

# The Advent of the Internet

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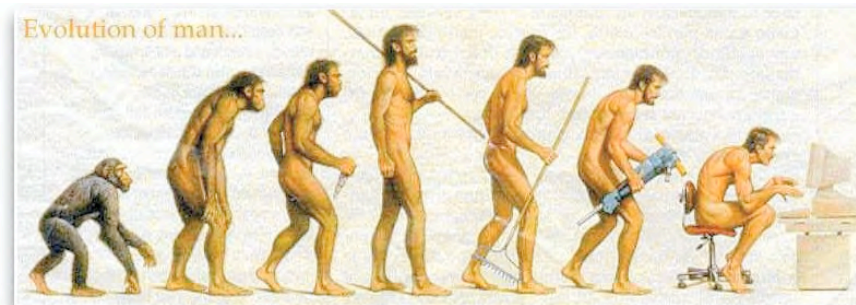
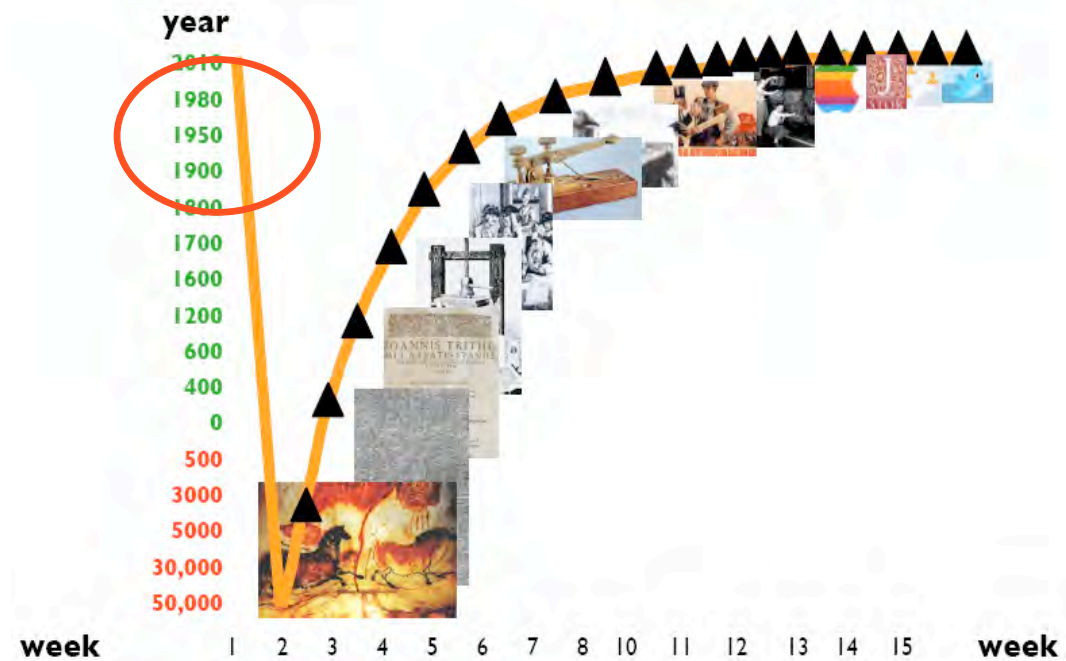
**Geoff Nunberg**  
**i103 History of Information**

April 12, 2012



# Where We Are

The dénouement!!!





## Puzzler

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What is the significance of woodchucks to the history of the World Wide Web?



## Itinerary, 4/12

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What ~~is the Internet~~ are the Internets?

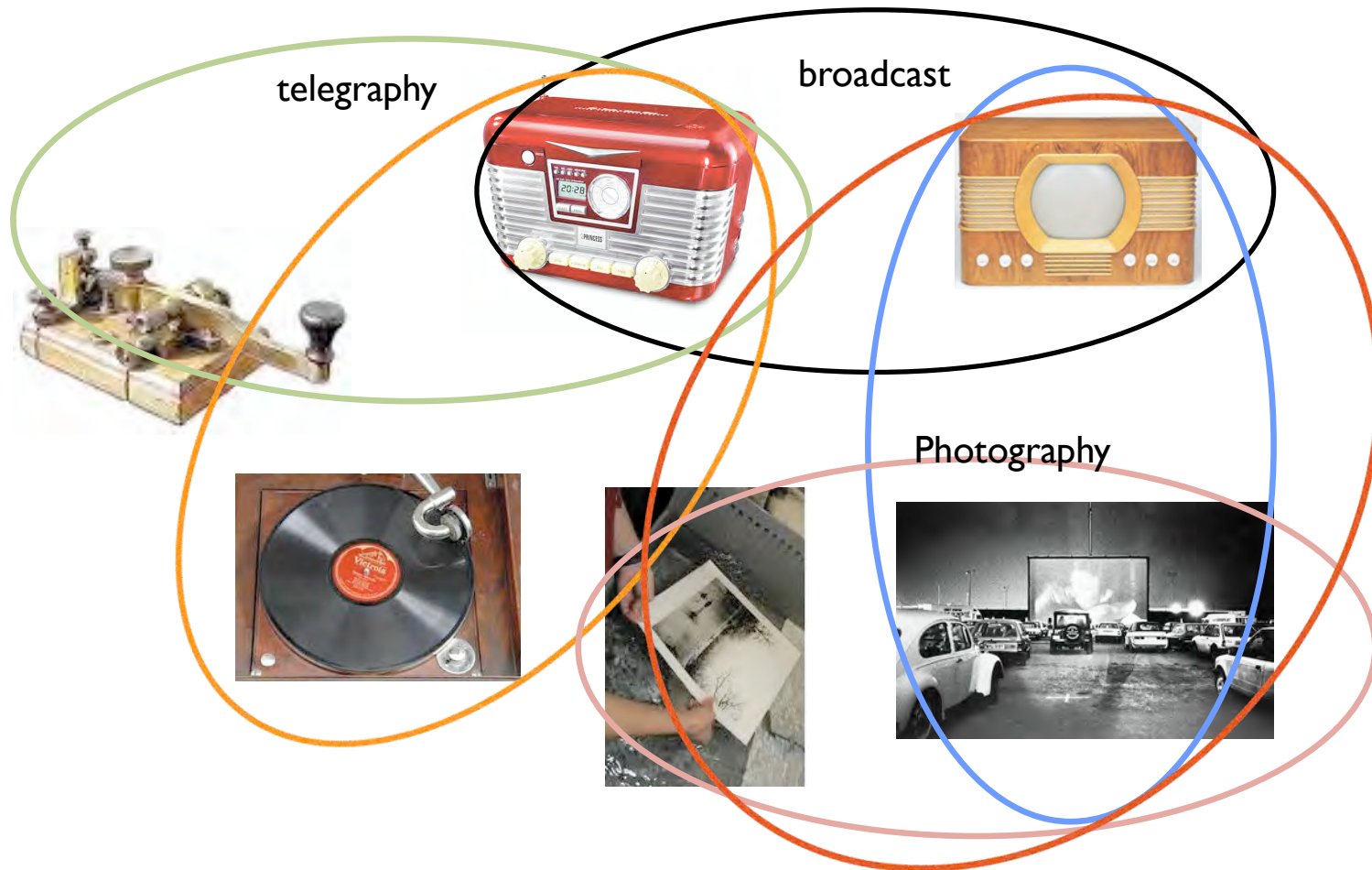
Technological bases of the Internet and WWW

Effects of the Internet, I: One World Language?



# What makes a "technology"?

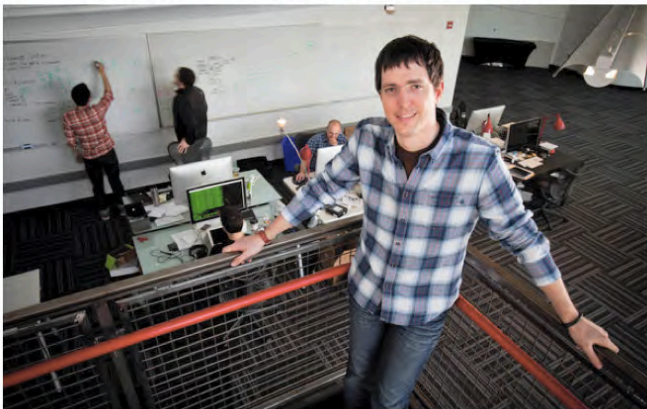
How many technologies?





# Where is the Internet? Where is the Web?

A Billion-Dollar Turning Point for Mobile Apps



Peter D'Silva for The New York Times

The path for Internet start-ups used to be quite clear: establish a presence on the Web first, then come up with a version of your service for mobile devices. Now, at a time when the mobile start-up Instagram can command \$1 billion in a sale to Facebook, some start-ups are asking: Who needs the Web?

Smartphones are everywhere now, allowing apps like Foursquare and Path to be self-contained social worlds, existing almost entirely on mobile devices...

In that context, the Instagram deal looks like something of a turning point, as even the Web giant Facebook tries to get a better grasp on a market that requires a rethinking of old rules.

“For decades, the center of computing has been the desktop, and software was modeled after the experience of using a typewriter,” said Georg Petschnigg, a former Microsoft employee who is one of the creators of Paper, a new sketchbook app for the iPad. ...



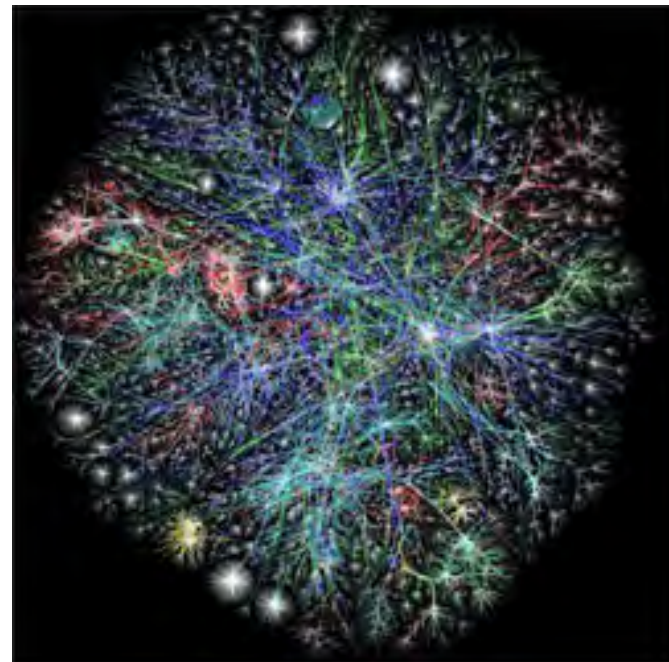


# What makes a "technology"?

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The **Internet** is a global system of interconnected **computer networks** that use the standard **Internet protocol suite** ... to serve billions of users worldwide. It is a *network of networks* that consists of millions of private, public, academic, business, and government networks...that are linked by a broad array of electronic, wireless and optical networking technologies.

--a well-known infallible source of conventional wisdom



Visualization from Opte Project  
Asia Europe/Africa  
Latin America  
North America  
Private Networks (RFC1918)



# What makes a "technology": Devices







# What makes for a "technology"?: Content





## Looking for the Internet: W was right

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The "internet": a technology, a channel, a medium, a "place," a set of applications...?

Contrast "radio," "television" etc.

a technology?

a network?

a set of applications?

a communications channel?

media?

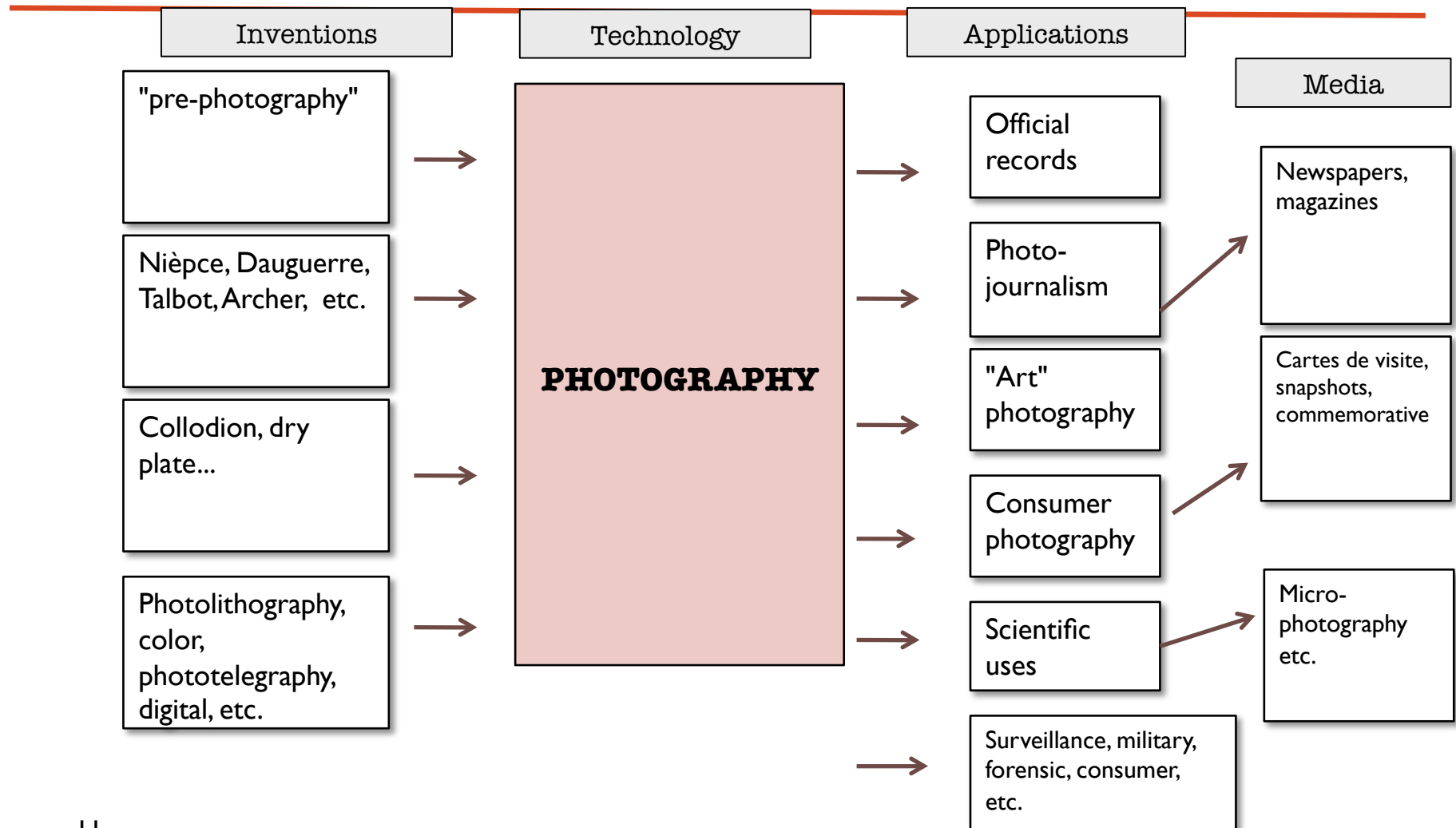
a place?



*"a vast unintended  
consequence"*

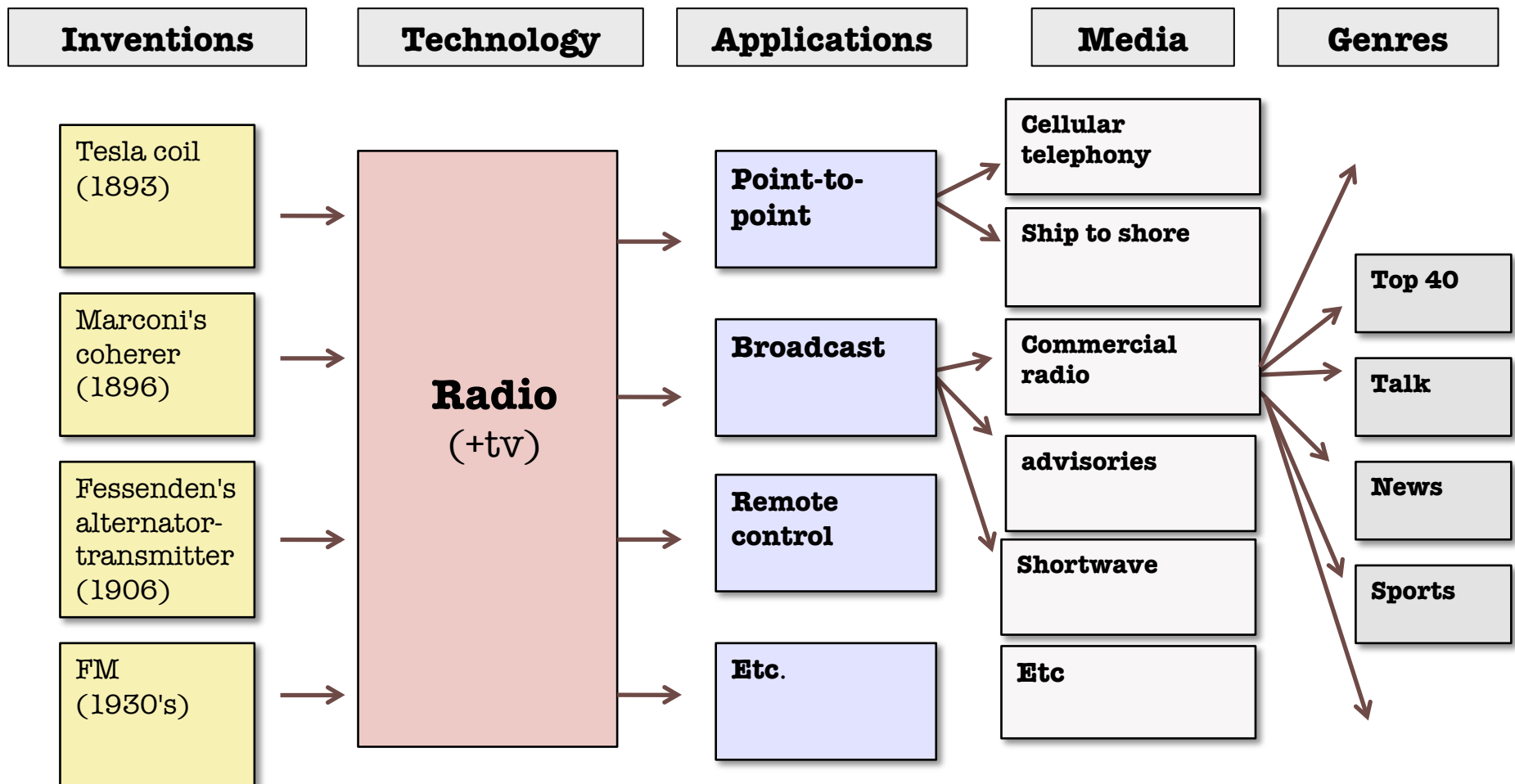


# Inventions, Technologies, Applications, Media



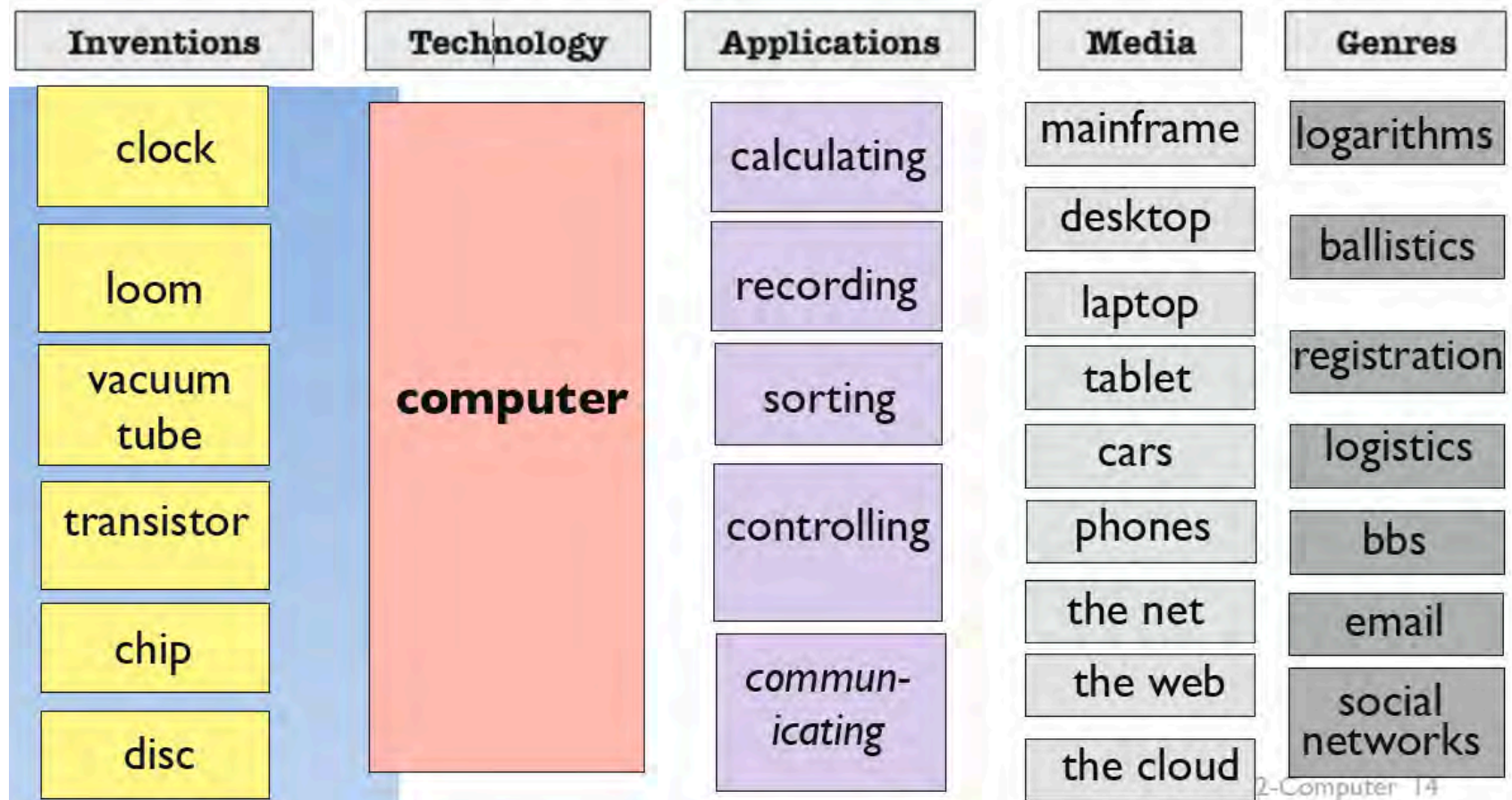


# Inventions, Technologies, Applications, Media, Genres





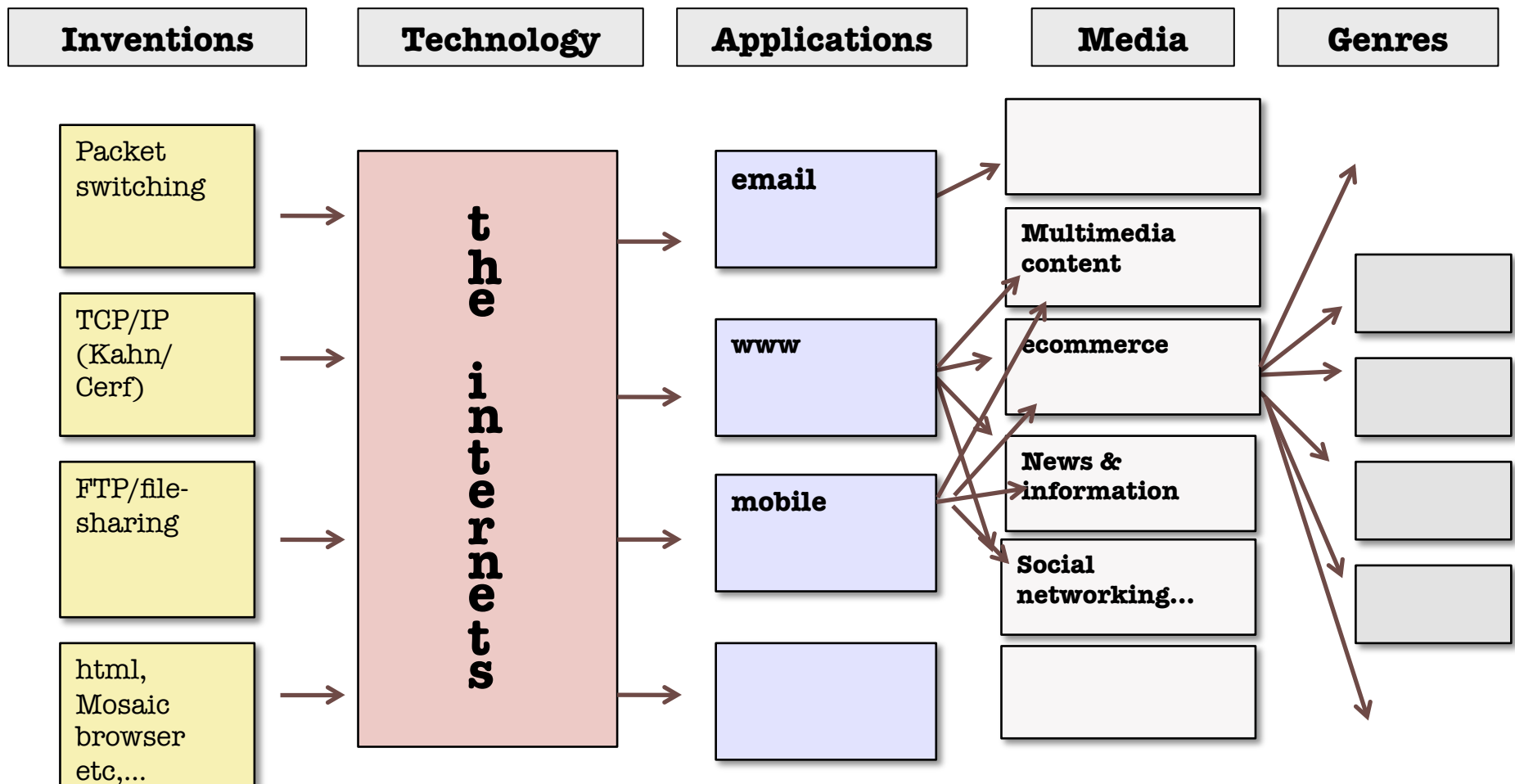
# Inventions, Technologies, Applications, Media, Genres







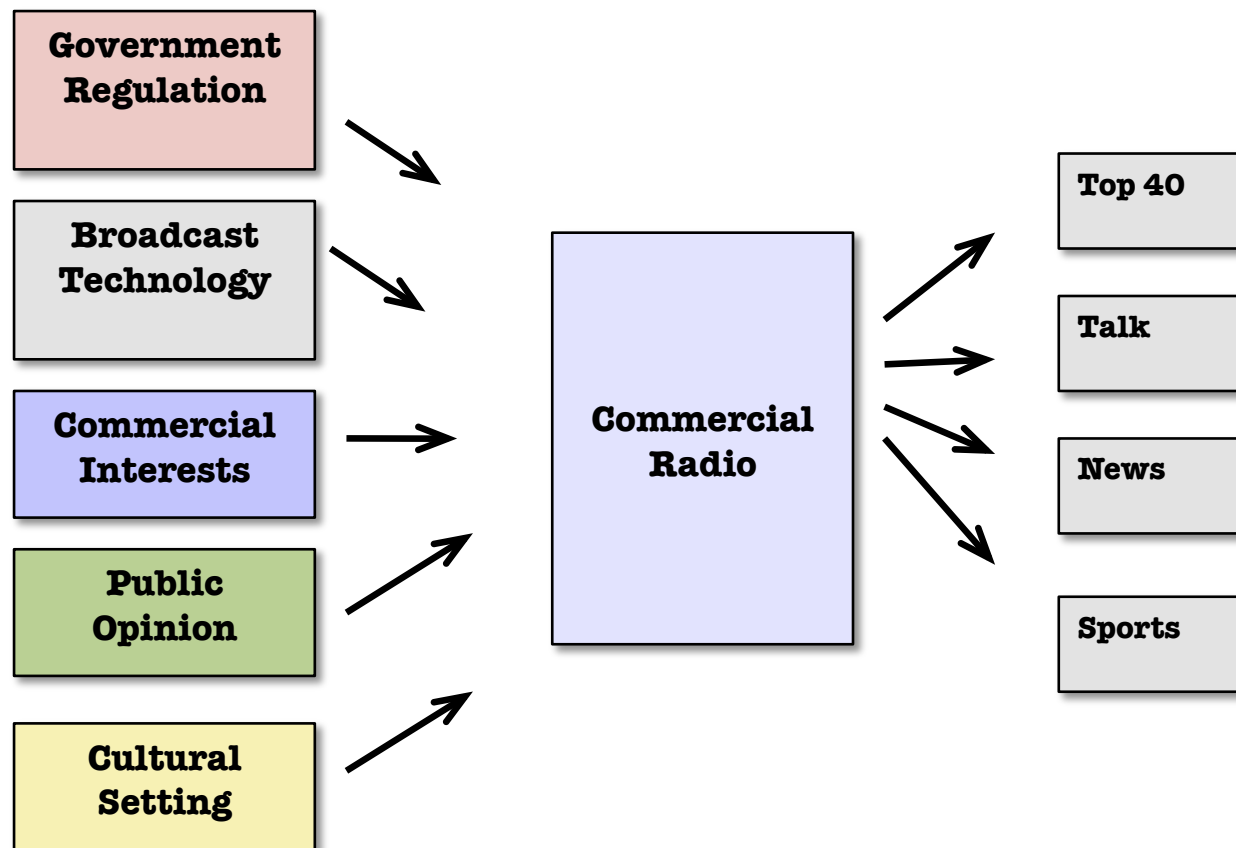
# Inventions, Technologies, Applications, Media: not an easy story to tell





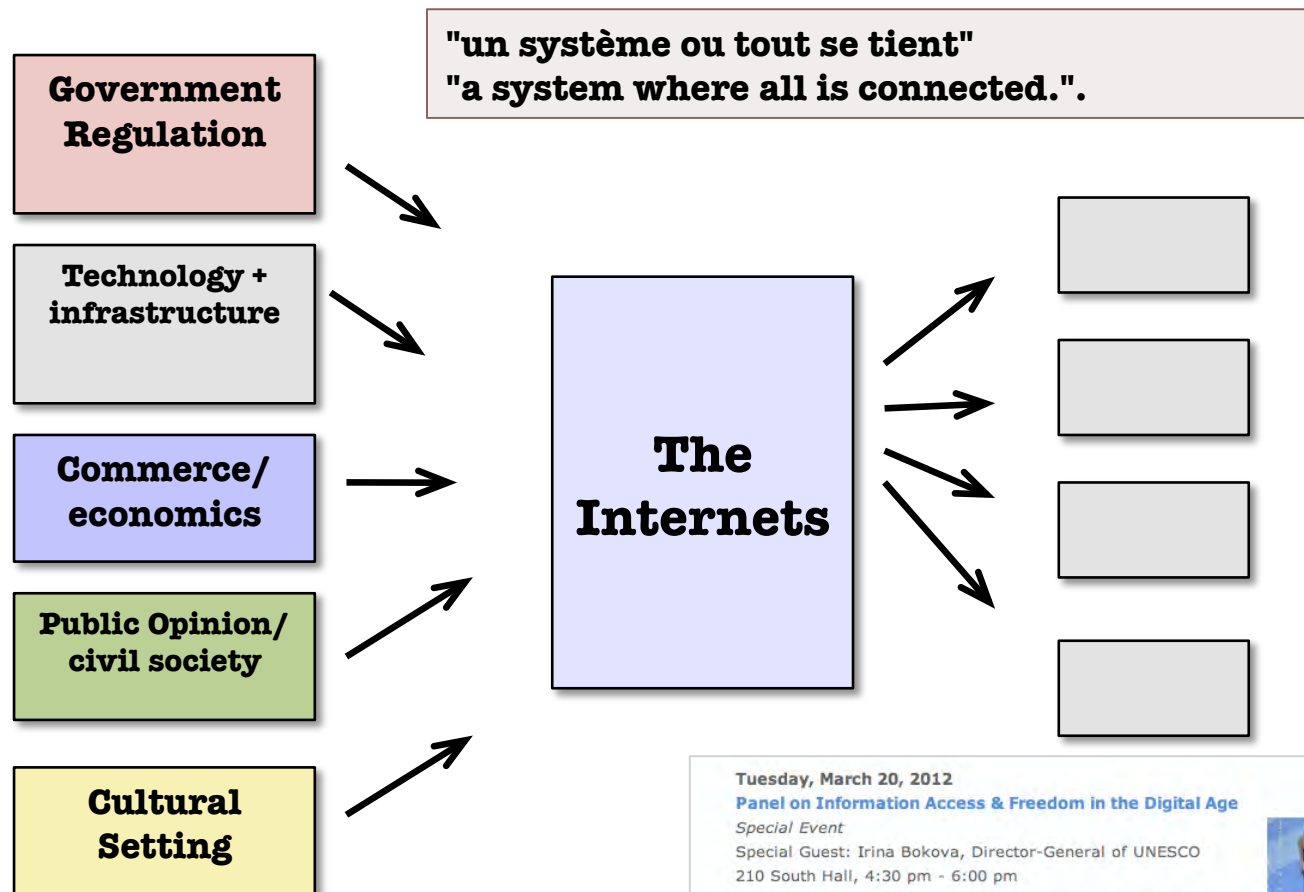
# Multiple Influences

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# Multiple Influences



Tuesday, March 20, 2012

**Panel on Information Access & Freedom in the Digital Age**

*Special Event*

Special Guest: Irina Bokova, Director-General of UNESCO  
210 South Hall, 4:30 pm - 6:00 pm

Panel discussion with Irina Bokova, Director-General of UNESCO; privacy and censorship scholars Deirdre Mulligan & Nicole Wong; and Chinese human-rights activist Qiang Xiao; moderated by Geoffrey Nunberg.





# Technological Bases of the Web

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Communications protocols/Packet switching

Physical Networks

Addressing system

Hypertext transfer protocols

Browsers/ Graphical browsers

Indexing & search

Broadband



Hughes' telegraph, 1855



Edison Stock Ticker, 1869

# Communicating

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**intra-machine**

time-sharing

**different machines**

computer to printer

[the stock ticker]

Ethernet: computer to printer

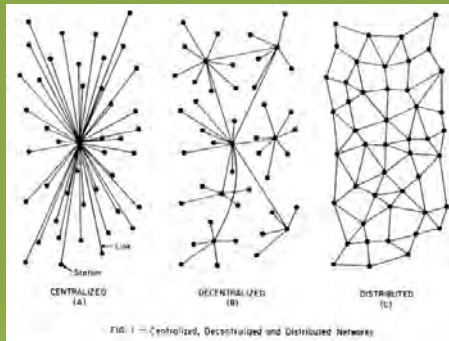
**Arpanet**



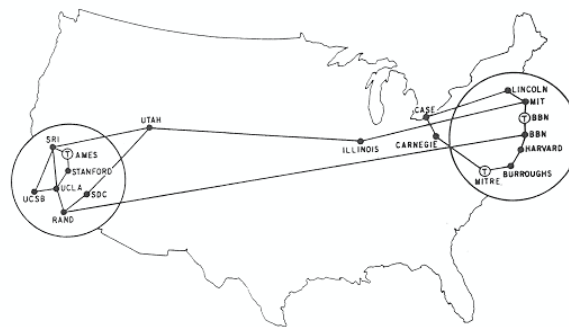


# Technological Beginnings: The Arpanet

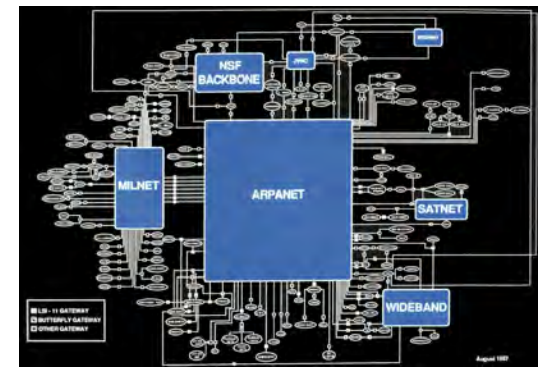
1969: ARPA (Advanced Research Projects Agency of DOD) (later DARPA) creates Arpanet, linking time-sharing computers at four research sites by telephone lines.



Paul Baran, "On Distributed Communications, 1964 RAND report



Arpanet 1971



Internet 1987, a "network of networks"



# Technological Beginnings: 60s & 70s

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1969: ARPA (Advanced Research Projects Agency of DOD) (later DARPA) creates Arpanet, linking time-sharing computers at four research sites by telephone lines. Net makes use of packet-switching, rather than circuit switching, as with phone communication at the time.

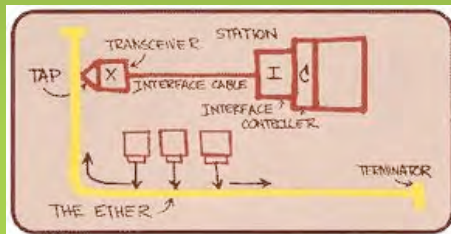
1971: File Transfer Protocol (FTP permits easy exchange of files between sites.

1974 Bob Kahn and Vin Cerf ("Father of the Internet") demonstrate Transfer Control Protocol, which enables machines to route & assemble data packets.)



# Communicating

1974: Ethernet developed at Xerox Palo Alto Research Center (PARC), allowing communication among machines on local networks.



PARC Alto (1<sup>st</sup> PC) 1973



## Internet Development:80s

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1980's: NSF funds national backbone to connect computer research centers. Other gov't-funded networks (BITNET, CSNET) emerge

1980's: Commercial networks begin to emerge

1983: Domain Name System (DNS) introduced to keep up with growing number of hosts, introduces domain names .com, .gov, .mil, .edu, etc./ name servers translate into IP numbers...

Late 1980's: First Internet Service Providers emerge

1989: Australia, UK, Germany, Italy, etc. join Internet



## Internet Development:90s

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1990: ARPANET shuts down

**1991: NSF removes all restrictions on commercial use of Internet**

1992: Internet Society (ISOC) formed, assumes responsibility for fixing standards through the Internet Engineering Task Force (IETF), a voluntary organization

1995: NSF discontinues support of infrastructure

1998: Internet Corporation for Assigned Names and Numbers (ICANN) established to oversee assignment of domain names and IP addresses, formerly under control of US government.





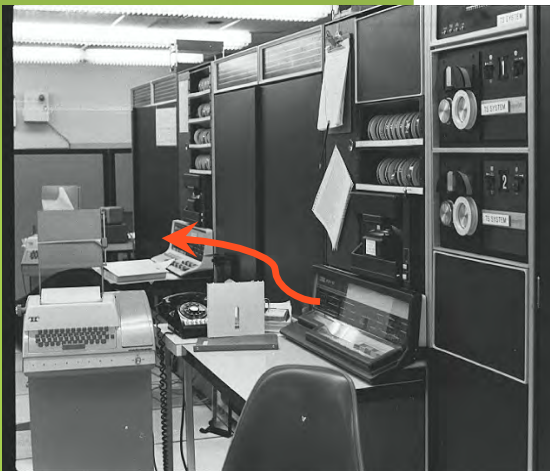
# The Origins of Email

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1971: First network email program created by Ray Tomlinson at Bolt, Beranek & Newman (BBN), with "USER@hostname.domain" addressing system.

But public access to email doesn't begin until 1988, when MCI mail is linked to the Internet

1975: 1<sup>st</sup> email client MSG (permits "forward," "reply")



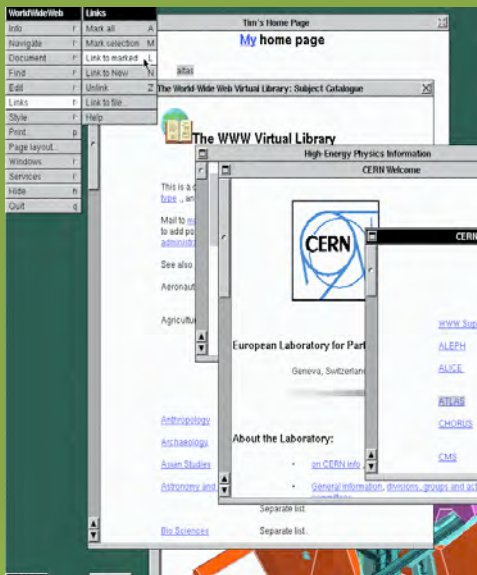


# The Emergence of the WWW

1945: Vannevar Bush writes "As We May Think" in *The Atlantic*; envisions Memex machine to follow links between documents on microfiche

1965: Ted Nelson coins the term "hypertext" to describe "compound documents" formed by links among documents

1990: Tim Berners-Lee of CERN coins the term "World Wide Web"; develops HTTP protocol for transmitting hypertext documents between clients and servers and first Web browser making use of hypertext links.



Sir Tim

## World Wide Web

The WorldWideWeb (W3) is a wide-area [hypertext](#) information retrieval initiative aiming to give universal access to a la

Everything there is online about W3 is linked directly or indirectly to this document, including an [executive summary](#) of the [Asked Questions](#) .

### [What's out there?](#)

Pointers to the world's online information, [subjects](#) , [W3 servers](#) , etc.

### [Help](#)

on the browser you are using

### [Software Products](#)

A list of W3 project components and their current state. (e.g. [Line Mode](#) ,[X11 Viola](#) , [NeXTStep](#) , [Servers](#) , [Tools](#) ,

### [Technical](#)

Details of protocols, formats, program internals etc

### [Bibliography](#)

Paper documentation on W3 and references.

### [People](#)

A list of some people involved in the project.

### [History](#)

A summary of the history of the project.

### [How can I help?](#)

If you would like to support the web..

### [Getting code](#)

Getting the code by [anonymous FTP](#) , etc.

**The First Web Page**

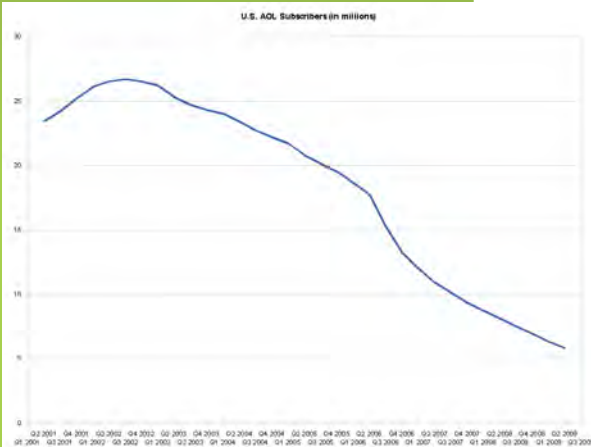


# The Emergence of the WWW

Gated communities:

ca 1990-: Pay-based online services like AOL, CompuServe, and Prodigy market connectivity + proprietary content (games, chat rooms, e-commerce, instant messaging etc.) to users unfamiliar with computers, first for hourly and then for monthly fee. By 1998, AOL has 15m. members.

**AOL subscribers, 2001-2009**



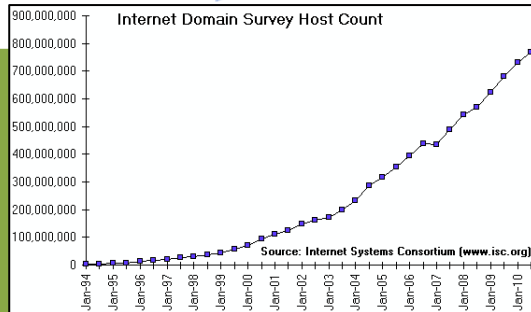
2000: AOL merges w/ Time-Warner

2005: gives away free email acc'ts

2009 spun off by Time-Warner

2010 eliminates chat rooms

2011 acquires Huffington post



## The Growth of the WWW

1993: Mark Andreessen's Mosaic browser released by NCSA, which runs on Windows and permits easy integration of graphics in Web pages.

CERN announces that W3 technology will be available free to everyone.

1994: Over 200 HTTP servers; traffic on CERN server has grown 1000-fold since first launched. From the mid-90s on, Internet use roughly doubles every year.

1994: Andreessen, now in private sector, releases Netscape Navigator browser.

1995: Microsoft releases Internet Explorer bundled with Windows 95 to compete with Netscape.

1995 AOL makes Internet available to all subscribers



## The Addition of Search

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1991: Gopher, developed at U. Minnesota, creates searchable index of FTP sites

1994: Infoseek and Lycos search engines launched.

Jerry Yang and David Filo introduce Yahoo!, a directory of Web sites.

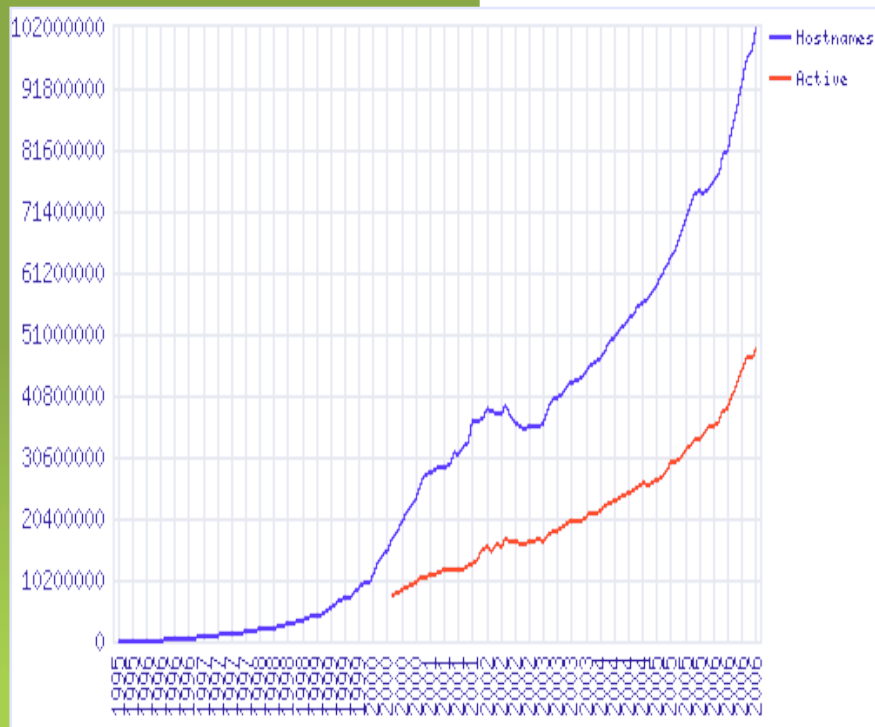
1995: AltaVista launched by DEC; company regards it as showpiece for its hardware

1997 Larry Page and Sergey Brin launch Google, which makes use of Page Rank algorithm to rank pages according to popularity.

1998: Goto.com (later Overture, later Yahoo! Search) introduces pay-per-click advertising



## The Web Takes Off



1994-2005: Internet use increases rapidly, driven by email, E-commerce, news & information, pornography & gambling. By 2005 there are an estimated 100m Web sites.

~2000- Growth of broadband enables exchange of audio & video content; blogs and social networking sites proliferate, etc.

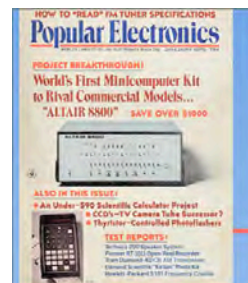
2005: 68 percent of American adults and 90 percent of American teenagers have used the Internet.



# Infrastructural background



Hayes Smartmodem 1981



## home brew, fone freaks

**1975** Altair

**1976** Apple I

**1983** Lisa

**1984** Macintosh

culture clash

21-Hoff I2-Computer: 58





# The Addition of Search



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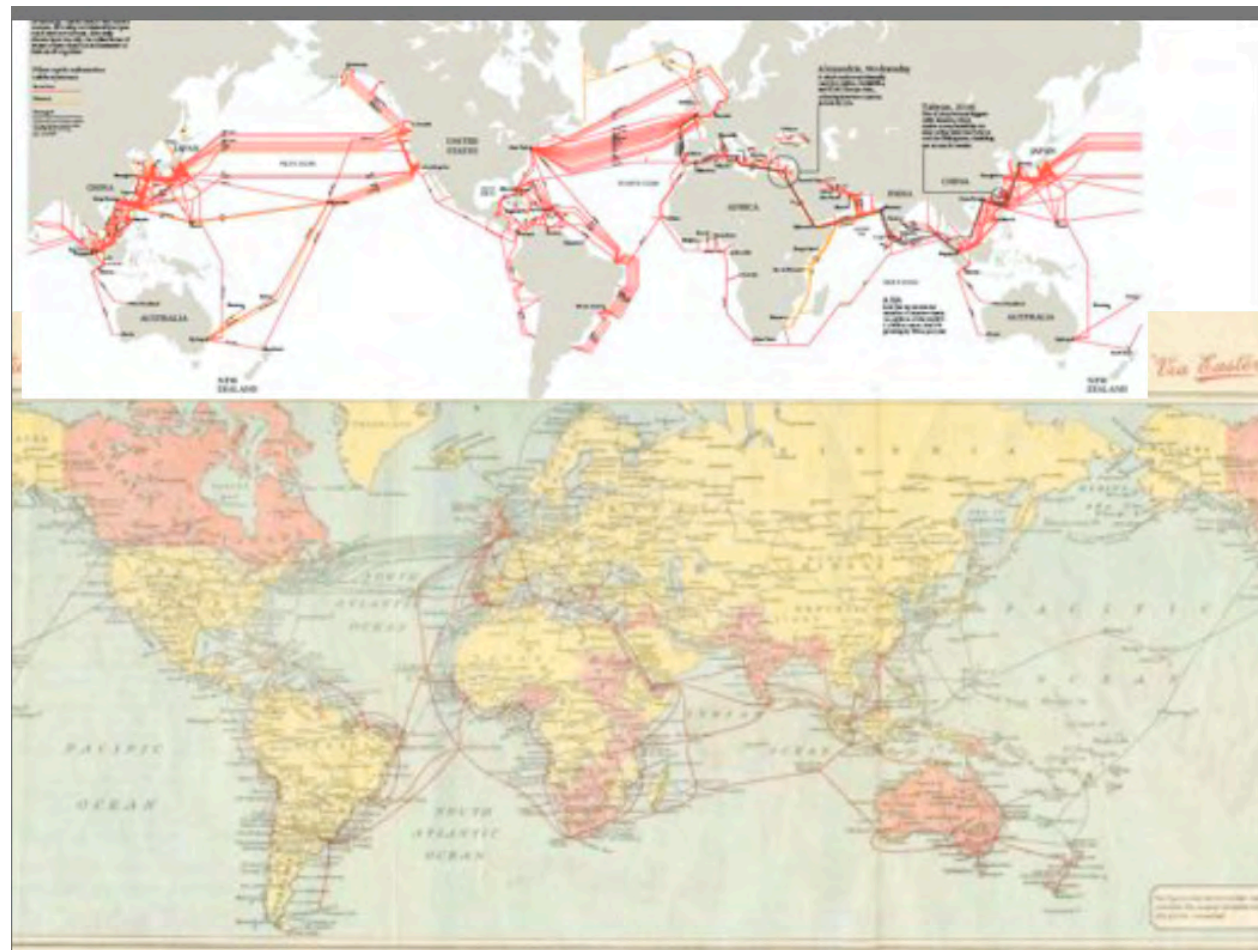
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# The Wired World





# Cairncross: Everything is different(?)

---

1. Death of distance
2. Fate of Location
3. Improved Connections
4. Increased Mobility
5. More Customized Networks
6. Deluge of Information
7. Increased Value of Brand
8. More Minnows, more Giants
9. More Competition
10. Increased Value of Niches
11. Communities of Practices
12. Loose-Knit Corporation Culture
13. Openness
14. Manufacturers as Service Providers
15. Inversion of Home and Office
16. Proliferation of Ideas
17. Decline of National Authority
18. Loss of Privacy
19. Global Premium for Skills
20. Rebirth of Cities
21. Rise of English
22. Communities of Culture
23. A New Trust
24. People as Scarce Resource
25. Global Peace



# Cairncross: Everything is different(?)

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## English on the Web

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The decisive factor in modern history...





## English on the Web

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The decisive factor in modern history...  
"that the North Americans speak English."  
Otto von Bismarck, 1898



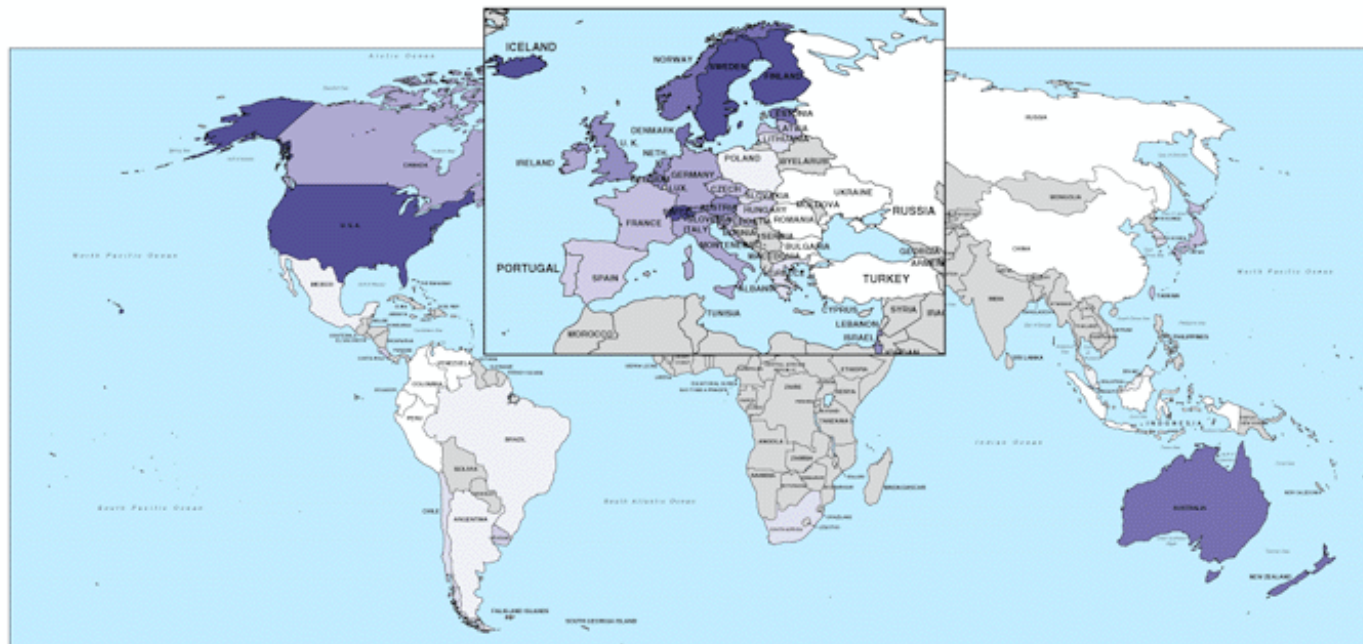


# The Internationalization of the Web, 1

Relative size of Eng-speaking population in developed world

Cf. Web penetration, 1997

Web Penetration







# Reasons for Early English Domination

Need for language communities to achieve critical mass before using local lg

**Proportion of Non-English Web Sites**

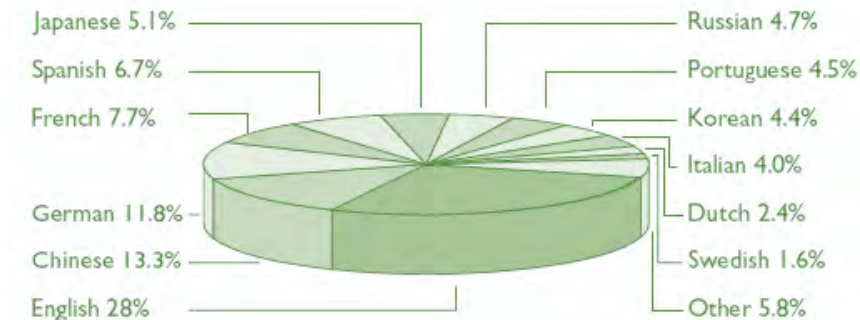




# English as a Lingua Franca

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English as dominant language of trade, science, diplomacy, tourism, etc.



Proportion of World's Books Annually  
Published in Each Language



## Fears of English Hegemony...

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“The Web is the ultimate act of intellectual colonialism.” Director of Russian ISP, 1999

“Nearly 70 per cent of the world's Web sites are in English, at times crowding out voices and views.” Kofi Annan, 12-Jan-04

English has consolidated its dominance as the language of the Internet, where 80 percent of the world's electronically stored information is in English, NYTimes 2007

**Across cultures, English is the word**

By Seth Mydans  
Published: Monday, April 9, 2007



## And Anglophone Triumphalism...

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The Internet is "a great force for the Anglification of the planet."

“[Thanks to the Internet,] English will be the native language of a majority of the world by some time in the next century.” Editor, *The Futurist*

"There is no retreat from English as the world language; no retreat from and English-speaking world." Sridath Ramphal, chairman of Commission on Global Governance, 1996

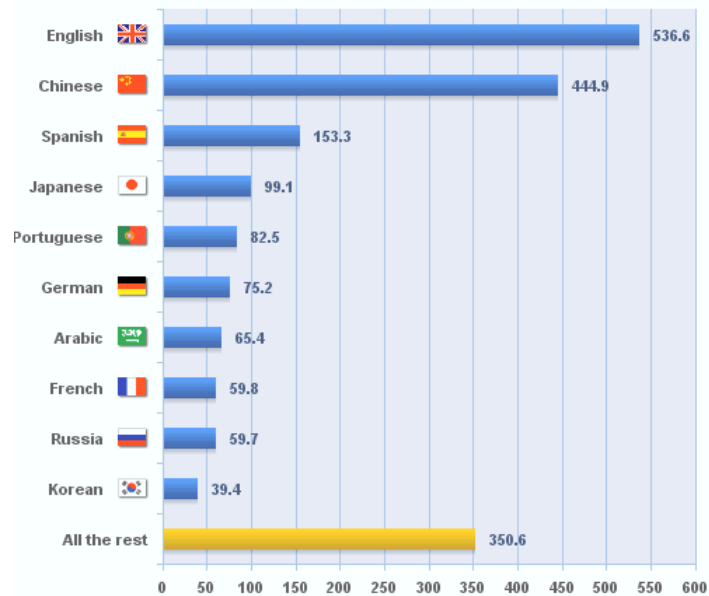


# The Internationalization of the Web, 1

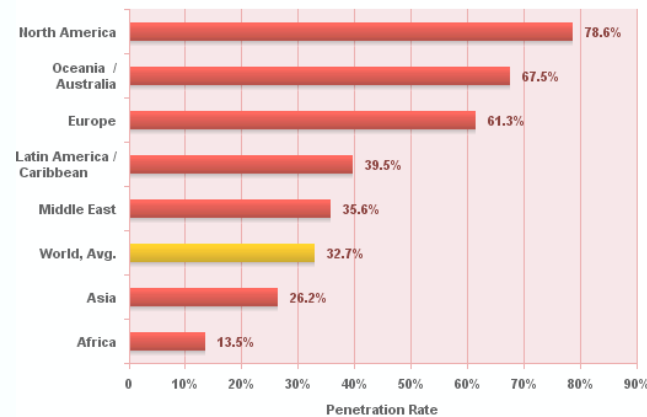
Relative size of Eng-speaking population in developed world

Cf. Web penetration, 2010

Top Ten Languages in the Internet  
2010 - in millions of users



World Internet Penetration Rates  
by Geographic Regions - 2011



Source: Internet World Stats - [www.internetworldstats.com/stats.htm](http://www.internetworldstats.com/stats.htm)  
Penetration Rates are based on a world population of 6,930,055,154 and 2,267,233,742 estimated Internet users on December 31, 2011.  
Copyright © 2012, Miniwatts Marketing Group



# The Polyglot Web

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... But the *perception* of English dominance persists

One reason: English still by far the most widely used single language...



# The “Omnigooglization” of the Web

1st 50 Google hits for “Roland Barthes”:  
44 English, 4 French, 1 Spanish, 1 German

The screenshot shows a Google search for "roland barthes". The search bar contains the text "roland barthes" and the Google logo is on the left. Navigation links for "Web", "Images", "Groups", "News", "Froogle", "Local", "New", and "more" are visible. The search results are displayed under the "Web" tab, showing "Results 1 - 100 of about 341,000 for 'roland barthes'". The first result is "Roland Barthes: Mythologies" from orac.sund.ac.uk. Other results include "Roland Barthes" from kirjasto.sci.fi, "PopCultures.com | Theorists and Critics | Roland Barthes", "Semiotics" from cudenvr.edu, "en.wikipedia.org/wiki/Roland\_Barthes", "www2.ucsc.edu/people/tuttle/", and "ROLAND BARTHES THE DISCOURSE OF HISTORY" from clas.ufl.edu.

Google "roland barthes" Search Advanced Search Preferences

Web Results 1 - 100 of about 341,000 for "roland barthes" [defin]

**Roland Barthes: Mythologies**  
Set of lectures, by Tony McNeill, on Barthes' view of postmodern literature, art, mythology, and semiology.  
orac.sund.ac.uk/~os0tmc/myth.htm - 65k - [Cached](#) - [Similar pages](#)

**Roland Barthes**  
... **Roland Barthes** was born in Cherbourg, Manche. After his father's death in a ... **Roland Barthes**: Un regard politique sur le signe by LS Calvet (1973); ...  
www.kirjasto.sci.fi/rbarthes.htm - 17k - [Cached](#) - [Similar pages](#)

**PopCultures.com | Theorists and Critics | Roland Barthes**  
Texts by and about **Roland Barthes**. ... **Roland Barthes** (abstracted from the Fifty Key Contemporary Thinkers by John Lechte); **Roland Barthes** ...  
www.popcultures.com/theorists/barthes.html - 7k - [Cached](#) - [Similar pages](#)

**Semiotics**  
... Basics of Semiotics, **Roland Barthes**, Paul Bouissac ... **Roland Barthes**; Ron Burnett; Sonesson Pictorial Semiotics; Sonesson Photography ...  
www.cudenver.edu/~mryder/lc\_data/semiotics.html - 91k - 9 Apr 2005 - [Cached](#) - [Similar pages](#)

[en.wikipedia.org/wiki/Roland\\_Barthes](http://en.wikipedia.org/wiki/Roland_Barthes)  
[Similar pages](#)

[www2.ucsc.edu/people/tuttle/](http://www2.ucsc.edu/people/tuttle/)  
[Similar pages](#)

**ROLAND BARTHES THE DISCOURSE OF HISTORY**, translated by Stephen ...  
**ROLAND BARTHES** THE DISCOURSE OF HISTORY, translated by Stephen Bann. Comparative Criticism, 3 (1981): 7-20. Pagination, superscripts, and accents are not ...  
www.clas.ufl.edu/users/poraddoc/barthes.htm - 36k - [Cached](#) - [Similar pages](#)

Done





# Omnigooglization, 2

1st 50 Google hits for “Garcia Lorca”:  
45 English, 4 Spanish, 1 Italian

The screenshot shows a Google search for "garcia lorca". The search bar contains the text "garcia lorca" and the Google logo is on the left. Navigation links for "Web", "Images", "Groups", "News", "Froogle", "Local", "New", and "more" are visible. The search results are listed under the "Web" tab, showing the first 10 results. The results include a brief biography from cyberspain.com, a list of poems from boppin.com, a page from tiscali.be, a romance poem from tiscali.be, a biography from imagi-nation.com, a page from geocities.com, and another biography from aol.com. The page also shows a "Ga" button and a "Done" button at the bottom.

Google "garcia lorca" Search Advanced Search Preferences

Web Results 1 - 100 of about 268,000 for "garcia lorca"

[Federico Garcia Lorca in CyberSpain](#)  
Brief biography, plus text of "Lament for Ignacio Sanchez Mejias".  
[www.cyberspain.com/passion/lorca.htm](http://www.cyberspain.com/passion/lorca.htm) - 13k - [Cached](#) - [Similar pages](#)

[Federico Garcia Lorca](#)  
Five poems and a short introduction to the life and work of Lorca.  
[boppin.com/lorca/](http://boppin.com/lorca/) - 8k - [Cached](#) - [Similar pages](#)

[Pagina de Federico Garcia Lorca](#) - [ [Translate this page](#) ]  
... Federico Garcia Lorca es de ningún partido político, pero un artista moderno es, por definición (se piensa al concepto del 'arte degenerado'), ...  
[home.tiscali.be/ericlaermans/cultural/fglorca.html](http://home.tiscali.be/ericlaermans/cultural/fglorca.html) - 12k - [Cached](#) - [Similar pages](#)

[Federico Garcia Lorca: ROMANCE SONAMBULO](#) - [ [Translate this page](#) ]  
... 4. ROMANCE SONAMBULO. A Gloria Giner ya Fernando de los Rios. Verde que te quiero verde. Verde viento, Verdes ramas. El barco sobre la mar ...  
[home.tiscali.be/ericlaermans/cultural/lorca/romancero\\_gitano/romance\\_sonambulo.html](http://home.tiscali.be/ericlaermans/cultural/lorca/romancero_gitano/romance_sonambulo.html) - 5k - [Cached](#) - [Similar pages](#)

[Federico Garcia Lorca](#)  
Biography of Spanish dramatist and poet Federico Garcia Lorca, plus links to all of his works currently in print.  
[www.imagi-nation.com/moonstruck/cisc67.html](http://www.imagi-nation.com/moonstruck/cisc67.html) - 16k - [Cached](#) - [Similar pages](#)

[FREDERICO GARCIA LORCA, POET, ARTIST, MARTYR](#)  
Federico Garcia Lorca, Poet, Artist, Martyr of the Spanish Civil War 1936-1939.  
[www.geocities.com/CapitolHill/9820/lorca.html](http://www.geocities.com/CapitolHill/9820/lorca.html) - 9k - [Cached](#) - [Similar pages](#)

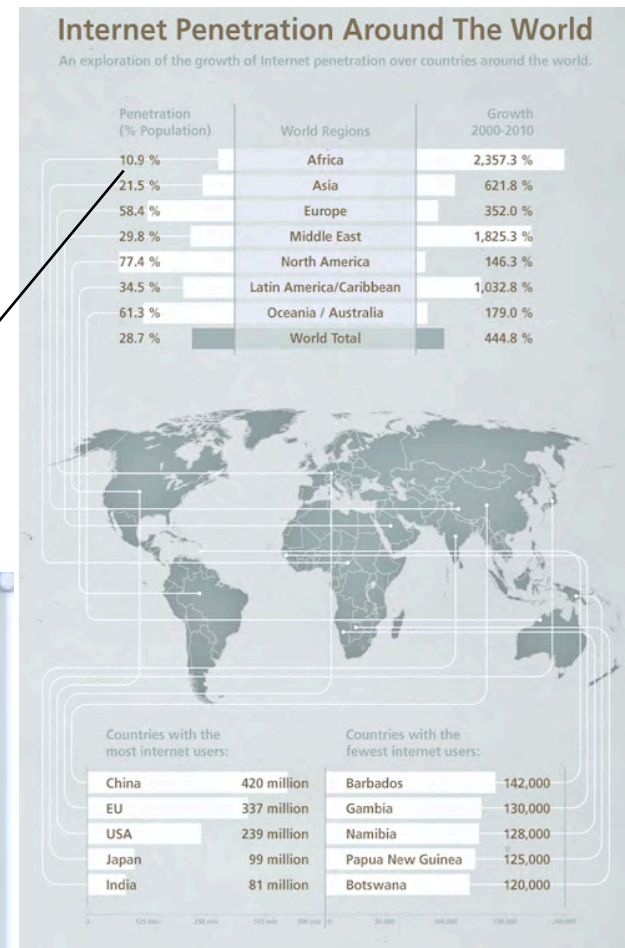
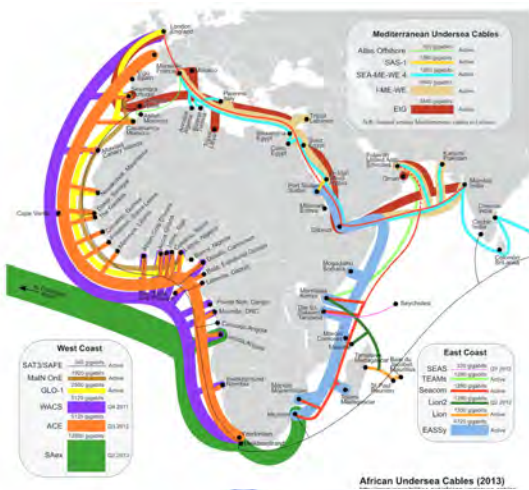
[Federico Garcia Lorca](#)  
Brief biography, plus selections of his poetry from "Lorca's Grave", "Recycled Words", and "Blow, Man, Blow!".  
[members.aol.com/mwpress/lorcablo.html](http://members.aol.com/mwpress/lorcablo.html) - 4k - [Cached](#) - [Similar pages](#)

Done



# The Internationalization of the Web, 1

Growth is fastest in developing world:



Музеј 25. мај  
Ботићева 6

Glavna nagrada  
VW Golf VI !

# ПОЛИТИКА ONLINE

3а четвртак 07. мај 2009

ПОЧЕТНА О НАМА ИМПРЕСУМ ОГЛАШАВАЊЕ АРХИВА

ВЕСТИ БАН КИ-МУН ИМЕНОВАО НОВОГ ШЕФА БЕЗБЕДНОСТИ

У петак се очекује  
решење око  
штрајка

Пут у ЕУ нема везе  
са Косметом

Од недеље рад  
на Коридору 10

СВЕТ  
ПОЛИТИКА  
ДРУШТВО  
ТЕМА ДАНА

ПОГЛЕДИ  
Владимир Голорџ  
ЕКОНОМИЈА  
ХРОНИКА  
СПОРТ  
КУЛТУРА

ШТА ДА СЕ РАДИ?

ЕКОНОМИЈА  
Јужни ток кроз Србију – 400 километара

# Space for Smaller Languages

Web encourages the spread of English....  
And maintenance and spread of smaller national, regional, and ethnic languages

פֿאַרווערטס

1897 יעדן טאג אין אַ פֿאַרשפּאַרע

May 1st, 2009

HELP | אַבאָנעמענט | דאָיאַ | וועג אונדז | וועגן זייט | 2009 ער מײַ

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פֿאַרווערטס  
ייִדיש־וועלט  
פּובליציסטיק  
נייעס  
קהילה לעבן  
רעליגיע  
קולטור  
געשיכטע  
פֿאַטאָגראַפֿיע  
משפּחה  
פֿאַרשידנס  
בריוו פֿון לייענער  
אַנאָנסן  
אַבאָנעמענט  
אַרכיוו

לייענער ווייטער  
קאָנט  
May 1st, 2009

די ייִדיש־וועלט פֿון דער פֿאַטאָגראַפֿע דזשאָן ראָט  
(נייריאַרק)

ווער עס קומט אויף ייִדישע אונטערנעמונגען אין ניו יאָרק, זעט די פֿאַטאָגראַפֿע דזשאָן ראָט ביי דער אַרבעט. אָדער מיט איר ווידעאָ־אַפֿאַרט, אָדער מיט איר פֿאַטאָ־אַפֿאַרט, אָדער מיט בידע, כאַפּט זי אַפֿ די

Dijous  
7 de maig del 2009

# EL PUNT.CAT

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Eleccions europees TOTA LA INFORMACIÓ SOBRE LES ELECCIONS 7 de juny 2009

BARCELONA

PAISOS CATALANS

EUROPA

La Moreneta és blanca

L'estudi sobre el Roine desaconsella el transvasament perquè és car i problemàtic

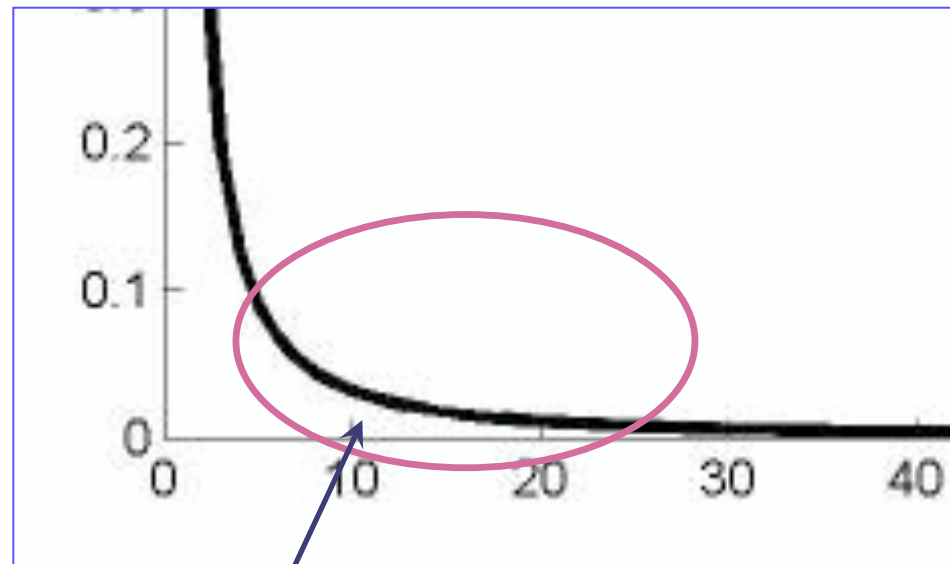
«Agur», l'ba

7/05/09 02:00 - INFRASTRUCTURES I SERVEIS - BARCELONA



## Where the action is:

The middle range of the powerlaw curve



South of Wilshire





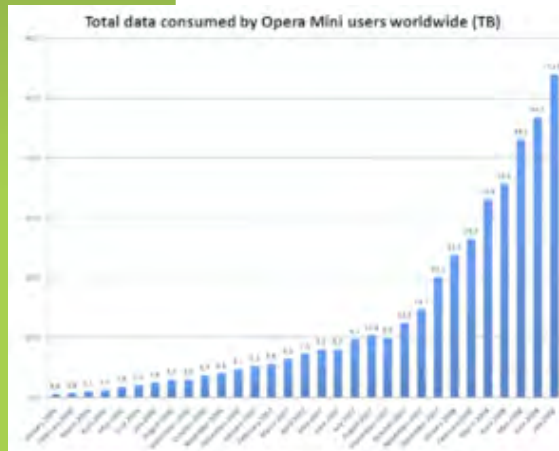
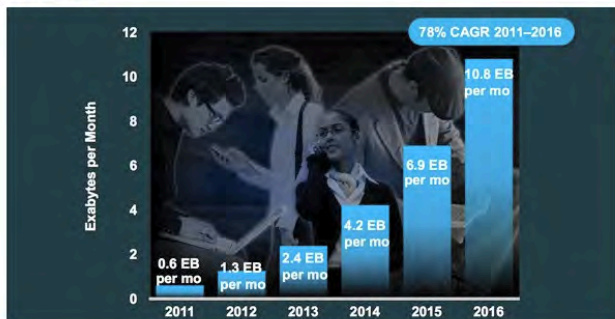
# Faster than we expected

## Cisco: mobile connections to hit 10 billion by 2016

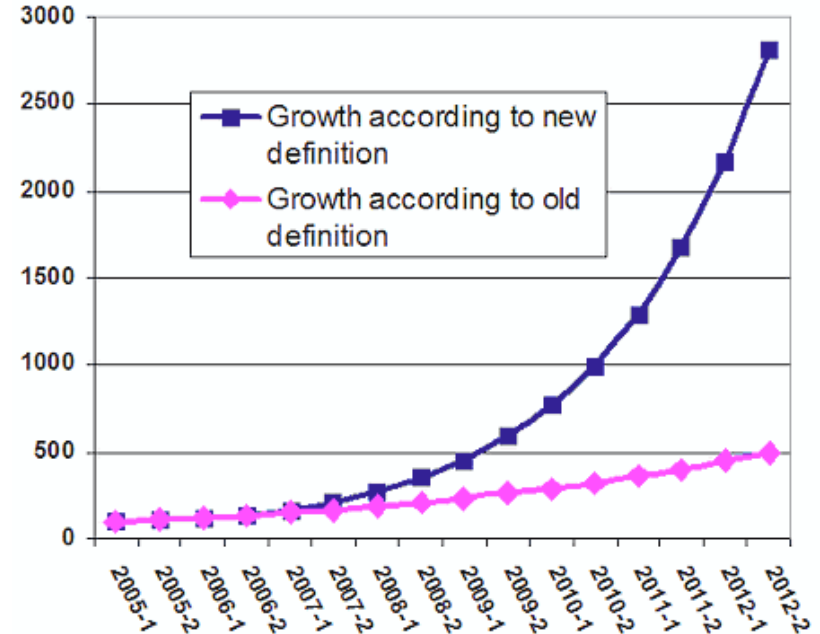
By: Dan Graziano | Feb 15th, 2012 at 12:30AM

0 Comments

Filed Under: [Mobile](#)



## Chinese Internet Users - 2 Growth Scenarios



**AMD: By 2015 half of world will have an Internet connection**



## ...and not so fast

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But in much of world, desire for connectivity creates preference for fixed connections



Internet Café,  
Accra, Ghana



## Next Time

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Required reading:

Auletta, Ken. 2010. "Publish or Perish." *The New Yorker*, April 26.

Additional:

Darnton, Robert. "Google and the Future of Books," *The New York Review of Books*, Feb. 12, 2009.





## Assignment for 4/17

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Auletta writes: “Amazon seems to believe that in the digital world it might not even need publishers at all.” Twentieth-century publishers generally performed several tasks: they have been gatekeepers who selected the most authoritative or readable works; they have been editors who checked, edited, and corrected manuscripts; they have handled production and design of volumes and overseen printing; they have marketed books, helping them to find their appropriate audience; they have distributed books to bookstores; and they have handled publicity and advertising.

In a digital world, is it necessary to have a separate firm or organization to perform these functions? If so, do you see a continuing role for publishers in some of these functions, or can they be undertaken by someone else? Be sure to make *specific* reference to the discussion in Auletta’s article of the roles of publishers and how they are now being questioned.