

63.135 Information Technology and Society

## **Topic 1: Cyberethics and the IT revolution**

1. Ethics (notes from lecture by J. D'Andrea)
2. Cyberethics
3. Technology and society
4. History of IT
5. The Internet's acceleration of change

### **Ethics**

- Addresses principles to guide decision making
- “How should I behave?”
- Principles (independent of each other, and not all espoused by all ethicists):
  - Nonmaleficence: not only intend no harm, but do no harm unintentionally
  - Beneficence: obligation to help others
  - Justice: treat people fairly, treat like alike in compensation or distribution
  - Autonomy: respect decisions of rational beings

## Theories

- *Utilitarianism* (J. Bentham, 18<sup>th</sup> cent.): Act in most useful way to give maximum benefit to greatest number of people
- *Deontological ethics* (E. Kant, 18<sup>th</sup> cent.): Duty-driven, regardless of circumstances and consequences; categorical imperative
  - Humanity of persons as an end not only as a means
  - Act as if maxim of an action were to become a universal law
- *Liberal individualism* (J. Locke): Each individual has rights to life, health, freedom, property

## 1. Cyberethics

- *Definition*: “The field of applied ethics that examines moral, legal and social issues in the development and use of cybertechnology”
- **Cybertechnology**: “A broad spectrum of technologies that range from stand-alone computers to the cluster of networked computing, information, and communication technologies”

## Cybernetics

- Norbert Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine*, 1948
- The study of feedback-driven systems
- Word origin: *kyber*, person at helm of boat
- *Note:* Cybernetics was *not* defined in relation to computer technology
- *Note:* Cybernetics relates to *interaction*

## Morality

### *Definition:*

- “an informal public system
- “applying to all rational persons
- “governing behavior that affects others, and
- “includes what are commonly known as the moral rules, ideals and virtues and
- “has the lessening of evil or harm as its goal.”

## Ethics

- *Assumption*: people make free rational decisions
- Ethical theories are *deontological* or *consequential*
- *Immanuel Kant* (absolute deontological): follow rules that can universally apply to everyone; “Do unto others” expresses similar idea; humans as ends not only as means
- *John Stuart Mill*: utilitarian, consequentialist
- *John Locke*: Natural-rights theory

## A moral framework for legal discourse

- Based on notion of human rights
- Freedom and autonomy of the individual must be recognized
- Individuals have responsibility toward society
- ISPs have different roles
  - Common carrier
  - Distributor
  - Editor/creator/publisher
- A new look at the role of the ISP is needed for the legal system

## Rights, goals, laws

- *Negative rights* (liberties) imply that no one may prevent a person from acting
- *Claim rights* (positive rights) imply an obligation by others to provide something
- *Goals* (e.g., profit maximization) may be ethical, but ethical constraints may also apply to *actions* pursuing these goals
- *Laws* may enforce ethical principles (e.g., against stealing) or may establish *conventions* (e.g., driving on the right)

## Kinds of policy choice

- *Personal*: choices depend on values and on situation
- *Organizational or business*: choices depends on consumer demand, market behavior, ethics, laws
- *Law*: decisions impose constraints on people who didn't make them

## The Internet creates new ethical challenges

- Speed of communication
- Scope of communication is worldwide
- Environment is interactive
- Enables anonymity
- Enables new ways to reproduce information

## Ethics and the malleability of information technology

- Computer technology has the new feature of “logical malleability” (J. Moor)
- This creates new possibilities for human activity
- “Computing is changing everything” (Bynum)
- Information revolution is not only technological but social and ethical
- *Thesis*: “Many new activities made possible by the new technology are so different from the previous ways of doing things that we need a new set of rules of the game’.” (Baase, p. 26)

## 2. Technology and society

- Technology *enables* social actors; social actors *use* technology to pursue their interests
- Why did computers arise in the West rather than China? Fear of social disruption in China
- State can be a leading force in technology, or can cause stagnation if it defaults
- Current technological revolution took place in, and to enable, a restructuring of capitalism
- Soviet *statism* failed to use principles of informationalism

## Advanced capitalism and informationalism

- Capitalism, statism are *modes of production*
- Industrialism, informationalism are *modes of development*
- Castells' theoretical framework: "societies are organized around human processes structured by historically determined relationships of *production, experience, and power*" (14)
- *Technology*: The specific form of the relationship between labor and matter in production process

## Industrialism and informationalism

- Capitalism aims at profit maximization, statism at power maximization
- Informational mode of development is distinguished by action of knowledge on knowledge as primary source of productivity
- Industrialism aims at economic growth, informationalism at technical development
- From informationalism we should expect new forms of social interaction, change, and control

## Knowledge and information

- *Knowledge*: organized statements presenting judgment or experience.  
Contrast: news, entertainment (Bell)
- *Information*: “data that have been organized the communicated” (Porat)
- What is crucial today is not the central role of knowledge and information, but the feedback effect, applying knowledge to the process of knowledge generation

## Restructuring of capitalism

- Keynesianism met its limitations in 1970s, with rampant inflation
- Restructuring:
  - deregulation
  - privatization
  - dismantling capital-labor social contract
- Goals of reforms:
  - deepen logic of profitability in social relations
  - enhance productivity
  - globalize production and markets
  - marshal state support

## Informationalism and capitalism

- “Informationalism is linked to the expansion and rejuvenation of capitalism” as industrialism was linked to setting it up
- The world has become digital (Negroponte)
- Informationalism is pervasive: as important as the Industrial Revolution
- Technologies aren't just tools to use, but processes to develop
- User = developer

## Self in the informational society

- Main organizing principle in informational societies is *identity*, “the process by which a social actor recognizes itself and constructs meaning primarily on the basis of a given cultural attribute or set of attributes, to the exclusion of a broader reference to other social structures”
- For many people the self is lost and isolated
- *Item:* new attractiveness of religious fundamentalism

## Lessons of the Industrial Revolution

- The West was ascendant because of technological advances made there
- Two industrial revolutions:
  - (1) machines;
  - (2) use of science, electricity, chemicals, communication

### 3. History of information technology

*IT includes:*

- micro-electronics
- computing
- telcom/broadcasting
- opto-electronics
- genetic engineering

### Pre-history of computing

- Leibnitz and Newton developed the calculus to reason about scientific data
- G. Boole developed a mathematics of truth values, logic
- Charles Babbage invented a computing machine based on mechanics, e.g., cogwheels; never built
- Countess Ada Lovelace programmed for Babbage's invention; first programmer
- Looms were automated, 18<sup>th</sup> century
- 1890 U.S. census was tabulated with help of punched cards

## Electronics technology and the IT revolution

- Telephone: 1876; radio: 1898
- Vacuum tube: 1906; transistor: 1947
- *Semiconductor technology* uses the principle that voltage above a certain threshold will be conducted (switch that switches a switch)
- Silicon transistor: 1954; integrated circuit: 1957
- 1959-1962: price of semiconductors fell 85%
- 1962-1971: price of semiconductors fell 98%
- **Microprocessor: 1971**

## Computers

- ENIAC, 1946 (Mauchly-Eckert), 30 tons, drew enough power to dim lights of Phila.
- UNIVAC, 1951, first commercial computer
- Altair, 1975, first microcomputer
- Apple, 1977; IBM PC, 1981; Macintosh, 1984
- Networked and Internet computing on mass scale, 1990s
- **Cost of data processing**
  - 1960, per million operations: \$75
  - 1990: less than \$0.0001

## The Internet

- A network of networks, originated by DARPA, 1960-1964, as communication system invulnerable to nuclear attack
- Based on packet transmission and decentralized control; online 1969
- Internet Protocol (IP) and host-to-host (TCP) defined, 1978
- Modem invented for PCs, 1978
- IT revolution was started in 1970s, in form of the personal computer and the Internet

## The World Wide Web

- Developed, Europe, 1990, at CERN Geneva
- Based on hacker culture and *hypertext* concept, HTML, HTTP, URL
- Early browsers: Mosaic, Netscape (Later: Internet Explorer, Foxfire)
- Network became in information processing system via Java (1995) and Jini (1999)
- Next: universal global infrastructure based on fiber optics and digital transmission

## Technologies of life

- DNA discovered, Watson-Crick, 1953
- Gene cloning procedures, 1973
- Human gene cloned, 1977
- Cloning of living organisms is questionable, since they develop in interaction with environment
- Human genome project launched, 1990, with government funding

## Social context and dynamics

- Oil shock of 1973-74 coincided with inventions of 70s to cause, and enable, restructuring of capitalism with new model of accumulation
- Synergy is a factor. Examples: software-hardware, computers-communication
- Technological revolution was technologically induced, not socially, but was shaped by social forces

## **Models, actors, sites of the IT revolution**

- Milieus and clusters of innovation played a crucial role
- State, as well as innovative entrepreneurs, played role
- State was initiator, entrepreneur was shaper of decentralized structures

## **4. The Internet's acceleration of change**

- The Internet, around 1995
  - enabled all members of society to be directly connected
  - hence was the factor that allowed computing to become universal in society

## Special characteristics of network communication

- *Scope* (speed/immediacy; vastness of reach; interactivity)
- *Anonymity* (implying diminished trust)
- *Reproducibility* (enables harassment and violation of privacy)
- *Many-to-many* (for first time in history)

## Possible policies for a web browser

*Allow a site to*

1. install executable programs on user's hard disk and run them
2. Delete information on user's HD without user's knowledge
3. Leave a file on user's disk without informing user
4. Leave a file on user's disk and inform user
5. Do not leave or take information from user's disk
6. Give user the information and ability to accept or decline cookies

### **Example: Copying software for friends**

*Is it morally justifiable to copy copyrighted software for one's friend?*

- Is the law just or unjust?
- Do ethics let us make exceptions for our friends and ourselves?
- Is this case different from stealing CDs?
- What about software makes it different?

*Note: Morality is public and requires impartiality (B. Gert)*

### **“Web 2.0”: features not seen before**

- Increasing richness of interaction
- *Interactive blogs* (vs. one-way communication)
- *Video sharing* (vs. broadcasting)
- *Wikis* (vs. centrally edited publication)
- *Social networks* (Facebook, MySpace, LinkedIn)
- *Web 1.0*: Downloading information, hyperlinking, E business

## Collaborative tools

- Wikipedia, Wiktionary
- Open Directory Project
- Free Software Foundation
- Webcams monitored by volunteers
- Crime reporting to other community residents to enlist volunteers

## Free Internet based services

- *Social networking*: Unexpected uses have been political campaigns, product marketing
- *Web-based email*: Advantages includes access to email and archive from any Internet client machine
- *Search engines*: Priority of a site in the provider's index decides site's visibility
- *Payment for free services*: Advertising; donations or payment by a few big users

## References

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Richar Spinello and Herman Tavani, Eds. *Readings in CyberEthics*, 2<sup>nd</sup> ed. Jones and Bartlett, 2004.