Introduction to Software Engineering

Lecture # 3

Lecture by Engr. Sidra

Web software engineering

- **Software reuse** is the dominant approach for constructing web-based systems
  - When building these systems, you think about how you can assemble them from pre-existing software components and systems
- **Web-based systems** should be developed and delivered incrementally
  - It is now generally recognized that it is impractical to specify all the requirements for such systems in advance
- **User interfaces**, constrained by capabilities of web browsers
  - Technologies such as AJAX allow rich interfaces to be created within a web browser but are still difficult to use. Web forms with local scripting are more commonly used

Web-based software engineering

- Web-based systems are complex distributed systems but the fundamental principles of software engineering discussed previously are as applicable to them as they are to any other types of system
- The fundamental ideas of software engineering, discussed in the previous section, apply to web-based software in the same way that they apply to other types of software system

Key points

- Software—programs, data, and descriptive information—addresses a wide array of technology and application areas.
- Essential software product attributes are maintainability, dependability and security and efficiency.
- Software engineering is an engineering discipline that is concerned with all aspects of software production.
- Software engineering encompasses process, methods, and tools that enable complex computer-based systems to be built in a timely manner with quality. (Layered Technology)

Key points

- The high-level activities of specification, development, validation, and evolution are part of all software processes.
- There are many different types of system, and each requires appropriate software engineering tools and techniques for their development.
- The fundamental ideas of software engineering are applicable to all types of software system. These fundamentals ideas including managing software processes, software dependability and security, requirements engineering, and software reuse.
- Web-based systems and applications have evolved from simple collections of information content to sophisticated systems that present complex functionality and multimedia content.

Software Engineering Ethics

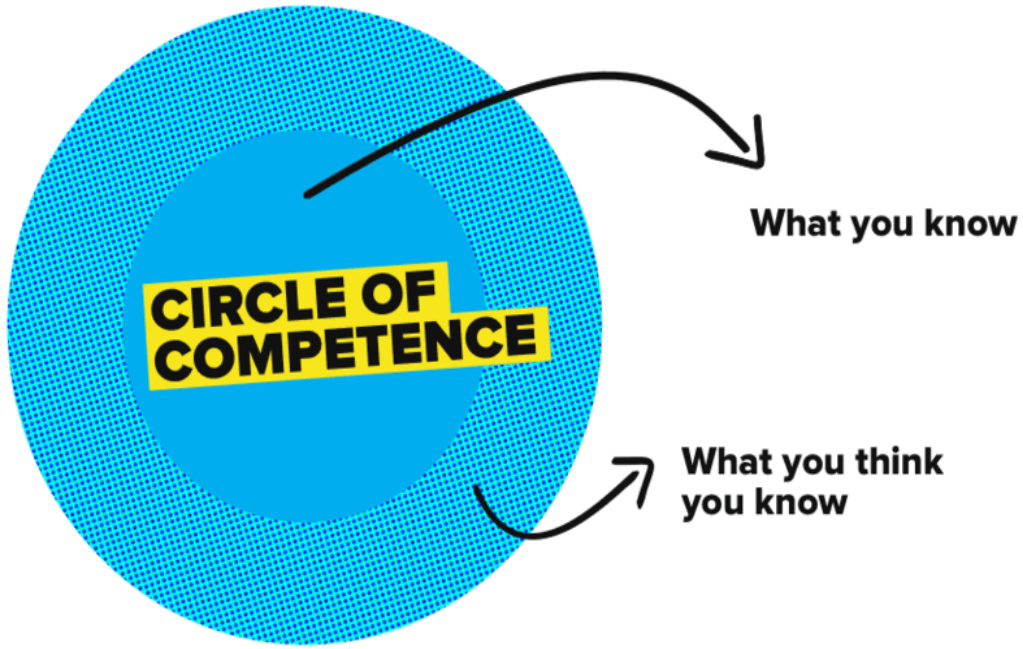
- Software engineering involves wider responsibilities than simply the application of technical skills
- Software engineers must behave in an honest and ethically responsible way if they are to be respected as professionals
- Ethical behavior is more than simply upholding the law but involves following a set of principles that are morally correct.

Issues of professional responsibility

- **Confidentiality**

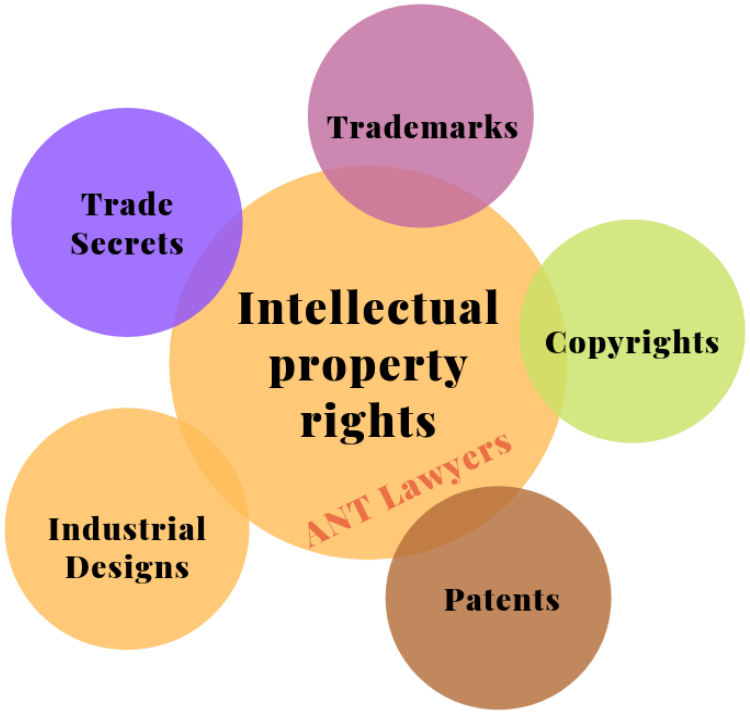
Issues of professional responsibility

- **Competence**



Issues of professional responsibility

- Intellectual property rights



Issues of professional responsibility

- **Computer Misuse**

The IEEE/ACM joint Code of Ethics

- IEEE Computer Society and Association for Computing Machinery (ACM), two major professional bodies jointly established a task force to frame software engineering code of ethics and professional practice.
- According to this code, every software professional has obligations and these obligations have to be fulfilled by every person as
  - a human being
  - a professional
  - a software engineering professional
- While discharging one's duties, sometimes there may be a conflict between the obligations to different entities.

Advantages of Code of Ethics

- Code of Ethics enables us to:
  - Set out the ideals and responsibilities of the profession
  - Exert a regulatory effect, protecting both clients and professionals
  - Improve the profile of the profession
  - Motivate and inspire practitioners, by attempting to define their reason for being
  - Provide guidance on acceptable conduct
  - Raise awareness and consciousness of issues
  - Improve quality and consistency

Preamble of Code of Ethics

- Prevalence of software in society provide significant opportunities to do good or cause harm.
- Ensure that efforts are used to do good.
- Not intended to be applied piecemeal.
- Not to be used to justify errors.
- Not a simple algorithm to produce ethical decisions.
- Software engineer must use judgment after thoughtful consideration of the 8 fundamental principles.
- Always use the public interest as the highest and governing principle.

IEEE/ACM Code of Ethics and Professional Practice

- 8 fundamental principles
  1. Public
  2. Client and employer
  3. Product
  4. Judgment
  5. Management
  6. Profession
  7. Colleagues
  8. Self

1.PUBLIC

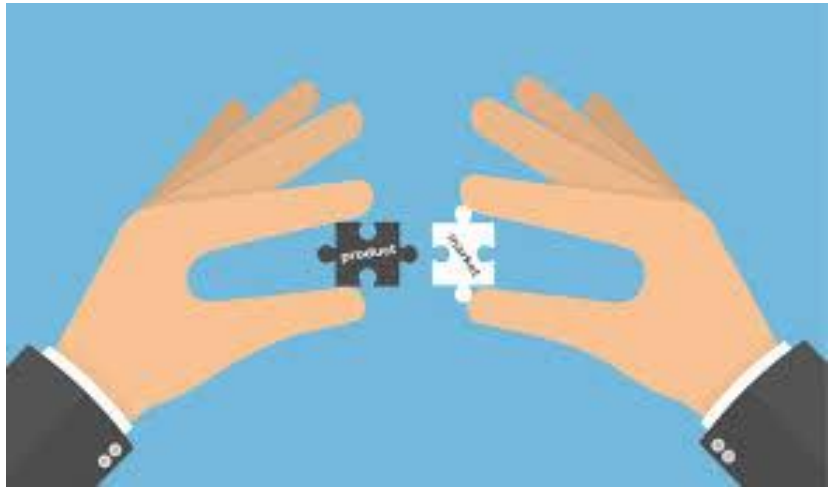
Software engineers shall act consistently with the public interest.

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.

3.PRODUCT

Software engineers shall ensure that their products and related modifications meet the highest professional standards possible.



4.JUDGMENT

Software engineers shall maintain integrity and independence in their professional judgment.

5.MANAGEMENT

Software engineering managers and leaders shall subscribe to and promote an ethical approach to the management of software development and maintenance.

6.PROFESSION

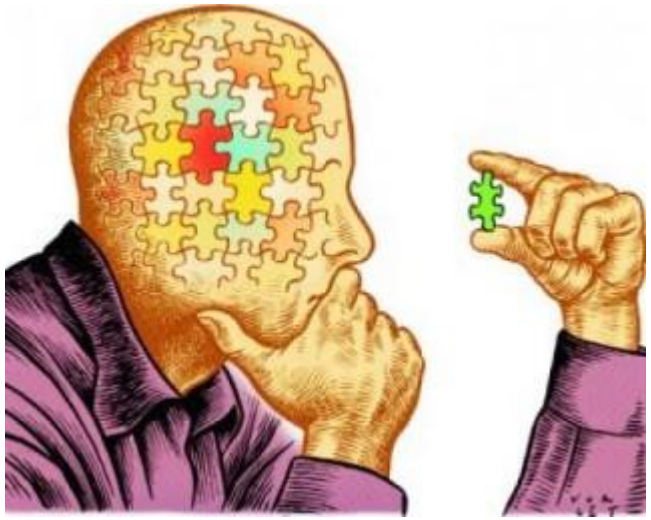
Software engineers shall advance the integrity and reputation of the profession consistent with the public interest.

7.COLLEAGUES:

Software engineers shall be fair to and supportive of their colleagues.

8. SELF:

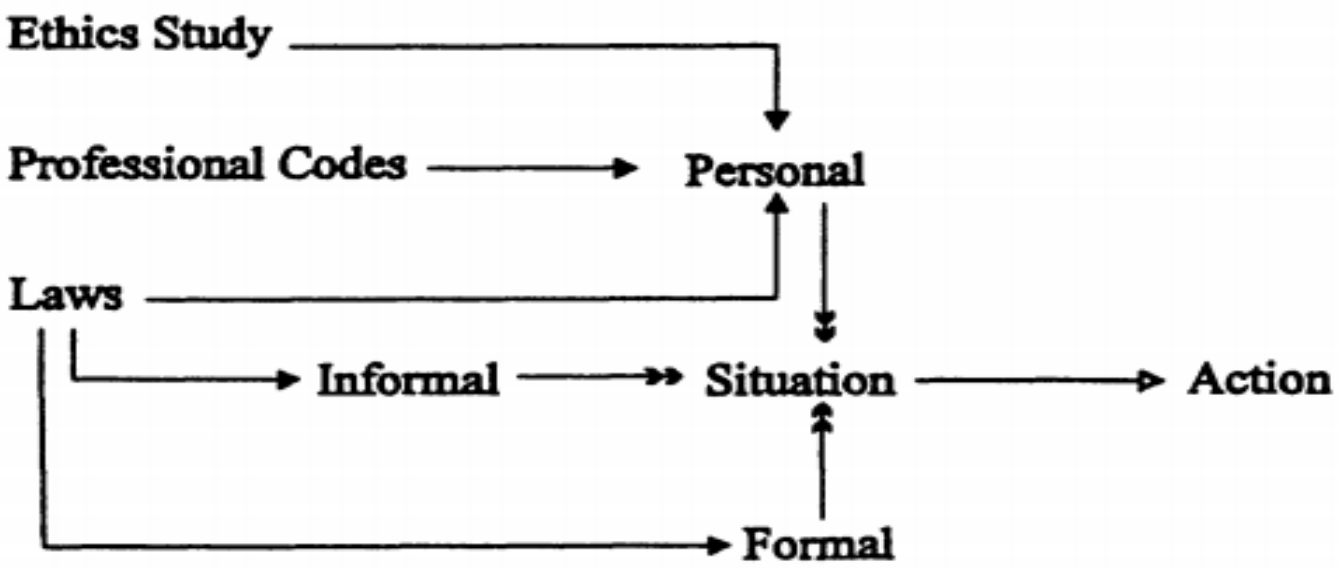
Software engineers shall participate in lifelong learning regarding the practice of their profession and shall promote an ethical approach to the practice of the profession.



Failure to follow Code of Ethics

- leads unethical processes carried out such as; poor communication between the professionals, poor judgment, poor design, lack of or poor testing, money mindedness of the management.
- The unethical practice of professional ethics is not only costly but also reduce the integrity of software engineers.
- Unethical practice may also be punishable

How best to follow ethics



Model of ethical decision making related to Software Engineering

Scenario # 1

- You are the owner of the software engineering company. Your employees(engineers) want you to pay for them to attend training.
- How would you respond in a way that is legal, moral and ethical?

Scenario # 2

- You are software engineer at a company where management routinely encourages you and your colleagues to use pirated softwares.
- How would you respond in a way that is legal, moral and ethical?

Scenario # 3

- You are the owner of a software engineering company. Your employees (engineers) want you to let them do pro bono work for a local non-profit organization on company time.
- How would you respond in a way that is legal, moral, and ethical?

Summary

- Need of code of ethics
- Issues of professional responsibilities
- IEEE/ACM code of ethics and professional Practices
- Failure to follow code of ethics
- How can follow the code of ethics