

**CMP 1102**

**Lecture 4**

**Privacy, Ethical Dilemmas, Choices, and Codes of Ethics**

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# Privacy Protection And The Law

*Ethical conundrum:*

- IT technology allows businesses to gather information
- must balance the needs of those who use this information against the privacy rights of those people whose information may be used

Systems collect and store key data from every interaction with customers

- purchasing habits, contacts, search terms, etc.

Many people object to data-collection policies of government and business

- strips people of the power to control their own personal information
- but IT does it on a regular basis....

# Privacy Protection And The Law (cont.)

## Privacy

- key concern of Internet users
- top reason why non-users still avoid the Internet (according to US Census data)

## Reasonable limits must be set

- information and communication technologies must be developed to protect privacy, rather than diminish it

## Historical perspective on the right to privacy

- Fourth Amendment (1789) - reasonable expectation of privacy protection against unreasonable searches and seizures

# Key Privacy And Anonymity Issues

Government electronic surveillance

Data encryption

Identity theft

Customer profiling

Need to treat customer data responsibly

Workplace monitoring

Spamming

Advanced surveillance techniques

# Data Encryption

## ***Cryptography***

- science of *encoding* messages
- only sender and intended receiver can understand the messages
- key tool for ensuring confidentiality, integrity, authenticity of electronic messages and online business transactions

## ***Encryption***

- process of converting electronic messages into a form understood only by the intended recipients

# Data Encryption (continued)

## ***Encryption key***

- a (large random) value applied using an algorithm to encrypt or decrypt text
- length of key determines strength of encryption algorithm

## ***Public key*** encryption system uses two keys: public and private key

- message recipient's *public* key
  - readily available and used for encryption
- message recipient's *private* key
  - mathematically related to public key
  - kept secret and used for decryption

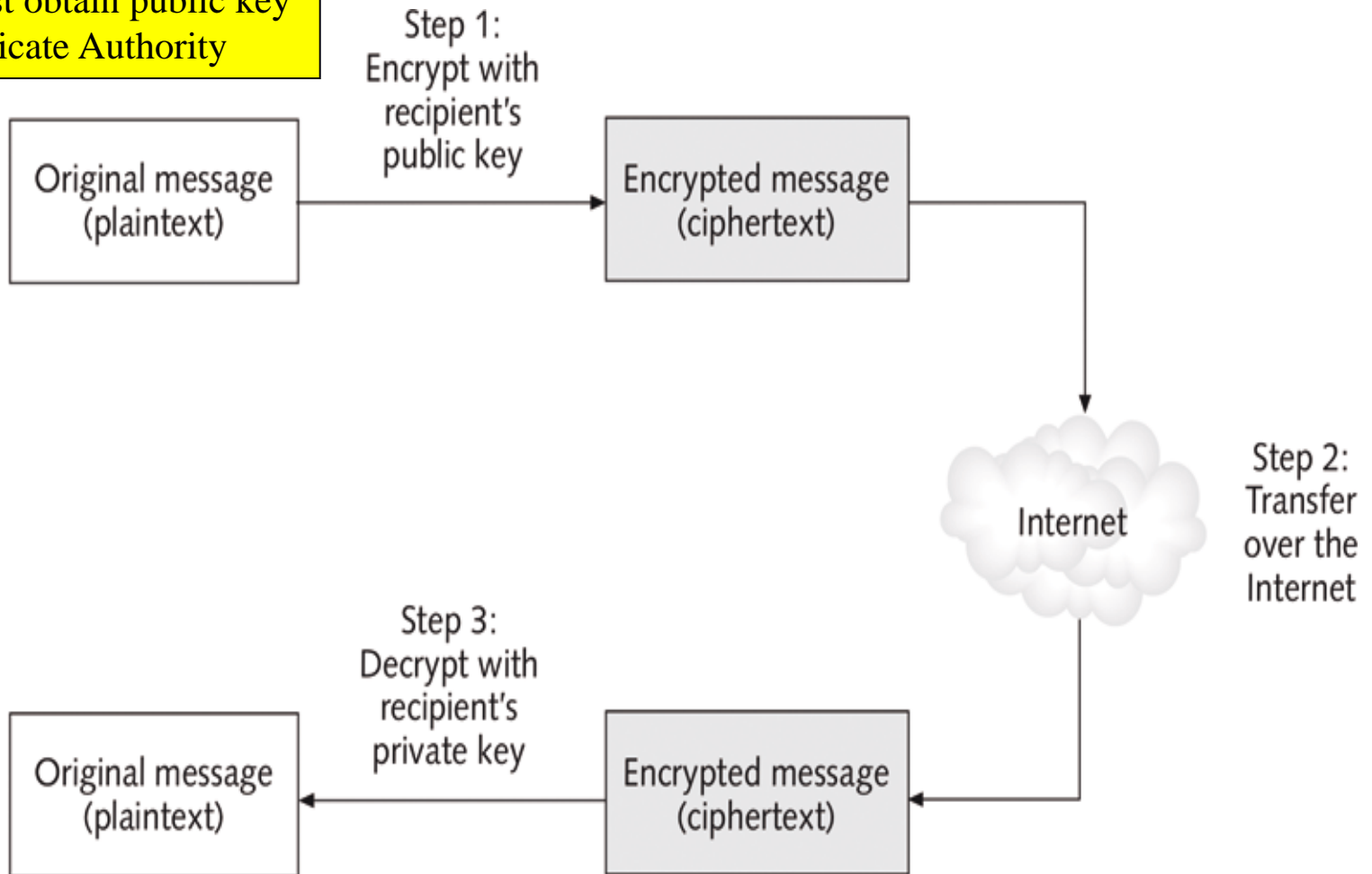
RSA - a public-key encryption algorithm (RSA keys typically 1024–2048 bits long)

## ***Private key*** encryption system

- single key to encode and decode messages
- issue of secretly distributing private key to sender/receiver paramount

# Public Key Encryption

Sender must obtain public key  
from Certificate Authority



Only recipient can  
read message

Public key encryption

## Data Encryption (continued)

Despite potential management and administration headaches most people agree encryption eventually must be built into

- networks
- file servers
- tape backup systems

Seagate Technology hard drive

- automatically encrypts all data
- must know password to access data

U.S. Arms Export Control Act controls the export of encryption technology, hardware, and software

- violators face 10-year jail term and \$1M fine



# Identity Theft

Theft of key pieces of personal information to gain access to a person's financial accounts

- using this info, ID thief may apply for new credit or financial accounts, register for college courses, etc—all in someone else's name

Information includes:

- name
- address
- date of birth
- Social Security number
- passport number
- driver's license number
- mother's maiden name

# Identity Theft (continued)

Fastest growing form of fraud in the United States

- victims spend >600 hours over several years recovering from ID theft

Lack of initiative by companies in informing people whose data was stolen

*“The personal information of 90,000 people in a Stony Brook University database was accidentally posted to Google & left there until it was discovered almost two weeks later.”*

## **Phishing**

- attempt to steal personal identity data
- by tricking users into entering information on a counterfeit Web site (spoof emails)
- spear-phishing - a variation in which employees are sent phony e-mails that look like they came from high-level executives within their organization

# Identity Theft (continued)

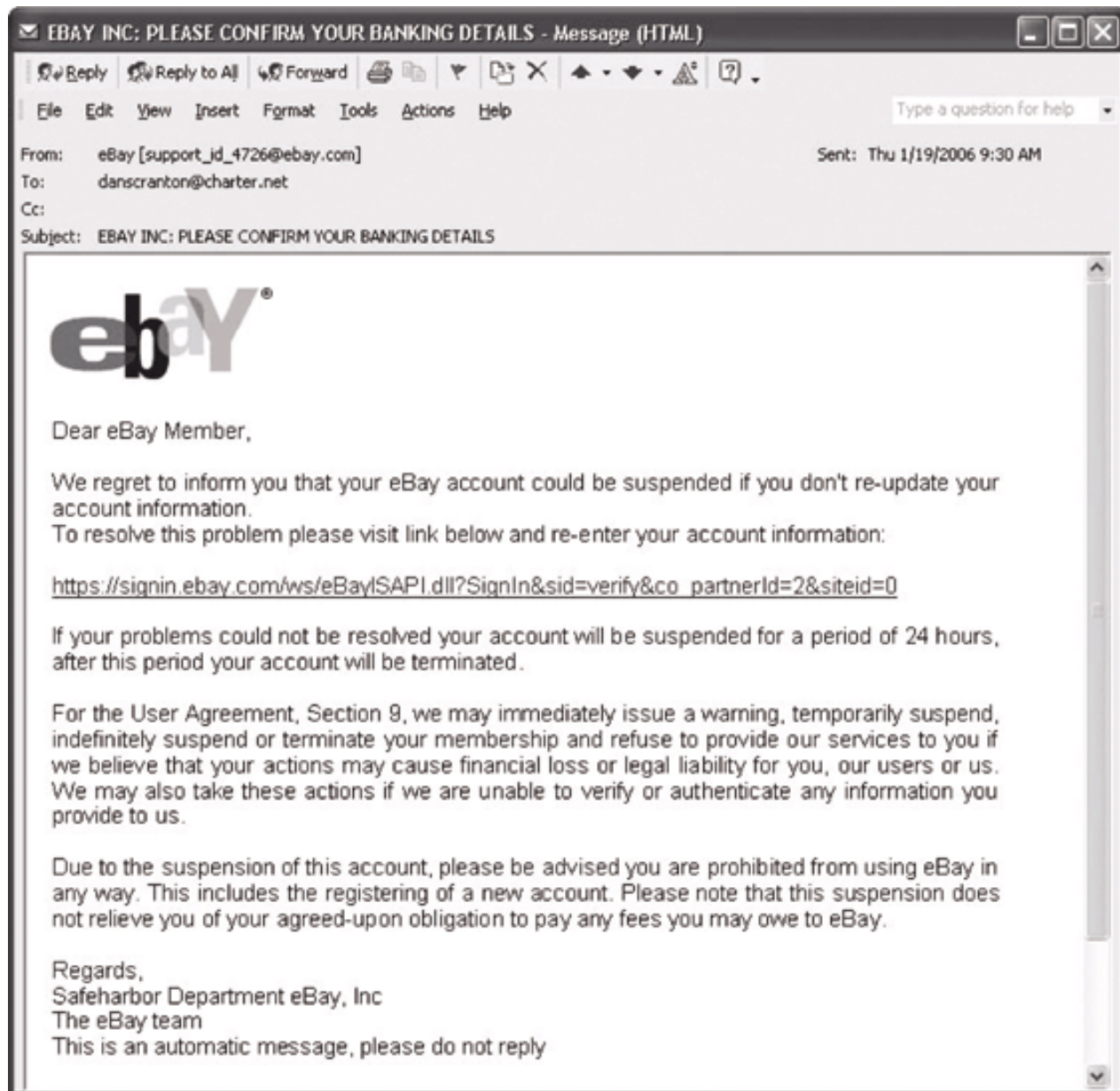
## ***Spyware***

- keystroke-logging software downloaded to user's computer without consent
- enables the capture of:
  - account usernames
  - passwords
  - credit card numbers
  - other sensitive information
- operates even if an infected computer is not connected to the Internet
- records keystrokes until users reconnects; data collected then emailed to spy or posted to a web site

Identity Theft and Assumption Deterrence Act of 1998 was passed to fight Identity fraud

- makes it a Federal felony (3-25 yrs in prison)

# E-mail Used by Phishers



# Consumer Profiling

Companies can collect info about consumers without their explicit permission!

Companies openly collect personal information about Internet users

- when they register at web sites, complete surveys, fill out forms or enter contests online

## Cookies

- text files a web site places on user's hard drive so that it can remember info
- examples: site preferences, contents of electronic shopping cart
- cookie are sent back to server unchanged by browser each time it accesses that server

## Tracking software

- identify visitors to your web site from e.g. pay-per-click accounts

# Consumer Profiling (continued)

Similar methods used outside the Web environment

- marketing firms warehouse consumer data
- for example, credit card purchases, frequent flier points, mail-order catalogue purchases, phone surveys

Databases contain a huge amount of consumer behavioral data

## ***Affiliated Web sites:***

- group of web sites served by single advertising network
- DoubleClick tracks ad clicks and web purchases: useful for marketers and sellers

Customized service for each consumer

- marketers use cookies to recognize return visitors and store useful info about them

# Consumer Profiling (continued)

## Types of data collected while surfing the Web

- GET data: affiliated web sites visited and info requested
- POST data: form data
- Click-stream data: monitoring of consumer surfing activity

## Four ways to limit or even stop the deposit of cookies on hard drives

- set the browser to limit or stop cookies
- manually delete them from the hard drive
- download and install a cookie-management program
- use anonymous browsing programs that don't accept cookies
  - e.g. anonymizer.com allows you to hide your identity while browsing

# Consumer Profiling (continued)

**Personalization software** used by marketers to optimize number, frequency, and mixture of their ad placements

- ***Rules-based:***  
uses business rules tied to customer-provided preferences or online behavior to determine most appropriate page views
- ***Collaborative filtering:***  
consumer recommendations based on products purchased by customers with similar buying habits
- ***Demographic filtering:***  
considers user zip codes, age, sex when making product suggestions
- ***Contextual commerce:***  
associates product promotions/ads with content user is currently viewing

## ***Platform for Privacy Preferences (P3P)***

- shields users from sites that don't provide desired level of privacy protection
- P3P software in a browser will download privacy policy for each site visited and notify users if policy does not match their preferences



# Treating Consumer Data Responsibly

Strong measures are required to avoid customer relationship problems

Code of Fair Information Practices and 1980 OECD privacy guidelines

- companies collect only personal info necessary to deliver its products/services
- protects this info
- informs customers if it intends to use this info for research or marketing
- provides a means for customers to opt out

Chief privacy officer (CPO)

- executive to oversee data privacy policies and initiatives
- avoids violating government regulations and assures customers that their privacy will be protected

# Manager's Checklist for Treating Consumer Data Responsibly

Questions	Yes	No
Do you have a written data privacy policy that is followed?	_____	_____
Can consumers easily view your data privacy policy?	_____	_____
Are consumers given an opportunity to opt in or opt out of your data policy?	_____	_____
Do you collect only the personal information needed to deliver your product or service?	_____	_____
Do you ensure that the information is carefully protected and accessible only by those with a need to know?	_____	_____
Do you provide a process for consumers to review their own data and make corrections?	_____	_____
Do you inform your customers if you intend to use their information for research or marketing and provide a means for them to opt out?	_____	_____
Have you identified a person who has full responsibility for implementing your data policy and dealing with consumer data issues?	_____	_____

# Workplace Monitoring

## Ethical conundrum

- ensure worker productivity without violating privacy rights of employees

## Employers monitor workers

- record email, surfing activity, files, even videotaping employees on the job
- ensures that corporate IT usage policy is followed

## Fourth Amendment cannot be used to limit how a private employer treats its employees

- public-sector employees have far greater privacy rights:  
“reasonable expectation of privacy” *Katz v. U.S.* 1998 Supreme Court ruling

## Privacy advocates want federal legislation

- to keep employers from infringing upon privacy rights of employees
- inform employees of electronic monitoring devices; restrict type of info collected

# Spamming

Transmission of same e-mail message to *large* number of people

*Extremely inexpensive* method of marketing

- \$1K vs. \$10K for direct-mail campaign
- 3 weeks to develop vs. 3 months
- 48hrs for feedback vs. 3 weeks

Used by many *legitimate* organizations

- example: product announcements

Can contain *unwanted and objectionable* materials

Last 2 bullets point to the ***ethical conundrum!***

**Email considered Spam: 40% of all email; Daily Spam emails sent: 12.4 billion; Daily Spam received per person: 6; Annual Spam received per person: 2,200; Spam cost to all non-corp Internet users: \$255 million; Spam cost to all U.S. Corporations in 2002: \$8.9 billion; States with Anti-Spam Laws: 26**

## Spamming (continued)

### The ***Controlling the Assault of Non-Solicited Pornography and Marketing*** (CAN-SPAM) Act 2004

- says it is legal to spam but
  - spammers cannot disguise their identity
  - there must be a label in the message specifying that the e-mail is an ad or solicitation
  - they must include a way for recipients to indicate they do not want future mass mailings (i.e. opt out)
- may have actually *increased* the flow of spam as it legalizes the sending of unsolicited e-mail

# Advanced Surveillance Technology

Provides exciting new data-gathering capabilities vs. personal-privacy issues

- **advocates:** people have no legitimate expectation of privacy in public places
- **critics:** creates potential for abuse – intimidation of political dissenters, blackmail of people caught with “wrong” person or in “wrong” place

## ***Camera surveillance***

- U.S. cities plan to expand surveillance systems  
London has one of world’s largest public surveillance systems
- “Smart surveillance system”  
singles out people acting suspiciously

## ***Facial recognition software***

- identifies criminal suspects and other undesirable characters
- yields mixed results  
at Boston’s Logan airport: 96 failures, 153 successes

## ***Global Positioning System*** (GPS) chips

- Placed in many devices to precisely locate users
  - cars, cellphones, etc.
- **Good:** accurately respond to 911 callers; real-time location-aware marketing
- **Bad:** wireless spamming from local restaurants etc, your whereabouts always known

# **Ethical Dilemmas, Choices, and Codes of Ethics**



# Resolving Moral Dilemmas

## 1. Moral clarity

- Need to know something is wrong! *Do not ignore problems!*
- Loyalty to employer, responsibilities to public and environment (and complex relations between these)

## 2. Know the facts

- Get hard, documented facts, discuss with others
- Competence matters in gathering technical facts

## 3. Consider options

- Diversity of actions to take? Evaluate/discuss.
- Long-term, short-term perspectives, repercussions?
- “Creative middle solution”?

## 4. Make a reasonable decision

- Weigh all factors, recognize “gray areas”/compromises
- An engineering design problem?



# Case

- Engineer A is employed by a software company and is involved in the design of specialized software in connection with the operations of facilities affecting the public health and safety (i.e., nuclear, air quality control, water quality control). As the part of the design of a particular software system, Engineer A conducts extensive testing and although the tests demonstrate...

that the software is safe to use under existing standards, Engineer A is aware of new draft standards that are about to be released by a standard setting organization-standards which the newly designed software may not meet. Testing is extremely costly and the company's clients are eager to begin to move forward. The software company is eager to satisfy its clients, protect the software company's finances, and protect...

...existing jobs; but at the same time, the management of the software company wants to be sure that the software is safe to use. A series of tests proposed by Engineer A will likely result in a decision whether to move forward with the use of the software. The tests are costly and will delay the use of the software by at least six months, which will put the company at a competitive...

...disadvantage and cost the company a significant amount of money. Also, delaying implementation will mean the state public service commission utility rates will rise significantly during this time. The company requests Engineer A's recommendation concerning the need for additional software testing.

**Question: Should Engineer A design the software to meet the new standards?**

# Analyzing the case...

- Moral clarity:

- What is wrong? What is the core issue/question?
- Will the software meet the new standards?
- Why are there new standards?
  - Experience shows new failure modes
  - New tests designed to test new failure modes
- Engineer's role in new standards?
  - Development of new standards
  - Following new standards

## Analyzing the case, continued...

- Know the facts

- It is critical software (health/safety of public)
- New standards to test new failure modes (that you need to understand)
- Testing is costly, company finances at stake
- Need to protect existing jobs
- Testing will delay release by > 6 months
- Testing will hurt competitive advantage?
- Utility rates will rise

# Analyzing the case, continued...

- Consider options

- **Option 1:** Ignore the new tests, take risk to public safety/welfare, save time/money
- **Option 2:** Conduct the tests, risk jobs, hurt finances, become certain software will work, protect safety/welfare of the public
- **Option 3:** Creative middle of the road solution: Is there are limited version of full tests that could be conducted that would partially test, but save some money/time?



# Analyzing the case, continued

- Make a reasonable decision
  - Pick Option 2 since safety/health/welfare of the public is paramount
  - If company says no, pick Option 3 and try to do a limited test for the failure mode (your competence in coming up with an economical test is critical here). In this option, all constraints considered, you *try* to protect the safety, health, and welfare of the public

# Resolving moral dilemmas, “line-drawing”

- Harris et al. idea to try to make solving moral dilemmas more analytical/quantitative
- Given moral dilemma
  - Establish key features, issues
  - Establish extremes of features/issues and paradigms (indicating totally ethical vs. clearly unethical aspects)
  - Construct a line drawing (see below)
  - Evaluate “test case” (your current moral dilemma)

# Line-drawing, bribery example (Harris et al.)

- Victor is an engineer in a large construction firm. He has been assigned the task of being the sole person to recommend rivets for the construction of a large apartment building. After some research and testing, he decides to recommend ACME rivets for the job, which he determines are of the lowest cost and highest quality. On the day after Victor's decision was made, an ACME representative visits him and gives him a voucher for an all-expense-paid trip to the annual ACME Technical Forum, which meets in Jamaica. The trip will have considerable educational value, but will also provide day trips to the beach and other points of interest. **Question: If Victor accepts, has he been bribed?**

# Line-drawing, bribery example (Harris et al.)

Feature	Paradigm (bribery)	Test case	Paradigm (not bribery)
Gift size	Large	--- <u>X</u> -----	Small (<\$1)
Timing	Before decision	----- <u>X</u> ----	After decision
Reason	Personal gain	-----X-----	Educational
Responsibility	Sole	-- <u>X</u> -----	None
Product quality	Worst	-----X----	Best
Product cost	Highest	---X-----	Lowest

X – test case feature evaluation, X important issue

Do you see a “creative middle solution”?

What about affect on future decisions on ACME?

What is company policy? Is there an *appearance* of bribery?

May not be a bribe, but still may not be a good idea!

# Codes of Ethics

- Why are codes important?
  - Serve and protect the public
  - Guidance/support for engineers
  - Inspiration, deterrence, discipline
  - Shared standards, education, mutual understanding
  - Profession' s image
- Limitations of codes
  - Too vague to be useful in every day ethical decision-making?
  - Impossible to cover all eventualities

# National Society of Professional Engineers (NSPE)

- Code of Ethics for Engineers
- Preamble: Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity. Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality,

- fairness, and equity and must be dedicated to the protection of the public health, safety, and welfare. Engineers must perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

# Fundamental Cannons

1. Hold paramount the safety, health, and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.



Also...

- Rules of Practice
- Professional Obligations
- Several pages long...
- Consider a shorter code...

“Hold paramount the safety, health,  
and welfare of the public”

- How to assess impact on human safety, health, and “welfare”?
- Amartya Sen uses a “capabilities approach:”
  - Being able to live a long life in health
  - Being able to get an education, being able to work
  - Being able to have freedom of expression and association
  - Others...
- Lack of welfare=capability deprivation
- **Note:** It does not say the engineer should be encouraged to focus on (even extreme) capability deprivation. Should it?

# IEEE Code of Ethics

We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:

1. To accept responsibility in making engineering decisions consistent with the safety, health, and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;

**Concern:** “Disclose” phrase nice, but “**consistent**” vs. ABET (NSPE), “engineers shall hold **paramount** the safety, health, and welfare” ... is a weaker statement? What does “consistent” even mean?

2. To avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;

Example: Ownership in a supplier's company

3. To be honest and realistic in stating claims or estimates based on available data;

Examples: When dishonest claims give you an advantage over a competitor, or when unrealistic claims endanger individuals

#### 4. To reject bribery in all its forms;



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Example: Supplier gifts, when are they big enough to constitute a bribe?

5. To improve the understanding of technology, its appropriate application, and potential consequences;

Examples: Importance of teaching youth about engineering, importance of publishing engineering results in IEEE publications



6. To maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;

Example: A coop student who took on task that affected safety on a manufacturing line

7. To seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;

Note: Important to keep an emotional separation to your work so that when it is criticized you do not take it personally

8. To treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin;

Note: There are certainly still problems in industry with these issues. We will discuss this more later.

9. To avoid injuring others, their property, reputation, or employment by false or malicious action;

Example: Speaking poorly of someone's project results when they do not deserve it

10. To assist colleagues and co-workers in their professional development and to support them in following this code of ethics.

Example: If you are a manager, giving them opportunities for professional development (e.g., taking courses or attending a conference)

## Critique the code...

- You have moral autonomy - do not take it as given - challenge it! Demand that right!
- Some problems: “paramount” vs “consistent” discussed earlier +
  - **Short!** Compare to NSPE, ASCE, ASME...
  - Leaves out possibility of much education/guidance by reading it.
  - **Omissions? Yes!** Consider our earlier definitions of professionalism that lead others to put in statements on “public service”...

# Relevant portions of IEEE Code of Ethics

We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and *in accepting a personal obligation to our profession, its members and the communities we serve*, do hereby commit ourselves to the highest ethical and professional conduct and agree: ...

5. *To improve the understanding of technology, its appropriate application, and potential consequences;*

# National Society of Professional Engineers (NSPE)

- III. 2. A. Engineers shall seek opportunities to participate in civic affairs; career guidance for youths; and work for the advancement of the safety, health, and well-being of their community.
- This is THE code for the professional engineer!



# Software Engineering Code of Ethics and Professional Practice

- ACM/IEEE-CS Joint task force on software engineering ethics and professional practices
- Principle 1: Public: “...software engineers shall, as appropriate:”
  - 1.08. Be encouraged to volunteer professional skills to good causes and contribute to public education concerning the discipline.

# The 1979 IEEE Code of Ethics

- Article IV: Members shall, in fulfilling their responsibilities to the community:
  1. Protect the safety, health, and welfare of the public and speak out against abuses in these areas affecting the public interest;
  2. *Contribute professional advice, as appropriate, to civic, charitable or other nonprofit organizations;*
  3. Seek to extend public knowledge and appreciation of the profession and its achievements

IEEE destroyed a key aspect of the  
spirit of professionalism with their  
1990 revision/shortening of the  
1979 code

# Social justice perspectives

- “Hold paramount the safety, health, and welfare of the public, **and encourage engineers to focus on improving the worst safety, health, and welfare problems**”? Better?
- Paid, or gratuitous, engineering with this goal:
  - Catholic: “preferential option for the poor” demands special attention for poor, and demands that everyone contribute to the “common good”
  - Jewish/Muslim: Views on charity (which in some cases can be service, not money)
  - Rawls: “Difference Principle” as it applies to a state’s institutions, “inequalities are only allowed that will reduce inequalities”
  - Sen: Broad view of how to focus on promoting justices and avoiding injustices

# Individual obligations to serve vs. a profession's encouragement to serve

- Does an engineer have an obligation to serve humanity (e.g., for free)?
- Does an engineer have an obligation (even in paid employment) to help with the worst cases of capability deprivation?
- Are such obligations “duties” (certainly, engineers should not be coerced in any way to do these things)?
- If individuals do not have an obligation, does the profession *as a whole*? In connection with this, should engineering profession's codes of ethics “encourage” engineers to do these things (or “aspire” to doing these things)? Not a requirement that any one engineer does these things.