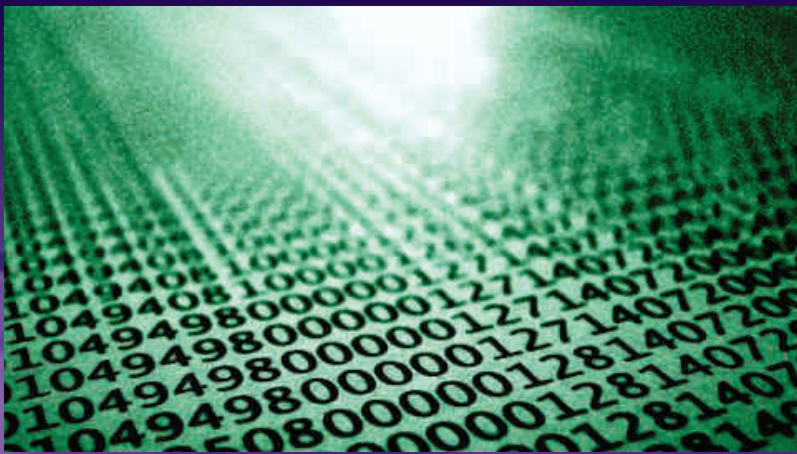


The Network: *The* Platform for Productivity and Innovation



Once Upon a Time, Organizations Managed Their Apps and Data In-House...







— The Ford Motor Company went down from **24 data centers to 2**

The California State University system went down from **dozens of data centers to 3**



Simplicity, Clarity, Lower Costs



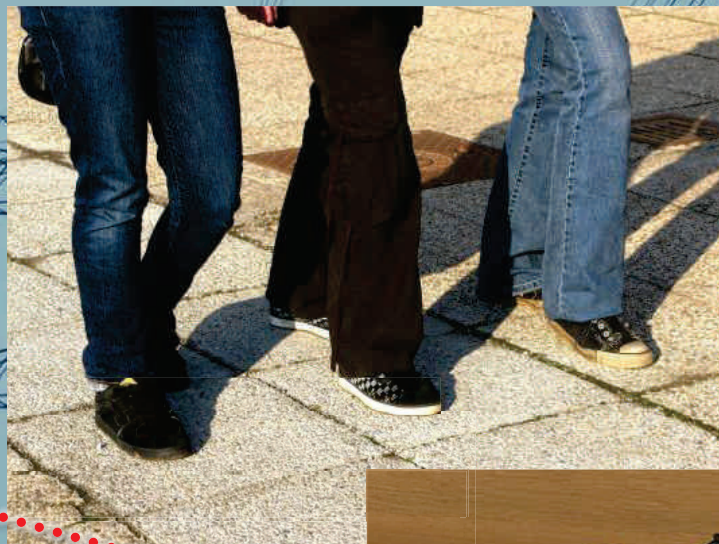
Seventy percent of corporate IT budgets is devoted to keeping existing systems running.



BYOD.... Big-time

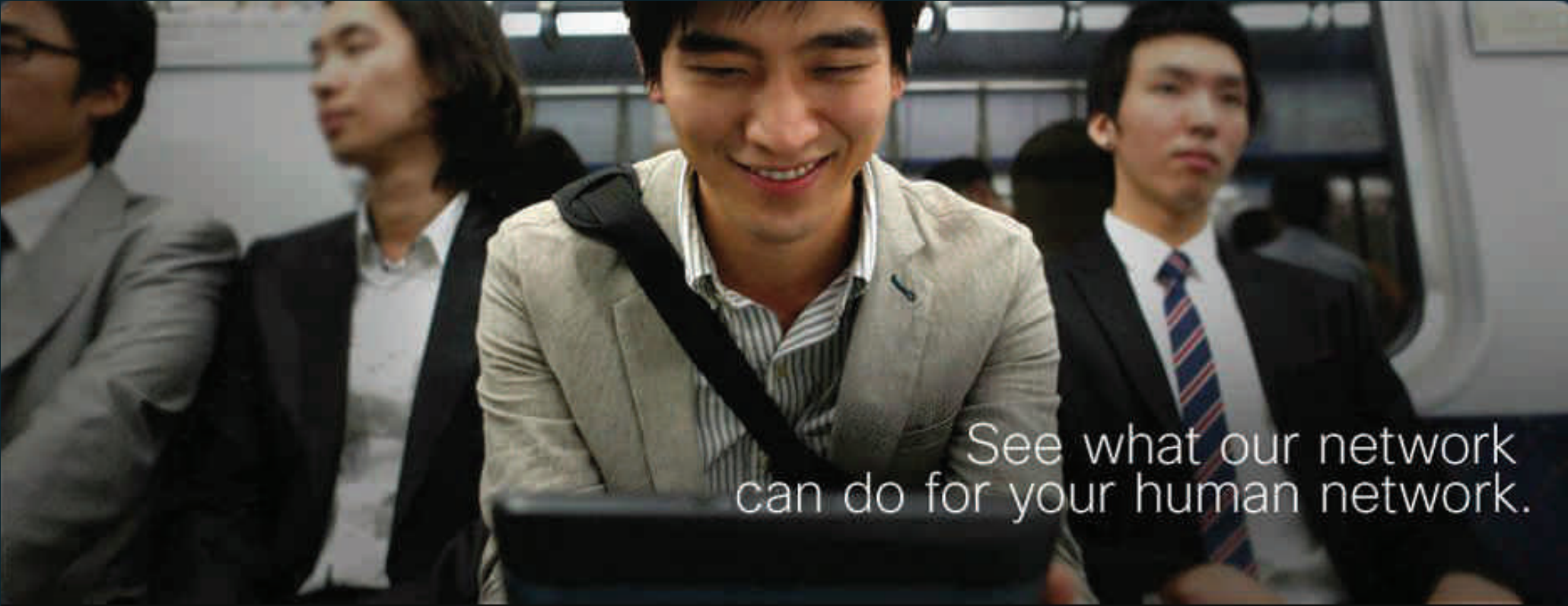


**By 2015, employees will
buy (and bring to work)
55 percent of business
devices in the workplace**

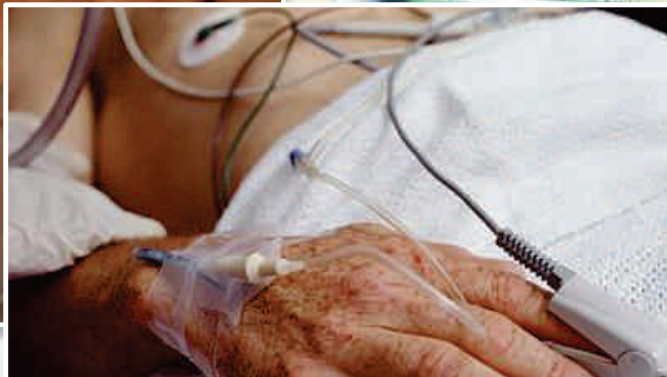
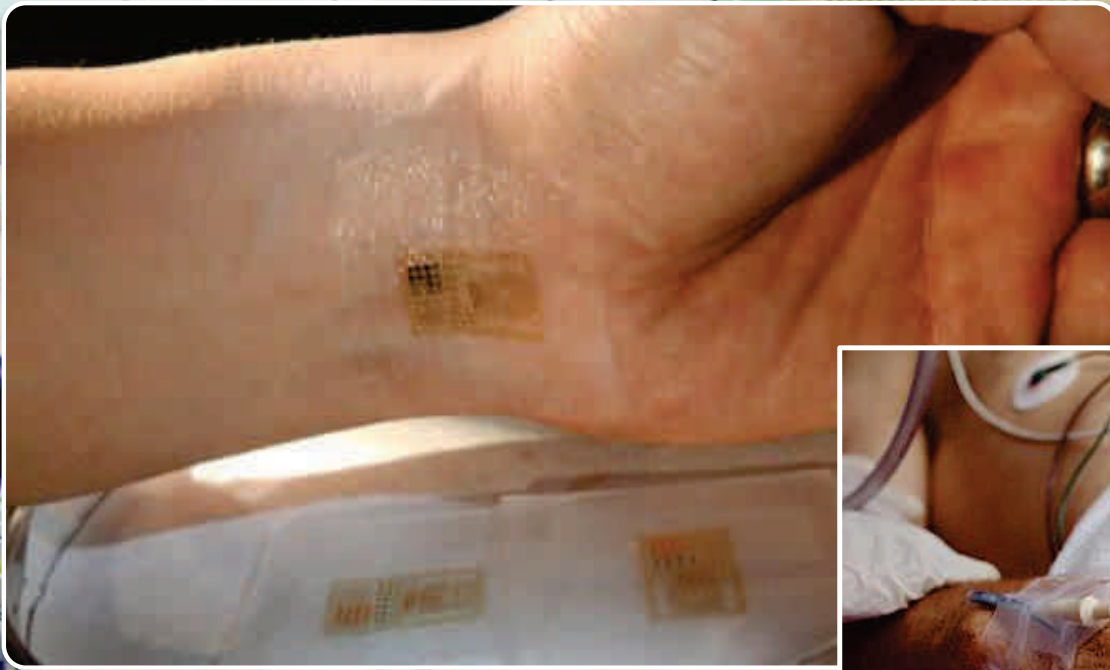




Queen's University Belfast is working on
"body-to-body" wireless networks



See what our network
can do for your human network.



Next: wearable electronic patches...
flexible, ultra-thin, skin-like



Teaching Geology Tomorrow

Visualizing Geology in the Field with Augmented Reality
by Bjørndal



Visualizing Geology in the Field with Augmented Reality
by tjelund



Visualizing Geology in the Field with Augmented Reality
by tjelund



**Norwegian University of
Science and Technology –
Trondheim**

From AR Overview website



BE READY STAY SAFE

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- [About Mines Rescue](#)
- [Virtual Reality Training](#)
- [Available Courses](#)
- [Course Schedule](#)
- [Contact Mines Rescue](#)
- [Photo Gallery](#)

Virtual Reality Training



Coal Services Pty Ltd has developed the most advanced real world simulator of its kind, exposing staff to dangerous situations that may be encountered in a hazardous environment.

Our Virtual Reality Training System is accurate and realistic, allowing staff to experience and respond to real hazards in a safe and controlled environment... before actually encountering them in the workplace.

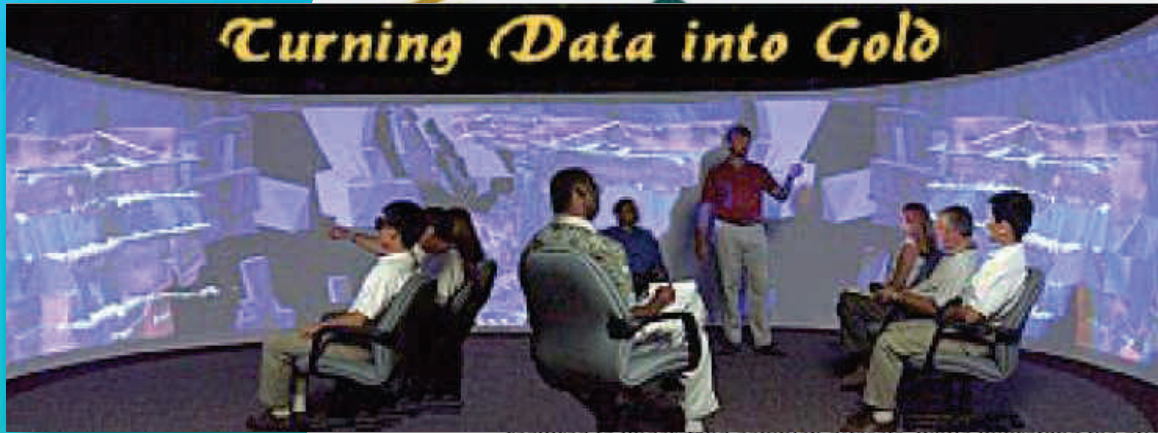
Simulation scenarios address core competency standards for workers in hazardous environments. This state of the art training tool is designed to give staff practical experience reducing risk.

Virtual Reality Training creates accurate and realistic virtual environments, where a trainee's response to the situation affects outcome. As such, it delivers the highest quality training and outcomes that could be life saving.

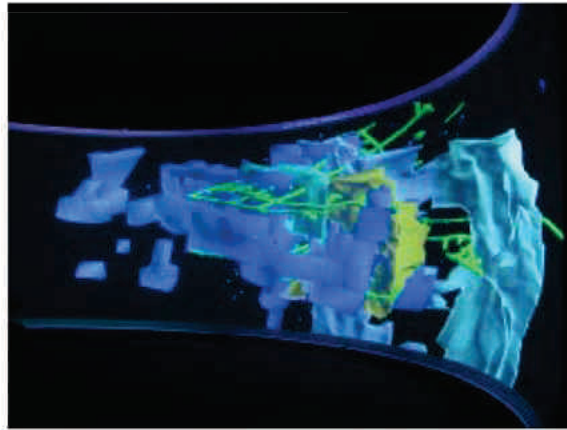
Reduce the risk of training in a dangerous environment, reduce overall training costs and build team cohesiveness and skill levels.

ADJUST YOUR FONT A- A+





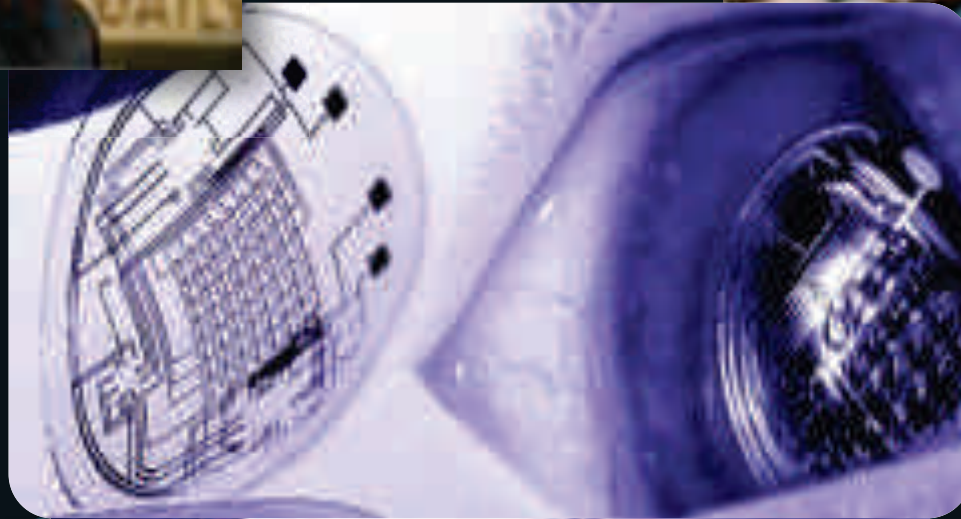
required to understand complex datasets, while improving the overall qual



Mixed Reality for Mixed Company



Michio Kaku
City College
of New York



Google's futuristic glasses move closer to reality

MICHAEL LIEDTKE, AP Technology Writer

Updated 10:21 p.m., Wednesday, June 27, 2012

VIEW: LARGER | **HIDE**

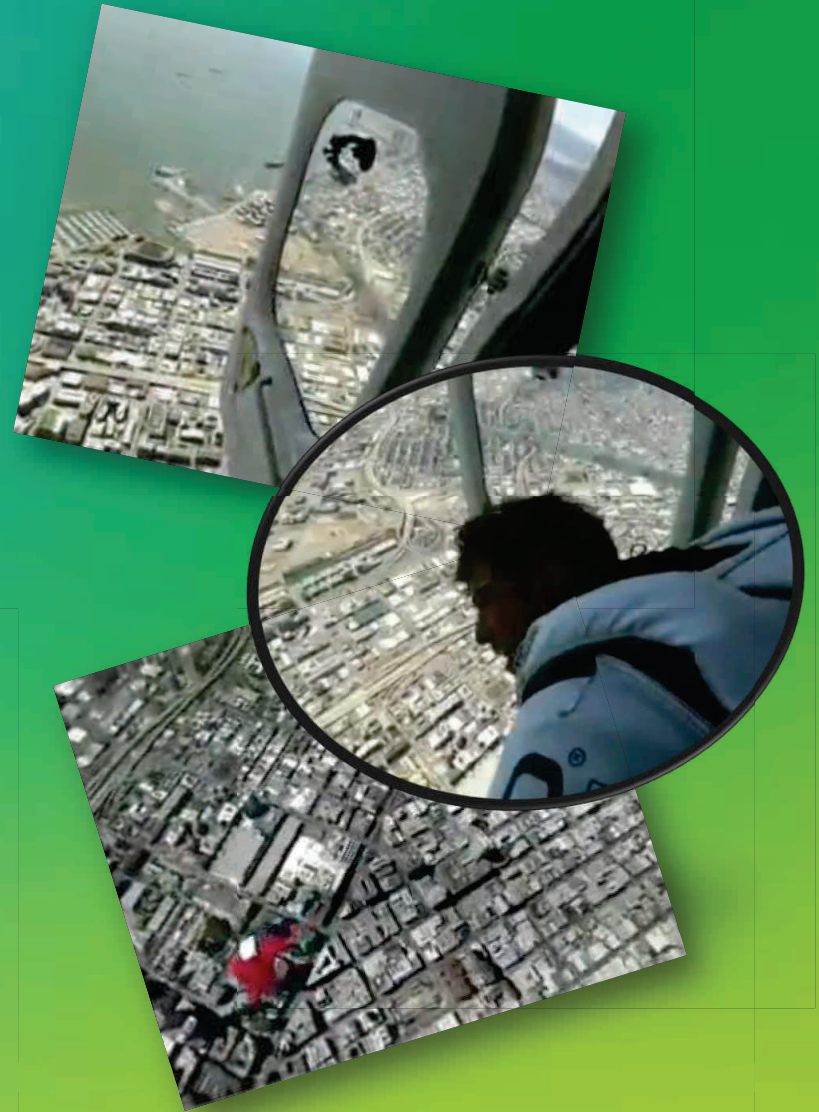
6 of 6

◀ PREV

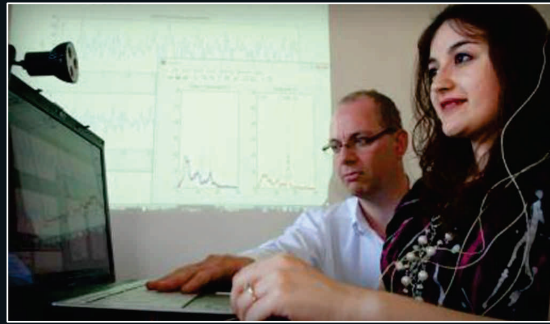
NEXT ►



Google co-founder Sergey Brin demonstrates Google's new Glass, wearable internet glasses, at the Google I/O conference in San Francisco, Wednesday, June 27, 2012. The audience got live video feeds from their glasses as they descended to land on the roof of the Moscone Center, the location of the conference. Photo: Paul Sakuma / AP

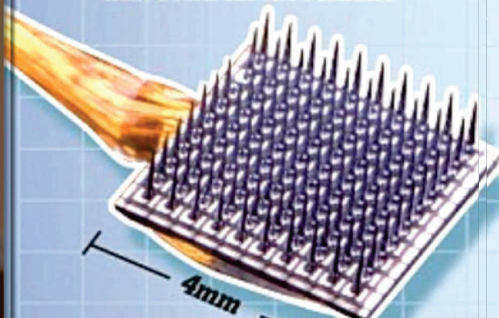


Human-Machine Interfaces

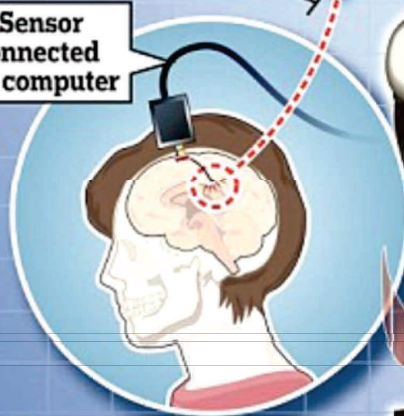


TURNING BRAIN WAVES INTO ACTION

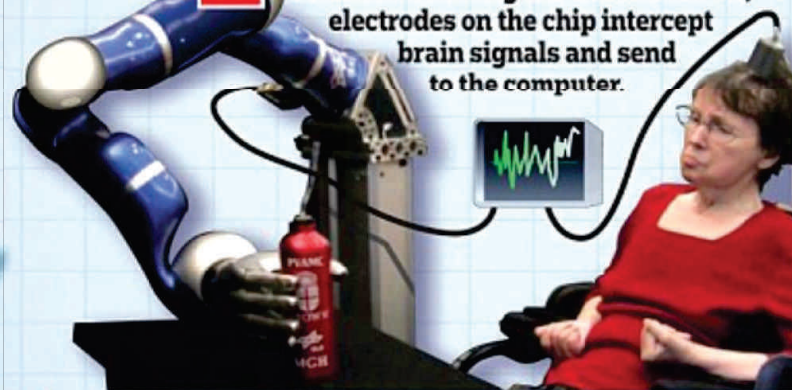
1 Cathy Hutchinson has tiny sensor with 96 electrodes implanted into area of brain that controls movement.



■ Sensor connected to computer

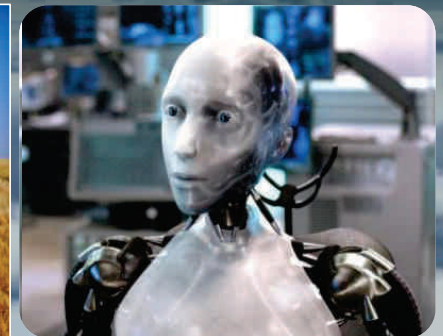


2 When she thinks about picking up the flask and drinking the coffee inside it, electrodes on the chip intercept brain signals and send to the computer.



3 Computer decodes signals and activates the motors needed to move the robotic arm, take the flask towards Miss Hutchinson's mouth and tilt it, allowing her to sip coffee through a straw... and smile in delight





Technological Change Is Exponential

During the 21st
Century we may
experience
20,000 years of
progress

Ray Kurzweil



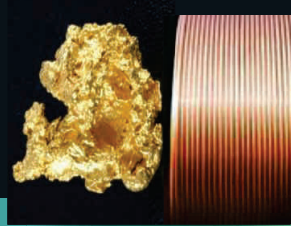
The Past 20,000 Years at a Glance



20,000 years ago



11,000 years ago



8,000 years ago



5,500 years ago







The world at seven billion

[What's your number?](#) | [How many more?](#) | [Seven stories](#) | [Population control](#) | [Is seven billion accurate?](#)

The world's population is expected to hit seven billion in the next few weeks. After growing very slowly for most of human history, the number of people on Earth has more than doubled in the last 50 years. Where do you fit into this story of human life? Fill in your date of birth below to find out.



1. DATE OF BIRTH



2. COUNTRY



3. GENDER



4. RESULTS

Where do you fit into 7 billion? Enter your date of birth to find out:

When you were born, you were the:

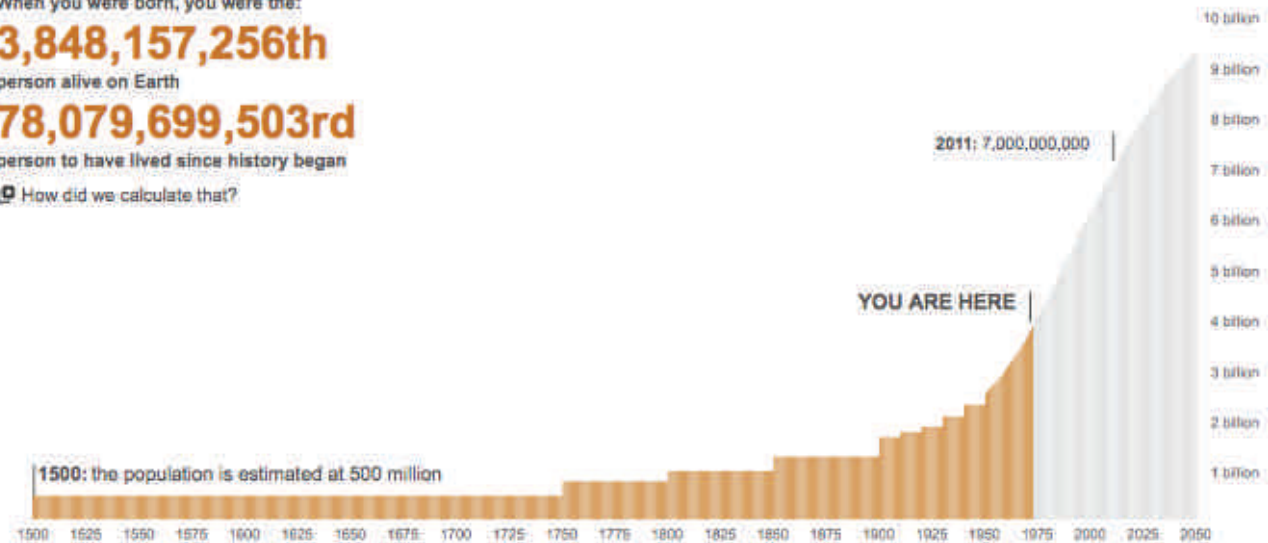
3,848,157,256th

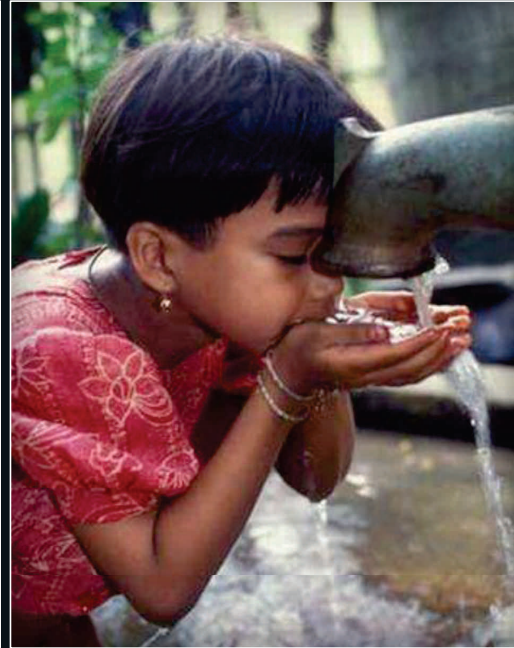
person alive on Earth

78,079,699,503rd

person to have lived since history began

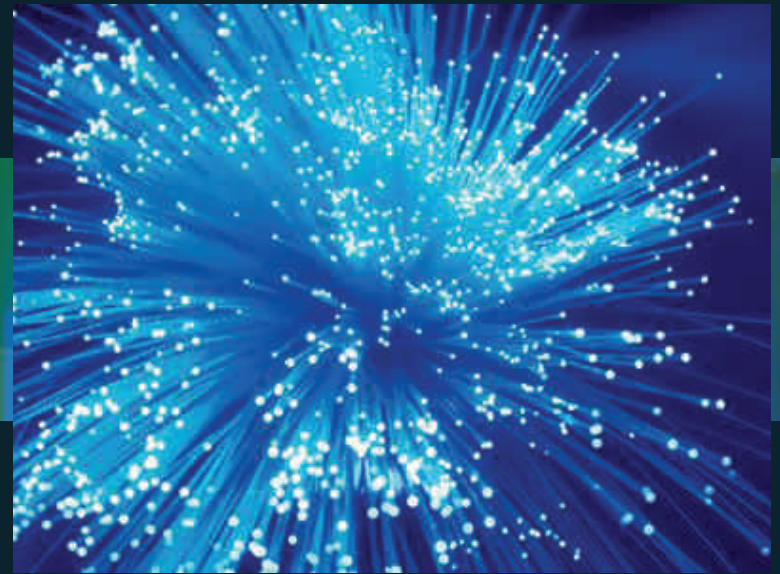
[How did we calculate that?](#)





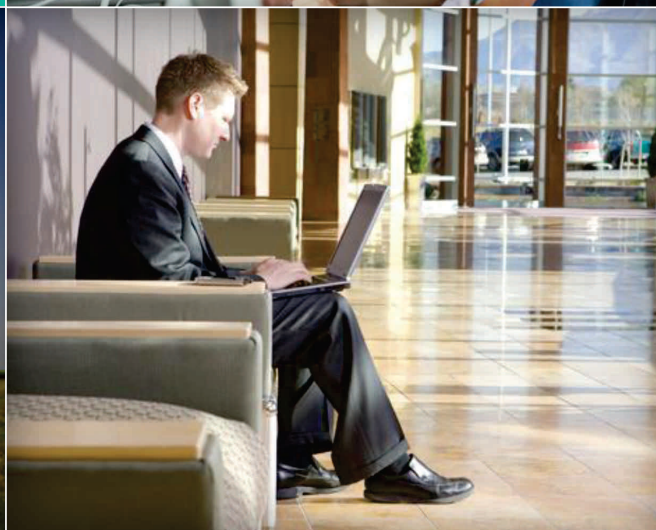
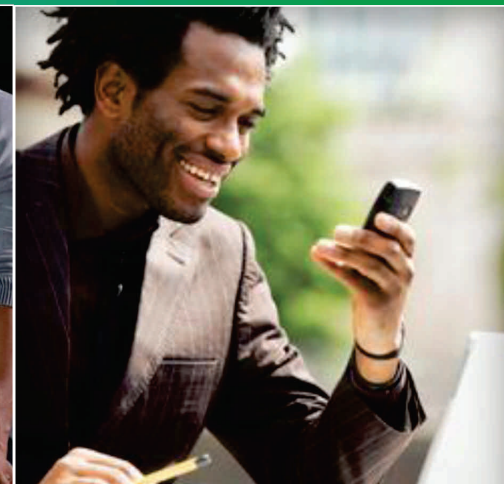
Broadband Is a Driver of Growth

A 10 percent increase in high-speed Internet access increases economic growth by 1.3 percent...



The World Bank
Economic Impacts of Broadband, June 2009

A U.S. study: For every \$1 invested in broadband infrastructure, local GDP goes up by \$10



The Benefits of Smart+Connected Communities

Over 20 years, a city of 5 million could experience...



Source: Connecting Cities: Achieving Sustainability Through Innovation, Nicola Villa and Wolfgang Wagener, Cisco IBSG

Why Productivity Matters

The background of the slide is a collage of various images showing people in different settings: a man looking at a laptop, a woman smiling, a man working at a computer, a woman in a library, a man in a classroom, and a woman in a workshop. The entire collage is overlaid with a semi-transparent blue filter. In the center, there is a white rounded rectangle containing the main text.

**Rapid Productivity Gains Can Raise
the Standard of Living for People
Around the World**

A man's REACH should
exceed his GRASP, or
what's a heaven for?

Robert Browning

