TECHNOLOGY IN AMERICAN HISTORY

ARPANet and INTERNET

ADVANCED RESEARCH PROJECTS AGENCY NETWORK

Developed *by* and *for* Scientists & Engineers working for the Federal Gov't

ARPA is a component of the Department of Defense

- originally focused on both military AND civilian applications
- at various times the word "Defense" has been added and deleted in its acronym
- primarily a civilian agency, but staffed by both civilian and military personnel

A response to SPUTNIK (1957) & the so-called "Missile Gap"

- research conducted by corporations &research-oriented academic institutions
- government contracts, task-oriented (as opposed to corporate R&D philosophy)
- aimed to catch-up and surpass perceived Soviet lead in science & technology

ARPANET & A New Concept of Computer Science

Before ARPANET

- computers viewed as tools for advanced Mathematcial calculations
- main-frame computers, batch-processing of data
- human interface involved travel between widely separated institutions

ARPANET

- a revolutionary concept for Computer Science: Real-time information exchange
- computers viewed as tools for communication between humans
- standardized infrastructure to link non-standard computers

ARPANET & A New Concept of Computer Science

ARPANET's Genesis

- ARPA tasked to maximize its investment in Computers
- Dr. J. C. R. Licklider headed the effort
- Licklider advanced the concept of Interactive Computing

A New Paradigm for Computer Science

- System Development Corporation locked into batch-processing methodology
- Licklider: "I was interested in a new way of doing things … they were studying how to make improvements in the way things were done already."

A New Paradigm for who should drive Computer Science

- Early 1960's ARPA directors: "We should not support that effort because 'the computer industry' will do it - if it's worth doing!"
- Licklider: "They have an economic and psychological commitment to the arithmetic engine model, and it can die only slowly."

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ARPANET's Development

- 1967: Concept of networking
- Two problems:
  1) telephone circuits and switching nodes w/ necessary reliability, delay characteristics, capacity, and cost
  2) standard protocols and procedures to link non-standard computers

ARPANET's Success

- Number of users exceeded the number of developers
- New protocols developed as demand for capacity grew
- "Open Technical Documentation," free software
- File Transfer Protocols (FTP) and E-mail

Commercialization of ARPANET

The “Personal Computer”

- Edmund Berkley’s “SIMON,” how-to articles in Radio Electronics, ‘50 - ‘51
- Apple II, 1977; first successful mass-produced PC; proprietary operating system
- IBM PC, 1981; licensed architecture, MS-DOS operating system (Bill Gates!)
- Graphic User Inferface (GUI), 1984; Apple Macintosh)

DARPA interacts with vendors

- 1985: workshop; open exchange between “inventors” and manufacturers
- 1986 - present: annual conferences

Commercialization of ARPANET

Vendors take off

- Originally, separate communities:
  1) Manufacturers of hardware & software
  2) "Internet Service Providers" (ISP)

- 1980s and beyond:
  1) Proliferation of "package" providers - MS anti-trust suit
  2) Internet Service becomes a commodity service ("dot-coms")

A World Wide Web (WWW)

- A global mass market of PC households
- ISP "Industry" transition from small to big business, eg: USAOnramp - STARGATE - EARTHLINK
- WWW as an undergraduate research tool (ach!)
- Built-in obsolescence (how old is YOUR computer?)
- All based on a communications infrastructure built and maintained with *your* Defense Tax Dollars