

# The Distributed Future

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National Science Digital Library

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**Pew Internet**

Pew Internet & American Life Project

**PewInternet.org**



# Apology



# THE CHRONICLE

of Higher Education

St

we need a tshirt, "I survived the keynote disaster of 09"

it's awesome in the "I don't want to turn away from the accident because I might see a severed head" way

Too bad they took my utensils away w/ my plate. I could have jammed the butter knife into my temple.

November 1

**Confe**  
**Back**

*By Marc*

**Tweckl**

*he/sh*

Con

T

And you m

# The internet is the change agent

## Then and now

2000

46% of adults use internet

5% with broadband at home

<20% watch video online

53% own a cell phone

0% connect to internet wirelessly

<10% use “cloud”

0% tech social network users

= slow, stationary connections  
built around my computer

2010

74% of adults use internet

65% with broadband at home

>55% watch video online

85% own a cell phone

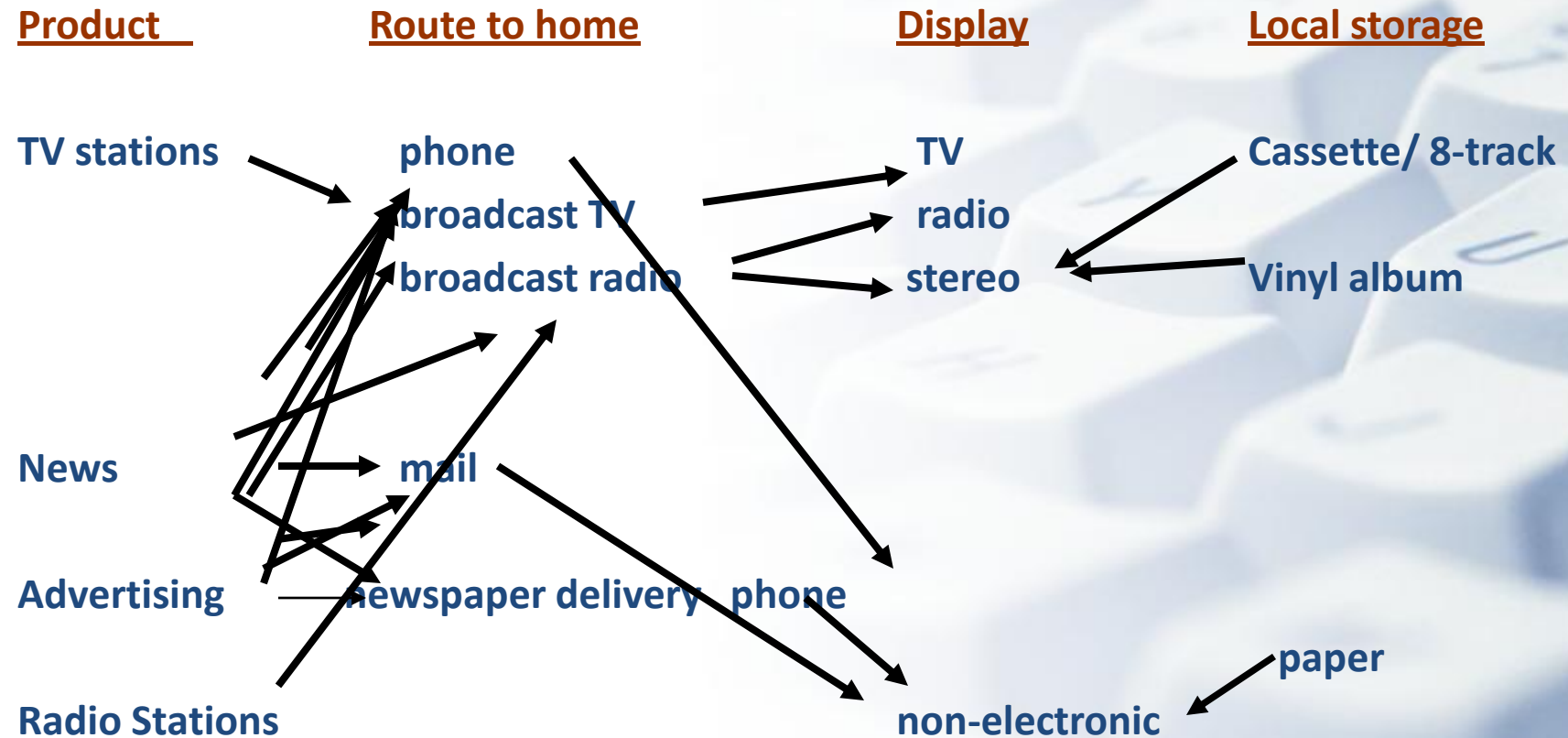
57% connect to internet wirelessly

>two-thirds use “cloud”

46% tech social network users

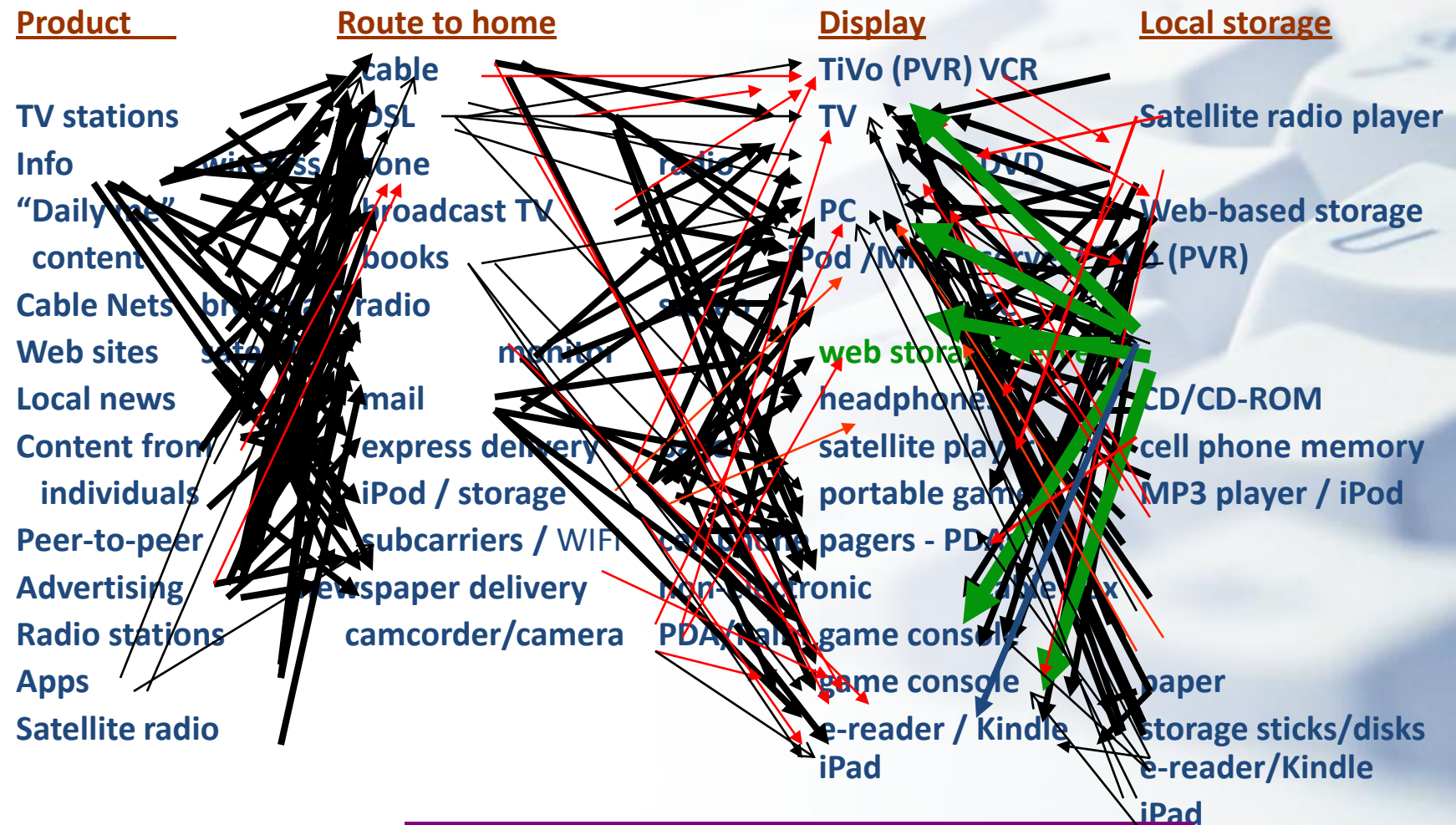
= fast, mobile connections on  
outside servers and storage

# Media ecology – then (industrial age)



Adapted from Tom Wolzien, Sanford C. Bernstein & Co

# Media ecology – now (information age)



Adapted from Tom Wolzien, Sanford C. Bernstein & Co

# Media ecology – now (information age)

Product

Route to home

Displ

TV stations

Info

“Daily

content

Cabl

In

Pe

A

Ra

Satellite radio

s/disks

der/kmarc

**Ubiquitous computing age**  
**Cloud computing**  
**“Internet of things”**

Adapted from Tom W. H. Bernstein & Co



Media

45% of adults own **DVRs** –  
up from 3% in 2002

52% of adults own **laptops** –  
up from 30% in 2006

42% of adults own **game consoles**

4% of adults own **tablet computer** - iPad

5% of adults own **e-book readers** - Kindle

47% of adults own **MP3 players** –  
up from 11% in 2005

## Networked creator universe

- 62% are social networking site users
- ~50% share photos
- 33% create content tags
- 32% contribute rankings and ratings
- 30% share personal creations
- 26% post comments on sites and blogs
- 24% use Twitter / other status update features
- 15% have personal website
- 15% are content remixers
- 14% are bloggers
- 4% use location-sharing services

Produ

TV

Info

"Daily

conten

Cable N

Web site

Local ne

Content

individ

Peer-to-

Advertis

Radio st

Satellite



# Media ecology – now (information age)

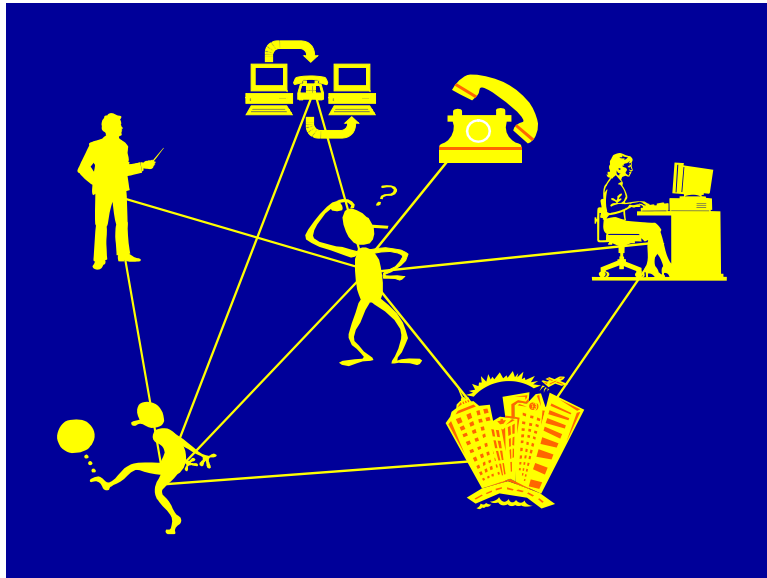
... and this all affects social networks

- 1) their composition
- 2) their importance and the way people use them
- 3) the way teachers and organizations can play a part in them

Adapted from McLuhan, Marshall McLuhan, Walter D. Dyer Pines, Jr., and Paul Wolfenbarger, Sanford C. Bernstein & Co

# Behold the idea of networked individualism

Barry Wellman – University of Toronto



The turn from groups to social networks = a new social operating system

## *Networked Individuals* have a different ...

- Sense of information availability – it's ambient
- Sense of time – it's oriented around “continuous partial attention”
- Sense of community and connection – it's about “absent presence”
- Sense of the rewards and challenges of networking for social, economic, political, and cultural purposes – new layers and new audiences

# Changes underway for learners

Voice, translation, natural language search, projectors, screens, wearable devices make information ....

## Pew Internet

- pervasive
- portable
- personal
- participatory

## danah boyd

- persistent
- replicable
- scalable
- searchable



***COLLAPSED CONTEXTS***

# New learners of the future

- More self directed and less dependent on top-down instructions
- Better arrayed to capture new information inputs
- More reliant on feedback and response
- More attuned to group outreach and group knowledge
- More open to cross discipline insights, creating their own “tagged” taxonomies
- More oriented towards people being their own individual nodes of production.

# Futurism 101 – the technology side

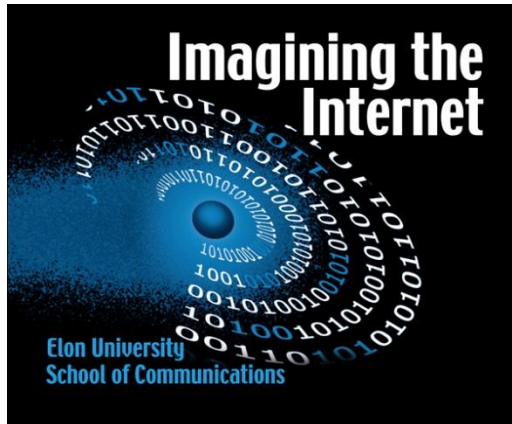
- **Computing capacity:** The price/performance ratio of computing hardware doubles every 18-24 months (Moore's Law)
- **Bandwidth capacity:** Doubles every two years in wired environment (Gilder's Law and Nielsen's Law)
  - Doubles every 2.5 years - wireless (Cooper's Law).
- **Digital storage capacity:** Doubled every 23 months since 1956 (Kryder's Law)
- **Others:** miniaturization, density of graphical displays, file compression, sensor/RFID proliferation



# Futurism 101 – the operating/apps side

- Search improvements
  - Relevance – quality information
  - Real-time
  - Relatedness
- Expansion of local awareness
- Conversational user interface
- Translation improvements
- “Social graph” expansions and nuances
- Rise of the “internet of things”

# About the Future of the Internet surveys



- Led by Lee Rainie of Pew Internet and Janna Anderson of Elon U. We issue our reports free online. Books pub. by Cambria Press
- Respondents - Experts in Early '90s Predictions Database. New invitees (high-tech organizations, etc.) Pass-along recommendations, and “friends of Pew Internet” – surveys not a scientific sample
- We pose scenarios in order to inspire detailed elaborations – more voices making more predictions

PewResearchCenter



# Survey 4 – 2010 – 10 questions

## 895 respondents

- 371 past participant experts
- 524 new recruits and friends
  - 15% research scientists/scholars
  - 14% business leaders or entrepreneurs
  - 12% consultants or futurists
  - 12% authors, editors or journalists
  - 9% technology developers or administrators
  - 7% advocates or activists
  - 3% pioneers or originators
  - 2% legislators, politicians or lawyers
  - 25% specified themselves as “other”



**The Future of the Internet**

Experts and stakeholders say the Internet will enhance our intelligence – not make us stupid. It will also change the functions of reading and writing and be built around still-unanticipated gadgetry and applications. The battle over control of the internet will rage on and debates about online anonymity will persist.

Janna Quinley Anderson, Elon University  
Lee Rainie, Pew Internet & American Life Project  
February 19, 2010

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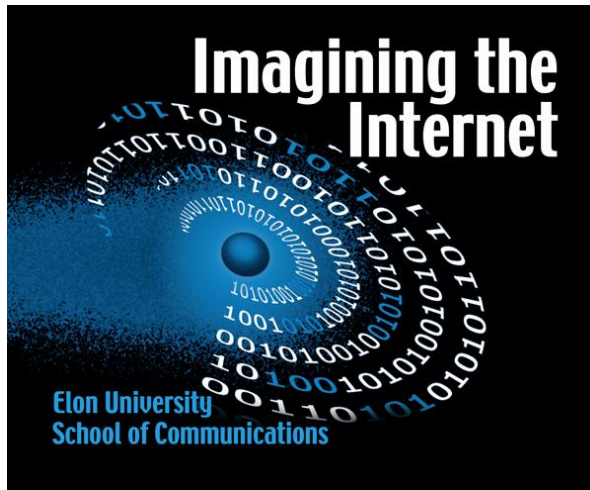
**THE FUTURE OF THE INTERNET**

This publication is part of a Pew Research Center series that captures people's expectations for the future of the Internet, in the process presenting a snapshot of current attitudes. Find out more at: <http://www.pewinternet.org/topics/future-of-the-internet.aspx> and <http://www.imaginingtheinternet.org>.

<http://www.elon.edu/predictions/>

# Question strategy change

- Tension pairs – force choice between two opposing statements
- Inspires deep narrative elaborations
- Pairs based on common, published attitudes being discussed (these are not “our” predictions)



<http://www.elon.edu/predictions/>

# Are hot new gadgets and apps evident now?

The image shows a tablet displaying the Twitter website. A red arrow points to a retweet icon (two arrows forming a square) on a tweet from NASA. The tweet text is: "NASA Today's space shuttle mission status briefing will air live on NASA TV at 12:30pm ET." Below the tweet, it says "ow and 2 others" and "nly see retweets from users you follow".

**New! Retweet to spread the word**

Share interesting tweets with your followers by hovering over a tweet and clicking "Retweet".

Close

140

**Iranie**  
812 tweets

268 following 1,376 followers 144 listed

Navigation links: Home Profile Find People Settings Help Sign out

Navigation links: Site Tour Edit Your Profile

Navigation links: View More Photos of Me (6) Create a Profile Badge

Navigation links: Friends 51 friends See All

Navigation links: Marina Ehan Shamus Minter Scott Morrow

Navigation links: October 27 Amy and Akhil are now f

Navigation links: October 20 Amy wrote on the wall fo Group. 3:45pm

Navigation links: October 13

# Are hot new gadgets evident now?

The hot gadgets and applications that will capture the imagination of users in 2020 are pretty evident today and will not take many of today's savviest innovators by surprise.

**16% experts**

17% full sample

Hot gadgets and apps that will capture the imagination of users in 2020 will often come “out of the blue” and not have been anticipated by many of today's savviest innovators.

**81% experts**

80% full sample

# Themes

- **iPhone, iPhone, iPhone – most common example cited – nobody would have predicted it**
- **Innovation ecosystem will change: bandwidth / processing**
- **There are basic trends evident now that will come to fruition and some groundwork that has been in place for years that will expand to have more impact**
  - The internet of things
  - Proliferation of sensors
  - Growth of mobile connectivity and location-based services
  - Bigger/thinner TVs - 3D displays
  - “Consolidated,” all-purpose gadgets and apps





# The internet and human intelligence

By 2020, people's use of the internet has enhanced human intelligence; as people are allowed unprecedented access to more information, they become smarter and make better choices. Nicholas Carr was wrong: Google does not make us stupid

**81% experts**

76% full sample

By 2020, people's use of the internet has not enhanced human intelligence and it could even be lowering the IQs of most people who use it a lot. Nicholas Carr was right: Google makes us stupid

**16% experts**

21% full sample

# Themes

- **Cognitive capacities will shift**
- **New literacies will be required. Fourth “R” will be retrieval.... “Extreme Googlers”**
- **Technology isn’t the problem here. It is people’s inherent character traits**
- **Performance of “information markets” is a big unknown, especially in the age of social media and junk information.... Google will improve**

# Will Millennials' use of tech change as they age?



# Will Millennials' use of tech change as they age?

By 2020, members of Gen Y will continue to disclose personal information to stay connected. Even as they mature, have families, and take on more significant responsibilities, their enthusiasm for widespread information sharing will carry forward.

**67% experts**

69% full sample

By 2020, members of Gen Y will have grown out of much of their use of social networks and transparency-engendering online tools. As they age and find new commitments, their enthusiasm for widespread information-sharing will abate.

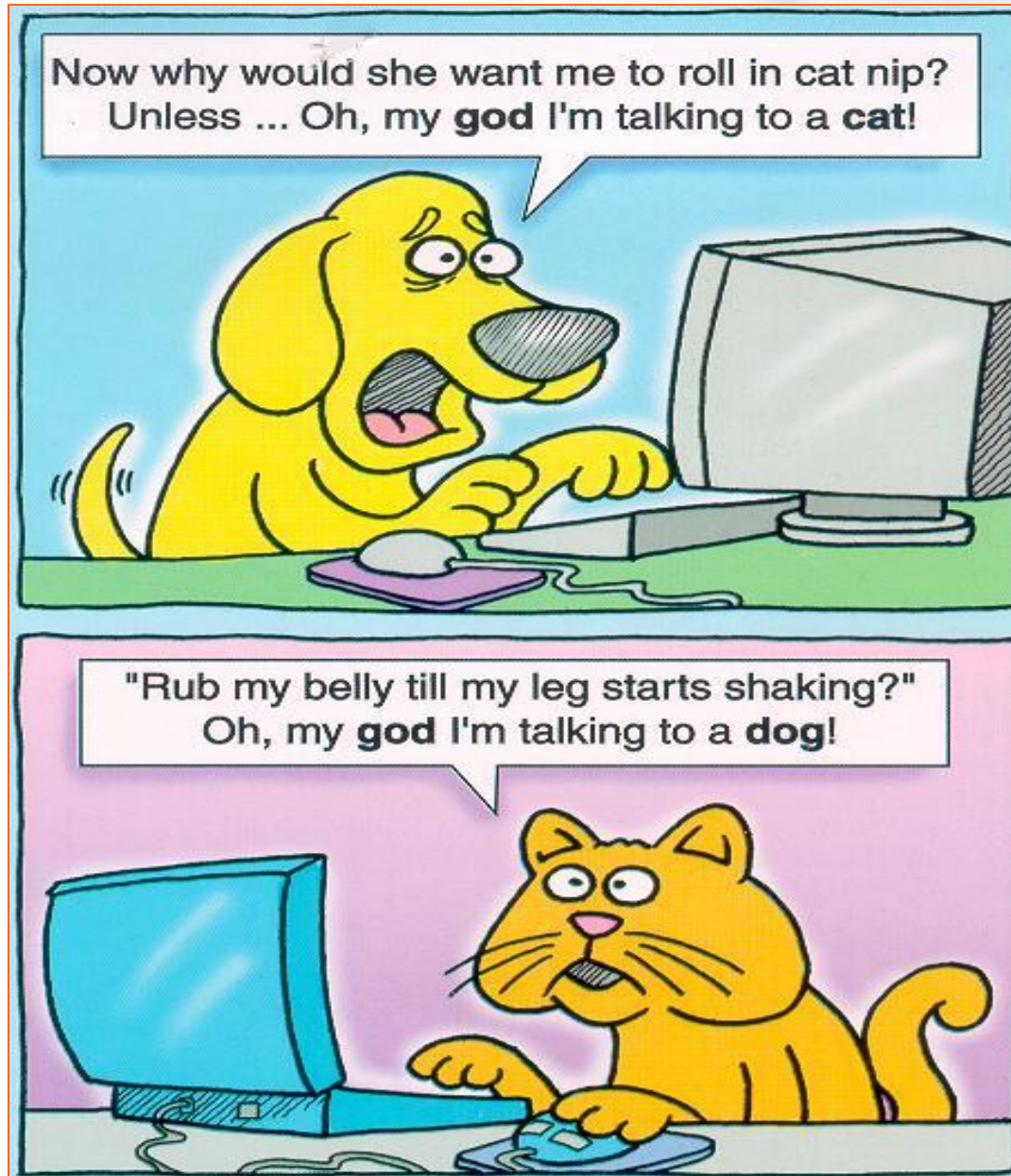
**29% experts**

28% full sample

# Themes

- **Online sharing builds friendships, forms communities and builds reputations – Millennials have seen the benefits and will continue to share online as they grow older**
- **New social norms that reward disclosure of private information are already forming, in fact, 20<sup>th</sup> century notions of privacy are already morphing**
- **New boundaries will be set as people adjust to new realities shaped by social network providers**
- **Those who disagreed with the majority mostly said that commitments tied to aging will change Millennials level of sharing – especially the time crunch from work and family**

# What is the future of online anonymity?



# What is the future of online anonymity?

By 2020, the ID systems used online are tighter and more formal – fingerprints or DNA-scans or retina scans. The use of these systems is the gateway to most of Internet-enabled activity such as shopping, communicating, creating content, and browsing. Anonymous online activity is sharply curtailed.

**42% experts**

41% full sample

By 2020, Internet users can do a lot of normal online activities anonymously even though the identification systems used on the Internet have been applied to a wider range of activities. It is still relatively easy for Internet users to create content, communicate, and browse without publicly disclosing who they are.

**54% experts**

55% full sample

# Themes

- **The law and new regulations will give people some privacy protections even though they are required to disclose more**
- **There are still sufficient “workarounds” that will allow people some measure of anonymity – “pseudonymity” will be available to people**
- **Confidentiality and autonomy will replace yearning for anonymity**
- **The rise of social media is as much a challenge to anonymity as business and government security reqs**
- **Reputation management and “information responsibility” will emerge**



# The fate of the semantic web

avatar  
semantic<sup>SL</sup>  
web  
geospatial  
MUVE  
3:0



# The fate of the semantic web

By 2020, the semantic web envisioned by Tim Berners-Lee will not be as fully effective as its creators hoped and average users will not have noticed much of a difference.

**52% experts**

47% full sample

By 2020, the semantic web envisioned by TBL and his allies will have been achieved to a significant degree and have clearly made a difference to the average internet users.

**38% experts**

41% full sample

# Themes

- **There is too much variation among people and economic competitors to allow it to happen**
- **Improvements are inevitable, but they will not unfold the way TBL & Co. have sketched out; they will be grassroots-driven rather than standards-driven; data mining, links, analysis of social exchanges will help drive the process of smartening the web**
- **The semantic web will not really take off until it finds its killer app - the killer app will come when we can ask the internet questions and *Conversational search* could be the key**
- **There will be upstairs/downstairs deployment**

# The impact of the internet on institutions



# The impact of the internet on institutions

By 2020, innovative forms of online cooperation will result in significantly more efficient and responsive governments, business, non-profits, and other mainstream institutions.

71% experts

72% full sample

By 2020, governments, businesses, non-profits ... will primarily retain familiar 20th century models for conduct of relationships with citizens and consumers online and offline.

26% experts

26% full sample

# Themes

- **The tide is too strong to resist – pressures for transparency are powerful**
- **The “future” is unevenly distributed – businesses will change most; governments least**
- **Data will be the platform for change**
- **Workarounds, facilitated by social media, will be common**
- **Efficiency and responsiveness aren’t the same thing**
- **Anonymous worries about corporate power**

# The cloud vs. the desktop



# The cloud vs. the desktop

By 2020, most people won't do their work with software running on a general-purpose PC. Instead, they will work in Internet-based applications... Most innovative work will be done in that domain, instead of in apps that run on a PC OS.

**72% experts**

71% full sample

By 2020, most people will still do their work with software running on a general-purpose PC.... The most innovative and important applications will run on (and spring from) a PC operating system. Aspiring application designers will write mostly for PCs.

**25% experts**

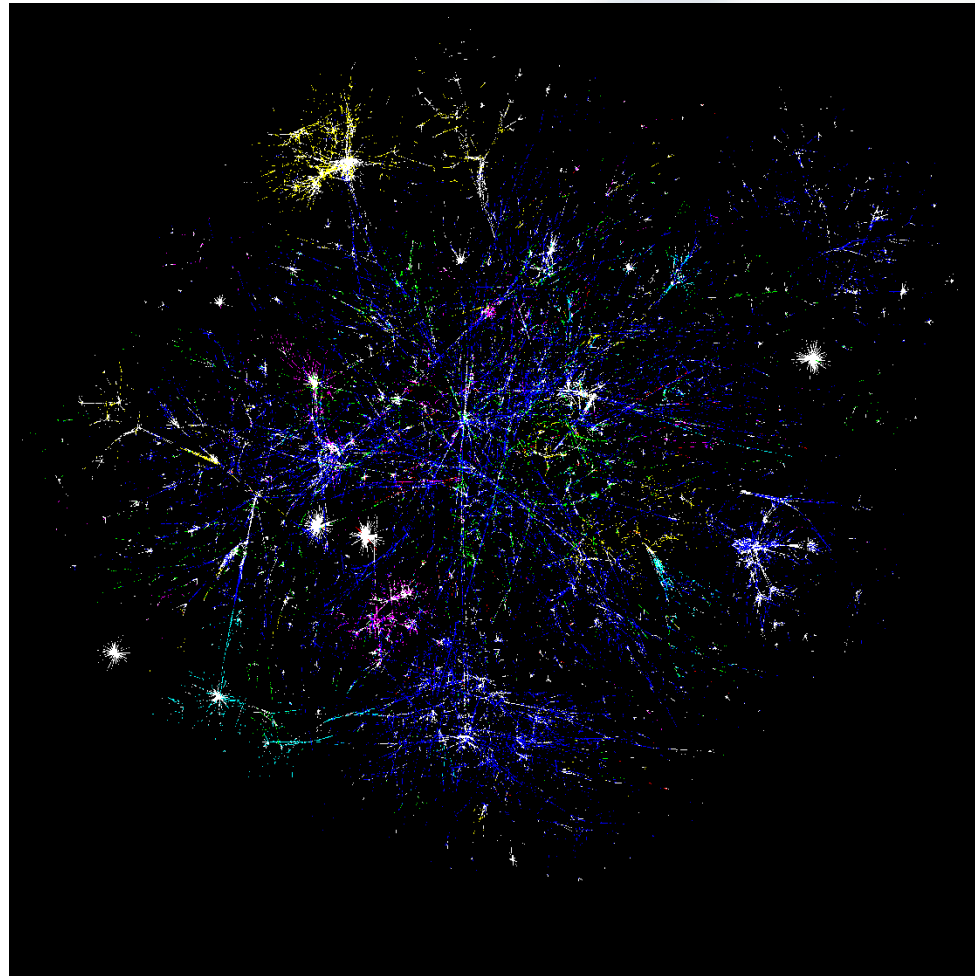
27% full sample



# Themes

- **The advantages of ubiquitous access and mobility trump other things**
- **Security problems will result – and new kinds of privacy disputes are inevitable**
- **Ordinary users won't know the difference – or care very much**
- **A hybrid world of cloud and desktop will evolve as each system finds its own primary value. Strains on spectrum might drive people back to device-based computing**

# Will internet be dominated by end-to-end principle?



# Will internet be dominated by end-to-end principle?

In the years between now and 2020, the Internet will mostly remain a technology based on the end-to-end principle that was envisioned by the Internet's founders. Most disagreements over the way information flows online will be resolved in favor of a minimum number of restrictions over the information available online and the methods by which people access it.

**63% experts**

61% full sample

In the years between now and 2020, the Internet will mostly become a technology where intermediary institutions that control the architecture and significant amounts of content will be successful in gaining the right to manage information and the method by which people access and share it.

**29% experts**

33% full sample

# Themes

- **There is too much good history and user buy-in to part with end-to-end internet to see it largely overturned**
- **Openness has its own virtues and those who resist it will fall behind those who enable it**
- **Those who took the opposite view were not necessarily happy about it, but they argued there are many forces pushing towards more control of the internet: governments, businesses, users themselves to ward off bad experiences**
- **Some things will have to be managed, especially if the capacity of the current internet becomes strained**

# Thank you!

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