

History of the Internet

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Objectives

1. Discuss the developments that led to the modern Internet
2. Discuss how the world wide web was created
3. Describe the basic architecture of the Internet
4. Describe the values of those who help develop the Internet and how these values effect sociological discussions of the Internet

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Early Computing

- ▶ Computers have been around since the late 1930's
- ▶ When the idea for connecting computers was given serious consideration in the 1960's computers were...
  - ▶ Not compatible with each other
  - ▶ Mainly government agencies, universities, and larger businesses had computers
  - ▶ Were ultimately adding machines
  - ▶ Computers were very large, bulky, and not user friendly

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### Early 1950's "UNIVAC" (Universal Automatic Computer)

Image from: <https://iaseers.llnl.gov>




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### Developing the Internet

- ▶ Plans for what became the Internet started with an agency in the department of defense
  - ▶ Advanced Research Projects Agency (ARPA)
- ▶ A cold war project
  - ▶ To protect against the Soviets using missiles to destroy communications




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### Developing the Internet

#### Main Ideas

- ▶ A distributed network
  - ▶ Every computer would be linked to three or four others
  - ▶ Redundancy is built into the network
- ▶ Packet switching
  - ▶ The information sent from one computer was broken into packets, and found its way to the destination along the most efficient route
  - ▶ Limits data errors
  - ▶ Bottlenecks are avoided




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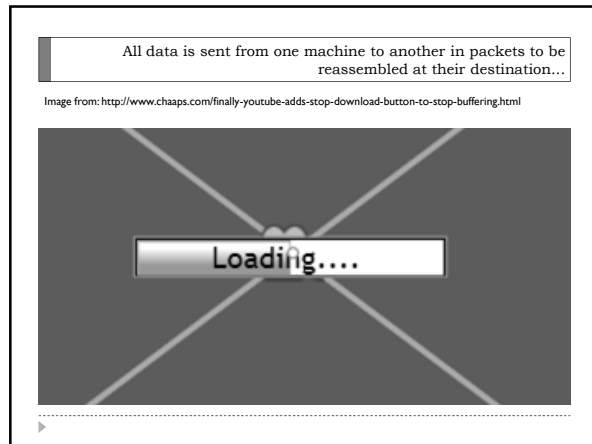
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### Developing the Internet

Main Ideas

- ▶ Interface Message Processors (IMPs)
  - ▶ Solves problems of custom built computers
  - ▶ Connected to, but autonomous from computers.
  - ▶ Initially controlled by ARPA and shared common specs.
  - ▶ Packets were sent along the IMPs, which could communicate with each other; and then the IMPs would forward these messages to the computers linked to them

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### Developing the Internet

- ▶ October 26, 1969 – first link between two computers was established in a proposed network
  - ▶ One at UCLA, the other at Stanford
- ▶ In 1972, there were 29 nodes (IMPs) with multiple terminal connections per node
  - ▶ The system was referred to as the ARPANet...or simply "the Net"

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## Developing the Internet

- ▶ But there was a problem...
  - ▶ Other computer networks were developing around the world: French system (Cyclades) and British system (NPL)
  - ▶ Also, different networks were developing in the US.
  - ▶ These networks were incompatible
- ▶ A universal packet switching computer language (protocol) was needed so these networks could communicate
- ▶ In 1973, the TCP/IP (transmission control protocol/internet protocol) was written by Vincent Cerf and Robert Kahn




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## Developing the Internet

- ▶ By 1983, the TCP/IP was the industry standard for all IMPs
- ▶ Thus, networks were connected, and we could say that we had an "Internet" (interconnecting networks)




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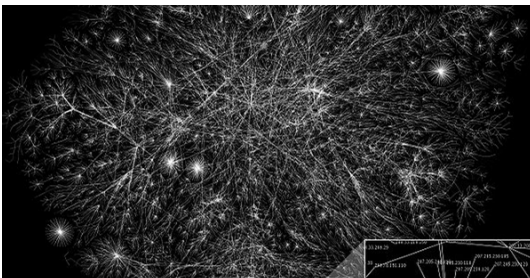
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## Map of Modern Internet

Image from: [http://en.wikipedia.org/wiki/File:Internet\\_map\\_1024.jpg](http://en.wikipedia.org/wiki/File:Internet_map_1024.jpg)




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## Developing the Web

### Before the "Web"

- ▶ Before the 1990's, communication between computers was text based
- ▶ Computer code was needed in order to connect to other computers and/or find information on the Internet
- ▶ Traffic on the Internet was not web traffic (people using Firefox or Explorer to find webpages). Instead, it was e-mail, or other types of communication like Telnet or FTP.




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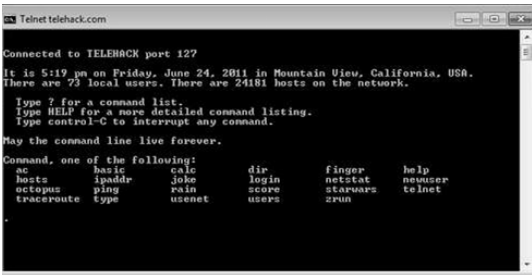
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### How Connecting to the Internet Looked in the 1980's

Image from: <http://www.instructables.com/id/Relive-The-Internet-of-the-1980s-early-90s/>




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## Developing the Web

### Main Ideas

- ▶ The World Wide Web
  - ▶ A system of documents and resources linked together and accessible via the Internet
  - ▶ The web is an application running on the Internet
- ▶ HTTP
  - ▶ The language in which software installed on your computer can communicate with servers and access documents




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## Developing the Web

### Main Ideas

- Hyperlinks
  - A reference to a document on the web
- URL (uniform resource locator)
  - Set of codes that specify the location of files on web servers.
  - A URL indicates the type of resources being accessed, the address of the server, and the location of the file




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## Developing the Web

### Main Ideas

- Web Browser
  - The software that uses HTTP to find "pages" on other computers
  - The web browsers is a GUI (graphical user interface) that allows people to find pages on the "web"
  - Instead of typing in a URL, web browsers allow you to type in a web address.




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## Developing the Web

- The development of the web was revolutionary
- The web became the major source of Internet traffic
- It allowed everyday people to access and *produce* content for other to see
- The web became so popular that it became synonymous with Internet (now you know the difference)
- Since around 2006 however, the share of traffic from browsing the web has shrunk...




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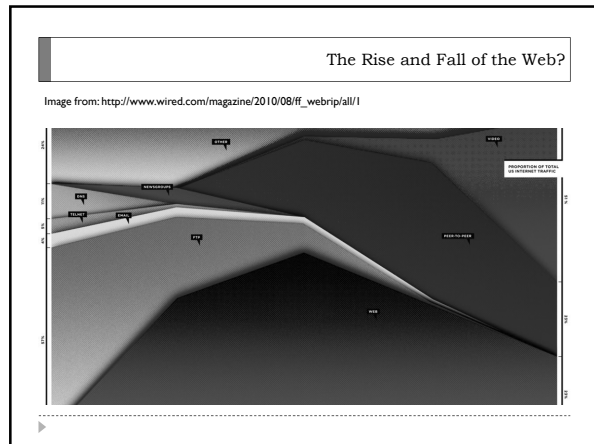
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**Class Activity**

- ▶ Let's look at how much the Internet (web) has changed...
- ▶ Go to the "Internet Wayback Machine"
  - ▶ <http://www.archive.org/web/web.php>

1. As a class, find RIC's webpage for March 10<sup>th</sup>, 1997
  - ▶ How have things changed?
2. Individually, find a page from 5 years ago from one of your favorite websites.

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### Internet Values

- The way in which the Internet was designed, and how that design occurred has produced a series of values
- Leaders in the past, present, and future development of the Internet tend to embody these values
- These values are important, as they lead to the types of phenomena that sociologists find interesting

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### Internet Values

- Openness
  - The development of the Internet was a communal process
  - Although groups competed for contracts, most of the work was non-profit
  - Innovations were shared
  - From these beginnings, a belief in sharing code (and other content) has continued

In what ways can this value lead to interesting sociological phenomena?

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### Internet Values

- Trust
  - The early developers of the Internet were working with a small community of people
  - They trusted that the people who connected to the endpoints in their network were competent, honest, and would participate in the community.
  - The Internet provides no mechanism for identifying people. It was expected that people would be law abiding participants and identify themselves

In what ways can this value lead to interesting sociological phenomena?

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## Internet Values

### ► Online Equality

- There is no means of privileging some information (packets) over another
- This means that anyone's information can be, at least theoretically, equal to others online
- This is called "Net Neutrality"

In what ways can this value lead to interesting sociological phenomena?



## Internet Architecture

Type of Layer	Description	Examples
Human Layer	The sociological dynamics that occur because of society's use of the Internet	Building of social ties, cyberbullying, community development, political action
Content Layer	The information that is produced and housed on the Internet	Documents, Videos, Music
Web Applications	The programs that allow users to interact with the Internet	Web 2.0 websites such as Facebook, Google Calendar, Farmville
Software Applications	The programs that allow users to easily take advantage of computing powers of hardware	MS Excel, Web Browsers, Skype
Hardware	The types of machines that transmit and receive data	Computers, Mobile Phones, DVD players
Infrastructure	The wires or airwaves over which data is transmitted	---

## Internet Architecture

### ► Key Points

1. The layers are not connected. Innovation at one layer is not necessarily connected to another layer. This has given the Internet its power.
2. We as sociologists will focus mainly on the content layer and the human layer.



## Wrap-Up

In this lecture, we completed these four objectives:

1. Discuss the developments that led to the modern Internet
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## References

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