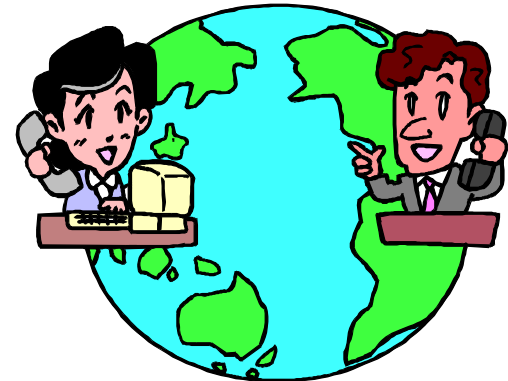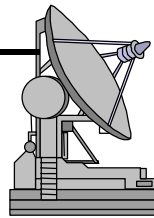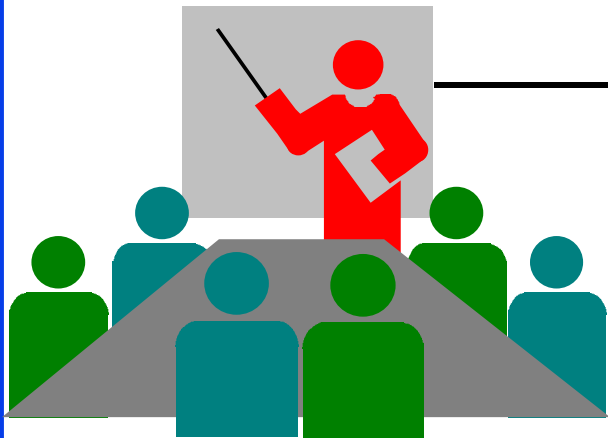# Networking and Its Relationship to Higher Education

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http 8-97/ Raj Jain

Overview

❑ Networking Trends

❑ Impact of Networking

❑ Effect on Education

❑ Technology life cycles

Trends

❑ Communication is more critical than computing

  ❍ Greeting cards contain more computing power than all computers before 1950.

  ❍ Genesis's game has more processing than 1976 Cray supercomputer.

❑ Internet: 0.3 M hosts in Jan 91 to 9.5 M by Jan 96 $\Rightarrow$ More than 5 billion (world population) in 2003

Stone Age to Networking Age

❑ Microwave ovens, stereo, VCRs, had some effect. But, Stone, iron, …, automotive, electricity, telephone, jet plane,…, networks caused a fundamental change in our life style

❑ In 1994, 9% of households with PC had Internet link. By 1997, 26%. Soon 98% … like TV and telephone.

❑ URL is more important than a company's phone number. (54 URLs in first 20 pages of March'97 Good Housekeeping.)

❑ Better communication $\Rightarrow$ Distance not important
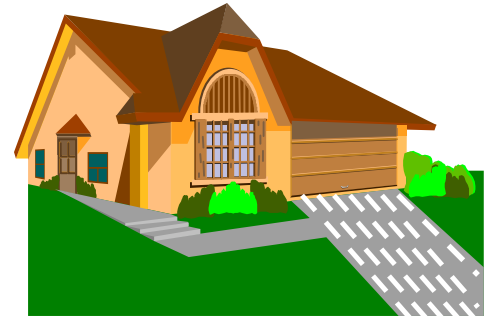
Cave Persons of 2050

Garden Path to I-Way

❏ Plain Old Telephone System (POTS)
  = 64 kbps = 3 ft garden path

❏ ISDN = 128 kbps = 6 ft sidewalk

❏ T1 Links to Businesses = 1.544 Mbps
  = 72 ft = 4 Lane roadway

❏ Cable Modem Service to Homes:
  = 10 Mbps = 470 ft = 26 Lane Driveway

❏ OC3 = 155 Mbps = 1 Mile wide superhighway
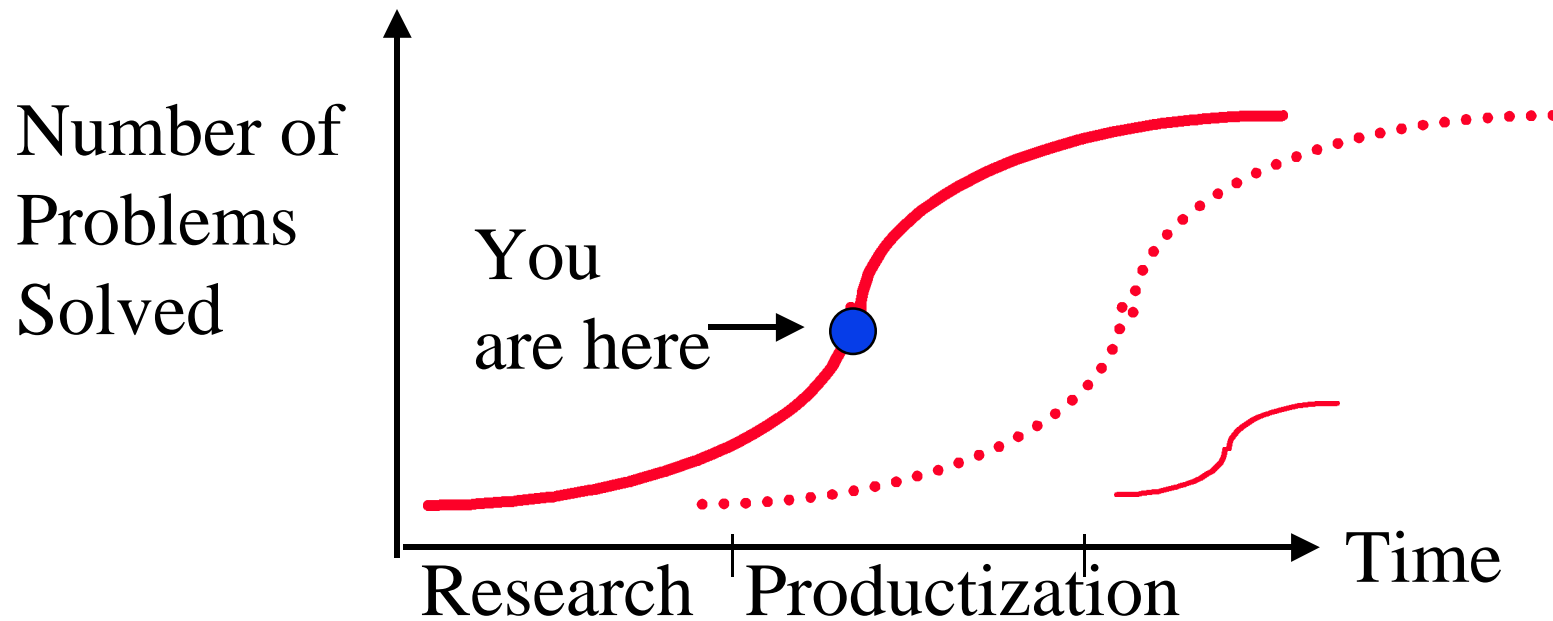
❏ OC48 = 2.4 Gbps = 16 Mile wide superhighway

Raj Jain

Impact on Education

❑ Email is faster than telegram
   $\Rightarrow$ Fast pace of life

❑ Shorter product life cycles.
   Distance between research and products has narrowed

❑ Technology is changing faster than our
   ability to learn
   $\Rightarrow$ A person's value (salary) decreases with
   experience (years out of college)

❑ Recent graduates know C++, HTML, Java, TCP/IP, ...

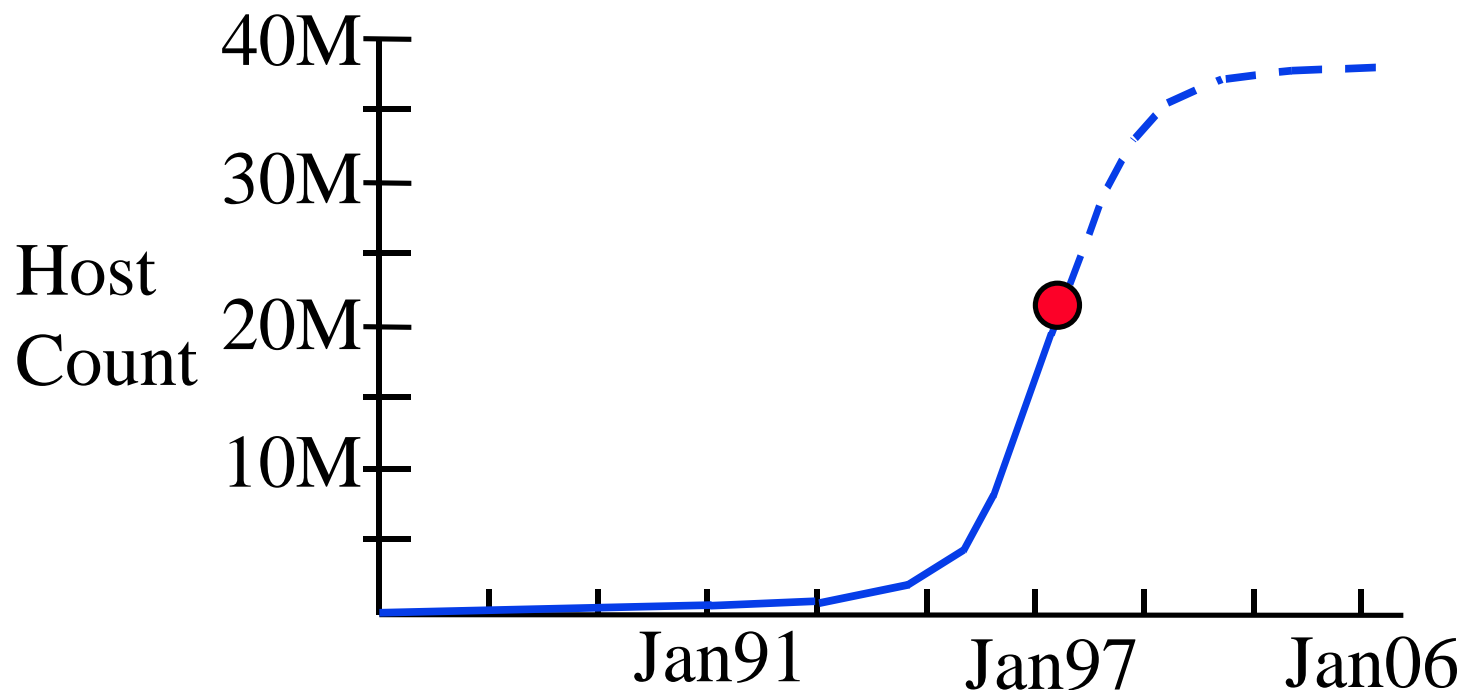❑ New Opportunities/Challenges for educators

❑ New challenges for learners

Impact on Learning

❑ Life-long learning $\Rightarrow$ Distance education

❑ All institutions are at the same intersection
$\Rightarrow$ World-wide competition

❑ A handheld device has storage
enough to carry a small library

❑ Computers have bigger memory than humans
$\Rightarrow$ Knowing where to find the information is more
important than the information
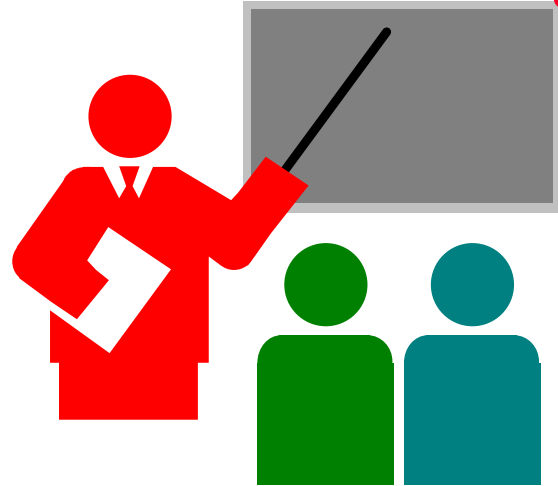
Life Cycles of Technologies

Internet Technology

Host Count — graph showing exponential growth from before Jan91 through Jan97 (solid line) to Jan06 (dashed line), with vertical axis 10M, 20M, 30M, 40M

❑ **New Challenges**: Exponential growth in number of users. Exponential growth in bandwidth per user. Traffic management, Security, Usability, ...

Summary

❑ Networking is the key to productivity

❑ Networking Age

❑ Impacting all aspects of life, particularly, education

❑ Investment of 70's paid off in 90's.
  Need new investment for the next decade.