

Ethics and Professionalism in Software Engineering

Week 6



Why become aware of Ethical and Professional Responsibilities as a Software Engineer? Surveillance Technology As a Case

Task for an AI expert and software developer to write a software program

A User story

<u>As a</u> security analyst <u>I want to be able to identify unauthorised</u> items on the desk surface <u>so that</u> I can take appropriate action

Unauthorised Items

Task for an AI expert and software developer to write a software program

A User story

<u>As a</u> security analyst <u>I want to be able to identify unauthorised items on a target surface so that I can take appropriate action</u>

How might we develop this software??

Do you know of some relevant technologies?

Would Yolo be helpful?

https://pjreddie.com/darknet/yolo/

"You only look once (YOLO) is a state-of-the-art, real-time object detection system".

Programming Sensitivities

More specific task for an AI expert and software developer to write a software program

A User story

As a security analyst I want to be able to identify unauthorised items on the desk surface so that I can take appropriate action



Tony Clear S2 2024 CISE ENSE701

Big Tech call center workers face pressure to accept home surveillance

Link to padlet

https://padlet.com/tony_clear/1s4siiuqqcu6fei6

link to NBC news article

https://www.nbcnews.com/tech/tech-news/big-tech-call-center-workers-face-pressure-accept-home-surveillance-n1276227

Software Engineering Graduates

In the 2004 software engineering curriculum (Lethbridge et al., 2006), the expectations for a software engineering graduate (as opposed more generally to those from a computer science curriculum) were stated as:

"a software engineering graduate must be able to do the following:

- 1. Show mastery of the software engineering knowledge and skills necessary to begin practice.
- 2. Work individually or in a team to develop quality software.
- 3. Make appropriate trade-offs within the limitations imposed by "cost, time, knowledge, existing systems, and organizations."
- 4. Perform design in one or more domains using software engineering approaches integrating "ethical, social, legal, and economic concerns."
- 5. Demonstrate understanding of and apply current theories, models, and techniques necessary for software engineering.
- 6. Demonstrate skills such as interpersonal negotiation, effective work habits, leadership, and communication.
- 7. Learn new models, techniques, and technologies as they emerge."

Lethbridge, T. C., R. J. Leblanc, J., Sobel, A. E. K., Hilburn, T. B., & Diaz-herrera, J. L. (2006). SE2004: Recommendations for Undergraduate Software Engineering Curricula. *IEEE Software*, *23*(6), 19-25. https://doi.org/10.1109/MS.2006.171

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It needs to be enough information so the Moderator and Analyst can use AUT library to find the original article. The SPEED app will have a submission form for a Submitter to fill in.

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The pdf version of the article can NOT be included, for copyright reasons. There can be no link to the article online either, apart from the DOI (Document Object Identifier – a URI) of the article.

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Lecture Outline

- Power and Technology
- 2. Professional Responsibility
- 3. Ethics What & Why
- 4. Philosophical Ethics
- 5. Professional Ethics
- 6. Codes of Ethics
- 7. Conflict of Professional Responsibility
- 8. Project Risk & Software Development Impact Statements
- 9. Al and ethics
- 10. Further



Computer Ethics

Information Technology – Multiple Discipline Perspectives

- Information Technology (IT) sometimes an umbrella term for the computing disciplines, and a descriptor of the industry in which practitioners work.
- Yet there is little agreement on what the term means.
- Orlikowski [7], distinguishes the "IT artifact" under four broad conceptual categories: the *computational* view, the *tool* view, the *proxy* view and the *ensemble* view of IT.
- The *computational* view, of "technology as algorithm" underpins the computer science discipline.
- [7] Orlikowski, W., & Iacono C., Research Commentary: Desperately seeking the "IT" in IT Research a Call to Theorizing the IT Artifact. *Information Systems Research*, 12:2 (2001), 121-134.

Information Technology – The 'Ensemble' View

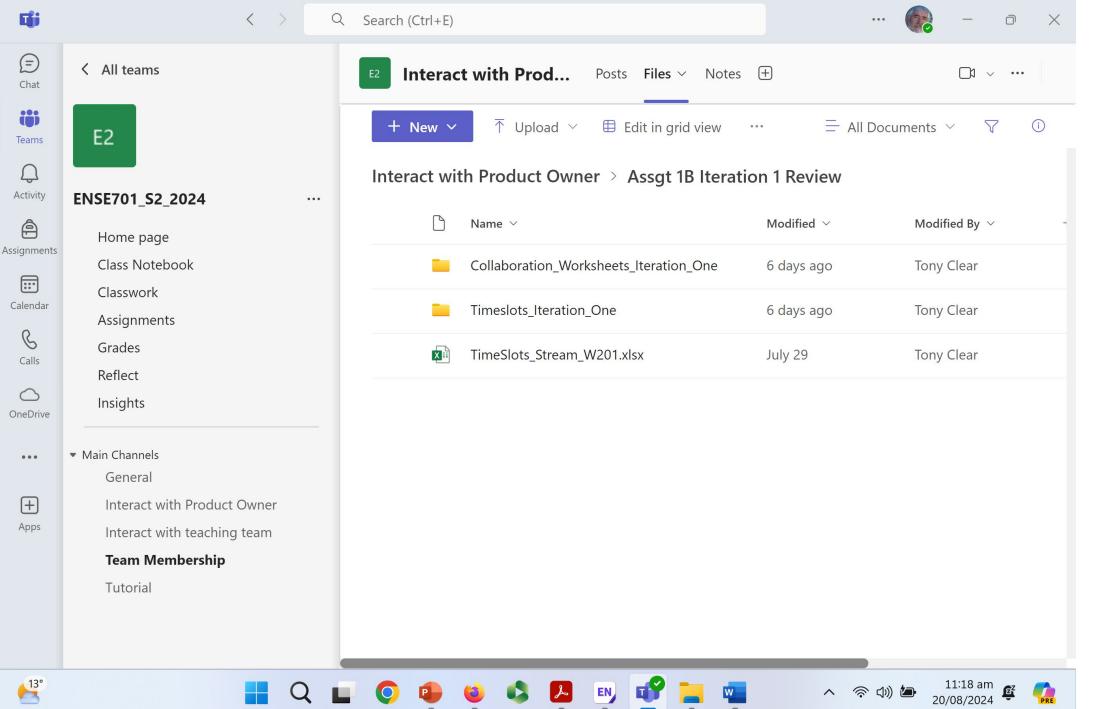
- The tool view of "technology as labor substitution tool" and "technology as productivity tool"
- – underpins the commercial perspective on IT, and the business rationale for IT industry research and development activities.
- The proxy view with "technology as perception" or "technology as diffusion" is taken up by the information systems discipline.
- – Explorations are conducted into motivations of users, new technology acceptance within organizations, and barriers to the spread of new technologies.
- [7] Orlikowski, W., & Iacono C., Research Commentary: Desperately seeking the "IT" in IT Research a Call to Theorizing the IT Artifact. *Information Systems Research*, 12:2 (2001), 121-134.

Information Technology – The 'Ensemble' View

- The *ensemble* view [7] presents four views of Technology
- It regards "technology as development project"
- – this model in combination with "technology as algorithm" could be said to underpin the software engineering discipline.
- It also views Technology as 'Production Network' a supply side perspective on technology
- – a global industrial system of technology creation viewed at levels of industry and nation state and collaborative alliances
- [7] Orlikowski, W., & Iacono C., Research Commentary: Desperately seeking the "IT" in IT Research a Call to Theorizing the IT Artifact. *Information Systems Research*, 12:2 (2001), 121-134.

Information Technology – The 'Ensemble' View

- The Technology as "Embedded System" perspective is one of an evolving system embedded in a complex and dynamic social context.
- This influenced its introduction and how different user groups engaged with that technology, sometimes called the "web model" of Technology
- 'Technology as Structure' focused on the ways in which technology is enmeshed in its conditions of its use.
- It draws on the theory of 'structuration' and the idea that technologies embody set of rules and resources built into the technology during its development and how they are then appropriated by users as they interact with the technology.
- Particular systems and how they evolve into distinctive patterns of use have been studied.
- The "technology in practice" or "technology in use" is observed through interactions in which these patterns are established and reinforced.
- [7] Orlikowski, W., & Iacono C., Research Commentary: Desperately seeking the "IT" in IT Research a Call to Theorizing the IT Artifact. *Information Systems Research*, 12:2 (2001), 121-134.



Appropri ation

Power and Technology

- "A designer of systems, who has the de facto prerogative to specify the range of phenomena that [his] system will distinguish clearly is in possession of enormous degrees of power....
- It is in this sense that computer programmers, the designers of computer equipment, and the developers of computer languages possess power."
- (Boguslaw, "The New Utopians" 1965, p.190 quoted in (Winograd, T. & Flores, F. 1986)).

Power and Technology

- "To the extent that **decisions** made by each of these participants in the design process serve to
 - reduce,
 - limit or
 - totally eliminate action alternatives,
- they are applying force and wielding power in the precise sociological meaning of these terms"
- (Boguslaw, "The New Utopians" 1965, p.190 quoted in (Winograd, T. & Flores, F. 1986)).

Power and Systems

- Systems development an extension of managerial power by the use of an administered system?
- The system as a tool to exert control within the wider instrumentality of the organisation itself, the organisation's goals and the objectives of the project.
- Systems developed as instruments of control often struggle in bridging the gap between design and execution,
- May fail in implementation because of their unacceptability to the intended user community.
- Remember conceptions of IT algorithm, tool, proxy or ensemble
- *Tool* for control or *Ensemble* reflecting unpredictability in the ways that IT may be appropriated??

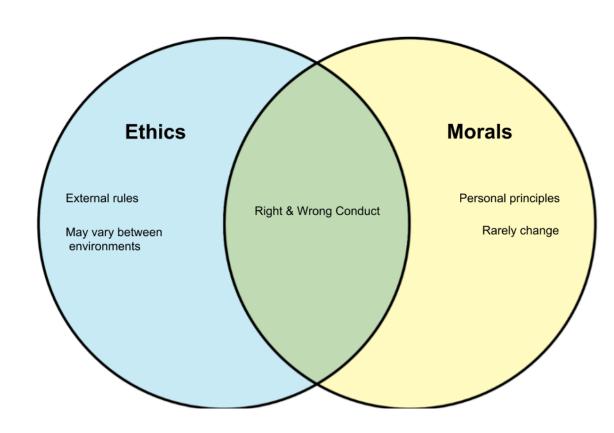
Computing Professionals - Responsibilities

- Computing professionals' actions change the world.
- To act responsibly, they should **reflect upon the wider impacts** of their work, consistently supporting the **public good**.
- The ACM Code of Ethics and Professional Conduct ("the Code") expresses the conscience of the profession.
- https://ethics.acm.org/
- https://www.acm.org/special-interest-groups/sigs/sigcas

What is ethics?

Defining Terms

- Society:
 - The group of people organized under ordered community
- Morality
 - Division between right and wrong action
- Ethics
 - Is based on standards of what is believed to be right and what is wrong



Teaching

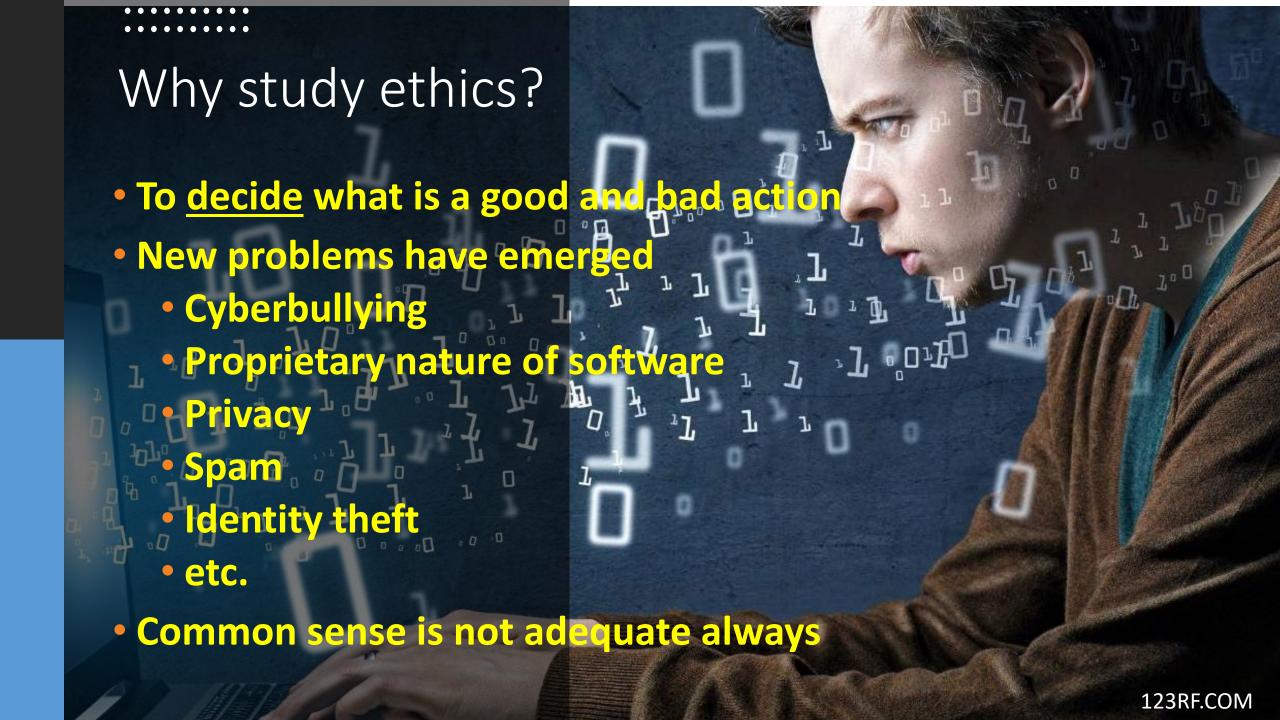
Social and

Martin, C. D., Huff, C., Gotterbarn, D., & Miller, K. (1996). A framework for implementing and teaching the social and ethical impact of computing. Education and Information Technologies, 1(2), 101-122.

What is ethics?

• The set of principles about what is right and wrong that individuals use to make choices to guide their decisions (Stair et al., 2020, p. 68)





Why study ethics (cont.)

Scenario 1*

- Megan Meier, a 13-year-old resident of Dardenne Prairie, Missouri, had an account on MySpace where she received a
 "friend" request from a user named Josh Evans
- Evans, who claimed to be a 16-year-old boy, told Meier that he lived near her and was being home-schooled by his parents
- At first, Evans sent flattering e-mails to Meier, which also suggested that he might be romantically interested in her
- Soon, however, Evans's remarks turned from compliments to insults, and Evans informed Meier that he was <u>no longer sure</u> that he wanted to be friends with her because he heard that she "wasn't very nice to her friends"
- Next, Meier noticed that some highly derogatory posts about her—e.g., "Megan Meier is a slut" and "Megan Meier is fat"—began to appear on MySpace
- Meier, who was reported to have suffered from <u>low self-esteem</u> and <u>depression</u>, became increasingly distressed by the <u>online harassment</u> (cyberbullying) being directed at her
- On October 17, 2006, Meier decided to end her life by hanging herself in her bedroom
- An investigation of this incident, following Meier's death, revealed that Josh Evans was not a teenage boy; she was Lori Drew, the 49-year-old mother of a former friend of Meier's

^{*}From (Tavani, 2013) and online at https://abcnews.go.com/GMA/story?id=3882520&page=1 or: https://www.youtube.com/watch?v=HFsfDLCkfQU

Why study ethics (cont.)

Cyberethics as a Unique Kind of Ethics

- Some say yes based on:
 - Computers are <u>malleable</u>
 - Computer malleability creates "Policy Vacuums"
 - Accordingly computer ethics is a way to
 - analyze these policy vacuums
 - and to formulate appropriate policies
- Some say no:
 - The principles of ethics are relatively constant
 - The principles of medical ethics, legal ethics, computer ethics, etc. are the same
 - There does not seem to be sufficient evidence to substantiate the claim that one or more new ethical issues have been introduced

<u>Policy Vacuums</u>: absence of policies for dealing with new possibilities in the information technology

The distinction between law and ethics

- An assumption is always made that what is ethical is also what is legal
- What is unethical is illegal
- However, it is possible for an act to be ethical but illegal
- Or legal but unethical
- Technology opportunities can outpace the legal framework
- Uber drivers contractors or employees? 12/02/2021 Contractor in NZ
- https://www.heskethhenry.co.nz/insights-opinion/employment-court-deems-uber-driver-a-contractor/
- The New Zealand Employment Court has dealt Uber a significant blow in a case taken by four of its drivers, ruling that they are employees not contractors. 27/08/2022
- https://chapmantripp.com/trends-insights/uber-drivers-found-to-be-employees/
- Uber drivers contractors or employees? 16/03/2021 Employee in UK
- https://www.heskethhenry.co.nz/insights-opinion/uk-supreme-court-delivers-decision-on-uber-driver-employment-status/
- https://medium.com/swlh/uber-and-lyfts-business-model-is-not-a-business-model-13c1433dd00c

Ethics and law are not the same thing

	Legal	Illegal
Ethical	?	?
Unethical	?	?

Development of computing ethics

Cyberethics evolution can be divided into four phases

Time period	Technological Features	Associated Issues
1950s-1960s	Stand alone machine	Artificial Intelligence (AI), database privacy
1970s-1980s	Minicomputers & the ARPANET; desktop computer interconnected via privately owned networks	Intellectual property and software piracy, computer crime, and communications privacy
1990s-present	Internet, World Wide Web, and early "Web.2.0" applications, environments, and forums	Free speech, anonymity, legal jurisdiction, behavioral norms in virtual communities
Present to near future	Convergence of information and communication technologies with nanotechnology and biotechnology; increasing use of autonomous systems	Artificial intelligence electronic agents ("bots") with decision-making capabilities, and developments in nanocomputing, bioinformatics, and ambient intelligence

Ethical Theories

- There are many ethical theories
- However, we consider only a few that are most widely discussed and used
 - Consequentialism
 - Egoism
 - Utilitarianism
 - Altruism
 - Deontology
 - Human nature
 - Relativism
 - Hedonism
 - Eudaimonism https://www.youtube.com/watch?v=VFPBf1AZOQg
 - Emotivism

Ethical Mindset

- Plato and the Good Life
- https://www.youtube.com/watch?v= oJs5u GAYA&list=RDLVVFPBf1AZOQg&index=3
- "The unexamined life is not worth living"

Eudaimonism



Central image - employee, exuding contented, harmonious and positive work experience.

Smaller images, values affecting work as experienced today.

The clock and money images represent values overshadowing all others when it came to forces governing the work of the employees in our research.

The scales indicate the necessity to strive for a better balance between these important aspects of time efficiency and financial results in an organisation, and other essential aspects and conditions that will affect how well the individual, as well as the organisation as a whole, will perform.

Among these latter aspects are experiencing joy, a sense of belonging, and a meaningful, rewarding, healthy and balanced work situation. [p.13-14]

Cajander, Å. (2010). *Usability - Who Cares?: The Introduction of User-Centred Systems Design in Organisations*. Unpublished PhD Thesis Uppsala University, Uppsala, Sweden http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-122387

Professor Casey – should Batman kill the joker?

•

https://www.instagram.com/tv/CT0epClhQRO/

Consequentialism

- Consequentialism: actions are judged either good or bad, right or wrong
 - Egoism: puts an individual's interests and happiness above everything else
 - <u>Utilitarianism</u>: an action is right if it results in the greatest benefit of the greatest number of people
 - <u>Altruism</u>: an action is right if the consequences of that action are favourable to all except the actor

Deontology

- Does not concern itself with the consequences of the action
- It is concerned with the will of the action.
- An action is good or bad depending on the will inherent in it.

Moral dilemmas and "crowd ethics"

Ask an audience to decide the ethics for intelligent autonomous machines

- Dilemma: decision making problem between two moral choices, neither of which is ideal
- http://moralmachine.mit.edu

Professional Ethics

What is a Profession?

- Before we delve into professional ethics, it is useful first to understand what is meant by "profession" and "professional"
- A profession is an area in which one <u>professes</u>
- Requirement of a profession*
 - Expert knowledge: special technical knowledge that is certified by some authority
 - Autonomy: a professional has power over how the service is provided
 - Observance of a code of conduct
- Professionals often make decisions that can have significant social effects

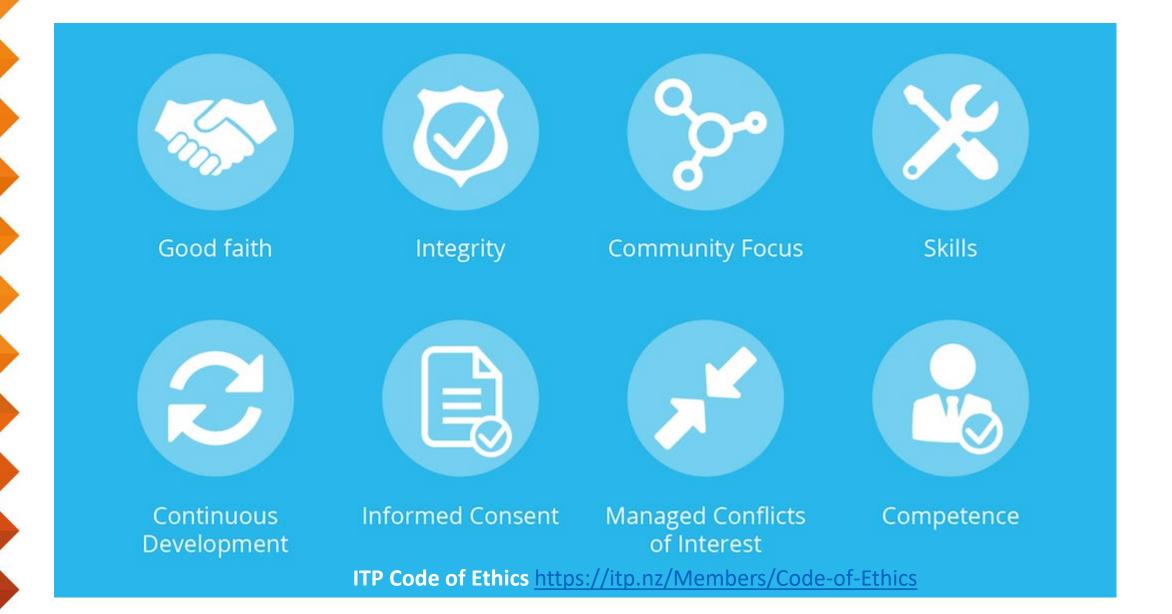
To profess is to make a public declaration, a claim of something.

Professional Ethics (cont.)

Code of Ethics and Professional Conduct

- Many professionals have established a <u>professional society</u>
- A professional society adopts <u>codes</u> of <u>conduct</u>
- Examples
 - Medical profession → New Zealand Medical Association (NZMA)
 - Engineering profession → Registered Engineering Associates (REA)
 - Legal profession → New Zealand Law Society (NZLS)
- All the above professions have formal codes of ethics/conduct
- Computer/IT professionals in New Zealand also established
 - IT Professionals New Zealand
- Computer/IT professionals not in New Zealand Global Societies
 - Association for computing machinery (ACM)
 - Institute for Electrical and Electronics Engineers-Computer Society (IEEE-CS)

Professional Ethics — 8 Tenets as Essence of ITP Code of Ethics



IEEE-CS Software Engineering Code of Ethics

- "Each principle of this code addresses three levels of ethical obligations owed by professional software engineers in each of these relationships.
- The first level identified is a set of ethical values, which professional software engineers share with all other human beings by virtue of their humanity.
- The second level obliges software engineering professionals to more challenging obligations than those required at Level One. Level Two obligations are required because professionals owe special care to people who may be affected by their work.
- The third and deeper level comprises several obligations that derive directly from elements unique to the professional practice of software engineering."

• Gotterbarn, D., Miller, K., & Rogerson, S. (1997). Software engineering code of ethics. *Communications of the ACM*, 40(11), 110-118.

IEEE-CS SE Code of Ethics (cont.)

- Level One: Aspire (to be human). Statements of aspiration provide vision and objectives, and are intended to direct professional behavior. These directives require significant ethical judgment.
- Level Two: Expect (to be professional). Statements of expectation express the obligations of all professionals and professional attitudes. Again, they do not describe the specific behavior details, but they clearly indicate professional responsibilities in computing.
- Level Three: Demand (to use good practices). Statements of demand assert more specific behavioral responsibilities within software engineering, which are more closely related to the current state of the art. The range of statements is from the more general aspirational statement to specific measurable requirements.

IEEE-CS SE Code of Ethics at a Glance

CODE OF ETHICS AT A GLANCE

The short version of the Code summarizes aspirations at a high level of abstraction. The clauses that are included in the full version give examples and detail of how these aspirations change the way we act as software engineering professionals. Without the aspirations, the details can become legalistic and tedious; without the details, the aspirations can become high sounding but empty; together, the aspirations and the details form a cohesive Code.

Software engineers shall commit themselves to making the analysis, specification, design, development, testing, and maintenance of software a beneficial and respected profession. In accordance with their commitment to the health, safety, and welfare of the public, software engineers shall adhere to the following Principles:

- 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 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.

Gotterbarn, D., Miller, K., & Rogerson, S. (1999). Computer society and ACM approve software engineering code of ethics. *Computer, 32*(10), 84-88.

IEEE-CS SE Code of Ethics - Preamble

- "The Preamble to the Code was significantly revised.
- It includes specific ethical standards to help the professional make ethical decisions.
- The Code emphasizes the professional's obligations to the public at large.
- This obligation is the final arbiter in all decisions. "In all these judgements, concern for the health, safety, and welfare of the public is primary; that is, the 'Public Interest' is central to this Code."
- The primacy of well being and quality of life of the public, in all decisions related to software engineering, is emphasized throughout the Code".

Gotterbarn, D., Miller, K., & Rogerson, S. (1999). Computer society and ACM approve software engineering code of ethics. *Computer, 32*(10), 84-88.

IEEE-CS SE Code of Ethics — Ethical Tensions

- "Ethical tensions can best be addressed by thoughtful consideration of fundamental Principles, rather than blind reliance on detailed regulations.
- These Principles should influence software engineers to consider broadly who is affected by their work;
- to examine if they and their colleagues are treating other human beings with due respect;
- to consider how the public, if reasonably well informed, would view their decisions;
- to analyze how the least empowered will be affected by their decisions;
- and to consider whether their acts would be judged worthy of the ideal professional working as a software engineer.
- In all these judgments concern for the health, safety, and welfare of the public is primary; that is, the *public interest* is central to this Code".

Gotterbarn, D., Miller, K., & Rogerson, S. (1999). Computer society and ACM approve software engineering code of ethics. *Computer, 32*(10), 84-88.

ACM Code of Ethics – General Ethical Principles

- 1. GENERAL ETHICAL PRINCIPLES.
- A computing professional should...
- 1.1 Contribute to society and to human well-being, acknowledging that all people are stakeholders
- in computing.
- 1.2 Avoid harm.
- 1.3 Be honest and trustworthy.
- 1.4 Be fair and take action not to discriminate.
- 1.5 Respect the work required to produce new ideas, inventions, creative works, and computing artifacts.
- 1.6 Respect privacy.
- 1.7 Honor confidentiality.

https://www.acm.org/code-of-ethics

ACM Code of Ethics – Professional Responsibilities

- 2. PROFESSIONAL RESPONSIBILITIES.
- A computing professional should...
- 2.1 Strive to achieve high quality in both the processes and products of professional work.
- 2.2 Maintain high standards of professional competence, conduct, and ethical practice.
- 2.3 Know and respect existing rules pertaining to professional work.
- 2.4 Accept and provide appropriate professional review.
- 2.5 Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks.
- 2.6 Perform work only in areas of competence.
- 2.7 Foster public awareness and understanding of computing, related technologies, and their consequences.
- 2.8 Access computing and communication resources only when authorized or when compelled by the public good.
- 2.9 Design and implement systems that are robustly and usably secure.

https://www.acm.org/code-of-ethics

ACM Code of Ethics - Leadership

- 3. PROFESSIONAL LEADERSHIP PRINCIPLES.
- Leadership may either be a formal designation or arise informally from influence over others. In this section, "leader" means any member of an organization or group who has influence, educational responsibilities, or managerial responsibilities. While these principles apply to all computing professionals, leaders bear a heightened responsibility to uphold and promote them, both within and through their organizations.

A computing professional, especially one acting as a leader, should...

- 3.1 Ensure that the public good is the central concern during all professional computing work.
- 3.2 Articulate, encourage acceptance of, and evaluate fulfillment of social responsibilities by members of the organization or group
- 3.3 Manage personnel and resources to enhance the quality of working life.
- 3.4 Articulate, apply, and support policies and processes that reflect the principles of the Code.
- 3.5 Create opportunities for members of the organization or group to grow as professionals.
- 3.6 Use care when modifying or retiring systems.
- 3.7 Recognize and take special care of systems that become integrated into the infrastructure of
- society.

https://www.acm.org/code-of-ethics

Professional Ethics (cont.)

Strength and Weaknesses of Professional Codes (Tavani 2013)

Strengths	Weaknesses
Codes inspire the members of a profession to behave ethically.	Codes include directives that tend to be too general and too vague.
Codes guide the members of a profession in ethical choices.	Codes are not always helpful when two or more directives conflict.
Codes educate the members about their professional obligations.	Codes comprise directives that are neither complete nor exhaustive.
Codes discipline members when they violate one or more directives.	Codes are ineffective (have no "teeth") in disciplinary matters.
Codes inform the public about the nature and roles of the profession.	Codes sometimes include directives that are inconsistent with one another.
Codes "sensitize" members of a profession to ethical issues and alert them to ethical aspects they otherwise might overlook.	Codes do not always distinguish between microethics issues and macroethics issues.
Codes enhance the profession in the eyes of the public.	Codes can be self-serving for the profession.

- Whistle-blower: is a person who exposes any kind of information or activity that is deemed illegal, unethical, or not correct within an organization that is either private or public
- Here we will discuss the following questions
 - Do employee and employers have a special obligation of loyalty to each other?
 - Should loyalty to one's employer ever preclude an employee's "blowing the whistle" in critical situations?



^{*} Whistleblowing law keeps media out of the loop https://www.rnz.co.nz/national/programmes/mediawatch/audio/2018735702/whistleblowing-law-keeps-media-out-of-the-loop

- □ Consider Challenger disaster in January 1986, which resulted in the deaths of the seven crew members
- ☐ Engineers who designed the space shuttle were aware of the safety risks in launching the shuttle in cooler temperatures
- □ Some engineers, when learning the Challenger was scheduled for launch on a cool January morning, went to their supervisors to express their concerns
- ☐ However, a decision was made to stick with the original launch date
- ☐ Having received no support from their supervisors, should those engineers have gone directly to the press?

Would whistle-blowing at that level have saved the lives of the Challenger's crew?

NZ issue and CAA: https://www.nzherald.co.nz/nz/whistleblowers-warn-caas-new-approach-could-lead-to-more-aviation-accidents-in-new-zealand/HAXQ74ITMNBJHLCCLGGBKGN2OI/

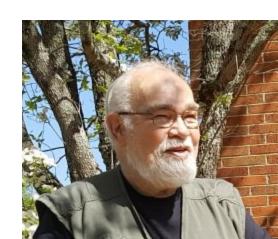
- Can professional codes guide engineers in whistle-blowing decisions?
 - Does the IT Professional NZ code of ethics answer the question?
- Section 6.12 and 6.13 of SECEPP state
 - express concerns to the people involved when significant violations of this
 Code are detected unless this is impossible, counterproductive, or dangerous;
 - report significant violations of this Code to appropriate authorities when it is clear that consultation with people involved in these significant violations is impossible, counterproductive, or dangerous.
- They are still too <u>vague</u>?

Extending Codes of Ethics to Risk Assessment? A Bi-Cultural Project Context

- In mid-2002, a number of students at Auckland University of Technology (AUT) began work on a **project to extend the existing IT systems of a Maori tribal authority, Te Runanga a Iwi o Ngapuhi** (TRAION), the statutory body representing the Ngapuhi tribe, or *iwi* (Clear et al., 2004).
- Proposed changes in a broadly conceived project included the following:
 - Online registration of tribal members
 - Linking members to several groupings of significance to Maori Extended family (whanau) Subtribe (hapu)
 - *Marae* (a meeting-house complex used for several cultural purposes and serving the Maori community centered in that location)
 - Creating a database of genealogical (whakapapa) information
 - Creating a database of interests in communally owned tribal land

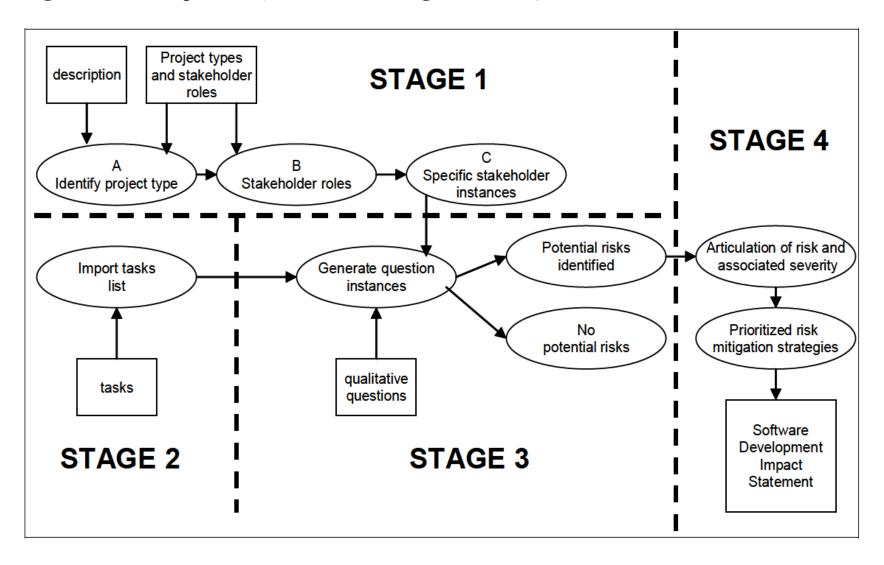
Extending Codes of Ethics to Risk Assessment? A Bi-Cultural Project Context (Cont'd)

- The TRAION project, then, was entering into sensitive areas. For Maori, "Identity and worth were found in family and tribal connectedness [and] ...identity was linked to both ancestry and place" (King, 2003, p. 77).
- As a consequence, Maori people have **known sensitivities about research related to** *whakapapa* (genealogical and land-based information), which is considered a *taonga* (treasured possession) particular to
- the groupings (whanau, hapu, and iwi) who have interests in this information.
- To better articulate the risks and to investigate the issues inherent in computerizing such sensitive information,
- a Software Development Impact Statement (SoDIS) analysis
- was undertaken.



SoDIS Project TRAION Risk Assessment?

Figure 1. SoDIS® process (Gotterbarn & Rogerson, 2005)



TRAION SoDIS Inspection: Outcomes

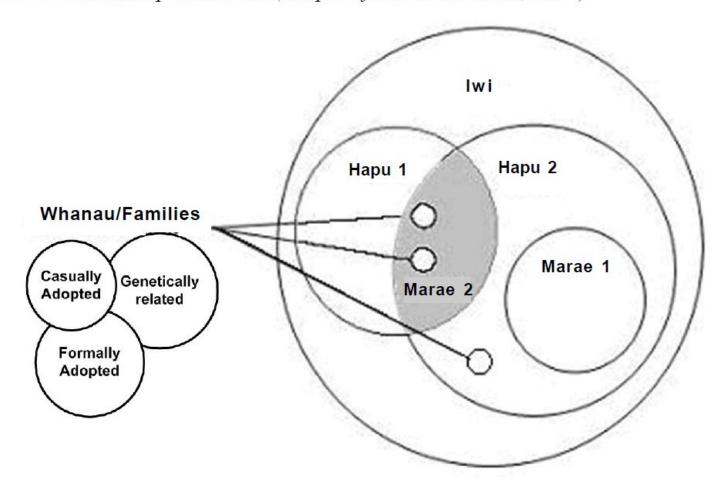
- In the **first cluster of** *client developer communication*, the key Maori ethical questions related to **who could legitimately represent the** *iwi* **as the project client**. ...historical situations in which the authority of the chiefs had been subverted and the authority structures of Maori society undermined ... when engaging in research and development with Maori (Bishop, 1996), **the processes of initiation** and the **need to work through due tribal and group decision making and authority structures** are critical.
- In the **second cluster of** *sensitive data*, several Maori ethical questions arose. **Privacy concerns** and mechanisms for **obtaining consent** for provision of data for genealogical research purposes raised complex questions of **who could legitimately view what data**.
- The collective ownership of whakapapa at different levels meant that group and individual access rights had to be negotiated. Individual data were personal, but whanau data were the property of the family group to decide, and hapu and iwi had their own interests and group decision-making processes in order to determine these rights.
- For instance, what rights would system administrators, data entry clerks, and Runanga management have to access or restrict access to this data? These policies and authorization protocols would need to be developed and agreed upon through accepted tribal decision-making processes.

TRAION SoDIS Inspection: Outcomes (Cont'd.)

- Similarly, protocols concerning display of cultural artifacts over the Web or use of whakapapa information for commercial purposes (e.g., to defray expenses of the site or to support storage and research costs) would need to be agreed upon at the tribal level in order to offset concerns over commercialization and inappropriate use of treasured information and sacred objects.
- Data integrity and the need to preserve the very authenticity of whakapapa as a stakeholder in its own right has been noted as a key Maori concern.
- In the **third cluster**, *user experience*, several more Maori ethical questions arose. Again, **questions over** authority in disputed circumstances would need to be settled (i.e., who could determine official groupings and their standing?). For instance, a particular Northern grouping, Ngati Hine, claims *iwi* status but has been deemed by Te Ohu Kai Moana as a *hapu*. How do such determinations hold standing, who decides official lists of *hapu* and *iwi*, and how are dissenting voices to be registered? Likewise, under what criteria are membership applications to be refused registration and what is the impact for those refused? What authority will systems administrators and Runanga clerks possess, and what controls will be in place to ensure the integrity of data entered and stored? How is the integrity of *whakapapa* to be maintained in each of these circumstances?

Who is Legitimately a Member?

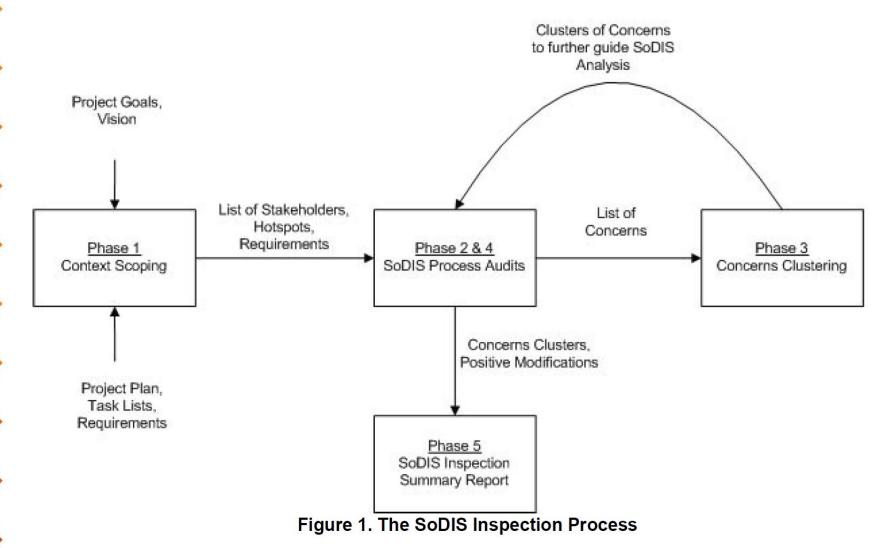
Figure 2. Iwi relationship structures (adapted from Clear et al., 2004)



Extending Codes of Ethics to Risk Assessment? - Baptist Action Trust

- The qualitative risk analysis (SoDIS inspection) was commissioned in early December 2004 by Stuart Simpson of Eagle Technology, on behalf of their client Baptist Action Trust (BAT).
- The SoDIS inspection was conducted by AUT researchers, in conjunction with Stuart Simpson (a co-author of this paper), in a form of "collaborative practice research" (Mathiassen, 2002).
- The system was to automate Homecare rosters,
- time and travel payments for Homecare workers,
- the billing of Homecare clients,
- rostering of Healthcare workers at two Hospitals and a Rest Home,
- wage payments to staff at these sites by timesheet entry and electronically transmitted to the Datacom payroll processing Bureau,
- other client billing,
- and the transfer of General Ledger transactions to the BAT corporate system.

Baptist Action Trust - SoDIS Inspection?



BAT SoDIS Inspection: Outcomes

- The team had identified **16 critical concerns**, **106 significant concerns**, and **2 minor concerns** for the project to take into account. A few of these concerns were more in the nature of questions where the team lacked local knowledge to make a judgment as a site visit was not undertaken.
- The team categorised the concerns into four main clusters as follows:
- Overall project cluster. For example; issues concerning the overall project implementation and the needs of all stakeholders; issues that may result in Supplier, Consultant, or Developer intervention; issues to do with clarity of the scope of project goals; issues that may cause confusion to all stakeholders; and issues that may cause support service intervention, additional installation and processing costs, or additional work to stabilise business processes in the event of project breakdown.
- Administrative, legal or regulatory cluster. Such as; issues concerning administrative processes, legal requirements, and conformance to regulations and professional standards; issues that may cause potential loss of control of operation and service; issues that may cause significant overtime and expenditure; and issues that may cause conflicts and inaccuracies in time rosters and time payment errors.
- Data security, privacy and accuracy cluster. Issues concerning security, privacy, and accuracy of data within both data storage and data transmission, and issues concerning data integrity and reconciliation and the possible resultant downstream effects.
- Quality of end user service delivery cluster. Issues relating to interruptions to or degradation of service delivery caused by possible conflicts and contradictions within the proposed solution and its implementation, and issues relating to user dynamics, professional responsibility, and the critical nature of service delivery to BAT clients.
- http://citrenz.ac.nz/conferences/2005/papers/choon.pdf

BAT SoDIS Inspection: Outcomes

- 5.3 SoDIS Inspection Outcome Recommendations
- Where the AUT risk assessment team were able to derive solutions for concerns, or positive modification suggestions, these were presented in the report. For example:
 - Ensuring a managed data conversion process with careful plans for checking data accuracy and completeness
 - Ensuring that adequate security protocols are in place and that the technology supports BAT policies and procedures
 - A clear procedure for off-line adjustments to the automated business processes and ensuring total accuracy within both automated and off-line processes
 - Confirmation that the application meets regulatory constraints and will detect clashes in the rostering
 - Ensuring that business processes are designed to complement automated systems (and vice-versa), and the change process is adequately managed

Al ethics

Asimov's Three Laws

- 1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
- 2. A robot must obey the orders given to it by human beings except where such orders would conflict with the First Law.
- 3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.

The Three Laws, quoted as being from the "Handbook of Robotics, 56th Edition, 2058 A.D. introduced in Asimov's 1942 short story "Runaround" in the March 1942 issue of Astounding Science Fiction.



IMPLICATIONS FOR SOFTWARE PRACTITIONERS:

- Good reviews of Generative AI technology and its implications:
 - Ebert, C., & Louridas, P. (2023). Generative AI for software practitioners. IEEE Software, 40(4), 30-38.
 - Ozkaya, I. (2023). Application of Large Language Models to Software
 Engineering Tasks: Opportunities, Risks, and Implications. *IEEE Software*,

 40(3), 4-8. https://doi.org/10.1109/MS.2023.3248401

RESPONSIBILITIES FOR SOFTWARE PRACTITIONERS:

What will determine if the next phase includes innovations beyond our imagination or another AI winter is largely dependent on **not our ability to continue technical innovations**, but on our ability to practice software engineering and computer science through the highest level of ethics and responsible practices. We need to be bold in experimenting with the potential of LLMs in improving software development, and we need to be cautious and not forget fundamentals of engineering ethics and rigor.

Ozkaya, I. (2023). Application of Large Language Models to Software Engineering Tasks: Opportunities, Risks, and Implications. *IEEE Software*, 40(3), 4-8. https://doi.org/10.1109/MS.2023.3248401

Al ethics

Intelligent Autonomous Machines (IAMs)

A major problem is that, currently, it is not known how best to ensure that IAMs make the right decisions.

What is to be the basis of their moral or ethical fabric?



• • • • • • • • •

Main problem with programming or hardwiring ethics into IAMs

- Hardwired or programmed IAMs mean they can only do what they are programmed or hardwired or told to do
- But intelligent human ethical behaviour seems to invoke free will and choice
- Result: we no longer have an IAM
- In any case, such hardwiring or programming does not help IAMs when faced with a dilemma
- Result: we no longer have an IAM



How do we give IAMs moral principles and make them ethical?

- Use Machine Learning (ML) algorithms to teach moral concepts to intelligent autonomous machines by using human moral behaviour
- In 2016, the Microsoft Twitter chatbot Tay produced racist and genocidal speech in less than 24 hours
 - https://www.theguardian.com/world/2016/mar/29/microsoft-tay-tweets-antisemitic-racism
- ML has other examples of discrimination against people on the basis of race and gender*
- Teaching ethics to IAMs can lead to learning the worst of human ethical behaviour

^{*}Caliskan-Islam A, Btyson JJ, Narayanan, A (2016) Semantics derived automatically from language corpora necessarily contains human biases. https://www.princeton.edu/~aylinc/papers/caliskan-islam_semantics.pdf

The Need for New Ethical Principles for Autonomous Systems?

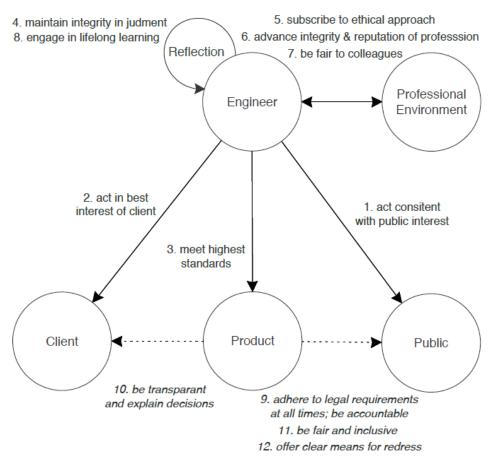


Figure 1: Schematic overview of the Code of Ethics of IEEE/ACM; circles represent actors, arrows represent ethical principles, and dotted arrows suggest new ethical principles for autonomous systems, such as self-adaptive systems.

Weyns, D. (2020). Towards a code of ethics for autonomous and selfadaptive systems. In *Proceedings of the IEEE/ACM 15th International Symposium on Software Engineering*

for Adaptive and Self-Managing Systems (pp. 163-165)



Ethics and Professionalism in Software Engineering

Associate Professor Tony Clear

Department of Computer Science and Software Engineering,

Auckland University of Technology

Tony.clear@aut.ac.nz



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- Autonomous Drone [Digital Image]. (n.d.). Retrieved March 3, 2019 from https://www.electronicdesign.com/automotive/ethical-considerations-autonomous-system-design
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Further Questions for Consideration

Associate Professor Tony Clear

Department of Computer Science and Software Engineering,

Auckland University of Technology

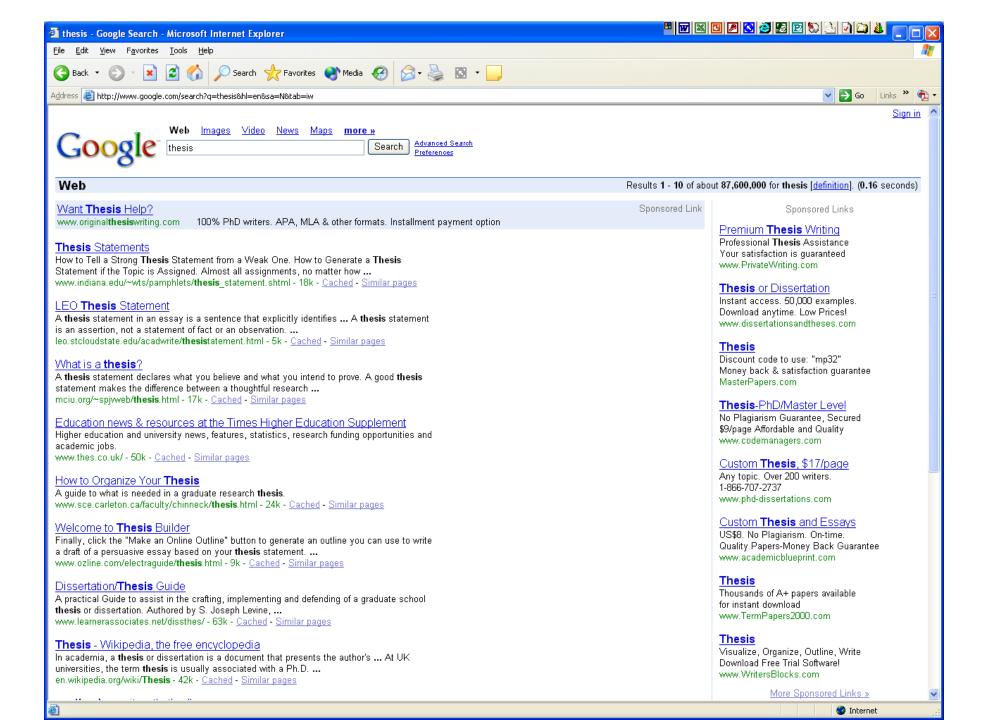
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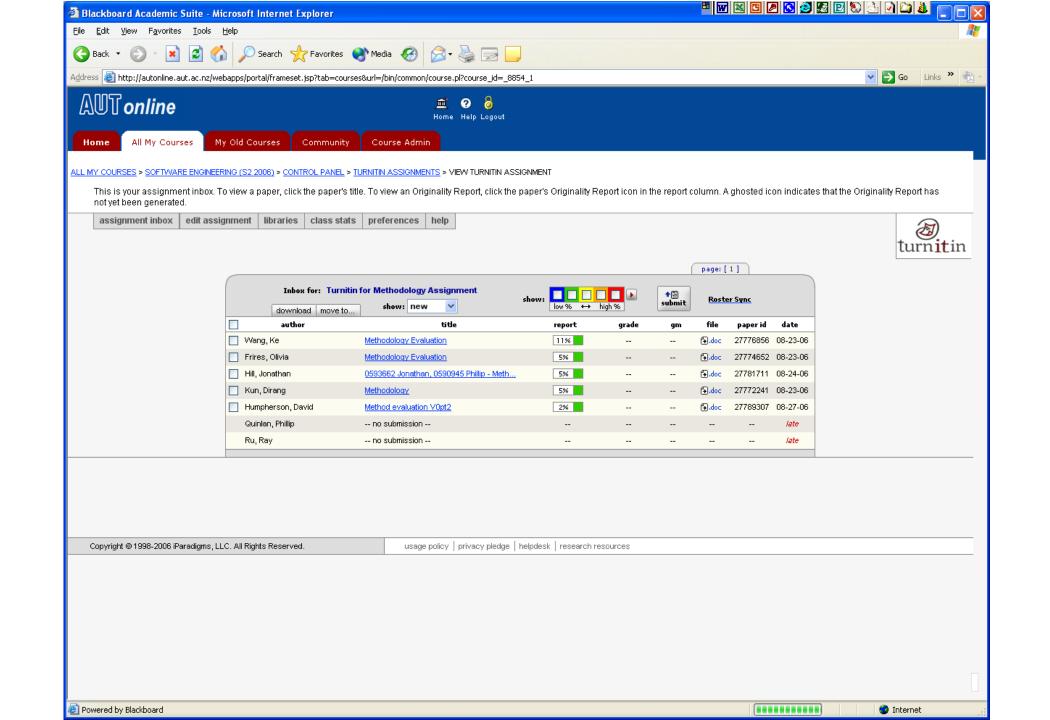
Tony.clear@aut.ac.nz

Do Some Computer Corporations Have Special Moral Obligations?

Search Engine Companies

- Search engines should shoulder social responsibility because they
 - provide access to information that is crucial for responsible citizenship
 - are now central to education
 - are owned by private corporations—i.e., by businesses that are mostly interested in making a profit
 - A small case from education...
 - Clear, T. (2006). Google™ "Do No Evil" Yeah Right! SIGCSE Bulletin, 38(4), 8-10.





Colonising the lifeworld?

The 'lifeworld' of CS Educators

•We want to see students rise to challenges set in their courses
•build knowledge, develop and grow
•develop professionally and ethically
•Be fairly rewarded for their own efforts



•An example

•Google as a search engine - a technical system steering CS educational experiences consistent with lifeworld of educators and students

•Google as an advertising site - economic system primary steering CS educational experiences in a manner inconsistent with lifeworld of educators

- •But maybe consistent with lifeworld of some students?
- Turnitin.com as a response (all students viewed as cheats)All examples of distorted communication

Do Some Computer Corporations Have Special Moral Obligations?

Bionics

https://www.nationalgeographic.com/magazine/2010/01/bionics-robotics-medical-technology/

https://www.ceoinstitute.com/resources/bionics-institute-tinnitus-research

http://www.medicalbionics.com/rd.php

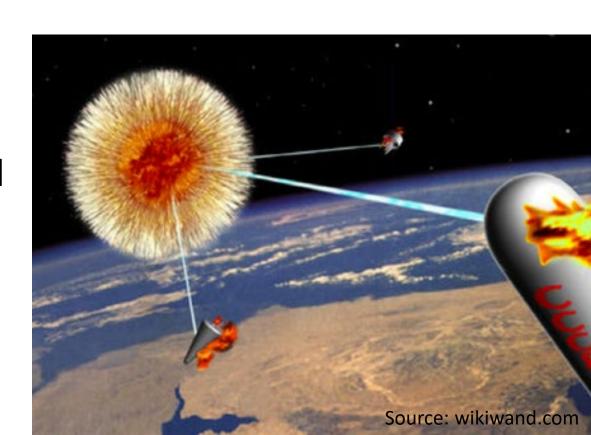
The Christchurch Call https://www.christchurchcall.com/

Scenario and Questions

- □ In the early 1980s, a U.S. military proposal called the Strategic Defense Initiative (SDI) was introduced and debated
- □ It was a national missile defense (NMD) system that would provide a "defense shield" against incoming ballistic missiles
- □ The SDI proposal, which was vigorously supported by the Reagan administration, soon became very controversial
- While SDI's supporters argued that the missile system was essential for America's national defense, critics argued that the system's software was unreliable

One critic, David Parnas, decided to go public with his concerns about

- When Parnas went public with his position, some of SDI's supporters accused him of disloyalty and of acting out of his own self-interest.
- Many of Parnas's defenders, pointed out that Parnas walked away from a lucrative consulting contract.
- Did Parnas do the right thing?



- Richard De George criteria has an answer
- Two situations
 - a. morally permitted to blow the whistle, and
 - b. morally obligated to do so
- You are morally permitted to go public with information about the safety of a product if
 - 1. The product will do <u>serious and considerable harm</u> to the public
 - 2. The engineer(s) have reported the serious threat to their immediate supervisor
 - 3. The engineer(s) have exhausted the internal procedures and possibilities
- You are morally required to go public if
 - 4. The engineer(s) have accessible, documented evidence that would convince a reasonable, impartial, observer that one's view of the situation is correct
 - 5. The engineer(s) have good reasons to believe that by going public the necessary changes will be brought about

Discussion (back to SDI and David Parnas case)

Was Parnas morally permitted, morally required (obligated) or both to blow the whistle?

Appendix: Professional Decision Making

- A Three-step Strategy for Approaching Computer Ethics Issues (*)
 - Step 1: Identify a practice involving information and communications technology, or a feature of that technology, that is controversial from a moral perspective.
 - 1a. Disclose any hidden (or opaque) features or issues that have moral implications
 - 1b. If the ethical issue is descriptive, assess the sociological implications for relevant social institutions and socio-demographic and populations.
 - 1c. If the ethical issue is also normative, determine whether there are any specific guidelines, that is, professional codes that can help you resolve the issue.
 - Step 2. Analyze the ethical issue by clarifying concepts and situating it in a context.
 - 2a. If a policy vacuums exists, go to Step 2b; otherwise, go to Step 3.
 - 2b. Clear up any conceptual muddles involving the policy vacuum and go to Step 3.
 - Step 3. Deliberate on the ethical issue. The deliberation process requires two stages.
 - 3a. Apply one or more ethical theories (see Chapter 2) to the analysis of the moral issue, and then go to Step 3b.
 - 3b. Justify the position you reached by evaluating it via the standards and criteria for successful logic argumentation (see Chapter 3).

^{*} Adopted from (Tavani 2013)