

# CS 453 / 698: Software and Systems Security

## **Module: Non-technical Aspects of Security**

Lecture: ethics and legal issues

Meng Xu (*University of Waterloo*)

Fall 2024

# Outline

- 1 Why studying ethics and laws?
- 2 Differences between laws, morality, and ethics
- 3 Ethical practices in security and privacy domain
- 4 Intellectual property
- 5 Other common legal issues in security and privacy domain

# Motivation

- The course content includes a wide range of attacks.
- These attacks can have societal impacts and individual impacts.
- Your future work, being it research, industry, start-ups, software, security, ..., depends on your awareness of legal and ethical issues.

# Cambridge Analytica



Facebook–Cambridge Analytica data scandal

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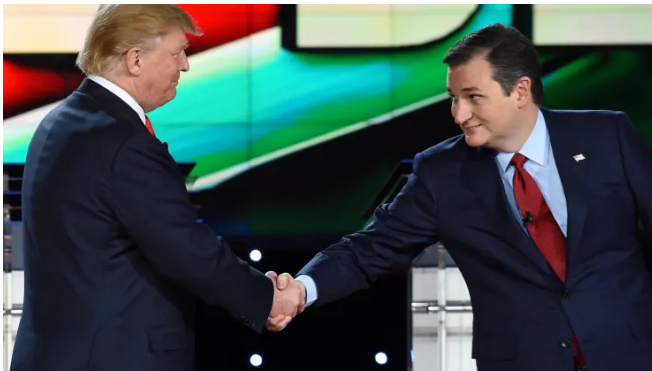
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- In 2014, Facebook adapted its rules to limit a developer’s access to user data, especially the friends’ data.
- In 2015, The Guardian reported that Cambridge Analytica was helping Ted Cruz’s presidential campaign. FB acknowledged the data leak and argued that they have legally pressured Cambridge Analytica to remove all of the data they had improperly acquired.

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- In 2016, Cambridge Analytica was responsible for the “Defeat Crooked Hilary” video campaign on FB (assisting Trump's team).

# A timeline of the Cambridge Analytica scandal



Donald Trump and Ted Cruz shake hands before the start of the Republican Presidential Debate (2015)

# A timeline of the Cambridge Analytica scandal



Christopher Wylie, whistleblower of the Cambridge Analytica scandal

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- In March 2018, Mark Zuckerberg first apologized for the situation, calling it an “issue”, a “mistake” and a “breach of trust”
- In July 2018, United Kingdom’s Information Commissioner’s Office announced to fine FB £500,000 (\$663,000)
- In July 2019, the Federal Trade Commission announced to fine FB around \$5 billion to settle the data breach investigation
- In July 2019, the Securities and Exchange Commission announced to fine FB around \$100 million for misleading investors about potential risks it faced from misuse of user data

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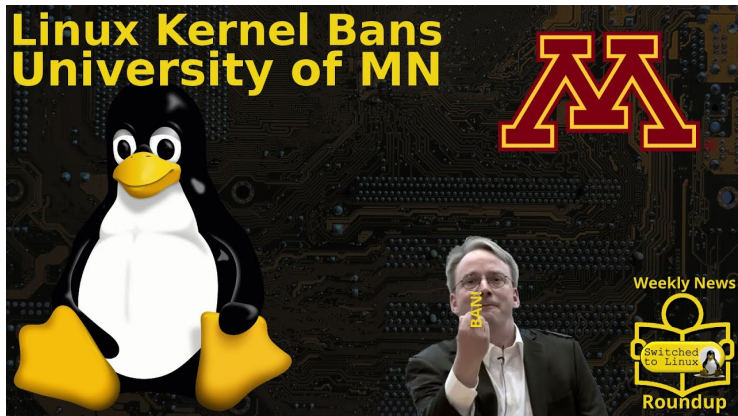
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**Q:** How bad can this be?

# Linux kernel and the University of Minnesota



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Fortunately, we have laws and ethics to guide us on making a right-or-wrong judgement call.

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## Laws, morality, and ethics

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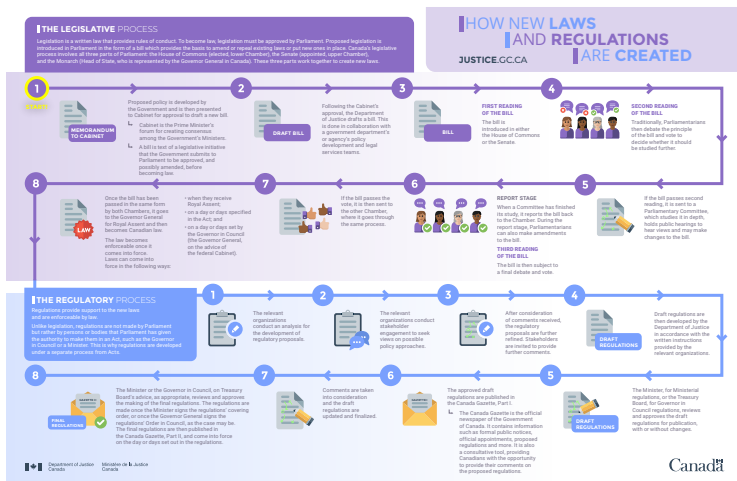
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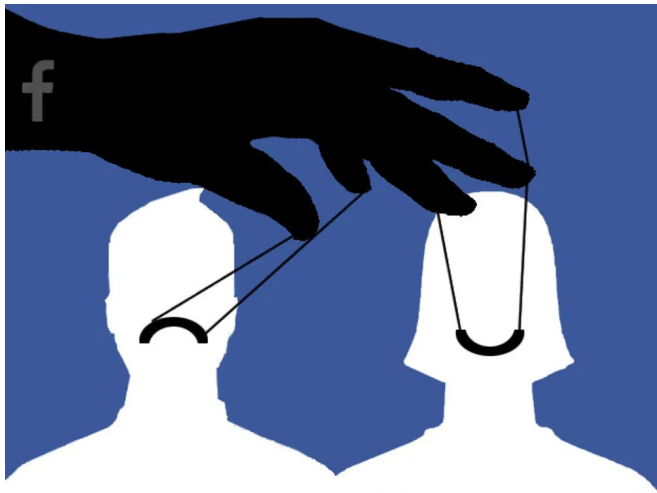
- The **lengthy legislative process** does not match with the fast-pacing tech industry
- Laws usually have a very **narrow** focus.

# Lengthy legislative process



## The legislative process in Canada

## Non-violations of law



The (secret) mood manipulation study by Facebook in 2012

## Some facts about the mood manipulation study

For one week in January 2012, data scientists in Facebook skewed the content of News Feed for 689,003 users.

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**Finding 1:** More negative News Feeds led to more negative status messages, as more positive News Feeds led to positive statuses.

**Finding 2:** Omitting (either positive or negative) emotional content reduced the amount of words the person subsequently produced.

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However, we might still have some upset feelings here.

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**A:** There is rarely a moral authority agreed by every individual

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In an ideal world, our ethical reflections shape the laws and moral systems a society will develop.

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- A **public partial disclosure** if you want to further pressure the responsible parties; or a **public full disclosure** in the interests of potential victims.



# Build ethically

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Tips for incorporate ethical decisions when building something new

- Get as many **dissenting** voices as possible.
- Explain how something works, what is possible to go wrong, and how bad actors can take advantage to a **non-expert**.
- The privacy and data protection norms and cultural values **vary by region and country**
- **Consult** other experts (e.g. ethics, religions, advocates, activists)

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If the tool works as intended?

- Who does this effect?
- Does this data need to be collected?

If the tool does not work as intended?

- Failure modes? abuse cases?
- Who does this effect?

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is a committee that applies research ethics by reviewing the methods proposed for research to ensure that they are ethical.

## Codes of professional ethics

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## Example: CIPS

These are the high-level bullets from CIPS' code:

- Protect Public Interest and Maintain Integrity
- Demonstrate Competence and Quality of Service
- Maintain Confidential Information and Privacy
- Avoid Conflicts of Interest
- Uphold Responsibility to the IT Profession

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## Legal protections

How can we defend against a threat?

- Prevent it: block the attack
- Deter it: make the attack harder or more expensive
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In addition to (sometimes instead of, unfortunately) using technological defences, we can also use **legal** defences

# Overview of intellectual property

In contrast to real property, so-called “intellectual property” (IP) differs in important ways:

- It is **non-depletable**
- It is **replicable**
- It has **minimal marginal cost**

So the laws for IP differ from the laws for real property, and indeed are much more complicated

# Types of intellectual property

Four kinds of IP here:

- Trade secrets,
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These four kinds of IP:

- Cover different intangibles
- Convey different rights
- Have different durations
- Use different registration process



# Trade secrets

- This is the simplest kind of IP
- You want to protect some secret information
  - The formula for Coca-Cola
  - The method for computing how many airline seats to oversell
  - Your new  $O(n)$  sorting algorithm
- Just don't tell anyone, and call it a trade secret
  - Unfortunately, you have to tell **someone**, or it's not useful
  - **You get legal protection if that person passes it on**

# Reverse engineering

- **Reverse engineering** is the process of taking a finished product and taking it apart to figure out how it works
  - If someone successfully does this and published the results, you've effectively lost your trade secret protection
  - General rule for trade secrets: **it has to be a secret**
- A similar rule applies to software, with some caveats we'll see later
- RC4 was originally a trade secret (a violation of Kerckhoffs's principle), but it was reverse engineered in 1994

# Trademarks

- Trademarks protect **names, brands, logos**, and also **domain names**
- To get one, make a legal filing showing that you are using the name in commerce
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**Example:** Microsoft vs MikeRoweSoft

Mike Rowe used to own the domain name “MikeRoweSoft.com”

# Patents

- Applies to **inventions** (including algorithms), which must be:
  - Novel
  - Useful
  - Non-obvious
- The bargain is that:
  - You tell everyone how your invention works
  - In exchange, you get to have a monopoly over it for 20 years
- The most difficult form of IP to obtain

# Cryptography patents

Many cryptographic algorithms are (or were) patented

- Diffie-Hellman (expired 1997)
- RSA (expired 2000)
- IDEA (block cipher used in early PGP, expired 2012)
- Lots of patents on elliptic curve cryptography

Since 2000, you could pick a good unpatented candidate of each type of crypto

NOTE: unlike trade secrets, this is not against Kerckhoffs's principle.

# Copyright

- Copyright is the most well-known kind of IP
- Protects expressions of ideas in a tangible medium
  - But not ideas themselves!
- No filing requirement
  - But you can get additional benefits if you do file
- Lasts a “limited time”
  - Currently: life+70 years in the US, life+50 in Canada
- The copyright holder has monopoly rights over certain uses of the work; primarily, making copies

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# Cyber crime

- We saw that laws regarding intellectual property differ from those about real property
- Similarly, laws about unauthorized access to computers, networks, or services differ from those about physical trespass
  - But until those new laws came about, courts had to make really stretched analogies to handle such events

# Cyber crime

- Early on, there were bizarre rulings:
  - The value of stolen data was the value of the paper it was printed on
  - The value of a stolen manual was the value of the equipment it was intended for
- Things seem to have settled down somewhat
  - GDPR:  
General Data Protection Regulation
  - PIPEDA:  
The Personal Information Protection and Electronic Documents Act
  - HIPAA:  
Health Insurance Portability and Accountability Act
- But there are still many recent and active issues!
  - If your ISP keeps a copy of your incoming email, is that wiretapping?

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Computer forensics replace regular forensics

## Cybercrime treaty

- Worse, computer crime is often international (two or more jurisdictions)
- Rules of evidence, police powers, etc. in one country don't usually carry over to another
- The Council of Europe cybercrime treaty (to which Canada and the US are also signatories) stipulates that member countries should pass laws making it easier for law enforcement to access telecommunications traffic (including voice, data, and Internet)

## Bill C-13 (“Cyberbullying Law”)

Full name: Protecting Canadians from Online Crime Act:

- Really a “lawful access” law
- Passed in December 2014
- Any “public officer” (not just the police) can demand that any computer data in a person’s control not be deleted (until a production order can be obtained)
- Lowers standard for seizing of computer data, transmission data, and tracking data to “reasonable grounds for suspicion”
- Provides immunity to ISPs that “voluntarily” hand over customer data to government
  - Even though the Supreme Court had recently ruled that unconstitutional!

〈 End 〉