Lecture Overview

• Introduction
• What defines a profession?
• Is software engineering a profession?
• Compare Software Engineering to other professions

Current Affairs

Joe Biden: Learn to code; anyone can do it
One developer’s view

What is a Profession?

Webster: “a calling requiring specialized knowledge and often long and intensive academic preparation”

What is a Profession

• Profession is a calling that requires:
  – Specialized knowledge
  – Long and intensive academic preparation
• Professionals:
  – Require advanced training and experience
  – Must exercise discretion and judgment in their work
  – Their work cannot be standardized
  – Contribute to society, participate in lifelong training, assist other professionals
  – Carry special rights and responsibilities

What is a Profession

• Informally, a profession is a vocation requiring…
  – High level of education
  – Practical experience
• We pay professionals well
  – Doctors
  – Lawyers
• We trust professionals to…
  – Correctly ascertain and treat problems
  – Take actions for the good of their clients

Characteristics of a Profession

• Initial professional education
• Accreditation
• Skills development
• Certification
• Licensing
• Professional development
• Code of ethics
• Professional society
Attributes of a Mature Profession

- Certification and licensing not required
- College degree not required
- Apprenticeship not required
- Membership in professional society optional
- No specific requirements for continuing education
- Most computer programmers, system analysts, etc. are part of teams
- Ability to harm public can be similar to members of mature professions

Computer-Related Careers

- Partial list of IT specialists
  - Programmers
  - Systems analysts
  - Software engineers
    - Computer Hardware Engineers (to some extent)
    - Database administrators
    - Local area network (LAN) administrators
    - Chief information officers (CIOs)

Discussion...

In light of how we defined other professions...
Is software engineering a profession?
What do we need to do in order to cause “acceptance” of software engineering as a profession?

Are IT Workers Professionals?

- Legal perspective
  - IT workers do not meet legal definition of professional
    - Not licensed by state or federal government
    - Not liable for malpractice

Discussion

Degree requirements
  - Accreditation
  - Certification
  - Licensing
Professional societies
  - Skills development
  - Professional Development
  - Code of Ethics
Certified Public Accountants

- Bachelor’s degree
  - 150+ semester hours
  - 24+ hours of accounting-related classes
- Two years’ experience working under supervision of a CPA
- CPA exam
- To retain certification
  - Continuing education
  - Follow code of ethics

The Changing Professional Services Industry

- IT workers are considered part of the professional services industry
- Seven forces are changing professional services
  - Client sophistication (able to drive hard bargains)
  - Governance (due to major scandals)
  - Connectivity (instant communications)
  - Transparency (view work-in-progress in real-time)
  - Modularization (able to outsource modules)
  - Globalization (worldwide sourcing)
  - Commoditization (for low-end services)

Professional Relationships That Must Be Managed

- IT workers involved in relationships with:
  - Employers
  - Clients
  - Suppliers
  - Other professionals
  - IT users
  - Society at large

Relationships Between IT Workers and Employers

- IT workers agree on many aspects of work relationship before workers accept job offer
- Other aspects of work relationship defined in company’s policy and procedure manual or code of conduct
- Some aspects develop over time

Relationships Between IT Workers and Employers (cont’d.)

- IT workers must set an example and enforce policies regarding the ethical use of IT in:
  - Trade secrets
    - Business information generally unknown to public
    - Company takes actions to keep confidential
    - Require cost or effort to develop
    - Have some degree of uniqueness or novelty
  - Whistle-blowing
    - Employee attracts attention to a negligent, illegal, unethical, abusive, or dangerous act that threatens the public interest

Relationships Between IT Workers and Clients

- IT worker provides:
  - Hardware, software, or services at a certain cost and within a given time frame
- Client provides:
  - Compensation
  - Access to key contacts
  - Work space
- Relationship is usually documented in contractual terms
### Relationships Between IT Workers and Clients

- Client makes decisions about a project based on information, alternatives, and recommendations provided by the IT worker.
- Client trusts IT worker to act in client’s best interests.
- IT worker trusts that client will provide relevant information, listen to and understand what the IT worker says, ask questions to understand impact of key decisions, and use the information to make wise choices.

- Ethical problems arise if a company recommends its own products and services to remedy problems they have detected.
  - Creates a conflict of interest.
- Problems arise during a project if IT workers are unable to provide full and accurate reporting of a project’s status.
  - Finger pointing and heated discussions can ensue.

### Relationships Between IT Workers and Clients

- Fraud
  - Crime of obtaining goods, services, or property through deception or trickery.
- Misrepresentation
  - Misstatement or incomplete statement of material fact.
  - If misrepresentation causes a party to enter into a contract, that party may have the right to cancel contract or seek reimbursement for damages.

- Breach of contract
  - One party fails to meet the terms of a contract.
  - When there is material breach of contract:
    - The non-breaching party may rescind the contract, seek restitution of any compensation paid to the breaching party, and be discharged from any further performance under the contract.
  - IT projects are joint efforts in which vendors and customers work together.
    - When there are problems, it is difficult to assign who is at fault.

### Relationships Between IT Workers and Suppliers

- Develop good working relationships with suppliers:
  - To encourage flow of useful information and ideas to develop innovative and cost-effective ways of using the supplier in ways that the IT worker may not have considered.
  - By dealing fairly with them.
  - By not making unreasonable demands.

- Bribery
  - Providing money, property, or favors to obtain a business advantage.
  - U.S. Foreign Corrupt Practices Act (FCPA): crime to bribe a foreign official, a foreign political party official, or a candidate for foreign political office.
  - At what point does a gift become a bribe?
    - No gift should be hidden.
    - Perceptions of donor and recipient can differ.
    - United Nations Convention Against Corruption is a global treaty to fight bribery and corruption.
Relationships Between IT Workers and Other Professionals

- Professionals feel a degree of loyalty to other members of their profession
- Professionals owe each other adherence to their profession’s code of conduct
- Ethical problems among the IT profession
  - Résumé inflation on 30% of U.S. job applications
  - Inappropriate sharing of corporate information
    - Information might be sold intentionally or shared informally with those who have no need to know

Relationships Between IT Workers and IT Users

- IT user: person using a hardware or software product
- IT workers’ duties
  - Understand users’ needs and capabilities
  - Deliver products and services that meet those needs
  - Establish environment that supports ethical behavior:
    - To discourage software piracy
    - To minimize inappropriate use of corporate computing resources
    - To avoid inappropriate sharing of information

Relationships Between IT Workers and Society

- Society expects members of a profession:
  - To provide significant benefits
  - To not cause harm through their actions
- Actions of an IT worker can affect society
- Professional organizations provide codes of ethics to guide IT workers’ actions

Professional Codes of Ethics

- State the principles and core values that are essential to the work of an occupational group
- Most codes of ethics include:
  - What the organization aspires to become
  - Rules and principles by which members of the organization are expected to abide
- Many codes also include commitment to continuing education for those who practice the profession

Professional Organizations

- No universal code of ethics for IT professionals
- No single, formal organization of IT professionals has emerged as preeminent
- Five of the most prominent organizations include:
  - Association for Computing Machinery (ACM)
  - Institute of Electrical and Electronics Engineers Computer Society (IEEE-CS)
  - Association of IT Professionals (AITP)
  - SysAdmin, Audit, Network, Security (SANS) Institute

Professional Codes of Ethics (cont’d.)

- Following a professional code of ethics can produce benefits for the individual, the profession, and society as a whole
  - Ethical decision making
  - High standards of practice and ethical behavior
  - Trust and respect from general public
  - Evaluation benchmark for self-assessment
### Certification

- Indicates that a professional possesses a particular set of skills, knowledge, or abilities in the opinion of the certifying organization
- Can also apply to products
- Generally voluntary
- May or may not require adherence to a code of ethics
- Employers view as benchmark of knowledge
- Opinions are divided on value of certification

### Vendor certifications

- Some certifications substantially improve IT workers’ salaries and career prospects
- Relevant for narrowly defined roles or certain aspects of broader roles
- Require passing a written exam, or in some cases, a hands-on lab to demonstrate skills and knowledge
- Can take years to obtain necessary experience
- Training can be expensive

### Industry association certifications

- Require a higher level of experience and a broader perspective than vendor certifications
- Must sit for and pass written exam
- May need to pay annual renewal fee, earn continuing education credits, and/or pass renewal test
- Lag in developing tests that cover new technologies
- Are moving from purely technical content to a broader mix of technical, business, and behavioral competencies

### Government Licensing

- License is a government-issued permission to engage in an activity or operate a business
- Generally administered at the state level in the United States
- Often requires that recipient pass a test
- Some professionals must be licensed – doctors, lawyers, CPAs, medical and day care providers, engineers
- One goal: protect public safety

### Case for licensing IT workers

- Encourages following highest standards of profession
- Encourages practicing a code of ethics
- Violators would be punished
- Without licensing, there are no requirements for heightened care and no concept of professional malpractice

### Issues associated with government licensing of IT workers

- There are few licensing programs for IT professionals
- No universally accepted core body of knowledge
- Unclear who should manage content and administration of licensing exams
- No administrative body to accredit professional education programs
- No administrative body to assess and ensure competence of individual workers
IT Professional Malpractice

- Negligence: not doing something that a reasonable person would do, or doing something that a reasonable person would not do
- Duty of care: obligation to protect people against any unreasonable harm or risk
  - Reasonable person standard
  - Reasonable professional standard
- Professional malpractice: professionals who breach the duty of care are liable for injuries that their negligence causes

Requirements of a Professional

1. A set of highly developed skills and deep knowledge of the domain
2. Autonomy. Room to vary the say the service is provided
3. Observance of a code of conduct:
   - Professional code: set of guidelines provided to the professional by the profession
   - Personal code: a set of individual moral guidelines on which professionals operate
   - Institutional code: imposed by the institution for which the professional works
   - Community code: community standard developed over a period of time based on either the religion or culture of the community

Pillars of Professionalism

Commitment

Person making the commitment must do so willingly
Person responsible must try to meet the commitment
Must be agreement on what is be done, by whom, and when
Commitment must be openly and publicly stated
Commitment must not be made easily
Prior to the commitment, if it is clear it cannot be met, advance notice must be given and a new commitment negotiated

Integrity

State of undivided loyalty to self-belief
Honesty, uncompromising self-value, and incorruptible
3 maxims
  - Vision
    - Capacity to anticipate and make a plan that will circumvent obstacles and maximize benefits
  - Love
    - Love of what you do
  - Commitment
    - Bond with work until it is finished

Responsibility

Deals with roles, tasks, actions and their ensuing consequences
Depends on person’s value system
Various types
  - Provider
  - Service
  - Product
  - Consequential
Accountability

Obligation to answer for the execution of one’s assigned responsibilities
3 key elements
- A set of outcome measures that reliably and objectively evaluate performance – minimum set of measures
- A set of performance standards defined in terms of these outcome measures
- Set of incentives for meeting the standards and/or penalties for failing

Making of an Ethical Professional: Education and Licensing

Formal Education
- Targeted and incremental
Licensing
- Grants individuals formal or legal permission to practice
- Testing
Set of Rules
- Can be used as control and educating instruments
- Enables professions to enforce their rules by law

Professional Dilemma in Decision Making

Conflicting Codes of Conduct
Advances in Technology
Incomplete or Misleading Information
Guilt

Whistle-Blowing

Should whistle blowing be allowed?
What circumstances should be considered?
How should it be done?

Harassment and Discrimination

Have you ever experienced either?
What did you do about it?