

An Overview of the Internet and the Web



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Fearless Tech Predictions

- “The telephone has too many shortcomings to be seriously considered as a means of communication. The device has no value.” -- Western Union 1876
- “TV will never be serious competitor to radio” -- New York Times, 1939.
- “The total world market for computers will be about five” -- T.J. Watson, founder of IBM, 1945
- “There is no reason anyone would want a computer in their home.” -- Ken Olson, Founder and CEO, Digital Equipment Corporation

Predictions are difficult, especially about the future

Moore's Law Rules!

- For past 40 years: available computing power **doubles every 18 months** (at constant or declining cost)
- The singing greeting card contains more computing power than existed on earth in 1950
- Sony Playstation's processor would have cost \$3 million in mainframe form in 1980
- If autos developed like microprocessors, today's fastest car would travel 100,000 mph and cost ten cents
 - ◆ [They would also periodically and without warning crash and burn, killing everyone inside!]

The Net Changes Everything

- *Business-to-consumer (B2C)*
 - ◆ Shifting information balance
 - ◆ Re-structuring retail models
- *Business-to-business (B2B)*
 - ◆ Supply chain and distribution management
 - ◆ Dis-intermediation and re-intermediation
- *Intra-business*
 - ◆ Intranets, re-engineered business processes
 - ◆ Virtual organizations; dispersed task teams
- *Person-to-person/Consumer-to-consumer (P2P/C2C)*
 - ◆ Real time and asynchronous communications
 - ◆ Virtual communities, virtual identities
 - ◆ Auctions, direct selling
- *Nation-states and regions*
 - ◆ New sources of comparative and competitive advantages
 - ◆ New governance and security issues

The Net's Growing Exponentially

- 1995: Fewer than 5 million users
- Summer 2000: Over 350 million worldwide have Internet access
 - ◆ 145 million Americans; half are active users
 - ◆ 62,000 new users every day in the USA alone for the next 5 years
- Over two billion web pages (only a fraction are indexed by search engines)
- *AND: The web is still at early growth stage!*

Web-Based Commerce is Very New--But Growing Explosively

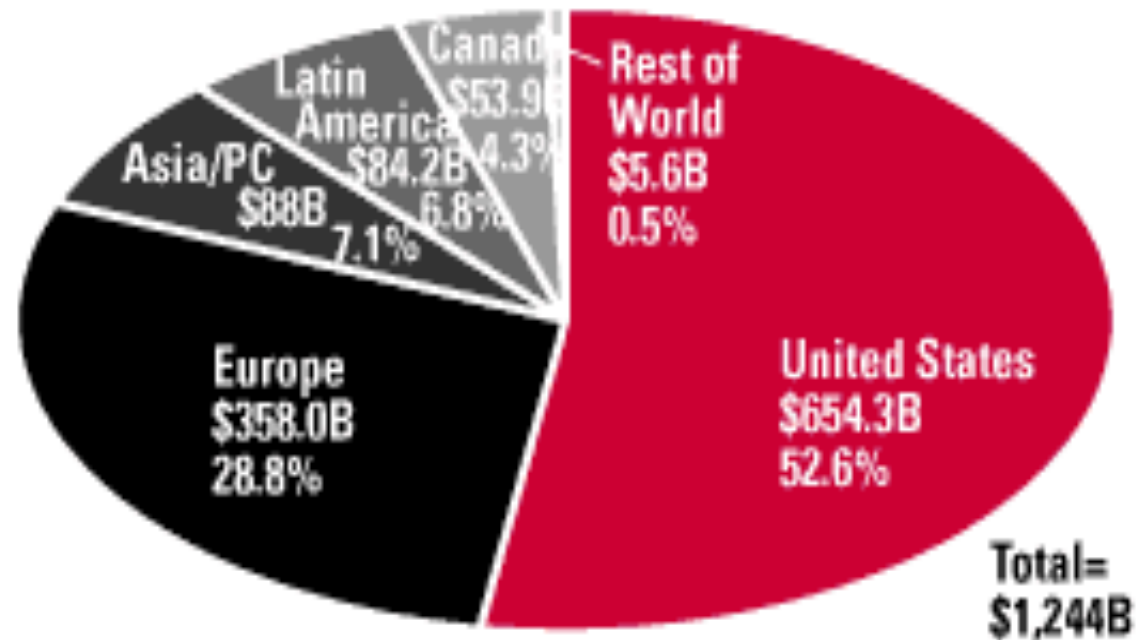
- Pre-1994: The Acceptable Use Policy
 - ◆ No commercial use permitted
- 1994: Privatization of the Net
- 1996: Sales of goods and services = \$1 billion
- 2000: Internet retail sales of consumer goods and services = \$20 billion
- **B2C**: 1998: \$5 billion --> 2002: Online retail sales may exceed \$76 billion
 - ◆ Potential to capture 20-25% of all retail sales: \$500 billion in US; over \$1 trillion worldwide
- **B2B**: 1998: \$58 billion in e-commerce [10 times as much as B2C] --> 2003: **\$1.3 trillion** = 10% of all US business trade
 - ◆ Could reach 40% by 2006

Welcome to the Global Digital Economy

- Traffic on the Internet doubles every 100 days
- Every minute, five million email messages are sent worldwide
- Radio took 38 years to get 50 million users; TV took 13 years; Internet took four years
- In next 15 years, over 700 million wireless subscribers

Everyone's Going Online...

2003 World eCommerce Distribution



Source: eStats, 1999

Especially the Young!

- 70% of Americans under 16 use computers; 43% have email addresses
- More than 15% of world's Internet users are under age of 16
- “Technology is technology only for people who were born before it was invented”
- In 1997, Pres. Chirac of France did not recognize a computer “mouse”

How Are Executives Reacting?

- *Fall 1999 survey of senior management in cross section of global industries*
- 89% believe Internet will “revolutionize” their industry
 - ◆ Knowledge becoming key asset
 - ◆ More competition; Customers may become competitors
- 88% say Internet will reshape corporate culture
 - ◆ Flattened hierarchies; Increased flexibility
 - ◆ Virtual communication/collaboration; longer work hours
- 88% have websites; 63% have intranets; 29% have extranets

What is the Internet?

- Global network of networks
 - ◆ Late 1960's: ARPANet's distributed architecture
 - ◆ Packet switching and the TCP/IP protocol
- Independent, separately administered networks:
No single group is in charge
- Complex mix of commercial, government, academic, and individual users
- Client-server structure

Key Point: The Net's explosive growth is due to its distributed, non-hierarchical structure, and its open, non-proprietary standards

Client-Server Architecture

- **Network:** LANs, WANs, Backbones
- **Client:** Software application that typically runs on end user's computer; interface can be customized
 - ◆ Initiates request for information; travels over network to server
- **Server:** Software application that runs on information provider's computer
 - ◆ Interprets request, takes action, sends results back to the requesting client

How Do I Connect?

- Purchase access
 - ◆ Internet Service Providers (ISPs) or hosts: ATTWorldNet, PSINet, Netcom, MediaOne, etc.
 - ◆ Online Service Providers (OSPs) add proprietary content : AOL, MSN
- Telephone dialup: PPP “virtual” connection
- Direct or dedicated connection (“always on”)
 - ◆ Local area network (T1 or T3 leased lines)
 - ◆ Cable modem, DSL

How the Net Links Up

- The **IP address** (Internetworking Protocol): Each computer on the Internet has a unique address (e.g., 123.34.56.1)
 - ◆ Allows host computer to locate remote computer and share data
 - ✦ Administered by ICANN, non-profit corporation
- **Domain Name System** (DNS) associates a “domain name” to an IP address (e.g., www.yahoo.com)
 - ◆ Seven “top level” domains: .com, .org, .edu, .gov, etc
 - ✦ Country codes such as .uk, .fr, .cn, etc
 - ◆ Domain name registration now open to global competition
 - ◆ Conflicts between domain names and trademarks (“cybersquatting”)

The World Wide Web

- Early 1990's: Tim Berners-Lee at CERN created HTML system of "hyperlinks"
- Consistent interface, universal access to variety of document types; open standards
- Web server stores and serves files upon request
- Web browser clients link you to related information sources world-wide
- The "connectionless" Web
 - ◆ Each request ("click") handled independently
 - ◆ The browser keeps track via history list, bookmark file or "cookie"

The Powerful URL

- Access to remote WWW resources is provided by a **Uniform Resource Locator (URL)**.
- **Every web object** (text, pictures, sound and movie files, etc) has a unique Uniform Resource Locator (URL).
- The URL "address" retrieves that item of information wherever it exists on the Web and displays it on browser
 - ◆ The "http://" prefix means: "go to the web site address ..."
 - ◆ Web clients are "multi-protocol": mailto:, ftp:, telnet:, news:

HTML Markup Language

- HTML = *Hypertext Markup Language*
 - ◆ Subset of SGML, the standard in print publishing
- HTML describes the **structure** of the document, not page layout
- Web page or document: A single text file, opened and formatted by a web browser
- Website: One or more linked web pages containing text and/or graphics
- Create a web document in a word processor and add markup tags

A Few HTML Tags

- `<Head>...</Head>` marks start of text at top of page
- `<Title>...</Title>` appears in window's heading bar
- Heading Level: `<H1>...</H1>` to `<H6>...</H6>`
- `<Body>...</Body>` defines the body section of document
- `<P>` inserts paragraph break
- `<A Href=`
`"http://www.cba.neu.edu/web/~rthomas/index.html"`
`> HomePage` anchors a hypertext link called HomePage to an external file named "index.html"

XML: Extending HTML to Next Generation Web

- eXtensible Markup Language: Makes web information self-describing by adding meaning (semantics) to text
- XML tags say **what info is**, not what it looks like
 - ◆ Could label parts of a web-based order as “size”, “quantity”, “price”, etc.
- Specialized markup languages can be created for each industry
 - ◆ Metadata descriptors: Much faster and more accurate info retrieval
- Will do for Web what card catalog did for libraries
- Will encourage collaborative information sharing

XML: An Example

Take the sentence: “In Sam Mendes’ *American Beauty*, there is a *highly original* treatment of *fin de siecle* angst.”

HTML would mark the italicised words: “In Sam Mendes’ `<i>`American Beauty`</i>`, there is a `<i>`highly original`</i>`, treatment of `<i>`fin de siecle`</i>` angst.”

XML adds semantics: “In Sam Mendes’ `<title>`American Beauty`</title>`, there is a `<emphasis>`highly original`</emphasis>` treatment of `<foreign>`fin de siecle`</foreign>` angst.”

XML creates a **language for e-commerce**, at the industry-specific level.

XML and Healthcare Industry Information

- **Gathering/Search:** XML distinguishes between the spoof rock band Spinal Tap, and the medical procedure
- **Organizing:** Retrieved patient data marked with XML tags for address, condition, insurer, etc. could be organized and searched by criteria.
- **Selection:** Software agents can automate purchase decisions: “Buy 5,000 syringes if price falls below \$X”
- **Synthesis:** Agents could execute complex decision processes: “Purchase optimal price mix of three inputs for the given date.”
- **Distribution:** Send product catalogue to 30 different websites, automatically formatted for each site

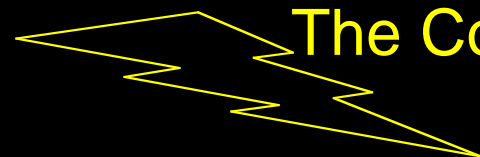
The Emerging Digital Economy

- **Matter** is less important
 - ◆ Processing information is more powerful and cost-effective than moving physical products
 - ◆ Company's assets increasingly intangible
- **Space** is shrinking: Global interconnectivity with customers and competitors means "death of distance"
- **Time** is collapsing: Instant responsiveness; culture of constant change
- **Growth** is accelerated by networks: First-mover critical mass --> increasing returns
- **Value** rises exponentially with market share
 - ◆ Network effect of establishing platform or standard
 - ◆ Give away offering to gain market share

The Emerging Digital Economy

- **Efficiency** multiplies through “infomediaries”
- **Market power** shifting to buyers: Instant comparison shopping
- **Impulse** economy: “Click to purchase” closes gap between marketing, sales and fulfillment
- **Transactions**: One-to-one, instant personalization and customization
- **People** are central: Company’s major assets walk out the door every evening

Enterprise Value Chain

 The Competition!

Vendors & Supply Chain

- Procurement
- Logistics
- Supply/Demand Coordination

The Enterprise

- Primary Value Adding Activities (Manufacturing)
- Support Services (R&D, HRM, MIS, etc.)

Markets & Customers

- Cataloging
- Outbound Logistics
- Fulfillment
- Customer Relationship Mgt


Trading Partners, Strategic Allies

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E-Biz Value Chain Impact...

- **Customers**
 - ◆ Power shifting to the customer
 - ◆ Customization, personalization: Market segments of one
 - ◆ New forms of customer information
- **Competitors**
 - ◆ Shifting industry boundaries
 - ◆ New competitors, Dot.com predators
- **Trading Partners**
 - ◆ Channel conflict and dis-intermediation
 - ◆ E-procurement choices; resistant partners

...And Inside the Company

■ Challenges for the Enterprise

- ◆ Technical : Build or buy? Reliable, scalable systems, Integrate legacy infrastructure
- ◆ Executional : Agility, time to market, fast response
- ◆ Analyzing information assets; creating new offerings
- ◆ Re-structuring, outsourcing: Customer-centric processes
- ◆ New skills and people resources needed
- ◆ Managing the FUD factor, organizational inertia

Why Is Digital Content Special?

- Reproduced with no generation loss
- Easily compressed
- Can be inventoried and distributed at almost no cost
- Can be distributed through virtually any electronic conduit
- Can be randomly accessed
- Can be easily altered and customized
- Interactive

Why is Information Different?

- Large up-front costs, but **minimal marginal** unit costs
 - ◆ Expensive to produce, cheap to reproduce
 - ◆ **Incremental cost** of unit is constant and **near zero**, regardless of volume
- Fixed costs to produce initial unit are **sunk costs**; can't recover if production is halted
- **No natural capacity limits** for additional copies

The New World of Increasing Returns

- **Metcalfe's Law:** Total value of network is proportional to the square of the number of users
 - ◆ “Fax machine effect”
- **Network effects:** More units deployed --> greater value of each unit
- Cost of making **perfect reproductions** *and* cost of **fast, cheap distribution** are radically reduced
- ***Result: As volume increases, so do returns!***

The Internet Puts the Customer in Control

- Equivalent price/quality offerings --> **commoditization** of many markets
 - ◆ Declining importance of brands; increased “churn”
- **Balance of power** shifts from merchant to consumer
 - ◆ Comparison shopping, “perfect market information”
 - ◆ *But also*: Online merchants get precise feedback
- The only **differentiator** is the customer relationship

“You achieve customer satisfaction when you sell merchandise that doesn’t come back to a customer who does” --Stanley Marcus