



THE CLOUD, THE CROWD, AND THE 3-D INTERNET: WHAT'S NEXT FOR COLLABORATION ONLINE



Michael R. Nelson
Visiting Professor, Internet Studies
Communication, Culture and Technology Program
Georgetown University
MNELSON@POBOX.COM



Outline

- Introduction
- Four technology trends
- Two predictions
- Three possible scenarios
- Five Implications for virtual worlds
- Lots of policy challenges



My Background

- B.S., geology, Caltech
- Ph.D., geophysics, MIT
- 1988 -- Congressional Science Fellow
- 4 years as Senator Gore's science advisor
- 4 years as IT policy guru at White House
- 1998-1999 -- Technologist at FCC
- 9+ years as IBM's Director, Internet Tech.
- Teaching at Georgetown since January, 2008
- Part of Obama campaign's tech policy team



50 Things I learned in Washington

LESSON #1

ALWAYS have a good bumper sticker



50 Things I learned in Washington

LESSON #3

To make a point, you need two good,
memorable “factoids”



50 Things I learned in Washington

LESSON #3

To make a point, you need two good,
memorable “factoids”

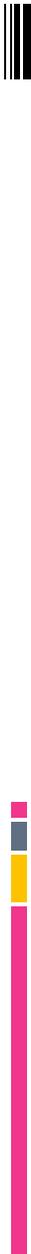
(preferably true)



50 Things I learned in Washington

LESSON #5

State your conclusions upfront



Conclusions

- We are entering the third phase of the Internet
 - As profound as the World Wide Web
 - The next 2-3 years will define the Next Generation Internet
- Standards and business practices are shaping the Net as much—or more—than law and regulation
- The Internet revolution is less than 15% complete
 - Number of users
 - Total bandwidth
 - Total amount of content
 - Number of devices
 - Number of applications



TREND #1 – Cloud Computing

Academic grids as a prototype of the cloud

Amazon, Google, Microsoft building huge data centers and offering online apps

Amazon's Elastic Compute Cloud

Gmail – “the entry drug for cloud users”

Flickr, YouTube

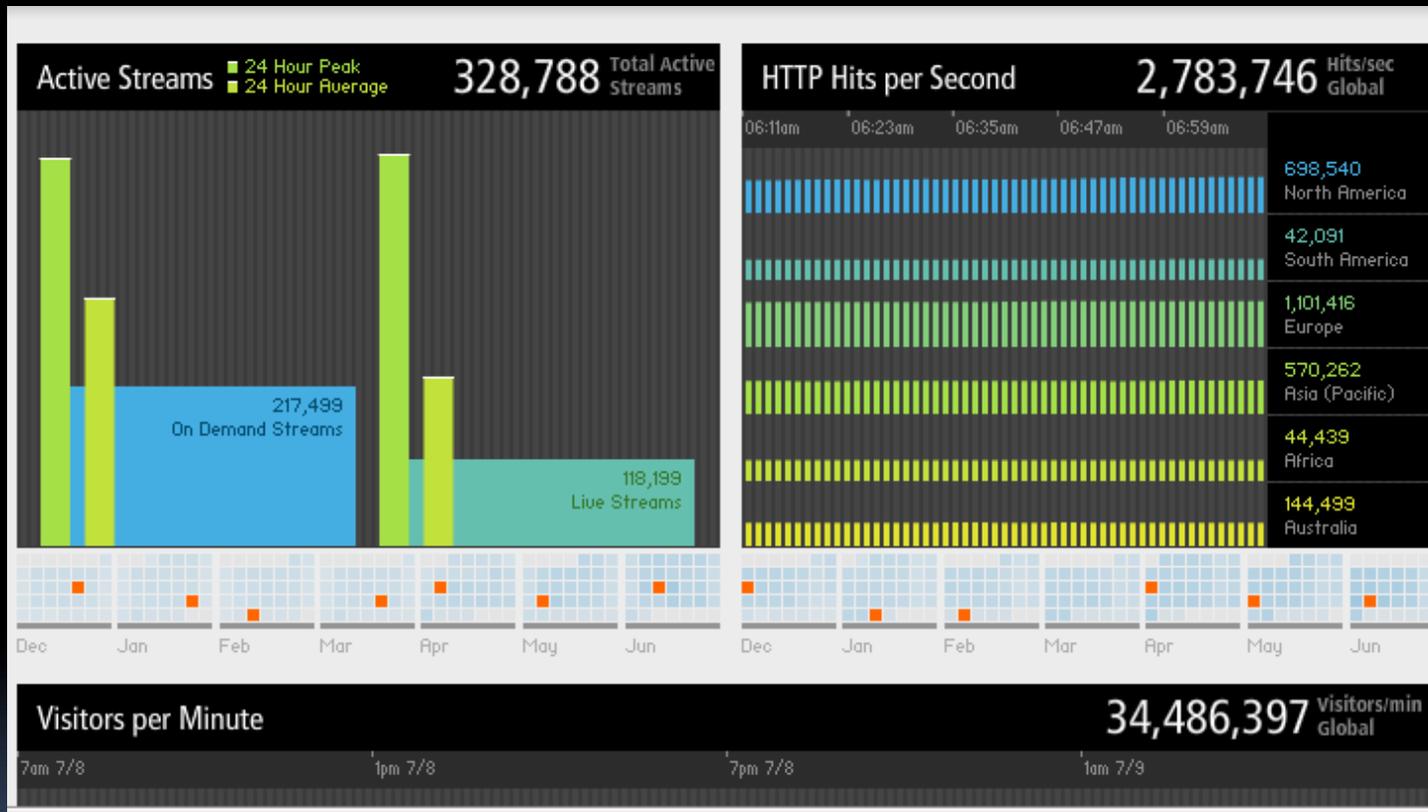
Online back-up

SalesForce.com

Akamai delivers 15-20 percent of Internet traffic

BOINC grids more powerful than supercomputers

Akamai - Visualizing the Internet



http://www.akamai.com/html/technology/visualizing_akamai.html

THE WALL STREET JOURNAL

WSJ.com

PAGE ONE | MARCH 26, 2009, 4:08 A.M. ET

The Internet Industry Is on a Cloud -- Whatever That May Mean

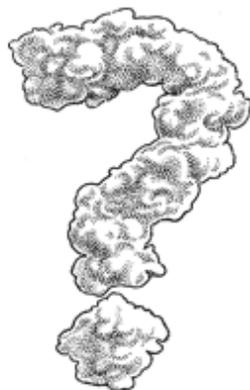
By GEOFFREY A. FOWLER and BEN WORTHEN

Ever since Google Inc. Chief Executive Eric Schmidt publicly uttered the term "cloud computing" in 2006, a storm has been gathering over Silicon Valley.

Companies across the technology industry are jockeying to associate themselves with clouds. Amazon.com Inc., better known for peddling books online, began selling an Elastic Compute Cloud service in 2006 for programmers to rent Amazon's giant computers. Juniper Networks Inc., which makes gear for transmitting data, dubbed its latest project Stratus. Yahoo Inc., Intel Corp. and a handful of others recently launched a research program called OpenCirrus.

While almost everybody in the tech industry seems to have a cloud-themed project, few agree on the term's definition.

"I have no idea what anyone is talking about," said Oracle Corp. Chief Executive Larry Ellison, when talking about cloud computing at a financial analyst conference in September. "It's really just complete gibberish. What is it?" He added: "When is this idiocy going to stop?"



In its broadest sense, cloud computing describes something apparent to anybody who uses the Internet: Information is stored and processed on computers somewhere else -- "in the clouds" -- and brought back to your screen.

But no two clouds, apparently, are alike. A company's backroom mass of servers and switches is cloudlike. So are social-networking sites like Facebook Inc., or the act of buying a book on Amazon. Some clouds, like Google's email service, Gmail, are public. Others, like corporate networks, are closed to outsiders.

Part of the problem, say observers, is that the tech industry has become bogged down in jargon. Companies have long pushed the likes of "network-distributed parallel processing," often packaged as "solutions" that are "end-to-end" and "scalable." Cloud sounds much nicer.



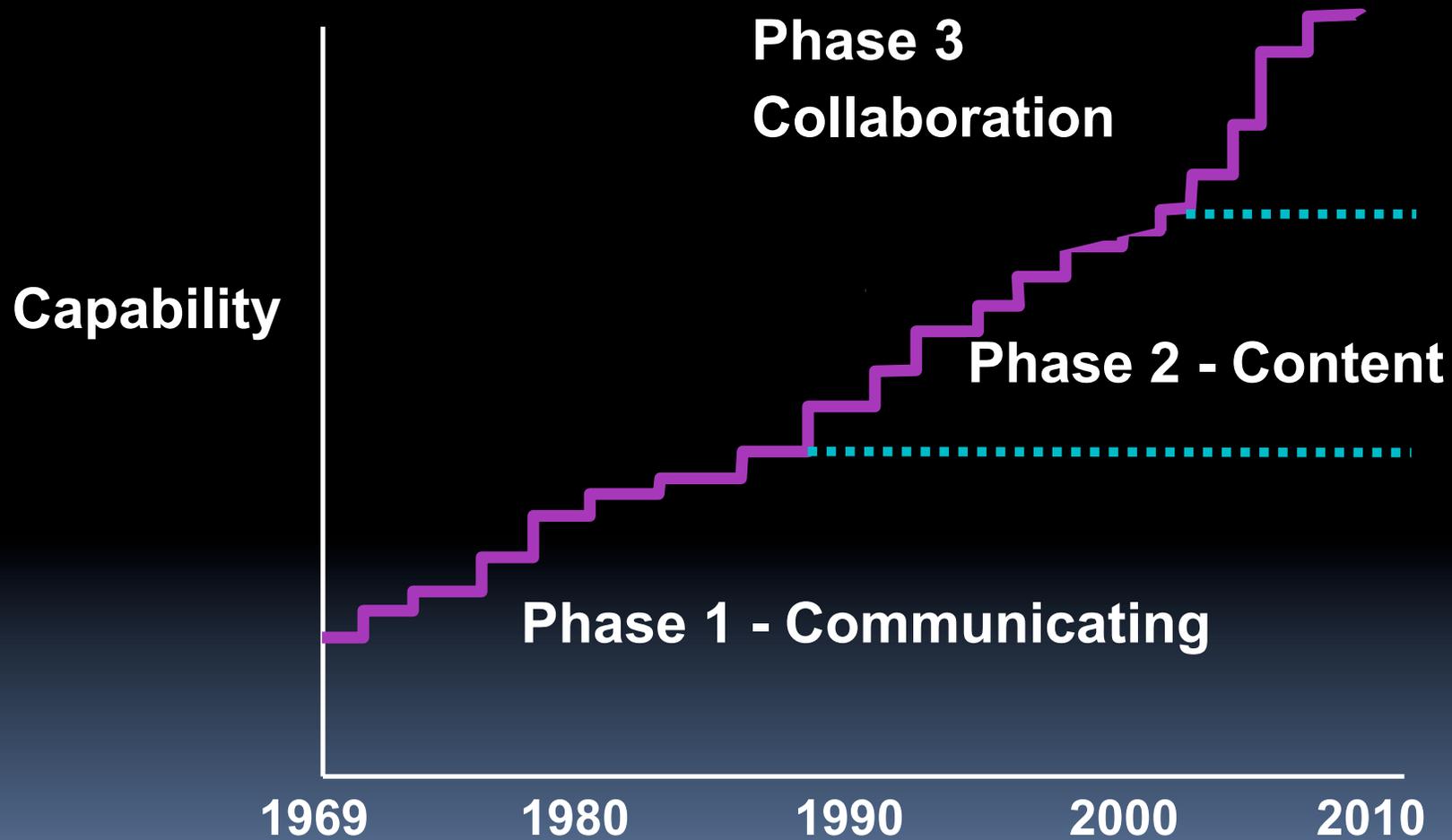
TREND #1 – Cloud Computing

Why it matters:

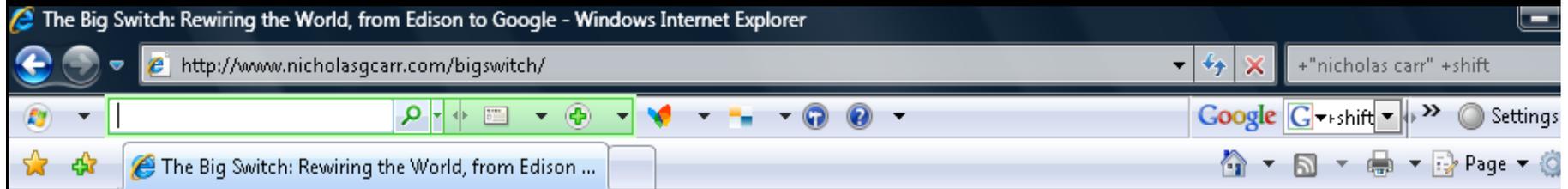
This is the 3rd phase of the Internet

This is the 3rd phase of COMPUTING

The Third Phase of the Internet



“The Big Switch” by Nicholas Carr



nicholas g carr



Excerpts:
["Where did the computer go?"](#)
["Among the dynamos"](#)
["A spider's web"](#)

THE BIG SWITCH

a Wall Street Journal bestseller

His last book shook up the high-tech industry. Now, Nicholas Carr is back with The Big Switch, a sweeping and often disturbing look at how a new computer revolution is reshaping business, society and culture.

A hundred years ago, companies stopped generating their own power with steam engines and dynamos and plugged into the newly built electric grid. The cheap power pumped out by electric utilities didn't just change how businesses operate. It set off a chain reaction of economic and social transformations that brought the modern world into existence. Today, a similar revolution is under way. Hooked up to the Internet's global computing grid, massive information-processing plants have begun pumping data and software code into our homes and businesses. This time, it's computing that's turning into a utility.

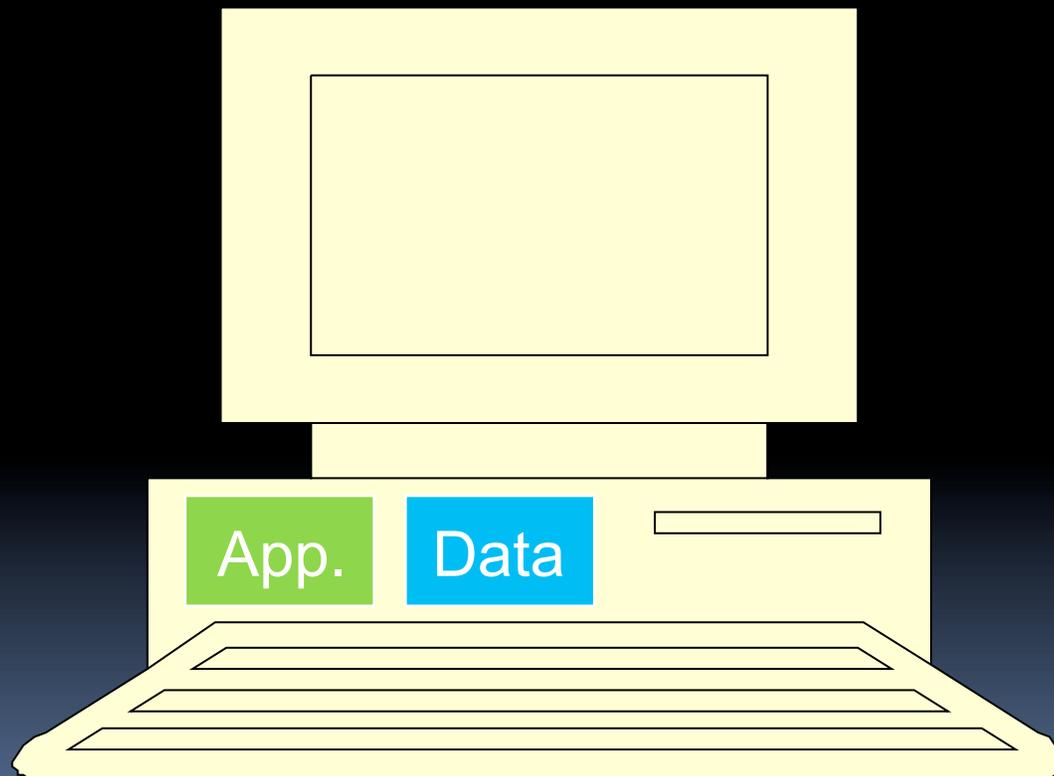


This is a VERY big deal

Gartner Says Cloud Computing Will Be As Influential As E-business

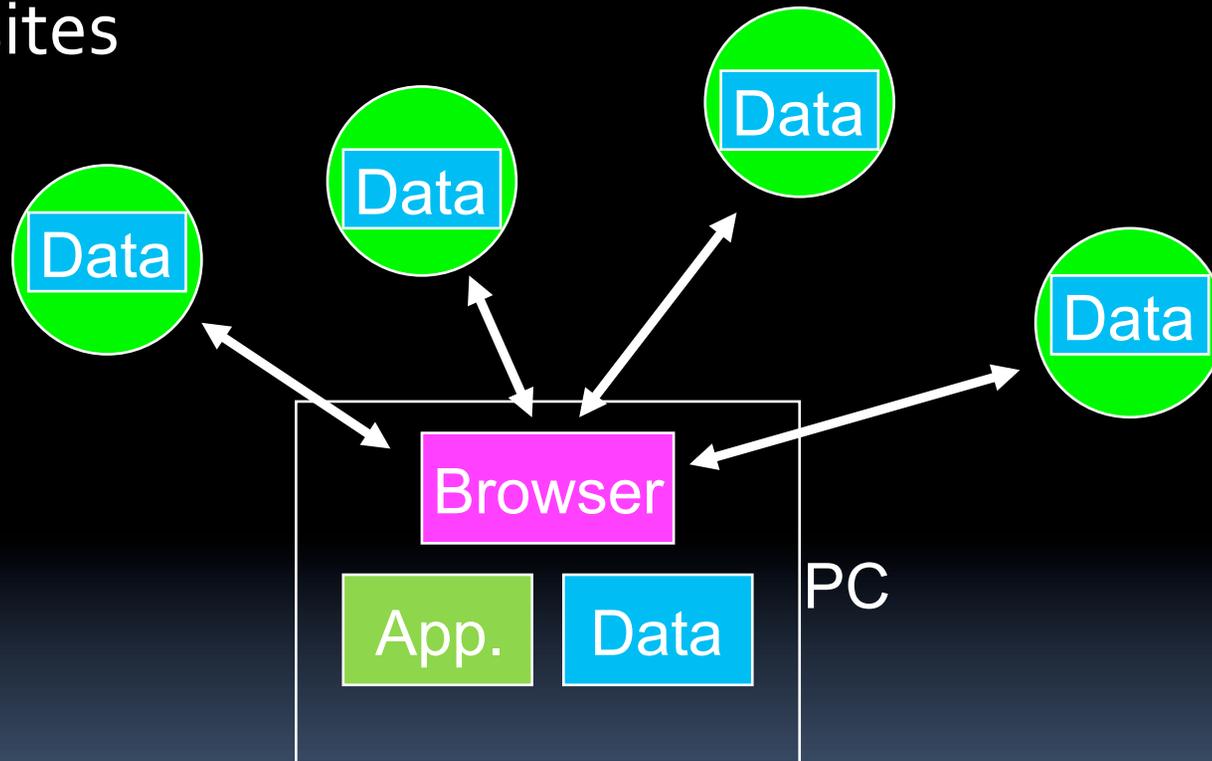
Special Report Examines the Realities and Risks of Cloud Computing (June 26, 2008)

Phase One – Stand Alone Computer

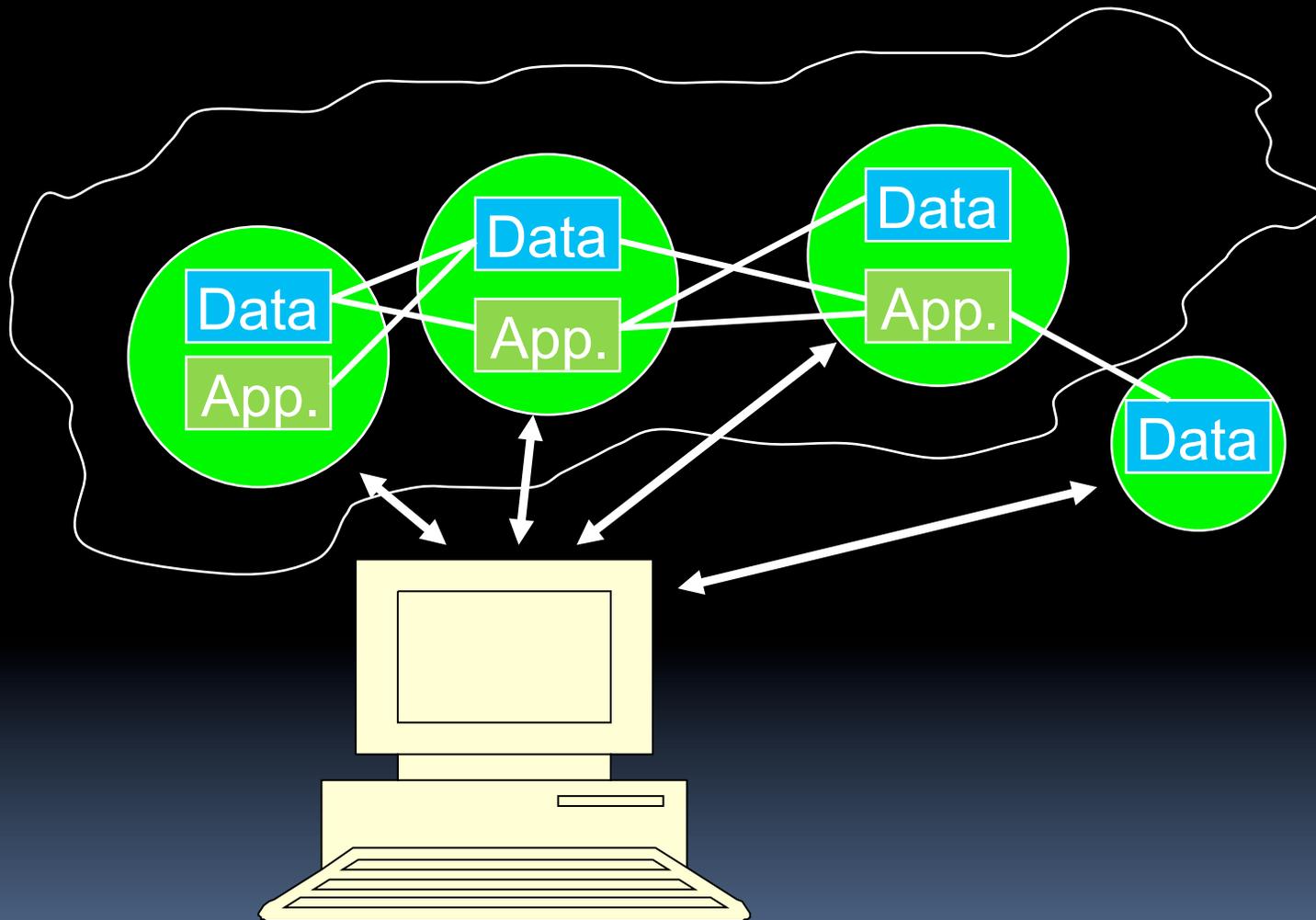


Phase Two – The Web

Web sites



Phase Three – The Cloud





TREND #2 – Internet of Things

Why it matters:

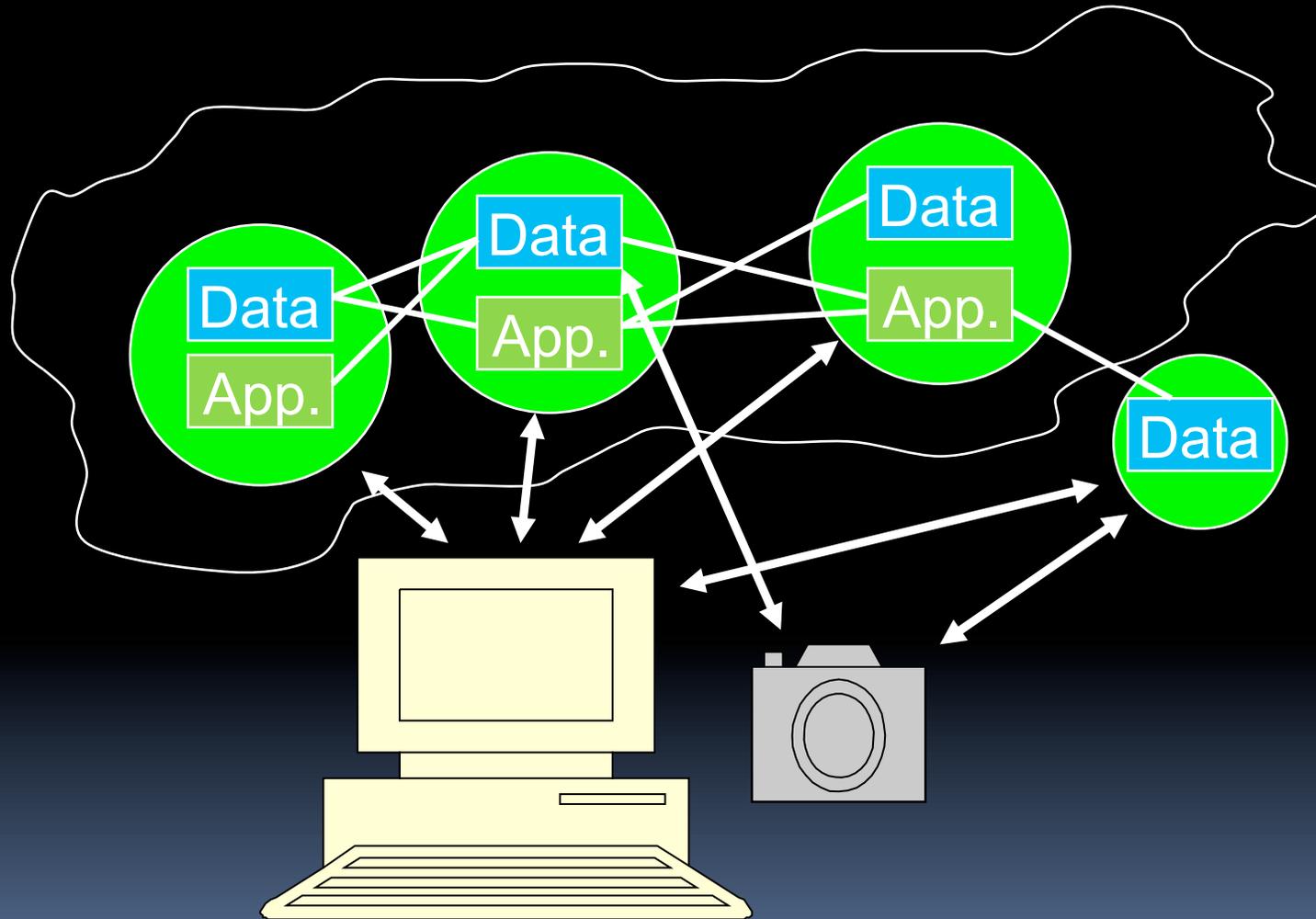
100 billion devices, not just 1.4 billion PCs

Impacts?

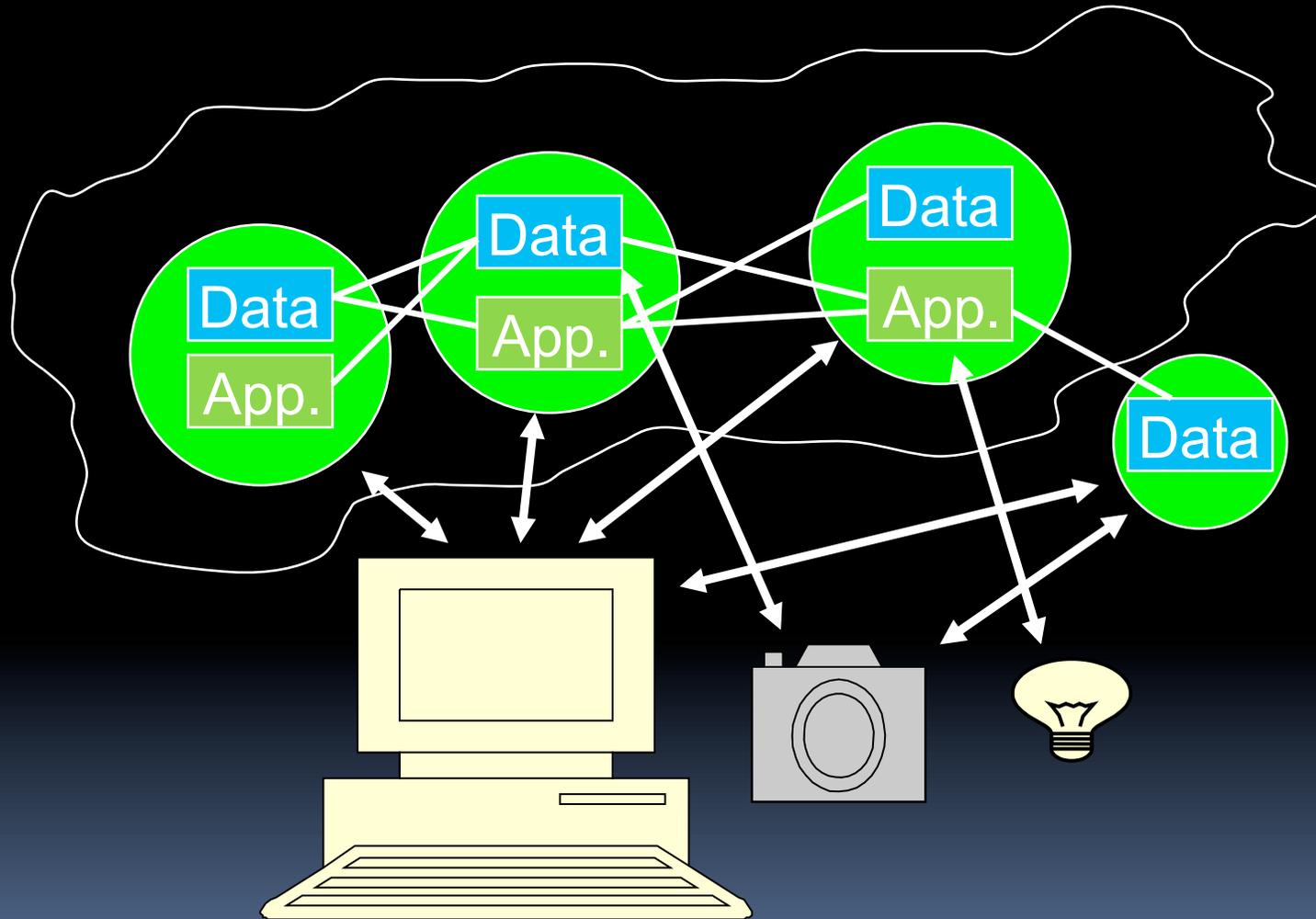
Increased demand for ubiquitous wireless

New uses for the Cloud

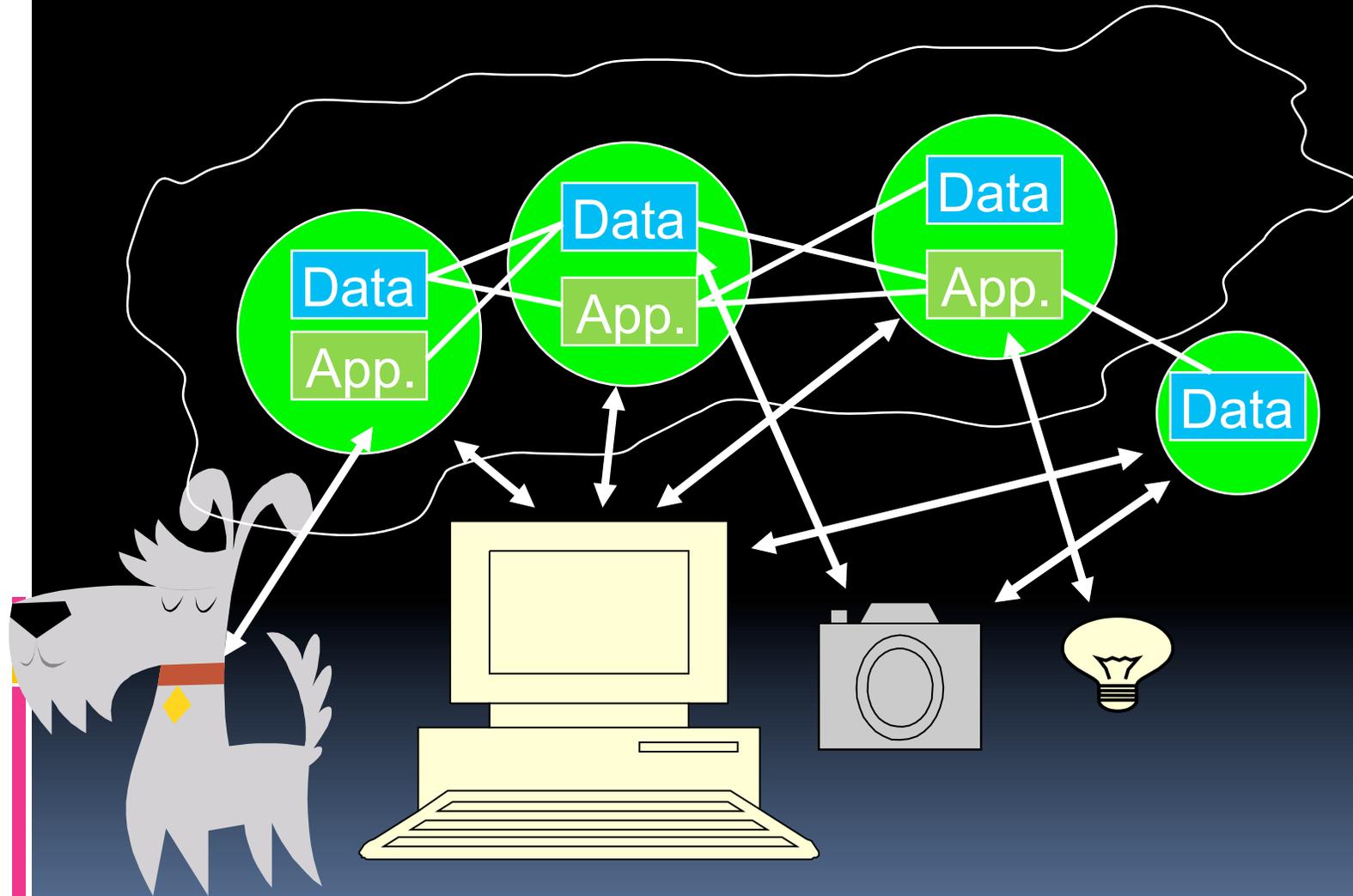
The Cloud + The Internet of Things



The Cloud + The Internet of Things



The Cloud + The Internet of Things





TREND #3 – Social Media

Web 2.0 buzz

Twitter, Facebook, YouTube, MySpace



TREND #3 – Social Media

Web 2.0 buzz

Twitter, Facebook, YouTube, MySpace

Does it matter?

Web 2.0 is so over. (Fortune, Jan. 8, 2009)

“Financially speaking, Web 2.0 has been a total bust.”



TREND #3 – Social Media

YES, it matters

Facebook, Twitter becoming platforms for
communication and collaboration
replacing e-mail

spurring innovation

Giving users one more very big reason to
stay connected everywhere, all the time.



TREND #3 – Social Media

YES, it matters (cont.)

It got Obama elected!!

Our first Internet President

“How Obama REALLY did it,” Sept.-Oct.
2008 issue of MIT’s Technology Review



Politics in virtual worlds

- Obama created campaign office in Second Life in March, 2008
- Obama Fest '08 organized by Obama's Second Life supporters in September, 2008

Obama in Second Life, March 2008

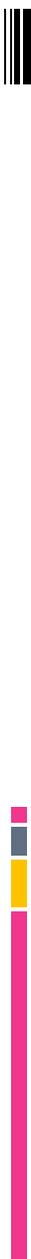
Barack Obama in Second Life



Obama campaign office

Barack Obama in Second Life





TREND #4 – Internet Video

Warner Brothers, Fox offer TV shows
(including “Desperate Housewives” on the
Internet

Apple’s iStore selling movies online



TREND #4 – Internet Video

Warner Brothers, Fox offer TV shows
(including “Desperate Housewives” on the
Internet

Apple’s iStore selling movies online



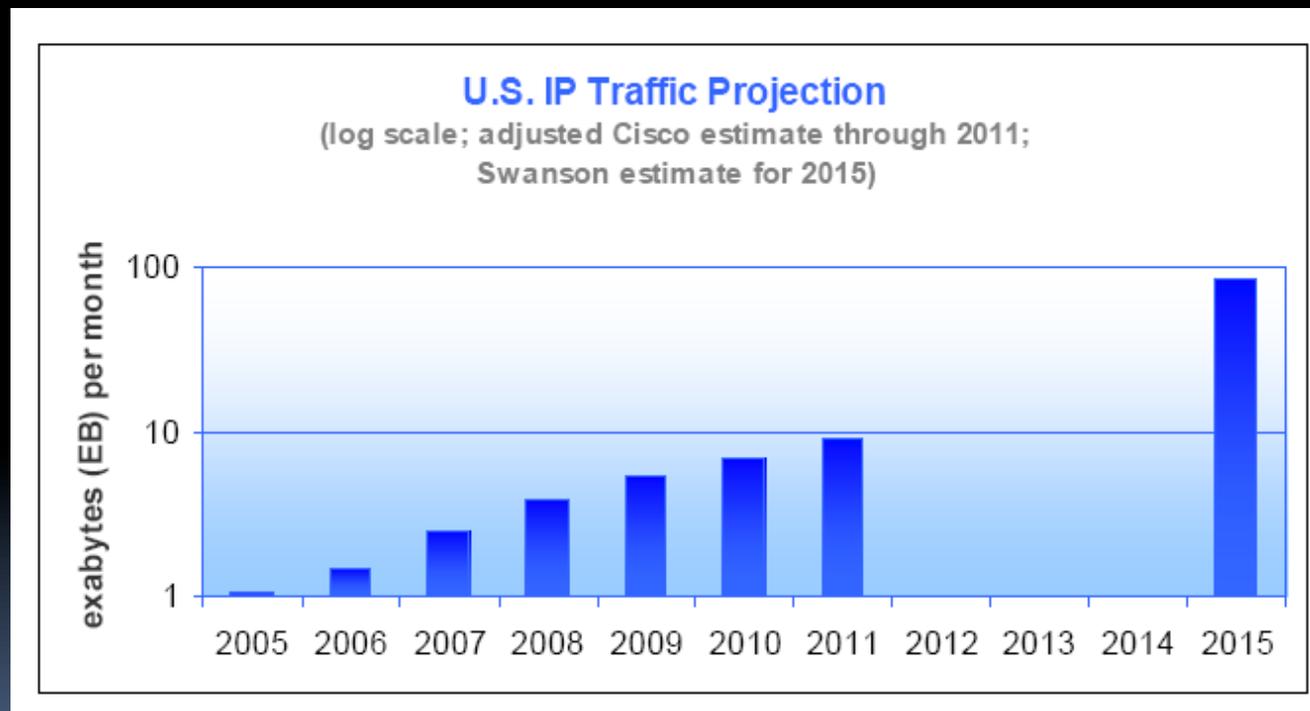
Impacts?

Amateur and illegal video everywhere!

98% of all traffic in 1 year (Hui Zhang, CMU)

Estimating the Exaflood

(Swanson and Gilder, 2008)



What's in the Exaflood?

Rough estimate of annual U.S. IP traffic, by application, circa 2015

Movie downloads and P2P	100 exabytes
Video calling and virtual windows	400 exabytes
“Cloud” computing / remote backup	50 exabytes
Internet video, gaming, virtual worlds	200 exabytes
Non-Internet “IPTV”	100 exabytes, or more
Business IP traffic	100 exabytes
Other (phone, Web, e-mail, photos, music)	50 exabytes
total	1,000 exabytes = 1 zettabyte



BIG, Hairy Audacious Prediction #1

Within 5 years, 80% of all computing and storage done worldwide could happen “in the cloud”



BIG, Hairy Audacious Prediction #1

Within 5 years, 80% of all computing and storage done worldwide could happen “in the cloud”

(But it might take 10 years)



BIG, Hairy Audacious Prediction #2

Within 5 years, 100 BILLION devices
and sensors could be connected to
the Net



Not-quite-so-audacious Prediction #2

Within 10 years, 100 BILLION devices
and sensors will be connected to
the Net



Why Not?

- Technical
 - Agreement and adoption of key standards
 - IPv6, DNSsec, IPsec, Grid standards
- Business practices
 - Cooperation around open standards vs. proprietary lock-in; open source software
- Culture
 - Users have to learn to “trust the cloud”
 - CIOs and their teams have to adapt to new roles
- Policy



GOVERNMENTS' FIRST CHALLENGE

- How to be an early adopter of new technologies?
(such as Cloud computing, virtual worlds, sensors)



GOVERNMENTS' FIRST CHALLENGE

- How to be an early adopter of new technologies?
(such as Cloud computing, virtual worlds, sensors)
- To do list:
 - Fix procurement
 - Move to open standards
 - Explore open source software
 - Address security
 - Change culture and reorganize



Three Possible Futures

1. The Clouds Scenario
2. The Cloudy Skies Scenario
3. The Blue Skies Scenario

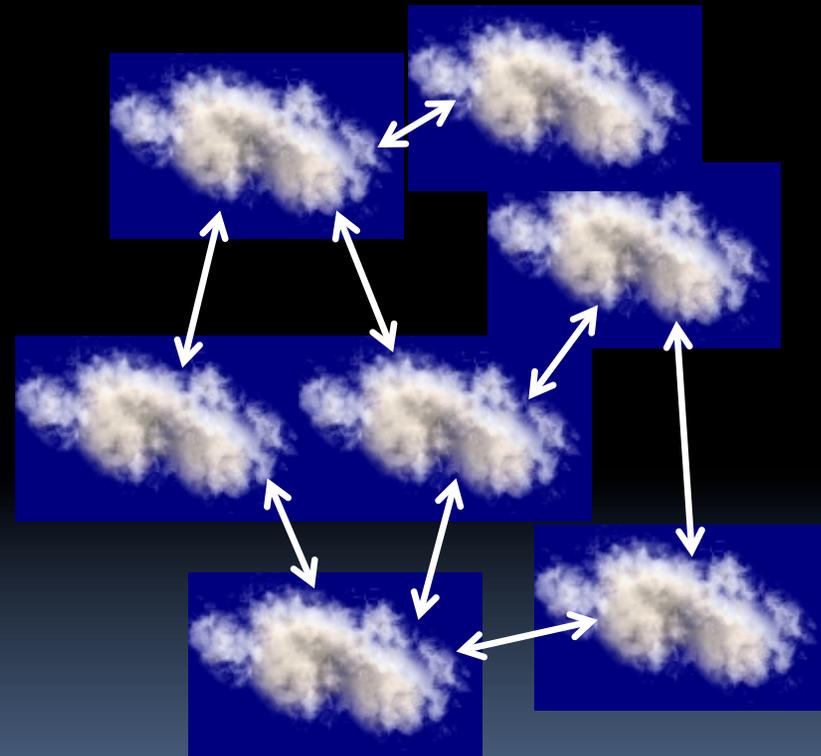
The Clouds Scenario

- Different, distinct, proprietary clouds
- Non-interoperable standards
- The cable television network business model; bottlenecks and monopolies



The Cloudy Skies Scenario

- Distinct clouds
- Interconnected
- Cloud applications aren't interoperable
- Little common middleware (e.g. no single sign-on)
- Lots of missed opportunities



Blue Skies Scenario

- A “cloud of clouds” like the network of networks
- Truly interoperable clouds services
- “Mix and match”
- Common middleware
- Seamless
- Almost infinite opportunities



Sky's the Limit!!

Implications for Virtual Worlds?

- Far cheaper computing resources leading to:
 - More realistic worlds
 - More sophisticated physics engines
 - Easier-to-use tools
- Sensors + camera = “Second Earth”
- Virtual worlds will help drive the exaflood
- Virtual worlds could help bring the different pieces of the cloud together >> Blue Skies
- Virtual worlds will be in the vanguard of effort to address new Cloud policy challenges



Areas of concern

- Open standards
- Intellectual property
- Wiretapping and electronic surveillance
- Consumer protection
- Contract issues and rules of incorporation for businesses in virtual worlds
- Taxation and Tariffs
- Security, identity, and trust



Open Standards

THE TOUGH QUESTIONS:

- Will virtual worlds interconnect, allowing content and avatars to move from one world to another?
- How much interoperability is needed, desirable?
- Do governments have a role to play in fostering open standards?



Intellectual property

THE TOUGH QUESTIONS:

- What is fair use in a virtual world?
- Which nation's IPR laws apply?



Wiretapping and Electronic surveillance

THE TOUGH QUESTIONS:

- Under what conditions can a law enforcement agency gain access to a Second Life user's data?
- How should and when could a user's activities be monitored?
- Which national laws apply?



Consumer Protection

THE TOUGH QUESTIONS:

- Are the terms of the user's contract enough or is government regulation needed?
- How could national consumer protection laws apply to virtual worlds?
- "Out of world" transactions (on eBay, etc.)



Contract issues and rules of incorporation

THE TOUGH QUESTIONS:

- How to incorporate a company whose employees and board never meet?
- How to deal with a virtual, ever-changing work force?
- Enforcement?



Taxation and Tariffs

THE TOUGH QUESTIONS:

- Which tax regime should apply?
- When should the tax be collected?
- Who's going to do the necessary paperwork?
- Where is a virtual product created?



Security, identity, and trust

THE TOUGHEST QUESTIONS:

- How much anonymity?
- Is identity and reputation transferable between worlds?
- Who sets standards for accuracy/validity?
- Will federated identity systems evolve?
- Governments' role?

Emerging Issues (e.g. cyber-adultery)

Is This Man Cheating on His Wife? (Wall Street Journal, Aug. 10, 2007)



Janet Spielman

Controlled By



Tenaj Jackalope

Married To



Dutch Hoorenbeek

Controlled By



Ric Hoogestraat

Married To

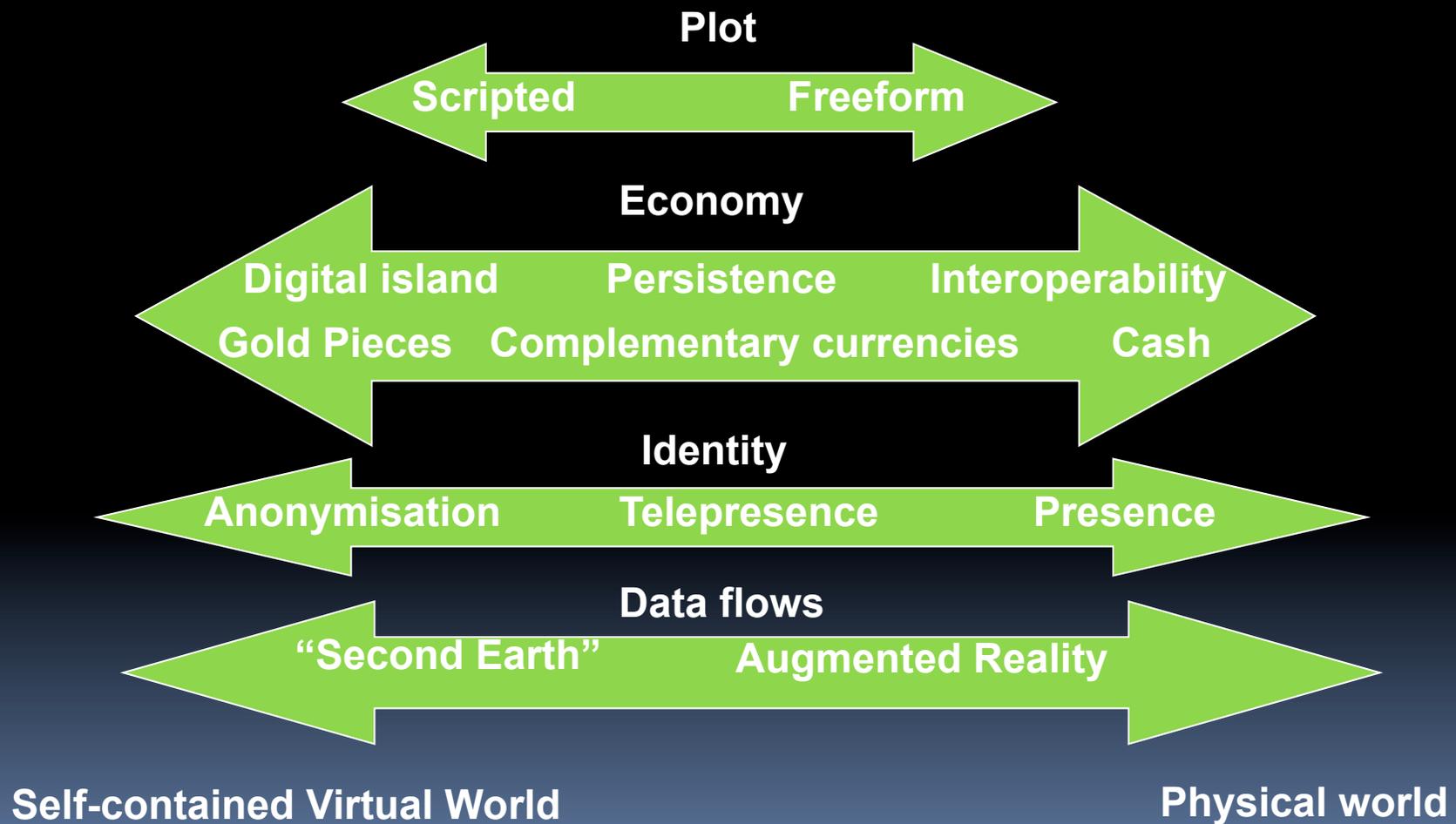


Sue Hoogestraat



Virtual World and 3D Internet

Evolution and Categorization (Chris Francis, IBM, 2007)



Four Scenarios

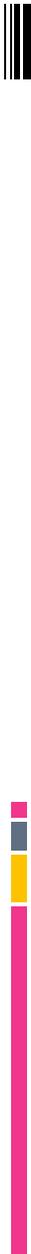
(Viktor Mayer-Schoenberger and John Crowley, 2006)

- 1) Virtual world providers will serve as regulators by enforcing the terms of their contracts with users to prevent cyber-fraud and ensure proper behavior
- 2) Governments could try to block their citizens from using virtual worlds that don't abide by government restrictions and regulations (although this will never be 100% effective, just as governments have not been able to completely block access to Web sites)
- 3) Government may try to minimize the real-world impact of virtual worlds by, for instance, banning the sale of virtual goods for real-world currency
- 4) "Real-World Assisted Virtual World Self-Governance"



Conclusions

- New virtual worlds will spawn new policy challenges
- The 3-D Internet, just like the Web, will fundamentally challenge business models and regulatory models
- Lots of need for lawyers and policy makers who understand virtual worlds
- There's a serious lack of good data on what's happening in virtual worlds
- Virtual worlds like Second Life will provide instructive test cases for addressing policy problems in the "cloud," the evolving distributed IT infrastructure



Conclusions

- The Internet Revolution is less than 15% complete
- The Internet Revolution will be as disruptive as the printing press, but:
 - Much faster
 - Totally global
 - More unpredictable
- When in doubt, empower the user!