New Horizons on the Internet

Ron Brachman
Vice President, Worldwide Research Operations
The Internet: From network infrastructure...

- The **Internet** is a worldwide, publicly accessible network of interconnected **computer networks** that transmit data by **packet switching** using the standard **Internet Protocol (IP)**. It is a "network of networks" that consists of millions of smaller domestic, academic, business, and government networks, which together carry various information and services (*Wikipedia*).

- **ARPANet**: collaboration among DoD researchers
  - **ftp** for file transfers
  - **telnet** for remote logins
  - Email to substitute for US mail

- **Key concerns**: infrastructure, routing, DNS, QoS, streaming/multicast…
…to an interconnected world

- A distributed, heterogeneous repository of tools, data, media and people

The user-centric view

- Functionality: Find, Use, Share, Expand, Interact, Help, Enjoy

Example views:
- searching/finding
- communicating (email, IM)
- socializing/sharing (groups, communities)
- buying/selling
- matchmaking/recommending
- experiencing media

“Stuff” = data/knowledge, help, things, entertainment
Far, far away from ftp and telnet

- Instant messaging
- Search engines
- E-commerce
- Social media
- Networked games
- Interactive advertising
- Podcasting, UG-video
- Blogging
- Wikis
- VOIP telephony
- The mobile Web
- TB’s of data

Key concerns: search, relationships/community, advertising, privacy, rights, payments, markets, non-PC apps, user-generated content, media experience, personalization, scale
Foundation for the future

- Adding an economic and social component to CS
  - E.g., mechanism design and implementation in large-scale network spaces; social network analysis for insight into community needs
- Beyond IR algorithms (emphasize finding, not searching)
  - Understanding of intent, structure
  - “Social search”
  - Timeliness of delivery, information overload
- Natural language translation
- Dramatically richer media
- Assistive technology
  - Cognitive assistance
  - Assisted perception, locomotion

We need to keep in mind the human drivers
- Social/family/community
- Commerce
- Entertainment
- Self-expression
- Cultural individualization
We need to move from the “old” CS

- Hardware
- Computer Systems Organization
- Software
- Data
- Theory of Computation
- Mathematics of Computing
- Information Systems
- Computing Methodologies
- Computer Applications
- Computing Milieux

[ACM Computing Classification System]
...to the new

- “Finding” science and systems
- Community science and systems
- Computational advertising
- Computational micro-economics
- Media experiences
- Data science

The world has changed from one where the primary concepts were TCP headers, DNS, and telnet, to one where the watchwords are things like “Mashup” and “StumbleUpon”