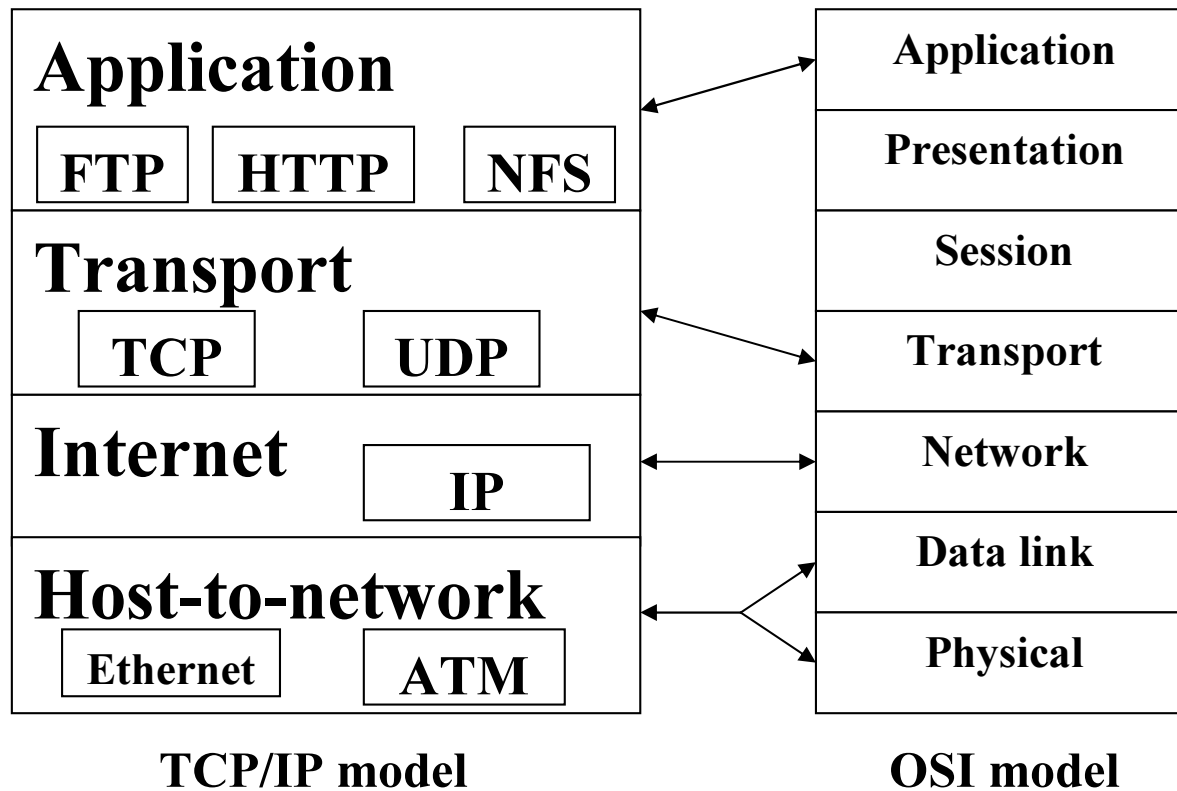# CS155a: E-Commerce

Lecture 5: Sept. 20, 2001

**Archetypal Internet Business: Netscape
Introduction to Online Content Distribution**

HTTP (Hypertext Transfer Protocol)

TCP/IP model		
Application		
FTP	HTTP	NFS
Transport		
TCP	UDP	
Internet		
	IP	
Host-to-network		
Ethernet	ATM	

TCP/IP model

OSI model
Application
Presentation
Session
Transport
Network
Data link
Physical

OSI model

- Standard protocol for web transfer
- Request-response interaction
- Request methods: GET, HEAD, PUT, POST, DELETE, …
- Response: Status line + additional info (*e.g.,* a web page)

HTML (Hypertext Markup Language)

- Language in which web pages are written
- Contains formatting commands
- Tells browser what to display and how to display

```
<TITLE> Welcome to Yale </TITLE>
```
   - The title of this page is "Welcome to Yale"

```
<B> Great News! </B>
```
   - Set "**Great News!**" in boldface

```
<A HREF="http://www.cs.yale.edu/index.html">
Yale Computer Science Department </A>
```
   - A link pointing to the web page
   http://www.cs.yale.edu/index.html with the text
   "Yale Computer Science Department" displayed.

What does "http://www.cs.yale.edu/index.html" mean?

Protocol	Host, Domain Name	Local File
http	www.cs.yale.edu	index.html

- **Late 1990**: WWW, HTTP, HTML, "Browser" invented by Tim Berners-Lee

- **Mid-1994**: Mosaic Communications founded (later renamed to Netscape Communications)

- **Summer of 1995**: Market share 80%+

- **August 1995**: Windows 95 released with Internet Explorer

- **January 1998**: Netscape announced that its browser would thereafter be **free**; the development of the browser would move to an **open-source** process

Estimated Market Share of Netscape

100%

80%

60%

40%

20%

Nov 1998:
AOL buys Netscape

1994 1995 1996 1997 1998 1999 2000 2001
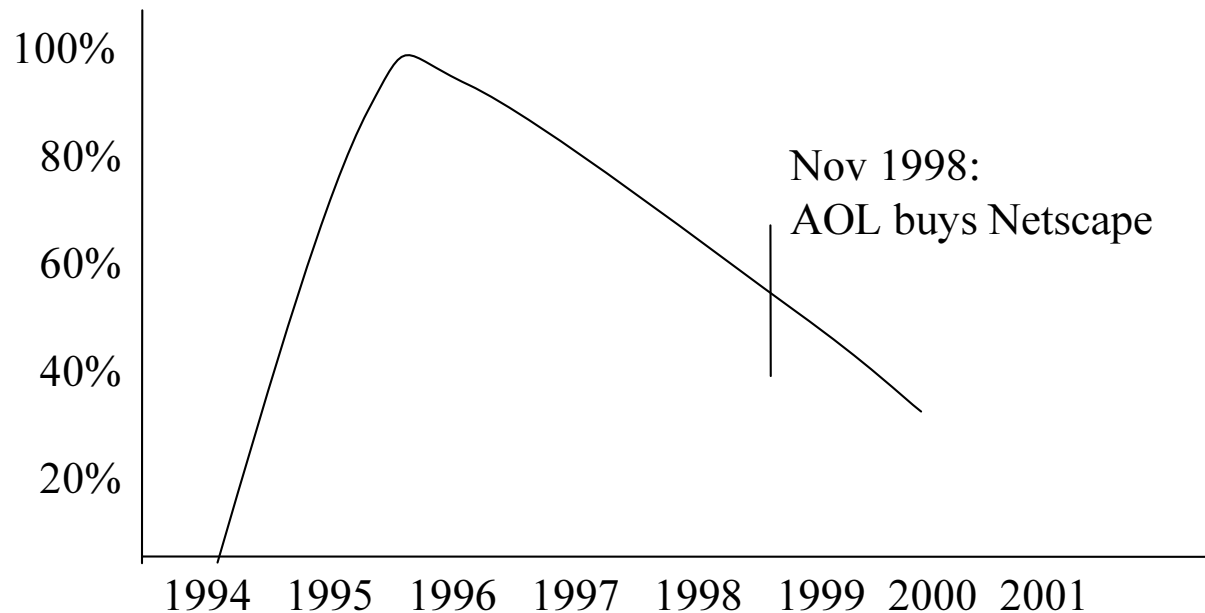
NOTE: data are from different sources and not exact

Perfectly Captures the *Essence* of Internet Business

- Enormous power of Internet architecture and ethos (*e.g.,* layering, "stupid network," open standards)
- <u>Must</u> bring new technology to market quickly to build market share
- Internet *is* the distribution channel
  - First via FTP, then via HTTP (using Netscape!)
  - Downloadable version available free <u>and</u> CD version sold

Uses Many "Internet Business Models"

(esp. those that involve making money by "giving away" an information product)

Complementary products (esp. server code)

- Bundling
  - Communicator includes browser, email tool, collaboration tool, calendar and scheduling tool, *etc.* One "learning curve," integration, compatibility, etc.

- Usage monitoring
  - Datamining, strategic alliances
  - "Installed base" ≠ "Active installed base"

Browser as "Soul of the Internet"

- "New layer" (Note Internet architectural triumph!)
- Portal business
  - Early "electronic marketplace"
  - Necessity of strategic alliances
  - "Positive transfers" to customers
- (Temporarily?) Killed R&D efforts in user interfaces

Pluses and Minuses of Network Effects

+ Initial "Metcalf's Law"- based boom

+ Initial boom <u>accelerated</u> by bundling, complementary products, etc.

– Market share ≠ lock in
high market cap ≠ high switching costs

– Network effects strong for "browser" but weak for any particular browser

Exposed the True Nature of Microsoft

- 1995: Navigator released, MS rushes IE to market
- 1996: Version 3.0 of IE no longer technically inferior ("Openness" and standardization begets commoditization)
- MS exploits advantage with strategic allies (Windows!)
  - Contracts with ISPs to make IE the default
  - Incents OEMs <u>not</u> to load Netscape products
  - Exclusive access to premium content (from, *e.g.*, Star Trek)
- 1998: MS halts browser-based version of these "strategies" under DoJ scrutiny of its contracts with ISPs.

Internet-ERA Anti-Trust Questions are Still Open

- Can consumers benefit from full integration of browser and OS?
- How to prevent "pre-emptive strikes" on potential competitors in the Windows-monopoly universe?
  - ("post-desktop era" technical Solution?)
- Remember: DoJ case is <u>not</u> about protecting Netscape!

Revolution in Content-Related Technology

- Computers and digital documents radically change content <u>creation</u>.
- WWW radically changes content <u>publication.</u>
- Internet radically changes content <u>distribution</u>.

Revolution in Content-Related Business?

- Plenty not scarcity?
- Anyone can be a publisher?
- Disintermediation and reintermediation?

Three Major "Enforcers" Support a Content-Distribution Business

- Legal Protection
- Digital-Rights Management
- * Business Model

Technical-Protection System Components

- Encryption
  - Symmetric Key
  - Public Key
- Signature
- PKI
- Rights-Management Language
- Time stamping
- Secure Containers

Product- or Service-Developer's Goal

- Choose the right ingredients and weave them together into an effective end-to-end technical protection system (TPS).
- Ingredients must be "right" w.r.t. business model and legal and social content as well as technical context.

Notoriously Difficult!

General Points about TPSs

- TPS is a means, not an end. Cannot answer legal, social, or economic questions about ownership of or rights over digital documents.
- No TPS is perfect.
- Continued improvement in TPS requires ongoing R&D, including "circumvention."
- TPS easier to design for special purpose devices and systems (*e.g.,* cable television) than for the Internet.
- TPS should serve customers' needs, *e.g.,* assured provenance, as well as rightsholders' needs.

TPS Design Principles

- Know the $$ value of content
- Following rules: Convenient
- Breaking rules: Inconvenient
- Breaking rules: Conscious
- Renewable/Improvable Security
- Don't let Pirates use your distribution channel
- Provide value that pirates don't

A.Rubin & M. Reiter – used with permission
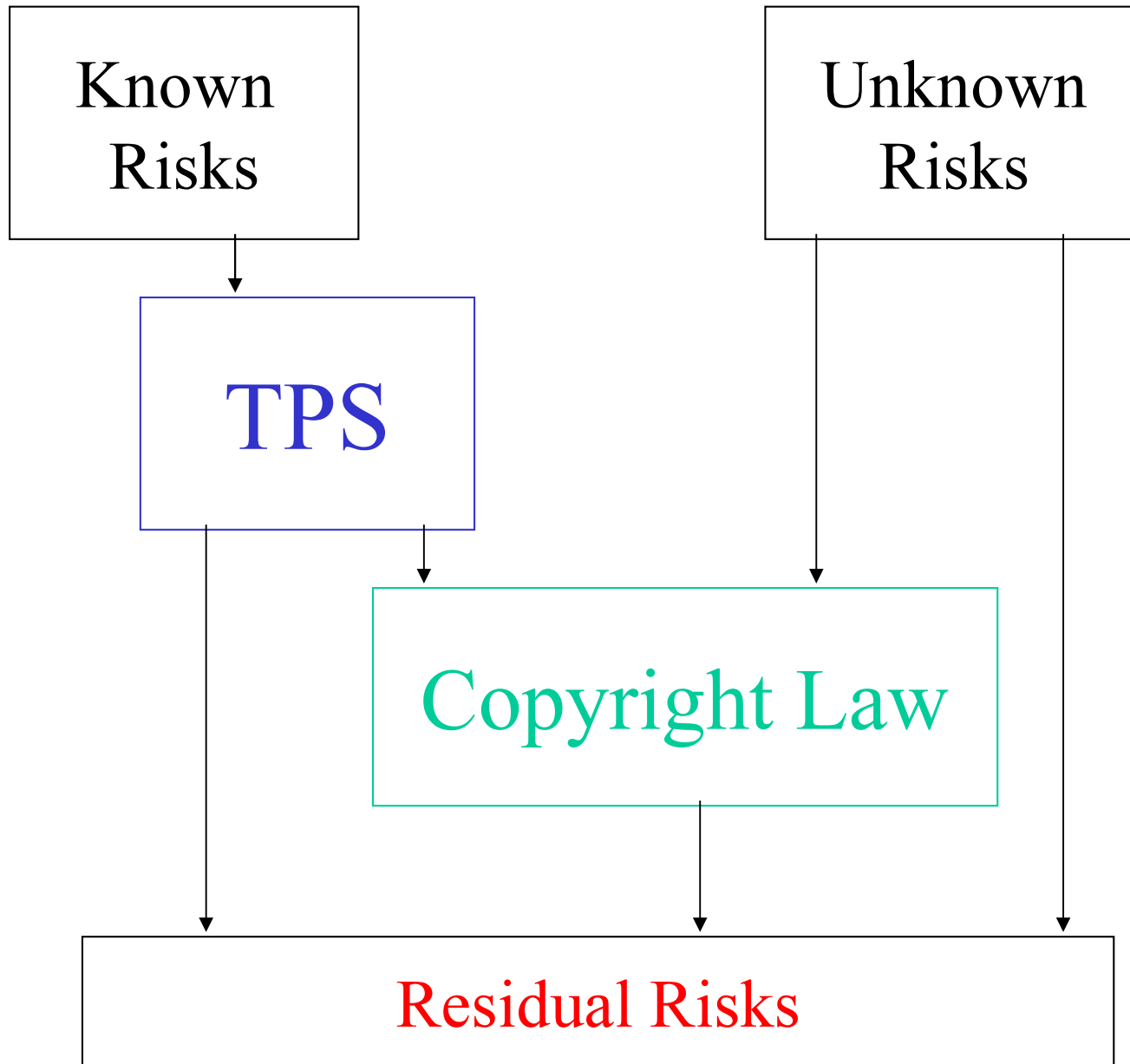
Dual Doomsday Scenarios

Today's Rights Holders and Distributors: TPSs won't work. Copying, modification, and distribution will become uncontrollable.

Fair-Use Advocates and (Some) Consumers: TPSs will work. Rights holders will have <u>more</u> control than they do in the analog world.

Best TPS is a Great Business Model

"The first line of defense against pirates is a sensible business model that combines pricing, ease of use, and legal prohibition in a way that minimizes the incentives for consumers to deal with pirates."

Lacy *et al.*, IEEE Symposium on Industrial Electronics, 1997.

Holy Grail: A Great Business Model for Internet Music Distribution

Hal Varian (quoted in C. Mann's "Heavenly Jukebox" article): "Maybe Coke will find a way integrate itself directly into the shows. Or they'll release the music free on the Internet, except that it will be wrapped in a commercial." What's the difference if the Spice Girls are marketed by Coca-Cola or by Virgin Records, soon to be a subdivision of AOL-Time Warner?

2000 Sales by RIAA members: $15B
2000 Coca-Cola Net Operating Income: $20.5B

Existing Business Models for Information Products

- Fee models: Subscription purchase, Single-transaction purchase, Single-transaction license, Serial-transaction license, Site license, Payment per electronic use

- Advertising models: Combined subscription and advertising income, Advertising income only

- "Free" distribution models: Free distribution (no hidden motives), Free samples (*e.g.,* coming attractions), Free first version, Free information when you buy something else (complementary products, bundling).

Less Traditional Business Models for Information Products

- Extreme customization: Make the product so personal that few people other than the purchaser would want it
- Provide a large product in small pieces, making it easy to browse but difficult to get in its entirety
- Give away digital content because it complements (and increases demand for) the traditional product
- Give away the product, sell the service contract
- Allow free distribution of the product but request payment (Shareware)
- Position the product for low-priced, mass market distribution

Reminder: First Written Homework Assignment

- Due **in class** on **Tuesday, Sept. 25**
- Covers readings and lectures through today
- Available online (http://www.cs.yale.edu/~vijayr/cs155/hw1.pdf)