COSC1147: PCP

Professional Computing Practice

Semester 2, 2017

Lecture 12

System reliability and administration, and codes of ethics (SAGE, ACS)

Ref: http://education-for-solidarity.blogspot.com.au/2011/09/thats-not-my-job-or-whos-to-blame-whose.html

To err is human but to really foul things up requires a computer” – anonymous.

Who is responsible?

Who is …. ?

- **accountable** – the person(s) to respond when mishap occurs (ie. role-responsibility).
- **caused** – the (non-) person(s) that caused mishap (ie. causal-responsibility).
- **blameable** – the person(s) who ought not have caused mishap.
- **liable** – must pay damages / compensation.
- **strict** liability : liability without fault / blame
- **negligent** – incompetent; failed to act reasonably / prudently.

Conflicts of Professional Responsibility: Employee Loyalty and Whistle-blowing

- What, exactly, is *employee loyalty*?
- Do employees and employers have a special obligation of loyalty to each other?
- Should loyalty to one's employer ever preclude an employee from "blowing the whistle" in critical situations?
- In which cases can whistle-blowing be justified?

Employee Loyalty and the Outsourcing of Programming Jobs

- Many computer programming jobs are being "outsourced" by major corporations, such as IBM, to countries where programmers are willing to write the code for much lower wages.
- *…Not only does this practice raise questions for employee loyalty, but it could also affect the future of the computer profession in the U.S. if young people are discouraged from entering the programming field because of having their high-skilled jobs eliminated via outsourcing*

  (Baker and Kripilani, 2005).

Do Computer Professionals Have Special obligations of Loyalty to Their Employers?

- They have to balance their obligation of loyalty owed to an employer against other obligations of loyalty they also may have
- Loyalty is not something that an employee must give exclusively or blindly to one's employer
- Loyalty should also be seen as an obligation that individuals have to society as a whole, especially where safety and health issues are at stake.

Whistle-blowing

- The effort by individuals to “get the public’s attention” - occurs when one or more employees go outside the organization (e.g., to the press) to shed some light on misconduct within the organization.
- In the context of software engineering, whistle-blowing incidents often occur in attempts to alert the public to a potentially unsafe product.

Whistle-blowing (Continued)

Whistle-blowing incidents can occur because of either:

- (a) *overt wrongdoing* (where an employee informs the public about the immoral or illegal behaviour of an employee or supervisor);
- (b) *negligence* (e.g., where one or more individuals in an organization have failed to act).

The act of blowing the whistle can be:

- condemned as an action taken by “disloyal troublemakers” who “rat” on their companies and undermine teamwork based on the hierarchy of authority within the corporation;
- regarded as a “tragedy to be avoided”
  - (though it may sometimes be a “necessary evil”);
- affirmed “unequivocally” as an “obligation that is paramount” in certain circumstances where it “overrides all other considerations, whatever the sacrifice involved in meeting it.”

Michael Martin (2003)

Controversial Political Issues in Whistle-blowing

SDI (“Star Wars”) Case

David Parnas blew the whistle on Star Wars because of three factors:

1. The specifications for the software could not be known with any confidence.
2. The software could not undergo realistic testing.
3. There would not be sufficient time during an attack to repair and reinstall failing software (no "real-time" debugging).

An Engineer is *Permitted* to Blow the Whistle when …

1) The harm that will be done by the product to the public is serious and considerable.
2) they have made their concerns known to their superiors.
3) they have received no satisfaction from their immediate supervisors and they have exhausted the channels available within the corporation, including going to the board of directors.

(Richard De George, 1999)

Two additional conditions …

An Engineer is *Required* to Blow the Whistle when:

4) The engineer has documented evidence that would convince a reasonable, impartial observer that his/her view of the situation is correct and the company policy wrong.
5) There is strong evidence that making the information public will in fact prevent the threatened serious harm.

Software Importance

Bjarne Stroustrup (C++) observed:

"… our civilization runs on software. It is therefore a tremendous privilege as well as a deep responsibility to be a software developer. It is a privilege because what we do as an industry has changed and will continue to change the world. It is a responsibility because the world in turn relies on the products of our labor."

Paul Levy (co-founder IBM Rational) :

"Ultimately, building software is the world's most important industry"

Software Importance

Ian Caughley (Team Fortress founder, Quake add-on 1996, RMIT CS / Aero graduate) designed many visual elements in Team Fortress 2, but his most ignominious achievement was declaring the Australian GA-8 aircraft aero-elastically sound 2 months before it plowed into the turf.

- Ian reputedly said, *"getting bugs out of software is a lot harder than aircraft!"*

Hardware Deficiencies

- I(C)T comprises hardware and software and communications.
- Hardware deficiencies are generally straightforward in terms of producer / consumer law.
- Hardware is a tangible product; laws have dealt with similar products (electronics, electrical goods…) for some time.

Software Deficiencies

Software deficiencies are relatively new and complex :

- Is software a product or service ?
  - a different area of the law applies to each.
- Who is the producer ?
  - author(s)? : designer/analysts, implementers
  - publisher? : licenser, vendor, agent
- Who is consumer ?
  - licensee?
  - end-user?

Software Deficiencies

- Comprehensive software testing is at least as difficult as for hardware.
- Warranty claims are difficult to win.
- Free / open source software exacerbates above problems by adopting a service (not product) distribution model, evolving along a tree (not a linear distribution model), and necessarily minimizing warranty exposure.
- Free / open source could build certification into its service distribution tree to enhance reliability, but what will it cost?

Responsibility

- A person could be held responsible even if he or she did not intend the outcome.
- Robert Morris, who launched the "Internet worm" in 1988, claimed that he did not intend for the Internet to be brought to a standstill.
- Morris was held responsible for the outcome *caused* by his act of unleashing the computer worm.

Liability vs. Responsibility

Liability is a legal concept.

- It is sometimes used in the narrow sense of "strict liability."
- To be strictly liable for harm is to be liable to compensate for it even though one did not necessarily bring it about through faulty action (e.g., when a someone is injured on a person's property).
- The moral notion of "blame" may be left out.

Accountability (vs. Liability and Responsibility)

Accountability means that someone, or some group of individuals, or perhaps even an entire organization is *answerable*.

Accountability – many hands

...there will be someone, or several people to answer not only for malfunctions in life-critical systems that cause or risk grave injuries and cause infrastructure and large monetary losses, but even for the malfunctions that cause individual losses of time, convenience, and contentment.

Nissenbaum (1995)

Responsibility, Liability, and Acc

Moral Responsibility	Legal Liability	Accountability
Attributes of blame (or praise) to individuals.	Does not attribute blame or fault to those held liable.	Does not necessarily attribute blame (in a moral sense).
Usually attributed to individuals rather than "collectivities" or groups.	Typically applies in the case of corporations and property owners.	Can apply to individuals, groups of individuals, and corporations.
Notions of guilt and shame apply, but no legal punishment or compensation need result.	Compensation can be required even when responsibility in a formal sense is not admitted.	Someone or some group is answerable (I.e., it goes beyond mere liability).

The Problem of "Many Hands"

- Two problems for assigning responsibility (e.g., in the Therac 25 Case) is that:
  - (a) we tend to think of responsibility as something that applies to individuals but not to groups (or collectivities);
  - (b) we tend to think of responsibility in exclusionary terms: If X is responsible, then Y is not, and vice versa.
- Accountability is a broader concept than responsibility; it is non-exclusionary, and it can apply to groups as well as individuals.

Risk Assessment

Concept of risk has typically been understood in terms of three conditions, where software is either:

- (i) behind schedule;
- (ii) over budget;
- (iii) fails to meet a system's specified requirements.

- Software can satisfy all three conditions and still fail to meet an acceptable standard of risk assessment (e.g. Aegis Radar System).

Social Policies

- Some rules of conduct guide our actions at the "macro-ethical" level by helping us frame *social policies*.
- Rules such as
  - “Proprietary software should not be copied"
  - Software that can be used to invade the privacy of users should not be developed"

  are examples of rules of conduct arising from social policies.
- There is a correlation between directives and social policies (e.g., rules involving stealing).

Cyber policies

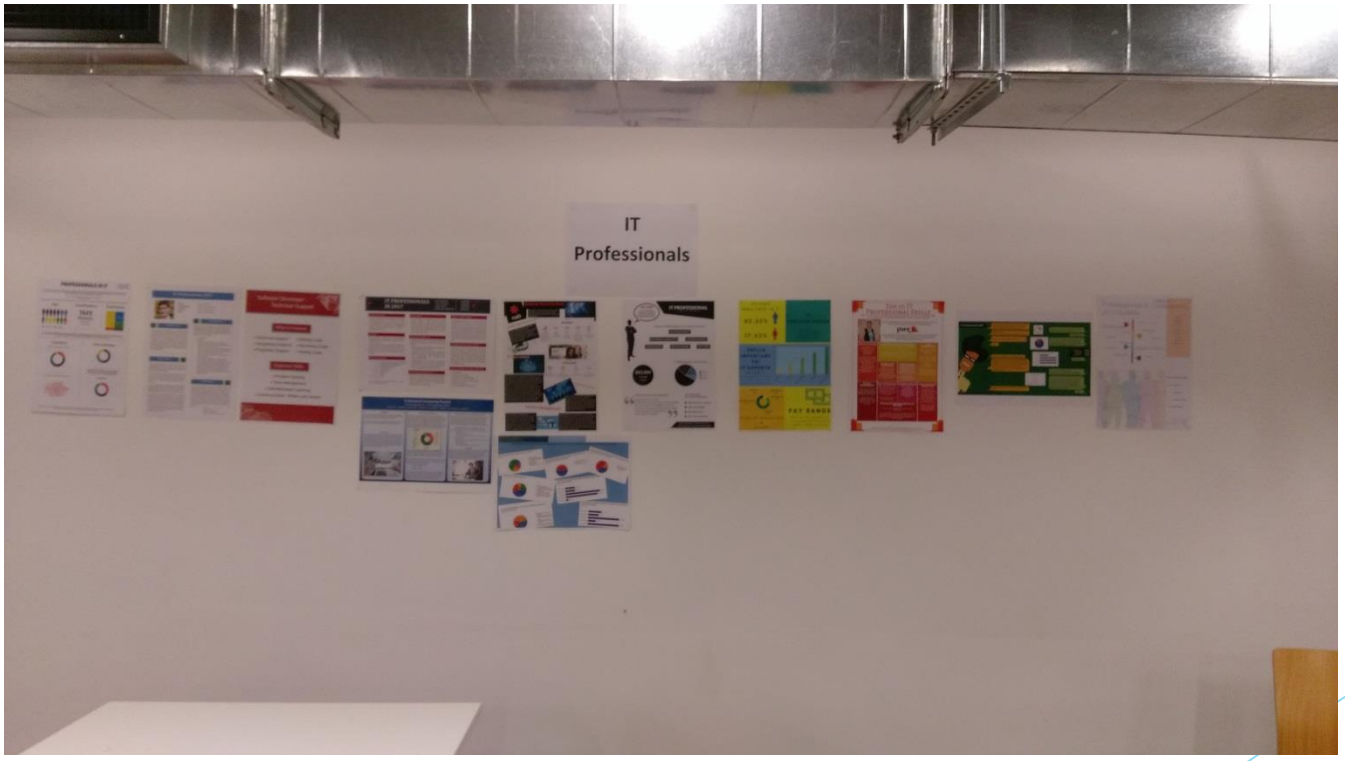
Values

- Values can be viewed as objects of our desires or interests.
  - eg happiness, love, freedom, etc.
- Philosophers distinguish between two types of values:
  - intrinsic and instrumental values.
- Any value that serves some further end or good is called an instrumental value because it is tied to some external standard.
  - Automobiles, computers, and money are goods that have instrumental value.
- Values such as life and happiness are intrinsic because they are valued for their own sake.
- Core values are ability, security, knowledge, freedom, opportunity, resources

What is professional ethics?

- Characteristics of (higher) professions :
  - esoteric body of knowledge acquired through higher education (which is said to justify…
  - autonomy in their work (non-professionals generally take more orders)
  - professional body controls membership and sets standards of practice (so as to…
  - fulfil an important social function; represent commitment to a social good.
- I.T. "professionals" may not be the purest of professionals, but neither are they bottom of the profession's continuum☺

IT Professionals



Professional relationships

- When I.T. professionals take jobs, they enter relationships with one or more of :
  - Employers,
  - Clients,
  - co-professionals and
  - society

Employer-Employee

- The moral foundation of this relationship seems to be contractual; each party agrees to certain things in exchange for other things.
- Such a contractual relationship can be seen as fulfilling the categorical imperative; it is wrong for either party to exploit the other.
- Loyalty can be both good and bad.

Client-professional

- A contractual relationship.
- Characteristic is the disparity in expertise of the parties. At least 3 models attempt to handle this disparity :
  - **agency** – professional is the agent of the client
  - **paternal** – professional decides for the client
  - **fiduciary** – client retains authority but decides on the basis of professional's advice. (NB. fiduciary implies trust)

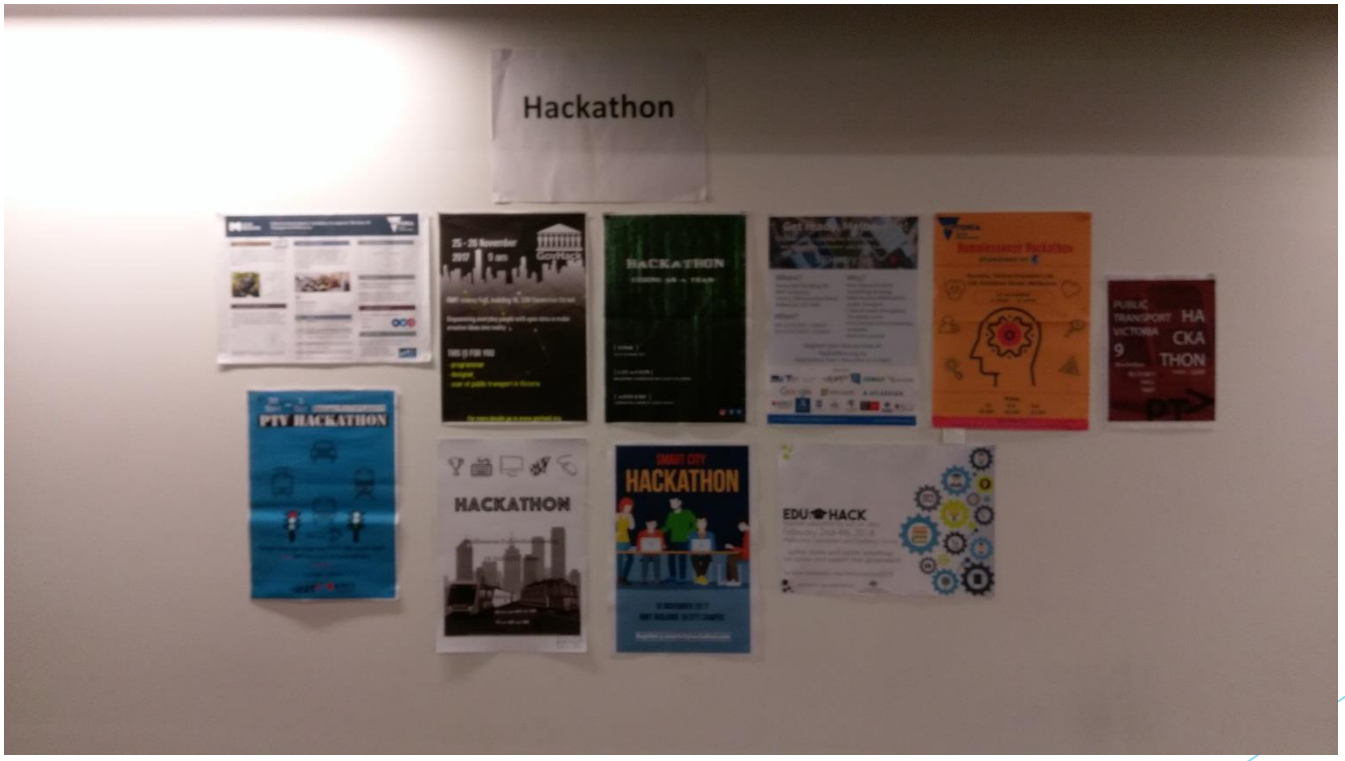
Society-Professional

- Society has a social contract with each profession. Society grants a profession the right to practise (perhaps with special privileges) in exchange for always practising in ways that do not harm society. The correlation between knowledge and responsibility can be based on a principle of ordinary morality : "do no harm".
- Specifically, the more harm one can do, the more care must be exercised to avoid the harm.

What does one need to know?

- To understand a code of professional conduct (eg. ACM, ACS, IEEE, etc), ask not only :
  - what are its functions / aims ? but also
  - who is it written for ?
- In general, answers include :
  - win public confidence
  - defer external regulation
  - set expectations of public, employers, clients

What data can one use?



Example Codes of Professional Ethics

- Following are some online links to various I.T. organizations' professional codes of ethics.
  - IEEE Code of ethics:

    <http://www.ieee.org/web/membership/ethics/code_ethics.html>
  - Online ethics center:

    <http://www.onlineethics.org/>
  - ACM Code of Ethics:

    <http://www.acm.org/about/code-of-ethics>
  - Software Engineering Code of Ethics and Professional Practice

    <http://www.acm.org/about/se-code>

8 characteristics of a profession

- Core body of knowledge,
- Accreditation,
- Skills development,
- Certification,
- Licensing,
- Professional Society,
- Code of Ethics *(surprise surprise☺)*,
- Professional development.

Suggested Reading

References

- ACM Code of Ethics: http://www.acm.org/about/code-of-ethics
- IEEE Code of Ethics: http://www.ieee.org/about/corporate/governance/p7-8.html
- ACS Code of Ethics: https://www.acs.org.au/__data/assets/pdf_file/0014/4901/Code-of-Professional-Conduct_v2.1.pdf
- Therac case:

https://www.youtube.com/watch?v=izGSOsAGIVQ

http://computingcases.org/case_materials/therac/therac_case_intro.html

- http://en.wikipedia.org/wiki/Aegis_combat_system

If you have time ….

- Watch TED talk: Why we need moral operating system? [https://www.ted.com/talks/damon_horowitz]
- Consider whistleblowing and what is happening to the whistleblower:
  - Edward Snowden [https://www.youtube.com/watch?v=BhdENw-vhDQ]
  - Bradley Manning [https://www.youtube.com/watch?v=V6Z_0-wDCbA]
- Watch out for what happens with problematic software:
  - Case of Therac 25 [https://www.youtube.com/watch?v=izGSOsAGIVQ]
  - Reagan SDI promo [https://www.youtube.com/watch?v=uLDK0G4Wktc]

And now ….

- Best wishes for the exam!!