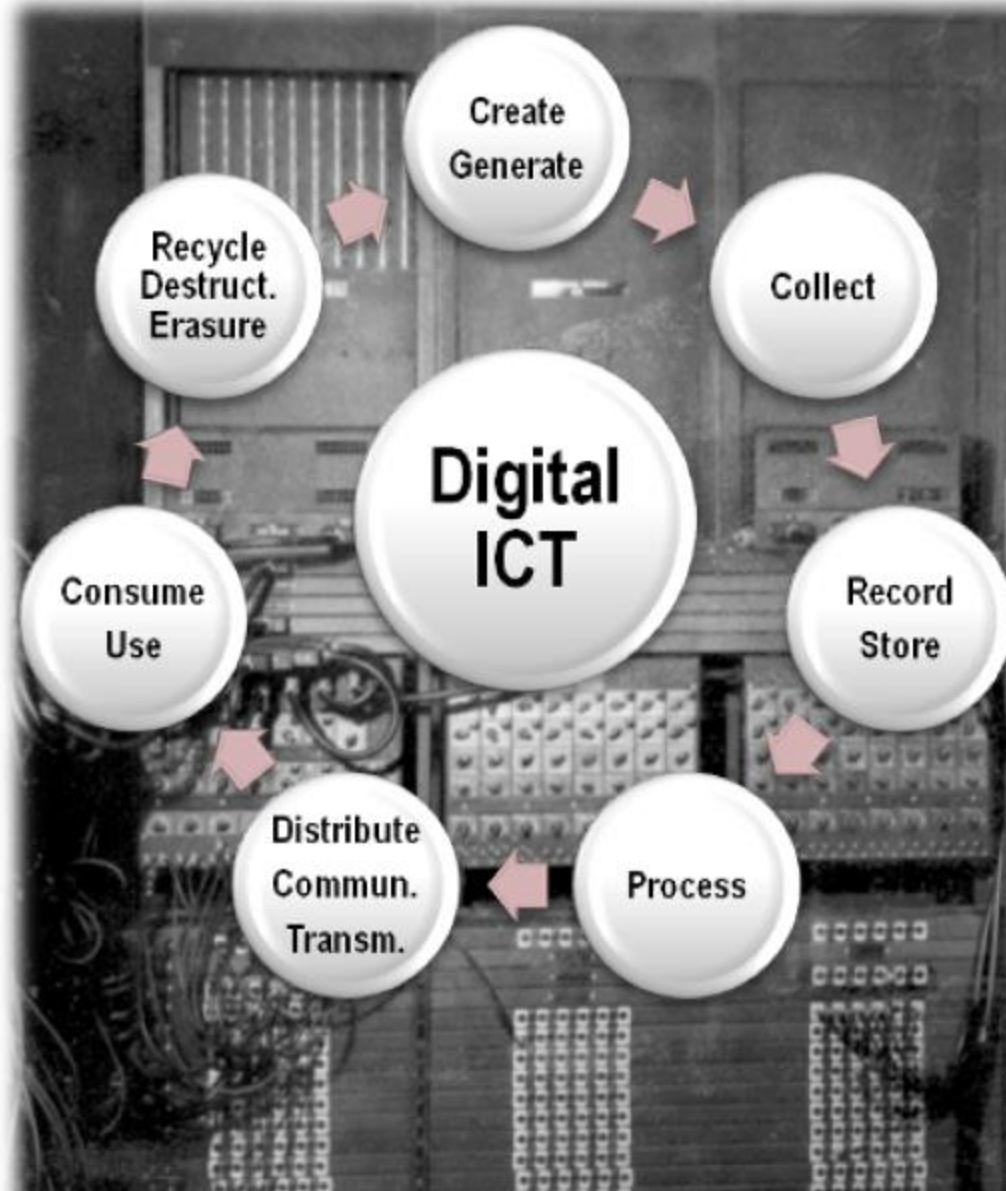# Ethics

Ethics

- Why talk about ethics?
- What's High School students' take on this?
  - Grades
- What's college/university students' take on this
  - Career
- Consequences of lack of ethics here?

Create
Generate

Recycle
Destruct.
Erasure

Collect

**Digital
ICT**

Consume
Use

Record
Store

Distribute
Commun.
Transm.

Process

Since the fifties:

Computer revolu

Mobile, Internet (
2.0), computers a
communication r
than computation
devices, distribut
interactivity (GPS

Digital revolution

Amazon and the
renaissance, mo
printing.

eniac4.png

Information revolution: from things to energy to information

Educational Institutions have established ethics codes for their students, e.g. the U.S. Air Force Academy:

"We Will Not Lie, Steal Or Cheat, Nor

Tolerate Among Us Anyone Who Does"

-- Which do you think is the harder part:

Line 1 or Line 2? Why?

A nation or a culture cannot endure for long unless it is undergirded by common values such as valor, public spiritedness, respect for others and for the law; It cannot stand unless it is populated by people who will act on the motives superior to their own immediate interest.

Chuck Colson, *Against the Night*

When the situation needs improvement, Gandhi offers guidance: "You must be the change you wish to see in the world."

Ethics

Ethics and Professional Conduct

- Why should we be interested in ethics and professional conduct?
- Here is one answer:
  - Today the quality of software produced by software engineers is critical to society.
    - The success of many, if not most, human endeavors is dependent on high-quality software (e.g. applications used in financial, legal, library, health, personnel, and transportation systems)
    - Lives depend on the safety and reliability of many software systems (e.g. control of aircraft, medical devices, and nuclear power stations)
  - In addition to technical capability, the quality of software products depend on the ethics and professional conduct of the engineers that developer develop them.
- In recognition of the importance of this area, ABET (Accreditation Board for Engineering and Technology) has criteria that requires study of ethics and professional conduct.

What's Your Understanding Of SE Ethics?

- Set of moral principles that govern individual or group of what is acceptable while "building" software
- Set of moral principles that govern the entire software development activities
- What are some of the ethical "rules" you gathered from the reading?

SE Code of Ethics

- Public
  - Software engineers shall act consistently with the public interest

- Client and Employer
  - Act in a manner which is the best interest of the client and employer, and consistent with public interest

- Product
  - Ensure their product and modifications meet the highest standard

- Judgment
  - Maintain integrity and independence in their professional judgment
- Management

- Profession

- Colleagues

- self

What are the Ethical Issues?

- Four issues proposed with the acronym PAPA
  - P   Privacy
  - A   Accuracy
  - P   Property
  - A   Accessibility
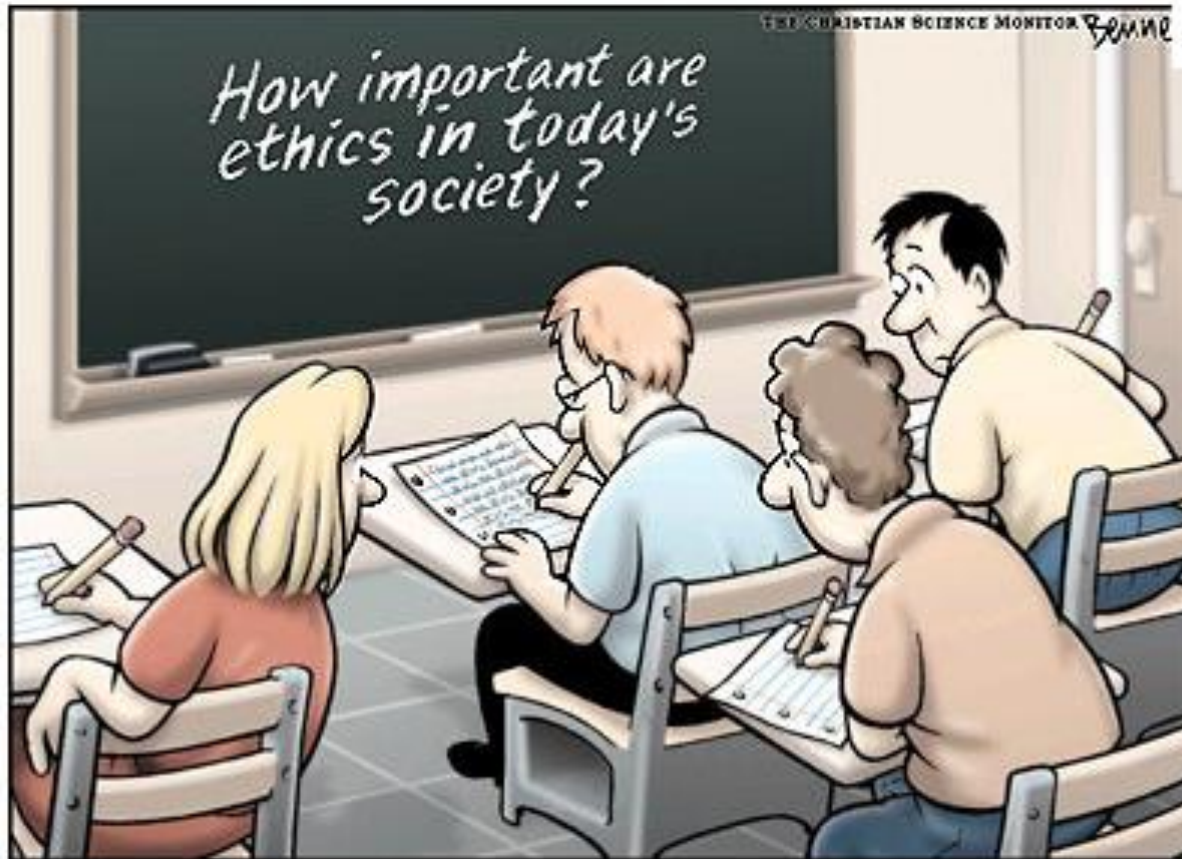
Ethical Theories

Provide a framework for

(1) Getting at the underlying rationale of moral arguments,

(2) Classifying and understanding various arguments, and

(3) Most importantly, defending a conclusion about what is right or wrong

Three Major Types of Ethical Theories

1. Consequentialism-- utilitarianism
2. Deontological theories
   The "categorical imperative"
3. Ethical relativism

Utilitarianism

- The basic principle is that everyone ought to act in ways which bring about the greatest amount of happiness for the greatest number of people.

- The alternative that produces the most overall net happiness (good minus bad) is the right action.

Deontological Theories

- Put the emphasis on the **character of the act itself**, not its effects. What makes an action right or wrong for dentologists is the intrinsic character of the action.

Categorical Emperative

- Can be stated as follows:

Never treat another human being merely as a means, but always as an end in himself or herself.

Ethical Relativism

- "There are no universal moral rules
- "Good" is functional for that society and culture.
- People are bound by the moral rules of their culture or society."

Responsible Computing Code of Ethics

- Functions of Code of Ethics:

1. A public statement that the profession is concerned about actions of its members (self- regulation rather than government regulation)

   E.G. Doctors can lose their license; lawyers can be disbarred; all done by professional association

Functions of Code of Ethics

2. Recognition of the responsibilities of individuals

3. Establishment of readily accessible, clear guidelines

4. Justification for actions taken in opposition to directives by superiors

"To see what is right and not to do it is want of courage." (Confucius)

What is SEEPP?

- Stands for

- Software Engineering Ethics and Professional Practices

- Goal: Establish a code of conduct for professional software engineers to make software engineering a beneficial and respected profession.

- Joint Effort by IEEE-Computer Society and Association of Computing Machinery(ACM)

Who are the Engineers?

- Software engineers are those who contribute either by direct participation or by
  - teaching,
  - analyzing,
  - Specification generating,
  - designing,
  - developing,
  - certifying,
  - Maintaining and
  - testing

of software systems

Roles of Software Engineers

- "Professional Software Engineers" include
  - Practitioners
  - Educators
  - Managers
  - Supervisors
  - and Policy makers
- Trainees and Students of the Profession

What is Software?

- Recall our original/main definition?
- Computers have a central and growing role in commerce, industry, government, medicine, education, entertainment and society at large

- Software Engineers develop software to automate / facilitate other areas of society

- Thus Role of software in medicine, education, government, industry, commerce etc is "Key"

Software Engineers in focus

- Because of their roles in developing software systems, software engineers have significant opportunities to
  - Do good or cause harm
  - Enable others to do good or cause harm
  - Influence others to do good or cause harm

Ground principles

- SE requires the application of engineering principles guided by informed management
- Principles must be rooted in sound theory
- Rigorous approaches must be combined with experimentation, intuition, and common sense
- No "silver bullets"

Progress expected

- Increased specialization
  - specialization is a sign of maturity of a discipline
- Component-based development
- Standard domain-specific architectures
- Increased reuse
- Distributed virtual teams

Social responsibility

- Software defects may cost lives or tremendous business losses
  - we should try to prevent them
  - we should study them when they occur, to avoid failures in the future
- Software creates new opportunities for increasing productivity and services, but also opportunities for criminal fraud and sabotage (e.g., viruses)
- Building reliable software is not only a technical goal; it has ethical and social implications for the serious professional

Need for Code of Ethics

To ensure, as much as possible, that software engineers efforts will be used for good

Software engineers must commit themselves to making software engineering a beneficial and respected profession
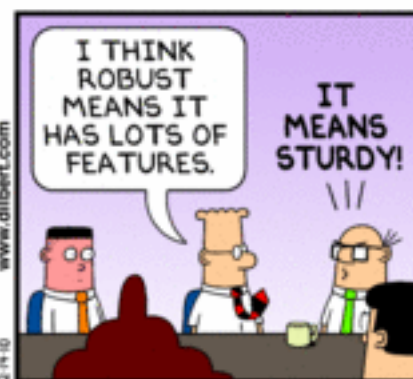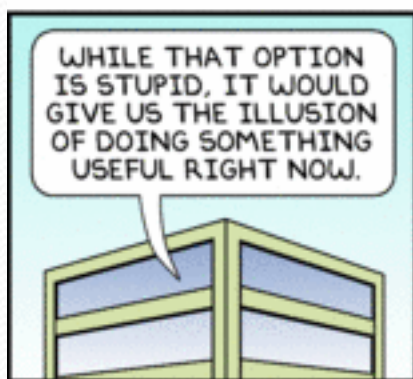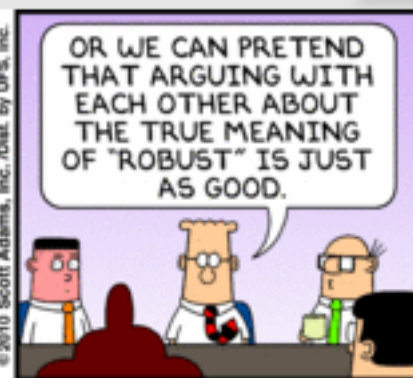
In accordance with that commitment, software engineers shall adhere a Code of Ethics and Professional Practice

Software Engineering Code of Ethics and Professional Practice

- The Code contains eight Principles related to the behavior of and decisions made by professional software engineers
  1. **PUBLIC**
  2. **CLIENT AND EMPLOYER**
  3. **PRODUCT**
  4. **JUDGMENT**
  5. **MANAGEMENT**
  6. **PROFESSION**
  7. **COLLEAGUES**
  8. **SELF**

Software Engineering Code of Ethics and Professional Practice (Contd.)

- 1 PUBLIC
  - Software engineers shall act consistently with the public interest
    - Accept full responsibility for their own work.
    - Moderate the interests of the software engineer, the employer, the client and the users with the public good
    - Approve software only if they believe that it is safe, meets specifications, passes appropriate tests
    - Be fair and avoid deception in all statements, particularly public ones
    - Consider issues of physical disabilities and allocation of resources
    - Be encouraged to volunteer professional skills to good causes

Software Engineering Code of Ethics and Professional Practice (Contd.)

- 2 CLIENT AND EMPLOYER
  - Software engineers shall act in a manner that is in the best interests of their client and employer, consistent with the public interest
    - Provide service in their areas of competence
    - Not knowingly use software that is obtained or retained either illegally or unethically.
    - Use the property of a client or employer only in ways properly authorized
    - Identify, document, collect evidence and report to the client or the employer promptly if, a project is likely to fail or to violate intellectual property law

Software Engineering Code of Ethics and Professional Practice (Contd.)

- 3 PRODUCT
  - Software engineers shall ensure that their products and related modifications meet the highest professional standards possible
    - Strive for high quality and acceptable cost
    - Ensure proper and achievable goals and objectives for any project
    - Ensure that they are qualified for any project they work on
    - Ensure that an appropriate method is used for any project
    - Work to follow professional standards
    - Strive to fully understand the specifications for software
    - Ensure adequate testing, debugging, documentation and review of software
    - Treat all forms of software maintenance with the same professionalism as new development.

Software Engineering Code of Ethics and Professional Practice (Contd.)

- 4 JUDGMENT
  - Software engineers shall maintain integrity and independence in their professional judgment
    - Temper all technical judgments by the need to support and maintain human values.
    - Only endorse documents if prepared under supervision
    - Maintain professional objectivity with respect to any software
    - Not engage in deceptive financial practices such as bribery, double billing, or other improper financial practices.
    - Disclose to all concerned parties those conflicts of interest that cannot reasonably be avoided or escaped.

Deceptive Practice??

Software Engineering Code of Ethics and Professional Practice (Contd.)

- 5 MANAGEMENT
  - Software engineering managers and leaders shall subscribe to and promote an ethical approach to the management of software development and maintenance
    - Ensure good management for any project on which they work
    - Ensure that software engineers are informed of standards before being held to them.
    - Ensure realistic quantitative estimates of cost, scheduling, personnel, quality and outcomes on any project
    - Provide for due process in hearing charges of violation of an employer's policy or of this Code.
    - Not ask a software engineer to do anything inconsistent with this Code
   - Not punish anyone for expressing ethical concerns about a project.
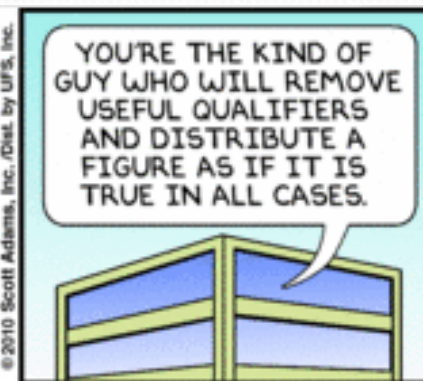
Software Engineering Code of Ethics and Professional Practice (Contd.)
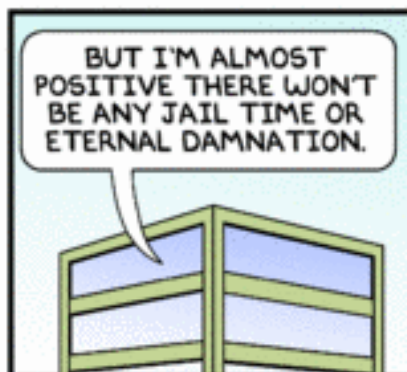
- 6 PROFESSION
  - Software engineers shall advance the integrity and reputation of the profession consistent with the public interest
    - Help develop an organizational environment favorable to acting ethically
    - Promote public knowledge of software engineering
    - Support, as members of a profession, other software engineers striving to follow this Code.
    - Not promote their own interest at the expense of the profession, client or employer.
    - Take responsibility for detecting, correcting, and reporting errors in software
    - Report significant violations of this Code to appropriate authorities
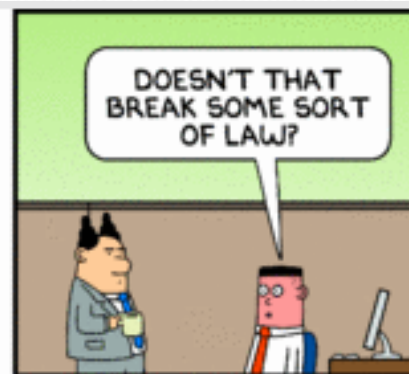
Software Engineering Code of Ethics and Professional Practice (Contd.)

- 7 COLLEAGUES
  - Software engineers shall be fair to and supportive of their colleagues
    - Encourage colleagues to adhere to this Code
    - Assist colleagues in professional development
    - Credit fully the work of others and refrain from taking undue credit
    - Assist colleagues in being fully aware of current standard work practices
    - Not unfairly intervene in the career of any colleague

Software Engineering Code of Ethics and Professional Practice (Contd.)

- 8 SELF
  - Software engineers shall participate in lifelong learning regarding the practice of their profession and shall promote an ethical approach to the practice of the profession
    - Further their knowledge of recent developments
    - Improve their ability to create safe, reliable, and useful quality software
    - Improve their ability to produce accurate, informative, and well-written documentation
    - Improve their knowledge of relevant standards
    - Not influence others to undertake any action that involves a breach of this Code

Where to find this code?

http://www.computer.org/tab/seprof/code.htm

http://www.acm.org/serving/se/code.htm#full
Full Version

http://www.acm.org/serving/se/code.htm#short
Short Version

Case studies

- Software Licensing (illegal copies)
  - EX: http://www.delcam.com/general/about/s_licence.asp
- Sharewares (hidden bomb)
  - http://www.mekabay.com/overviews/crime.pdf
- Team mates act of vandalism(loopholes)
- Virus in Public Software (Bugged browser)