APPLIED SCIENCE 450
Professional Engineering Practice

The Professional Governance Act, EGBC, and the Code of Ethics

W. Scott Dunbar, PhD, PEng

The topics

- Engineering – a self-regulated profession
- EGBC definitions *engineering disciplines*, *professional engineering practice,* and *professional engineer*.
- The *Engineer in Training* designation
- The difference between doing engineering and practicing engineering
- Why follow the Code of Ethics?
- When does the Code of Ethics apply?
- Who is the public?
- How to contravene Principle 1 of the Code of Ethics
- Conflict between Principles in the Code of Ethics

Self-regulation

Society allows professionals to self-regulate, i.e., to control entry into the profession and to monitor the activities of practicing professionals.

Society needs the services of professionals, including engineers, but does not have the time or resources to understand and monitor the way professionals provide their services.

Self-regulation takes the form of a statute which is the legal basis of a body that regulates and governs the professionals. For example, the *Professional Governance Act* (PGA) in British Columbia is the legal basis for *Engineers and Geoscientists of British Columbia* (EGBC) to set bylaws and regulations.

See video at https://www.egbc.ca/About

Some definitions from the regulation

“engineering discipline" means agricultural, biomedical, bioresource, biosystems, building, chemical, civil, computer, electrical, environmental, food, forest, geological, geomatics, industrial, marine, mechanical, mechatronics, metallurgical, mining, naval architecture, nuclear, petroleum, software and structural engineering and engineering physics;

"practice of professional engineering" means the provision of

(a) advice or services that are based on an engineering discipline, or

(b) advice or services that are ancillary to those described in paragraph (a)

"**professional engineer**" means an individual who is registered with the regulatory body as a professional engineer under this Act

Engineers and Geoscientists Regulation (gov.bc.ca)

What is an EIT

The **Engineer-in-Training** (EIT) category of membership is for people who have completed their education and are working towards obtaining the required four years of work experience in order to obtain their Professional Engineer (P.Eng.) designation.

EIT is defined by EGBC, not in its bylaws

And after 4 years of EIT experience

A certificate

and a seal

Must be signed and dated if used

Clause 7.3.7(5) of the EGBC bylaws

A Professional Registrant must Authenticate

(a) a Document that

(i) the Professional Registrant **has prepared in their professional capacity or has been prepared under their Direct Supervision**,

(ii) contains content related to the Regulated Practice, and

(iii) will be relied on by others, or

(b) a Document that is otherwise required to be Authenticated by applicable legislation, associated regulations, the Bylaws, or standards approved by the Council

2021-02-05-Engineers-and-Geoscientists-BC-Bylaws.pdf.aspx (egbc.ca)

Can I do engineering without being registered?

Of course you can!

But you cannot *practice* engineering,
i.e., you cannot assume responsibility for what you design.

If you are not registered

You must not represent yourself as a registered professional engineer to someone who might use your services AND who would expect you to assume responsibility.

Key question: Who assumes liability?

If you practice on your own or in a partnership, you may need professional liability insurance.

Such insurance can be expensive and can be a barrier to working on your own or to forming a partnership.

If you work in a large company or a professional engineering company, the company purchases liability insurance and assumes liability.

You may or may not be registered if you work for an engineering company, but typically the company will want its engineers to be registered.

Whether or not you are registered …

be careful of doing pro bono engineering work for friends, family, community groups, or charities.

A typical type of request:

> "We need a solar powered electrical system for our cottage. You're an engineer, Can you build it for us?"

Fear is the correct response to such requests.

Titles

Which one of these engineers might be registered as a PEng or EIT?

Sales engineer

Senior Engineer

Systems Engineer

Project Engineer

Test engineer

Junior Engineer

Construction Engineer

https://www.egbc.ca/Complaints-Discipline/Unauthorized-Practice-and-Use-of-Title

Who is eligible to use the title "doctor" and its abbreviations?

Only registrants of the College are permitted by law to use the title "doctor" with some notable exceptions […] The BC Supreme Court has previously held that even persons with medical training and degrees cannot call themselves "doctor" in circumstances *where they are expressing or implying that they are registrants of the College*.

https://www.cpsbc.ca/for-public/unlawful-practice

Why follow the code of ethics?

Because I agreed to when I registered with EGBC!

(an unsatisfying explanation)

What would happen if every engineer did not follow the code of ethics?

Interaction between engineers and society would be non-uniform.
Profession would fall into disrepute, a significant loss to all engineers.

Conclusion: It is self-defeating to not follow the code of ethics.

Kant would like this answer.

Is P2 rational and universal as Kant would want it?

EGBC Code of Ethics, Principle 2:

> practice only in those fields where training and ability make the registrant professionally competent

Rational: to do otherwise would lower the value of engineering or geoscience work which would be self-defeating

Universal: applies to every engineer or geoscientist in all situations

Yes and Yes

Each principle of the code of ethics can be shown to be rational and universal.

Does the Code of Ethics apply to me …

… even if I am not doing or practicing engineering?

Yes, registration as an EIT or PEng renders the Code of Ethics binding on you *personally* and wherever you happen to be.

Have a look at these FAQs on the code of Ethics:
https://www.egbc.ca/Complaints-Discipline/Ethics,-Law,-and-Conduct/Ethics,-Law,-and-Conduct-FAQ

It's common sense and part of being a professional

As a trained engineer, you have knowledge and skills that a lay person does not have and you should use them even when not at work.

For example, if you have the relevant knowledge and expertise you should:

- Report a situation that is unsafe, damaging or potentially damaging, or that could lead to a conflict with any other principle of the code of ethics.
- Challenge a decision that is based on incorrect technical information.

Examples from other professions:

Lawyers are required by law to report any illegal activity they encounter.

Contractors cannot ignore problems uncovered in the course of doing renovations.

Code of Ethics Principle 1

Hold paramount the safety, health, and welfare of **the public**, including the protection of the environment and the promotion of health and safety in the workplace

Code of Ethics (egbc.ca)

So who is the public?

Engineering codes of ethics are silent on a definition of “the public”.

Davis (p. 165)[1] suggests:

> ... “public” would refer to those persons whose lack of information, technical knowledge, or time for deliberation renders them more or less vulnerable to the power an engineer wields on behalf of his client or employer.

In other words, it is those who do not or could not know any better.

This places a responsibility on the engineer to define his/her public.

It’s not simple.

[1]Davis, M, 1991. Thinking like an Engineer: The Place of a Code of Ethics in the Practice of a Profession, *Philosophy and Public Affairs*. 20 (Spring): 150-167

Should I do engineering for the armed forces?

First thought:

No, because it's partly about endangering the safety of the public of an enemy who indeed do not or could not know better.

Second thought:

Actually, it's about endangering the *soldiers* of the other side who are not helpless innocents – they know the dangers of the job and may have knowingly signed up for it.

So that means I can take that job designing systems that shoot explosive pointy things at buildings and enemy soldiers.

Right? 

There is nothing wrong with these arguments, but ...

(there are always some buts) ...

- Innocent civilians do get killed in war, often by mistake
- Bombing infrastructure is a good way to destroy an economy, but that affects and endangers innocent people.
- There's war for a good cause and war for a bad cause and you can't be selective.
- What about the morality of it?

The fact is ...

an engineering code of ethics can't help you with this decision because that is not the intent of professional codes of ethics.

It's a personal ethics/morality issue.

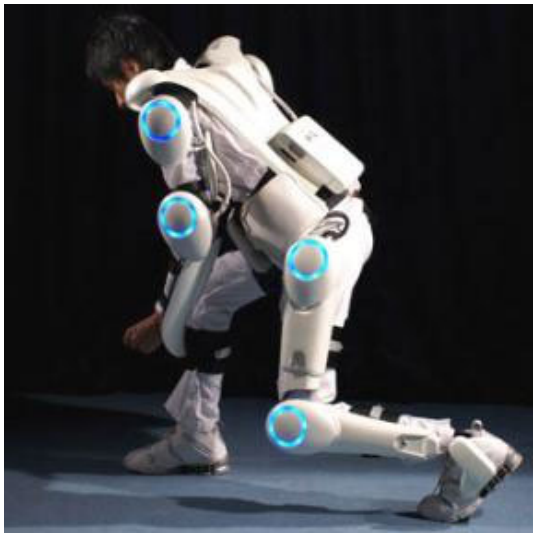
The intent of a professional code of ethics is to guide the actions of professionals at all times, but especially *when practicing the profession*

It *cannot* help you decide what type of work to do.

Engineering codes of ethics are silent on the definition of the public. In addition to the "safety, health, and welfare of the public", Principle 1 of the EGBC code of ethics also holds "protection of the environment" as paramount. However, the code is silent on the definition of environment.

But, if you decide to take that defence job …

your public becomes the armed forces who expect this stuff to work



How do you contravene Principle 1?

It's good to know that no one does it deliberately!

No engineer wakes up one day and says:
"I'm going to endanger the public, damage the environment, and make my workplace unsafe."
("and if I'm lucky maybe I'll do all three.")

It usually happens because some other Principle is contravened.

But it is easier to view an occurrence as contravention of P1.
It's more difficult to trace events to contravention of other principles.

For example…

Principle 2:

> Practice only in those fields where training and ability make the registrant professionally competent

Suppose you provide an opinion that is not founded on adequate training, knowledge, or experience and a mistake occurs as a result.

Then, as a result of the mistake, an unsafe or environmentally damaging situation results.

Result: contravention of P1

Questions: When was the opinion provided? Is there a record?

September 2019 EGBC disciplinary case

In the case of a civil/structural engineer

- Seven counts of "*failing to provide*", "*failing to include*", "*failing to explain*" or "*failing to identify*" items in site construction drawings
- Also failed to "adequately investigate and assess the stability of the embankments of the excavation"

All conduct was called "contrary to Principal [sic] 1 of the Association's Code of Ethics" by the EGBC disciplinary committee

But the conduct was likely the result of contravention of P2:

> Practice only in those fields where training and ability make the registrant professionally competent

Conflicts between principles

Remember Kantian or rule-based ethics:

"Always tell the truth"
"Do not harm people"

What if telling the truth will harm someone?

One solution to this problem was:

Rule violation is possible if one accepts that others may do the same at any time under the same circumstances.

Potential conflict in EGBC code

Principle 1

Hold paramount the safety, health, and welfare of the public including the protection of the environment …

Principle 9

Report to Engineers and Geoscientists BC and, if applicable, any other appropriate authority, if the registrant, on reasonable and probable grounds, believes that:

a) the continued practice of a regulated practice by another registrant or other person, including firms and employers, might pose a risk of significant harm to the environment or to the health or safety of the public or a group of people; …

Principle 10

Present clearly to employers and clients the possible consequences if professional decisions or judgments are overruled or disregarded

Suppose …

the company you work for is doing something incorrectly which could cause a public safety issue or damage to the environment.

Do you clearly present the problem to your employer in accordance with P10. What if they don't make changes?

Do you then report it to authorities in accordance with P9?

This is the conflict associated with whistleblowing.

Recent (2021) changes

In February 2021, the Professional Governance Act (PGA) came into force and replaced the Engineers and Geoscientists Act.

As a result …

- An *updated Code of Ethics* was introduced, aligned with mandatory ethical principles contained in the PGA.
- Engineering and geoscience *firms will become regulated*, bringing BC in line with the rest of Canada.
  - But the profession is still self-regulated – EGBC controls entry into the profession and monitors activities of registrants
- *Continuing education will be mandatory*, requiring registrants to complete 60 hours on a 3-year rolling average.


THANK
YOU

APSC 450
Professional Engineering Practice

Notes to accompany "An Introduction to Ethics"

By W Scott Dunbar

These notes refer to particular groups of slides in the lecture.

Trolley problems

Trolley problems were devised as models of decision-making in life or death medical situations. But they actually are models of a number of moral dilemmas:

- You are a doctor in a war-ravaged country. You have five patients, each of whom is about to die due to a failing organ of some kind. There is another patient on life support due to brain damage, but who has healthy organs. Is it appropriate for you to remove the life support from the other patient so that he will die and you can harvest and transplant five of his organs into the bodies of the other five patients?

- Enemy soldiers have taken over your village. They have orders to kill all remaining civilians. You and some of your townspeople have sought refuge in the cellar of a large house. Outside you hear the voices of soldiers who have come to search the house for valuables. Your baby begins to cry loudly. You cover his mouth to block the sound but that makes it difficult for the baby to breathe. If you remove your hand from his mouth, her crying will summon the attention of the soldiers who will kill you, your child, and the others hiding out in the cellar. To save yourself and the others you must smother your child to death. Is it appropriate for you to smother your child in order to save yourself and the other townspeople?

- Suppose an autonomous car detects the possibility of a fatal accident. How should it be programmed to avoid the accident? Should it depend on whether there are more (or less) people in the path of the car when it maneuvers to avoid the accident? Or should it depend on how many people are in the car?

See https://en.wikipedia.org/wiki/Trolley_problem for all you ever wanted to know about trolley problems but were afraid to ask.

Some ethical norms

Walker and Walker (2018) provide reasons why the Golden Rule is insufficient as a stand-alone ethical norm, especially in today's pluralistic society.

Consequentialism is a general name for ethical norms such as Utilitarianism that are based on results of actions. Deontology is another name for Rule based ethical norms after the Greek word deon (δεον) for duty.

One of Immanuel Kant's major contributions to ethics was the Categorical Imperative which he formulated in two ways:

> Act only according to that maxim by which you can at the same time will that it should become a universal law.
>
> Act so as to treat humanity, whether in your own person or in another, always as an end and never as only a means.

The first formulation is a purely logical statement that expresses the condition that conduct must be based on a universal law that is applicable in all situations. Conduct cannot be self-defeating. (Ask the question: "What if everyone did that?")

The second formulation addresses the morality of conduct. We should not use other people and treat them as a means to our own ends. Kant considered humanity an end-in-itself, meaning its inherent value does not depend on anything else – it does not depend on whether a person is enjoying their life, or is making other people's lives better. Humanity exists and therefore has value.

Consequentialism and Deontology are perhaps two ends of a spectrum of ethical norms. However, *virtue ethics* lies outside this spectrum. Rather than require some principle or rule for guidance, a virtue ethicist measures actions against a set of virtues acquired through practice. Examples of virtues are honesty, bravery, and generosity. The ultimate goal is to be a virtuous person. Virtue ethics has many applications in real life, especially in situations where it is difficult or impossible to define benefits or to identify a rule.

Here are some examples to illustrate the results of application of these ethical norms:

- Suppose the possibility of telling the truth arises. A utilitarian will say that the consequences of telling the truth are increased trust (a good thing) whereas a rule-based ethicist will say telling the truth is in accordance with the rule "Never lie".

- Suppose you find a wallet on the street containing a lot of money but no identification. If you were concerned about consequences and had no luck finding the owner, you might want to give the money to a homeless person – spread the wealth, do the most good. If you followed rules, you would think that the right thing to do is to try to return the wallet, no matter what the consequences. This is also rational because if others did not return lost wallets, the world would be a chaotic place. In contrast, as a virtue ethicist you would look internally and try to do something in accordance with virtues such as honesty, integrity, generosity etc. You might try to find a way to identify the owner of the wallet. Honesty and integrity would suggest first trying to find the owner. If that failed, generosity would suggest giving the money to the poor.

- People appear to be utilitarian when responding to the Bystander scenario (aka the Trolley Dilemma) reasoning that it is better to save five lives at the expense of one. In response to

> the Footbridge scenario or dilemma, people appear to be following a rule such as “Don’t kill”. However, recent research has found that increasing of the number of victims in the Footbridge scenario led to a utilitarian response. (Nakamura, 2012)

Functional magnetic resonance imaging of the brain shows that parts of the brain associated with reasoning become active when the subject confronted with a moral-impersonal dilemma such as the Bystander. However, parts of the brain associated with emotions become active when the subject is confronted with a moral-personal dilemma such as the Footbridge. This video is a good description of the interpretation of these observations.
https://www.youtube.com/watch?v=9xHKxrc0PHg

Professional ethics

This distinction and separation between professional ethics and individual morality is important since it can be used to illustrate the situations in which professional ethics applies and where it does not or cannot.

Interaction between professional ethics and individual morality is possible. For example, suppose your individual morality makes you uncomfortable with working on matters related to national defence or with the development of processes involving genetic engineering. A professional code of ethics cannot help you determine the best course of action in such a situation. However, if you do decide to do the work, you must do it according to the standards set by the code of ethics.

A more difficult example is whether you should tell your boss that your work colleague (and close friend) has embezzled money from the company. For most people, the situation is this: embezzlement is in conflict with individual morality and is illegal, but there is this nagging issue of what effect disclosure of the crime could have on your friend. However, from a professional ethics perspective, you have a duty to report illegal activity. Part of Principle 9 of the EGBC Code of Ethics states that registrants must:

> report to Engineers and Geoscientists BC and, if applicable, **any other appropriate authority**, if the registrant, on reasonable and probable grounds, believes that
>
> …
>
> b. a registrant or another individual has made decisions or engaged in practices which may be illegal or unethical;

Illegal conduct should be reported and the appropriate authority would be your employer.

Hmmm … What should you do?

This situation raises a number of issues. First, signing and sealing the design without having supervised its preparation or having done a very detailed review of the work contravenes Clause 7.3.7(5) of the EGBC bylaws:

> A Professional Registrant must authenticate
> (a) a Document that
> (i) the Professional Registrant **has prepared in their professional capacity or has been prepared under their Direct Supervision**

Although the work of the unregistered engineer might be competently done, a detailed review would likely involve essentially repeating the work. However, you should be paid an appropriate fee for your time and that fee may well be more than the fee the unregistered engineer is willing to pay you. There are also liability and insurance issues – you would be taking responsibility for another person's mistakes.

Note that this is different from the EIT situation. Registered engineers supervise the work of EITs and, once checked and reviewed, the work is sealed by a registered engineer.

References

Nakamura K 2012. The Footbridge Dilemma reflects more Utilitarian thinking than the Trolley Dilemma: Effect of number of victims in moral dilemmas. In *Proceedings of the Annual Meeting of the Cognitive Science Society*, 34(34). Permalink: https://escholarship.org/uc/item/8062w0px

Walker P and Walker A, 2018. The Golden Rule Revisited. *Philosophy Now*, Issue 125, available at https://philosophynow.org/issues/125/The_Golden_Rule_Revisited

APPLIED SCIENCE 450
Professional Engineering Practice

An Introduction to Ethics

W. Scott Dunbar, PhD, PEng

Outline

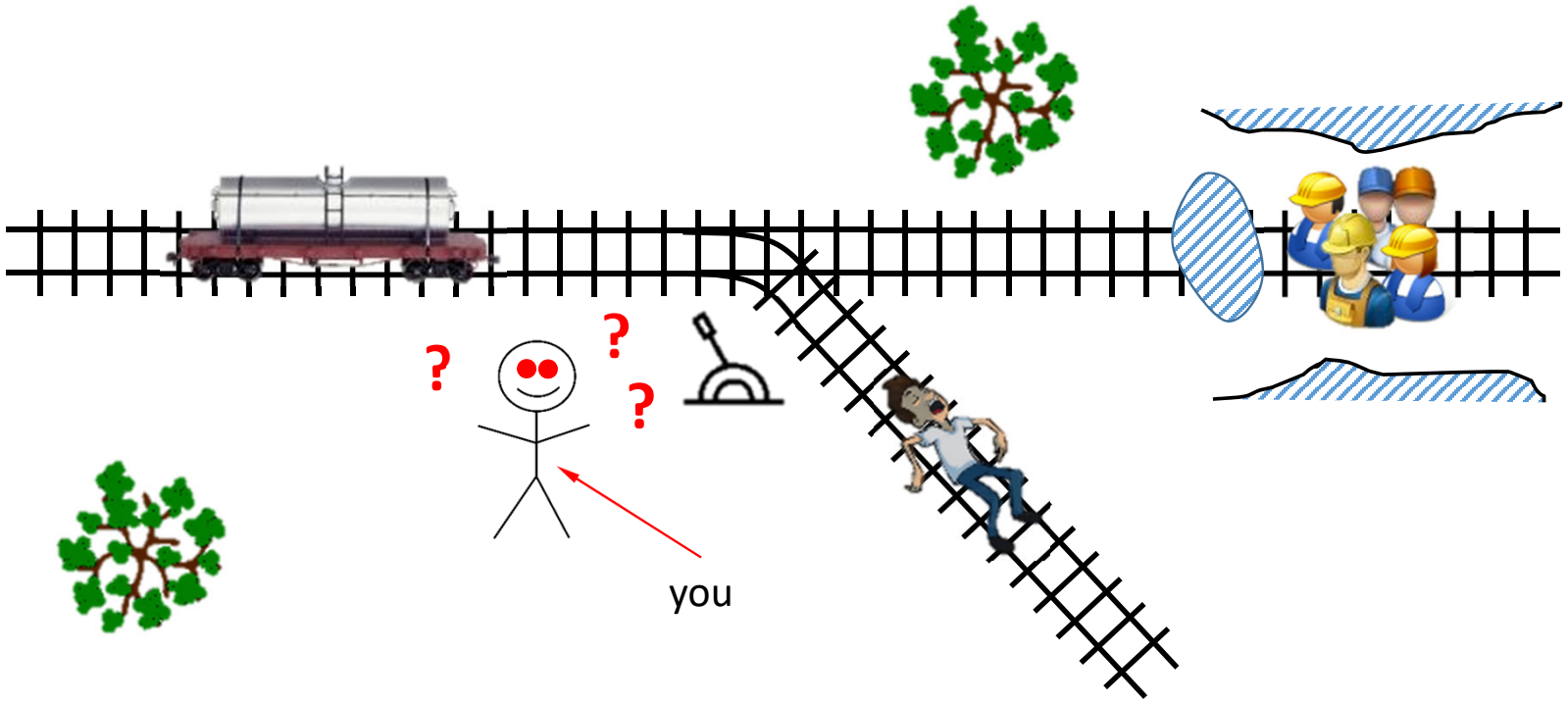
Purpose: to enable an understanding of professional ethics

- Examples of moral dilemmas – two alternatives, neither preferable
- Ethical norms – guides for what to do when confronted with a dilemma
- Professional ethics:
  - origin of and rationale for a code of ethics
  - relationships and conflicts between ethics, the law, professional ethics, your employer, and your personal morality or ethics
  - a few examples

Notes related to some of the content are posted on the course website.

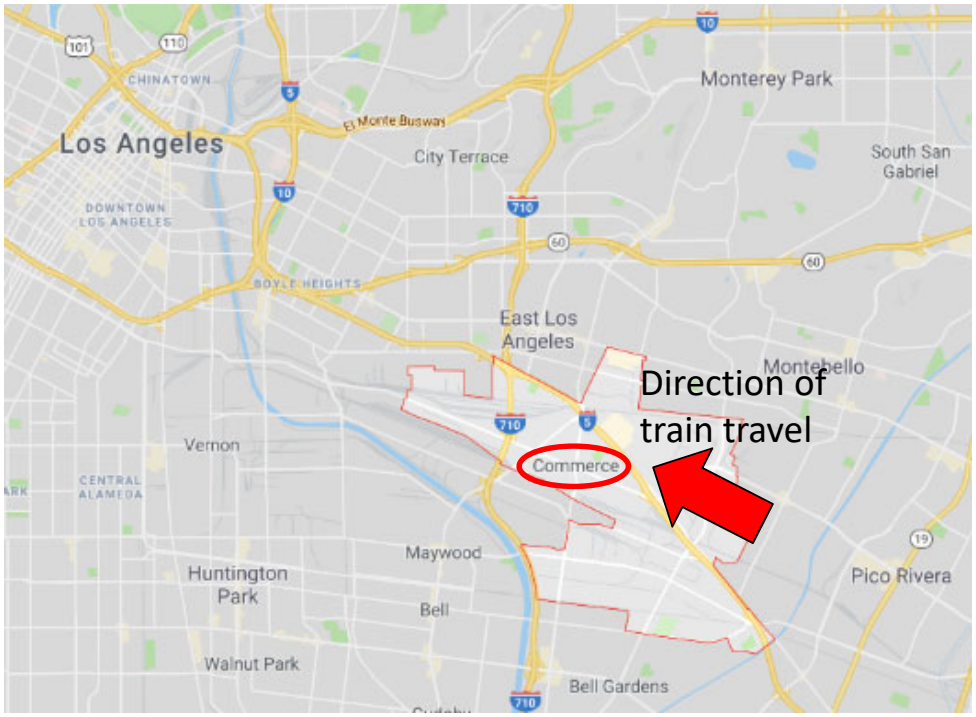
Trolley problems
(hypothetical moral dilemmas)

The Bystander scenario



You are walking by a railway track and notice a tank car full of propane heading toward five workers who cannot escape an inevitable explosion.
A man is sleeping on the siding.
Would you pull the lever and divert the tank car to the siding?

July 20, 2003, 11:58 am Commerce, Ca



Thirty-one freight train cars carrying mostly lumber broke loose during a switching operation and rolled 27 miles (43 km) before railroad officials switched the cars to a side track in Commerce.

Twenty-eight of the cars derailed, crashing into three homes and injuring 13 people. NO DEATHS!

Over a 20 minute period the runaway cars went through 25 highway rail crossings and reached estimated speeds of 95 mph (153 kph)

Sources: CNN.com, NTSB accident report NTSB/RAB-04/03

13 minor injuries, ruptured gas lines, $2.4M in damage

Source: http://www.geo-tech-imagery.com/unionpacific.html

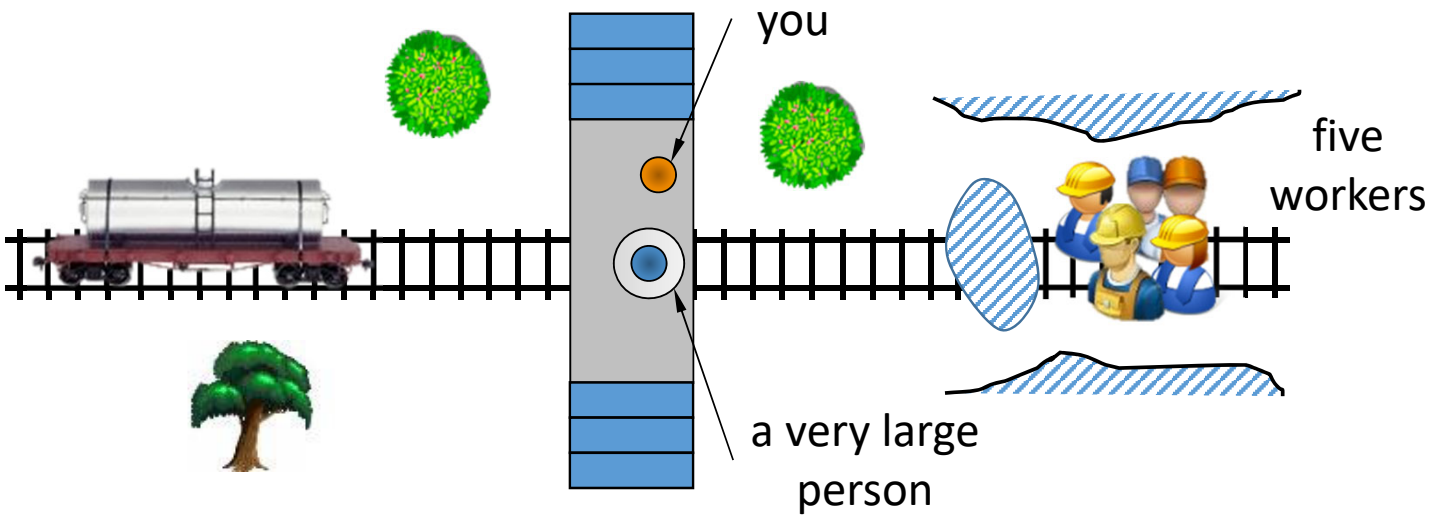
Statements from Union Pacific spokesperson

"UP knew the maneuver was likely to cause a derailment, but it would have been *more dangerous* to allow the train to continue moving into central Los Angeles."

"... they did this [because] the train was headed to the *more populated area* of Los Angeles, where there are possibly commuter trains and more population."

Note the uncertainty – terms such as "likely" and "possibly"
Uncertainty makes ethical decision-making very complicated
The decision is between a "bad" situation and a "less bad" situation – typical characteristic of an ethical dilemma

The Footbridge scenario



You are on a footbridge over a railway track. A tank car full of propane is heading toward five workers who cannot escape an inevitable explosion.
Next to you is a very large person.
Would you push the large person off the footbridge to derail the train?

A Footbridge-like dilemma for you

You discover that a work colleague (and a close friend) has managed to embezzle a large sum of money from the company. He has denied it but you have enough evidence to know he is lying.

If you report him, he will be fired, possibly go to jail, and his life and job prospects will be ruined. If you don't report him, the embezzlement will likely continue, the company could go bankrupt, and you will be out of a job.

How would you handle such a situation?

Analogies:
Large person ↔ your friend
Five workers ↔ your company

Based on a real situation

Some ethical norms
What should one do?

What about the Golden rule?

Do to others as you would have them do to you

Jesus Christ
Matthew 7:12, Luke 6:31

Basically: Treat others as you want to be treated*

Maybe this is all we need to be good people as well as good professionals!

*Would you want to be pushed off a bridge?

The Golden Rule is a universal concept in many religions

- **Buddhism:** "...a state that is not pleasing or delightful to me, how could I inflict that upon another?" *Samyutta NIkaya* v. 353
- **Islam:** "None of you [truly] believes until he wishes for his brother what he wishes for himself." Number 13 of Imam "*Al-Nawawi's Forty Hadiths*."
- **Judaism:** "What is hateful to you, do not to your fellow man. This is the law: all the rest is commentary." *Talmud, Shabbat* 31a.
- **Yoruba people:** (Nigeria): "One going to take a pointed stick to pinch a baby bird should first try it on himself to feel how it hurts."

And it's a great idea but …

the Golden Rule does not tell us <u>what</u> to do; it is a *consistency principle*

See *The Not So Golden Rule* on the course website

An ethical norm can help decide what to do

There are many ethical norms – here's two

RESULTS  **RULES**

Results of actions are used to make choices

Rules are applied to make choices

Take your pick but be careful.
These two norms can lead to quite different results.

Act Utilitarianism

Actions that would produce the greatest benefit (or utility, or happiness) for the greatest number of people are morally correct

Jeremy Bentham
1748-1832

"Hedonic calculus":
An algorithm to estimate the amount of happiness in an action

Each action in a set of actions is considered individually

But there are a few problems

How do you measure benefits?

What actions or practices should be considered?
Are actions independent?
What if results are uncertain?

How big a group is “the greatest number of people”?

Benefits may come at the expense of the rights of individuals.
Therefore injustice is possible.

A benefit or harm to any one individual matters just as much as the same benefit or harm to any other individual.

As illustrated by its application to the pandemic

Ethicists double down on utilitarian framework for pandemics

by Xavier Symons | 31 May 2020 |

Utilitarian ethics seems to be the most practical way to deal with medical decision-making and public policy during the pandemic.

However, it requires some care in its application.

This article is available on the course website

Rule-based ethics

Selection of moral actions must be based on rules

Immanuel Kant
1724-1804

For example

“Never lie”

No exceptions, even if lying would protect someone from harm

Kant's categorical imperative

A categorical imperative is a rule that is binding on everyone in all situations.

Categorical imperatives are derived from *pure reason*, independent of the consequences of applying the rule.

The question:

Is it rational for a rule to apply to everyone, to be universal?

The test:

If everyone acted the same way, what would be the result?

“Lie if it benefits you”

Is this a rational and universal rule?

If everyone obeyed this rule, it would be standard practice to lie and therefore no one would believe anyone, including you.
Thus the possibility that you can benefit by lying would not exist.

OR

The rule would result in a world in which truth does not exist but the rule requires truth for lying to occur.

The rule is not rational and cannot be universal.
(See the notes on the course website for more examples.)

Rules can conflict

Two rational and universal rules:

"Always tell the truth"

"Do not harm people"

What if telling the truth will harm someone?

Either

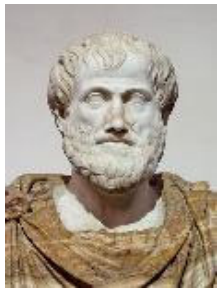
one of these rules is not rational and universal or,

rule violation is possible if one accepts that others may do the same at any time under the same circumstances

Virtue ethics – a different kind of norm

Actions are guided by a set of virtues, not principles or rules
What would a virtuous person do?

Examples of virtues are
Courage, Honesty, Generosity, Kindness, Self-control
Acquired by practice and experience



Aristotle
384–322 BC

Confucius
551–479 BC

Old ideas, but they have been applied to many current situations in politics, business, and environmental management

Virtue ethics in the workplace

Honesty:

Always “tell it like it is” to co-workers and clients

Generosity:

Offer help to others whenever possible

Be a team player or leader

Kindness:

Treat people with respect, listen to their opinions, accept them as they are

No gossiping!

Ethics becomes what you do.

What you do is not based on consequences or rules.

Nature of ethical issues

- Often a choice between “right and right” – a dilemma
  - Either choice results in a loss. Which loss is important?
- Choice within a discrete set or a continuous range of alternatives
- Unstructured, at least initially
- Uncertainty usually present
- Involve human emotions and human foibles

May seem unfamiliar and intimidating but engineering itself is often like this

We can be either Utilitarian or Kantian

The Bystander scenario (moral-impersonal) induces Utilitarian thinking:

Most people agree with kill one to save five

The Footbridge scenario (moral-personal) leads to rule-based thinking:

Do not harm people!

Interesting factoid:

Different parts of the brain become active when confronted with these two types of dilemmas. See the notes on the course website.

Morals vs ethics

The terms morals (or morality) and ethics are often used interchangeably.

But we will make a distinction:

One's morals (or personal morality) are his/her own sense of what is right and what is wrong. This may be based on culture, religion, or upbringing.

Ethics are standards of right and wrong, good and bad, that are devised, and perhaps imposed, by an outside party such as a society or a profession.

This means that if ethical standards are to apply to all members of the group, they must be devised without consideration of culture, religion or upbringing.

For example …

Trolley problems are moral dilemmas because they involve causing someone to die, an act that raises many social, cultural, and religious issues.

Euthanasia (assisted dying) also raises religious and social issues. One person could say that the practice of euthanasia is immoral while another could say it is the best alternative if someone is terminally ill.

Ethical norms and moral norms are different (search “moral norms”).

Not giving credit for a colleague’s work or, worse, acting and speaking as if the work was your own are considered unethical by any professional standard. These acts are not called immoral.

Professional Ethics

Professional ethics – a very specific ethical norm

Standards, or codes of ethics, used to guide the conduct of professionals at all times, but especially *when practicing the profession*.

Established by professionals to achieve a common goal or ideal

Origin and rationale

Society places trust in the professions, including engineering, but does not have the time or resources to understand and monitor the way professionals provide their services. That is left up to the professionals.

Professionals devise a code of ethics to communicate to society, and to other members of the profession, how they will serve society.

The goals of three professions

EGBC Code of Ethics, Principle 1:

Hold paramount the *safety, health and welfare of the public*, the *protection of the environment* and the promotion of health and safety within the workplace.

BC College of Social Workers Code of Ethics, Principle 1:

A social worker shall maintain the *best interest of the client* as the primary professional obligation.

Canadian Medical Association Code of Ethics and Professionalism

Doctors must commit to the *well-being of the patient*; *always act to benefit the patient and promote the good of the patient*.

The essential aspect of a profession is a commitment to:

place the needs of the public or client first before your own

Common ethical issues for engineers

- Public welfare, health and safety
- Fairness to other engineers
- Duties to employers and clients
  - Confidentiality
  - Conflicts of interest
- Fair compensation
- Whistle-blowing
- Bribery and fraud

Thankfully usually not life and death

Macro-ethical issues for engineers

Should you use your skills to design these things?

- Large footprint projects:
  - dams, mines and other industrial projects, civil infrastructure
- Nuclear weapons systems, smart weapons
- The Internet: great tool but …
  - forum for perverts, pedophiles, pornographers, and terrorists
  - search algorithms can be used to create unwanted links between users and provide possibly questionable profile data of individuals and groups
  - social media can be used to influence opinions
- Complex systems with emergent properties that cannot be predicted
  - digital control or AI systems, fossil fuel systems, aquifer use, gradual encroachment on ecosystems by infrastructure
  - decisions made by autonomous vehicles

Engineering codes of ethics cannot provide guidance

Engineering design is utilitarian, but ethics is rule-based

The design process follows distinctly utilitarian thinking – find the best solution among a number of alternatives, for example.

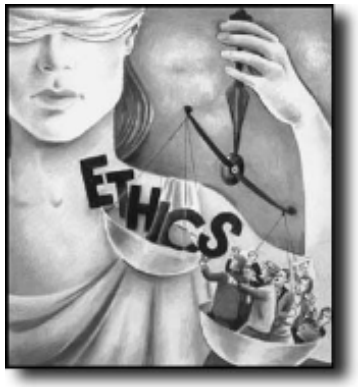
- Balance cost and technical criteria to select the best material
- Limit bandwidth to reduce noise but at the expense of signal
- Metal recovery versus metal concentration in mineral processing

But engineering codes of ethics have a distinct rule-based flavor.

For example: EGBC code of ethics … registrants must:

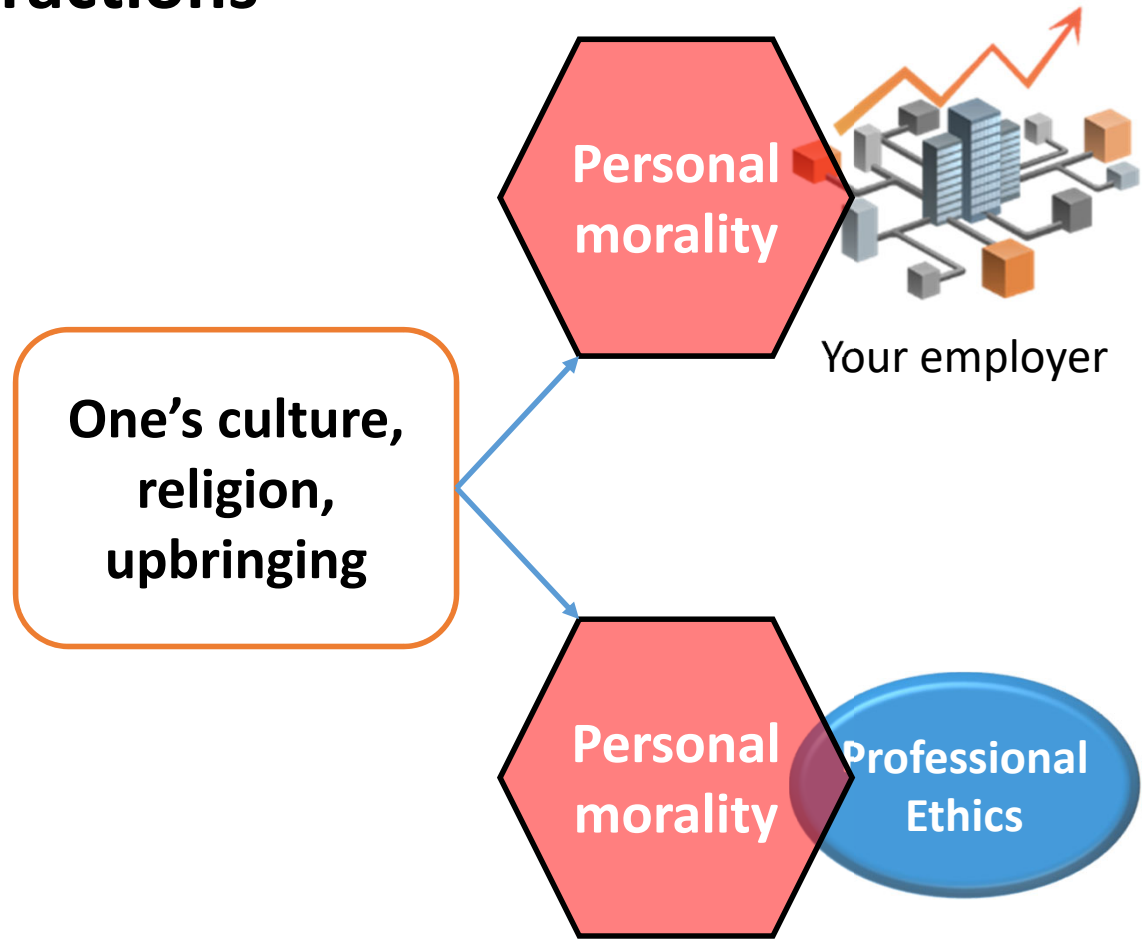
- (P2) practice only in those fields where training and ability make the registrant professionally competent
- (P10) present clearly to employers and clients the possible consequences if professional decisions or judgments are overruled or disregarded

Personal morality interactions



Ethics is indifferent to context

The law is always there



(Employer & Professional ethics)🡐🡒Personal morality

Paul Cottle resigns from MDA

Paul Cottle, an engineer who had helped develop satellite technology for MacDonald Dettwiler and Associates (MDA), resigned from his job of three years after MDA announced it had been sold to Alliant Techsystems (ATK).

"I do not want to work for a company like ATK that manufactures weapons that kill civilians and soldiers indiscriminately"

(See article on course website)

What is it? The first decision or choice

Personal morality issue

Professional ethics

Legal issue

A non-issue

This could be a legal issue

You discover that a work colleague (and a close friend) has managed to embezzle a large sum of money from the company. He has denied it but you have enough evidence to know he is lying.

If you report him, he will be fired, possibly go to jail, and his life and job prospects will be ruined. If you don't report him, the embezzlement will likely continue, the company could go bankrupt, and you will be out of a job.

How would you handle such a situation?

Too many job interviews

You live in Vancouver and are invited to two job interviews, one in Toronto, the other in nearby Burlington. The interviews are two days apart. Both companies allow you to claim expenses for the trip but each will want the original receipts.

You have no idea whether either company will hire you, but claiming expenses from one company and not the other seems unfair.

What should you do and why?

Hmmm…

You are a registered electrical engineer. An unregistered but qualified electrical engineer offers you a fee to review her design of the power supply system of a private hospital and to seal the plans once you have reviewed them.

What should you do?

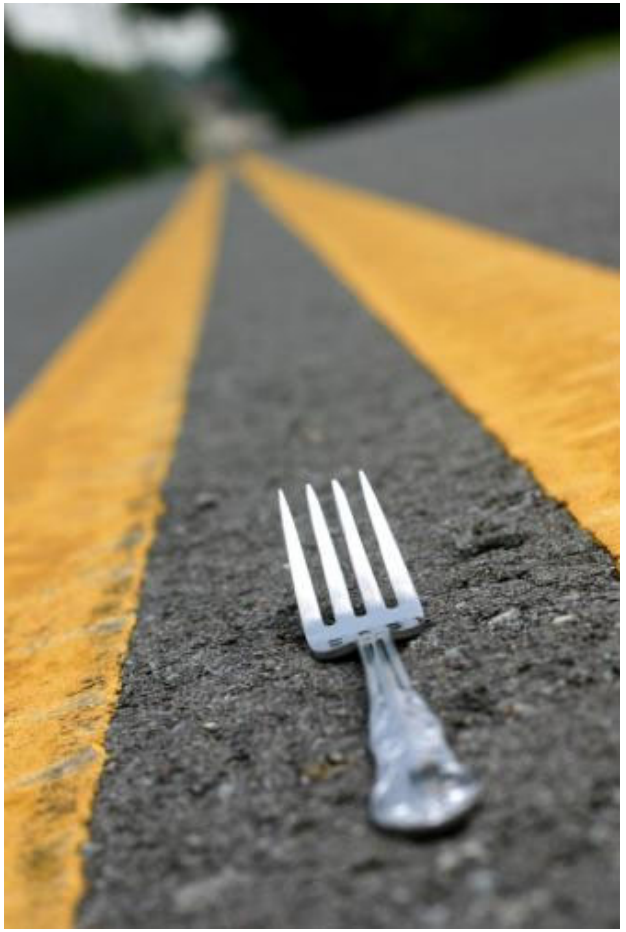
Committee work

Your company manufactures specialized machinery. You have been asked to sit on a committee that sets performance and safety specifications for this type of machinery. Other members of the committee include manufacturers and users of the machinery.

Should any representative of a manufacturer work on this committee?

In summary

Ethics is useful and provides a real-world perspective on decision-making. It also guides interaction with the society a professional has agreed to serve.



If you come to a fork
in the road …
Take it!

Yogi Berra

APSC 450
Professional Engineering Practice

Notes on Conflicts of Interest 2021

These notes refer to particular slides in the presentation entitled "*Conflicts of Interest*"

Slide 2

A more precise definition of a conflict of interest:

A conflict of interest is a situation in which some person P (an individual or corporate body) stands in a certain relation to one or more decisions. P has a conflict of interest if, and only if,

1. P is in a relationship with another requiring P to exercise judgment in the other's behalf, and
2. P has a (special) interest tending to interfere with the proper exercise of judgment in that relationship.

The kind of exercise of judgment required for a conflict of interest must involve P's having considerable latitude and discretion in acting on behalf of the other party. The kind of "interest" that satisfies condition 2 is any influence, loyalty, concern, emotion, or other feature of a situation tending to make P's judgment less reliable than it would normally be.

Source: Davis M and Stark A, 2001. *Conflict of Interest in the Professions*. Oxford University Press

Slide 4

Canadian courts have developed a basic test for determining whether fiduciary obligations arise from a relationship: first, the fiduciary has the ability to exercise some discretion or power; second, the fiduciary can unilaterally exercise that power to affect the interests of the beneficiary; third, the beneficiary is in a position of vulnerability at the hands of the fiduciary.

Usually the obligations of an engineer are not fiduciary.

Slides 11 and 12

In slide 11 both A and B form joint ventures with C to bid on a project. Can costs and methods really be the same for both A and B? Suppose A wants to build the project in a different way. Then what? C must be impartial in such a situation and provide objective advice to both parties? This is difficult.

Slide 12 is a case where one company (EE) designs two different projects for two competing firms, X and Y. No proprietary information should leak from X to Y and vice versa.

The situation could become an actual CoI if EE accepts favorable treatment from either X or Y. For example, suppose the contract between X and EE provides financial incentives to EE to accelerate the design work in order that X can get to market faster. This could bias EE's judgment.

These two cases illustrate how difficult it can be to determine what kind of CoI you are dealing with. As stated before, the kind of CoI really doesn't matter because it's the perception that counts. In reality, no reasonable company in the position of A, B, C, X, Y, or EE would deliberately get involved in such situations.

Slide 15

It is interesting to compare how different professions deal with conflicts of interest. Generally, the professions are very concerned about the damaging effects of conflicts of interest and provide significant guidance on how to deal with them.

- See discussion of Principle 8 in Section 4.8.1 of the EGBC Guidelines to code of ethics: https://www.egbc.ca/getmedia/33d03861-5d04-43e9-b76b-ff57ba8b9bdb/EGBC-Guide-to-the-Code-of-Ethics-V2-0.pdf.aspx

- Guidelines for physicians and surgeons with examples of how CoIs arise in practice: https://www.cpsbc.ca/files/pdf/PSG-Conflict-of-Interest.pdf

- The code of ethics for social workers does not explicitly mention "conflict of interest", but see items 5 and 7 at this link:
  https://www.bcasw.org/about-bcasw/casw-code-of-ethics/
  See also the discussion of Value 4 at this link:
  https://www.casw-acts.ca/sites/default/files/attachements/casw_code_of_ethics.pdf

- The Law Society has lots to say about conflicts of interest:
  https://www.lawsociety.bc.ca/support-and-resources-for-lawyers/act-rules-and-code/code-of-professional-conduct-for-british-columbia/

Public sector versus private sector

The standards concerning conflicts of interest for people working in the public sector (e.g., government) are generally stricter than the standards in the private sector. In the private sector, an actual conflict of interest might be grounds for disciplinary action or dismissal. However, in the public service even an apparent conflict of interest can be grounds for disciplinary action. In Canada, at least one case in the Federal Court of Appeal supports this distinction. See explanation at this link.
https://www.canada.ca/en/treasury-board-secretariat/services/values-ethics/conflict-interest-post-employment/apparent-conflict-interest.html#a3

Note that Principle 8 of the EGBC Code of Ethics (and any similar principle in other jurisdictions) applies to any kind of conflict of interest regardless of the sector in which a registered engineer works.

Slides 17-20

The interactions between automatic and controlled processes have received much attention in psychology. These interactions are the reasons why conflicts of interest are so prevalent despite all efforts to prevent them.

The brain is divided into a limbic system that is responsible for emotions and a cognitive system responsible for thinking (or, more formally, cognition). The limbic system is where automatic processes occur and is responsible for fast reactions that aid survival. It's an ancient system sometimes called the "lizard brain". Brain scans done while subjects are confronted with problems and dilemmas have shown that these systems work together and therefore there is no such thing as emotion-free thinking. Thus, personal interests that provoke an emotional response will always interfere with thought processes needed to perform professional duties. The result: conflicts of interest are inevitable.

Paul Thagard of the University of Waterloo provided a very readable account of the psychology of conflicts of interest. It's an easy read - you don't have to be a psychologist or philosopher to understand it. The paper is available on the website.

Thagard P, 2007. The Moral Psychology of Conflicts of Interest: Insights from Affective Neuroscience. *Journal of Applied Philosophy*, 24(4).

See also
https://www.psychologytoday.com/ca/blog/hot-thought/201701/what-s-wrong-conflicts-interest

Slide 25

Experiments and evidence suggest that professionals who disclose a CoI

- will know their advice may be discounted and may therefore exaggerate or "speak louder"
- become less wary of self-interest and biases affecting their advice since they may feel disclosure gives them a "moral license" to say what they want and the client will understand

and that clients of professionals who disclose a CoI

- do not know what to do with disclosure
- may not understand the severity of the conflict
- do not discount advice as much as they should

The client may not have the ability to make a critical assessment of advice given by the conflicted professional. In fact, the client hired the professional for his/her expertise.

Source: Cain et al, 2005. The dirt on coming clean: perverse effects of disclosing conflicts of interest. *Journal of Legal Studies*, 34, 1-25

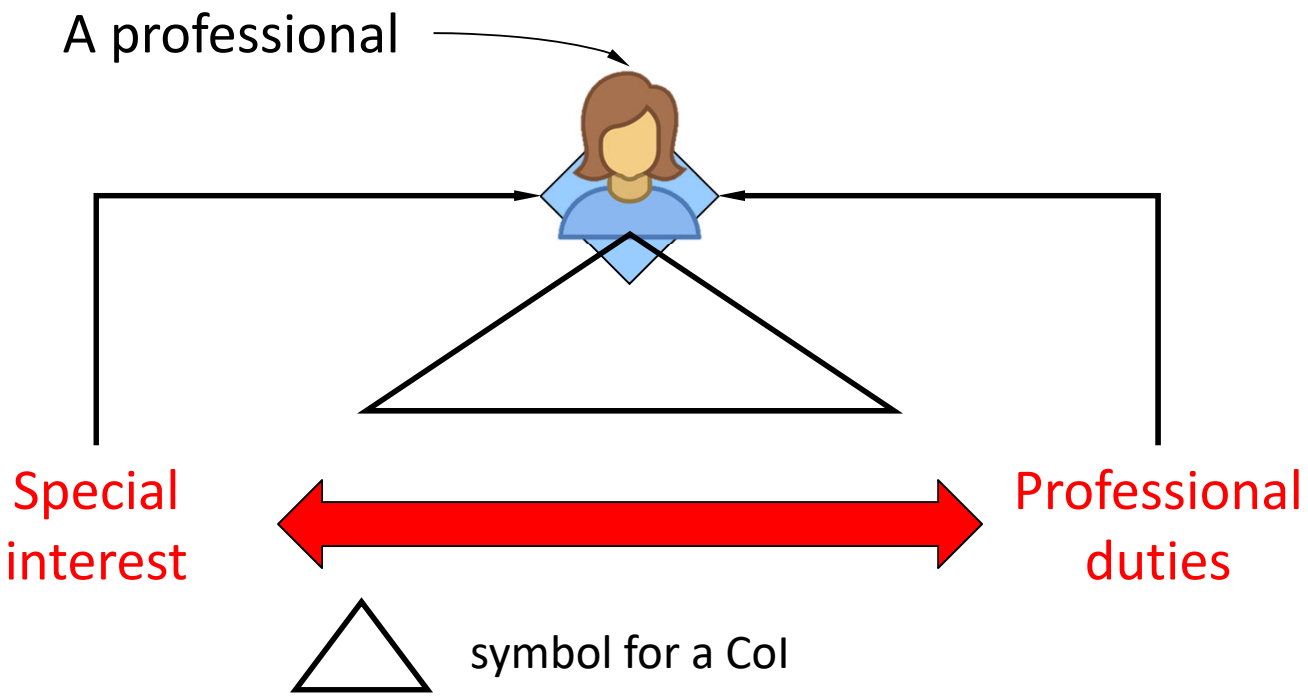
APPLIED SCIENCE 450
Professional Engineering Practice

Conflicts of Interest

W. Scott Dunbar, PhD, PEng

Conflict of Interest

A situation in which a professional has a special interest that influences the objective exercise of professional duties



The usual special interests

- Self-interest
  - job
  - career goals
  - financial
  - reputation
- Financial relationships with family or friends
- Loyalty to a group
- Emotional connection

Anything that renders a professional's judgement less reliable than it would be otherwise

Professional duties

- Duty of care and standard of care
- Maintain confidentiality
- Impartiality
  - e.g., in decisions, evaluations, and design choices
- Fiduciary duties
  - duty arising out of an obligation to act in best interest of someone or some group
- Third parties who may rely on or be affected by your advice or judgment
  - e.g., users of product sold by a distributor

It is important to avoid CoIs

Engineers are employed for their expertise and skill

Advice and judgment must be reliable – many may depend on it and trust the engineer to make unbiased decisions

The usual results of a CoI:

- Damage to reputation, career, future business
- Damage to work colleagues or company
- Damage to the profession
- Criminal and civil charges in some extreme cases

A conflict of interest is not ...

A conflicting interest:

Jane likes her engineering job, but also likes to play soccer and drink foamy brown fluids; she cannot decide which she wants to do.

Not a CoI even if professional obligations are involved

Conflicting legitimate obligations:

Emily designs widgets. She has an obligation to the public to make safe widgets, but she also has an obligation to her employer to ensure that the widgets are manufactured at the lowest possible cost.

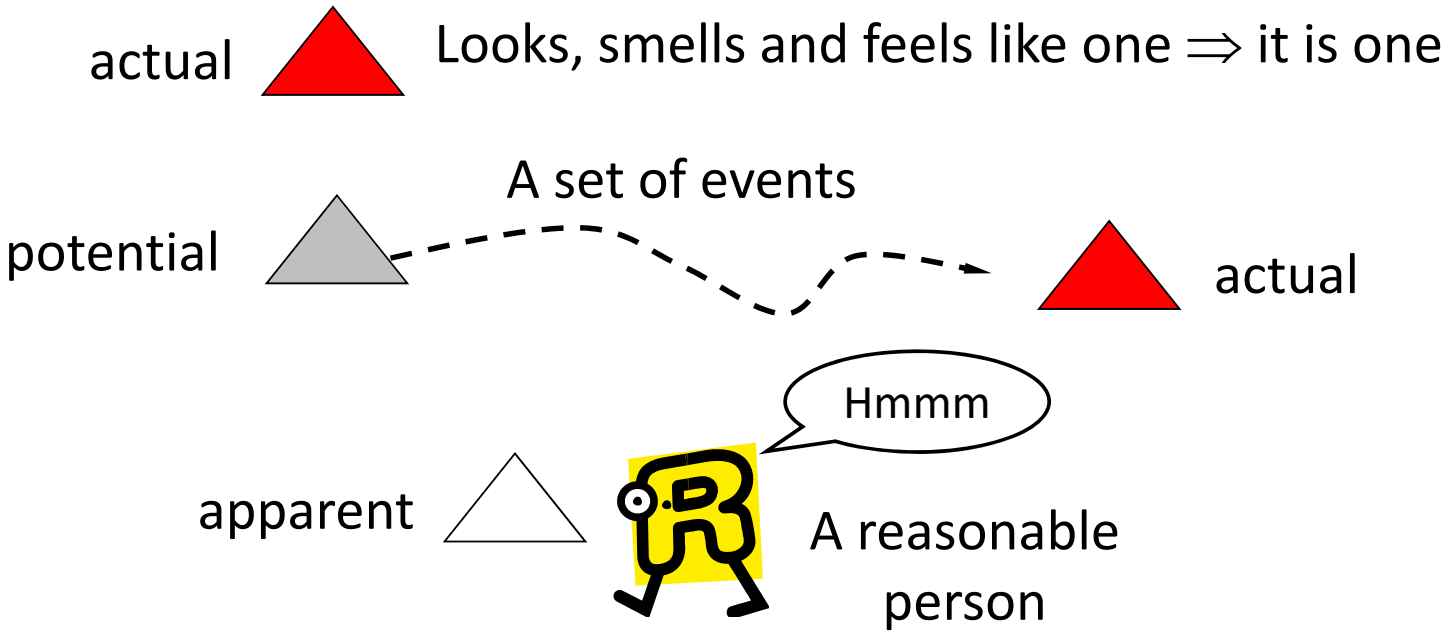
These obligations should not be in conflict

An ethical dilemma or conflict:

Honesty versus honesty causing harm or a conflict between professional duties and personal morality

This you have to sort out yourself: What's paramount to you?

Types of conflict of interest



What kind it is really doesn't matter,
they are all bad news.

COI: Scenario 1

John is an engineer working for JayCo. For the past 50 years, John's family has owned Bolts R Us, a company that makes bolts. JayCo needs to purchase 500,000 bolts for a large construction project. John recommends that JayCo purchase the bolts from Bolts R Us and because of this, John's shares in Bolts R Us increase by 15%.

Does John have a conflict of interest?

It would be difficult for John to argue that his recommendation was not affected by the possibility of a financial gain. This is an actual COI.

COI: Scenario 2

John is an engineer working for JayCo. For the past 50 years, his fiance's family has owned Bolts R Us, a company that makes bolts. JayCo needs to purchase 500,000 bolts for a large construction project. His fiance could gain financially (and so could John) if he recommends that JayCo purchase the bolts from Bolts R Us.

Does John have a conflict of interest?

Being in a personal relationship with his fiance means there already is a potential CoI. If John is not the person in JayCo who recommends bolts, at least an apparent CoI remains. Perception is reality.

COI: Scenario 3

John is an engineer working for JayCo. For the past 50 years, John's family has owned Bolts R Us, a company that makes bolts. Ten years ago, John had a fight with his family and has not spoken to them since. John owns no stock in the bolt company. JayCo needs to purchase 500,000 bolts for a large construction project.

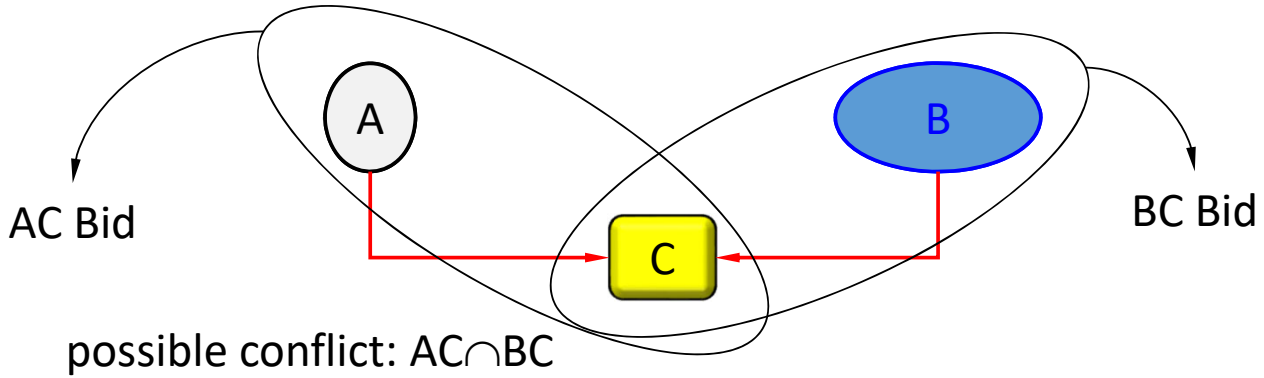
Does John have a conflict of interest?

More subtle, but the assumption is that John has forgotten all the bad feelings and would be objective about ordering bolts from his family's company. If not, … ? It's an apparent CoI.

What is this?

Companies A and B are competitors bidding on a project. Each forms a joint venture with Engineering Company C to prepare their bids.

Is C in a conflict of interest? If so, what kind?



Bit of potential and apparent CoI. If methods and costs are the same in both bids, then perhaps there is no problem. However, this is unlikely since A and B may want to build the project differently.

And this?

Engineering company EE is designing manufacturing plants for two companies X and Y that compete in the same market. The same people in EE will be working on both design projects.

What is this?

Again this is somewhere between an apparent and potential CoI but if X and Y knowingly engage EE to do the design, it is a conflicting legitimate obligation for EE. EE should not allow the same people to work on the two projects.

This is very common

Company M is asked to provide a feasibility study for an industrial project, including preliminary design, cost estimates, and economic analyses. If the feasibility study is favorable, M knows that it may be asked to bid on the final design and/or construction management.

What should M do?

M should take either the feasibility study or the possibility of bidding on the project, not both. Because M knows they will be asked to bid on the final design, they may be inclined to favorably bias the feasibility study, or at least there may be a perception that they will be biased. Such perceptions are not good.

Sometimes these situations are unavoidable because the available talent and experience is limited to a few companies.

What EGBC says about CoIs

EGBC Code of Ethics, Principle 8:

[… registrants must:]

avoid situations and circumstances in which there is a real or perceived conflict of interest and ensure conflicts of interest, including perceived conflicts of interest, are properly disclosed and necessary measures are taken so a conflict of interest does not bias decisions or recommendations;

What other professions say about CoIs

College of Physicians and Surgeons of British Columbia :

Physicians are expected to take steps to manage and avoid situations where a conflict of interest might occur and, in the event that a conflict of interest arises, disclose this to the patient.

BC Association of Social Workers (Principle 7):

A social worker who engages in another profession, occupation, affiliation or calling shall not allow these outside interests to affect the social work relationship with the client professional judgment, independence and/or competence.

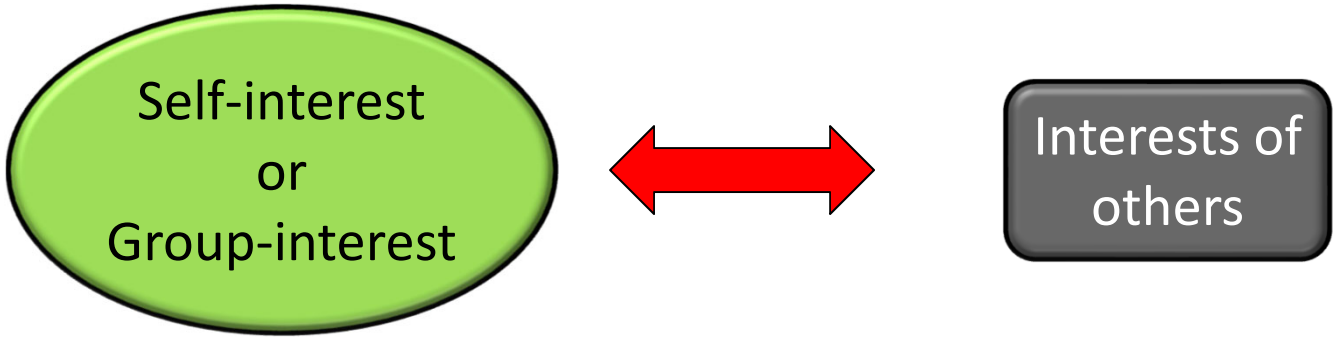
Law Society of British Columbia

has lots to say about COIs.

See links in notes

Why do CoIs happen?

Fundamentally it's the battle between



Let's look at self-interest

Sources of self-interest

Automatic mental processes that lead to latent biases:

- Inflated self-perception
- implicit prejudice
- favoritism of group

Actually very pervasive, but often dismissed
(can't possibly apply to me)

Automatic processing is done unconsciously

Origins are primal, the primitive "lizard brain" dealt only with survival, a useful self-interest

Automatic and Controlled Mental Processes

Automatic Processes	Controlled Processes
Fast (parallel processing)	Slow (serial processing)
Effortless	Effortful
Involuntary	Voluntary
Not accessible to introspection	Accessible to introspection

Vision is an automatic process. It is impossible to choose not to see if your eyes are open.

Often difficult to explain the processes by which your feelings about yourself, someone else or something arose.

The problem with automatic processing

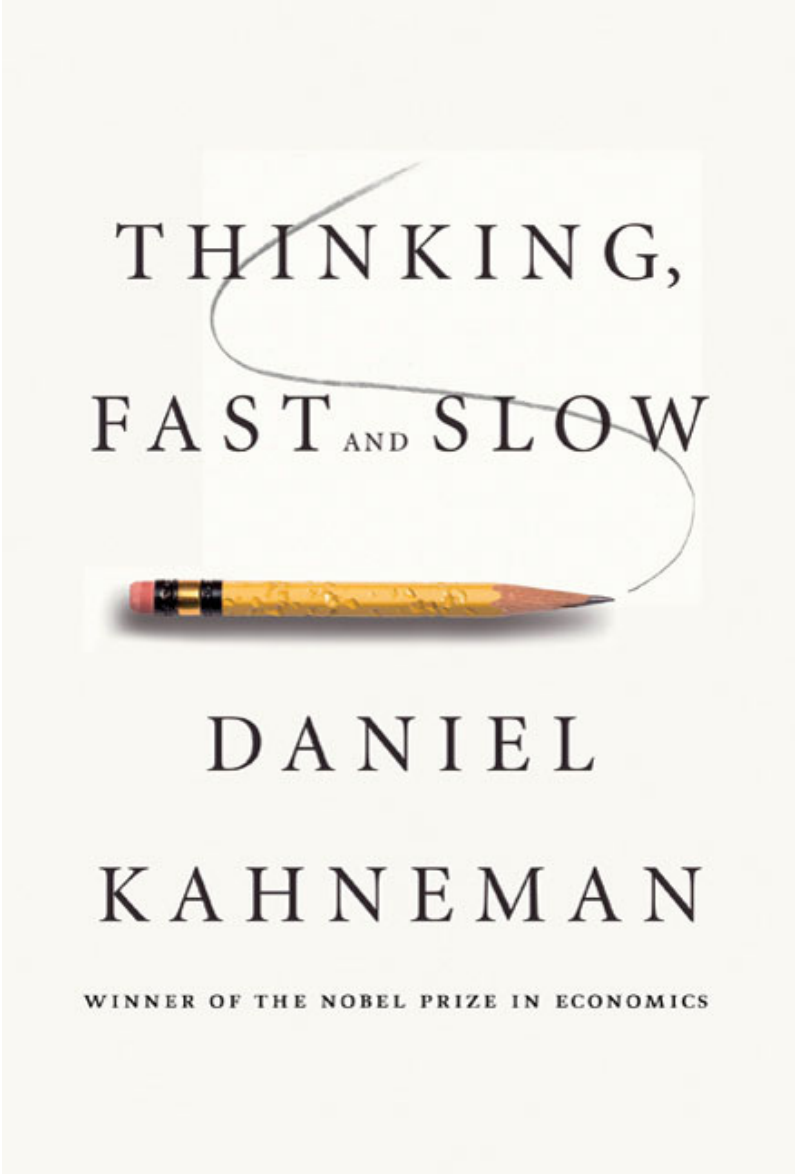
Automatic processing done unconsciously

its influence on decision-making is difficult to eliminate or correct and so …

self-interest often prevails even if conscious effort is made to be ethical and professional

$\Rightarrow$ Conflicts of interest are inevitable

Very readable discussion of the way automatic processes help us survive, but also cause us to make incorrect decisions.



The effect of latent biases

Age

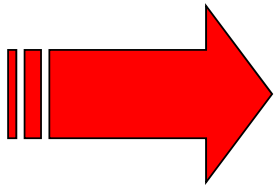
Gender

Race

Sexuality

Nationality

Weight



Automatic feelings

Try the Implicit Association test

https://implicit.harvard.edu/implicit/langchoice/canada.html

Latent biases are everywhere

- Criminological studies focus on street crime and delinquency
  - Result is racist and classist stereotypes
- Windows vs Android vs Linux vs MacOS/iOS :
  - Bias to Windows is (was?) because of market domination
- North American engineers are more free-thinking and flexible than engineers from other countries
  - Demonstrably false
- Well dressed, articulate – must be a nice person
  - Lots of counter-examples

This is very common – again

Company M is asked to provide a feasibility study for an industrial project, including preliminary design, cost estimates, and economic analyses. If the feasibility study is favorable, M knows that it may be asked to bid on the final design and/or construction management.

What should M do?

Feasibility studies are expensive so that the owner would only spend the money if there was a good chance the project was indeed feasible. If this is the perception before the study begins, how can the owner be sure that M is not influenced by this perception which might lead to biases that favor feasibility?

So if you see a CoI coming …

- Try to avoid it
- Is it manageable? Are there independent checks and balances that would avoid biases?
- Disclose it to all concerned
  - EGBC code of ethics, Principle 8
- Recuse – disqualify yourself from any decisions

What about disclosure?

It is assumed that with disclosure

- The professional is free of latent bias or the effects of self-interest
- The client will understand the CoI and be able to discriminate biased from unbiased advice

But

- Is the effect of the CoI on a professional's judgment any less as a result of disclosure?
- Does the client really have the ability to discriminate biased from unbiased advice?

This again but with disclosure

Engineering company EE is designing manufacturing plants for two companies X and Y that compete in the same market. EE informs X and Y that the same people will be working on both design projects.

What is this?

Even if EE discloses the situation and it is accepted by X and Y, can X and Y be sure there will be no effect on design decisions or choices made for either manufacturing plant?

EE should have different people working on each project.

Vigilance needed

Especially in a consulting engineering company

- Maintain records of details of previous contracts so that potential conflicts with new work being considered can be identified
- Past employment history of professionals on staff. For example, did they work for a competitor of a potential client?
- Professional staff may need training to understand and recognize a CoI and what to do about it?

Summary

- Conflicts of interest should be avoided
  - actual, potential, and apparent – all bad
  - sometimes hard to recognize

- Conflicts of interest are inevitable due to
  - automatic mental processes
  - latent biases

- Disclosure of a COI does not eliminate or mitigate it
  - Becomes even more difficult for the professional to be perceived as objective
  - The client is still unable to distinguish biased and unbiased advice

Here's a question

Subject to legislated restrictions, lawyers are allowed to charge contingency fees in personal injury cases. This means that their fees for legal work are related to the amount of the damages award (e.g., a percentage).

Should engineers be allowed to charge contingency fees? For example, should the fee be related to the benefits of the engineer's work to the client?

PROFESSIONAL ENGINEERING AND EGBC

Presentation to: APSC 450

Dr. Michael Isaacson, P.Eng.
Professor of Civil Engineering

September 2019

Coverage

1. Introduction
2. Professionalism & the Roles of Professional Engineers
3. Professional Engineering
4. EGBC
5. The Iron Ring

1. Introduction

Elliot Lake Mall Roof Collapse

Case study at the heart of describing an engineer's professional responsibilities! What are a few key words that are conveyed by the video clip?

- Human tragedy
- (Inadequate attention to) public safety
- Unprofessional conduct
- Emergency response also critical
- Continual improvement

Elliot Lake Mall Roof Collapse

- In June 2012, mall roof collapsed killing 2 people and injuring 19
- In July 2012, Ontario government established an independent public inquiry with Commissioner Belanger (– the inquiry cost some $20 million)
- Final report was released in October 2014

Elliot Lake Mall Roof Collapse

- Inspecting engineer had earlier claimed building was “structurally sound”; at owner's request (to ease a refinancing application), he changed report after sign-off, removing photographs and references to "ongoing" leakage
- Commissioner stated that some of the engineers forgot the “moral and ethical foundation” of their vocation, and were more concerned with pandering to clients than protecting the public
- The report made 71 recommendations re. maintenance, inspections and emergency response capability
- The engineer's trial ran from September 2016 − June 2017: insufficient evidence to support criminal negligence beyond a reasonable doubt

2. Professionalism & the Roles of Engineers

What is Professionalism?

- Dictionaries state: "*The conduct, aims or qualities that characterize a professional person*"; *"set of **attitudes** and **behaviours** believed to be appropriate to a particular occupation"*
- The EGBC Code of Ethics states: "*Members and licensees shall act at all times with fairness, courtesy and good faith to their associates, employers, employees and clients, and with fidelity to the public needs. They shall uphold the values of truth, honesty and trustworthiness and safeguard human life and welfare and the environment*."

What is Professionalism?

As indicated, professionalism is comprised of ***attitudes*** and ***behaviours***. Behaviours may relate to:

- Honesty, integrity, trustworthiness
- Respectfulness – courtesy, also deportment, punctuality, reliability, maintains confidentiality
- Fairness – fair treatment of all; good faith
- Specialized knowledge
- Knowing ones limitations
- Competence
- Continual improvement – lifelong learning
- Open-mindedness
- Excellence - exceeding expectations
- Efficiency and time management
- Accountability – responsible for ones actions
- Altruism (selfless concern for the well-being of others)
- ...

What is Professionalism?

- Some companies have adopted a *Code of Conduct* that may relate to these and/or additional aspects of professional behaviour
- These may relate, for example, to: competency; conflict of interest; perception of conflict of interest; confidentiality; use of company documentation; respect for privacy; environmental responsibility; cultural sensitivity; equity; discrimination; harassment; occupational health and safety; alcohol and drug use; …

Roles & Responsibilities of Engineers

Generally:

- Demonstrating professionalism
- Adhering to the EGBC Code of Ethics

Specifically:

- Protection of the Public
- Serving the Public Interest

These usually refer to public safety, but may also relate to the economy and the environment

Roles & Responsibilities of Engineers

- **Protection of the Public**
  - EGBC Code of Ethics states: "*Hold paramount the safety, health and welfare of the public, the protection of the environment and promote health and safety within the workplace*"
  - Minimizing the risk of failure impacting public safety with respect to design, construction and operation of facilities
  - Minimizing the negative impacts on public safety that arises from a failure

Roles & Responsibilities of Engineers

- **Serving the Public Interest***
  - **EGBC** Code of Ethics: "*Hold paramount the ... welfare of the public ...*"; "*Members ... shall act at all times ... with fidelity to the public needs*"
  - Reduction of negative societal, economic and environmental impacts, even when these imply reduced private profits
- *** Note. Public interest** − benefit to the general public (vs. "selfish" interest of an individual, group or company) − assessed by comparing net benefits and costs to the public of a decision, program or project

Roles & Responsibilities of Engineers

Other roles and responsibilities

- Professional engineers may taken on other roles and responsibilities, not specifically identified in the Code of Ethics
- Examples include entrepreneurship, profit-making, volunteerism, ...
- However, these may still be impacted by the Code of Ethics and codes of conduct

Roles & Responsibilities of Engineers

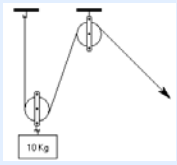
Competing Stakeholders Interests

- A key dilemma arising in many civil engineering projects relates to competing stakeholder interests
- Examples include:
  - "NIMBY" (not in my back yard)
  - Economic development versus increased levels environmental protection
- The role of the engineer is often to provide informed options for the consideration of decision-makers, backed by a sound rationale

3. Professional Engineering

Pre-Engineering in Ancient Times

- Early building blocks



- Major early structures

- In Canada and BC, many activities of First Nations communities

Origins of Professional Engineering

- But professional engineering is more than building a structure; it also involves also acquiring and applying scientific, mathematical, economic, social, and practical knowledge in order to design, construct, ...
- Three additional ingredients were needed for engineering to develop fully as a profession:
  1. The Printing Press
  2. The Industrial Revolution
  3. Organization and Regulation

Origins of Professional Engineering 2

1. **The Printing Press**: around 1400; major impact on the development and spread of knowledge, ideas, science
2. **The Industrial Revolution**: 1750 – 1850; major advances in areas such as textiles, metallurgy, mining, chemicals, agricultural machinery, transportation – canals, roads, railways, ...
3. **Organization and Regulation**. In the UK:

   1771: Society of Civil Engineers (social / technical)

   1818: Institution of Civil Engineers (all disciplines)

   1890's: introduction of exams for professional engineering qualifications

Origins of Professional Engineering in Canada

- Corresponding developments, a little later, in Canada
- Early focus on transportation (railways, roads) and resource development (mining, forestry)
- 1800's: explorers, the gold rush, mining, road and rail construction
- Organization and Regulation:

1887:	Canadian Society of Civil Engineers formed (all disciplines)
1918:	Name changed to Engineering Institute of Canada (EIC)
1920's:	provincial associations (PEO, APEGGA, EGBC, OIQ, ... or forerunners), along with provincial acts regulating engineering
1970's:	EIC's divisions spun off to technical societies ... CSCE, CSME, CGS, ...

Regulation of Engineering in Canada

Background

- The engineering profession is regulated by various jurisdictions worldwide to protect the safety, well-being and interest of the public
- Licensure provides the title "Professional Engineer" (P.Eng.) or equivalent, and grants the right to practice professional engineering
- The P.Eng. title can only be used by licensed engineers; it grants the authority to take legal responsibility for engineering work
- The practice of engineering is protected in law and enforced in all provinces

Regulation of Engineering in Canada

Origins in Canada

- 1920's: provincial associations formed (PEO, APEGGA, EGBC, OIQ, ... or forerunners), along with provincial acts regulating engineering

Origins in BC

- In 1920, Province passed the *Engineering Profession's Act*, associated with the founding of the *Association of Professional Engineers of BC*
- [N.B. Engineering education in BC started with UBC's founding in 1915]
- In 1990, geoscience was included, resulting in a name change and a revised act entitled the *Engineers and Geoscientists Act*

Regulation of Engineering in Canada

Role of EGBC

- Under provincial law, *Engineers & Geoscientists British Columbia (EGBC)* – regulates engineering practice in BC
- Specifically, EGBC is authorized under the Province's *Engineers and Geoscientists Act* to uphold and protect the public interest with respect to engineering – by licensing all individuals who practice professional engineering in BC and by regulating the engineering profession in BC
- EGBC also has some non-regulatory roles

Regulation of Engineering in Canada

The Concept of Self-Regulation

- ***Self-regulation*** refers to the regulation of a profession, in conformance with the relevant Act, by a body comprised of the members themselves
- In BC, the engineering profession is self-regulated through EGBC on the basis of powers provided to it through the *Engineers & Geoscientists Act*
- An alternative model is direct regulation by government though a government ministry, department or body
- Sometimes self-regulation may be curtailed or withdrawn, e.g.:
  - Teachers in BC
  - Engineers in Quebec
  - Recent reduction in degree of self-regulation of engineers in BC

Regulation of Engineering in Canada

National Roles

- EGBC and other provincial and territorial associations are constituent members of *Engineers Canada*
- *Engineers Canada* includes the *Canadian Engineering Accreditation Board (CEAB)* and the *Canadian Engineering Qualifications Board* (CEQB); it is also engaged in advocacy and promotion and in the development of national policies, positions and guidelines
  - CEAB is responsible for accreditation of engineering programs across Canada
  - CEQB is responsible for developing national guidelines for professional engineering qualifications, standards of practice, ethics and professional conduct

Regulation of Engineering in Canada

Engineering Accreditation

- CEAB accredits engineering programs across Canada
- Graduates of accredited programs meet the academic requirements for the P.Eng.
- CEAB accredits by assessing conformance with criteria that relate to:
  - Graduate attributes (knowledge base, problem analysis, investigation, design, professionalism, …)
  - Students (admissions, promotion, counseling, …)
  - Curriculum content and quality (natural sciences, engineering design, laboratory experience, …)
  - Program environment (faculty members, leadership, financial resources, …)
  - …

4. EGBC*

Note:

- EGBC is the acronym for *Engineers & Geoscientists BC*
- Legal name is *Association of Professional Engineers and Geoscientists of British Columbia*

Governance and Operation

- EGBC is governed by a Council
  - 13 elected members
  - 4 lay members appointed by Lieutenant Governor
  - Faculty and PGEO appointees if neither elected
  - Council includes the President, Vice-President and immediate Past-President, each with one-year terms
- A CEO and Registrar, reporting to the Council, is responsible for EGBC's operational activities
- The membership is engaged through branches, committees and other ways, and also votes in elections and on issues from time to time
- Key standing committees includes the registration, discipline and investigation committees

Regulatory Roles

- Regulation activities relate to:
  - Registration of suitably qualified individuals
  - Required standards of practice (through practice reviews, …)
  - Investigation and discipline (re. members inappropriately engaged in the practice of engineering)
  - Enforcement (re. non-members inappropriately assuming the P.Eng. role or inappropriately engaged in the practice of engineering)
- EGBC also liaises on regulatory matters with *Engineers Canada* and with other non-engineering organizations – most notably as relating to foresters, architects and technologists

Other Roles

- Development of *Practice Guidelines* relating to specific engineering topics
- Promotion of *Organizational Quality Management* that supports quality assurance in companies as relating to engineering practice
- Advocacy and promotion of engineering with the public and governments
- Promoting careers in engineering, in part through student scholarships (via the EGBC Foundation)
- Branch activities and other forms of membership engagement and support
- Other member benefits such as through publications and through the “affinity" program

Ongoing Changes to Governance, Roles and Responsibilities

Triggered by the Mount Polley failure, the provincial government has undertaken a process to review and make changes to the governance, roles and responsibilities of EGBC and some other professional associations. Changes are expected to include:

- Appointment of the *Superintendent of Professional Governance*, to oversee EGBC and some other associations
- Councillors no longer freely nominated or elected
- Regulation of companies, not just individuals
- Mandatory CPD (continuing professional development)
- ...

Becoming a P.Eng.

P.Eng. designation on the following basis:

- Canadian citizen or permanent resident
- Academic qualifications – accredited program or completion of specified courses / exams
- Four years satisfactory engineering experience (one year in Canada)
- Law & Ethics seminar
- Professional Practice Exam (PPE) – 3-hour exam, including a one-hour essay
- English Language Competency – via PPE essay and referee comments
- Evidence of good character – via referee comments

En Route to the P.Eng. – the EIT

- Engineer-in-training (EIT) status is granted to individuals meeting the academic requirements of the P.Eng. and who are working towards the four-year work experience requirement
- Experience requirement is normally under the supervision of a P.Eng.
- EIT's participate fully in branch activities and enjoy several member benefits
- An EIT's demonstration of suitable four-year experience has shifted from a logbook approach to an on-line competency-based approach

Benefits of the P.Eng.

- Employment requirement of many positions with many employers
- Right to practice professional engineering
- Right to the P.Eng. title, and the use of stamp and seal
- Prestige, distinction and professional excellence
- Engagement in branches, professional committees, …
- Access to EGBC publications, services, professional development, employment resources, affinity programs and mentoring

The Various Forms of Membership

P.Eng. and Engineer-in-Training are known. But also:

- Engineering Licensee – license to practice within a prescribed scope of practice
- P.Eng. with non-practicing status
- Non-Resident Licensee – licensed to practice in BC
- Inter-Association Mobility Agreement – applicant who is a P.Eng. or EIT in another province
- International Agreement – applicant with P.Eng. equivalent from a designated country
- Provisional Member – applicant working towards the one-year Canadian experience requirement

5. The Iron Ring

The Iron Ring

- In 1922, seven EIC past-presidents conceived of the "iron ring" ceremony; first ceremony in 1925
- Focused on "*The Ritual of the Calling of an Engineer*" developed by English poet Rudyard Kipling
- Distinct from EGBC and from PEng status
- Serves as a reminder of the obligations, ethics and humility associated with the engineering profession

The Iron Ring Ceremony

Isaacson's advice at past ceremonies has included:

1. **Remember the big picture**. Apart from needed specifics, make sure that the overall direction is the right one.
2. **Expect the unexpected**. Be prepared that something new or unaccounted for arises. We have developed systems of checks, reviews and quality control just to anticipate such situations.
3. **Don't be a rubber-stamp**. Encourage diverse viewpoints, maintain independent thinking and ask the tough questions (Code of Ethics includes: "*accept, as well as give, honest and fair professional comment*")

Slide 13 has been added and slides 16-21 on Administrative Law have been added. Background removed.

The Canadian Legal System

Steven Roxborough, B. Sc., M.A., J.D.
Barrister & Solicitor

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- Any views expressed are the personal views of Steven Roxborough and do not necessarily reflect the views of Merchant Law Group LLP

Overview

- Sources of law
- Division of powers
- Interplay between the courts and the legislatures
- Administrative law

Why does this matter to an engineer?

- Without being able to navigate the Canadian legal system, engineers may not be able to complete projects
  - Trans Mountain pipeline: https://decisions.fca-caf.gc.ca/fca-caf/decisions/en/343511/1/document.do

- Engineers should be able to understand what obstacles they may encounter and know how to work with lawyers to navigate obstacles

- Engineering is a self-governed regulated profession, your privilege to practice can be revoked

Canadian Legal System

- How do you enforce your rights?

- Criminal Law vs. Civil Law

- Criminal law = a harm to society that the government investigates and prosecutes

- Civil Law = disputes between private parties
  - This includes, contract, tort, family, property, labour etc.

Canadian Legal System

- Common Law Tradition vs. Civil Law Tradition

- Common Law Tradition = Judge made law
  - Practiced in all jurisdictions across Canada, except for Quebec
  - Based on precedent (stare decisis)
  - Adversarial

- Civil Law Tradition = Codified law
  - In Canada practiced in Quebec
  - Codified law
  - Inquisitorial

Common Law Tradition

The common law tradition originated in England and is practiced in the UK, US, Canada (except for QC), Australia, New Zealand and other countries.

Civil Law Tradition

The civil law tradition originated from Roman law and is practiced in most of Europe, most of South America, most of East Asia and is the most prevalent legal system in the world.

How is law made in Canada?

- Who enacts law?

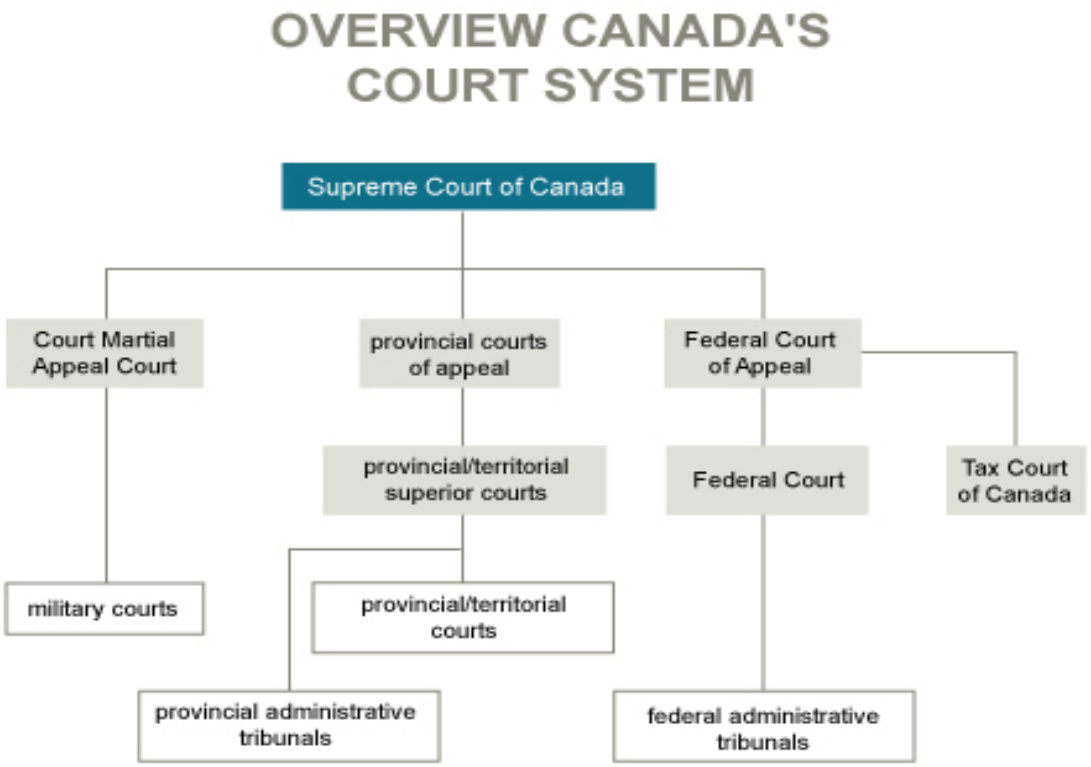
- Division of powers
  - Three levels of government
    - Federal - responsibilities set out in the Constitution Act, 1867 and that generally affect the whole country
    - Provincial - responsibilities set out in the Constitution Act, 1867, include education, health care, some natural resources, and road regulations
    - Municipal - receive authority for these areas from the provincial governments

How is law made in Canada?

- Parliament and Provincial Legislatures pass legislation in accordance with their respective jurisdictions

- The Judiciary is a series of independent courts that interpret the laws passed by Parliament and Provincial Legislatures

The Canadian Judicial System



https://www.cjc-ccm.gc.ca/english/resource_en.asp?selMenu=resource_courtsystem_en.asp

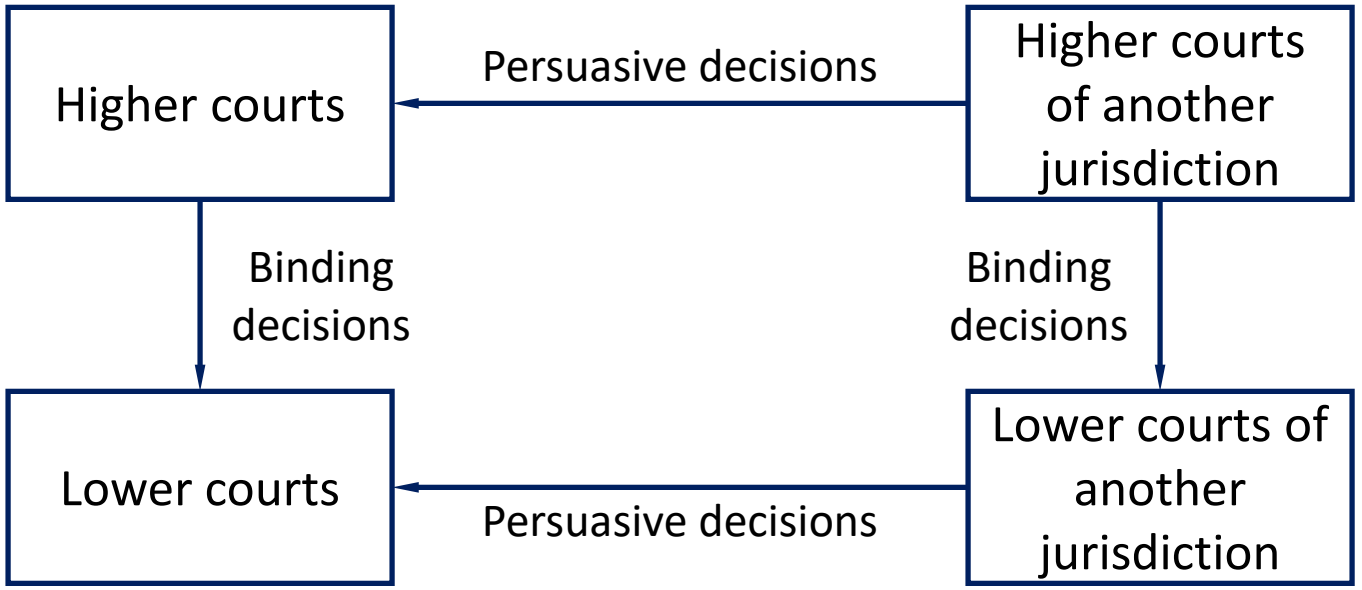
Jurisprudence/Case Law/Precedent Law/Stare Decisis

Stare Decisis is Latin for "to stand by things decided"

What does this mean?

- Decisions of provincial courts of appeal are binding on all courts in that province (provincial courts, provincial superior courts, provincial supreme courts and provincial courts of Queen's bench)
- Decisions of the Federal Court of Appeal are binding on the Federal Court
- Decisions of the Supreme Court of Canada are binding on all lower courts, including courts of appeal
- Decisions from different jurisdictions can be persuasive but are not binding
  - Why? See next slide

Vertical and Horizontal *Stare Decisis*



Binding decisions made by higher courts must be followed by all lower courts unless there are distinguishing factors.
Decisions made by courts in other jurisdictions are not binding but may be used to influence a court's decision.

This structure leads to predictability and consistency in legal decisions. An alternative decision structure would be inefficient.

Dialogue between the Courts and the Legislatures

- Parliamentary Supremacy - Legislatures can enact laws that supersede jurisprudence as long as it complies with the Canadian Charter of Rights and Freedoms (http://laws-lois.justice.gc.ca/eng/Const/page-15.html)
- The Judiciary interprets whether or not legislation complies with the Canadian Charter of Rights and Freedoms
- The Legislature and the Judiciary play a role in keeping the other branch in check
- Peter Hogg introduced this interplay as the dialogue principle (Hogg, Peter; Bushell, Allison (1997). "The Charter Dialogue Between Courts and Legislatures")

Dialogue between the Courts and the Legislatures

Examples:

- Re Manitoba Language Rights, [1985] 1 S.C.R. 721
  https://scc-csc.lexum.com/scc-csc/scc-csc/en/item/60/index.do

- Compliance with regulations necessary but not sufficient
  - What is sufficient? Ask a lawyer.

- Class Proceedings Act, RSBC 1996, c 50

Administrative Law

- The delegation by government of quasi-judicial powers to administrative tribunals (or boards, agencies, associations)
  - https://en.wikipedia.org/wiki/Canadian_administrative_law

- Purpose of the tribunal is to regulate highly specialized activities. Members of a tribunal are practitioners, not judges.

- Tribunals are not part of the court system.

Self-governing regulated profession

- Self-governing regulated professionals in Canada include engineers, lawyers, doctors, accountants, etc.

- In Canada self-governing regulated professions are granted the authority by government statute to license professionals, and are also granted the ability to discipline licensees.

EGBC

- Engineers and Geoscientists of BC (EGBC) regulates the practice of professional engineers and geoscientists in BC

- EGBC derives its authority from the ~~*Engineers and Geoscientists Act*~~, ~~RSBC 1996, c 116~~ (the "***Act***") Professional Governance Act http://www.bclaws.ca/civix/document/id/complete/statreg/96116_01

- EGBC has a duty to uphold and protect the public interest respecting the practice of professional engineering and geoscience

- EGBC establishes bylaws (Section 10) to govern how it operates and the requirements for practicing members

EGBC

- EGBC appoints an investigation committee to investigate complaints and concerns about practicing members.

- If there are grounds to believe that a member has contravened the bylaws related to engineering practice or the Code of Ethics, the case is referred to a discipline committee.

- Pursuant to section 33(2) of the *Act* the discipline committee can impose fines or revoke the license of the member.

And the member will never have stepped foot in a court room

What are the rights of a member?

Procedural Fairness

- The member is entitled to procedural fairness
  - The right to participate in the inquiry process in a meaningful way

- Tribunals such as the EGBC discipline committee must not be biased and must not have the appearance of bias

Standard of review

- Courts can review decisions made by a tribunal.

- The standards of review can vary depending on the circumstances
  - reasonableness; or
  - correctness

- Upon review, if a court finds that there was a reasonable apprehension of bias, the decision of the tribunal will be void

APPLIED SCIENCE 450
Professional Engineering Practice

Whistleblowing

W. Scott Dunbar, PhD, PEng

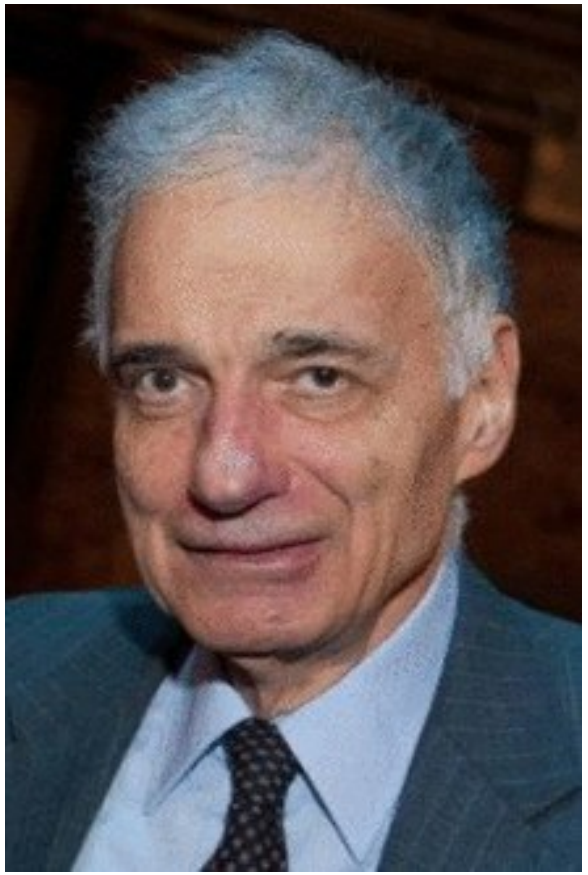
Definition of whistleblowing

The public exposure of an activity occurring within a private or public organization that is deemed illegal, unethical, incorrect, or that could endanger the public or the environment.

A whistleblower works for the organization and has privileged access to information about the activity.

Exposure of secret or confidential information may occur as a result of whistleblowing.

Ralph Nader – the original whistleblower



1965: critiqued the safety record of American automobile manufacturers

Coined the term whistleblower

Currently a professional activist for causes related to consumer protection, environmental protection and government reform

https://en.wikipedia.org/wiki/Ralph_Nader

https://nader.org/

Edward Snowden – whistleblowing's poster boy

2013: leaked classified documents (~1.5 million) from the National Security Agency (NSA) to journalists.

Documents revealed the existence of a massive surveillance program carried out by NSA and other security agencies that could invade anyone's privacy.

Charged under US espionage act. Surveillance program was found to be unconstitutional.

Labelled a traitor but gave up job, residency, and freedom for a principle. Currently living in Russia – no other country willing to offer asylum

https://en.wikipedia.org/wiki/Edward_Snowden

Evan Vokes – metallurgical engineer

Discovered that his employer, TransCanada Pipelines, was not complying with welding codes when constructing pipelines.

Reported problems internally – no changes

2011: Took stress leave

2012: Formally complained to National Energy Board who agreed with most of his findings.

Current employment unknown

See “Canadian whistleblowers” on web site

Jean-Claude Gilbert – structural engineer

May 2013 - gave Radio-Canada details and video of a broken expansion joint on the Champlain bridge in Quebec.

Concerned for safety of drivers

Employer complained to Quebec Order of Engineers who disciplined him for revealing confidential information to press.

Ordered to pay $5000

Currently self-employed

The DC-10 Disaster - swallowing the whistle

Built by McDonnell-Douglas

Fuselage designed by Convair

Contract between Convair and McDonnell-Douglas was imprecise with respect to design changes

DC-10 cargo door problem

The rear cargo door had to be secured from the outside, and there was no way for those inside the plane to check that this had been done correctly.

If door blew out during flight, the cargo hold would depressurize. The passenger compartment would remain pressurized, so there would be an immense pressure differential on the passenger floor.

The floor would collapse, rupturing the hydraulic control lines to the rear engine and control surfaces on the rear wings.

Some events

- June 12, 1972: Exactly this happened over Ontario. The pilot was able to land in Detroit

- June 27, 1972: Daniel Applegate, chief engineer at Convair, wrote a memo warning of this problem and its consequences.

- But nothing was done and Applegate did not continue to voice concerns

March 3, 1974

Turkish Airlines Flight 981

During climb after takeoff from Paris, cargo door blew out. Plane crashed, 346 people killed.

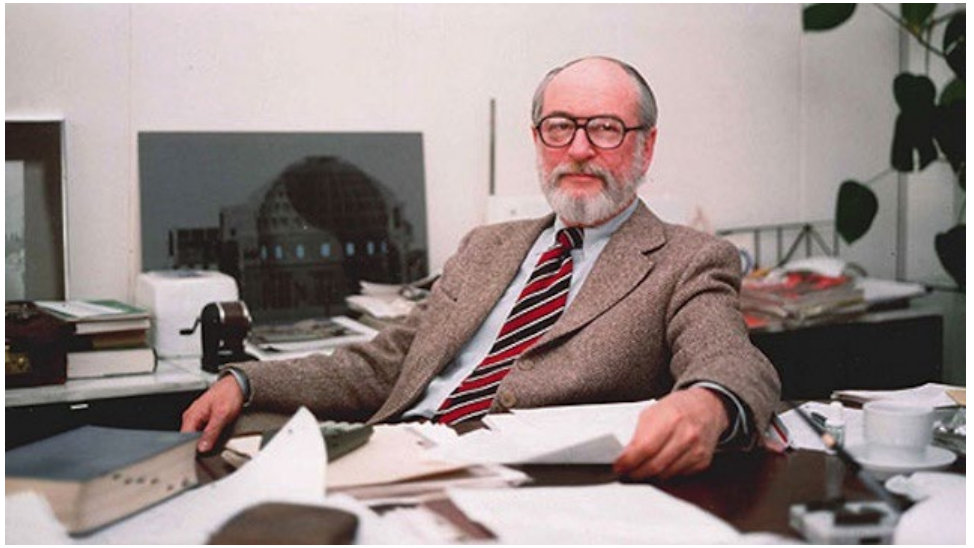
Result was a large ($100M) lawsuit against McDonnell-Douglas brought by families of the victims.

Applegate's memo was a key piece of evidence that the cargo door problem was recognized.

https://en.wikipedia.org/wiki/Turkish_Airlines_Flight_981

https://en.wikipedia.org/wiki/Dan_Applegate

William LeMessurier – blew the whistle on himself

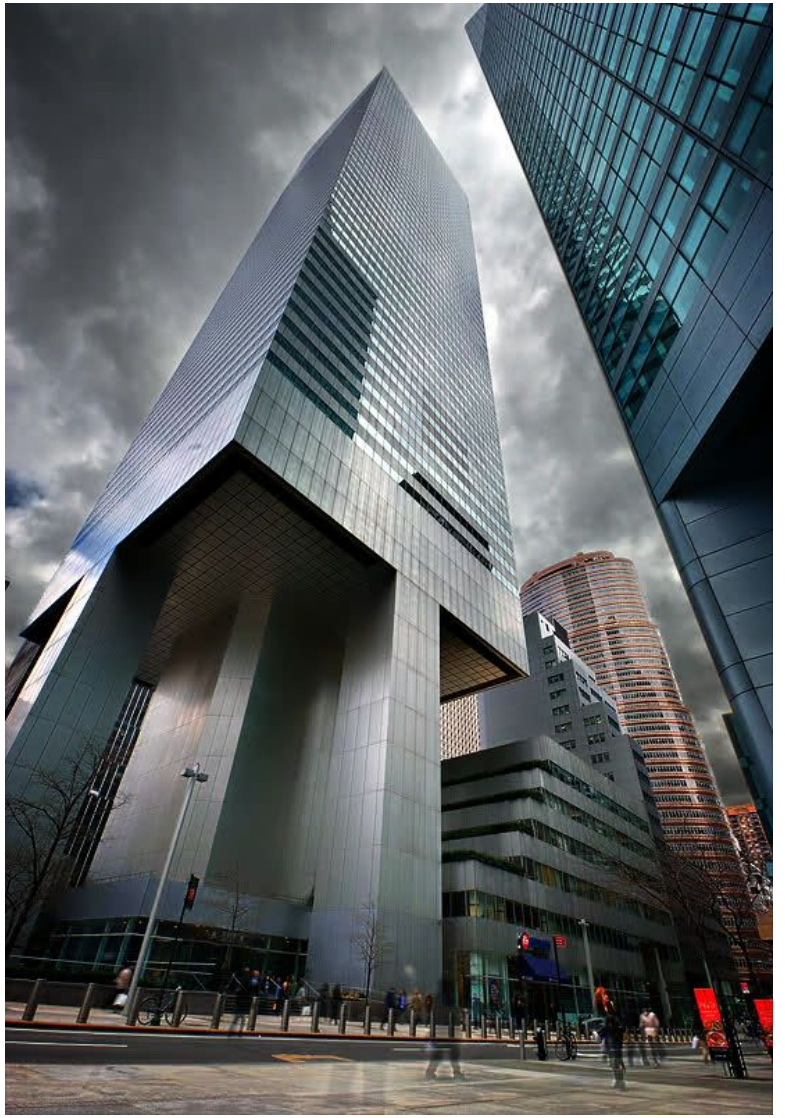


Citicorp Bank headquarters, New York

Designed to accommodate an old church

Building on nine-story columns

Construction complete in 1977



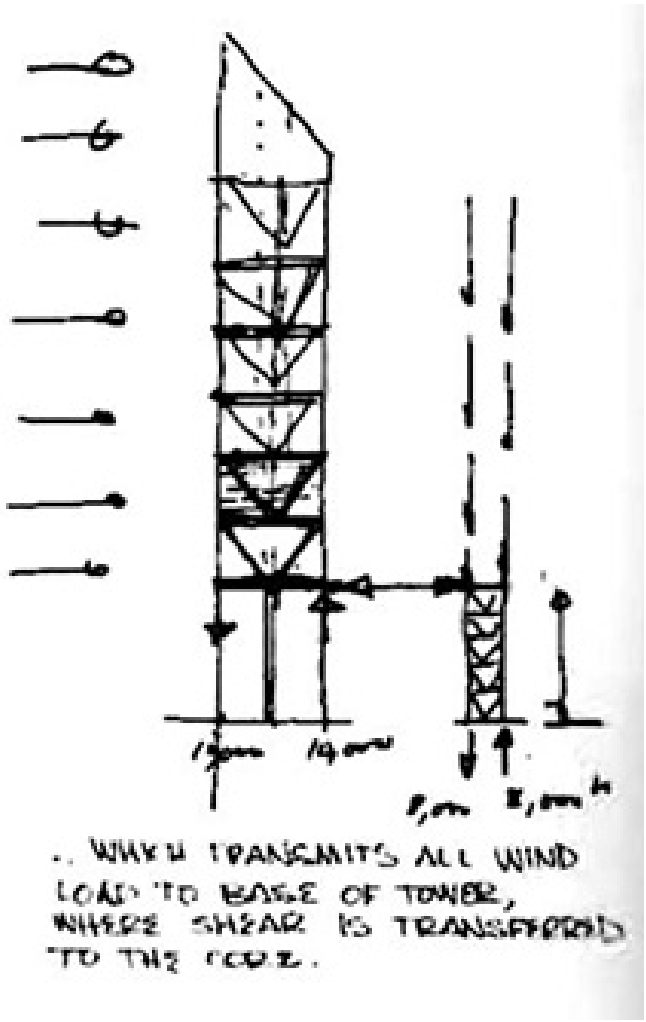
Unique building design

Diagonal bracing to transfer load to columns

As a result the building was very light
(the alternative would be more columns)

The low weight caused it to sway in the wind

$\Rightarrow$ tuned mass damper installed at top of building

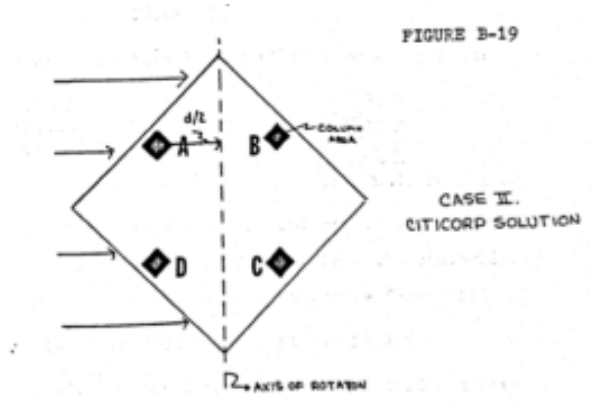


But then …

June 1978:
Diane Hartley, an architecture student called LeMessurier's company and said the columns should be at the corners, not in the middle of the walls because of loads due to winds at 45° angles.

Design accounted for perpendicular wind loads, but the response to diagonal winds was unknown.

Diane Hartley



The issue became a homework problem

Response to diagonal winds was posed as a problem to Harvard engineering students (where Le Messurier was an adjunct professor)

Students found that stresses in some diagonal members increased by 40%

Forces in joints increased by 160% - a serious problem because joints were bolted, not welded

Hurricane season was coming!
Mass damper required power to work.

What was done

Wind tunnel tests done at Western University, Ontario confirmed the problem, but stresses and forces would be greater than calculated.

Joint failure on 30th floor could cause complete structural failure

LeMessurier told Citicorp of the problem on July 31, 1978

Major joint re-fit program initiated and completed by September

Boundary Layer Wind Tunnel Laboratory at Western University

The results

Costs estimated at $4.3 million

Citicorp settled for $2 million, the value of LeMessurier's liability insurance

LeMessurier an "ethical hero". Asked to speak at engineering societies and at universities

See in Readings
The Fifty-Nine Story Crisis
Citicorp Center – a close call

Why do it?

To stop, hinder or prevent wrongful activities

Disclosure that has no chance of achieving this result is self-destruction, not whistleblowing.

Usual avenues for disclosure such as memoranda, face-to-face, or safety audits have failed.

How do you know you are doing it?

It is not obligatory.

It has desirable social benefits

It is not "informing" in the sense of criminals or spies who divulge secret information

Whistleblowing and the EGBC Code of Ethics

Duty to Report But disclosure/reporting confined to EGBC or appropriate authorities Activities of a regulated practice	(9) **report to EGBC** and, if applicable, **any other appropriate authority**, if the registrant, on reasonable and probable grounds, believes that: • (a) the continued practice of a *regulated practice* by another registrant or other person, including firms and employers, might pose a risk of significant harm to the environment or to the health or safety of the public or a group of people; or • **(b) a registrant or another individual has made decisions or engaged in practices which may be illegal or unethical;**
Stand Your Ground	(10) present clearly to employers and clients the possible consequences if professional decisions or judgments are overruled or disregarded;

The conflicting loyalties of a whistleblower

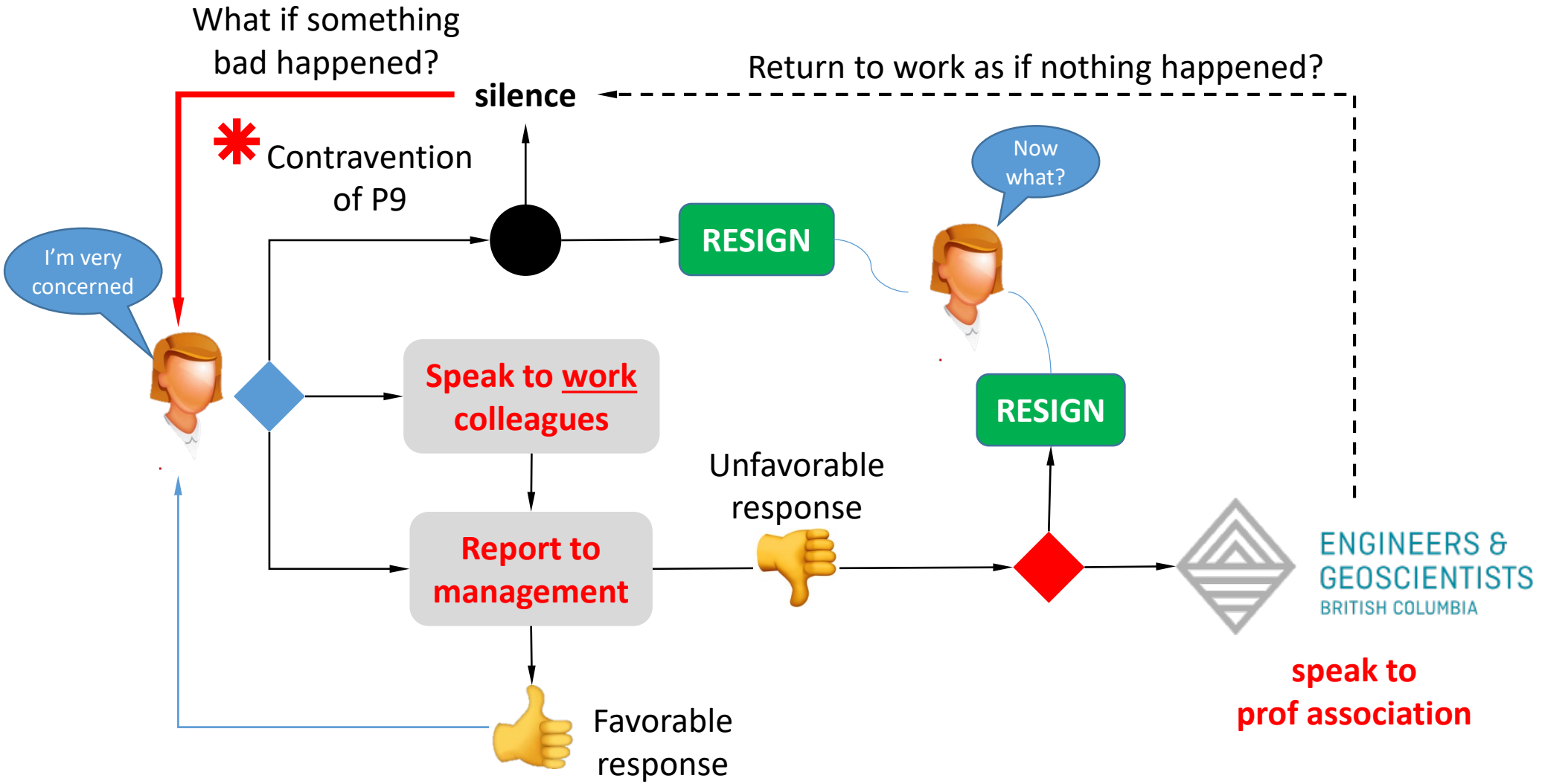
- To employer – an obligation to be loyal, to not disclose confidential information.
  - If not explicit, usually an implied term of an employment contract (Employment Law)
- To the public – an obligation to its safety, health and welfare – especially for an engineer
- To self – personal values of right and wrong, integrity
- To fellow employees – if they stay silent while you do not, they may be viewed as complicit in the wrongdoing
- To the profession – disclosure of wrongdoing could place the profession into disrepute, but so could non-disclosure.

Guidance available

See EGBC Guide to the Code of Ethics section 4.9

Guide to the Code of Ethics, Version 2.0 (egbc.ca)

The various paths



You may be sued by your employer

Leading to a drain on finances

Engineers Canada provides insurance coverage for whistleblowers who are registered members of provincial or territorial associations.

EGBC provides Secondary Professional Liability Insurance for members that includes insurance for whistleblowers

See links on website.

The rumor mill could wind up …

Can whistleblowing be avoided?

Very likely

A professional is supposed to sacrifice self-interest for the good of the public or profession. But whistleblowing seems to be an extreme sacrifice. What to do?

- The employer:
  - How is bad news handled? Does the company learn from mistakes?
  - Is there a whistleblower policy?
  - Lines of communication – are they flat or hierarchical?
- The engineer-employee
  - Develop good informal links in the company. (A howling “lone wolf” can become annoying and is eventually ignored.)
  - Develop skills for communicating bad news with supporting evidence
  - Companies have legitimate goals and constraints. Are these making the issue chronic?


truth
public interest
moral responsibility
corruption
snitch
illegal
tattletale
violation
WHISTLEBLOWER
anonymity
dishonest
fraud
disclosure
principles
organization
ethics
law
dilemma
regulation
loyalty
retaliation
information
media
foul play
government
protection
allegations
confidential

Procurement and Tendering

John Haythorne, P. Eng. Partner

UBC: APSC 450

25 September, 2019

Note About Slides and Video Presentation:

- **Video Slides:** The Video Presentation focuses only on the following slides: 4, 9,10, 12, 13, 14, 15, 16, 17, 18, 19, 21, 24, 25, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 39, 41, 42, 43, 44, 57, 59.
- **Additional Slides:** The other slides, including case comments, are intended to be a source of future reference, giving more detail on specific topics about Contracts than could be covered in this brief Video.

Why Tenders?

- Most projects, whether public or private, are implemented by contracts awarded through some form of competitive procurement

Procurement: A process for an owner to select a contract party and award a Contract

- In previous lecture we described manner in which Contract is formed:
  - Offer and Acceptance:
    - A party "accepts" and Offer presented by the other party.
    - Offer and acceptance occurs through negotiation until a live Offer is accepted.
- In general no special rules about exchanging offers and giving an acceptance – and creating Contracts – "freedom to Contract"
- Problem: often (usually) the owner is interested in receiving the "best" (eg lowest price) offer –
  - The Objective of **Procurement:** how to obtain the most advantageous Contract?

Overview

1) **Procurement: A process for an owner to select a contract party and award a Contract**
2) Need for competitive offers – to obtain the best Contracts
3) **If a person decides to select by Tender (usually no obligation) – ie wants to receive competitive bids then in Canada special legal rules will apply – the set of rules is the "Law of Tender"**
    1) Judge made law – Ron Engineering v. The Queen
4) Tender – impose some formalities - Very common in Engineering and Construction business
5) Common law rules – **always evolving**
6) **Fairness**
    1) Pure Heart no defence
7) **Tender vs RFP**
8) **Practical Tips**

5 大成 DENTONS

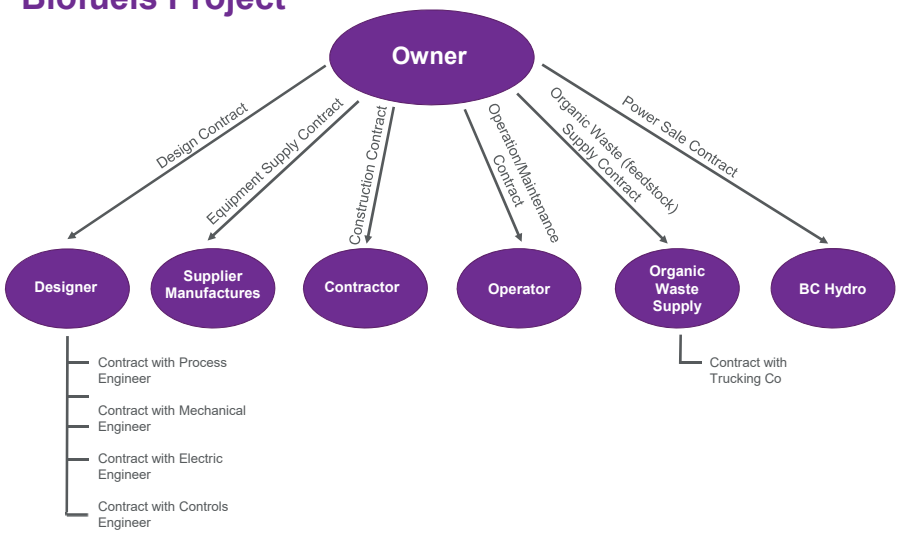
Tender Golden Rules

"the integrity of the bidding system must be protected"

"The rationale for the tendering process…is to replace negotiation with competition."

6 大成 DENTONS

Model Project: Schematic of Main Contracts for Biofuels Project



7 大成 DENTONS

List of Owner's Main Contracts for the Biofuels Project:

- **Design Contract**
  - Process Engineering/controls
  - Electrical
  - Mechanical
  - Geotechnical
- **Equipment Supply Contract**
- **Construction Contract**
  - Subtrades: electrical, mechanical, geotechnical, systems
- **Operation/Maintenance Contract:** Subtrades: cleaning; landscaping
- **Organic Waste (feedstock) Supply Contract**
  - Trucking Contract
- **Power Sale Contract**

8 大成 DENTONS

Need For Competitive Offers

- Benefit is seen on large projects, such as our Model Project, or in larger Contracts – important for owner to have confidence that the prices and Contract terms are competitive
- Question: How can the owner have a chance to get the best Contracts?
- Answer: Owner holds a competition between possible contractors to see who will offer the best Contract (best price/terms/options etc)

Competition for Contracts

- For convenience in running Contract competition Owners have developed some standard approaches – these include:
  1) As a matter of organization, and to guard against bidders playing games, bids are required to be submitted by set day and time ("bids close at 2:00 pm Tuesday)
  2) To give the Owner time to analyze bids, bids are to be irrevocable for xx days (often 30 or 60 days)
  3) The criteria that the Owner is looking for is announced in advance – "eg lowest price wins
  4) To provide security that the best bidder won't change its mind, bids are required to be accompanied by a deposit that the Owner can claim if a winning bidder declines to enter into the Contract.

Process to Create Tender Documents

- Starting point – consider the Owner's needs or objectives for the Contract:
  - Express the Owner's needs or objectives in a draft contract
  - The draft contract should, at a minimum:
    - **Scope:** Have a place in the Contract where the final scope of responsibility will be clearly defined (scope of construction work/scope of professional services/ description of equipment to be supplied etc)
    - **Price:** Have a place in the Contract where the Contract Price (or a number of applicable prices) will be set out that will be the payment for the performance of the Scope
    - **Schedule:** Have a place in the Contract where the performance/delivery times are clearly described
- At the end of the procurement this draft Contract will be completed with the winning bidder's prices and other information and will become the "Contract" – ie Contract "B"

3. Judge-Made Law – *Ron Engineering v the Queen*

- In 1981 the Supreme Court of Canada decided the case of *Ron Engineering* and changed the law around competitive procurement in Canada
  - Unique to Canada
  - Different from USA, England, Europe and the rest of the world
  - Put more duties on Owner who are inviting competitive bids for the purpose of competition in awarding a Contract

Facts in *Ron Engineering*

- Bidder refused Construction Contract award because of mistake;
- Bidder had included a Bid Bond to secure bid;
- Owner retained bond and awarded to next low bidder
- Bidder sued government to recover bid bond

- **Bid Content:**
  - Bid irrevocable for 30 days
  - Bid security to cover owner's loss if bidder rejects award
  - Other terms such as promise to use certain subcontractors

Parties' Rights Upon Submission of Bid

- Court asked: "if the parties have enforceable rights that come into life when bids are submitted, how do those rights arise?

- **Answer:** there is a "preliminary contract" that arises between each bidder and the owner that explains and governs all bidders' and the owner's rights and obligations between time when bids are submitted and the award of the contract

4. Result of Ron Engineering In Canada

- Contract "A": If there are outstanding obligations created by the submission of a bid (such as the obligation to hold prices for a specified time) then a Contract "A" forms between the Owner and each bidder that submits a valid bid – the terms of the Contract "A' are as described in the invitation (Instructions to Bidders/Request for Proposals) document.
- Contract "B": The ultimate contract that the owner awards to the winning bidder
- A major source of litigation in construction and engineering has been claims that an owner has failed to comply with the requirements of a Contract "A" in a procurement.

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Basic Principles of Tender Law

- A Contract A may arise with each bidder when bid is submitted
- Main terms of Contract A are in the tender documents
- Contract A protects the integrity of bidding process
- Once the bids are in, you are in a contract!

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Basic Principles of Tender Law

- Contract A arises only if acceptance is on the terms of the offer in the tender documents (compliance)
- A qualified bid – one that doesn't conform to tender documents – does not create a Contract A
- Breach of Contract A results in: an award of damages = lost profits ($$$)
- Applies to GC – subcontractor relationship too

Basic Principles of Tender Law

Owner obligations:

- Duty to follow express terms of Contract A
- Duty to treat all bidders fairly and equally
- Duty not to accept non-compliant bid
- Not to negotiate (competition replaces negotiation)

A Word on Fairness

- In the Canadian law of tender, the courts have identified that bidders are dependent on owners administering procurements in a way that does not improperly favour or prejudice any one bidder, as compared to other bidders – this is **Duty of Fairness**
- Duty of Fairness is imposed on any owner that elects to proceed by tender
  - Owner will receive the benefit of competitive bids
  - By doing so the Owner is electing to "replace negotiation with competition – ie the tender process"
  - Owner must apply the rules as described in the procurement documents fairly
  - **It is no defense for the Owner to try to justify a violation of the rules on basis that public is better served**

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Duty of Fairness

Martel Building, SCC, 2001

- Scope of duty of fairness depends on express terms of Contract A
- Owner can reserve rights and privileges in tender documents:
  - privilege clause
  - discretion clause
  - exclusion/limitation of damages clause

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Privilege Clause

MJB, SCC, 1999

- *"The lowest or any bid need not necessarily be accepted"*
- Reserves the right not to accept lowest or any bid
- Overrides custom of award to lowest bid and allows "nuanced" approach to price
- Cannot use to accept non-compliant bid or to breach duty of fairness
- Can use to reject all bids (for the right reasons), but careful not to breach Contract A – get advice

Discretion Clause

- Reserves the right of the owner, in its sole discretion, to waive minor irregularities and defects in a bid (i.e. non-compliant bids)
- Important Note: Sole discretion clause does not prevent later court review (*Graham*)
- Does not allow owner to enforce a contract with a **materially** non-compliant bid
- Reason: no Contract A arises

Exclusion Clauses - Do They Work?

- *No proponent shall have any claim for any compensation of any kind whatsoever, as a result of participating in this RFP, and by submitting a proposal each proponent shall be deemed to have agreed that it has no claim.*

Tercon, BCSC, 2006 – avoided the clause

BCCA, 2007 – upheld the clause

SCC, 2009 - ??

Tender vs Request for Proposals (RFP)

- Classically a "tender" is a competition where the design and scope of the construction/service etc is fully defined in the draft contract, and the only material point of competition is price
- A competition where the Owner invites alternate design or scope solutions, with price or other related issues such as schedule to vary according to the design offered, is an RFP
  - Basically the same legal rules (Contact "A" and Contract "B") apply to both tenders and RFP's

RFPs

Tercon Contractors, BCSC, 2006

- A Contract A arose because of intention to contract based on: irrevocability, formal process, bid security, commitment to build, specific scope of work, agreement attached, etc.

BCCA, 2007

- Only issue: upheld exclusion clause

SCC, 2009 (still waiting)

- Was there a breach of Contract A?
- Enforceability of exclusion clause
- (Whether a Contract A arose in the RFP)

RFPs

Budget Rent-A-Car, BCCA, 2009

- *This RFP does not constitute an offer. No agreement shall result upon submission of Proposals…[Owner] will not have any obligation to anyone in connection with this RFP unless [Owner] executes…an agreement in writing…*
- RFP held not to be a contract, but unusual facts

Process to Create Tender Documents

- To prepare the actual Instructions to Bidders/RFP documents the elements of the invited competition need to be clearly understood
  - Only price?
  - Proposed performance schedule?
  - Strength of bidder's team
- The "rules" for the competition are then set out in the Instructions to Bidders/RFP
  - Content for bids/proposals/submissions
  - Deadlines for delivery of bids
  - Location for delivery of bids
  - Any restrictions on who can bid
  - Bid Bond or other security required
  - Criteria for selection and review of bids
- Collectively the Instruction to Bidders/RFP are the terms of the Contract "A"

Practical Tips: Tip #1 – Request Only Essential Information

- Requesting unnecessary information increases:
  - Increases risk of non-compliance
  - Increases cost for bidders
  - Confuses evaluation – inference is that everything requested is relevant

Practical Tips: Tip #2: - Minimize "Mandatory" Information

- Missing any information specified as mandatory will result in non-compliance (*Graham)*
- (Be sure the owner will want to reject a low/attractive bid that misses a specified mandatory provision)
  - **"Must" submit 10 copies**
  - **"Must" be delivered in a sealed envelope addressed as "x"**
  - **Revision "must" be signed by same person as signed original**

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Practical Tips: Tip #3: - Tender Documents are "last chance"

- Once bids close the documents commit the owner for the entire project – therefore check it over carefully
  - Through the tender (duration of contract "A")
  - Through the construction contract (contract "B")
  - **One person should check it as a whole – (too often different people write different parts for different purposes – eg commercial terms vs specifications**

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Practical Tips: Tip #4: - Draft as an "Operating Agreement

- Should provide answers to likely questions during bid preparation, submission, evaluation and award

Practical Tips: Tip #5 - Make it difficult to be Non-compliant

- Make sure Tender Form has place for all information being requested
  - Eg – separate line for taxes

Practical Tips: Tip # 6 – Follow Procedures Designed to avoid Problems

- Specify that all questions must be addressed to one identified person
  - One representative avoids risk that two different answers will be given to the same question
  - Not an office or firm

Practical Tips: Tip # 7 – Draft for Clarity/Consistency and Organization

- Follow policy of stating any issue only once in the tender documents
  - (lawyer's rule of interpretation - if you say it twice you will say it differently)

Practical Tips: Tip # 8 – Amendment/Clarifications/Addenda

- Specify that no oral advice may be relied on – amendments may only occur by formal written addenda

Practical Tips: Tip # 9 – Evaluation/Selection Criteria

- Courts require fairness
- Courts will respect any process/criteria selected, but whatever is selected MUST be strictly followed
- Corollary is don't specify process that owner is unlikely to follow

Practical Tips: Tip # 10 – Post Award

- Cover duties and obligations between notice of award and execution of contract
- Can/must contractor start work?
- Any documents (wcb, insurance, bonds, schedule) required before work can start?

Caution!! Tender Rules Not Static – Can Change

- A strength of "common law" (which is law as defined and developed by judges) is that it can evolve and change over time to meet the community needs
- However, common law is never static and in theory is constantly changing.
- The law of tender in Canada is judge-made law and is therefore not static
  - Engineers and other parties who work in the area of procurement therefore need to take expert advice from qualified persons as to the most current procurement requirements

Current Issues in Tender/RFP

- Mistake
- Compliance
- Bid Shopping
- Evaluation
- Extent of Duties
- Cancellation of Tender

Mistake

- *Ron Engineering* – risk of mistake in calculation of bid price is bidder's – can't withdraw bid
- *Vachon* – mistake on face of bid can create uncertainty as to price so no Contract A (price in numbers different than price in words)
- *Canvar* – owner can't accept obvious mistake regarding price, apparent on face of tender (bid bond amount not 5% of bid price)

Compliance

Graham Industrial, BCCA, 2004

- Graham's bid was $5 million lower than next lowest bid
- $2 million calculation error – tried to withdraw (*Ron Eng.* won't allow)
- GVWD awarded Contract B to Graham, relying on discretion clause to waive minor discrepancies

Graham Industrial

"If a Tender contains a defect or fails in some way to comply with the requirements of the Tender Documents, which in the sole discretion of the Corporation is not material, the Corporation may waive the defect and accept the Tender."

Graham Industrial

Graham argued its own bid was non-compliant:

1. *Tenderer shall provide a 3 page discussion covering mitigation of impacts to neighbours regarding noise, air emissions and road safety, etc.*
2. *Tenderer shall include a 5 page outline of its intended Environmental Protection Plan, including…*

Graham Industrial

- Court held Owner couldn't rely on discretion clause because no Contract A arose
- Bid was **materially non-compliant:**

> "*one which fails to address an important/essential requirement or with an omission significant in owner deliberations*"

Kinetic Construction, BCCA, 2004

- Compliant bidder (with a Contract A) complained about award to non-compliant bidder – who failed to include price for 4 years of insurance
- Court said no breach of Contract A – privilege clause allowed owner to do this

Kinetic Construction, BCCA, 2004

- *The Owner may however, in its sole discretion, reject or retain for its consideration Tenderers, which are non-conforming because they do not contain the content or form required by the Instructions to Tenderers or for failure to comply with the process for submission set out in these Instructions to Tenderers.*

Compliance

Double N Earthmovers v. Edmonton, SCC, 2007

- An "informality" that can be waived is an omission or error not materially affecting price or performance of Contract B
- No duty on owner to investigate whether bidder can comply
- Once Contract B is awarded, the duties under Contract A are at an end

Compliance

Thales v. TTC, Ont SC, 2009 (injunction)

- Okay for TTC to reject a bid as non-compliant when submitted letter from bank that "under current conditions and expectations, we envision being in a position to issue" an LOC, rather than a firm Agreement to Provide a LOC

Compliance

St. Lawrence College v. Canada, FC, 2009

- Bidder's application for declaration that its bid was compliant was denied
- Cover letter in response to an RFP that attached the contract to be entered into reserved the right to negotiate the terms of the final contract
- A clear qualification on the bid per *J.Oviatt*, and so non-compliant

Compliance

Halifax v. England Paving, NSSC, 2009

- Whited out and corrected tender price not initialled was a minor non-compliance capable of waiver because price was found elsewhere in bid
- But missing Schedule of Quantities and Prices was substantial non-compliance, so owner could not accept the bid (note: dispute over whether bidder failed to submit it or owner lost it)

Compliance

N.A. Construction v. York, Ont SC, 2009

- ITs say must attach all addenda to bid (!!)
- Bidder asks if must attach the attachments to the addenda too
- Owner answers “No”
- Second low bidder attaches all attachments (a box) and complains when sees low bidder’s bid
- Court says it is a minor deficiency and allows waiver

Compliance

Bot Construction v. MOT, Ont SC, 2009

- Bid for “all Canadian steel” but mandatory rolled steel was not available in Canada –accepted by MOT
- Other bidder challenged successfully
- Accepted bidder argued rolled steel was .26% of tender price so it was a minor non-compliance that could be waived
- Problem: MOT didn’t waive, treated it as a change proposal that would be accepted under Contract B

Compliance

Coco Paving v. MOT, Ont CA, 2009

- Electronic tendering
- "Bid must be received by MTO servers before 3 pm"
- Bid received at 3:28. "Computer glitch". "Internet traffic jam". Cause not clear
- Bid closing time is "sacrosanct"
- No clause allowing acceptance of late bid

Compliance

Cambridge Plumbing v. Owners, BCSC, 2009

- 60 day Consent of Surety was not materially non-compliant with a 90 day requirement – not essential to tender
- Owner's behaviour is relevant to whether non-compliance is material

Compliance

Maystar v. Newmarket, Ont CA, 2009

- Owner wrongly accepted bid with error in bid price, GST, and/or total price
- After public opening, bidder advised his true price was the lower bid price – displaced low bidder
- Owner not allowed to correct bid. It was uncertain as to price and non-compliant
- Owner acted in good faith, but that's not a defence
- Privilege clause did not specifically allow acceptance of a non-compliant bid

Compliance

Russell v. Dalcon, Ont SC, 2009

- Consultant recommends rejection of low bid due to errors, informalities, weak experience
- Both low bidders threaten to sue
- Township asks court to bless its rejection of low bid
- Court declines. ITs give discretion to Owner to correct errors and waive irregularities and Court won't make decision
- "Listen to competent legal counsel and apply the many legal principles"

Bid Shopping

Stanco Projects, BCCA, 2006

- After public opening, consultant issued Post-Tender Addendum to get price on one tank
- Bid shopping = "nefarious practice of using bids as negotiating tool before award to get better price"
- Bid shopping is breach of Contract A
- Consultant found 100% liable to Ministry

Post Closing

- Owner/consultant generally has less freedom than is thought
- To be permissible, negotiation must be clearly allowed by tender documents – careful of bid shopping
- Keep in mind obligations to all bidders
- Careful of "clarifications" – don't let bidders fix a non-compliance with mandatory requirements or add significant new information after closing

Evaluation

Continental Steel, BCCA, 2007

- GC's decision to reject low subcontractor bid because of history of claims and disputes upheld by Court

Continental Steel

- Trial Judge wrongly substituted his own analysis – privilege clause gave GC a discretion and GC exercised it fairly and objectively
- GC entitled to take nuanced view of cost
- Not a case of undisclosed criterion or hidden preference
- GC entitled to act in own best financial interests, provided its process was not unfair
- Reasonable exercise of business judgment

Hub Excavating, BCCA, 2009

- Low bidder claimed owner had no good faith intention to proceed when project cancelled because bids over budget
- Post-closing, Consultant gave inaccurate information suggesting Hub would get the contract
- No duty of fairness before Contract A – Fairness means consistent and even treatment
- No court interference with owner's business decisions
- No reasonable reliance on Consultant' statements – bidder took business gamble not to bid on next project

Evaluation

Cherubini v. N.B. Power, NBCA, 2009

- Okay to pick second low bid based on experience of subcontractor (bidder argued we will supervise him)
- **No requirement to disclose weightings of criteria** (see also *Elite*)

Evaluation

James A. Brown v. Caisse, Ont SC, 2009

- Owner entitled to investigate reliability of information provided by bidders, including site visits (to all 3)
- No duty to allow bidder to reply to negative information collected
- Evaluation process not done perfectly, but not unfair

Evaluation

Force Construction v. N.S., NSCA, 2009

- Breach of duty of fairness for owner to make post-closing demand (with short time fuse) from low bidder for an assurance of supply of windows from a new supplier, and then to reject for failure to do so

Extent of Duties

- No duty by owner to subcontractor/JV team member: *Design Services*, SCC, 2008
- No duty by owner to the public in bid selection *Heyes* (Canada Line), BCSC, 2009

Cancellation of Tender

- Assume duty of fairness and good faith will survive
- Careful how you structure this. Best to:
  - Reject all bids, re-design and re-tender; or
  - Reject all bids and negotiate to de-scope (start with the low compliant bidder)

DON'T NEGOTIATE IN THE TENDER!

Cancelling the Tender

R. v. Crown Paving, 2009, Nfld CA

- Okay to cancel tender and enter into an extension of the existing contract when all bids were over double the budget

Cancelling the Tender

Amber Contracting v. Halifax, 2009, NSCA

- When prices were well over double available budget, it was okay to cancel tender and several months later, retender substantially the same work
- Relied on specific language of privilege clause allowing owner to reject all tenders if none is satisfactory and to cancel the tender and not award the work for any reason

Cancellation of Tender

Cambridge Plumbing

- Owner entitled to reject all bids when all over the provided funding available and okay to start negotiation with bidders – provided tender was clearly ended
- Unsuccessful bidder argued tender wasn't ended before negotiation began. Court found tender ended first

Thank you

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Note About Slides and Video Presentation:

- **Video Slides:** The Video Presentation focuses only on the following slides: 4, 11, 13, 14, 15, 18, 21, 26, 29. 30, 31.
- **Additional Slides:** The other slides are intended to be a source of future reference, giving more detail on specific topics about Contracts than could be covered in this brief Video.
- **Case Summaries:** The Case Summaries at the end beginning at Slide # are included as illustrations of legal reasoning, as well as for general interest.

Introduction: Why Learn About the Law?

- Virtually every aspect of work is carried out within legal constraints
- Not trying to make you into lawyers, but to leave you with some basic understandings so that you will be better prepared to know when to go seek expert legal advice
- There is an old joke that makes a point:
  - Q: What's the difference between a Lawyer and an Engineer?
  - A: The Lawyer doesn't think he/she is an Engineer

Introduction: Why Learn About Contracts?

- Virtually all commercial activity is carried out within a Contract, or more usually a number of Contracts
- A basic understanding of how Contracts work in our legal system is necessary to participate in the business world today

Outline

- What is a “Law”?
- Contract Law is “Private” Law
- Contract Formation: three main elements:
  - Offer
    - Store advertising
  - Acceptance
    - Counter offer/rejection
    - Crossing offers
  - Consideration
- Freedom to Contract – illegal agreements
- Contract Amendments
- A Word on typical Engineering Contracts – Professional Services; Design; Supply; Construction

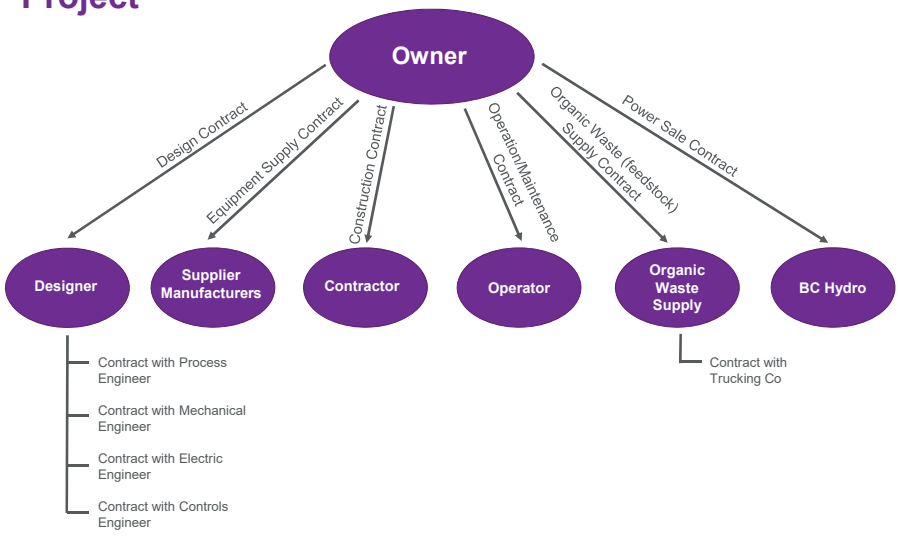
Model Project: Design, Build and Operate an Organic Waste/Biogas Recovery and Power Generation Plant

- For illustration, imagine a proposed new Waste/Biogas Recovery and Power Generation Plant that a government wishes to construct and operate:

Model Project:

- When the Project is first conceived the Project is a Blank Page
  - There will be a set of existing laws and regulations that the Project will need to meet to move forward – for example:
    - Zoning restrictions applying to the proposed site
    - Trucking/transportation rules for transport of organic waste to the site
    - Environmental regulations and Safety rules for handling and storage of Biogas
    - Worksafe BC rules for workers at the site
    - Design and building codes and requirements
    - Operational requirements
    - Regulations related to Utilities
- None of these are in place to help the Project proceed
- So how does a Project come to life? – mostly by the formation and implementation of a number of **Contracts**

Model Project: Schematic of Main Contracts for Project



List of Owner's Main Contracts for the Project:

- **Design Contract**
  - Process Engineering/controls
  - Electrical
  - Mechanical
  - Geotechnical
- **Equipment Supply Contract**
- **Construction Contract**
  - Subtrades: electrical, mechanical, geotechnical, systems
- **Operation/Maintenance Contract:** Subtrades: cleaning; landscaping
- **Organic Waste (feedstock) Supply Contract**
  - Trucking Contract
- **Power Sale Contract**

Numerous Simultaneously-Acting Laws

- Each of these Contracts are separate private "laws" –
  - Each define rights and obligations of people involved in Project, but contracts are not always harmonious with each other and conflicts may arise, especially among parties with differing interests
  - Participants in the contract "ecosystem" need to be aware of how other contracts and relationships may impact their portion of the work
- In addition to the Contract, all of the other laws (criminal; zoning; safety; speeding) continue to apply
- Rule: just because one law or set of laws applies does not mean that other laws don't still apply
  - E.g. OJ Simpson – criminal law and civil law

Contracts are Private Laws

- **Contracts are special laws because, unlike most other laws:**
  - Contract laws are created by two or more persons that want to "do a deal" **(freedom to contract)**
  - Contracts contain one or more "contract laws" or "agreements" between the signing parties (can be simple - one page, or incredibly complex - thousands of pages)
  - The Contract defines the binding rights and obligations of the parties with are applicable to their business relationship– i.e. applicable "laws"
  - Contract laws generally only apply to the Contract parties **(privity of contract)**
  - **But:**
    - If one party to the Contract fails to live up to its obligations then the aggrieved party can go to court and just like the breach of any other law, the courts and the government will enforce the innocent party's rights
    - Another But:
      - Courts are generally reluctant to force a party to do anything (Specific Performance), so most disputes are resolved by the payment of money by one party to the other as compensation for "damages"

Contracts are Private Laws

- The ability for private persons to make up their own Laws, and have them enforced by the courts, is very powerful
- This means that, with knowledge of the rules of Contracts, parties can make the law work to their personal benefit - this allows for flexibility and creativity in the marketplace and the community, as well as certainty around expectations
- Without such knowledge, a party can enter agreements to their detriment, and potentially expose their entire business to significant risk

How are these Project Contracts Formed?

- What are the key principles of Contract Formation?

Contract formation

- Classically a Contract is formed when **three** elements come together:
    1. a person(s) makes an **OFFER** to another person(s) with the intention of forming a Contract;
    2. the OFFER is **ACCEPTED** by the other person(s);
    3. the Offer and Acceptance include the promise of some payment or benefit or performance in exchange for the Offer (**CONSIDERATION**)

Contract formation – the Offer

- Must be a proposal intended as an offer that when accepted will lead to a Contract
  - The offer does not need to include the word “offer”
  - The offer does not need to be in writing
    - Can be in writing
    - Can be oral
    - Can be email
    - Can be combination of some or all of these – e.g. a chain of communications can amount to an offer

Contract formation – Advertisements

- Not all communications about a possible contract are “Offers”
- An Advertisement, even with a price defined, is generally not an offer – it is an invitation for an interested party to make an offer

Contract formation – Acceptance

- A Contract is not formed unless and until the other party accepts the Offer
- In order to be valid the Acceptance must be on the same terms as the Offer:
  - An Offer may specify the method of acceptance - eg require that the Acceptance must be in a prescribed form; or be delivered to a specified address; or be in writing or by email etc. – to be valid the Acceptance must meet the conditions of the Offer
  - The Acceptance cannot be on different terms than the Offer – ie the Acceptance cannot "accept" the Offer but modify any term
  - The Offer must be outstanding at the time of Acceptance

Contract formation – Acceptance – Immediately creates Contract

- An Offer can be withdrawn at any time before it is accepted – but once it is accepted then the Contract is formed, and both parties are bound – it is too late to have second thoughts

Contract formation – Counter Offer

- If an interested party who receives an Offer does not accept it completely but instead changes some of the terms of the Offer, then:
  - The reply is characterized as a “Counter Offer”; and
  - The original Offer is no longer valid and outstanding

Contract formation – Crossing Offers

- In modern commercial negotiations each side is often making offers containing the terms and conditions that it would prefer
- So it is common for each side to be effectively sending “Offers” to the other party simultaneously – responding back and forth with offers will not lead to a finalized Contract
- But if during that exchange at any time one party accepts the others latest Offer then a Contract will spring to life
- If you don’t intend to make offers that might become contracts, be careful to make that very obvious by using appropriate words (e.g. “this is not an offer”)

Consideration – a word

- In most engineering contracts "Consideration" is not an issue because usually the Contract relates to the supply or performance of goods (equipment or materials) or professional services or construction work
- The promise to supply or provide or perform in exchange for payment is sufficient Consideration
- To make sure there is never an issue over Consideration we frequently and routinely insert words at the start of a Contract to "create" no matter what other terms are in the Contract:
  - *"In consideration for the payment of $10.00 and other good and valuable consideration, the receipt and sufficiency thereof is hereby acknowledged, the parties agree as follows:"*

Freedom to Contract – Capacity, Consent, Lawful Purpose

- While our law gives parties broad freedom to contract on the terms they wish:
  - Each party must have the ability, or **CAPACITY**, to understand the terms and nature of the Contract
    - Anyone with a developmental disability, impaired judgment, or who is under the age of majority in Canada (18 or 19 years) does not have the capacity to enter into a valid contract .
  - Each party involved in the contract must also freely **CONSENT**, or agree, to the terms in the agreement
    - There are some situations that may prevent consent from occurring:
      - misrepresentation
      - mistake
      - undue influence
      - duress
  - Finally, every contract that is negotiated in Canada must have a **LAWFUL PURPOSE** or objective; i.e. no contract can violate any provision of the Criminal Code in Canada or any provincial law or municipal bylaw.
    - (e.g. agreements to commit crimes - human trafficking, money laundering/tax evasion, illegal dumping of waste etc.)

Misrepresentation

- **Misrepresentation** is a false statement about a material fact that is so important that it causes the other person to enter a contract.
- It makes genuine consent impossible.
- **Innocent misrepresentation** occurs when a person incorrectly believes something to be true. (e.g. a sales clerk repeats a manufacturer's false claim about a product).
- **Fraudulent misrepresentation** occurs when one party tries to deceive the other on purpose. (e.g. a person intentionally lies about his or her car in an effort to sell it.)
- **Both types** of misrepresentation allow a buyer, or offeree, to back out of a contract.

Mistake

- Certain types of mistakes can make a contract unenforceable by law.
- A **common mistake** occurs when an error is made by both parties in the contract.
  - (e.g. an agreement is made to purchase a product that is out of stock indefinitely).
- An **unilateral mistake** is when one party to the contract made a mistake, and the other party knew of it but did not try to correct it.
  - (e.g. buying a product to use for a purpose it was not intended for; the clerk is aware the product will not work for that purpose but does not say anything).
- A **clerical mistake** is an error caused by a clerk or store employee. Clerical mistakes often involve numbers, such as incorrect prices.

Undue Influence & Duress

- When one party applies pressure on the other (e.g. an aggressive salesperson) to form a contract, this is **undue influence**.
- Any contract that is formed with undue influence **lacks proper consent** and will be declared void.
- **Duress** is similar to undue influence. When one party uses threats, such as blackmail, or violence to intimidate the other party into forming a contract, that agreement would also be cancelled.

Contract Amendments

- In the same way that the law gives contracting parties freedom to select the terms of their private Contract, the law also gives contracting parties the freedom to amend their contracts, pretty much as they might choose.
- Once an amendment is agreed by the parties then it is enforceable
- Parties need to be careful not to inadvertently amend
- Amendment can be oral even if original Contract was in writing, EXCEPT if the original Contract specified the form or amendment

Discharging a Contract

- Once a contract has been successfully agreed upon, there can be several different ways to discharge, or end it:
  - Performance
  - Mutual agreement
  - Impossibility of performance
  - Breach of contract

Performance & Mutual Agreement

- The most common way to discharge a contract is through **performance**.
- Simply put, one or both parties fulfill their obligations under the contract.
- A contract may also be discharged if the parties involved **mutually agree** to end it.
- Various factors may exist for the parties to end a contract through mutual agreement. For example, they may agree to terminate the current contract in favour of a newer one with different or additional terms.

Impossibility & Force Majeure

- **Frustration of contract** occurs when the terms of a contract become **impossible** to fulfill.
- Over the years, Canadian courts have excused one or both parties from contracts if it can be proven that certain circumstances prevent them from performing their part of the agreement.
- For example, a music promoter may have to cancel or reschedule a concert if it is rained out.
- Many contracts contemplate what will happen (suspension of schedule, termination, etc.) if a project cannot continue as a result of '**force majeure**' or unforeseeable circumstances or events that prevent a party from fulfilling its obligations
  - (e.g. War, riots, earthquakes, hurricanes, lightning, explosions, energy blackouts, unexpected legislation, strikes and lockouts)

Breach of Contract

- Failing to perform an obligation owed to another party is a **breach of contract**.
- The failure to perform a specific and essential term of a contract is called a breach of condition or a breach of warranty.
- A breach generally allows the innocent party to claim "damages" (extra payment/reduction of price) – sometimes if it is sufficiently severe it may (but not always) allow the innocent party to terminate the contract

Remedies

- If a breach of contract occurs, the following remedies may be available:

1. Damages: awarded to compensate the injured party in the contract. This may take the form of liquidated damages — a sum of money specified in a contract to settle a breach.
2. Specific performance: the court may order a party to fulfill the terms of a contract.
3. Injunctions: the opposite of performance; one party is ordered by the court not to do something.
4. Rescission: the court may order the contract to be cancelled.
5. Other – Schedule extension

Duty of Honesty and Good Faith - *Bhasin v. Hrynew*

- In November 2014, the Supreme Court of Canada released their decision in ***Bhasin v. Hrynew***, setting out a duty of honest performance in contract law.
- **Facts:**
  - Can-am sold education savings plans ("**ESPs**") through its brokers, including B and H, who were contractually engaged with Can-am to sell only Can-am ESPs.
  - H desired to take-over B's business and worked with Can-am toward that goal.
  - H was appointed by Can-am as the individual responsible for auditing its brokers, including B, thus giving him access to private information on B's business.
  - B protested both the merger and H's appointment as auditor and in its responses, Can-am lied to B about the nature of H's role and about its plans for merging B's business with H's.
  - As per the termination provision of the contract between Band Can-am, Can-am elected not to renew by giving notice six months before the 3-year contract was set to expire.
  - B lost nearly the entire value of his business as a result.

New Duty of Honesty Imposed by Supreme Court

- What the new duty is:
  - The Supreme Court found Can-am liable to B by imposing a new general duty of honesty in contractual performance.
  - The newly imposed duty of honesty means that parties must not lie or otherwise knowingly mislead each other about matters directly linked to the performance of the contract.
  - This duty applies to all contracts and cannot be excluded by contract, though the parties may expressly agree on the standards to which performance of this duty is to be measured if those standards are not manifestly unreasonable and respect the core duty.
- What the duty is not:
  - This is not a duty of good faith or loyalty, so does not require a party to forego advantages flowing from the contract.
  - It also does not require disclosure of material facts, even relating to a decision to terminate the contract.
- What is the remedy for a breach of the duty?
  - Damages for breach of the duty of honesty will be calculated on the basis of what the injured party's economic position would have been had the duty not been breached.
- Resolution in *Bhasin v Hrynew*
  - As Can-am had lied and misled Mr. Bhasin, in particular in regards to its intentions to renew or not, it had breached its duty of honesty to him about its contractual performance.
  - As a result, Mr. Bhasin was entitled to be put in the position he would have been in had the breach not occurred. In this case, the court found he would have taken steps to protect his business, therefore the damages award was for the value of his business before termination, or $87,000.

Good Faith Recognized as an Organizing Principle Governing Contractual Performance

- Recognition of good faith as organizing principle
  - Principle is that parties generally must perform their contractual duties honestly and reasonably and not capriciously or arbitrarily.
  - Principle means that a contracting party should have "appropriate regard" for the legitimate contractual interests of the contracting partner.
  - What is "appropriate regard" depends on the relationship, but it will require a party to not seek to undermine the contracting partner's interests in bad faith.
- Explicit in certain situations (such as tender)
  - The principle currently operates in certain contexts where the law requires honest, candid, forthright or reasonable contractual performance.
  - Current contexts in which such a duty can apply: employment, insurance, tendering.
- Court open to expansion of situations where duty of good faith applies
  - However, the principle is not limited to the above contexts. It can, and likely will, be found to apply to new contexts; as the SCC noted, the duty "should be developed where the existing law is found to be wanting".
  - SCC specifically mentioned long-term contracts of mutual cooperation as a context where the organizing principle of good faith may call for an understanding of what honest and reasonableness require so as to give appropriate consideration to the legitimate interests of both contracting parties.
  - This, coupled with the recognition that the duty to treat tenderers fairly is grounded in this newly defined good faith principle, may indicate that long-term construction contracts will be an area where the Court would be open to the argument that a general duty of good faith should apply.

Some Practical Tips on Contract Formation:

- In most engineering-related Contracts there are three "core" issues that must be addressed:
  - Scope ("what?")
  - Pricing ("how much?")
  - Schedule ("when?")



Scope of Work, Services, and Supply

- What are you doing? Extent of responsibility
- Often part of Technical Specifications
  - Our Project - Design, Build and Operate an Organic Waste/Biogas Recovery and Power Generation Plant in accordance with the owner's technical specification and requirements

Pricing

- Fixed price?
- Cost-plus?
- Unit Price?
- Must consider pricing structure(s) in the context of:
  - Type of the project
  - Scope of the work
  - Scheduling limitations/needs
- Pricing structure can affect the practical implications of delay claims:
  - Impact of a delay claim under fixed-price can be very different than under cost-plus
  - Our Project – Fixed $250m plus $500K /month during the operating period

Schedule

- Too simplistic to just include start and finish dates
- Must identify:
  - Truly critical drop-dead interim dates, if any
  - Any critical interfaces with other activities or related projects (e.g., Olympics)
- Our Project - Sign contract in January 2020; obtain environmental permits, complete design and begin construction by April 2020; complete construction June 2021; operate until end of May 2046
  - Plus Detailed Work Schedule setting out critical path obligations etc.

Multiple Legal Specialties

- In addition to general Contract law considerations, each Contract may incorporate clauses which open up discrete legal issues such as:
  - Tax
  - Intellectual Property
  - Insurance
  - Employment
  - Occupational Health & Safety
  - Environmental Regulatory
  - First Nations Rights
- One advantage of engaging a large international legal firm is access to all the specialized legal knowledge under the same umbrella

Some Observations on Legal "Problem" Points:

- Engineers extrapolate and interpolate – good approach in engineering – usually a bad idea in law – relying on common sense to identifying legal issues and risk is usually not very helpful
- Statutes and Common Law provide the legal framework
  - Law is ever changing
    - The outcome of recent cases or 'precedent'
    - New legislation or amending or repealing of existing legislation
  - There is also a concept called Equity – (Don't ask…)
- Legal interpretation of statutes or cases are subject to complex set of interpretation rules – often to balance competing objectives and interests – (free speech vs libel and slander and hate literature; free use of property vs regulation of tree-cutting)

A Word on Standard Form Contracts

- Canadian Construction Documents Committee (CCDC)
- Association of Consulting Engineering Companies (ACEC)
- Usual to add Contract-specific modifications
  - Savvy owners will hire lawyers to revise or add conditions to standard forms for their benefit
  - You might not be able to depend on getting the standard engineer-friendly form, and may need to push back to protect your interests and limit risk

Merry Christmas from your lawyer...

Contracts 101 Cases

- **Payne v Cave (1789)**
- The defendant made the highest bid for the plaintiff's goods at an auction sale, but he withdrew his bid before the fall of the auctioneer's hammer. It was held that the defendant was not bound to purchase the goods. His bid amounted to an offer which he was entitled to withdraw at any time before the auctioneer signified acceptance by knocking down the hammer. Note: The common law rule laid down in this case has now been codified in s57(2) Sale of Goods Act 1979.
- **Fisher v Bell (1960)**
- A shopkeeper displayed a flick knife with a price tag in the window. The Restriction of Offensive Weapons Act 1959 made it an offence to 'offer for sale' a 'flick knife'. The shopkeeper was prosecuted in the magistrates' court but the Justices declined to convict on the basis that the knife had not, in law, been 'offered for sale'.
- This decision was upheld by the Queen's Bench Divisional Court. Lord Parker CJ stated:
  - "It is perfectly clear that according to the ordinary law of contract the display of an article with a price on it in a shop window is merely an invitation to treat. It is in no sense an offer for sale the acceptance of which constitutes a contract."

- **PSGB v Boots (1953)**
- The defendants' shop was adapted to the "self-service" system. The question for the Court of Appeal was whether the sales of certain drugs were effected by or under the supervision of a registered pharmacist. The question was answered in the affirmative. Somervell LJ stated that "in the case of an ordinary shop, although goods are displayed and it is intended that customers should go and choose what they want, the contract is not completed until, the customer having indicated the articles which he needs, the shopkeeper, or someone on his behalf, accepts that offer. Then the contract is completed."
- **Partridge v Crittenden (1968)**
- It was an offence to offer for sale certain wild birds. The defendant had advertised in a periodical 'Quality Bramblefinch cocks, Bramblefinch hens, 25s each'. His conviction was quashed by the High Court. Lord Parker CJ stated that when one is dealing with advertisements and circulars, unless they indeed come from manufacturers, there is business sense in their being construed as invitations to treat and not offers for sale. In a very different context Lord Herschell in *Grainger v Gough (Surveyor of Taxes)* [1896] AC 325, said this in dealing with a price list:

  "The transmission of such a price list does not amount to an offer to supply an unlimited quantity of the wine described at the price named, so that as soon as an order is given there is a binding contract to supply that quantity. If it were so, the merchant might find himself involved in any number of contractual obligations to supply wine of a particular description which he would be quite unable to carry out, his stock of wine of that description being necessarily limited."

- **Carlill v Carbolic Smoke Ball Co (1893)**
- An advert was placed for 'smoke balls' to prevent influenza. The advert offered to pay £100 if anyone contracted influenza after using the ball. The company deposited £1,000 with the Alliance Bank to show their sincerity in the matter. The plaintiff bought one of the balls but contracted influenza. It was held that she was entitled to recover the £100. The Court of Appeal held that:
  a) the deposit of money showed an intention to be bound, therefore the advert was an offer;
  b) it was possible to make an offer to the world at large, which is accepted by anyone who buys a smokeball;
  c) the offer of protection would cover the period of use; and
  d) the buying and using of the smokeball amounted to acceptance.
- **Harvey v Facey (1893)**
- The plaintiffs sent a telegram to the defendant, "Will you sell Bumper Hall Pen? Telegraph lowest cash price".
- The defendants reply was "Lowest price £900".
- The plaintiffs telegraphed "We agree to buy… for £900 asked by you".
- It was held by the Privy Council that the defendants telegram was not an offer but simply an indication of the minimum price the defendants would want, if they decided to sell. The plaintiffs second telegram could not be an acceptance.

- **Gibson v MCC (1979)**
- The council sent to tenants details of a scheme for the sale of council houses. The plaintiff immediately replied, paying the £3 administration fee.
- The council replied: "The corporation may be prepared to sell the house to you at the purchase price of £2,725 less 20 per cent. £2,180 (freehold)."
- The letter gave details about a mortgage and went on "This letter should not be regarded as a firm offer of a mortgage. If you would like to make a formal application to buy your council house, please complete the enclosed application form and return it to me as soon as possible." G filled in and returned the form. Labour took control of the council from the Conservatives and instructed their officers not to sell council houses unless they were legally bound to do so. The council declined to sell to G.
- In the House of Lords, Lord Diplock stated that words italicised seem to make it quite impossible to construe this letter as a contractual offer capable of being converted into a legally enforceable open contract for the sale of land by G's written acceptance of it. It was a letter setting out the financial terms on which it may be the council would be prepared to consider a sale and purchase in due course.

- **Harvela v Royal Trust (1985)**
- Royal Trust invited offers by sealed tender for shares in a company and undertook to accept the highest offer. Harvela bid $2,175,000 and Sir Leonard Outerbridge bid $2,100,000 or $100,000 in excess of any other offer. Royal Trust accepted Sir Leonard's offer. The trial judge gave judgment for Harvela.
- In the House of Lords, Lord Templeman stated: "To constitute a fixed bidding sale all that was necessary was that the vendors should invite confidential offers and should undertake to accept the highest offer. Such was the form of the invitation. It follows that the invitation upon its true construction created a fixed bidding sale and that Sir Leonard was not entitled to submit and the vendors were not entitled to accept a referential bid."
- **Blackpool Aero Club v Blackpool Borough Council (1990)**
- BBC invited tenders to operate an airport, to be submitted by noon on a fixed date. The plaintiffs tender was delivered by hand and put in the Town Hall letter box at 11am. However, the tender was recorded as having been received late and was not considered. The club sued for breach of an alleged warranty that a tender received by the deadline would be considered. The judge awarded damages for breach of contract and negligence. The council's appeal was dismissed by the Court of Appeal.

- **Brogden v MRC (1877)**
- B supplied coal to MRC for many years without an agreement. MRC sent a draft agreement to B who filled in the name of an arbitrator, signed it and returned it to MRC's agent who put it in his desk. Coal was ordered and supplied in accordance with the agreement but after a dispute arose B said there was no binding agreement.
- It was held that B's returning of the amended document was not an acceptance but a counter-offer which could be regarded as accepted either when MRC ordered coal or when B actually supplied. By their conduct the parties had indicated their approval of the agreement.
- **Gibson v MCC (1979)**
- Lord Denning said that one must look at the correspondence as a whole and the conduct of the parties to see if they have come to an agreement.

- **Trentham v Luxfer (1993)**
- T built industrial units and subcontracted the windows to L. The work was done and paid for. T then claimed damages from L because of defects in the windows. L argued that even though there had been letters, phone calls and meetings between the parties, there was no matching offer and acceptance and so no contract.
- The Court of Appeal held that the fact that there was no written, formal contract was irrelevant, a contract could be concluded by conduct. Plainly the parties intended to enter into a contract, the exchanges between them and the carrying out of instructions in those exchanges, all supported T's argument that there was a course of dealing between the parties which amounted to a valid, working contract. Steyn LJ pointed out that:
  a) The courts take an objective approach to deciding if a contract has been made.
  b) In the vast majority of cases a matching offer and acceptance will create a contract, but this is not necessary for a contract based on performance.

- **Hyde v Wrench (1840)**
- 6 June W offered to sell his estate to H for £1000; H offered £950.
- 27 June W rejected H's offer.
- 29 June H offered £1000. W refused to sell and H sued for breach of contract.
- Lord Langdale MR held that if the defendant's offer to sell for £1,000 had been unconditionally accepted, there would have been a binding contract; instead the plaintiff made an offer of his own of £950, and thereby rejected the offer previously made by the defendant. It was not afterwards competent for the plaintiff to revive the proposal of the defendant, by tendering an acceptance of it; and that, therefore, there existed no obligation of any sort between the parties.
- **Stevenson v McLean (1880)**
- On Saturday, the defendant offered to sell iron to the plaintiff at 40 shillings a ton, open until Monday. On Monday at 10am, the plaintiff sent a telegram asking if he could have credit terms. At 1.34pm the plaintiff sent a telegram accepting the defendant's offer, but at 1.25pm the defendant had sent a telegram: 'Sold iron to third party' arriving at 1.46pm. The plaintiff sued the defendant for breach of contract and the defendant argued that the plaintiff's telegram was a counter-offer so the plaintiff's second telegram could not be an acceptance.
- It was held that the plaintiff's first telegram was not a counter-offer but only an enquiry, so a binding contract was made by the plaintiff's second telegram.

- **Butler Machine Tool v Ex-Cell-O Corporation (1979)**
- The plaintiffs offered to sell a machine to the defendants. The terms of the offer included a condition that all orders were accepted only on the sellers' terms which were to prevail over any terms and conditions in the buyers' order.
- The defendants replied ordering the machine but on different terms and conditions. At the foot of the order was a tear-off slip reading, "We accept your order on the Terms and Conditions stated thereon." The plaintiffs signed and returned it, writing, "your official order… is being entered in accordance with our revised quotation… ".
- The Court of Appeal had to decide on which set of terms the contract was made. Lord Denning M.R. stated:
  - In many of these cases our traditional analysis of offer, counter-offer, rejection, acceptance and so forth is out-of-date. This was observed by Lord Wilberforce in *New Zealand Shipping Co Ltd v AM Satterthwaite*. The better way is to look at all the documents passing between the parties and glean from them, or from the conduct of the parties, whether they have reached agreement on all material points, even though there may be differences between the forms and conditions printed on the back of them. As Lord Cairns L.C. said in *Brogden v Metropolitan Railway Co* (1877):
    - … there may be a consensus between the parties far short of a complete mode of expressing it, and that consensus may be discovered from letters or from other documents of an imperfect and incomplete description.
  - Applying this guide, it will be found that in most cases when there is a "battle of forms" there is a contract as soon as the last of the forms is sent and received without objection being taken to it. Therefore, judgment was entered for the buyers.

- **GNR v Witham (1873)**
- GNR advertised for tenders for the supply of stores and W replied 'I undertake to supply the company for 12 months with such quantities as the company may order from time to time'. GNR accepted this tender and placed orders which W supplied. When W later refused to supply it was held that W's tender was a standing offer which GNR could accept by placing an order. W's refusal was a breach of contract but it also revoked W's standing offer for the future, so W did not have to meet any further orders.
- **Lord Denning in Entores v Miles Far East Corp (1955)**
- If a man shouts an offer to a man across a river but the reply is not heard because of a plane flying overhead, there is no contract. The offeree must wait and then shout back his acceptance so that the offeror can hear it.
- **Powell v Lee (1908)**
- The plaintiff applied for a job as headmaster and the school managers decided to appoint him. One of them, acting without authority, told the plaintiff he had been accepted. Later the managers decided to appoint someone else. The plaintiff brought an action alleging that by breach of a contract to employ him he had suffered damages in loss of salary. The county court judge held that there was no contract as there had been no authorised communication of intention to contract on the part of the body, that is, the managers, alleged to be a party to the contract. This decision was upheld by the King's Bench Division.

- **Felthouse v Bindley (1862)**
- The plaintiff discussed buying a horse from his nephew and wrote to him “If I hear no more about him, I consider the horse mine… ” The nephew did not reply but wanted to sell the horse to the plaintiff, and when he was having a sale told the defendant auctioneer not to sell the horse. By mistake the defendant sold the horse. The plaintiff sued the defendant in the tort of conversion but could only succeed if he could show that the horse was his.
- It was held that the uncle had no right to impose upon the nephew a sale of his horse unless he chose to comply with the condition of writing to repudiate the offer. It was clear that the nephew intended his uncle to have the horse but he had not communicated his intention to his uncle, or done anything to bind himself. Nothing, therefore, had been done to vest the property in the horse in the plaintiff. There had been no bargain to pass the property in the horse to the plaintiff, and therefore he had no right to complain of the sale.

- **Entores v Miles Far East Corp (1955)**
- The plaintiffs in London made an offer by Telex to the defendants in Holland.
- The defendant’s acceptance was received on the plaintiffs’ Telex machine in London. The plaintiffs sought leave to serve notice of a writ on the defendants claiming damages for breach of contract. Service out of the jurisdiction is allowed to enforce a contract made within the jurisdiction. The Court of Appeal had to decide where the contract was made.
- Denning L.J. stated that the rule about instantaneous communications between the parties is different from the rule about the post. The contract is only complete when the acceptance is received by the offeror: and the contract is made at the place where the acceptance is received. The contract was made in London where the acceptance was received. Therefore service could be made outside the jurisdiction.

- **The Brimnes (1975)**
- The defendants hired a ship from the plaintiff shipowners. The shipowners complained of a breach of the contract. The shipowners sent a message by Telex, withdrawing the ship from service, between 17.30 and 18.00 on 2 April. It was not until the following morning that the defendants saw the message of withdrawal on the machine.
- Edmund-Davies L.J. agreed with the conclusion of the trial judge. The trial judge held that the notice of withdrawal was sent during ordinary business hours, and that he was driven to the conclusion either that the charterers' staff had left the office on April 2 'well before the end of ordinary business hours' or that if they were indeed there, they 'neglected to pay attention to the Telex machine in the way they claimed it was their ordinary practice to do.'
- He therefore concluded that the withdrawal Telex must be regarded as having been 'received' at 17.45 hours and that the withdrawal was effected at that time.
  - Note: Although this is a case concerning the termination of a contract, the same rule could apply to the withdrawal and acceptance of an offer.

- **Brinkibon v Stahag Stahl (1983)**
- The buyers, an English company, by a telex, sent from London to Vienna, accepted the terms of sale offered by the sellers, an Austrian company. The buyers issued a writ claiming damages for breach of the contract.
- The House of Lords held that the service of the writ should be set aside because the contract had not been made within the court's jurisdiction. Lord Wilberforce stated that the present case is, as Entores itself, the simple case of instantaneous communication between principals, and, in accordance with the general rule, involves that the contract (if any) was made when and where the acceptance was received. This was in Vienna.
- **Adams v Lindsell (1818)**
- 2 Sept. The defendant wrote to the plaintiff offering to sell goods asking for a reply "in the course of post".
- 5 Sept. The plaintiff received the letter and sent a letter of acceptance.
- 9 Sept. The defendant received the plaintiff's acceptance but on 8 Sept had sold the goods to a third party.
- It was held that a binding contract was made when the plaintiff posted the letter of acceptance on 5 Sept, so the defendant was in breach of contract.

- **Household v Grant (1879)**
- G applied for shares in the plaintiff company. A letter of allotment of shares was posted but G never received it. When the company went into liquidation G was asked, as a shareholder, to contribute the amount still outstanding on the shares he held. The trial judge found for the plaintiff.
- The Court of Appeal affirmed the judgment. Thesiger LJ stated that "Upon balance of conveniences and inconveniences it seems to me… it was more consistent with the acts and declarations of the parties in this case to consider the contract complete and absolutely binding on the transmission of the notice of allotment through the post, as the medium of communication that the parties themselves contemplated, instead of postponing its completion until the notice had been received by the defendant."
- **Holwell Securities v Hughes (1974)**
- The defendant gave the plaintiff an option to buy property which could be exercised "by notice in writing". The plaintiffs posted a letter exercising this option but the letter was lost in the post and the plaintiffs claimed specific performance. The Court of Appeal held that the option had not been validly exercised. Lawton LJ stated that the plaintiffs were unable to do what the agreement said they were to do, namely, fix the defendant with knowledge that they had decided to buy his property. There was no room for the application of the postal rule since the option agreement stipulated what had to be done to exercise the option.

- **Tinn v Hoffman (1873)**
- Acceptance was requested by return of post. Honeyman J said: "That does not mean exclusively a reply by letter or return of post, but you may reply by telegram or by verbal message or by any other means not later than a letter written by return of post."
- **Yates v Pulleyn (1975)**
- The defendant granted the plaintiff an option to buy land, exercisable by notice in writing to be sent by "registered or recorded delivery post". The plaintiff sent a letter accepting this offer by ordinary post, which was received by the defendant who refused to accept it as valid.
- It was held that this method of acceptance was valid and was no disadvantage to the offeror, as the method stipulated was only to ensure delivery and that had happened.

- **R v Clarke (1927) (Australia)**
- The Government offered a reward for information leading to the arrest of certain murderers and a pardon to an accomplice who gave the information. Clarke saw the proclamation. He gave information which led to the conviction of the murderers. He admitted that his only object in doing so was to clear himself of a charge of murder and that he had no intention of claiming the reward at that time. He sued the Crown for the reward. The High Court of Australia dismissed his claim. Higgins J stated that:
  - "Clarke had seen the offer, indeed; but it was not present to his mind – he had forgotten it, and gave no consideration to it, in his intense excitement as to his own danger. There cannot be assent without knowledge of the offer; and ignorance of the offer is the same thing whether it is due to never hearing of it or forgetting it after hearing."
- **Williams v Carwardine (1833)**
- The defendant offered a reward for information leading to the conviction of a murderer. The plaintiff knew of this offer and gave information that it was her husband after he had beaten her, believing she had not long to live and to ease her conscience. It was held that the plaintiff was entitled to the reward as she knew about it and her motive in giving the information was irrelevant.

Thank you

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APSC 450

Introduction to Torts

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ATAC LAW

Introduction

- Who are you?
  - Engineers, computer scientists
- Why are you here?
  - Avoid lawsuits, advance your career, be true professionals
- Who am I?
  - Background, ATAC LAW, Teaching
- Why am I here?
  - Engineering Law class and fear of presentations

ATAC LAW

Topics of Law in this Course

- The Legal System
- Torts
- Torts – Negligence
- Criminal Law
- Contract Law
- Employment Law
- Intellectual Property Law
- Environmental Law
- Aboriginal Law
- Business Law

ATAC LAW

So I saw it on Suits…

ATAC LAW

Common Law

- Judge-made law developed case-by-case ("caselaw") which originated in England when the common people started to gain rights
- Common law regulates conduct mostly between the people (as opposed to btwn ppl and the state)
- Finding common law: found in "cases" e.g Jones v. Smith.
- Judges decide how the case should turn out and that sets a "precedent" for future cases should turn out.

ATAC LAW

Important Terms in Law

- Plaintiff: the person who makes a claim in a lawsuit - π
- Defendant: the person being sued by the plaintiff - Δ
- Appeal: an action a person can take when they have lost a lawsuit to have the case considered by a higher level of court
- Appellant: the person who brings an appeal; the person who lost the original lawsuit

ATAC LAW

Important Terms in Law 2

- Respondent: the person who defends against the appeal; the person who won the original lawsuit
- Action: a court proceeding; a lawsuit
- Damages: an amount of money awarded by a court to make up for a loss
- Personal Property: almost anything that has a value and is not real estate or related to real estate (also called chattels)

ATAC LAW

Torts vs crimes

- A **tort** is a wrongdoing that involves a breach of a civil duty owed to another party
- A **crime** is a wrongdoing that involves a breach of a duty prescribed by the state
- Some breaches can be both, e.g. a punch is
  - Tort of battery between the parties
  - Crime of assault between the punch thrower and the state

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Elements of a tort (generally)

1. Breach of an established common law duty
2. Intent (usually)
   If intent not required, then some other standard may apply such as strict liability* in nuisance (e.g. pollution)
3. Harm or loss or damage

*Strict liability simply means that intent is not required to find a person guilty of doing the prohibited thing.

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Purpose of tort law

- Restoration and compensation
- To put the plaintiff back in the position they were in before the tort occurred
- Can't get more out of law suit than that which you had before the harm occurred
- Compensation is by an award of "damages" (money)
- For egregious conduct, courts sometimes award *aggravated* or *punitive damages*

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Burden of Proof

- Plaintiff has the burden of proof
- Burden of proof : “on a balance of probabilities”, in other words, more than 50% likelihood
- Criminal law: beyond a reasonable doubt – much higher standard

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List of torts

Intentional Torts

- Assault (threats)
- Battery (physical contact)
- False Imprisonment
- Intentional infliction of nervous shock
- Conversion (stealing)
- Intentional Interference with Contractual Relations

Other Torts

- Defamation
- Nuisance
- Trespass to Land, Chattels
- Passing off
- False imprisonment
- Negligence

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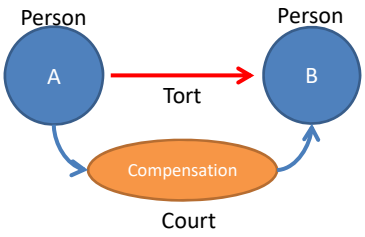
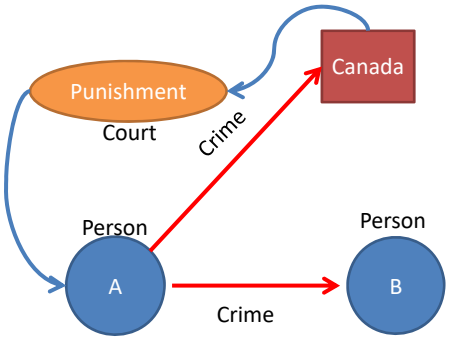
Torts vs Crimes

Torts (Civil proceedings)



Crimes (Criminal proceedings)



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Summary: Torts vs Crimes

	Tort	Crime
	Private, focus on plaintiff	Public, focus on offender
Purpose	Restoration, compensation, putting the individual back into the place they were before	Punish those who have committed offences under the criminal code, prevent repeat offenses, and deter others from committing
Procedural difference	Prosecution(suing) by plaintiff	Prosecution by state
Burden of proof	case must be proven on a balance of probabilities (>50% is sufficient)	Heavy – establish guilt of the accused beyond a reasonable doubt
Case Nomenclature	*Person Name v. Person Name*	*R (Regina, The Queen) v. Person Name*

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Torts – Example question

- Scenario: The Bourne Chop

> Danielle and Peter are watching the new Bourne movie. Peter is texting his friends about how great the movie is. The sound and light of Peter's phone annoys Danielle, who sits behind Peter. Feeling like she might be related to Jason Bourne, Danielle karate chops Peter in the head causing him to drop and break his phone. Peter suffered no injuries (other than to his ego).

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Torts – Example Question

- Scenario: The Bourne Chop
  - What can Peter do?
  - Who needs to prove what happened?
  - How convinced does the judge need to be?
  - What will Peter get if he wins?
  - For bonus points: *should* Peter sue?

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Torts – Example question #2

- Scenario: The Tortious Engineer

EngBob is a geotechnical engineer working for the Owner who intends to build a house on a hilly property. The Owner engages a contractor Mr. Hardy to do the excavation work to flatten the hills. EngBob notices that Mr. Hardy has no clue how to excavate. Mr. Hardy tells EngBob that he is doing extra work just so that he can bill the Owner for the extra work. EngBob then writes a letter to the Owner telling the Owner about Mr. Hardy's poor workmanship. EngBob also writes that Mr. Hardy is taking advantage of the Owner. The Owner cancels Mr. Hardy's contract and hires someone else. Mr. Hardy sues EngBob.

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Torts – Example Question #2

- Scenario: The Tortious Engineer
  - What could Mr. Hardy Sue EngBob for?
  - What are the elements of the tort(s)?
  - What damages would EngBob be responsible for if Mr. Hardy was successful?
  - Bonus: what will likely happen?

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Thank you

Introduction to Torts

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PROFESSIONAL NEGLIGENCE

Karen Martin and Geoff Bowman, Partners

UBC: APSC 450

Fall 2019

Overview

1) Liability for Professional Engineers
2) Professional Negligence Req’mt #1: Duty of Care
3) Professional Negligence Req’mt #2: Breach of Duty
4) Negligent Misrepresentation
5) Examples of Professional Negligence by Engineers
6) Negligence of Others
7) Protecting Yourself

Liability for Professional Engineers

- Types of law: public v. private; statutory v. common law
- Engineer may be liable to another person if he or she breached a legal obligation owed to that person
- Examples of legal obligations:
  - Contractual duties
  - Duties under tort law – i.e. assault, trespass, negligence
  - Statutory duties
- Negligence is private law, governed by common law, a tort
- A person will be liable in **negligence** if:
  - He owes a duty of care to another – “neighbor principle”
  - He breaches duty – standard of care - “reasonable person”
  - Damage is suffered

Prof Negligence Req'mt #1 - Duty of Care

- Professionals owe duties of care to:
  - The person they contract with – i.e. clients
  - Persons they don't contract with, if they create a risk of causing injury to person or damage to property
    - Example: *Winnipeg Condo*, 1995 SCC – cladding at risk of falling
- Professionals don't owe a duty of care to persons they don't have a contract with if those persons suffer only an economic loss – with no risk of injury to person or damage to property

Prof. Negligence Req'mt #2 – Breach of Duty

- Engineers must exercise the skill, care and diligence of a **reasonable and prudent** professional engineer in their area of expertise - in that location and at that time
- NO expectation of perfection - standard of an average eng. In similar circumstances
- BUT - if you hold yourself out to a higher standard, you will be held to that standard (i.e. the best, global expert, etc.)
- How is this proved? Often evidence of an expert engineer
- Case study – *N.B. Telephone v. John Maryon Int'l,* 1981 NBQB*:* where engineer knows a project requires expertise he does not have, he has a legal duty to seek guidance and advice from knowledgeable experts

Negligent Misrepresentation

- A type of negligence. Negligent advice
- Requirements:
  - Special relationship btw person making statement and person hearing or reading it (not the world)
  - Statement is untrue, inaccurate, or misleading
  - Person made statement negligently
  - Person receiving statement reasonably relied on it
  - Damage results from that reliance
- Case study: *Edgeworth Construction v N.D. Lea*, 1993 SCC – special relationship btw design engineer and bidding contractors

Prof. Negligence for Engineers - Examples

- During Procurement of a Project:
  - Estimating costs for owners
  - Preparing and administering procurement – tenders, RFPs
- Case studies:
  - *Saxby v Fowler*, 1977 ABCA: it is negligent to prepare a construction cost estimate intending it be relied upon by a client without adequate factual information or by guesswork – it's not a guarantee that the estimate won't be exceeded; but actual cost must be within a reasonable range
  - *Stanco Projects v British Columbia,* 2006 BCCA: Engineer's errors in drafting tender documents. Negligent administration of procurement after bids were submitted – illegal bid shopping. Engineer found liable to owner/client

Prof. Negligence for Engineers - Examples

- Design must be constructible, safe, effective
- Specification of materials - must be suitable
- Design must comply with codes, laws, bylaws, etc.
- Reasonable periodic field inspections must be completed
  - BC Building Code requires engineer's assurance of professional design (that design complies with code) and also a commitment for field review (to confirm construction is in general compliance with the design)
- Case study – *Coast Hotels v Bruskiewich,* 2001 BCSC: Eng. must apply prof. judgment to #/timing of reviews to be able to give assurance work done in accordance with design
  - No defence that contractor or owner limited scope

Negligence of Others

- What if more than one person's negligence contributed to the loss?
  - Other engineers
  - Clients / owners
  - Contractors
- If damage is caused by 2 or more parties' negligence, the court will decide the proportion of responsibility that falls on each person and apportions damages
- Example: *Coast Hotels v Bruskiewich,* 2001 BCSC – *Engineer 20% liable and contractor 80% liable*

Protecting Yourself

- Take care to meet the standard of care – be aware of good practices in your area of expertise - don’t be pressured to cut corners
- You can reduce the risk with contract language
- Exclusion clauses in contracts – agree with client- no liability
- Limitation of liability clauses - limit liability to $ amount, such as to your fees
- Should put disclaimers in your reports – protect against negligent misrepresentation claims by persons other than client – state in the report that it can’t be relied upon except by your client
- Professional Liability Insurance – cover you for negligence

Thank you

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APSC 450

EMPLOYMENT LAW

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Why learn employment law?

- Most of you will be employees
- Employers don't always place nice (and others are unaware)
- Some of you will become employers, managers or entrepreneurs and will be in charge of hiring and firing
- You have many, many rights under employment laws and what you know can help you

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Sources of Employment law

- Legislation
  - For federally regulated industries (e.g. banks, telcoms, airlines, Crown corps, all gov't departments): *Canada Labour Code; Canadian Human Rights Act*
  - For all other employees: BC *Employment Standards Act* & *Regulations*; BC *Human Rights Code*; and
- The Common Law

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BC Employment Standards Act: Minimum standards

- The *Act* says employees are entitled to minimum standards which cannot be contracted out of
  - Wages ($13.85/hr in BC, 2019)
  - Hours and overtime (1.5x for >8hrs; 2x for >12hr)
  - Vacation (1-4 yrs: 2 weeks; 5+ yrs: 3 weeks)
  - Termination and Notice (1 week/yr of service)
  - Statutory holidays and pregnancy leave
- Does not apply to P.Eng or EIT! (but does apply all other "engineers" [but prob. not comp. sci])
- Higher standards in contract are permissible

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Occupational Health and Safety

- WorkSafeBC is aimed at protecting workers and the public from severe H&S risks created by business activities
- Workers have 3 fundamental rights:
  - Right to participate
  - Right to know
  - Right to refuse unsafe work
- For a violation, employer can be investigated and fined or ordered to change behaviour
- If injured while working, cannot sue employer – instead, compensation is through WorkSafeBC

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Human Rights

- *Charter* vs Human Rights legislation
- *Charter,* s. 15(1):
  - "Every individual is equal before and under the law and has the right to the equal protection and equal benefit of the law without discrimination and, in particular, without discrimination based on race, national or ethnic origin, colour, religion, sex, age or mental or physical disability."

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Employee or Independent Contractor?

- Employees are entitled to statutory minimum standards; independent contractors are not
- Tax deductions: employees cannot deduct expenses from their income, contractors can
- For the employer: employees cost far more and require much more administration

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Employee or Independent Contractor?

	Employee	Independent Contractor
Effect on employee/ contractor	-Entitled to statutory minimums (wages, vacation pay, etc) -Cannot deduct expenses -Cannot usually do work for other employers	-No entitlement to statutory minimums -Can deduct business expenses -Can set own hours of work -Can do work for other employers -More expensive: need to buy own equipment/tools
Effect on employer	-Must upload statutory minimums (wages, vacation pay, etc) -Must pay into a number of schemes: Employment insurance, Canada pension plan, Workers compensation -Must withhold employee taxes	-No need to pay vacation, minimum wage, termination notice, etc. -Much easier to hire/fire -Less expensive, less administration -No need to pay into employment schemes

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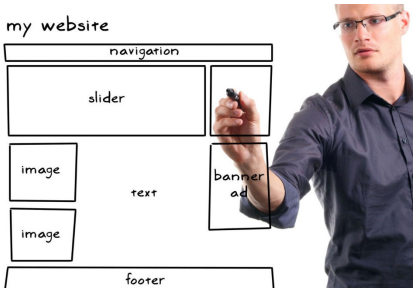
Employee or Independent Contractor?

- Distinguishing factors
  - Control
    - Can they do work for others/control their hours?
  - Ownership of tools
    - Do they have to buy their own equipment?
  - Chance of Profit/loss
    - Is there a chance they can lose money?
  - Integration
    - Is their function key to the business?



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Ending the employment relationship

- Employer can terminate employee with or without cause
- Most termination is <u>without cause</u>: employer has obligation to provide minimum notice, or payment in lieu of notice
- Where termination is with <u>just cause</u>: employer has no requirement to provide notice
- Where **employee resigns**, employee must give reasonable notice (usually 2 weeks)

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Termination: Just cause

- Termination with just cause is rare
- There must be serious misconduct:
  - eg. Theft; sexual harassment of subordinates; cruelty and offensiveness that breaks down the employment relationship; serious safety concerns
- Generally requires a formal warning first
- Consequence to the employee: no notice, no compensation

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Common Law and Employment

- Important principles not found in legislation:
  - Duty to mitigate damages
  - Enforceability of non-competition and non-solicitation agreements
  - Constructive dismissal

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Constructive Dismissal

- An employer can terminate the employment relationship through conduct by either
  - Breaching a fundamental term of the contract
    - Eg. 24 months notice unilaterally reduced to 8 months
  - Conducting itself in a way that makes continued employment intolerable
    - Relocating your office to the mechanical room
- Employee must notify employer of objections
- Employee can then sue employer for wrongful dismissal and obtain compensation in lieu of notice

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Constructive Dismissal

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Duty to Mitigate

- Where employee is claiming wrongful dismissal because of termination or constructive dismissal, employee must seek other employment, otherwise claim may be denied
- Employee must make reasonable efforts
  - Can take some time off to get over shock
  - May have to travel or relocate, depending on circumstances

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Non-competition and Non-solicitation agreements

- Restrictions on your actions that continue *after* employment ends
- Non-solicitation means you cannot talk to clients/customers of your former employer
- Non-competition means you cannot obtain business from clients of your former employer
- Court will only enforce what is *reasonable* as it does not wish to permit restraint of trade

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An example

You are a software engineer working for Hewtsuite, a social media management company located in Vancouver. On the day of your 4-year anniversary at work, you are surprised to find an owl sitting in your boss's chair. The VP says that you will now report to the owl. This was not in your employment contract. In fact, your contract explicitly stated that you would report to a humanoid. Naturally, your performance suffers since you don't speak owl. After enduring two weeks of your boss's hoots, the VP tells you that you are being let go, immediately, for failing to perform. The VP mumbles something about just cause.

After 8 weeks of moping around eating ramen noodles, you apply for, and obtain immediately, a similar position at a competing bird-themed social media company, Tweeter, in San Francisco.

A clause in your contract with Hewtsuite states:
The Employee agrees that during the Employee's employment and for 24 months after termination of the Employee's employment, the Employee shall not code for social media companies anywhere on the West Coast.

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Other Real Life Examples

- The Terminated Mine Worker
- The Competing Engineer

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THANK YOU

EMPLOYMENT LAW

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TRUSTED LEGAL ADVICE

CASE STUDIES IN ENGINEERING AND ETHICAL FAILURES

CRAIG A. WALLACE, P. ENG.

SHK

Kansas City Hyatt Walkway Collapse

(Beware of Field Changes)

The 40 story Hyatt Regency in Kansas City was constructed in 1978-1980.

The atrium lobby had several suspended walkways at the second, third and fourth floor levels.

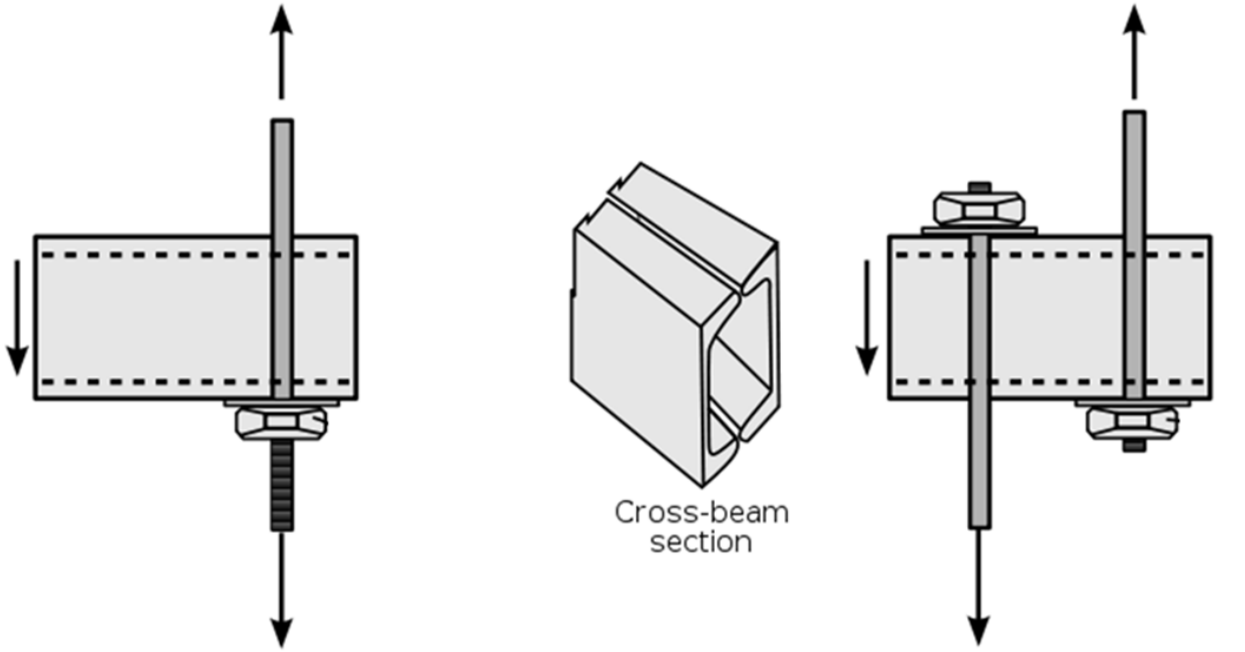
The fourth floor walkway was suspended directly over the second floor walkway; the third floor walkway was offset.

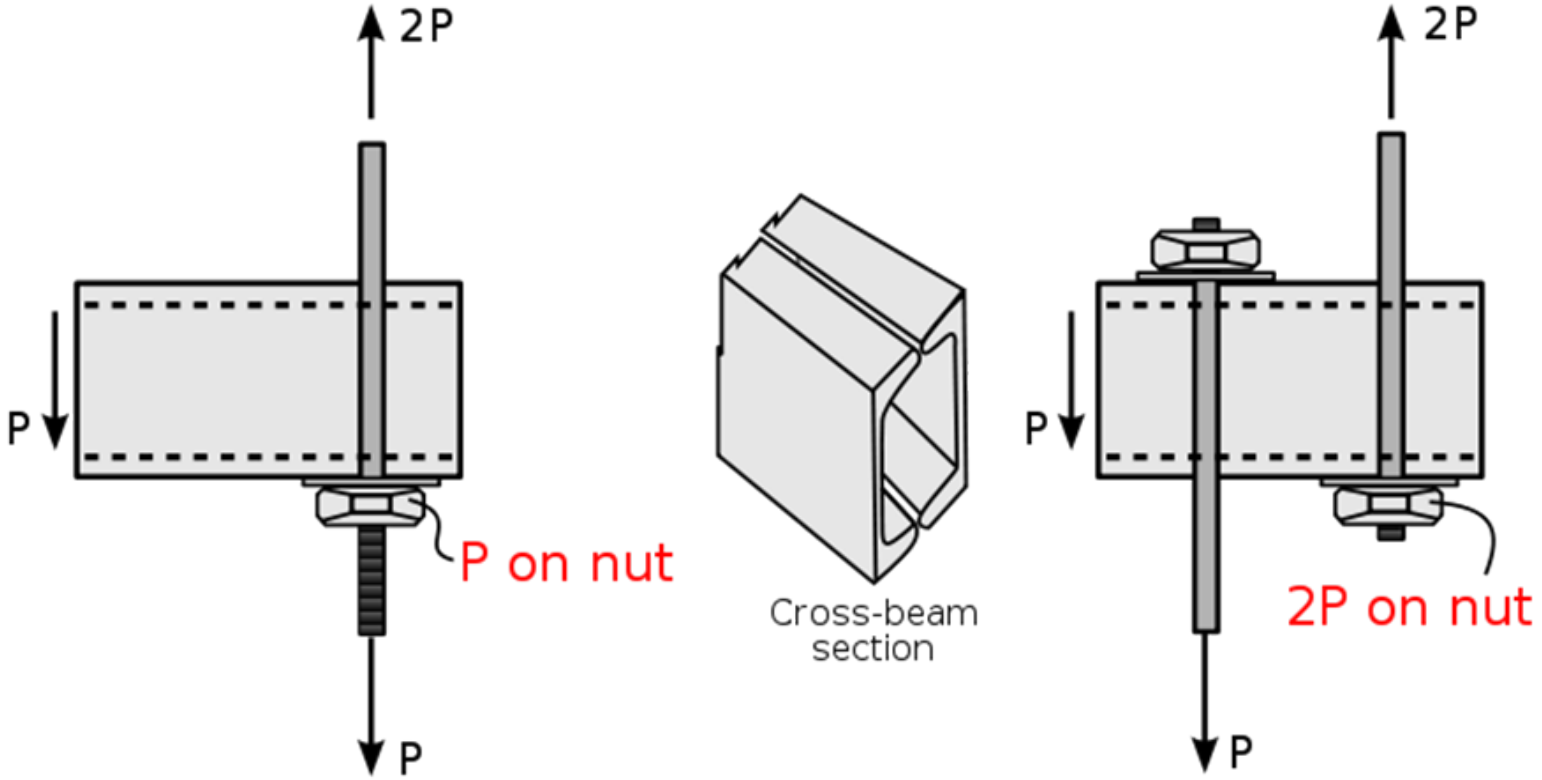
1600 people were in the lobby on July 17, 1981 to participate in and watch a "tea dance".

Many stood on the walkways to watch the dance on the floor of the lobby.

The fourth floor walkway collapsed onto the second floor walkway, which in turn collapsed onto the floor. 114 lives were lost.

Design change suggested by contractor during construction for ease of fabrication.





(a) Original design

(b) Actual construction

The result was that the load on the nuts holding the fourth floor walkway doubled, with tragic results.

As a result of various hearings and lawsuits, several engineers lost their licenses, firms went bankrupt and lives were ruined.

Fabricator claims to have phoned the design engineer to approve the change.

The design engineer denied ever receiving such a call.

There was no documentation of the change, other than a shop drawing showing the revised configuration, which was provided in a package of 42 shop drawings.

The connections were not adequately detailed on the shop drawings, and the fabricator had not performed calculations on the connections.

The design engineer assigned review of the shop drawings to a technician on his staff; the technician performed no calculations on the connections.

The design engineer testified at hearing that it was common industry practice for the structural engineer to leave the design of steel-to-steel connections to the fabricator.

The design engineer performed "spot checks" on portions of the shop drawings and approved them.

Discussion

Multiple causes, multiple responsibilities;

Insufficient attention given to changes during construction;

Insufficient attention given to crucial structural components;

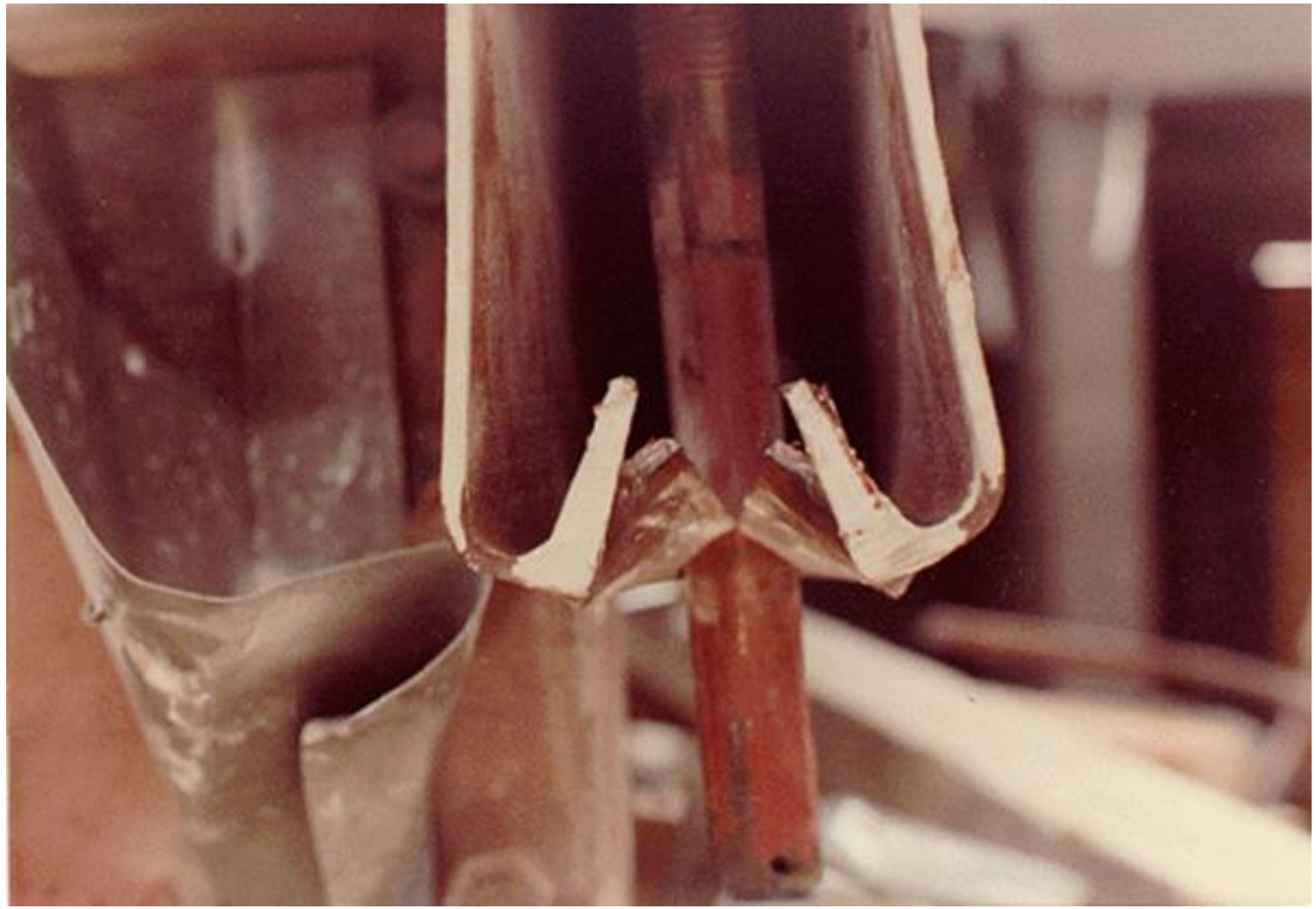
Inadequate checking of crucial structural components;

Inadequate communication;

Inadequate documentation of communication;

Inadequate field review; and

Inadequate intuition – "feel" the job.



DC-10 Cargo Door
(When do you blow the whistle?)

The DC-10 was McDonell Douglas's answer to Boeing's 747.

Developed in the late 1960s, the DC-10 began flying in 1970 and entered commercial service in 1971.

On March 3, 1974, Turkish Airlines flight 981, a DC-10 flying out of Paris experienced an explosive decompression 10 minutes after takeoff when a rear cargo door burst open.

The resulting differential in pressure between the passenger and cargo compartments collapsed the floor, severing the hydraulic control lines that ran within the floor.

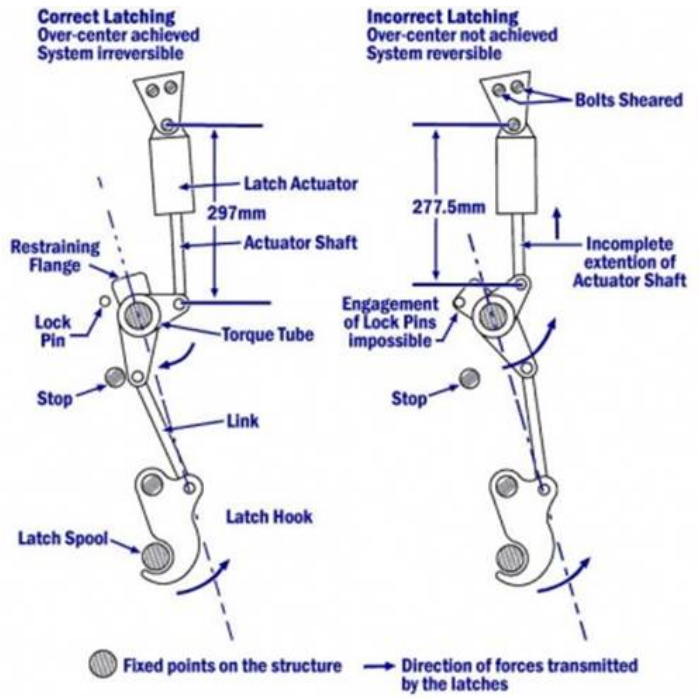
The aircraft crashed and 346 people were killed.

DC-10 cargo doors had failed prior to this crash – both doors blew off in 1970 during a ground test and the American Airlines flight had experienced a similar explosive decompression over Windsor, Ontario in 1972. The American Airlines flight landed safely, however.

Design Philosophy

Passenger doors are "plug type" (inward-opening) – pressure prevents door from opening.

Cargo doors have to open outward, but pressure would assist in keeping the latches closed.



Incomplete closure would result in pressure forcing the latches open.

The Choice of Actuator was Critical

Hydraulic actuator constantly applies pressure and, in the event of incomplete closure, would fail when the pressure offsets the (fairly low) actuator force.

Result: the cargo door would open under relatively small pressure differential, the aircraft will not pressurize and would have to land.

An electric actuator turns off after use and hard ratchets hold the latches in position; failure occurs only once the pressure is sufficient for the ratchet to fail.

Result: the cargo door failed under much greater differential pressure, resulting in collapse of the floor and loss of the aircraft.

Design engineer favoured the hydraulic actuator for this reason, but was overruled because of lower weight and ease of maintenance on the electric actuator.

Failure During Ground Test

The exact failure mode of both the American Airlines and Turkish Airlines incidents occurred on the ground in 1970 during a pressure test.

The incident was blamed on the mechanic failing to properly close the door and a series of small modifications were made to the door, including an indicator showing the ground crew when the cargo door was properly closed.

The fundamental vulnerability of a differential in pressure resulting in a failure of the floor, the severing of the hydraulic control lines, and the resulting loss of control of the aircraft was not addressed.

American Airlines Flight 96

Two circumstances save the American Airlines flight.

First, with only 36 people on board, the floor was very lightly loaded and did not completely collapse; not all hydraulic lines were severed.

Secondly, Capt. McCormick was extremely skilled, and had spent time in a simulator learning to fly a plane using only throttles and wing control surfaces in the event that he ever lost control of the rear surfaces; he had practiced for exactly this event.

Failures in Communication

Back in 1969, during the design process, McDonnell Douglas requested its subcontractor, Convair, which was designing the fuselage, including the cargo doors, to provide a "Failure Mode and Effects Analysis" (FMEA).

McDonnell Douglas instructed:

"No great reliance was to be given to warning lights on the flight deck" and "even less reliance should be placed on warning systems which relied on the alertness of ground crews“.

Convair's FMEA identified nine possible sequences that could result in life-threatening situations, including the exact sequences that resulted in the American Airlines flight 96 and Turkish Airlines flight 981 incidents.

Convair's FMEA was never shown to the FAA and McDonnell Douglas's own FMEAs submitted to the FAA made no mention of malfunctions of the cargo door.

Failures in Communication (Contd.)

Following the American Airlines flight 96 incident, Dan Applegate, Director of Product Engineering at Convair wrote a memo to his boss.

He said that the fundamental safety of the cargo door was being progressively degraded.

He said the airplane demonstrated an inherent susceptibility to catastrophic failure when exposed to explosive decompression - i.e. the unvented passenger floor.

He noted how the baggage loader in Detroit had forced the cargo door shut which caused the improperly latched door to blow off the airplane, very nearly resulting in its loss.

Failures in Communication (Contd.)

He called McDonnell-Douglas' service bulletins "Band-aid fixes" and predicted the loss of other aircraft because of their shortcomings and because of the decision to not cut vents in the passenger compartment floor above the aft cargo door.

Applegate made a compelling argument that even if the door fixes were fool-proof (which he argued they were not), the decision to not address the floor problems left the aircraft vulnerable to explosive decompression and total loss of control in the event of a bomb, mid-air collision or other event unrelated to the cargo door itself.

> "It seems to me inevitable that, in the 20 years ahead of us, DC-10 cargo doors will come open and I would expect this to usually result in the loss of the airplane".

Applegate's bosses did not act on the memo because they thought it would harm Corvair's relationship with McDonnell Douglas.

Modifications After Americans Airlines Flight 96

Two principal modifications were proposed:

- A peephole through which a baggage handler could visually confirm proper position of a locking pin; and

- A support plate which would prevent a torque tube from bending and allow “false closing" of the door.

Failure to convey the urgency of these modifications, and a failure on the part of the FAA to ground the aircraft until they were carried out, resulted in the second modification never having been done to the Turkish Airlines aircraft.

Ethical Considerations

Should Applegate have blown the whistle?

Should Convair have raised the Applegate memo with McDonnell Douglas?

Should McDonnell Douglas have looked more closely at the fundamental flaw – the vulnerability of the hydraulic lines?

(The routing of the hydraulic lines was a McDonnell Douglas decision, and it is easier to blame Convair for its door design.)

FORD PINTO

Crash tests of prototypes showed that the Pinto would not withstand standards proposed by the National Highway Traffic Safety Administration (NHTSA) which would require cars to survive a 20 mile-per-hour impact without leaking fuel.

A modification (a rubber bladder), estimated to cost $11 per vehicle, would prevent the loss of fuel.

The modification would push back the introduction of the Pinto.

Ford decided to bring the car to market without the modification.

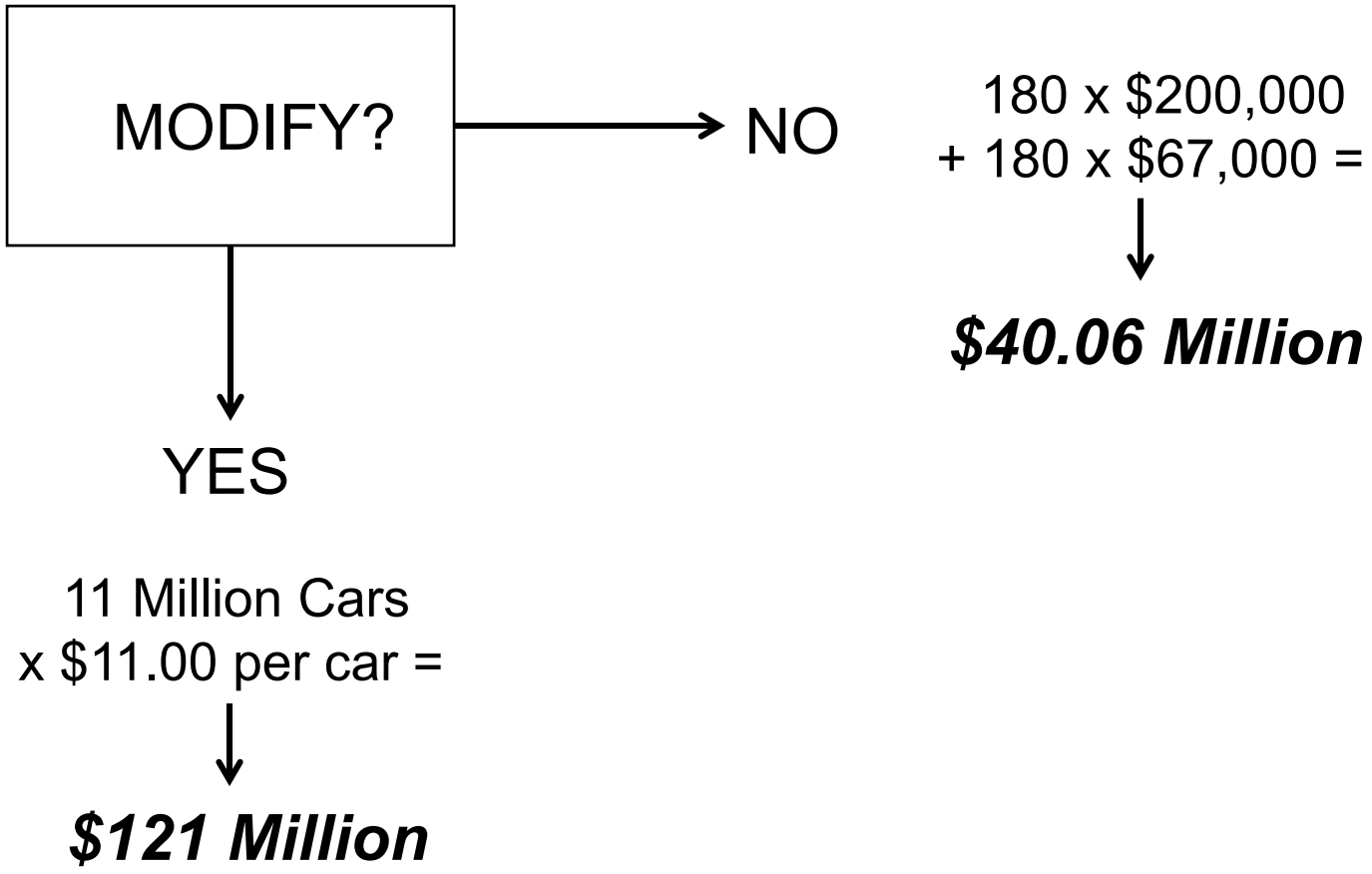
Cost-Benefit Analysis

Ford had an internal report entitled "Fatalities Associated with Crash-Induced Fuel Leakage and Fires" (the report was not specific to the Pinto, and concerned fuel leakage in rollover accidents, not rear end collisions, but it illustrates the rationale).

At the time, the law valued a life at $200,000.

At the time, the law valued serious burn injuries at $67,000.

Ford anticipated selling 11 million Pintos and, based on this statistic, Ford anticipated 180 burn deaths and 180 serious burn injuries.


MODIFY?
NO
180 x $200,000
+ 180 x $67,000 =
$40.06 Million
YES
11 Million Cars
x $11.00 per car =
$121 Million

Economic Theory of Negligence (Learned Hand Rule)

The defendant' duty to protect against injuries is a function of three variables:

(1) The probability of the accident;

(2) the gravity of the resulting injury;

(3) the burden of adequate precautions.

This relationship has been formalized as: PL>B

B is the cost (burden) of taking precautions, P is the probability of loss and L is the gravity of loss.

The product of P and L must be a greater amount than B to create a duty of care.

Punitive Damages

Generally, damages are intended to compensate the victim of a tort (negligence).

Courts can and do award punitive damages, which are intended to punish the defendant, rather than compensate the plaintiff.

Courts impose punitive damages (also called aggravated damages) in cases where the court finds that a defendant's conduct has been "high-handed, malicious or reprehensible".

Punitive damages skew the decision tree.

Problem: since judgments are retrospective, there is no way to know in advance what the punitive judgment would amount to.

CRAIG A. WALLACE, P.Eng.

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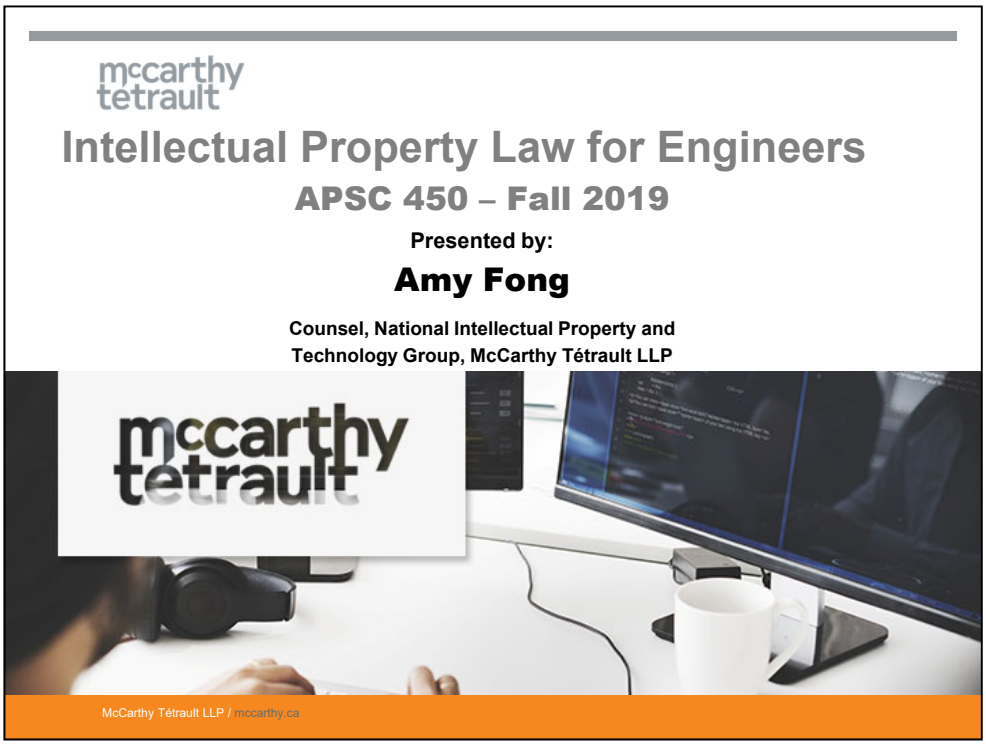
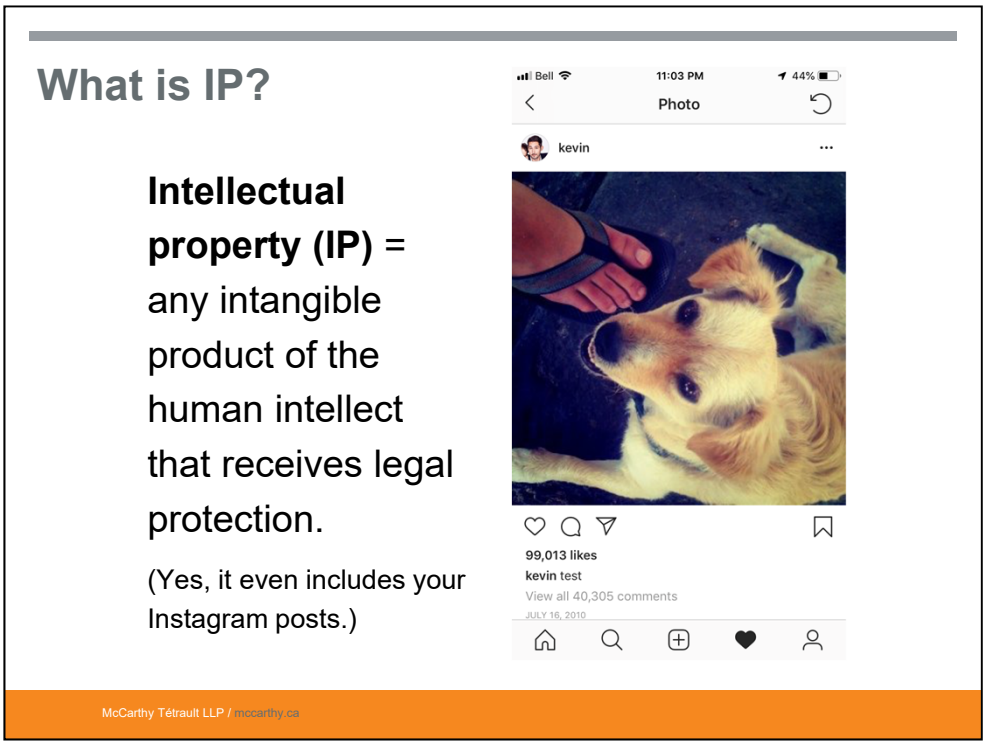


Hello. My name is Amy Fong. I am an intellectual property lawyer, and a patent and trademark agent with the firm of McCarthy Tetrault. Prior to studying law and becoming a lawyer, I received a Bachelor of Applied Science in Engineering Physics from UBC. I am happy to be sharing some insights with you today on the topic of intellectual property law.



So first off, what exactly is intellectual property, or IP, and why should we care about it?

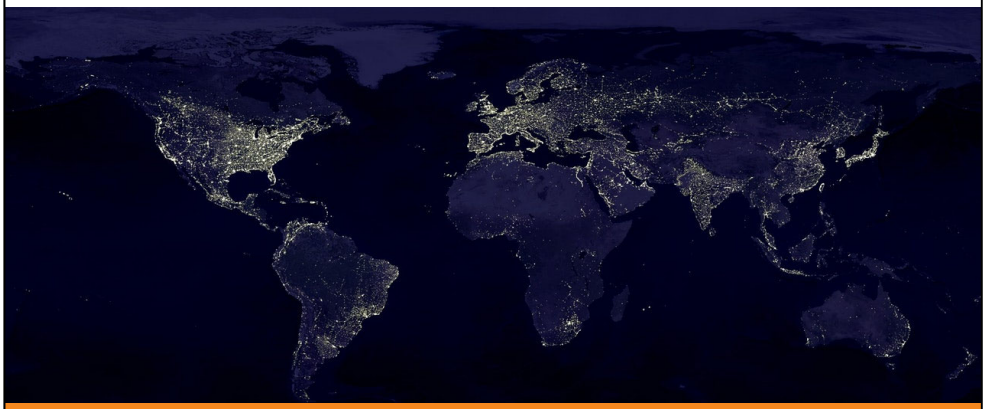
IP is a type of asset which is recognized to have value, and therefore receives legal protection. More specifically, IP is a non-tangible product of the human intellect, and is considered to be a form of intellectual capital. So, anything that you "create" could potentially be IP, including even your own Instagram posts, and there are laws in place to protect the creator's rights in that IP. IP is often misunderstood because there are so many different types of IP, governed by applicable contracts and a complex set of laws which are different in each country. So, using Instagram as an example, contrary to what many people believe, it is actually a violation of copyright law to re-post another Instagram user's posts without their permission. Simply re-posting with attribution to the source does not get you around that requirement. If you want to be in compliance with the law, the best practice when dealing with other's posts is to contact the content owner to request and obtain their permission to share their content on your feed.

Non-tangible assets, such as IP, are becoming increasingly valuable to companies, because innovation is accelerating in every sector. It is estimated that on average, about 85% of the value of a business is tied to its IP. Thus, because so much is invested in IP, it is important to develop a strategy around IP. As stated by Jim Balsillie, a co-founder of Research in Motion, "Innovation without a national IP strategy is philanthropy. You invent it you and invest in it, and others get the benefits"

As seen here, aspects of an IP strategy can provide both defensive and offensive advantages. Some aspects of an IP strategy can be used defensively as a shield, to protect your business against being sued for IP infringement. For example, before engaging in any business activity that might involve the use of another person's IP, it is best practice to do your due diligence by conducting searches and assessing the risks of infringement or other problems and determining a way forward that would minimize those risks. Other aspects of an IP strategy can be used offensively as a sword. For example, patents can be obtained as a form of legal protection for inventions. These patents can support an innovative culture and allow a company to monetize its IP assets by preventing others from copying its inventions without a license. While patents are generally considered part of an offensive strategy, patents can also be used by companies as part of a defensive tactic – the idea is that if another company is suing you for patent infringement or threatening to do so, you can say, I've got some patents too, and I'll sue you right back. Those cases often result in a settlement between the parties based on a cross-licensing deal. Alternately, some companies choose to patent their invention simply to prevent others from being able to patent it for themselves.

IP Rights are territorial

Cannot enforce your IP rights beyond the countries in which you have obtained rights



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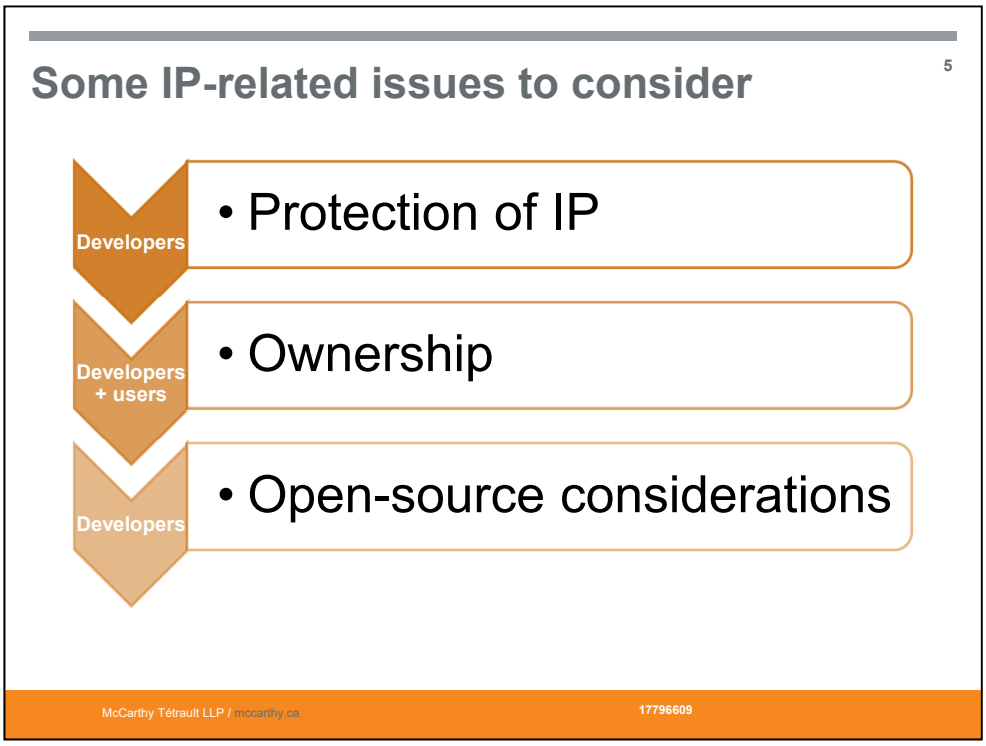
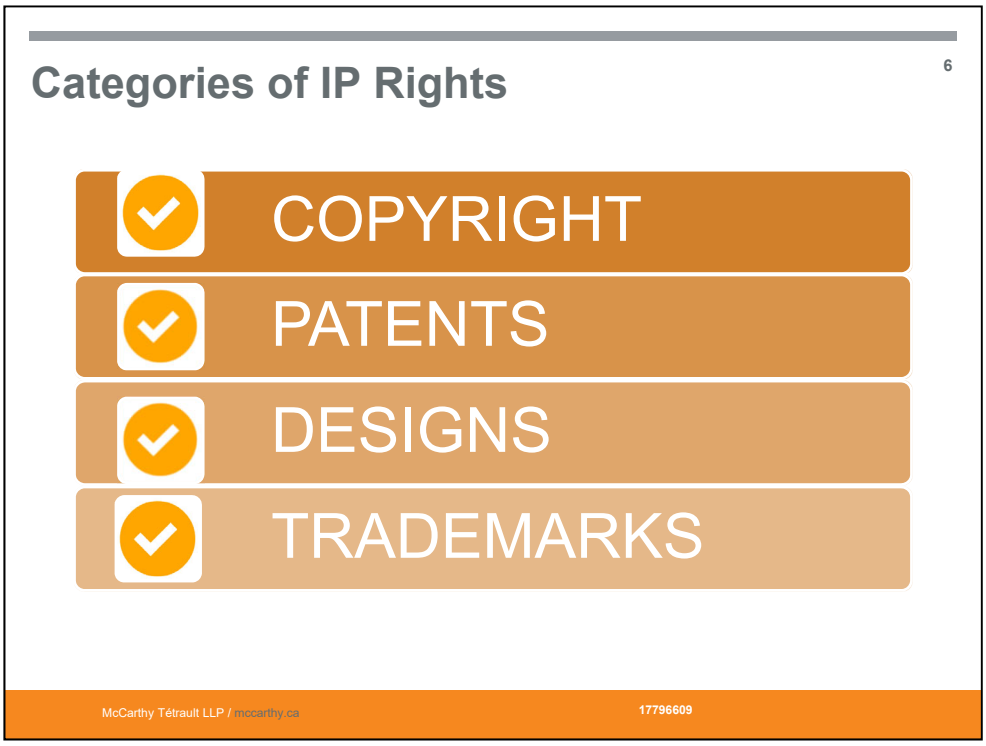
It is important to keep in mind that IP rights are territorial. This means that IP rights apply only with the borders of the country in which the rights have been obtained. You cannot enforce your IP rights beyond those borders. If you obtained a Canadian patent, you can only complain against others who are making, using or selling your patented invention in Canada. If you want patent rights to prevent others from making, using or selling your invention in countries outside of Canada, you have to apply for patents in those countries.



Legal issues can arise any time you are creating or using IP. Some of the IP-related issues which I will touch on in the next slides include: how to protect IP assets (which is relevant to developers of IP generally), IP ownership considerations (which are relevant to developers, as well as users who may wish to use the IP), and open-source considerations (which are relevant to software developers in particular, who need to use open-source code to generate their software applications). I will weave a discussion of these issues into the categories of IP rights which I will be going over in the next slides.



The categories that I will touch on are: copyright, patents , designs and trademarks.

Copyright

- Copyright exists in Canada in every **original** literary, dramatic, musical, and artistic work (includes software, business reports, etc.)

The first category that I'll be addressing is copyright. Copyright exists in every original literary, dramatic, musical and artistic work that you create. Software and technical documentation are protected under copyright, because they are considered literary works.

Copyright

- ¬ Exclusive right to reproduce or distribute the work
- ¬ Protects the **expression** of an idea (not underlying idea)
- ¬ Term: generally life of author plus 50 years

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Copyright in a work means that the owner of the copyright has the exclusive right to reproduce or distribute the work, and to authorize others to do so. Copyright protects the expression of an idea, not the underlying idea itself. Thus, if you write software to implement a particular algorithm that you've developed, copyright laws would prevent others from making a copy of your software. However, copyright laws would not prohibit a competitor from writing their own software, perhaps in a different programming language, to implement the same algorithm and achieve the same functionality as your software. If you want to stop that from happening, you need to get a patent on your software.

Unlike most other categories of IP, you don't need to apply to the government for copyright protection; the rights are automatically conferred upon the original creation of the work. The term of protection in Canada is generally the life of the author plus 50 years. While registration is optional, registering your copyright in Canada can provide some benefits, and in the United States, you effectively need to register your copyright with the United States copyright office in order to sue for copyright infringement.

What about open source?

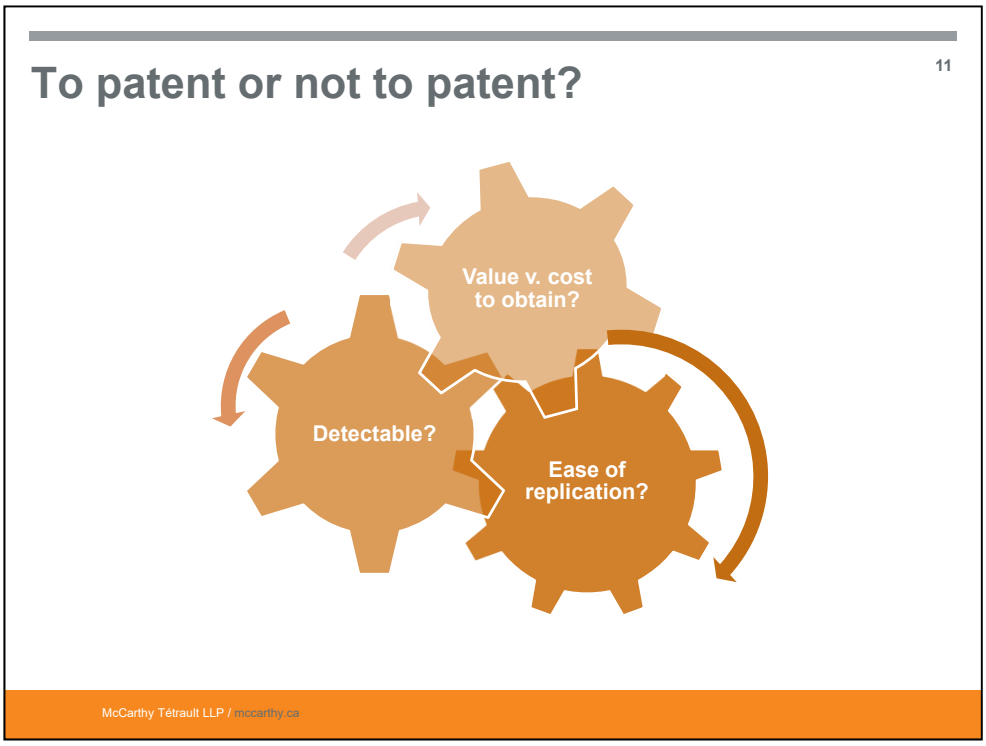
- Tale of caution: Linksys WRT54G 802.11g router
- Copyright of open source is still owned by somebody. If using open source, must comply with license terms.

I'd like to discuss a cautionary tale that demonstrates how copyright laws can catch even sophisticated companies off-guard, in the context of open source code. Linksys had a WiFi router that included a Linux kernel and other GPL (or General Public License) code. GPL is considered a "viral" type of open source license because any software program which you create that uses code distributed under the GPL terms must also carry the GPL terms. Somehow some GPL code in firmware had made it into the router because Linksys had acquired the firmware from another company, which in turn had outsourced the development of the firmware to an overseas developer. After Cisco's acquisition of Linksys in 2003 for 500 million US dollars, there were complaints that Linksys was violating the GPL terms in not providing the source code that it had used in its router, which is a requirement under the GPL terms. After significant pressure, Linksys finally released the source code of its router. To avoid open source headaches, and to ensure compliance with copyright laws, the best practice is to conduct open-source audits from time to time to determine which open source pieces have made it into your software. This is particularly important if many parties are contributing to the development of the software and you do not have control or oversight over what everyone is doing. It is also good to have in place an open source use policy and make sure your software developers are in compliance with that policy.

Patents

- Right to exclude others from making, using and selling an **invention**
- Protects functional aspects
- Term: generally 20 years

Moving on to patents, patents are a form of legal protection preventing others from making, using or selling an invention. An invention is defined in the Canadian Patents Act to be any new and useful art, process, machine, manufacture or composition of matter. Patents are costly to acquire, but can be very valuable, in establishing a monopoly around your invention. However, it is important to bear in mind that a patent is a prohibitive right only. It does not give you a positive right to practice your invention. So if you make improvements to a patented invention, and obtain a patent to your improvements, you would need a license from the owner of the base patented invention in order to practice your patented improvements.



To decide whether or not to patent your invention, you need to perform a cost benefit analysis and consider detectability and ease of replication.

For the cost benefit analysis, cost is usually easier to determine, as you can add up the legal fees, government fees and maintenance fees for all of the patents you are hoping to obtain. Value is more difficult to measure. It can be measured in different ways: e.g. company asset (patent provides a competitive advantage – right to exclude others from copying your invention) – adds value when you are licensing or exiting ; also freedom to operate – if you have a patent on it, then if competitors try to sue you on their patent for practicing your invention you can say I can sue you back because you're also doing what I'm doing and it's patented.

For detectability, you want to ask how easy is it to detect acts of infringement by your competitors? For example, if the software is on the client side or on a device that you can acquire, you could look at what it's doing, maybe with the help of decompilers. But, if everything is happening on the server side, detectability of infringement would be more difficult.

Also, you want to consider ease of replication - how easy would it be for others to reverse engineer your product and copy your product? If it's impossible for others to figure it out, then maybe you can protect as proprietary trade secret information instead of going through the patent route.

Who owns the IP rights (copyright, patents)?

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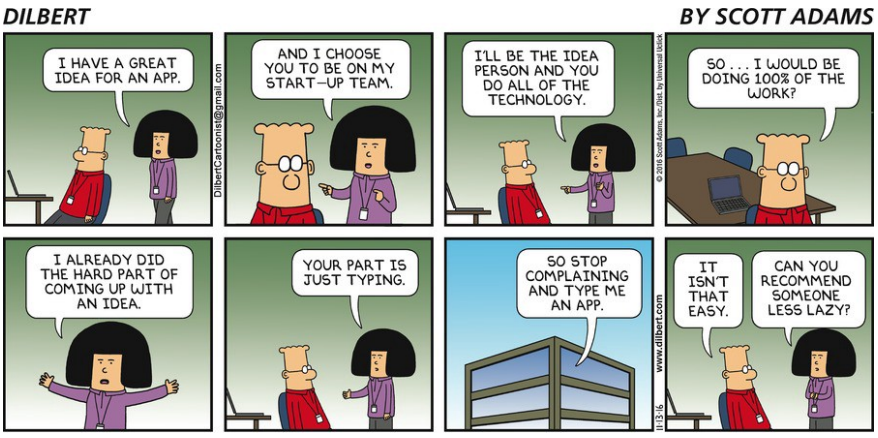

I'm going to now move into a discussion on the ownership of IP. The question of who owns the IP rights is often a hotly contested one. This is a humorous comic strip that illustrates how technology gets created. It also leads to a discussion of some of the ownership questions that might arise where there are multiple parties who contributed to the creation of IP and might have a stake in the asset – is the owner of the IP the person who came up with the idea? Or the person who did all the work in implementing it? Or both? Often, the answer is not as clear cut as it might seem.

Ownership

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- **Copyright** – generally owned by author, unless work was created in course of employment (then employer owns it) or there is an assignment to another party
- **Patents** – generally owned by inventor, unless there is an assignment to another party

Ownership determinations vary for each category of IP. For copyright, the author is generally the owner, unless the work was created in the course of employment (in which case the employer owns the copyright), or there is an assignment that gives the copyright to another party. For a patent, the inventor is the owner by default, unless there is an assignment that gives the patent to another party. To avoid any confusion as to who owns the IP rights, it's best to have a written agreement that clearly spells this out. My next case study will demonstrate what could happen if you don't have any agreement which addresses ownership.

Lack of written agreement → ownership dispute → loss of rights

- Seggie v. Roofdog Games Inc.
- Videogame *Extreme Road Trip*

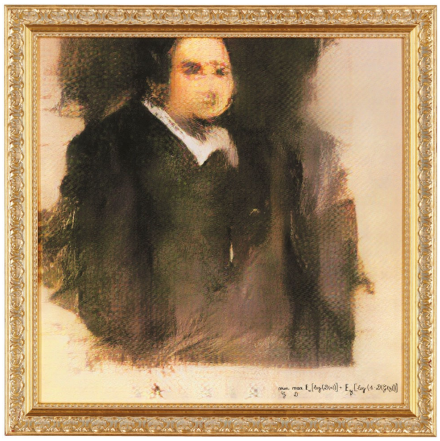
In this case study, Roofdog was a videogame developer, and Roofdog brought in an artist friend, named Seggie, to help out with the graphics design.

Seggie contributed a few new designs and artwork, but Roofdog did all the coding. After the game was launched in 2011, it exceed everyone's expectations and reached the top of the App store. Roofdog only wanted to pay Seggie a fixed salary, but Seggie said he was a co-author of the game and therefore should be able to share in the profits.

The problem was there was no paper documenting an agreement between the parties. So, a lawsuit was started by Seggie, who sought 50% of the profits. In the end, the Quebec Superior Court determined that Seggie was not a co-author, and therefore did not get a share of the profits. The court awarded Seggie $10,000 for his efforts, but then also awarded Roofdog's owner $22,000 for defamatory comments that Seggie had made on social media. So, Seggie is out $12,000.

If Seggie had made a bigger contribution to the game, the outcome might have been different, as he might have then been considered to be co-author and therefore co-owner of the video game. However, by not having any written agreement in place regarding ownership, the parties wasted a lot of time and money arguing that issue before a court, and letting the court ultimately decide.

Ownership: who has a stake? AI & art



Ownership questions can also be challenging to answer in the context of new technology developments.

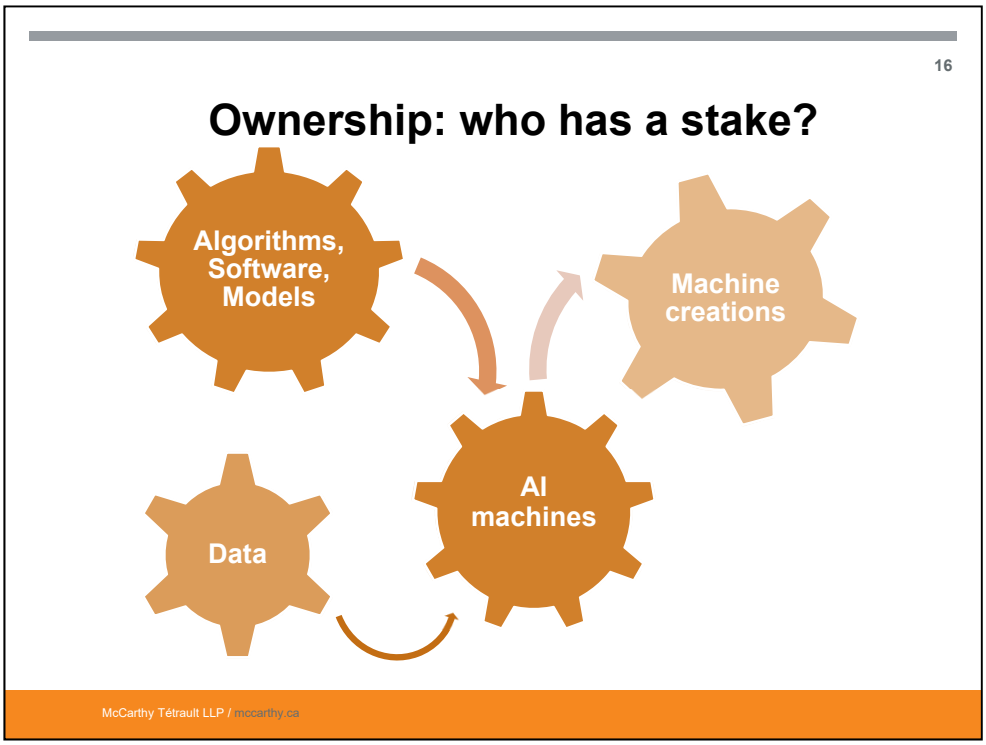
This is the AI-generated Portrait “Edmond de Belamy” from the French collective “Obvious” (formed of three 25-year old guys)

This portrait was created by feeding a series of portraits into a generator, then a discriminator tries to distinguish if it was done by hand or by computer.

It’s hard to see from this representation, but in the bottom right corner, the portrait was signed by a mathematical equation that represents the algorithm that was used to produce the portrait.

The open-source algorithm that was used for creating this portrait was shared by 19 year old Robbie Barrat, and he had developed it based on a “Generative Adversarial Network” (GAN) designed by Ian Goodfellow.

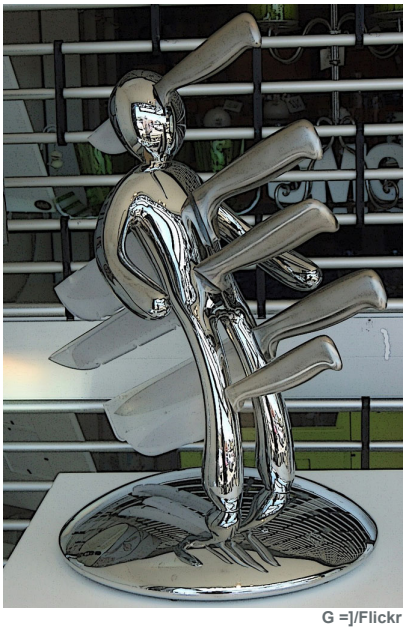
The portrait was auctioned off by Christie’s in October 2018. It was estimated to sell for $7K-$10K, but it sold for over $400K.



So, who owns the IP rights in an AI-generated portrait? The ownership question is more complicated because AI-generated artwork does not fit the traditional scenario of a solitary painter standing in front of a canvas, and the law hasn't caught up with the technology. There are many contributors to the process of creating AI art. So, is the owner, the person who developed the algorithm? The person who wrote the source code? Person who trained the machine? Person who contributed to data that was used to train the machine? The machine itself? The law is not very helpful in providing any answers here, so the best thing to do, in the absence of clear laws, is to have contracts in place, to deal with some of that uncertainty.

Industrial designs

- Protects the visual and aesthetic features in a finished article (does not protect functionality)



G =]/Flickr

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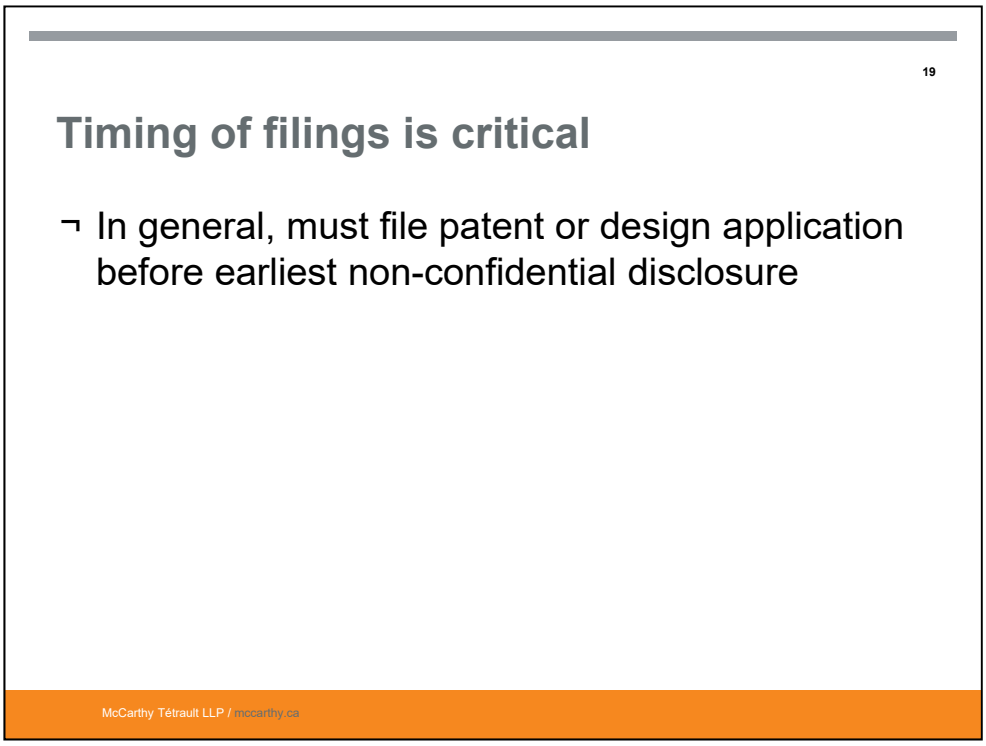
Next, I want to move on to industrial designs. An industrial design registration protects the visual and aesthetic features in a finished article. Unlike patents, a design registration does not protect functionality. A design registration would be useful for protecting a Voodoo knife holder such as the one shown here – it has some pretty striking features in the design. However, since the functionality of this knife holder is already known and therefore not novel, so you wouldn't also be able to get patent protection for this knife holder.

Industrial designs

- Prevents others from making article with substantially similar design
- Term: generally 10-15 years

Industrial design registration prevents others from making an article with a substantially similar design. The term of protection is generally 10-15 years, depending on the jurisdiction. Increasingly, industrial design registrations are being sought to protect user interface designs, such as the one shown here that is owned by Apple.

In the United States, they call an industrial design registration a “design patent”. A design patent should not to be confused with a regular or utility utility patent. So when you see in the media that something is “patented” in the US, you have to query whether they’re talking about a utility patent (which protects functionality), or a design patent (which is an industrial design registration and protects the visual features).



In general, in order to have valid protection, you must file a patent or design application before your earliest non-confidential disclosure of the invention or design. There are some limited grace periods available. For example, Canada and the US allow you to file a patent application within one year after your earliest public disclosure of the invention. However, other countries do not offer this grace period, so if you want to protect your invention in those countries, you've got to file your first application before any public disclosure.

Failure to file in time → loss of rights

- ¬ Crocs in Europe
- ¬ Industrial design protecting look

Emran Kassim/Flickr

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Here's an example of how not filing your application in time, can lead to problems for the IP rights holders.

Crocs had a design registration for their shoes in Europe. The French budget brand 'Gifi' brought a claim to cancel the design, on the basis that the design had been disclosed more than 12 months before filing. In Europe, there is a grace period of 12 months for pre-filing disclosures for design registrations. Note that there is no grace period in Europe for patent protection, meaning you have to file a patent application before any public disclosure if you want protection in Europe.

Crocs' design registration was ultimately cancelled by the IP Office, which was affirmed by the European Court of Justice in 2018. This meant that Crocs lost some market share to its competitors.

Trademarks

- A word, symbol or design, etc. used as an identifier of the source of your goods/services

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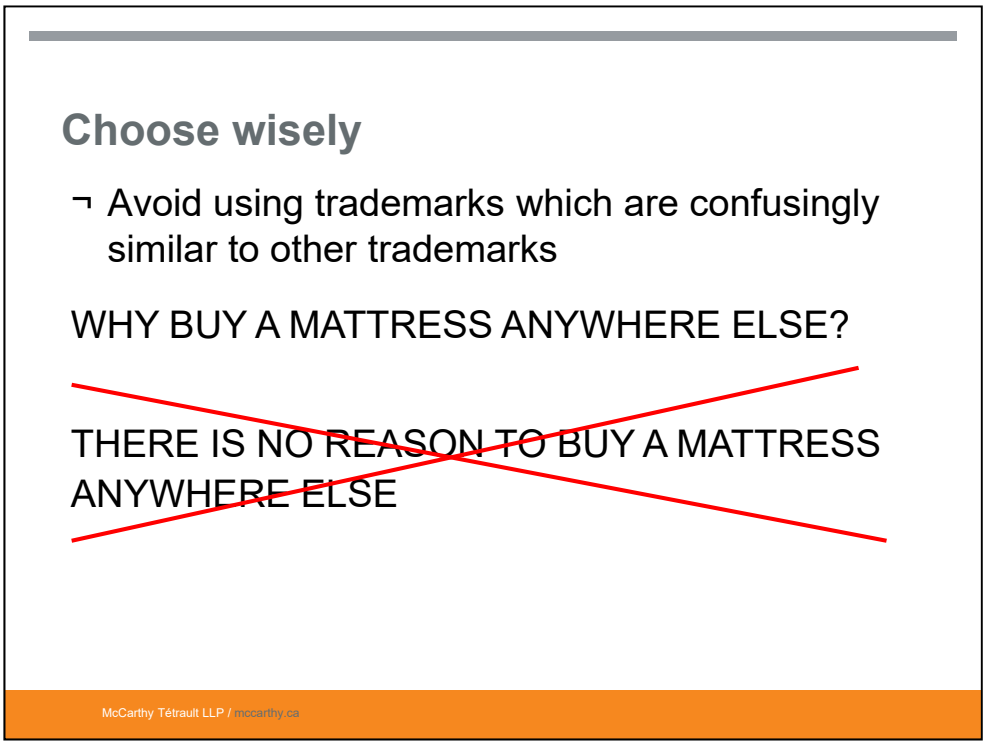
The final category of IP that I will be discussing is trademarks. A trademark is any word, symbol, or design, etc., that is used as identifier of the source of your goods or services. I say "etc." because sounds, scents, colors could also be considered an identifier. We live in a brand-oriented society where we rely on the use of trademarks to distinguish between all the various sources of goods and services that we can buy. And so, the value of brands has increased over the last several years.

Examples

Google

LENOVO

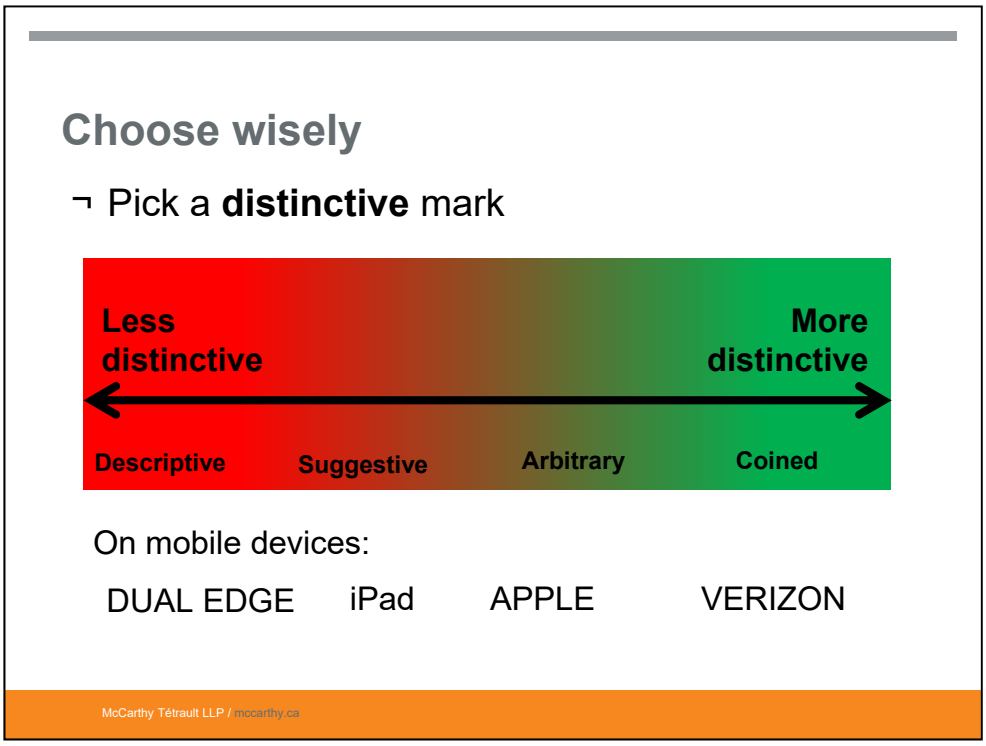
Here are some traditional examples of trademarks, including symbols, word(s), word and design combination, color (as applied to the sole of a shoe in this example illustrated), packaging (distinguishing guise of a Coca Cola bottle)



Many legal and business problems can arise if you do not choose your trademark wisely. First of all, you want to avoid being sued for trademark infringement, and also you want to be able to help your business grow by using a mark that can be protected through a trademark registration, develop a reputation, and be enforced against others.

To achieve the first objective of not being sued, you want to AVOID marks that can be confused with others' trademarks, trade names, and here's an example of that.

- Sleep Country has used its trademark (slogan) WHY BUY A MATTRESS ANYWHERE ELSE since 1994
- Sleep Country registered it as a trademark in 1996
- July 2016 – Sears began using THERE IS NO REASON TO BUY A MATTRESS ANYWHERE ELSE
- Sleep Country asked Sears to stop using that mark
- Sears did not, so Sleep Country brought an action for trademark infringement, depreciation of good will and passing off
- In early 2017, Federal Court ordered an injunction, prohibiting Sears from using the slogan



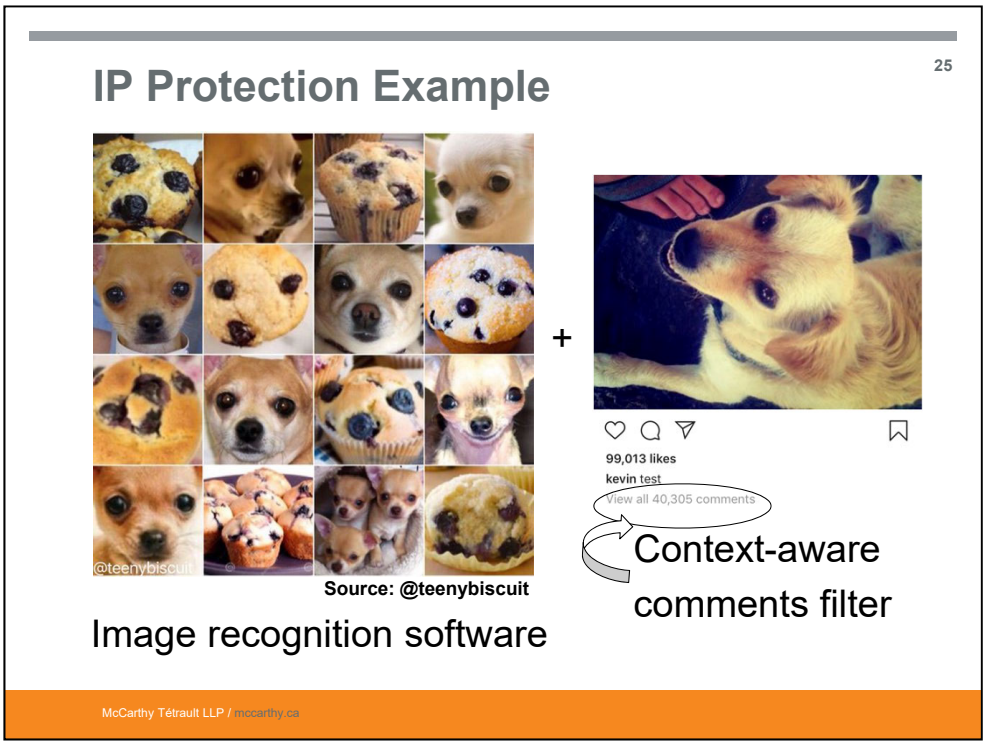
To achieve the second objective of helping your business grow, you want to choose a trademark that is **distinctive** (that means it must be capable of distinguishing you from others offering similar goods/services). If you don't have a distinctive mark, you will have trouble developing a reputation and you will have trouble protecting your mark and enforcing it since distinctiveness is a requirement for trademark registration.

I've shown here a distinctiveness spectrum, with some actual examples, where marks on the green side are more distinctive, and marks on the red side are less distinctive.

You want to AVOID marks that clearly describe your goods or services.

- LG's mark DUAL EDGE for mobile phones was found descriptive in the EU and therefore not eligible for registration

Many trademarks are not registered. The common law offers some limited protection for unregistered marks, typically confined to the particular local area in which you are using the mark. However, registration confers much stronger protection, as it provides you with the exclusive right to use the mark across the country. It's a good idea to a register a mark if it is valuable to your business.



To help you tie all the pieces together, I am going to walk you through a hypothetical example to illustrate how we might go about developing an IP strategy for an invention.

Let's say we've developed a new and improved image recognition software. It is so good that it can distinguish between images of chihuahuas and blueberry muffins with increased accuracy, for example.

Let's say you also want to help clean up the cesspool of social media and you've developed a new and improved context-aware comments filter for social media applications, blogs, websites – where image recognition can be used to provide some context for interpreting people's comments. For example, the comment "Nice muffins!" might be considered by this filter to be mundane and non-offensive in the context of a picture of blueberry muffins. But it might make a different assessment of those words in other contexts.

There is going to be some element of the application of artificial intelligence in both the image recognition piece and the context-aware comments filter.

You may also then develop a new user application and come up with a catchy name for the app and a particular user interface design – this app will allow an operator of a social media page or site to customize settings, tell the software what they would find acceptable or not – e.g. is criticism OK? Or do you want everyone to just post positive comments only?

So, what can be protected in this case?

First, you an apply for a trademark registration to protect the name of your app, but before you decide on the name, you should consider whether the name is even a wise choice, and

we've touched on some of the legal logistics for selecting a good trademark.

Second, while copyright will protect people from copying your source code for your software, it does not protect against people copying the underlying functionality, so you may want to look into applying for a patent if you want to also protect the functionality. There are multiple concepts you could explore protecting with patents –these include your new and improved image recognition engine, your context-aware comments filter, and perhaps even some aspects of the user application which enables users to adjust the settings of the context-aware comments filter.

Finally, it's important not to overlook design protection, which can be used here to protect the user interface design of your user app.

Develop an IP Strategy

- Identify your potential and actual IP assets (including non-protected IP such as ideas, inventions, know-how)
- Confirm that you own and can use, and identify risks
- Consider what IP and protection you need to achieve your business objectives
- Have policies and contracts to ensure you can protect and exploit your IP

I want to close by highlighting some key points in developing an IP strategy.

First, you want to identify IP assets by : reviewing documents (e.g. contracts, policies), results of R&D and business processes, interviewing your employees

Identify what IP assets the company needs and doesn't need in order to achieve its objectives

Typical objectives include:

the types of products and services on which the company intends to focus its resources
the market it intends to serve
the mitigation of risk
the return on investment shareholders require

Place a value on your IP assets

Consider whether the IP is of key interest to your company
Consider market demand and the size of the market
Consider the competitive advantage the IP provides
Confirm IP ownership and rights: For example: employees vs. subcontractors; programmers using open source; licensing rights - do you have all of the rights you need (i.e. licensed rights match intended uses)

Identify risks - for example:

potential third party liability (e.g. infringement suits)
defects in protection (e.g. flaws in registration, insufficient policies and procedures)
must prove IP "title" the hard way/from first principles:

prove chain of "title" (how IP got into company)
prove maintained "title" (not lost IP through exploitation)
prove not sold/alienated "title" (not sold IP)

Protection: protecting the IP that you own or have rights to

Most appropriate protection depends on the product/software and circumstances (e.g., trade secrets may be more useful in the context of a process than products because less risk of reverse engineering)

Choice of IP protection category is not mutually exclusive **(except trade secrets and patent)**

IP registration available for:

- Patents & designs - must register in order to protect; generally you must apply for protection prior to any non-confidential disclosure of the invention/design (but limited grace periods available in a few countries)
- Trade-marks – common law offers limited protection for unregistered marks, but registration confers much stronger protection
- Copyright - registration not required, unless you want to sue for infringement (particularly in the US)

Develop IP policies - e.g. disclosure on a "need to know" basis

Contracts:

- Confidentiality agreements
- Non-compete agreements
- Licensing
- Working with development partners or other 3rd parties: do you have agreements concerning ownership, protection, use and exploitation of IP?

I want to thank you for taking the time to listen to this presentation, and I hope that I have been able to shed some light on some of the complexities and issues of IP law that will help you in your career. If you have any follow-up questions, please feel free to reach out to me by email. Thank you.

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mccarthy tetrault

Business Organization

Steven Roxborough, B. Sc., M.A. J.D.
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Business Organization

- In Canada there are three main types of business organizations:
  - Sole proprietorship
  - Partnership
  - Incorporation

- There are other forms of business in Canada:
  - Co-operative
  - Limited Liability Partnership

Sole proprietorship

- This is a type of business where there is a sole owner responsible, and personally liable, for all debts and obligations

- Advantages
  - Simple
  - Inexpensive

- Disadvantages
  - Liability
  - Tax rates

Partnership

- This is a business created by two or more people. A partnership is a non-incorporated form of business where (1) the partners are responsible, and personally liable, for all debts and obligations and (2) the partners share in the profits as per their contractual agreements
- Advantages
  - Simple
  - Inexpensive
- Disadvantages
  - Liability
  - You are personally liable for your partners as well as yourself

Corporation

- A corporation is a separate legal entity that is formed for the purpose of carrying on business

- Corporations can be incorporated Federally or Provincially

- Shareholders are not personally liable for the debts or liabilities of the company

Corporation

- Advantages
  - Limit personal liability
  - Separate legal entity
- Disadvantages
  - More expensive
  - Highly regulated
- Other considerations?

Equity, Diversity, and Inclusion in Engineering

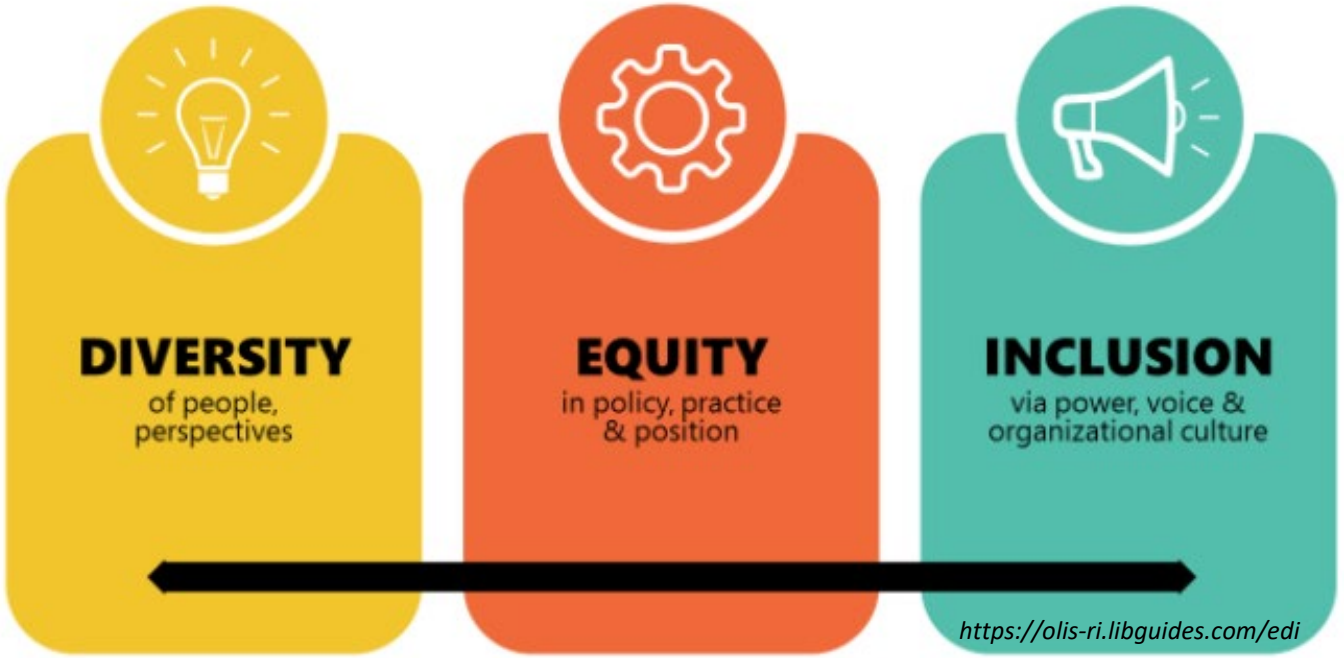
Tonia Welch, M.Eng., P.Eng., PMP

https://miro.medium.com/max/5120/1*d7RHomKlhU36sCftx-ohLQ.png

What is EDI?

Equity, Diversity, and Inclusion, or “EDI”, policies aim to provide a culture of inclusion and mutual respect where all individuals feel safe. These policies work to prevent prejudice and discrimination, and provide fair treatment and opportunities for all.

Discussions about diversity linked to access and equity require knowledge and understanding of historical and contemporary experiences of oppression and exclusion.



Diversity

The practice or quality of including or involving people from a range of different social and ethnic backgrounds and of different genders, sexual orientations, etc.

- *Oxford Dictionary*

- Uniting, rather than dividing
- Appreciating differences and our interconnectedness and building relationships across those differences

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Types of Diversity in the Workplace

Gardenswartz & Rowe (2003) categorized diversity into 4 layers:

1. Personality
2. Internal Diversity
3. External Diversity
4. Organizational Diversity

https://paramounttraining.com.au/wp-content/uploads/2021/07/inclusion.jpg

Level 1: Personality

The Big Five personality traits is a suggested grouping for personality traits developed from the 1980s onwards in psychological trait theory:

- Conscientiousness
- Agreeableness
- Neuroticism
- Openness
- Extraversion – gregariousness, excitement-seeking, warmth, activity, and positive emotions

Beneath each proposed global factor, there are a number of correlated and more specific primary factors.

Wikipedia: Big Five personality traits

Image Source: https://www.gardenswartzrowe.com/images/pages/why-layers.png

Level 2: Internal Diversity

Characteristics are ones related to situations that a person is born into. They are things that **a person didn't choose for themselves** and cannot change.

Examples include:

- Race
- Ethnicity
- Sexual Orientation
- Age
- Gender identity

Image Source: https://www.gardenswartzrowe.com/images/pages/why-layers.png

Level 3: External Diversity

Things that are related to a person but **not characteristics one is born with**.

External diversity can be heavily influenced by one's surroundings, but can be changed (and often are over one's lifetime).

Examples Include:

- Personal interests
- Appearance
- Relationship status
- Socioeconomic status
- Life experiences

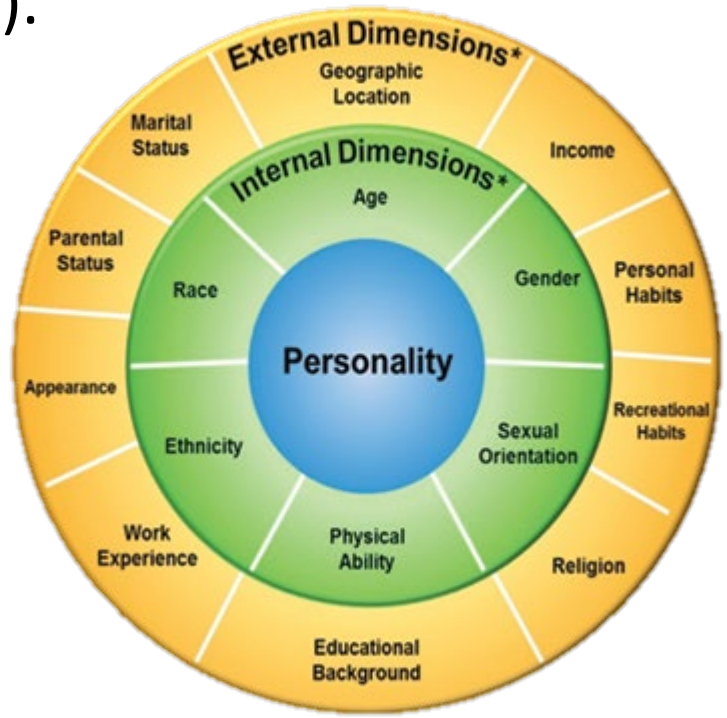


Image Source: https://www.gardenswartzrowe.com/images/pages/why-layers.png

Level 4: Organizational Diversity

Also called functional diversity - relates to the differences between people that are assigned to them by an organization. The workplace characteristics that **distinguish one employee from another**.

Examples Include:

- Job function
- Place of work
- Employment status
- Seniority
- Union affiliation

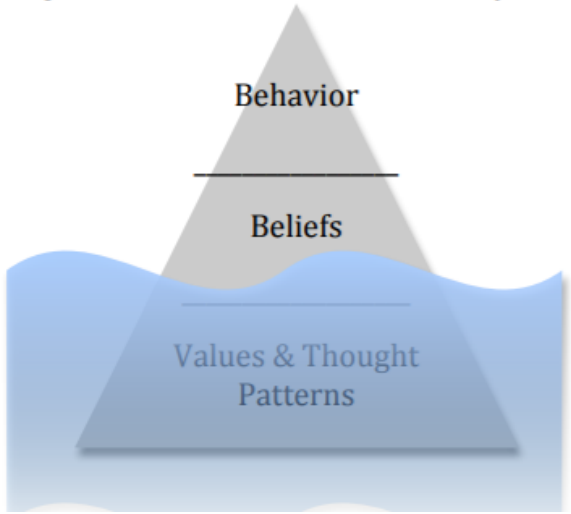
Image Source: https://www.gardenswartzrowe.com/images/pages/why-layers.png

Cultural Diversity

Diverse people vary in political systems, religions, faith traditions, economies, sports, languages, holidays, music, and art.

- Edward T. Hall's Cultural Iceberg Model:

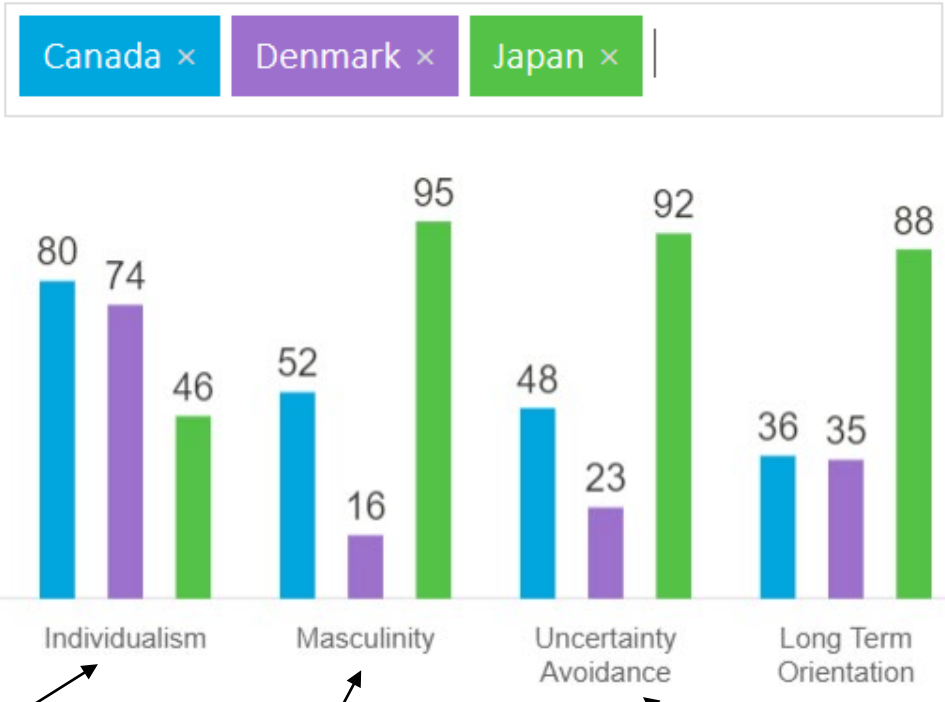
Internal	versus	External
Implicitly Learned		Explicitly Learned
Unconscious		Conscious
Difficult to Change		Easily Changed
Subjective Knowledge		Objective Knowledge



Source: https://www.spps.org/cms/lib/MN01910242/Centricity/Domain/125/iceberg_model_3.pdf

Cultural Diversity

Hofstede's Framework for assessing cultures (1980, updated 2010)



Degree to which people accept that power in organizations is distributed unequally

Degree to which people prefer to act as individuals

Degree to which culture favours traditional gender roles

Degree to which culture favours structured versus unstructured situations

Degree to which culture favours devotion to traditional values

Degree of freedom that societal norms give to citizens in fulfilling their human desires.

https://www.hofstede-insights.com/product/compare-countries/

Intersectionality

The interconnected nature of social categorizations such as race, class, and gender, regarded as creating overlapping and interdependent systems of discrimination or disadvantage

- Oxford Dictionary

Everyone has their own unique experiences of discrimination.

Example: “Woman” is not a catchall category that alone defines a woman’s relationship with power. A black woman may experience misogyny and racism, but she will experience misogyny differently from a white woman and racism differently from a black man.

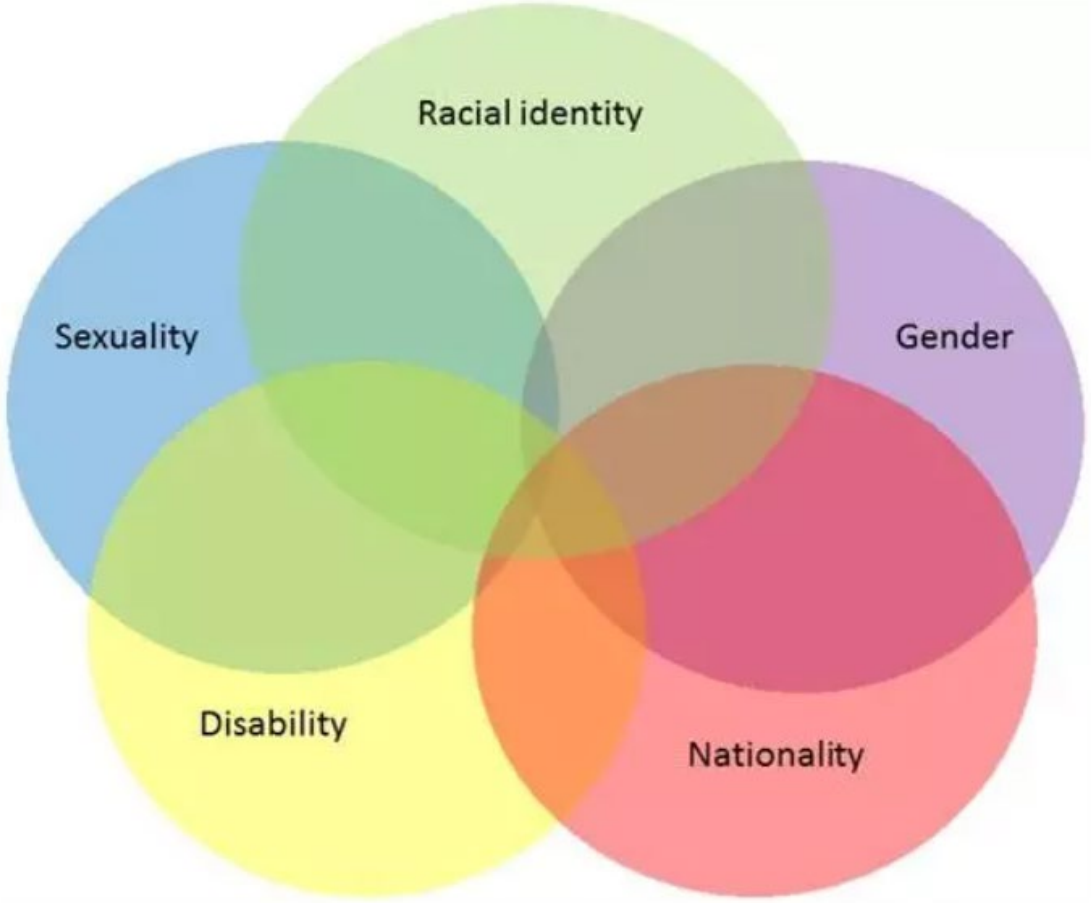


Image Source: https://www.womankind.org.uk/wp-content/uploads/2020/04/xintersectionality.jpg.pagespeed.ic.veTVl62D2s.webp

Equity

The removal of systemic barriers and biases enabling all individuals to have equal opportunity to access and benefit from a project, program, or system.

- Gov't of Canada

Equity, unlike the notion of equality, is not about sameness of treatment. Equity denotes fairness and justice in process and in results.

- Equity at McGill

https://miro.medium.com/max/5120/1*d7RHomKlhU36sCftx-ohLQ.png

Equity versus Equality

Image Source: https://www.rwjf.org/en/library/infographics/visualizing-health-equity/_jcr_content/infographics/infographics.infographic.img.jpg/1503346670255.jpg

Equity versus Equality

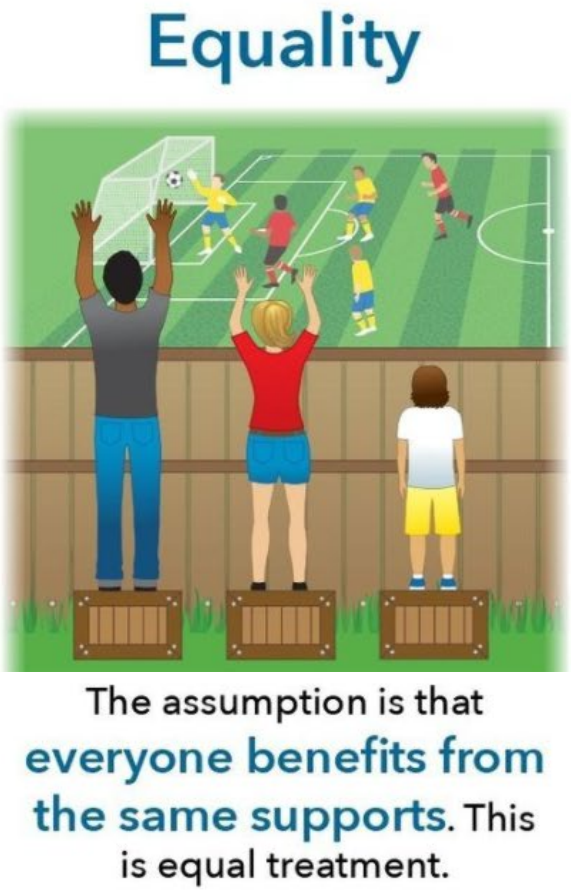


Image Source: https://www.mobilizegreen.org/blog/2018/9/30/environmental-equity-vs-environmental-justice-whats-the-difference

Question:

When distributing Covid-19 vaccines, the government sent more vaccines to communities with higher populations. What is this an example of?

a) Equal distribution of vaccines
b) Equitable distribution of vaccines
c) Both

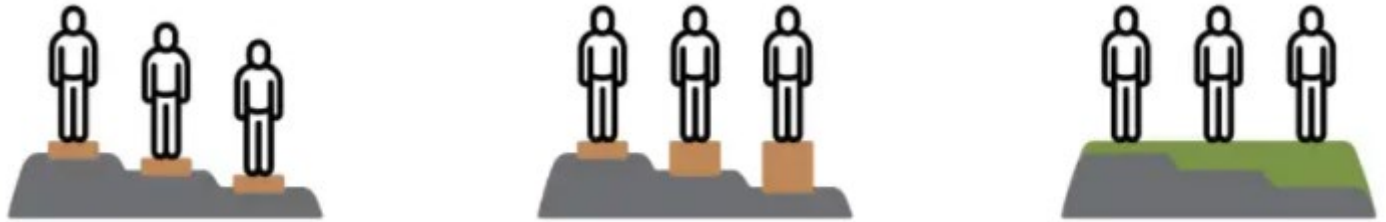


Image source: https://i1.wp.com/thesource.metro.net/wp-content/uploads/2021/05/equality-equity-justice.jpg?resize=863%2C250&ssl=1

Question:

When distributing Covid-19 vaccines, the government sent more vaccines to communities and groups that had the highest rate of infection and vulnerability. What is this an example of?

a) Equal distribution of vaccines
b) Equitable distribution of vaccines
c) Both

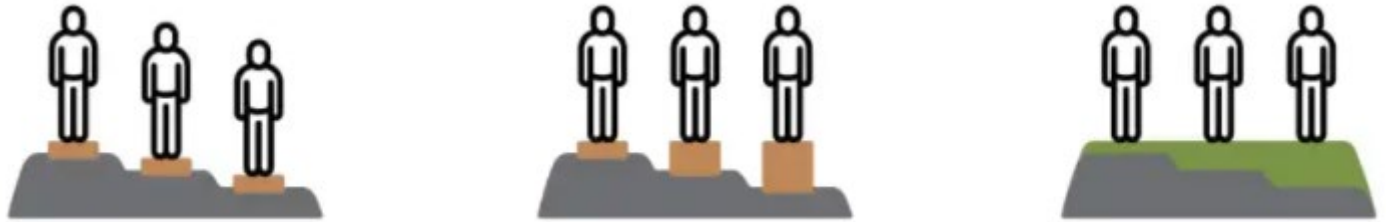
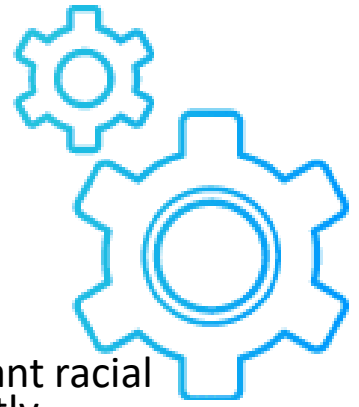


Image source: https://i1.wp.com/thesource.metro.net/wp-content/uploads/2021/05/equality-equity-justice.jpg?resize=863%2C250&ssl=1

Equity in Engineering:



External Equity: how are we, as engineers, contributing to a more equitable world?

- Examples:
  - Facial recognition technologies - the current implementation of these technologies involves significant racial bias. One study showed 28 members of Congress, disproportionately people of color, were incorrectly matched with mugshot images
  - Source: https://sitn.hms.harvard.edu/flash/2020/racial-discrimination-in-face-recognition-technology/

  - Many new buildings still don't have washrooms that are safe for non-binary, transgender, and gender non-conforming people.

  - Transportation Planning Equity Impacts - the quality of transportation available affects people's economic and social opportunities.
  - Source: https://www.vtpi.org/equity.pdf
    https://www.npr.org/2021/04/07/984784455/a-brief-history-of-how-racism-shaped-interstate-highways

  - Who do we design and problem solve for? Whose voices, ideas, and concerns are heard and acted upon? What solutions aren't even imagined? Who is harmed? What opportunities for justice are missed?

Internal Equity: how are we, as engineers, ensuring our teams and organizations are equitable?

Canada's Federally Designated Equity Groups

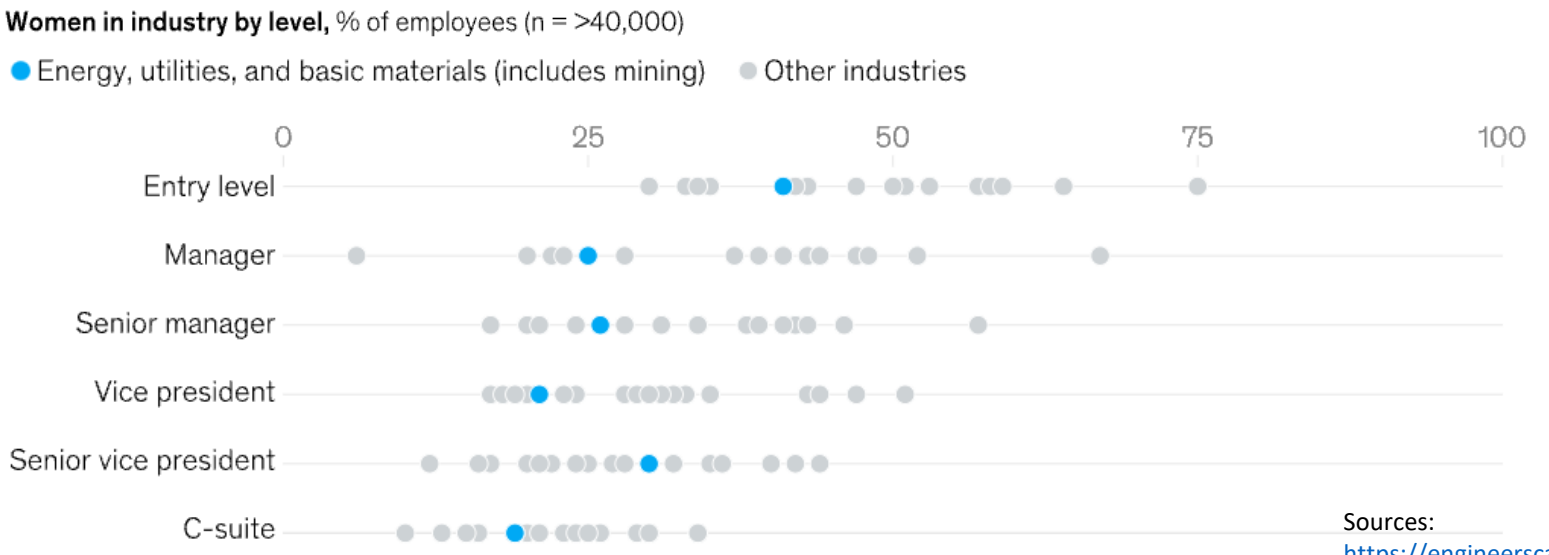
Canada's first *Employment Equity Act* came into force in 1986 with the objective to build a foundation for equal access to employment opportunities or benefits and to correct the conditions of disadvantage in employment experienced by:

- Women
- Indigenous peoples
- Persons with disabilities
- Members of visible minorities

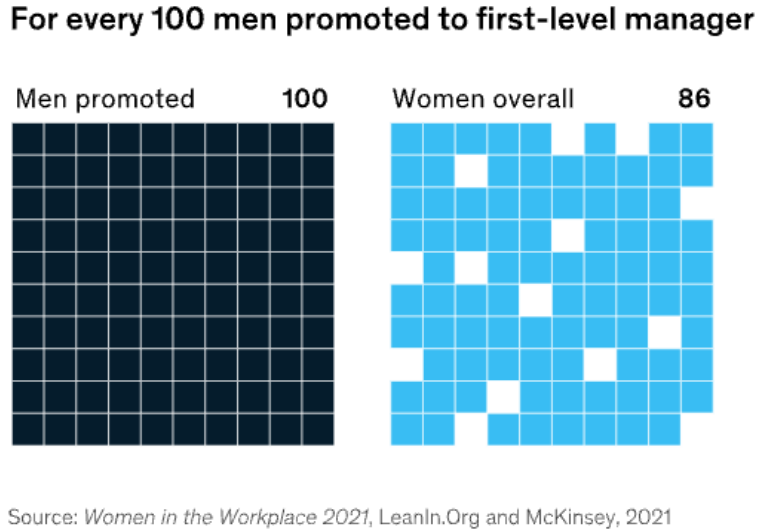
Image Source: http://psacunion.ca/sites/psac/files/styles/content_image_banner/public/diversity_1.jpg?itok=sHsU9Avs

Women

- Women make up more than half of the Canadian population account for only 13% of practicing engineers.
- In 2017, women accounted for over 21% of total undergraduate engineering enrolment. In the same year, 18% of newly licensed engineers were women.
- Based on 2016 census data, women in Canadian tech jobs, with a bachelor's degree or higher, earn nearly $20,000 less a year than their male counterparts



Source: *Women in the Workplace 2020*, LeanIn.Org and McKinsey, 2020



Source: *Women in the Workplace 2021*, LeanIn.Org and McKinsey, 2021

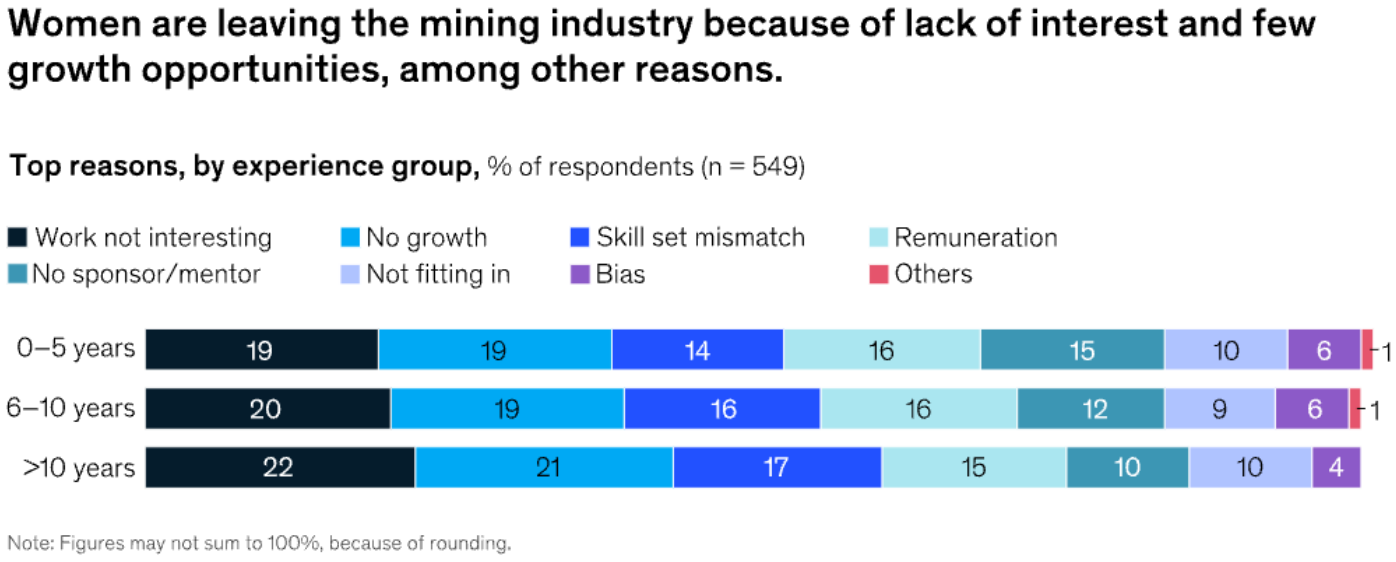
Sources:
https://engineerscanada.ca/sites/default/files/public-policy/nps-diversity-inclusion-en.pdf
https://www.cbc.ca/news/politics/pay-equity-legislation-1.6097263
https://brookfieldinstitute.ca/wp-content/uploads/FINAL-Tech-Workers-ONLINE.pdf
https://www.mckinsey.com/featured-insights/diversity-and-inclusion/women-in-the-workplace

Women

Some of the factors that contribute to persistence of inequality:

1. Conscious and unconscious biases (such as ingrained gender roles)
2. Uneven distribution of household responsibilities
3. Bullying and harassment
4. Lack of parental leave
5. Lack of mentorship

Source: https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/despite-diversification-efforts-fewer-than-1-in-5-mining-leaders-are-women-59101897

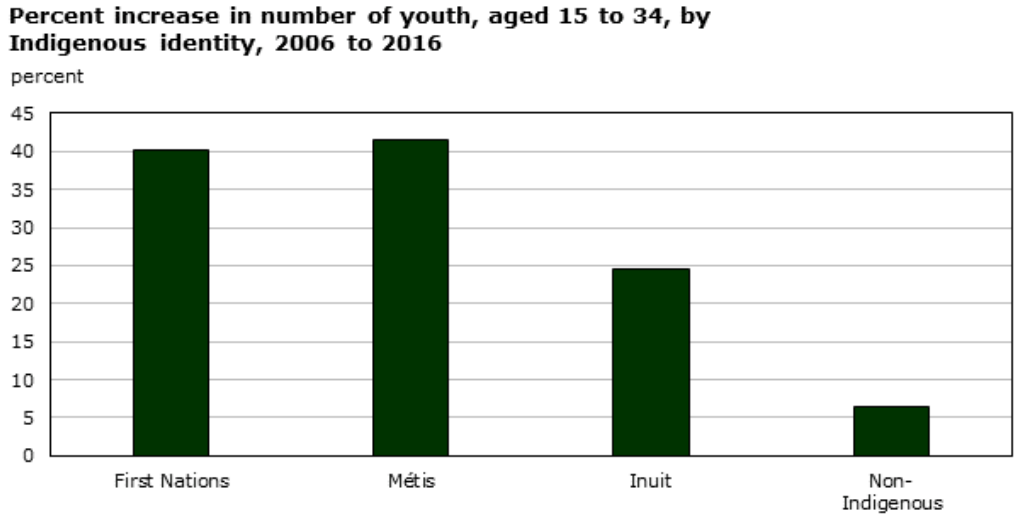


Indigenous Peoples

- Considering only individuals in their main working years with bachelor level education or above, the percentage of all engineers who identify as Indigenous is 0.73 per cent. This compares to 3.15 per cent of the labour force in their main working years who identify as Indigenous.
- Indigenous peoples accounted for only 1.2 per cent of total undergraduate engineering enrolment.
- Based on 2016 census data, Indigenous Peoples in tech occupations were paid much less than non-Indigenous tech workers—ranging from $30,000 lower on average for Inuit tech workers, to $3,400 lower for individuals identifying as Métis.

Salaries of Indigenous Tech Workers

Sex	First Nations	Métis
Male	$65, 680	$73,350
Female	$52, 270	$55,990



Sources:
https://engineerscanada.ca/news-and-events/news/new-report-finds-a-lack-of-indigenous-representation-in-engineering-occupations
https://www150.statcan.gc.ca/n1/pub/89-659-x/89-659-x2018001-eng.htm
https://brookfieldinstitute.ca/wp-content/uploads/FINAL-Tech-Workers-ONLINE.pdf

Indigenous Peoples

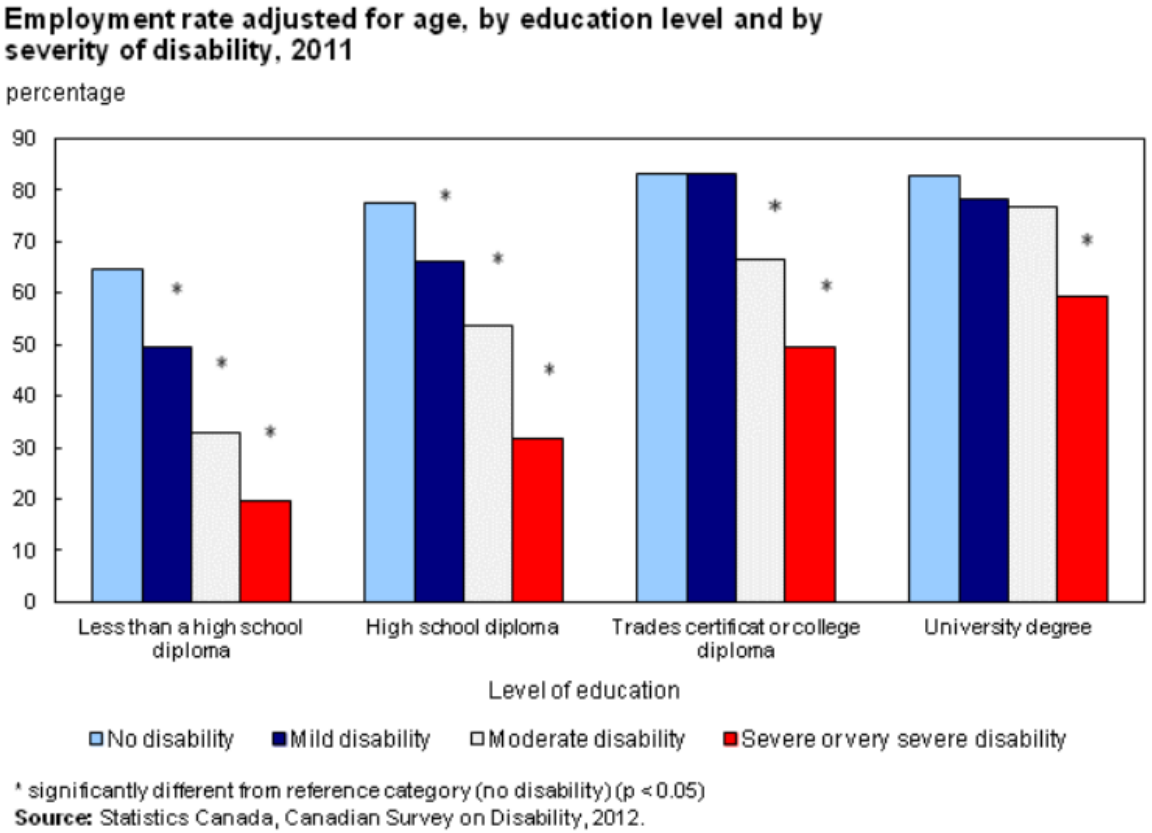
Some of the factors that contribute to the persistence of inequality:

1. Fundamental differences between Western science and Indigenous ways of learning.
2. Uneven access to technology and training - many rural and remote communities lack consistent access to the training programs, reliable internet, and digital tools
3. Legacy of residential schools
4. Conscious and unconscious biases
5. Lack of cultural accommodation
6. Lack of mentorship and advancement opportunities

Source: https://newlearningonline.com/literacies/chapter-1/eight-aboriginal-ways-of-learning

Persons with Disabilities

- In 2011, the unemployment rate of persons aged 25-64 with disabilities was 11%, compared with 6% for people with no disability
- 12% percent of Canadians with disabilities reported being refused work because of their disability
- Persons with a disability that does not affect their performance at work are still paid about 10% less than a comparison group with no disability



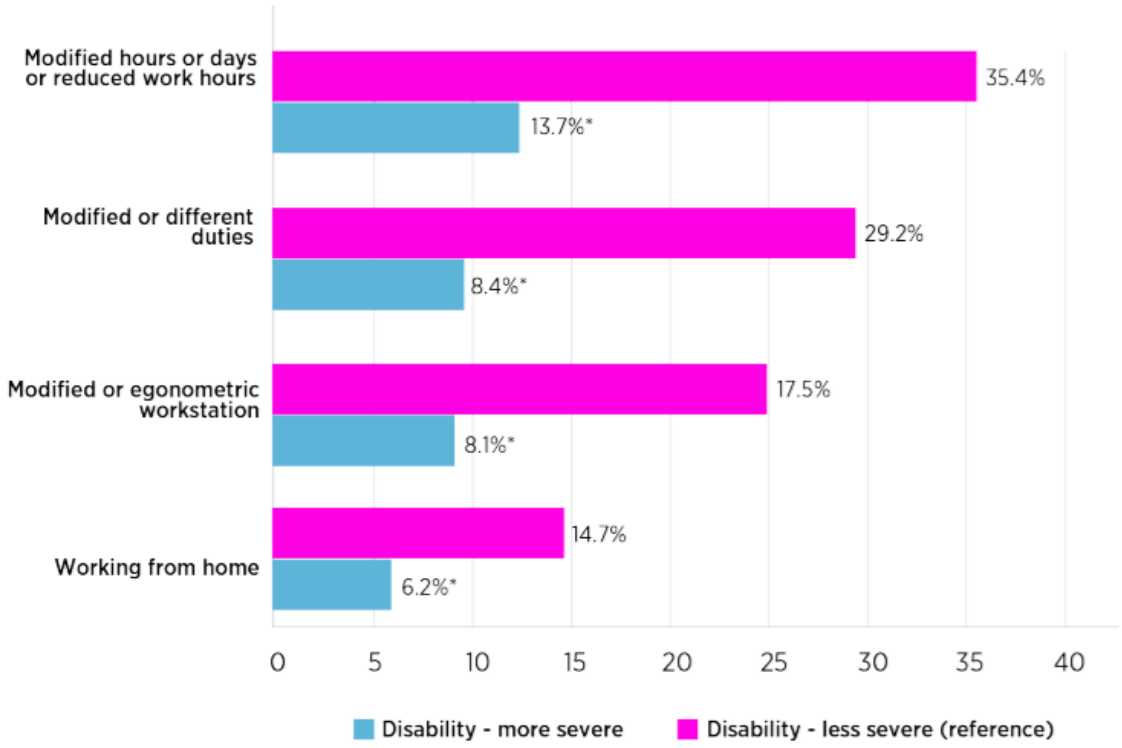
Sources:
https://www150.statcan.gc.ca/n1/pub/75-006-x/2014001/article/14115-eng.htm#a3tation-in-engineering-occupations
https://fsc-ccf.ca/wp-content/uploads/2020/01/SkillsGap-Disabilities-PPF-JAN2020.pdf
https://www.researchgate.net/publication/283201380_Pay_discrimination_against_persons_with_disabilities_Canadian_evidence_from_PALS

Persons with Disabilities

Some of the factors that contribute to persistence of inequality:

1. Students with disabilities underrepresented in STEM due to multiple barriers to accessing reasonable accommodation within the classroom and laboratory environments
2. Conscious and unconscious biases - many employers are hesitant to hire, retain or promote persons with disabilities due to discriminatory beliefs and stereotypes
3. Access to workplace accommodation is a serious concern for many Canadians with disabilities. Canadians with disabilities are uncomfortable or fearful of asking for accommodations in the workplace.

Figure 3: Most Commonly Required Accommodations for Employees with Disabilities (from 25 to 64 Years of Age) by Disability Severity

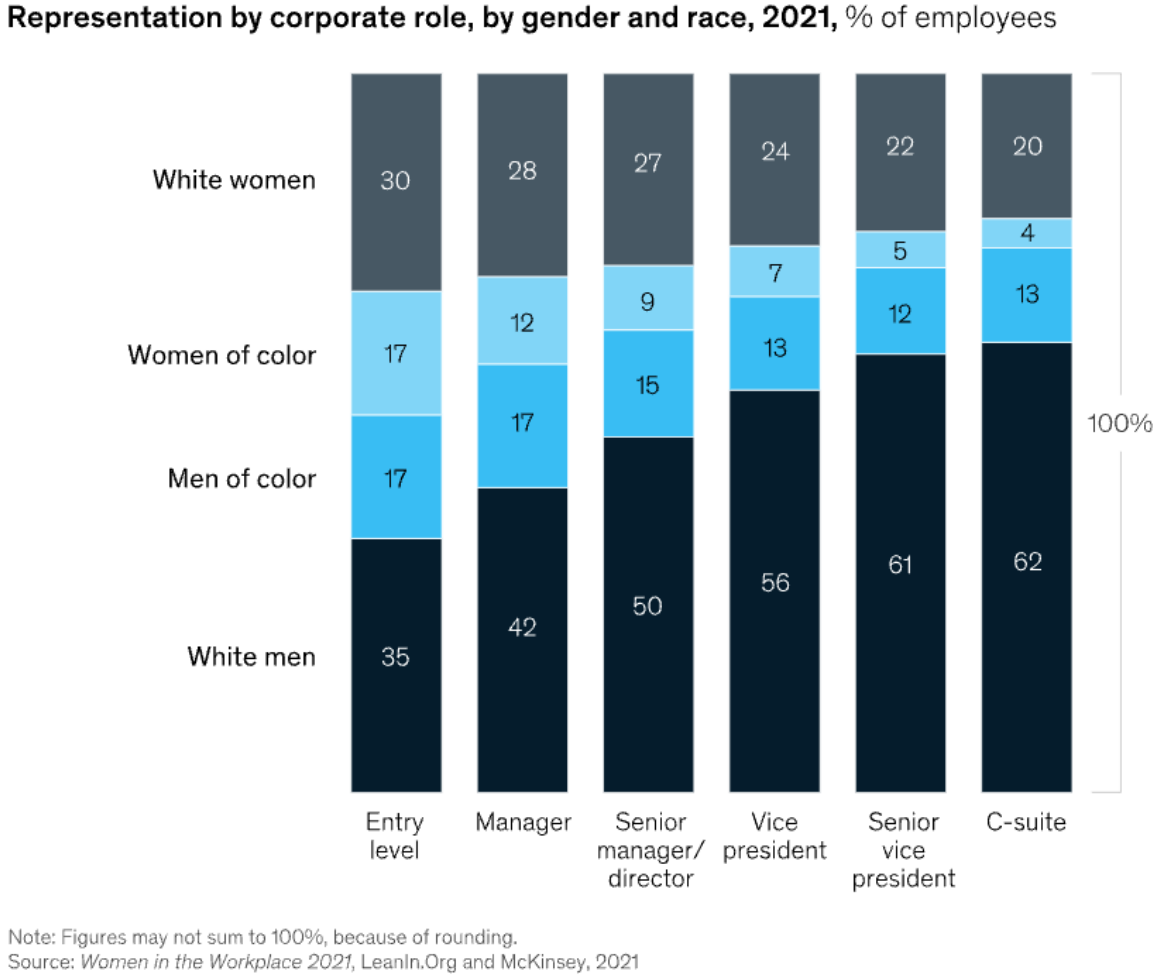


Sources:
https://cjds.uwaterloo.ca/index.php/cjds/article/download/510/768
https://fsc-ccf.ca/wp-content/uploads/2020/01/SkillsGap-Disabilities-PPF-JAN2020.pdf

Members of Visible Minorities

- In Toronto and Vancouver, almost one in two residents belongs to a visible minority group
  - Does leadership in engineering organizations reflect this? Google “board of directors” for some Vancouver-based companies and check!
- Average pay across all visible minorities in tech occupations was $3,100 lower than for non-visible minorities in tech occupations in Canada.
  - Black tech workers were the lowest paid. Their average salary was over $16,000 lower than non-visible minorities in tech occupations.
- Disparities in pay and corporate role representation are even starker for women belonging to visible minority groups.

Sources:
https://www.mckinsey.com/featured-insights/diversity-and-inclusion/women-in-the-workplace
https://brookfieldinstitute.ca/wp-content/uploads/FINAL-Tech-Workers-ONLINE.pdf



Members of Visible Minorities

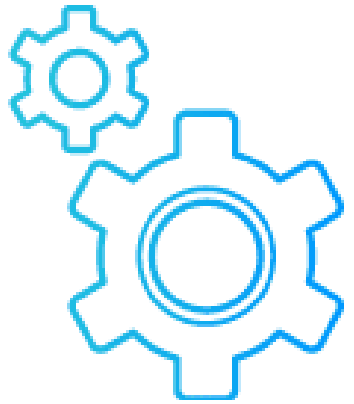
Some of the factors that contribute to persistence of inequality:

1. Conscious and unconscious biases against visible minorities in STEM are found in education and employment
    - Studies have shown that teachers have lower expectations of Black students, particularly when it comes to math
2. For newcomers to Canada, difficulty communicating and learning local norms results in challenges

Source: https://www.ncbi.nlm.nih.gov/books/NBK223640/

Image Source: http://www.vale.com/brasil/pt/aboutvale/news/publishingimages/news/2020/maio/diversiade_cultural_valecom_maio2020.png

Equity in Engineering



- Equitable outcomes often require differential treatment and resource redistribution in order to achieve a “level playing field”
- Engineers must have awareness and correct for ways their work unwittingly impacts the distribution of wealth, power, and privilege in society.
- Although all Canadians should have the same opportunities to enter engineering, systemic barriers that disproportionately impact certain groups result in lack of accessibility.
- Equity initiatives such as equal pay and equal opportunity must be continuously supported to remove barriers that limit the participation of underrepresented individuals.

Inclusion

The practice of ensuring that all individuals are valued and respected for their contributions and are equally supported

- Gov't of Canada

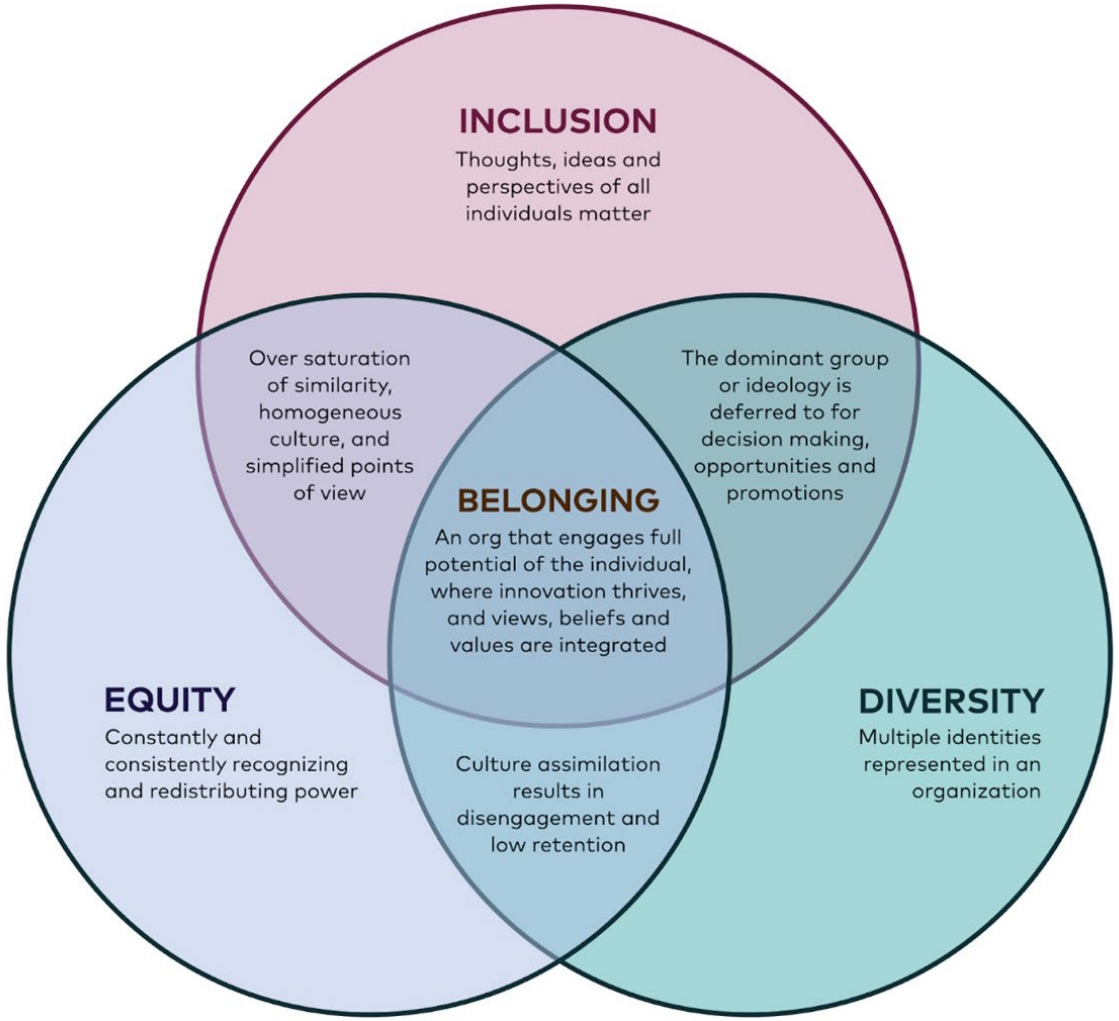
Inclusion calls for recognizing, reducing, and removing barriers to participation and belonging, sometimes entailing the change or re-imagination of such institutions, programs, or settings

- Equity at McGill

https://miro.medium.com/max/5120/1*d7RHomKlhU36sCftx-ohLQ.png

Inclusion is the final step in the EDI process

- A diverse workforce means having a “headcount”
- An equitable workforce means being aware of privilege and power
- An inclusive company culture allows employees to feel included irrespective of their intersectionality, power, and privilege
- Together, these enable each employee to contribute at their full potential



Source: https://www.shineinterview.com/the-meaning-of-diversity-and-inclusion-in-the-workplace/

Why Is EDI Important?

These are some of the ways EDI policies influence the workplace, workforce, and bottom line:

- **Varied perspectives** – Different personal experiences and backgrounds bring a wider variety of perspectives. Design teams that have diversity are more likely to develop innovative solutions that meet the needs of a more diverse range of end users.
- **Better problem-solving** – Diverse points of view result in more creativity and well-thought out solutions, as teams focus more on facts and process facts more carefully
- **Positive Reputation** – Showing commitment to equal opportunities gives your company a positive reputation allowing the capture of a larger share of the market.
- **Increased productivity** – Diverse teams show increased adherence to work schedules and deliverables
- **More job applicants** – maximizing your applicant pool will allow you to choose the top talent in your field
- **Increased safety benefits** – BHP's data showed a 67% lower Total Recordable Injury Frequency in high diversity teams
- **Higher profits** – McKinsey & Company studies have shown that companies with higher levels racial, gender, and ethnic diversity, companies likely to outperform their industry averages by up 35%
- **Increased employee retention and better corporate culture** – employees working in inclusive workplaces report feeling more pride in their company and decreased levels of dissatisfaction

Sources:

- https://www.bhp.com/news/prospects/2019/10/the-gender-equation
- https://www.scientificamerican.com/article/how-diversity-makes-us-smarter/
- https://www.mckinsey.com/featured-insights/diversity-and-inclusion/diversity-wins-how-inclusion-matters

Discrimination:

- Canadian Human Rights Act: Discrimination is the unfair or prejudicial treatment of people and groups based on the following characteristics:
  - Race, National or ethnic origin, Colour, Religion, Age, Sex, Sexual orientation, Gender identity or expression, Marital status, Family status, Disability, Genetic characteristics, a conviction for which a pardon has been granted
- Types of discrimination include:
  - **Direct discrimination:** individuals or organizations specifically exclude or impose extra burdens that are not imposed on others, without a legitimate reason
  - **Adverse effect discrimination**: When a law or policy does not explicitly single anyone out, but indirectly places certain groups at a disadvantage.
  - **Systemic discrimination:** consists of attitudes, behaviour, or policies that are part of the social or administrative structures that perpetuate a position of relative disadvantage on a certain group
  - **Poisoned Environment:** created when unwelcome conduct or comments are pervasive within the organization, which may result in a hostile or oppressive atmosphere for a certain group

Harassment

Harassment is another type of discrimination. It occurs when a person is subjected to any unwanted behaviour that offends, demeans or humiliates. It includes, but is not limited to:

- verbal abuse and intimidation
- displaying of racist, sexist, or other offensive materials
- sexually suggestive comments or gestures or unwanted physical contact

Harassment can involve a single serious incident, but more often consists of a series of unwanted incidents over a period of time.

Biases

- **Conscious Bias:** Biased attitudes about a group we are aware of.
- **Unconscious Bias:** Biased attitude operating outside your awareness and control. These can include:
  - Affinity Bias, Attribution Bias, Confirmation Bias, The Halo Effect, The Horns Effect, Gender Bias, Ageism, Name Bias, Beauty Bias, Height Bias, etc.

Image Source: https://www.verywellmind.com/what-is-a-confirmation-bias-2795024

The Halo Effect

The "halo effect" is when one trait of a person or thing is used to make an ***overall judgment*** of that person or thing.

Hiring and Discrimination

- Research shows that sometimes unfair biases and stereotypes may influence the hiring process. Studies have shown:
  - Applicants with Asian names were much less likely to be called for interviews than people with Anglo-Canadian names.
  - Half of Canadians said it's acceptable for an employer to screen out disabled applicants as too risky to hire.
- If the hiring process contains unfair barriers to people with a protected characteristic (like a disability) then the process may be discriminatory.
- Hiring managers should avoid asking questions that may elicit information that could be used to discriminate on a prohibited ground unless they have a lawful requirement for that information.

Sources:
- https://angusreid.org/rhf-accessibility/
- https://www.thestar.com/news/immigration/2017/01/25/better-education-doesnt-help-asian-job-candidates-beat-out-anglos-study.html

Image Source: http://www.thechicflaneuse.com/wp-content/uploads/2017/05/hawaian-airlines-stewardess-recruitment-vintage-ad-thechicflaneuse.jpg

Jobs Essential Functions

There may be legitimate reasons for an employer to ask questions about a protected characteristic. If a characteristic is relevant – it's a *bonafide* occupational requirement.

In employment law, a bonafide occupational requirement is a quality or an attribute that employers are allowed to consider when making decisions on the hiring and retention of employees—qualities that, when considered in other contexts, would be considered discriminatory.

- Gov't of BC

In order for it to be a bonafide occupational requirement, the employer must demonstrate:

1. That the requirement is rationally connected to the performance of the job
2. That the requirement is adopted in honest and good faith
3. That the standard is reasonably necessary to the accomplishment of that legitimate work-related purpose.

Example: To serve alcohol, a person must be at least 19. Age is therefore relevant to the job.

Example - LeFrense v IBM Canada Ltd,

Mr. LeFrense worked as an IT maintenance specialist, and requested that IBM accommodate his sleep apnea by relieving him of the on-call requirements of his position.

IBM took the position that it could not adapt his work schedule without suffering undue hardship, and offered him a different position at a reduced salary. Mr. LeFrense accepted this position, but later filed a Human Rights complaint.

The Board of Inquiry determined that IBM's requirement of on-call weekend and overnight work was a bona fide occupational requirement within the Nova Scotia Human Rights Act, and therefore IBM had not discriminated against Mr. LeFrense.

Source: https://coxandpalmerlaw.com/publication/the-duty-to-accommodate-when-is-the-point-of-undue-hardship-reached/

EGBC Obligations

ENGINEERS & GEOSCIENTISTS BRITISH COLUMBIA

- EGBC's Human Rights and Diversity Guidelines
  - establish expectations for how engineering and geoscience registrants should conduct and educate themselves on issues of human rights
  - clarifies expectations that all registrants uphold the principles of fair and equitable treatment of other professionals, clients, employees
- EGBC has a process for taking complaints against registrants in relation to allegations the registrant has not practiced professional engineering or professional geoscience in accordance with the standards of the professions, including aspects of practice related to human rights or a breach of the EGBC Code of Ethics.

Examples in Industry

- **UBC Mechanical Engineering Department:**
  - Addressing faculty hiring practices to reduce barriers to and increase engagement from applicants from equity seeking groups;
  - Collecting thorough data on EDI challenges within the Department in order to increase transparency, and set benchmarks for future goals;
  - Creating methods for students, faculty, and staff to directly report their EDI concerns.

- **Engineers Canada 30 by 30** – a national initiative to increase the number of newly licensed engineers who are women to 30% by the year 2030

- **BHP** - set its aspirational goal to achieve gender balance by 2025

- **Salesforce** - commitment to increase their U.S. representation of Black employees by 50% by the end of 2023.

https://www.fm-magazine.com/content/dam/fmm/issues/2020/aug/cultural-diversity-720.jpg

What can you do?

- Consider your privilege: Look beyond skin color or gender - Middle class? Able-bodied? Cis-gender? Your identities play into your privilege. Reflect on these and consider the discrimination and biases that you experience/don't experience because of your identity.
- Interact with people different from you
- Be open-minded to listen and let go of judgment
- Consider whether you are the right person to speak up on a topic
- Don't speak on behalf of other people's experiences
- If you see anyone who is being insensitive, speak out against it
- Accept that differences are beneficial and not harmful
- Don't force your beliefs on people with opposing views

- Consider your words: lots of words are exclusionary or hurtful to marginalized communities. Recognize and correct your use of offensive terms.
- Advocate to hire or work with diverse people
- Travel the world as much as you can to take part in cultures and understand them from the source
- Read literature and media and learn about different points of view
- **Remember it's not the responsibility of marginalized groups to do all the work in educating people on their experiences.** This often takes up lots of emotional labour and should never be taken for granted. Be prepared to take on some of the labour by doing your own research.

Thank you

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APSC 450 – THE EFFECT OF INDIGENOUS INTERESTS ON THE ENGINEERING PROFESSION

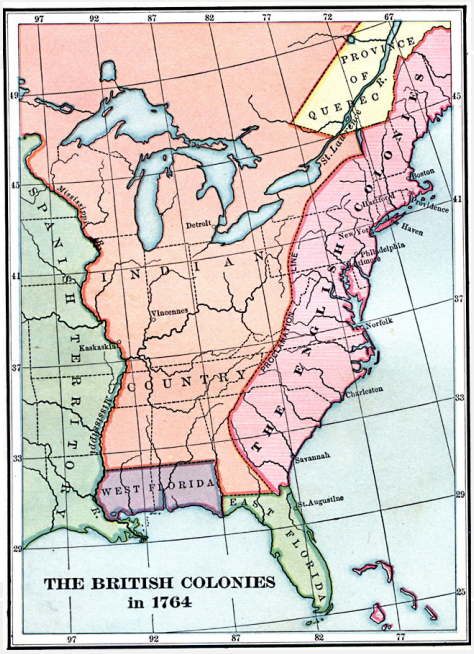
Instructor: Justin Himmelright, R.P. Bio. M.Eng.

HISTORY

1763 -Treaty of Paris – conclusion to the French and Indian War; France cedes its claims and settlements In North America to England

1763 - Royal Proclamation – King George III of England declares all lands west of the Appalachian Divide as reserved for Indigenous Nations.

- Recognizes Indigenous populations as sovereign nations
- Establishes government (Crown) exclusive right and obligation to negotiate taking up of lands through treaty negotiations with Indigenous Nations



Charles Kendall Adams, A History of the United States (Boston, MA: Allyn and Bacon, 1909) 87

French & Indian War AKA 7 Years War

- world war involving England, France, and Spain & their colonies. England defeated France and Spain
- Indigenous Nations were allies with and fought alongside England and France in North America
- INDIGENOUS Nations were not invited to Treaty negotiations

Royal Proclamation

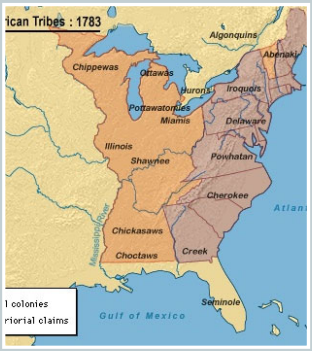
- Discontent and violence between colonists and Indigenous peoples after England gained control led to Royal Proclamation – Pontiacs Rebellion
- England (the Crown) moved immediately to negotiate treaties and take up lands for colonial settlements already established west of the Appalchias

American War of Independence

- Indigenous Nations traditionally aligned with the Crown of England fought on behalf of England in this war. As the losing combatants they were considered "defeated nations" by the new US Government. Many were displaced to Canada (Joseph Brandt, 6 Nations Reserve).
- Indigenous combatants were not invited to treaty negotiations

HISTORY

- 1784 - American War of Independence – England cedes Indigenous lands in the new United States to the USA



https://mappinghistory.uoregon.edu/english/US/US05-00.html

http://ushistoryvocab.weebly.com/treaty-of-paris-1783.html

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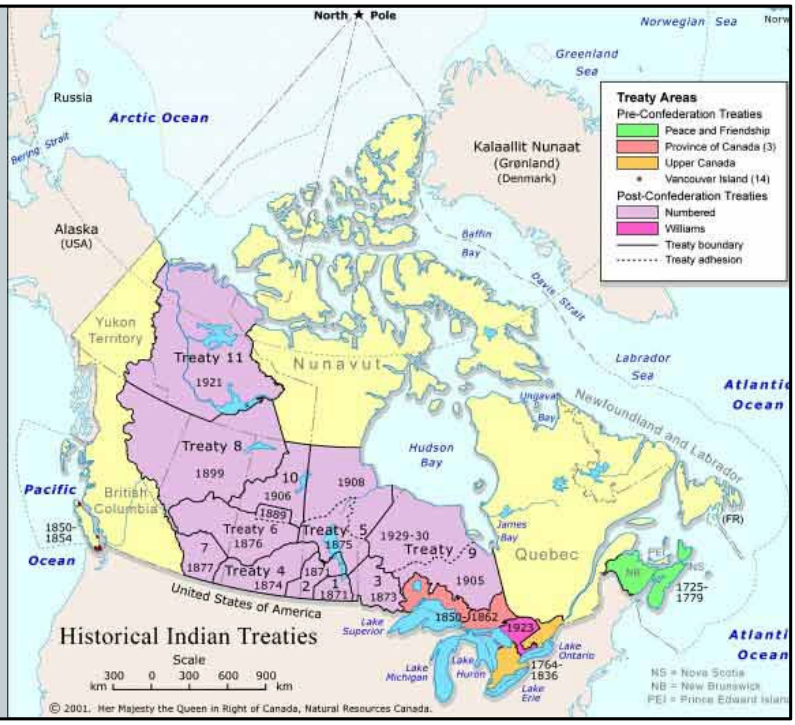
HISTORY

- 1867 – Canadian Confederation
  - The Indian Act and government policies
    - Registration of Indigenous people
    - Creation and confining to Reserves
    - No rights to vote or legal representation
    - Residential School system
    - Emancipation objective
  - Negotiation of numbered Treaties in central Canada



HISTORY

- 1960 – Indigenous people gain right to vote in Canada
- 1982 – Constitution Act (Canada) incl. Sec. 35
  - 35(1) The existing aboriginal and treaty rights of the aboriginal people in Canada are hereby recognized and affirmed.
    - (2) In this Act, "Aboriginal Peoples of Canada "includes the Indian, Inuit, and Métis Peoples of Canada.
    - (3) For greater certainty, in subsection (1), "treaty rights" includes rights that now exist by way of land claims agreements or may be so acquired.
    - (4) Notwithstanding any other provision of this act, the aboriginal and treaty rights referred to in subsection (1) are guaranteed equally to male and female persons.

CASE LAW

- 1973 – Calder: Courts recognize that Aboriginal Title to land existed prior to colonization.
- 1990 – Sparrow: Reliance on Constitution Act Sec. 35 establishes harvesting (fishing) as a constitutionally protected Aboriginal right.
- 1997 – Delgamuukw: Recognizes Aboriginal rights includes rights to land and that the Crown has an obligation to consult.
- 2004 – Haida & Taku: Courts provide guidance on consultation requirements.
- 2014 – Tsilqoht'in: Courts establish guidance on determination of Aboriginal Title and rights and benefits conferred by such title.

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Calder

- Nisga'a Nation on the West Coast of BC sued the BC government on the point of title to their land
- Courts acknowledged that Aboriginal title existed prior to the Royal Proclamation and was not derived from colonial law
- Split decision on the question of Nisga'a title, 3 for, 3 against, with the 7th judge dismissing the case on technicality

Sparrow

- A Musqueam man (Sparrow) was charged for fishing with a net longer than permitted by his food fishing licence
- Sparrow argued in court that he had an aboriginal right to fish that was protected by his constitutional rights
- Courts found that
    - Sparrow had an aboriginal right that had not been extinguished by any regulatory or policy regime of past governments (no treaty).
    - That right could not be infringed by government without justification
    - A restriction on the length of his net was not a justifiable infringement on

his rights

- Established the Sparrow test
    - What is infringement:
        - Creates undue hardship
        - Considered by court to be unreasonable
        - Prevents rights holder from exercising his right
    - When is infringement of these rights justified?
        - When there is a valid legislative objective (ie conservation)
    - There must be as little infringement as possible
    - Compensation must be provided
    - First Nations must be consulted in advance

Delgamuukw

- Gitsxan hereditary Chief (Delgamuukw) took the province to court over the rights to territory
- Courts found
    - Oral testimony is legitimate form of legal evidence
    - Aboriginal title is a right to lands and resources from those lands
    - Aboriginal rights can be infringed by the Crown under certain circumstances
    - Indigenous title to a certain tract of land did exist based on sufficient, continuous, and exclusive occupation (the Delgamuukw test)

Haida & Taku

- Two cases; one involving the renewal and transfer of a Tree Farm Licence from one major corporation to another and the the other case involving ther permitting of a mine access road.
- In both the First Nations argued that the decision by the Province to allow these acitivities had a potential impact to their rights and as such, they should have been consulted by the Crown
- The Court found:
    - Asserted rights are enough to trigger a duty to consult (need not be proven)
    - Scope of duty to consult is proportionate to the potential impact; on a scale from advising to deep consultation
    - Duty of consultation rests solely with the Crown
    - Crown can delegate procedural aspects of consultation to a third party
    - Government can design consultation processes and decide how best to integrate aboriginal rights into the business of government
    - Duty of accommodation for rights infringement rests with the Crown

Tsilqoht'in

- Roger Williams (Tsilqoht;in Chief) took the Province to court over title to Indigneous Lands
- The Courts used the Delgamuukw test to find that Indigenous title to the land did exist where the Tsilqoht'in (Chilcotin) nation lived
- The benefits of title were concluded to be "ownership rights similar to those associated with fee simple: the right to decide how the land will be used; the right of enjoyment and occupancy of the land; the right to possess the land; the right to the economic benefits of the land; and the right to pro-actively use and manage the land."
- Indigenous title lands are subject to Crown laws and regulation provided they do not violate the tests laid out in Sparrow.

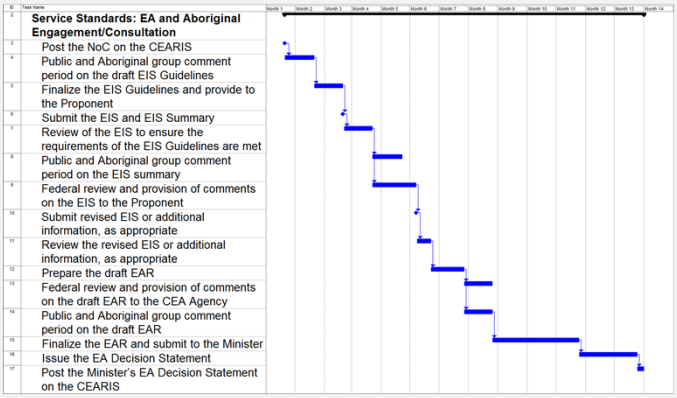
TODAY

- Truth and Reconciliation Commission – following and in depth review of residential school history, the TRC issues 94 "Calls to Action" for various sectors of Canadian society to advance reconciliation with Indigenous Nations.

- UN Declaration on the Rights of Indigenous Peoples (UNDRIP) – includes provisions for Indigenous peoples rights to enjoy and practice their cultures and customs, their religions, and their languages, and to develop and strengthen their economies and their social and political institutions. Includes a requirement for free, prior, and informed consent (FPIC) that affect them or their territories.

EFFECTS ON ENGINEERING PROFESSION

- Planning
  - Project design: Indigenous land use rights & heritage resources must be considered
  - Project timing: Requirements for consultation and accommodation of Indigenous nations affect timelines and complexity of achieving project approvals
- Costing
  - Development budgets must include consideration of design and timing issues examined during planning.



Gant chart for Project Approval- Federal EA Blackwater Project

EFFECTS ON ENGINEERING PROFESSION

- Contracts
  - Certain commercial rights may be granted to Indigenous Nations as a component of accommodation for potential rights infringement (IBA). Potential effects to employment, subcontracting, training, etc.
- Business Development
  - Developing an engineering business may consider policy that adopts/reflects the TRC Calls to Action for business
  - Professional Accreditation
    - APEGBC is implementing the TRC Call to Action, CPD programs are being offered

Signing of the Pretium Resources Impact Benefit Agreement with the Tahltan Nation, 2017.

Business Development & TRC:

- Hire Indigenous talent,
- train Indigenous students,
- diversify supply chain,
- cultural training for staff,
- consultation and relationship building in economic development,
- celebrate Indigenous Day,
- Territorial Acknowledgements where appropriate,

Innovation & Risk: Vision Before Money

Claudio Arato, P.Eng., FEC
CTO, SonoAsh

APSC 450

October 2019

Overview

Part One…

- How I got here

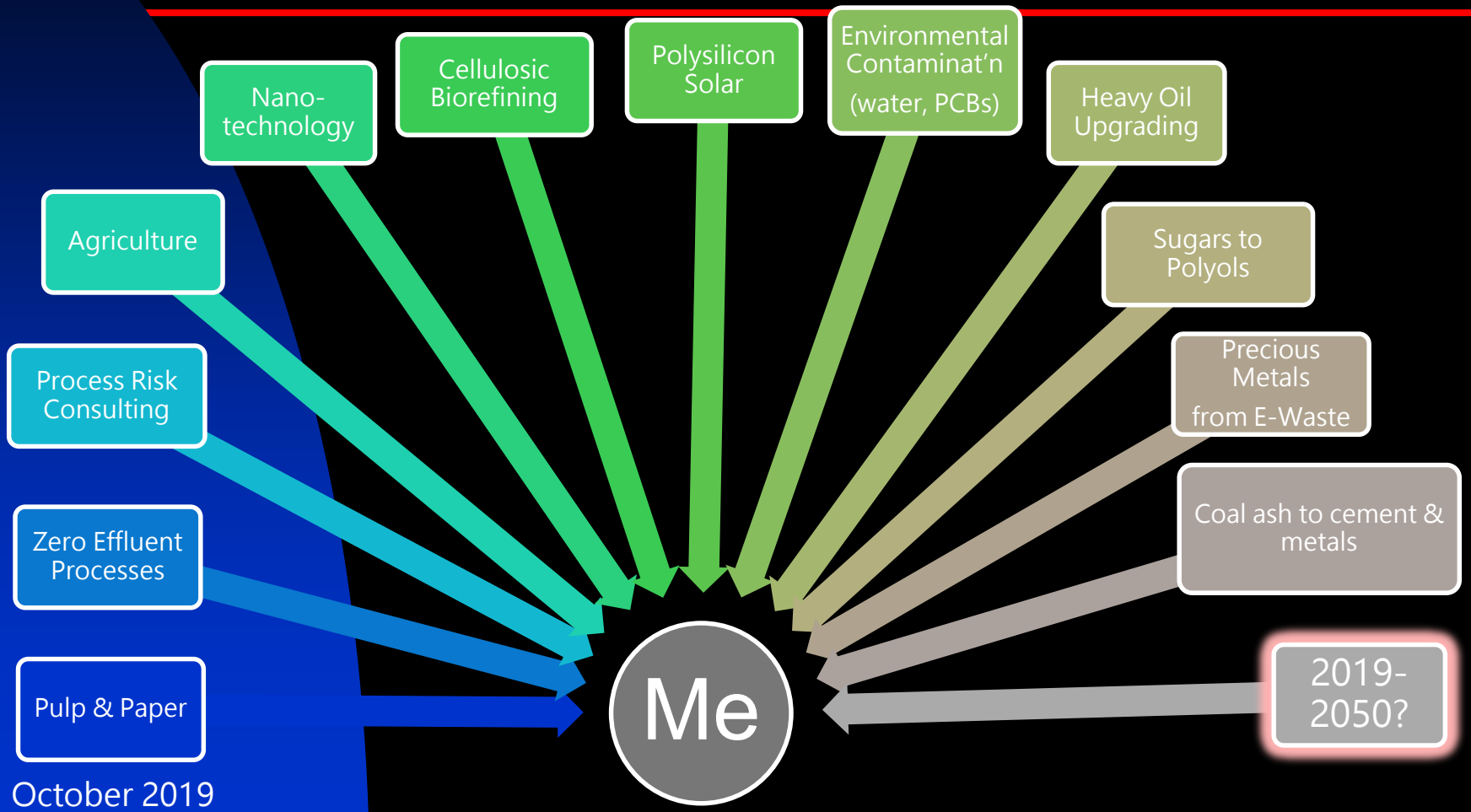
Part Two…

- Practical **ethics** & **innovation**
- Embracing **difficulty**
- **Money** & **creativity**
- Metrics

Assumptions

- Forbes (2012):The average job ~ 4.4 yrs
- Deloitte (2018): 28% plan for 5 yrs.
  - ~10 jobs over any working life.
- Industries of 2040 are in the labs of 2019.
- Not innovating implies vulnerability.
- Curiosity is the core of innovation.

Industries



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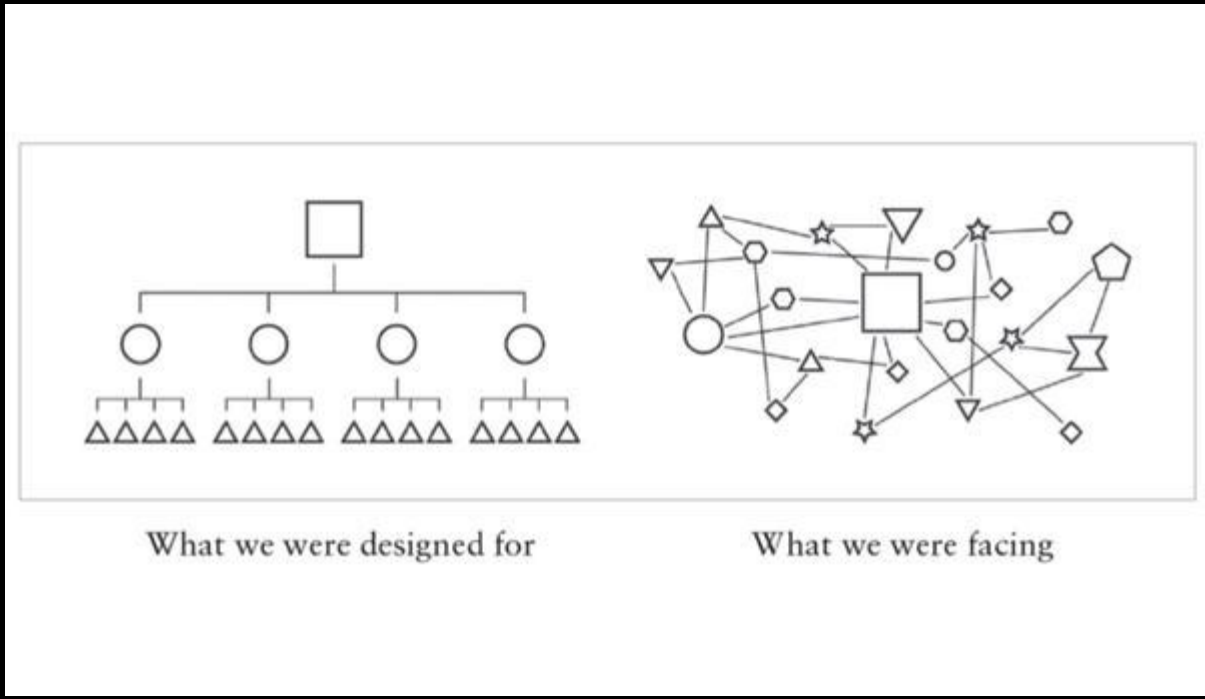
Thoughts

Failure is only the opportunity to begin again, this time more intelligently. Henry Ford

The difference between stupidity and genius is that genius has its limits. Albert Einstein

Organizations



Gen. Stanley McChrystal, "Team of Teams"

(de)Code of Ethics

1. Public interest
2. Know your limits
3. Don’t fake it
4. Conflict of interest
5. Respect your value
6. Lifelong learning
7. Do unto others…
8. Stand your ground
9. Be brave
10. Spread the word

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Professional = Ethical

- Awareness of your own skill & behaviour.
- f(ethical & technical competency).
- Commitment and renewal.
- Innovation in unpredictable situations.

Innovation…

Where does it come from:

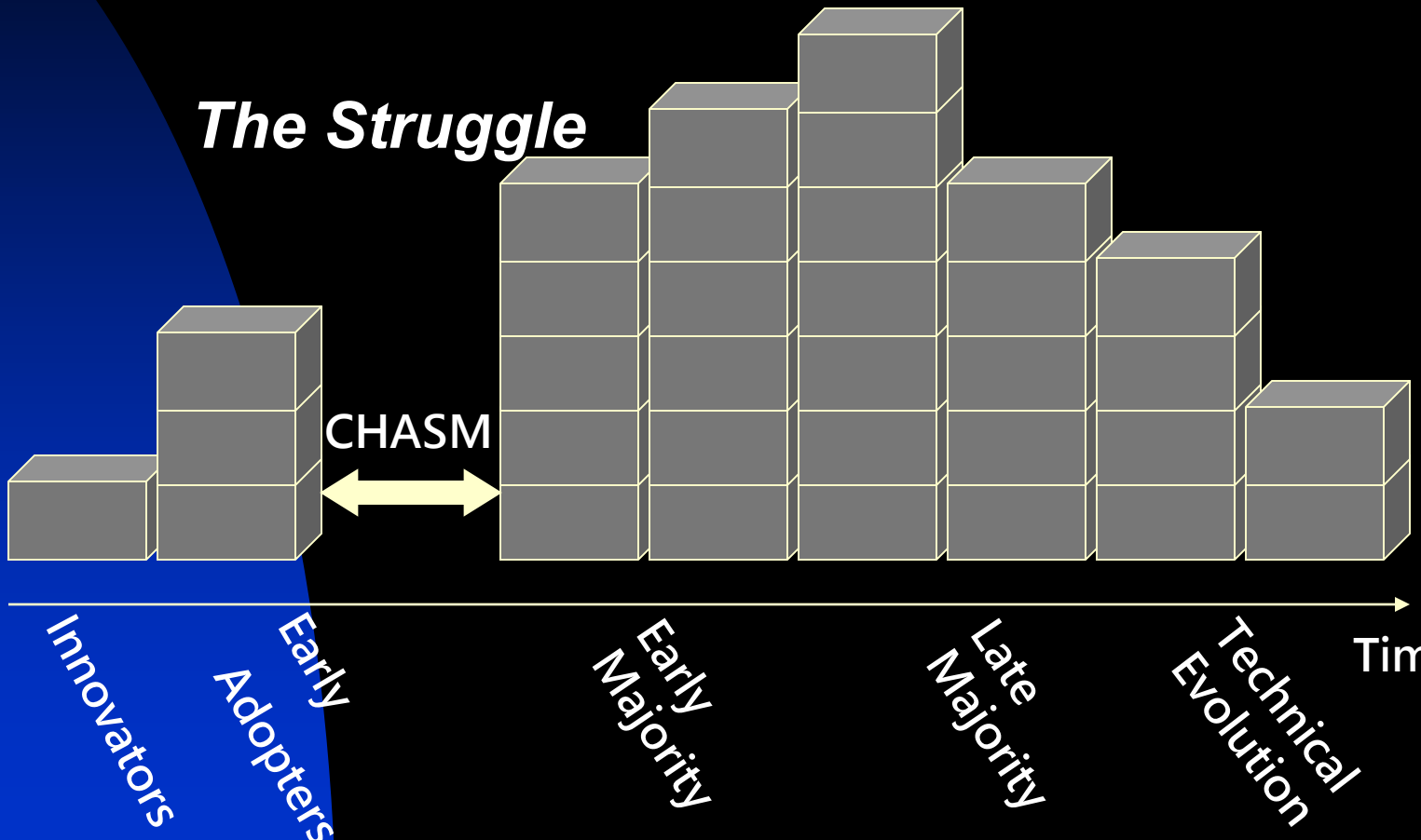
1. Good ideas?

2. Good people?

Concept to Path to …

- Issues are often driven by non-technical considerations.
- Our role: to ensure iterations balance business & technology.
- Knowledge + Independence to see opportunities in The Struggle.

Technology Adoption
Life Cycle



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Geoffrey Moore, "Crossing the Chasm"

Fundamentals

- The start point defines the end point.
- Requires critical thinking at each stage.
- Where is the social demand and what should it be?
- Communications are not a soft skill.
- Creativity is not a soft skill.

Innovation

- "Ideas occur when random thoughts churn until they coalesce. They come from different places for different reasons…"

  Tim Berners-Lee

- Technology without creativity is barren. Walter Isaacson on Da Vinci
  - This is your role.

Visioneering – Trap vs. Truth

- What is the narrative?
- What can innovation mean?
- Beware of the "disruptive" lure.

- Every global opportunity & challenge has an engineering component.

Momentum

- Execution = f (purpose, team, plan, $, timing)
- Today's innovations are dominated by tech.
  - Idealab (CA) started 100 cos. in 20yrs.
  - Spent <$10m
- Execution = f (purpose, team, plan, $, timing, intensity)
- Timing = f(creativity)

Metrics for Practice

1. Why, and what, are you doing? [QUANTIFY]
2. Where are the problems that match your capabilities + culture? [STRENGTH]
3. Is there a need for innovation or efficiency?
4. What is the culture of the business?
5. What is the culture of the industry?
6. Where do your ideas come from today? [CULTURE]
7. How much time is set aside for staff to find new ideas, to connect and get perspective? [LEARN]
8. Is objective/excellence hampered by silos vs. team? [CO-OP, CAPSTONE]

Money

- Money does not motivate for long. It is the destination but never the purpose.
- Motivation comes from work with purpose not passion.
- The art of the task elevates everything around it (you), money follows.

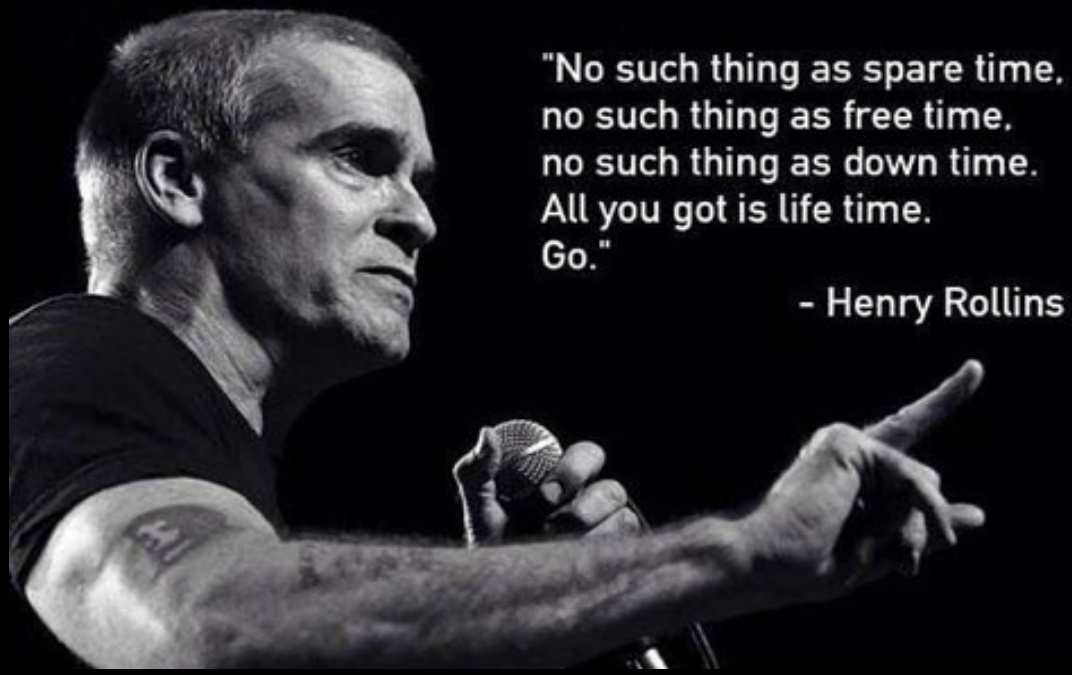
Summary

1. Look for emerging trends in industry, culture & social norms. See the arts as a porthole.
2. Understand government and its role.
3. Understand business drives technology.
4. Think/act on global demand now.
5. Think/act on global demand 10yrs from now.
6. Embrace what is hard. All great ideas are built on the shoulders of giants.
7. There is no right company, only opportunity.
8. You can’t be pragmatic without optimism.

Final Thought

Don’t get good at something you don’t want to do. - Anonymous

Final, Final Thought



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Thank You

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