

# HISTORY OF INFORMATION: THE INTERNET

Megan Finn – Lecture 14 – 05 Aug 2009

“But it did occur to me that there was a lot more money in bullshit than there had been in bulls and I would get into information. And here I am.”

John Perry Barlow, quoted from Turner  
*From Counterculture to Cyberculture*. 2006

## HISTORY OF INFORMATION: THE INTERNET

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# Leading up to today...



## □ Trends:

### □ Communication practices

- Postal service – expectation that you can be contacted

### □ Laying down lines

- The telegraph and telephone cross the country into the most rural areas

### □ Workstations

- Buckland – ideal of the “workstation” as a place to access knowledge

### □ Networked working

- Anno – the organization of the firm in Silicon Valley



# The machine



“But we're a bunch of raw materials that don't mean to be -- have any process upon us. Don't mean to be made into any product! Don't mean -- Don't mean to end up being bought by some clients of the University, be they the government, be they industry, be they organized labor, be they anyone! We're human beings!

And that -- that brings me to the second mode of civil disobedience. **There's a time when the operation of the machine becomes so odious, makes you so sick at heart that you can't take part! You can't even passively take part! And you've got to put your bodies upon the gears and upon the wheels, upon the levers, upon all the apparatus -- and you've got to make it stop!** And you've got to indicate to the people who run it, to the people who own it -- that unless you're free the machine will be prevented from working at all!!”

-Mario Savio,

... and the machine



# Freakonomics



**The Hidden Side of Everything**

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February 15, 2008, 1:18 PM

## Is MySpace Good for Society? A Freakonomics Quorum

By [STEPHEN J. DUBNER](#)

## How did we get here?

“But it did occur to me that there was a lot more money in bullshit than there had been in bulls and I would get into information. And here I am.”

John Perry Barlow, quoted from Turner  
*From Counterculture to Cyberculture*. 2006

# Framing: What is the internet?

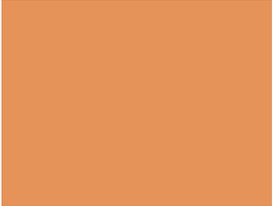


- “Information space” Berners-Lee
- Social space: “virtual community” Rheingold
- Work space: “commons-based peer production” Benkler

# 3 [terribly brief artificially separated] histories

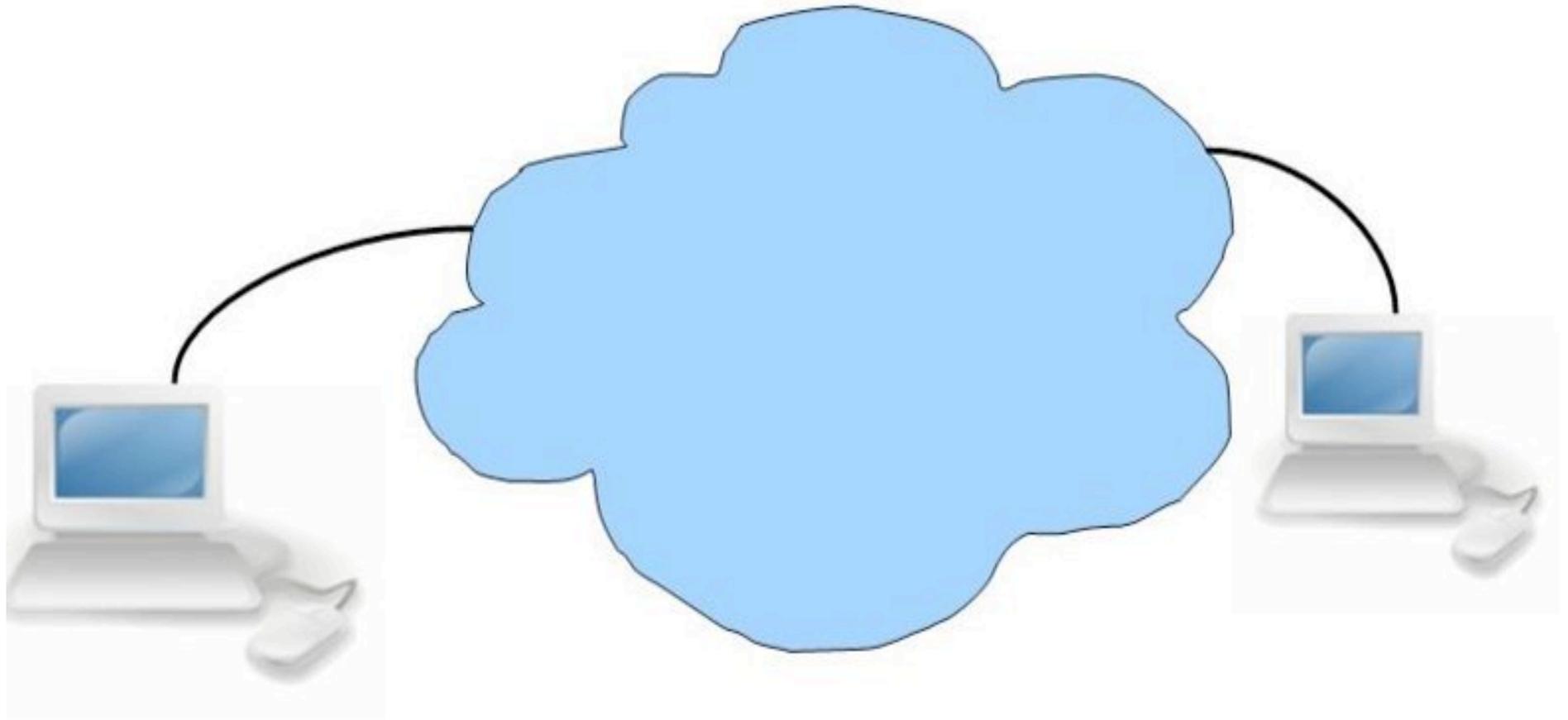


- Networking
  - ▣ Unstacking the network stack
- “Social software”
  - ▣ The development of uses of the Internet
- Open Source
  - ▣ One “worldwide” peer production network?

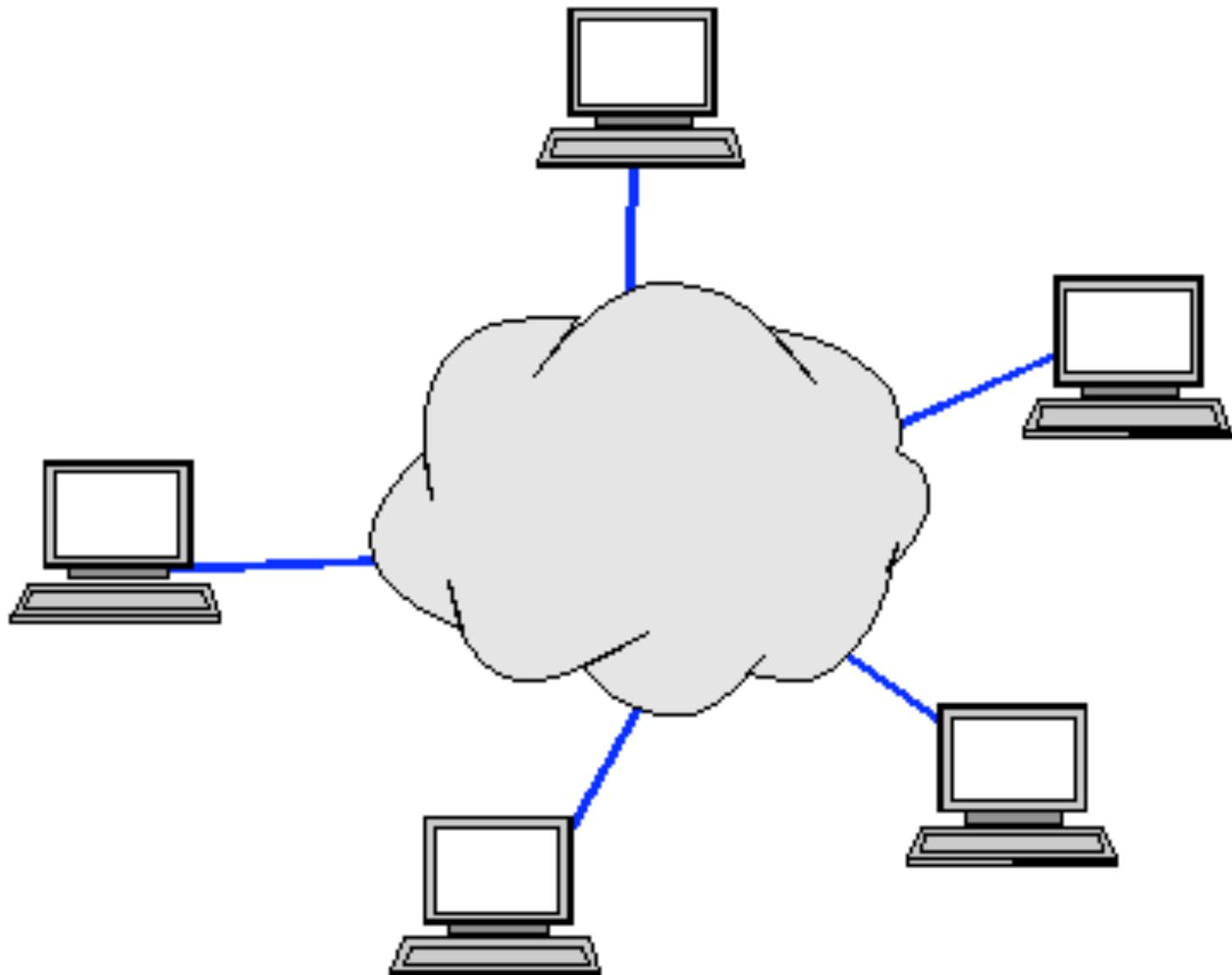


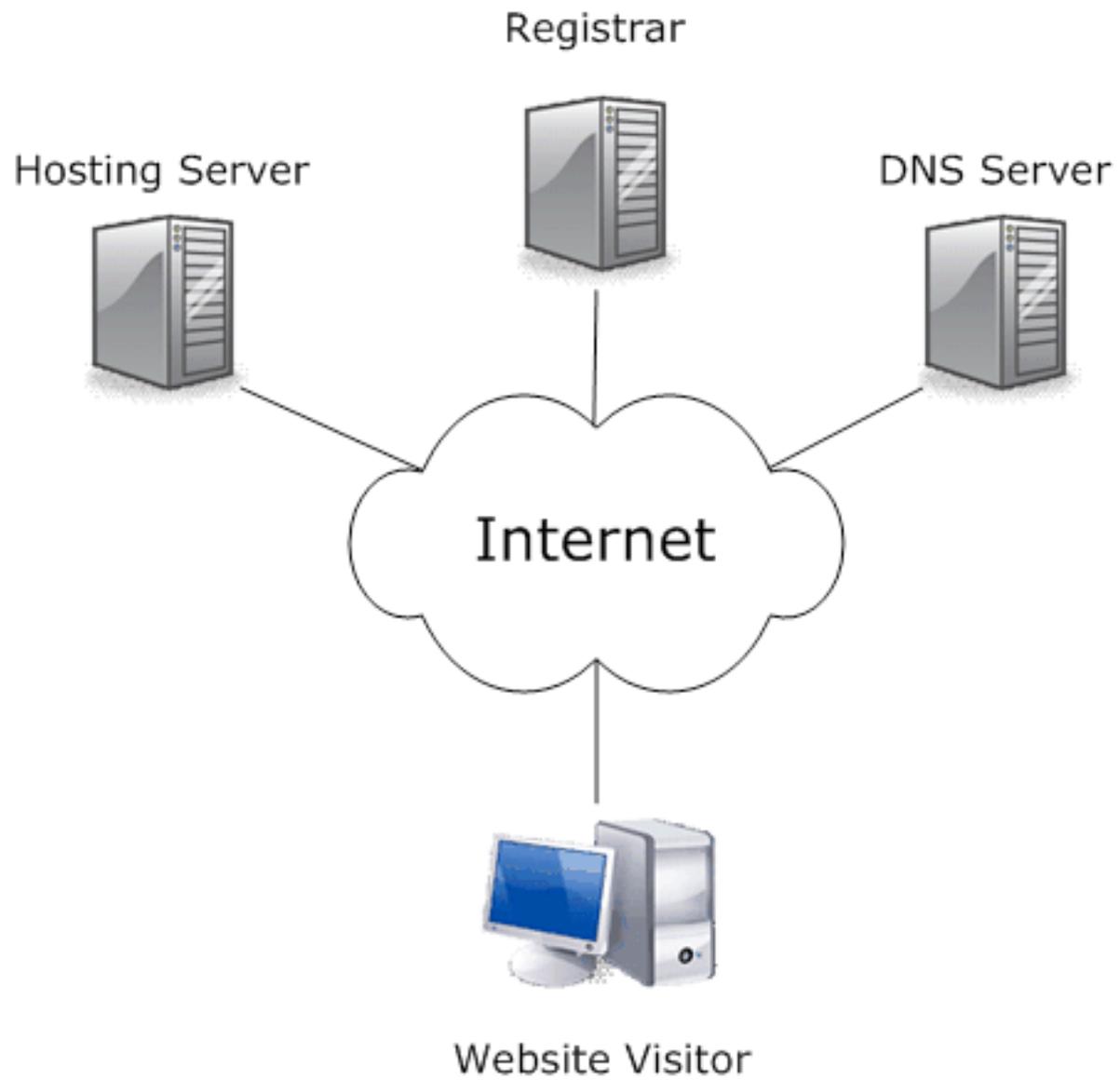
# Information space

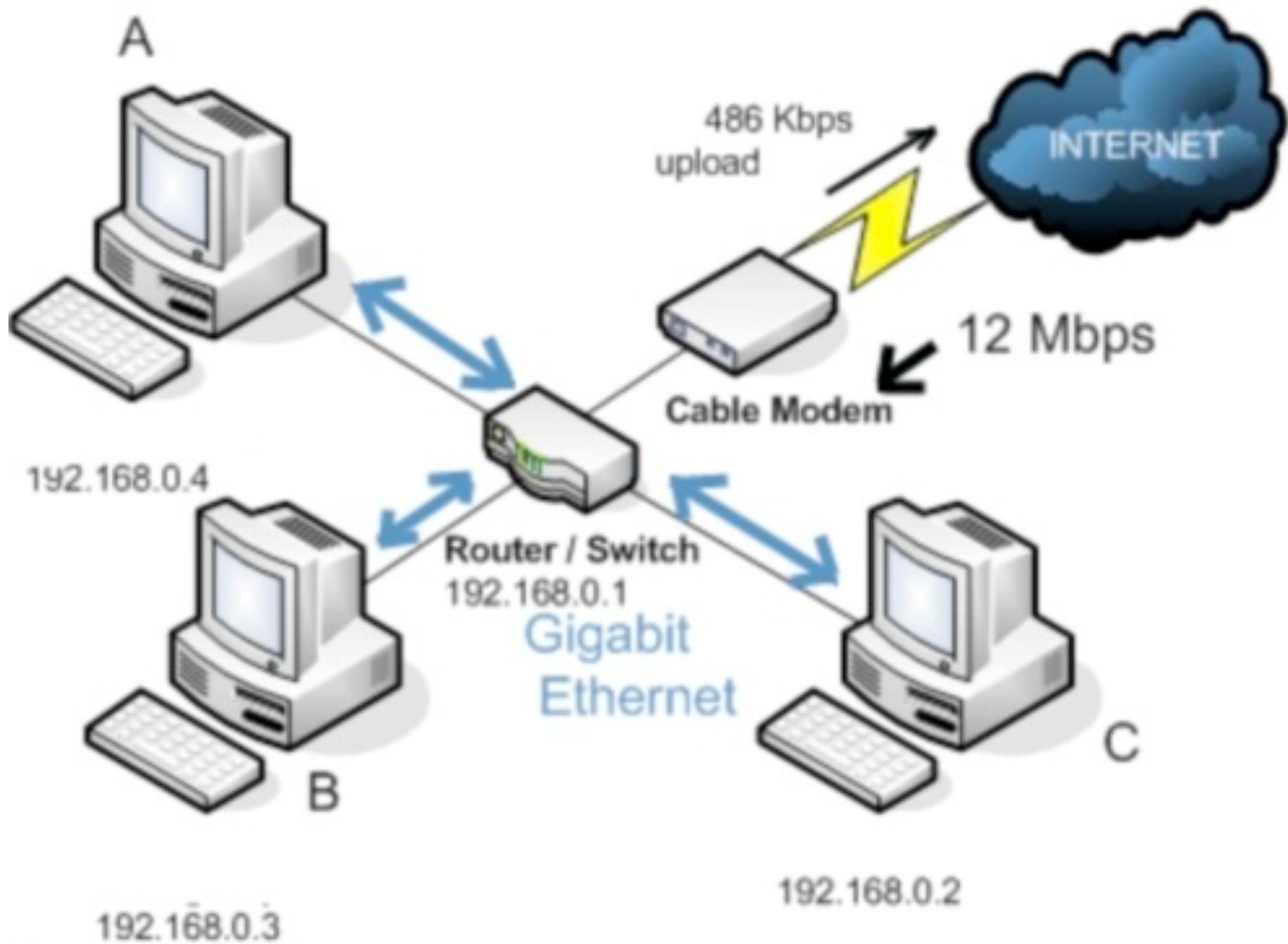
Networking history



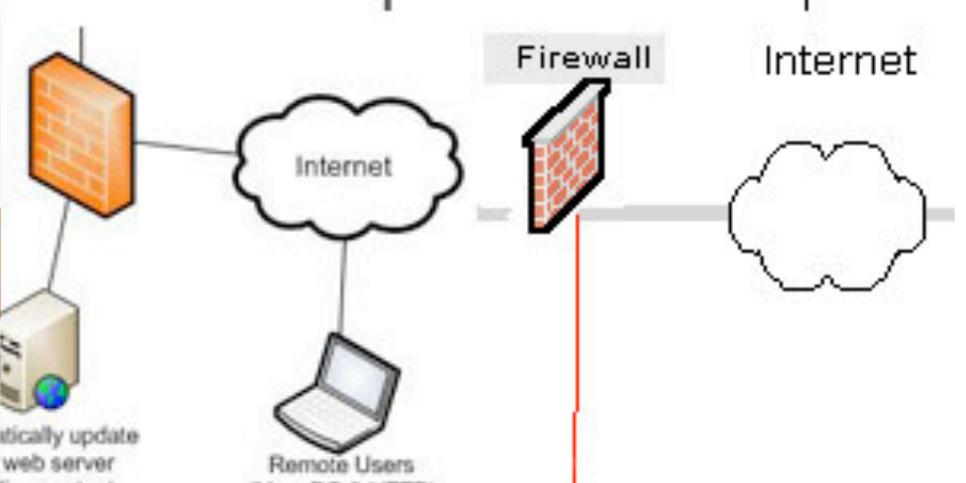
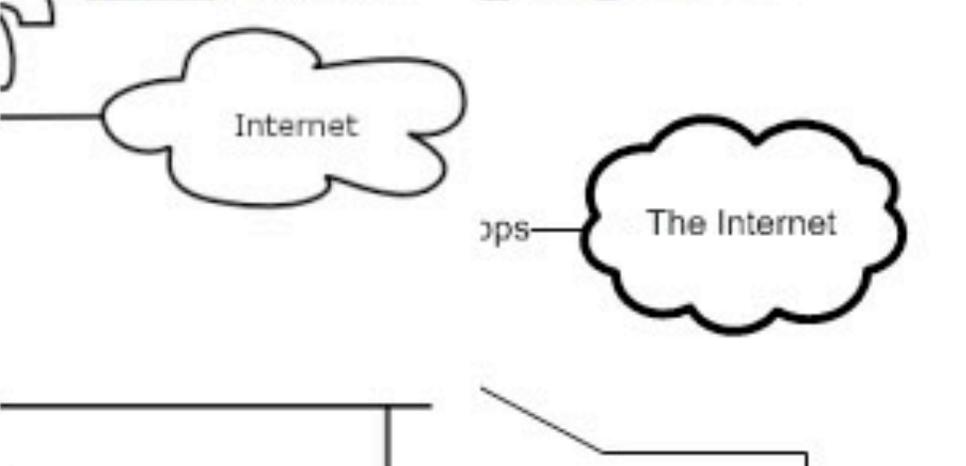
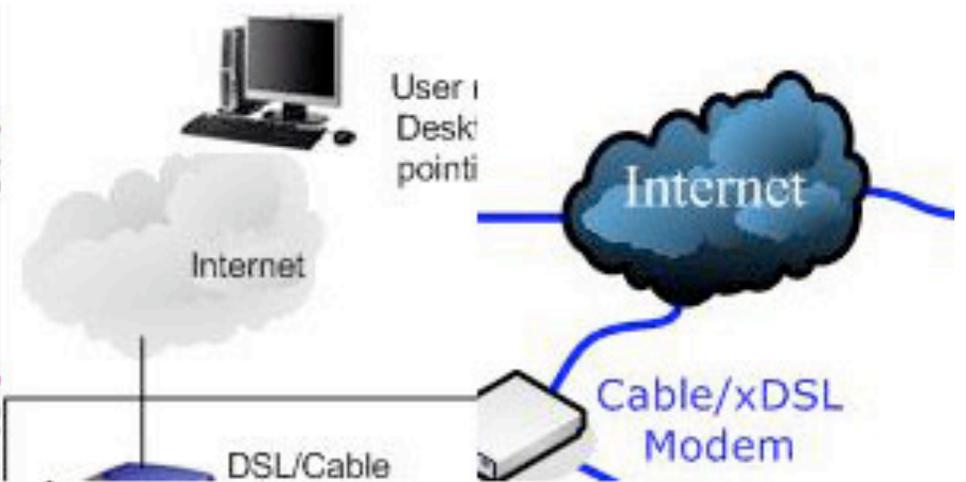
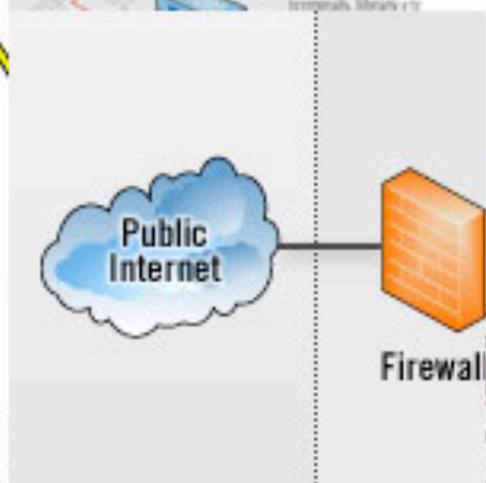
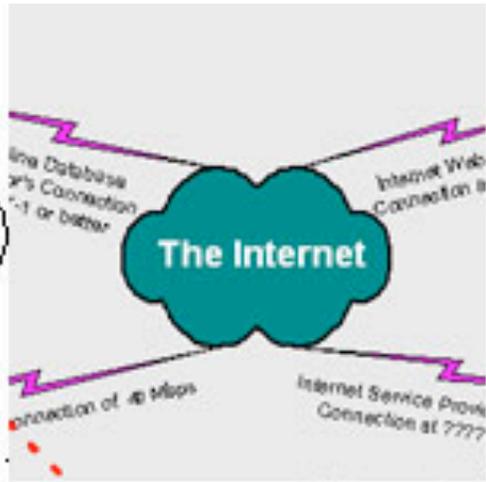
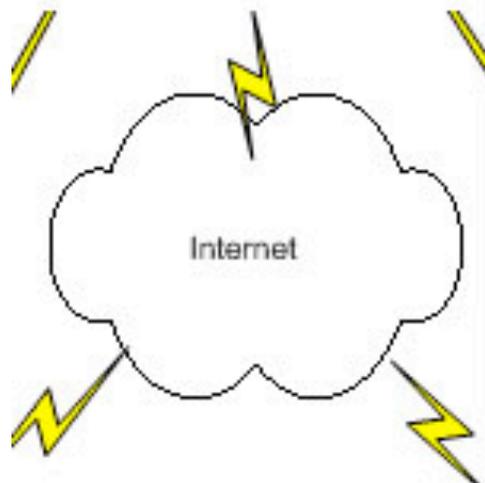
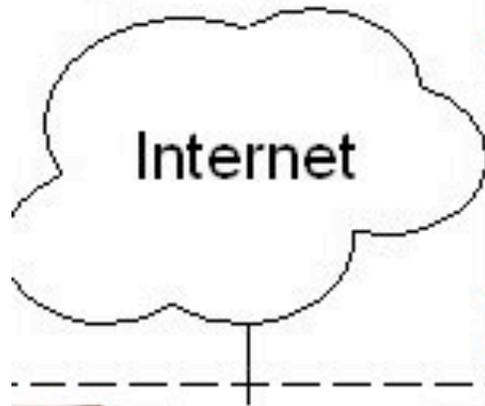
From Computer Desktop Encyclopedia  
© 1998 The Computer Language Co. Inc.





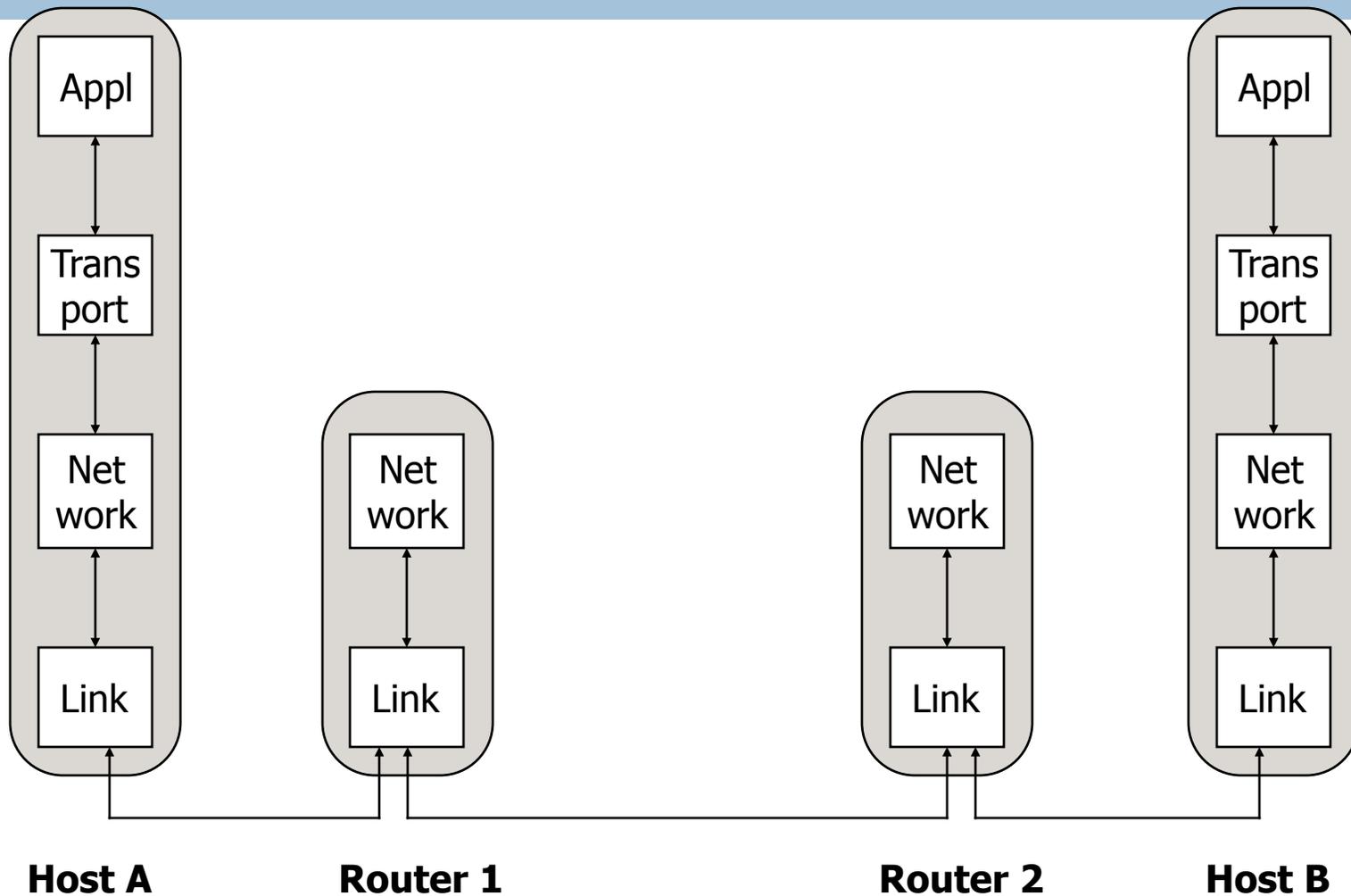


# DigitoxSpot



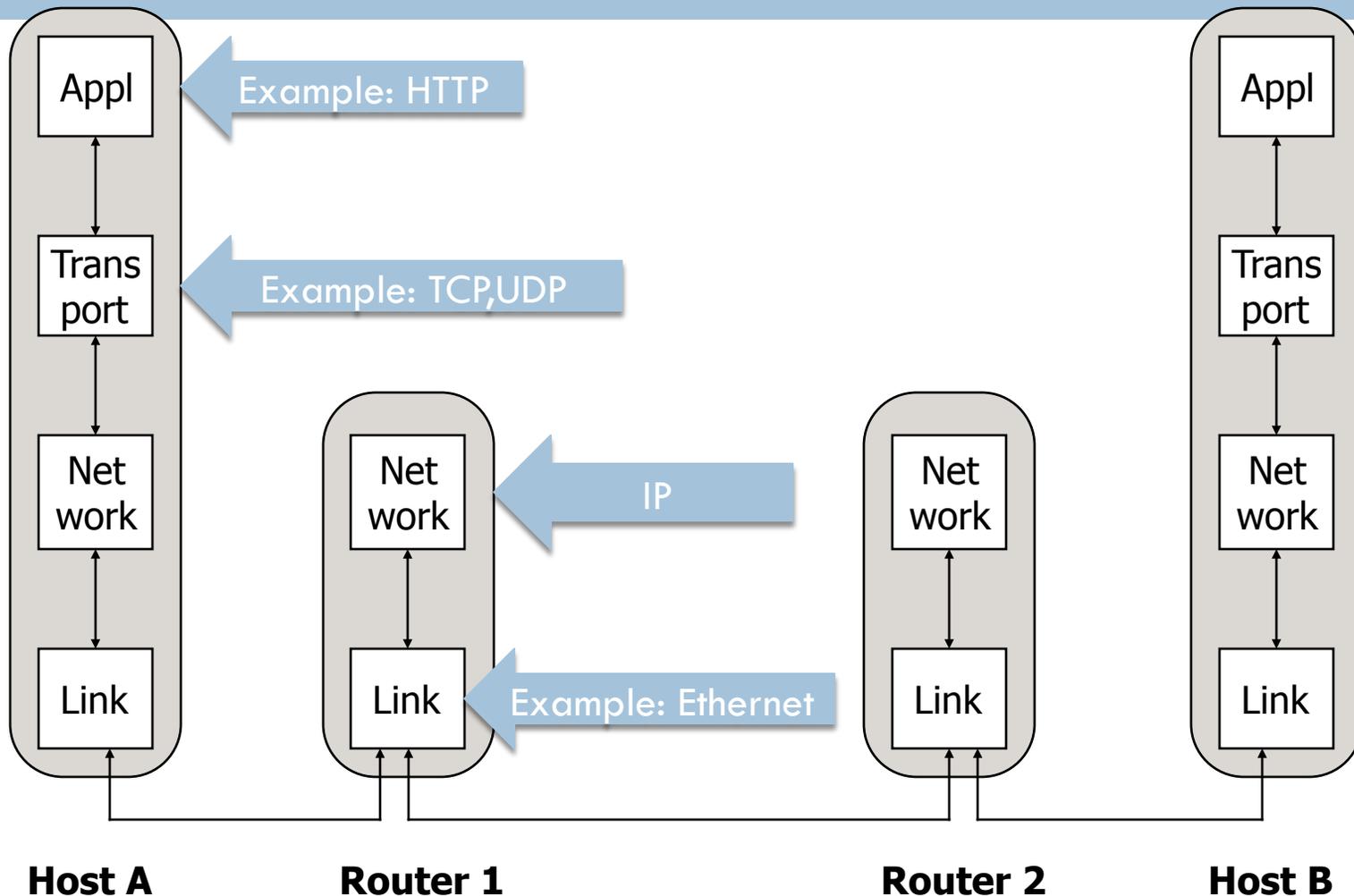
# What is going on? TCP/IP Model

16

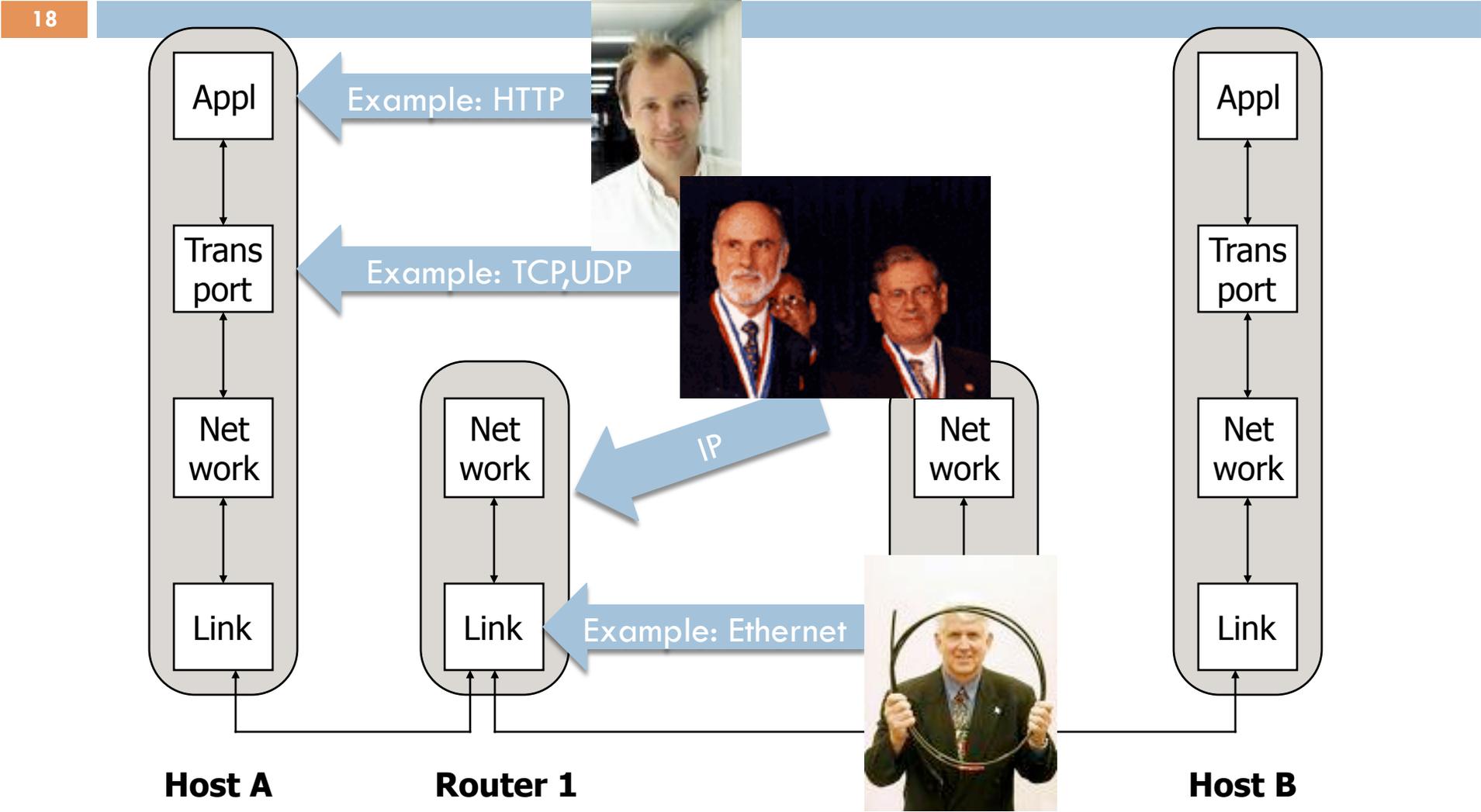


# Typical “web browsing” protocols

17

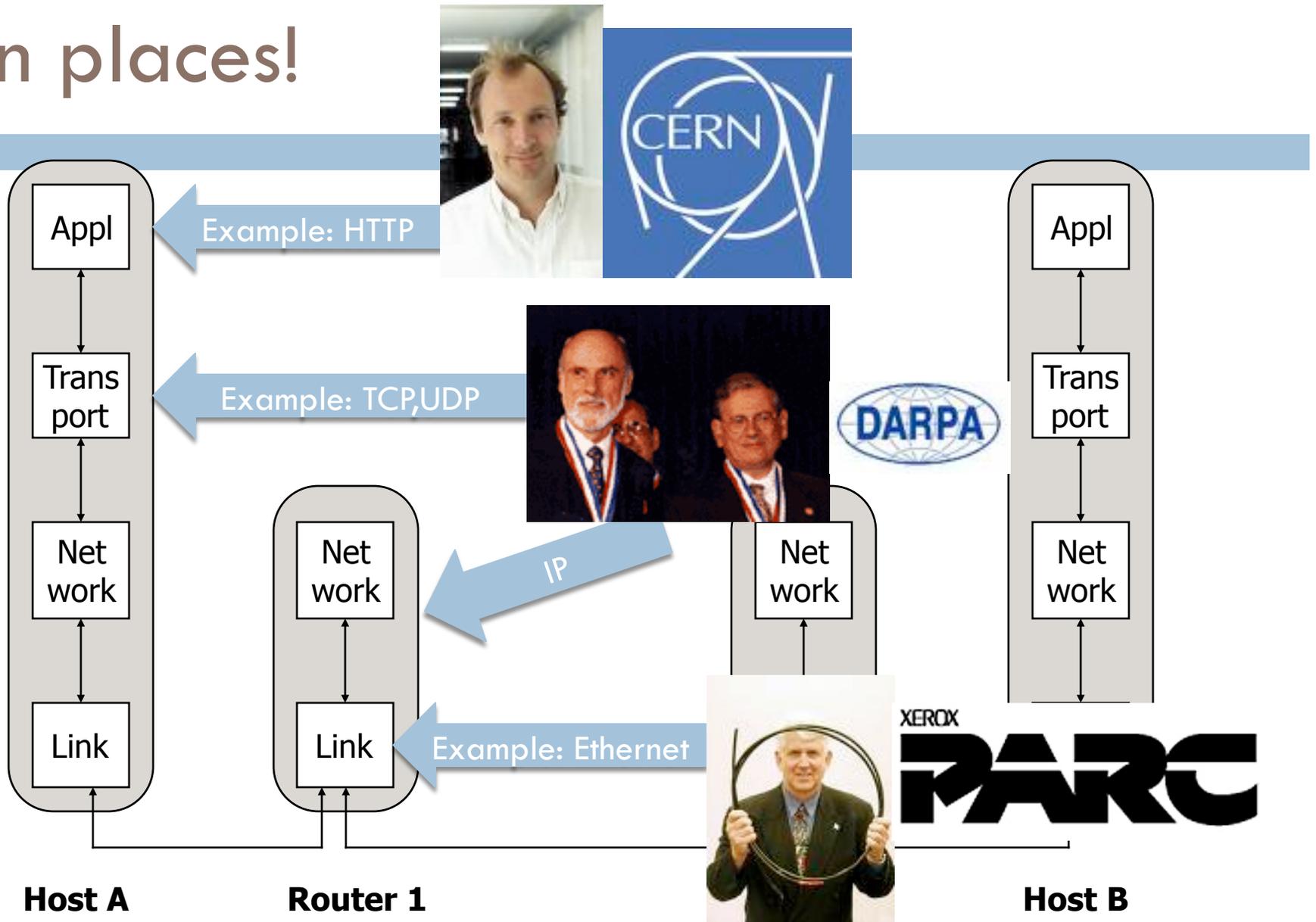


# The protocols were made by people!

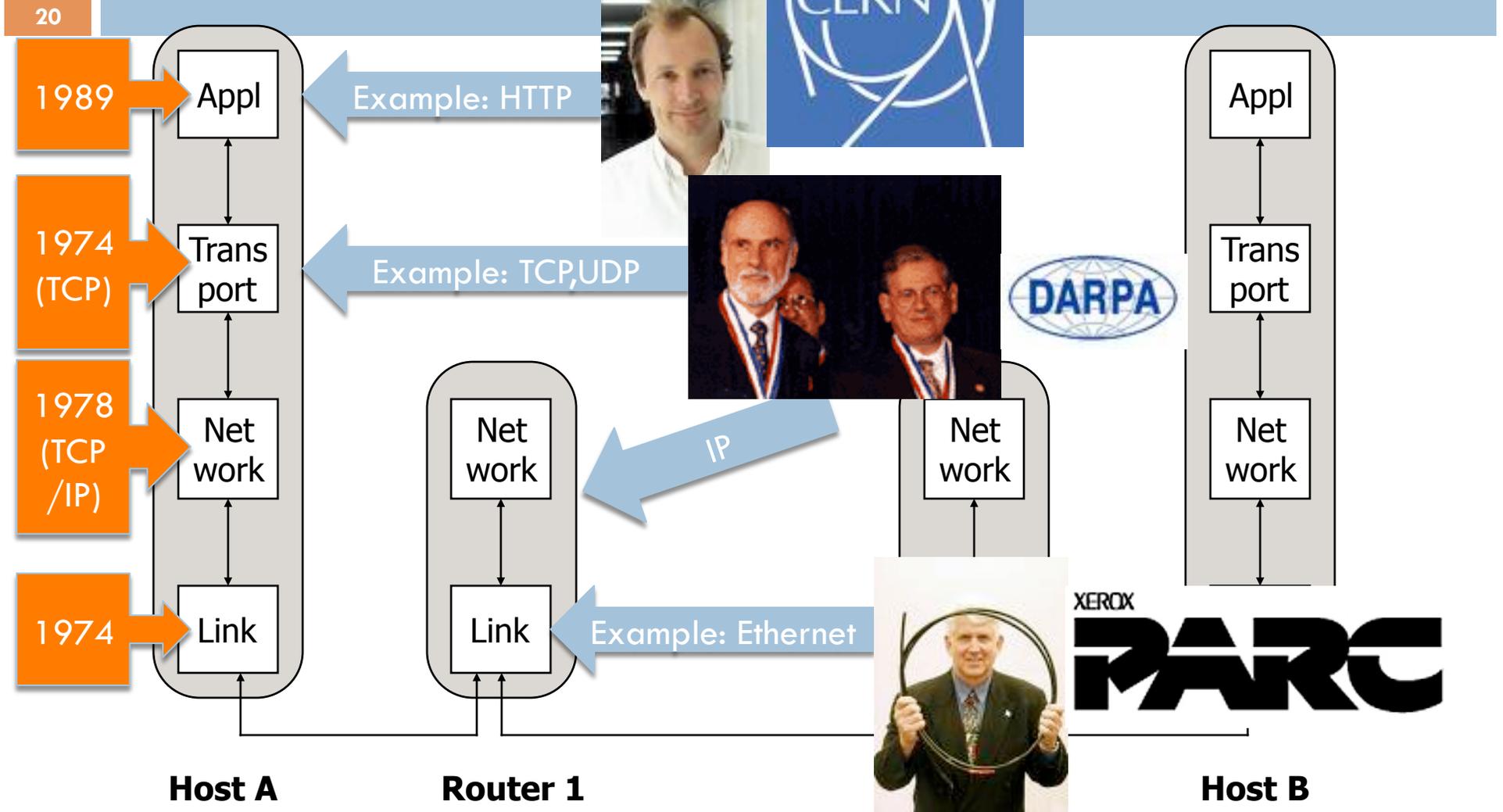


# In places!

19



# Over many years...



# Milestones



- 1969: ARPAnet
- 1971: File Transfer Protocol (FTP)
- 1974 TCP
- 1974: Ethernet
- 1978: TCP/IP
- 1980's: NSF funds national backbone
- 1980's: Commercial networks begin to emerge
- 1983: Domain Name System (DNS)
- Late 1980's: First Internet Service Providers emerge
- 1989: Australia, UK, Germany, Italy, etc. join Internet
- 1990: ARPANET shuts down
- 1991: NSF removes all restrictions on commercial use of Internet
- 1995: NSF discontinues support of infrastructure!
- 1998: Internet Corporation for Assigned Names and Numbers (ICANN)

## ARPAnet's story

“The protocols are widely used in the commercial and military environment, and have spawned a number of similar architectures. At the same time, its success has made clear that in certain situations, the priorities of the designers do not match the needs of the actual users.”

David D. Clark. *The design philosophy of the DARPA Internet protocols*. In Proceedings of ACM SIGCOMM, Stanford CA, August 1988.

# ARPAnet

- ~1958: Advanced Research Projects Agency (ARPA)
- 1969: Computers connected using packet-switching and phone lines
- UCLA->SRI->UCSB->University of Utah
- 1971: first email



Ray Tomlinson in 2001



Interface Message Processor and Leonard Kleinrock

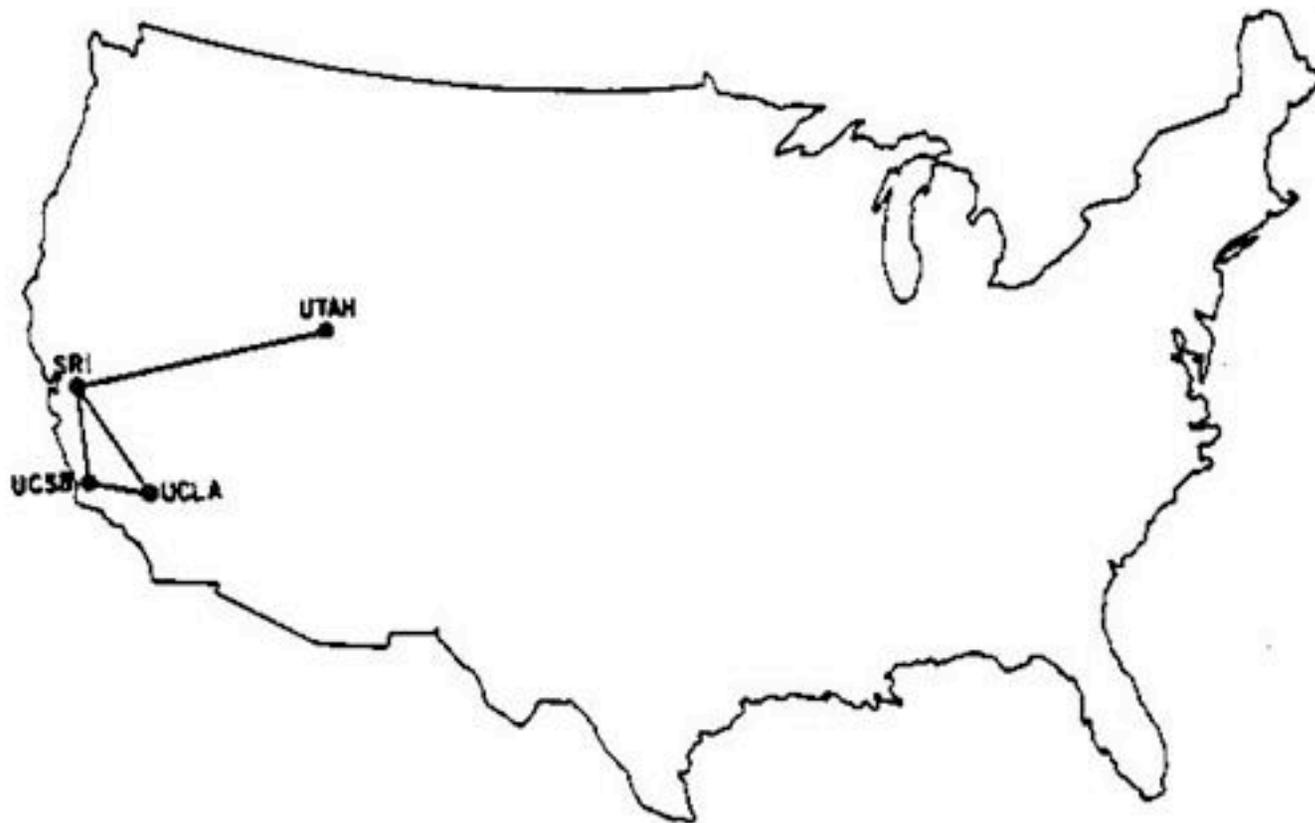
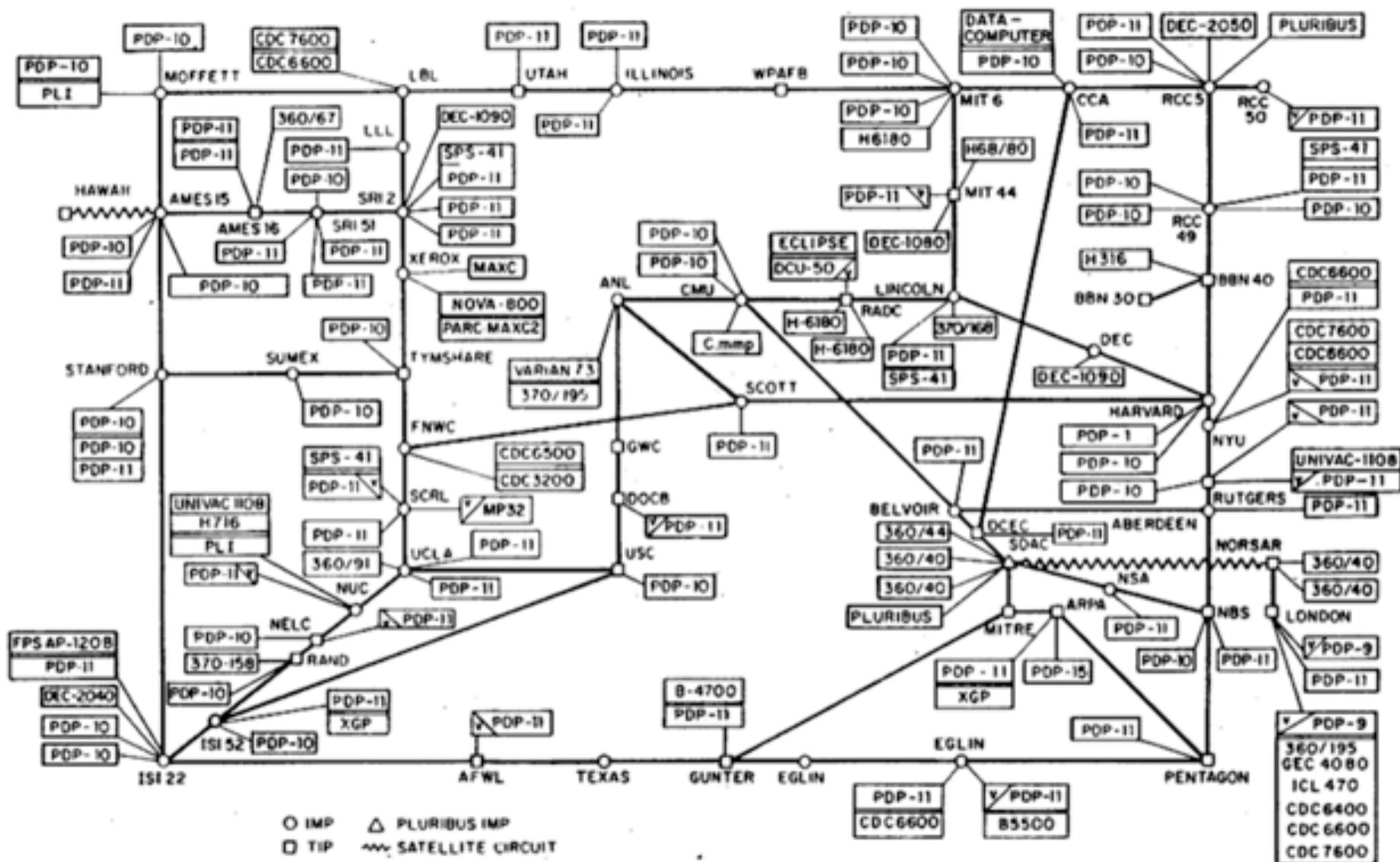


FIGURE 1: Map of ARPANET, 1969 (from <http://som.csudh.edu/cis/lpress/history/arpamaps/>). It was scanned by Larry Press from the ARPANET Completion Report, Bolt, Beranek and Newman, Burlington, MA, January 4, 1978.

# ARPANET LOGICAL MAP, MARCH 1977



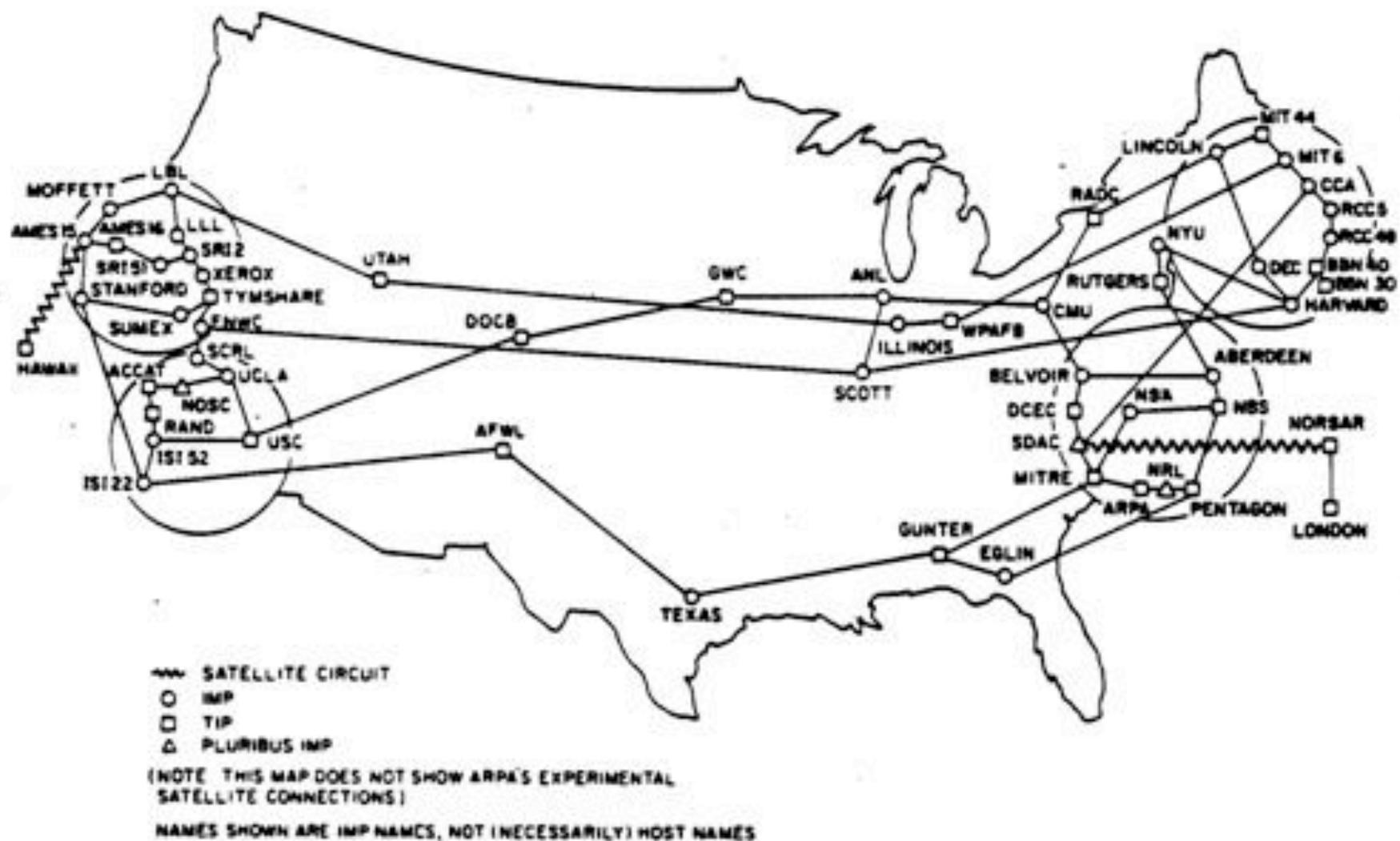


FIGURE 2: Map of ARPANET, July 1977 (from <http://som.csudh.edu/cis/lpress/history/arpamaps/>). It was scanned by Larry Press from the ARPANET Completion Report, Bolt, Beranek and Newman, Burlington, MA, January 4, 1978.

# Internet design goals

- 1. Internet communication must continue despite loss of networks or gateways.
- 2. The Internet must support multiple types of communications service.
- 3. The Internet architecture must accommodate a variety of networks.
- 4. The Internet architecture must permit distributed management of its resources.
- 5. The Internet architecture must be cost effective.
- 6. The Internet architecture must permit host attachment with a low level of effort.
- 7. The resources used in the internet architecture must be accountable.
- David D. Clark. *The design philosophy of the DARPA Internet protocols*. In Proceedings of ACM SIGCOMM, Stanford CA, August 1988.

# Challenges



- Security
- Mobility
- Reliability and availability
- Problem analysis
- Scalability
- Quality of Service
- Economics
- Anja Feldmann, “Internet Clean-Slate Design: What and Why?” ACM SIGCOMM Computer Communication Review 59 Volume 37, Number 3, July 2007

# The World Wide Web

*“Suppose all the information stored on computers everywhere were linked, I thought. Suppose I could program my computer to create a space in which anything could be linked to anything. All the bits of information in every computer at CERN, and on the planet, would be available to me and to anyone else. There would be a single, global information space.”*

Tim Berners-Lee. *Weaving the Web.*

# HTTP: Tim Berners-Lee



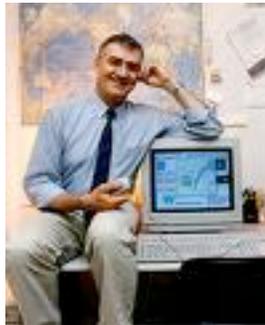
- “In addition to keeping track of relationships between all the people, experiments, and machines, I wanted to access different kinds of information, such as researcher’s technical papers, the manuals for different software modules, minutes of meetings, hastily scribbled notes, and so on... *document management system.*”
- Tim Berners-Lee. *Weaving the Web.*

# Hypertext



- "Hypertext" is non-sequentially linked pieces of text or other information. If the focus of such a system or document is on non-textual types (1) of information, the term hypermedia is often used instead. In traditional printed documents, practically the only such link supported is the footnote, so hypertext is often referred to as "the generalized footnote."
- "Hypertext'87 Trip Report" By Jakob Nielsen ACM SIGCHI Bulletin 19, 4 (April 1988), pp. 27-35.

# The network?



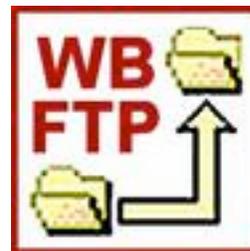
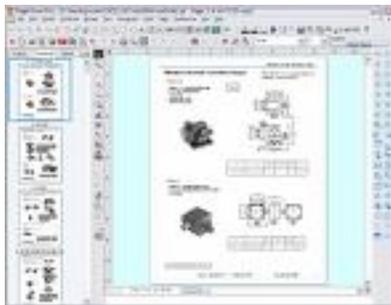
University of Wollongong



BROWN



digital



# HTTP: design feature



- “The system had to have one other fundamental property: It had to be completely decentralized. That would be the only way for a new person somewhere could start to use it without asking for access....”
- The “killer app” at CERN: the phone book.



## The internet as social space

“For all the utopian claims surrounding the emergence of the Internet, there is nothing about a computer or a computer network that *necessarily* requires that it level organizational structures, render the individual more psychologically whole, or drive the establishment of intimate, though geographically distributed, communities.”

-Turner, *From Counterculture to Cyberculture*. 2006

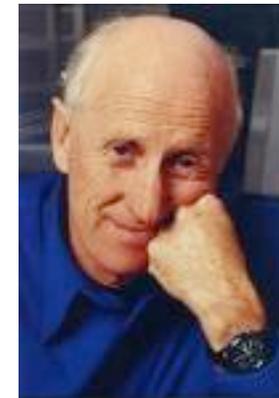
# The rise of social media



- ❑ 1978-79: Early MUDS (Multi-User Dungeons)
- ❑ 1979: Early BBSs (Bulletin Board services)
- ❑ 1980: USENET is conceived as “poor man’s ARPANET”
- ❑ 1985: Stewart Brand & Larry Brilliant found the BBS The WELL
- ❑ 1986: Matchmaker dating service begun as text-based BBS
- ❑ 1997: Slashdot created
- ❑ 1997 Sixdegrees.com
- ❑ 1998 Moveon.org founded.
- ❑ 2002 Meetup.com founded
- ❑ 2003: myspace founded,
- ❑ 2003: Second Life launched
- ❑ 2004: Facebook launched

# Turner's question

- “How was it, then, that computers and computer networks became linked to visions of peer-to-peer ad-hocracy, a leveled marketplace, and a more authentic self?”
- Turner, *From Counterculture to Cyberculture*. 2006
- Brand pulls together
  - ▣ Scientists from Stanford
  - ▣ Commune people
  - ▣ The art world



# Cybernetic beginnings... 1940s/1950s

- “This book argues that the integrity of the channels of internal communication is essential to the welfare of society. This internal communication is subject at the present time not only to the threats which it has faced at all times, but to certain news and especially serious problems which belong peculiarly to our age.”
- Norbert Wiener, *The Human Use of Human Beings*.
  - *Harnessing information*
  - *Science to heal humanity*
    - *The structure of work*

# Cybernetics to LSD

- “...Brand came to appreciate cybernetics as an intellectual framework and as a social practice; he associated both with alternative forms of communal organization...”
- “To the extent that they felt a sense of communion with one another, the sensation was brought about by the integration into a single techno-biological system within which, as Buckminster Fuller put it, echoing Norbert Wiener, the individual human being was simply another ‘pattern complex.’”
- Turner, *From Counterculture to Cyberculture*. 2006



# To *The Whole Earth Catalog*



- “As it links communes such as Drop City and the Lama Foundation to centers of high technology such as SRI and groups devoted to techno-social exploration, such as USCI and the Pranksters, the *Catalog* also facilitates the blending of their symbolic repertoires. Out of this blending, there emerged the image of a new kind of person, one who moved from task to task pursuing information and using technical tools in an experimental manner for the advancement of himself or herself and society.... It also modeled and offered access to new ways of being in community.”
- Turner, *From Counterculture to Cyberculture*. 2006

# To the WELL



- “the [*Whole Earth*] *Software Catalog* succeeded in introducing new networks of technology journalists and technology developers to the Whole Earth community and in turning the Whole Earth network’s collective gaze toward the digital horizon.”
- “the WELL became not simply a computer conferencing system but a way to recreate the countercultural ideal of a shared consciousness in a new ‘virtual community’”
- Turner, *From Counterculture to Cyberculture*. 2006

# To *Wired*, GBN, Media Lab



- “Kevin Kelly became executive editor of *Wired* magazine. In that capacity, he helped turn the social networks that he and Brand had helped create into symbols of the rise of a newly networked social order and evidence for the counterculture potential of the Internet and the World Wide Web.”
- Turner, *From Counterculture to Cyberculture*. 2006

## The internet as a work site

“Commons-based peer production is a socio-economic system of production that is emerging in the digitally networked environment. Facilitated by the technical infrastructure of the Internet, the hallmark of this socio-technical system is collaboration among large groups of individuals, sometimes in the order of tens or even hundreds of thousands, who cooperate effectively to provide information, knowledge or cultural goods without relying on either market pricing or managerial hierarchies to coordinate their common enterprise.”

-Benkler and Nissenbaum. “Commons-based Peer Production and Virtue” *The Journal of Political Philosophy*: Volume 14, Number 4, 2006, pp. 394–419

# To the Internet



- “Analysts have often argued that the shift to knowledge-based forms of production and flatter forms of organization either began or sped up dramatically at about the time Bell was writing [in 1973]. However, the history of Stewart Brand and the Whole Earth group serves as a reminder that many of the qualities associated with postindustrial society and its subsequent analytical incarnations in fact appeared earlier, in the in the military-industrial-academic research collaborations of WWII and the cold war.”
- Turner, *From Counterculture to Cyberculture*. 2006

# What is open source?



# Open Source



- 1977: BSD (Berkeley Software Distribution)
  - [“From the moment I became involved in the creation of new technologies, their ethical dimensions have concerned me, but it was only in the autumn of 1998 that I became anxiously aware of how great are the dangers facing us in the 21st century.” Bill Joy “The Future doesn’t need us” *Wired*. 2000]
- 1983: GNU manifesto
  - “GNU, which stands for Gnu's Not Unix, is the name for the complete Unix-compatible software system which I am writing so that I can give it away free to everyone who can use it. Several other volunteers are helping me. Contributions of time, money, programs and equipment are greatly needed.... Many programmers are unhappy about the commercialization of system software.”  
Stallman
- 1991: Linux
  - “Hello everybody out there using minix - I'm doing a (free) operating system (just a hobby, won't be big and professional like gnu)... I'd like to know what features most people would want. Any suggestions are welcome, but I won't promise I'll implement them :-)” Linus (torvalds@kruuna.helsinki.fi)

# open source beyond software

- "The emergence of free and open-source software, and the phenomenal success of its flagships, the GNU/Linux operating system, the Apache Web server, Perl, and many others, should cause us to take a second look at this dominant paradigm.... nonmarket production in general and **peer production in particular are phenomena of much wider application** than free software, and exist in important ways throughout the networked information economy"
- Yochai Benkler, *Wealth of Networks*. 2006
- → Wikipedia, Mechanical Turk, SETI@home, YouTube? Google?

# Concerns



- The fusion of spheres
- Virtue and vice
- Reordering work practices
- Inclusion
- Hidden institutions

# The fusion of spheres

wasting time  
with philip and michael AT WORK



WIKIPEDIA  
The Free Encyclopedia

home search global  
(This is you)

**Information**

**Account Info**  
Name: Kathryn Orland  
Member Since: August 2, 2005  
Last Update: November 15, 2005

**Basic Info**  
Location: Seattle, WA  
School: Oregon SS  
Status: Alumni/Alumna  
Sex: Female  
Concentration: Journalism: Magazine  
Japanese  
\$124,198.00  
Bellevue, WA 98008  
Newport High School '00

**Contact Info**  
Looking For: Whatever I can get  
Interested In: Women  
Relationship Status: In a Relationship  
Political View: Liberal  
Interests: Photography, computers, hiking, video.

**Personal Info**  
Looking For: Whatever I can get  
Interested In: Women

**Professional Info**  
Site: King star at 303.com.org



Facebook is your online home.



**Build Your Personal Brand by Working for Free**

GET OUT OF WORK  
"FREE"

Play the card... get the boot



Virtue?



□ Slide credit: Ryan Shaw

Photo by Chance Heath, <http://flickr.com/photos/83664946@N00/132100361/>

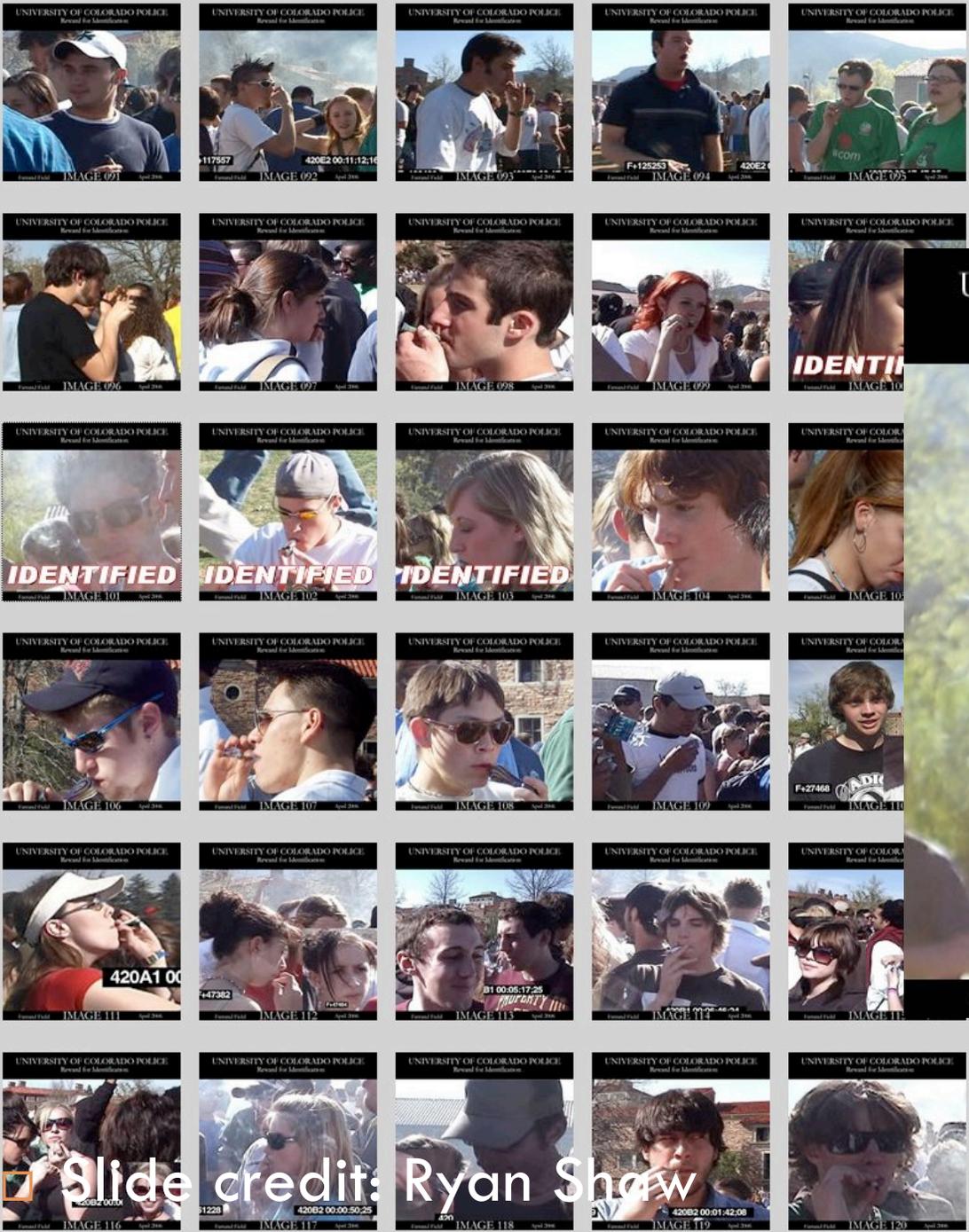


Slide credit: Ryan Shaw

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From the “420 Photo Album” at the CU-Boulder Police Department website



UNIVERSITY OF COLORADO POLICE  
Reward for Identification



Farrand Field IMAGE 101 April 2006

From the "420 Photo Album" at  
the CU-Boulder Police Department  
website

# Virtue?

collaboration among large groups of individuals, sometimes in the order of tens or even hundreds of thousands, who cooperate effectively to provide information, knowledge or cultural goods

□ Slide credit: Ryan Shaw

Photo by Chance Heath, <http://flickr.com/photos/83664946@N00/132100361/>

# Hidden institutions



- “The university, too, helped give us Linux and Facebook, and no doubt much of the love on Wikipedia. In the end, the unnoticed resilience of the university that runs through this account of revolution can give a feeling that we are replacing the social manifestations of a fifteenth-century technology with an eleventh century institution and calling the whole thing progress.”
  - ▣ Duguid, 2007, review of *Here Comes Everybody*

# Inclusion



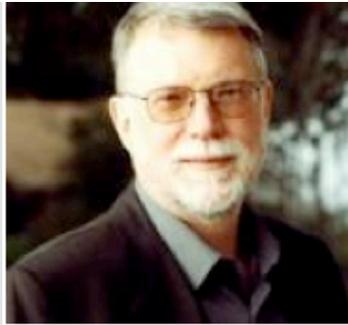
Jimmy Wales



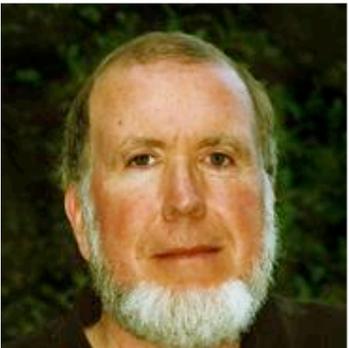
John Battelle



John Markoff



John Seely Brown



Kevin Kelly



Lawrence Lessig



Malcolm Gladwell



Randall E. Stross



# Reordering work practices



- “Wikipedians have independently arrived at some of the same governance answers as in offline communities... A large part of the increase in coordination and regulation efforts in Wikipedia is due to the need of defining quality standards and assuring quality control in entries. ”
- “The Hidden Order of Wikipedia” Fernanda B. Viégas, Martin Wattenberg, and Matthew M. McKeon

## A conclusion

Work + social + INFORMATION = ?

“cultural entrepreneurship in the Network Mode”

Turner, *Cyberculture to Counterculture*. 2006

# Turner: Counterculture to cyberculture

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- “By imagining the world as a series of overlapping information systems, and by deploying that imagination in particular organizational and media forms, Brand and his Whole Earth colleagues ultimately preserved certain New Communalist ideals long after the movement had faded away. They did so by creating a series of forums within which those ideals, and the social networks in which they lived, could be linked to emerging technologies and new centers of economic power.”

# Announcements

The next quiz: group feedback

The final essay

Class Friday

# DUE TOMORROW 8/6 AT 10AM



- subject line "group project feedback"
- For example, you might send us something like this:
  - group member 1: 20%
  - group member 2: 35%
  - group member 3: 20%
  - group member 4: 25%
- You can accompany this with an explanation, but it is not necessary.
- Your email will not be shared with anyone