Software Engineering

The SE Profession
SE Ethics
Definitions*

• Professionalism
  – the conduct, aims, or qualities that characterize or mark a professional person

• Ethics
  – the discipline dealing with what is good and bad, and with moral duty and obligation
  – a set of moral principles or values
    • a theory or system of moral values.
    • the principles of conduct governing an individual or a group

• Ethical
  – of or relating to ethics.
  – conforming to accepted professional standards of conduct

• Why should we be interested in ethics and professional conduct?
  – 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.


These notes adapted from SWENET modules ose2 & ose3, www.swenet.org
Software engineering (SE) as a discipline and profession is relatively young, some even say “immature”.

In 1996, Ford and Gibbs listed designated eight infrastructure components that can be used to evaluate a mature profession:

- a professional society
- initial professional education
- skills development
- professional development
- accreditation
- certification
- licensing
- a code of ethics

In the following slides, we will discuss these elements in relation to the current state of the software engineering profession.
There is no professional society devoted exclusively to software engineering, but there are two societies which provide mature support for the software engineering profession:

- **Association for Computing Machinery (ACM)** ([http://www.acm.org/](http://www.acm.org/))
  - Founded in 1947, ACM has 75,000 members and has the objective of advancing the skills of computing professionals and students worldwide.
  - The ACM has 34 “special interest groups” (SIGs). The Special Interest Group on Software Engineering (SIGSOFT) focuses on issues relating to all aspects of software development and maintenance.

  - Founded in 1946, with nearly 100,000 members, it is the largest of the 36 societies of the Institute of Electrical and Electronics Engineers (IEEE).
  - The Computer Society's vision is to be the leading provider of technical information and services to the world's computing professionals.
Ford & Gibbs list 4 elements related to SE education: Initial professional education, Skills development, Professional development & Accreditation.

- **Initial Professional Education**
  - Computer Science programs with software engineering components.
  - 20+ undergraduate degree programs in software engineering in the U.S.
  - ACM / IEEE-CS curriculum guidance for software engineering education.

- **Skills Development**
  - Skills-based training through corporate training programs, online training programs, vendor-based training (certification), and self-paced training.

- **Professional Development**
  - Industry and government devote significant resources to the training of software engineers.
  - The ACM and IEEE-CS promote and support professional development through publications, conferences, workshop and tutorials.

- **Accreditation**
  - ABET: for college and university programs in engineering
  - Recently introduced accreditation criteria for software engineering
  - Four programs currently accredited under this criteria
Certification and Licensing

- Certification is a voluntary process administered by a profession.
- Currently there are many certification programs for various computing technologies. Many are brand name certifications (e.g. Cisco, Java/Sun, Microsoft, Novell, etc.) and do not deal with the software engineering profession directly.
- The IEEE-CS offers a certification titled Certified Software Development Professional (CSDP) [7]. The CSDP has the following components:
  - At the time of application the candidate holds a baccalaureate or equivalent university degree and has a minimum of 9,000 hours of software engineering experience within at least six (6) of the eleven (11) SE knowledge areas (the ten SWEBOK areas [5] and Professionalism and Engineering Economics).
  - Candidates are required to subscribe to the Software Engineering Code of Ethics and Professional Practice [3]
  - Candidates must pass an exam demonstrating mastery of the knowledge areas
Certification and Licensing

- Licensing is a mandatory process administered by a governmental authority.
- In the U.S. licensing is administered at the state level.
- Only about 18% of U.S. engineers (civil, electrical, mechanical, etc.) are registered.
- **Texas is currently the only state to license software engineers.**
- In recent years, no topic has stirred more controversy and debate than certification and licensing of software engineers.
  - This seems to signal that the nature and maturity of software engineering is not yet stable.
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.
Many professions (engineering, law, medicine) provide a code of conduct that defines and motivates professional and ethical behavior by its members.

In 1999, an SE Code was developed by a ACM/IEEE-CS Task Force [3]

The code addresses eight areas of concern. The following is short version of the SE Code (entire code at [http://www.acm.org/serving/se/code.htm](http://www.acm.org/serving/se/code.htm)):

- **PUBLIC** - Software engineers shall act consistently with the public interest.
- **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.
- **PRODUCT** - Software engineers shall ensure that their products and related modifications meet the highest professional standards possible.
- **JUDGMENT** - Software engineers shall maintain integrity and independence in their professional judgement.
- **MANAGEMENT** - Software engineering managers and leaders shall subscribe to and promote an ethical approach to the management of software development and maintenance.
- **PROFESSION** - Software engineers shall advance the integrity and reputation of the profession consistent with the public interest.
- **COLLEAGUES** - Software engineers shall be fair to and supportive of their colleagues.
- **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.
1. Accreditation Board for Engineering and Technology – home page (http://www.abet.org/)