Information Technology (IT) is changing how we work, solve problems, do business, communicate and interact.

**IT & Science — Goals**

- Be able to define IT
- Understand where the *Internet* came from and when, and why it’s important
- Understand how the Web operates
  - Explain the Client-Server Model
  - Differentiate key types of software and protocols - the Internet vs. the World Wide Web (WWW)
- Discuss the limitations of the Web

**Changing Societies...**

- **Agrarian to Industrial to Post-Modern Society**
  - Periods of social changes that resulted in a shift in the foundation of science away from acquisition of theoretical knowledge toward technological innovations.

- **Ecological Society**
  - Emphasis on science and technology, and science education (in relation to human activities).

- **Technological (Information) Society**
  - Greater emphasis on the integration of technology and science (i.e., Information Technology) into society
Science and Technology...

- **Science** allows us to understand the natural world in a systematic, empirical manner.
- **Technology** (as information technologies) provides the tools that allow us to do science.
- **Science and technology** function synergistically in a positive feedback to produce new knowledge.


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**IT Definitions**

- **Broad Definition:**
  - the study of how information is collected, manipulated, and delivered using a computer
  - Not the way we now think of IT
    - IT is new, emerging with the WWW
  - Better Definition:
    - the *Integration* (collection and manipulation) and *Transfer* of information using networked computers

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**IT is a Cognitive Tool**

- Integration because IT is a cognitive tool
- Tool that enhances powers of thinking, problem-solving, learning
  - Written language
  - Mathematical notation
  - Scientific method
- Frames what is possible
Why Do I Need to Know?

- Land-Grant (VT’s) Interests
  - Computer Requirement
  - ETD
- Infusion of IT into our Society
- IT is a transforming agent
- "I want a job someday"

VT Investments in IT

- Tech’s newest building is the Advanced Communications & Information Technology Center

New Possibilities

- Micro air vehicles for scouting and diagnostic surveys
IT's Growth

- Fastest growing technology ever
- >13,000,000 jobs
- 1st source for information

Internet Stats....

- 513.41 million people online in Aug. 2001
- 1.5 million web pages developed daily
- 6 security incidences in 1988; in 1995 was 2412 (Computer Emergency Response Coordination Center)
- In 2000, 94% of users connected to the Internet mainly for email and instant messaging services
- $1.5 trillion of US GDP in online commerce in 2002.
- 126 million hosts in July 2001
Integration & Transfer: The Internet

- Components:
  - The WWW
  - email
  - distance education
  - Internet chat rooms & IM
  - decision support systems delivered over the Internet
  - on-line shopping and banking...

Integration & Transfer

- Activities:
  - Designing dynamic HTML documents
  - Automating data collection and analysis
  - Building distributed information systems
  - Educating at a Distance

- IT fits the Land Grant Mission
  - Information discovery, synthesis, transfer, and application

Land Grant Acts

- Morrill Act 1862
  - an act donating lands for Colleges of Agriculture and Mechanic Arts (the A&M system)

- Hatch Act 1887
  - provisions for a network of agricultural experiment stations for scientific research.

- Morrill Act 1890
  - provided further endowment for colleges, particularly for institutions of black students (HBCUs)

- Smith-Lever Act 1914
  - created the Cooperative Extension Service, an educational outreach unit
History

- Assignment!
- Internet was a military project, then an NSF project - Began in 1970s
  - Linking independent, equal computers through a network of Routers (IP)
  - Sending data transfer protocol (TCP - 1980s)
- WWW created in the 1990s
  - First effective multimedia format

How IT WWWorks...

- The Client-Server Model
  - Paired software applications running on your personal computer and on a remote server
  - Which is which?
- Clients you know about...
  - Web browsers
  - Email program
  - FTP

Client-Server

- Other Client-Server programs:
  - Telnet, CUSeeMe, MUD, X-Windows
- Are these Client-Server Applications?
  - Microsoft Word
  - Photoshop
  - Chat
  - FTP
  - Adobe Acrobat Reader
Client-Server & the Web

Create/Edit a File
WYSIWYG or Text Editor

Move files to and from Server
FTP

View a Local File
Browser

Retrieve and View a Web Page
Browser

Client-Server & the Web

Clients vs. Servers
- Platform-dependent
- Single-user
- Run when needed
- Converts user's commands to server using platform-independent commands protocols
- Displays Information

- Respond to platform-independent protocols
- Always on (up)
- Listen to a "Port"
- Respond to MANY users at once
- Do not generally display information
Getting what you want...the URL

- protocol://server.ip.address:port#/path/to/file/
  - e.g., http://calendar.isis.vt.edu:4444/whizcal/
    - show_cat/show_unit_monthly?id=IPM&month=-1
- Protocols: http, https, ftp, file, telnet
- IP Address: 128.173.55.28 is www.ento.vt.edu
- Port: 80 is the default for WWW Servers
  - Eg., http://www.vt.edu:10021/ = VT's FileBox
- File extension tells the type of file: HTML, GIF, MOV

The language of the WWW

- The WWW offered something new in 1992: multimedia
- A new language, HTML, allowed a person to define how to mix images, text, and other media into a graphical display. HTTP allowed computers to send HTML and other media across the Internet
- The Web is STATELESS

HTML

- At first, little formatting or interactivity
  - images needed to make pages look good
- Improved Formatting with:
  - tables, font tags, style sheets, and PDF
- Better Interactivity:
  - FORMS to Applets to JavaScript
- Everything is constantly changing!
Summary

- IT is transforming not only our communications systems, but how we think about and solve problems (i.e., how we do science)
- Maybe Al Gore did take initiative in kicking off the Internet - know the history!
- Modern IT is built on the Client-Server model running over the Internet.