COSC130
Fundamentals of Cybersecurity and Privacy

LECTURE 2: ETHICAL THEORIES

Introduction to Ethics and Ethical Theories

1. What is ethics?

2. Ethical Theories

3. Case Studies

Much of this lecture is based on the following two sources:

Chapter 2 Three Ethical Frameworks
Mary Manjikian. (2023) Cybersecurity Ethics, Routledge, Taylor & Francis Group.

Chapter 4 Ethical Frameworks for Cybersecurity
Chapter Markus, C., Gordijn, B., & Loi, M. (2020). C. Markus, B. Gordijn, & M. Loi (Eds.), The ethics of cybersecurity (Vol. 21). Champaign, IL: Springer.

In-text references to these two sources are typically omitted for readability.

What is Ethics?

Informally, ethics is a system of moral principles that can be adhered to in order to do what is 'right' and 'good'.

"[Ethics] is a study of what are good and bad ends to pursue in life and what it is right and wrong to do in the conduct of life. It is, therefore, above all, a practical discipline. Its primary aim is to determine how one ought to live and what actions one ought to do in the conduct of one's life."

[John Deigh, 2010]

What is Ethics?

One way to understand ethics is to focus on making 'ethical' decisions.

We will consider a *model* that makes the following assumptions:

1. It is always possible to identify a person or a group that makes a decision (as opposed to consensus or decisions evolving organically).

2. Those who are making decisions understand that they are making decisions and have the authority to do so.

3. Decision-makers are not coerced into making a particular decision (they have 'agency').

4. Each decision is made in isolation, independently of other decisions.

5. Decision-makers are aware of constraints under which they are making the decision (e.g., company policies and consequences of violating these policies).

Ethics

Metaethics

– Where do our ethical principals come from?

– Are ethics innate or learnt?

Normative Ethics – determining moral standards that regulate right and wrong.

Applied Ethics – examining controversial issues, such as balancing the right to privacy versus mass surveillance programs.

Metaethics

Some argue that we are born knowing right from wrong.

Others believe that we learn ethics from immersion in our culture or society.

Normative Ethics

The Golden Rule: "Do unto others as you would have them do unto you"

To decide if something is morally correct or not, one has to ask what would happen if everybody were doing it.

Ethical Theories

Virtue Ethics – emphases good habits, good character (e.g., benevolence)

Deontological - duty, obligation or rule-based ethics. The action is more important than the consequences.

Teleological – consequentialist ethics. The rightness or wrongness of an act is a function solely of the consequences of the act.

Virtue Ethics

Virtue ethics can be traced back to Aristotle, an Ancient Greek philosopher (384 – 322BC).

Aristotle equated virtue with the proper functioning of an object. Thus, he placed the emphasis on "being" rather than "doing".

Applied to human beings, virtue is an optimal 'mean' that avoids excesses either way.

- ❖ Cowardice – Courage – Recklessness
- ❖ Boorishness – Wit – Buffoonery

The optimal mean depends on the context and limitations.

- ❖ If a strong swimmer tries to save a drowning person from high waves, that's courage; if a weak swimmer attempts the same, that may be seen as foolishness.

Virtue Ethics

Acting virtuously and with the right intention leads to the good life (well-being, human flourishing). It does not require self-sacrifice and always putting others above oneself (saint-like behaviour).

Adherents to this view are not concerned with duty for duty's sake or the consequences of their actions, rather their actions are aligned with their values.

An individual and/or organisation needs to determine what virtues are important to them.

- Ancient Greeks Four Cardinal Virtues: prudence, courage, moderation, and justice
- Koran: forbearance, generosity, adherence to accepted custom, righteousness, patience, thankfulness, flexibility, reason, sound faith, and knowledge
- Bible Old Testament focuses on 'wisdom' – wisdom can help people acquire other virtues

A person can develop their character and grow in virtue through living a virtuous life, gaining new experiences, and interacting with others.

Virtue Ethics

Modern proponents of virtue ethics include

❖ Elizabeth Anscombe, a British philosopher, whose 1958 essay, "Modern Moral Philosophy" was widely credited with the revival of virtue ethics

❖Alasdair Macintyre, a Scottish philosopher, with his influential 1981 book "After Virtue".

They argued that the emphasis on rules and duties is insufficient and should be complemented by inclusion of virtue.

They argue that "good judgment emanates from good character" and that being a good person is not about following the rules.

They emphasize the noting of "good intent" embedded in virtue ethics.

❖ Accidentally donating money to a charity is not a virtuous act.

❖ saving a drowning man to impress a potential girlfriend is not a virtuous act.

Critiques of Virtue Ethics

1. Ethical theories should not be built on models as reality is more complex – people may be compelled or coerced to make certain decisions.

2. Individual level is not an appropriate level for achieving morality – that should be done on a societal level ("pragmatic ethics").

3. Person's character is not fixed and unchanging as people behave differently in different situations – supported by psychological studies.

4. Aristotle's virtue ethics is Western and male-centric – it focuses on virtues highly valued in the West and among males (e.g., courage).

5. Circular reasoning – one acts according to their character, and actions build character.

6. It is selfish for an individual to focus on their own virtues and well-being instead of the overall good.
   - A person valuing honesty telling a nazi officer during WW2 where a Jewish family is hiding.

Deontology

Deontology is derived from the Greek word "deon" which means "obligation, duty".

Deontological ethics can be traced back to German philosopher Immanuel Kant (1724 – 1804).

Kant believed that human's ability to reason gives them a privileged place in the world. A person can be moral without being religious, as they can devise a set of rules or duties for moral behaviour.

The moral value of an act depends on the act itself, rather than an act's consequence, or the character of the actor.

Deontology

The three principles of deontological ethics:

1. "Always act on the maxim or principle which can be universally binding, without exception, for all humans."

2. Golden Rule: "Would I be harmed if someone took the same action against me? How might I be harmed?"

3. "Everyone should treat others as an end in themselves, as people who deserve respect and dignity, rather than merely a means to an end."

Deontology

John Rawls, an American philosopher (1921 – 2002) argued that people had a duty to strive for a just or fair solution to ethical questions.

Since we are not objective but rather tend to subconsciously act in our self-interest, we need to apply the "veil of ignorance": "If I was blind to my position – i.e., I didn't know my gender, race, social class, nationality – what rule would I then be willing to adopt as universal in this situation?"

The Difference Principle: By applying the veil of ignorance, we act to improve the condition of the least favoured people in society.

Critiques Deontology

❑ Too idealistic – for example assuming that others are trustworthy.

❑ Too inflexible – e.g., the duty to be truthful (it was argued that this was a misunderstanding of Kantian ethics).

❑ Rawls' insisting on equitable solutions (a possible misunderstanding of Rawls' ethics).

Consequentialism

❖ Consequentialism is an ethical theory that considers an act to be morally right if it has a good consequence.

❖ In other words, the rightness or wrongness of an act depends only on the result (consequence) of that act.

❖ The act with more good consequences is more right than and act with less good consequences.

❖ "End justifies the means."

Consequentialism

❖ Utilitarianism is a type of consequentialism that favours actions that maximise happiness. Consequentialism is more general and aims to maximise some form of utility, and not necessarily happiness.

❖ Utilitarianism can be traced to Jeremy Bentham, an English philosopher (1748 – 1832): "It is the greatest happiness of the greatest number that is the measure of right and wrong."

❖ He argued that people should act in such a way to maximise pleasure (hedonism) and minimize pain.

Critiques of Consequentialism

❖ The main advantage of consequentialism is that uses a simple and objective algorithm; the calculation of the utility can easily be automated.

❖ The main criticism is that always subjecting an individual's rights to a group's interests can be seen as authoritarian.

Case Study: The Trolley Problem (Philippa Foot, 1978)

"In this thought experiment, children play on the trolley tracks, unaware that a trolley is speeding toward them.

An observer stands on a bridge. From this vantage point, he sees the events as they are about to occur and can influence them.

He stands next to a huge man. This man's mass is significant enough for the observer to throw him down onto the tracks; his body could stop the trolley. The man would, however, die.

Thus, the observer needs to decide if it is moral to sacrifice one man's life to save the lives of the children on the tracks."

(Note that this type of ethical dilemma may be faced by self-driving car designers.)

Why I Had to Buy My Wife's Inhaler on the Dark Web

Why I Had to Buy My Wife's Inhaler on the Dark Web.

"Let's not forget that this type of transaction is illegal: I was buying a prescription drug without a prescription and having it shipped across state lines, not to mention not paying taxes on it. But I felt that my hand had been forced. It wasn't a choice for me. Jackie's health is the most important thing, and I didn't particularly care what I had to do to keep her healthy. Besides, I didn't think the DEA would waste the time and resources to bust a guy buying an asthma inhaler. With my mind made up, I went through the fairly complicated process of actually buying something on one of these markets."

- ◦ Source: https://www.vice.com/en/article/qkvqbb/why-i-had-to-buy-my-wifes-inhaler-on-the-dark-web

Ethical?

Is the purchase of the inhaler ethical?

The husband's actions were selfless and compassionate, which would be considered ethical in the framework of virtue ethics.

The husband's duty to his wife is in conflict with his duty to obey the law.

In this scenario the action of buying the wife's inhaler on the Dark Web would be considered ethical in the framework of consequentialism.

However, there may be other consequences that the buyer hasn't considered.

What are the consequences of supporting an illegal market?

What if the inhaler had contained a lethal gas?

Who would be held responsible, accountable and liable for the woman's death?

More Ethical Theories

In order to consider case studies from the area of cybersecurity, we introduce some applied ethical frameworks that have been previously used in this context:

1. Principlism

2. Human Rights

3. Ethics of Risk

Principlism

Principlism is an approach to ethical decision-making that has been used widely in many professional fields, most notably in biomedical research. It is an example of *applied ethics*.

❑ It is derived from deontological ethics (or a mixture of deontological and consequential ethics).

❑ It is based on a small number of prima facie (meaning 'at first sight') principles (duties), usually 3 or 4, and relies on common-sense ethics and professional ethical practice.

❑'Prima facie' means that one has to honor these duties unless there are more pressing duties that are in conflict with it(first used in ethics by Scottish philosopher Sir William David Ross in his book 'The Right and the Good', 1930.)

❑ The conflict resolution is not pre-determined in advance; instead, the conflicts are resolved on a case-to-case basis.

❑Therefore, principlism is a minimalist and flexible framework.

Principlism

❑ Principlism originates from the Belmont Report produced by the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research in 1974, as a framework for the protection of human research subjects.

❑ It was introduced to Information and Communication Technology (ICT) research in The Menlo Report: Ethical Principles Guiding Information and Communication Technology Research, published by Homeland Security in 2012.

❑ The Menlo Report specifies 4 ethical principles:
- **Respect for Persons.**
- **Beneficence.**
- **Justice.**
- **Respect for Law and Public Interest.**

Principlism

- **Respect for Persons.** Participation as a research subject is voluntary, and follows from informed consent. Therefore the research should treat individuals as autonomous agents and respect their right to determine their own best interests, respect individuals who are not targets of research yet are impacted, and individuals with diminished autonomy who are incapable of deciding for themselves and are entitled to protection.

- **Beneficence.** Do not harm. Maximize probable benefits and minimize probable harms. Systematically assess both risks of harm and benefit.

- **Justice.** Each person deserves equal consideration in how to be treated, and the benefits of research should be fairly distributed according to individual needs, effort, societal contribution, and merit. The selection of subjects should be fair, and burdens should be allocated equitably across impacted subjects.

- **Respect for Law and Public Interest.** Engage in legal due diligence and be transparent in methods and results. Be accountable for your actions.

Human Rights

❑ Cybersecurity technologies are intended to protect individuals from cybercrime.

❑ However, in doing so, cybersecurity technologies may conflict with the human rights of individuals.

❑Cybercrime can be roughly divided into four broad categories:
- ❑ cybertrespass – unauthorized access
- ❑ cybervandalism – corrupting/disrupting data and/or processes
- ❑ cyberpiracy – illegal reproduction and distribution of content
- ❑computer fraud – deception for financial gain

❑ The methods used to fight cyberpiracy include secret access to computer systems and interception of data – which is exactly what cybertrespass refers to.

❑Hildebrandt argues that cybersecurity measures should be accompanied by additional safeguards for the human rights undermined by these measures (Hildebrandt, 2013).

Human Rights

- According to Hildebrandt, 2013, the affected human rights are:
  - privacy
  - data protection
  - non-discrimination
  - due process
  - free speech

According to EU law, Internet Service Providers cannot be ordered by a court to perform systematic monitoring of traffic to protect copyright, but they can monitor traffic to protect against malware if they choose to do so (Hildebrandt 2013).

Violating a human right defeats the very concept of a right. However, it is very likely that human rights will be in conflict with each other, and in conflict with cybersecurity goals.

In practice, it may be possible to distinguish between the core elements of a right, which much be preserved, and peripheral elements that could be sacrificed if they conflict with the core elements of other rights (Hildebrandt 2013).

Ethics of Risk

<u>Case Study (adapted from **Markus et al., 2020**)</u>

Responding to ransomware: You are the leader of a CERT team and you have identified ransomware (a software virus) that encrypts the data in the computers infected and directs the victims to a payment service where, after paying 400€, the victims can obtain the decryption key.

You know that a partner software company has already begun to code an algorithm to decrypt the data; you estimate that the company has a 65% chance of success within one month (and a 0% chance of succeeding later).

At the moment, 1,000 computers are affected, all belonging to the network of an important hospital. Unfortunately, it is impossible to reconstruct what data was saved in each computer and the date of the latest backup.

The probability that an alteration or deletion of data in the computers will cause the death of one patient is 60% overall. The probability that more than one patient will die as a result of an alteration or deletion of data is negligible.

Case Study (adapted from Markus et al., 2020)

You can choose one of following two response strategies.

Policy A: You quarantine all the affected computers and shut down the payment servers. These measures, with foreseen 100% efficacy, will prevent the spread of the infection and reduce the incentives for attackers to involve other computers in similar attacks in the near future. However, the malware is designed to detect your response and retaliate against it. It will irreversibly introduce random changes in the data in ways that are extremely hard to detect, or simply delete it. It is not possible to identify the data causally linked to the lives of patients in a reasonable amount of time.

Policy B: You do not isolate the affected system and do not bring down the payment server; after one month, either you have obtained the decrypting tool with no losses; or you have not, in which case the infection will have spread to other 1,000,000 computers, with an expected aggregate economic loss for your society of €400,400,000, consisting of €400 payments to the hackers.

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Ethics of Risk

1. Expected Utility Maximisation – the right action is the one that maximises the *aggregate expected utility*

   ❑ *Policy A* – It is expected that 0.6 patients will die.

   ❑ *Policy B* – Expected financial loss (disutility) of 140,140,000 €

2. The Maximin Rule - the utility of a mixture of potential outcomes is equal to the lowest utility associated with any of these outcomes.

   ❑ *Policy A* – In the worst outcome, one patients will die.

   ❑ *Policy B* – In the worst outcome, financial loss (disutility) is 400,400,000€

Ethics of Risk

3. Deontological theory – "If it is morally prohibited to perform a certain action, then this prohibition extends to all mixtures in which this action has non-zero probability."

   ❑ *Policy A* – Prohibited, as a patient dying has a non-zero probability

   ❑ *Policy B* – Not prohibited

4. Rights-Based Theory – "If someone has a moral right that a certain action not be performed, then this right extends to all mixtures in which this action has non-zero probability."

   ❑ *Policy A* – Prohibited, as a patient dying has a non-zero probability

   ❑ *Policy B* – Not Prohibited

Probability limit for risk-deontological theories: "Each prohibition of an action is associated with a probability limit. The prohibition extends to a mixture that contains the action if and only if the action has, in that mixture, a probability that is above the probability limit."

Ethics of Risk

5. Contractualism –MiniMax Complaint principle: "When we would not be violating any moral constraints, we are morally required to act in the way that minimises the strongest individual complaint"

    Since the complaint against loss of life is greater than the complaint against paying a ransom, we should choose Policy B.

6. Ex ante contractualism - compares complaints in terms of expected harm

    We compare a very small probability of loss of life to loss of 140€.

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