



Lecture 2: Critical Communication for Engineering ENGR90021



Overview of lecture for Block 2

- Communication strategies
- Working in pairs and teams
- Industrial incidents
- Incident coverage and awareness
- Industrial incident examples
- Incident investigations (phases, roles, trends)
- Introduction to research skills
- Upcoming assignments



Getting the message through



No one *wants* to read what you write.



How do you make what you write effective?



You must give written advice to the CEO. How would you maximize the chances it would be read and used?



Giving effective advice

MELBOURNE





Most important stuff first

Inverted Pyramid Writing





Mynas a major mess

MEGAN BAILEY

A MELBOURNE council has resorted to handing residents lasers to force a flock of Indian myna birds from their street.

Lasers last resort to shoo away pesky invaders





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Now officers have handed

out red lasers to residents, who will aim them at the birds in a bid to drive them out of the neighbourhood.

The council has called on officers to investigate ways to remove the bird as a matter of "extreme urgency".

Cr Wayne Smith said residents were under "extreme stress" because of the noise and health issues.

But he said a cull was out of the question, citing bad publicity the council received six years ago when it took action against a flock of corellas.

Vera Mezentseff, who has lived in the street for two years, said her sleep was being severely affected.

"They are so loud, you cannot ignore them," she said.

"At dusk when they fly in, they go for a whole hour, during the night if they are disturbed, they go off again and in the morning at 5.30 or six or seven they are all screeching. You cannot sleep — I never knew this problem existed."

Ms Mezentseff said the best option might be removing or relocating the tree — a

lophostemon confertus — which the birds seemed to prefer more than others in the street. But she said the lasers were showing some promise.

"The council will not be there on the weekend so I will be monitoring them," she said.

"I have two little laser beams for this."

Manager of city planning Nicola Ward said the council was "exhausting all possible control measures to deter Indian myna birds from roosting in the tree while a control program was developed".

Lasers last resort to shoo away pesky invaders



A rubber snake (above) and an Indian myna (right).



She said officers had been at the site every day, trialling the laser technique.

"This technique is low risk, and involves the use of a red laser pointer being directed

towards the birds to deter them from the tree," she said.

"Council stresses that successful Indian myna control programs are community led." megan.bailey@news.com.au

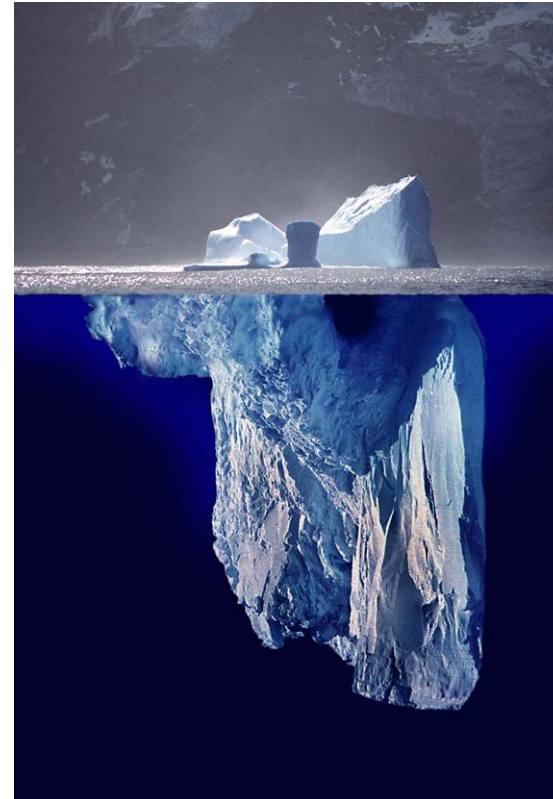
Be concise

This report, by its very length,
defends itself against the risk of
being read.

– Winston Churchill

“In writing, you must kill
your darlings.”

– William Faulkner



Source: Uwe Kils <http://www.ecoscope.com/iceberg/>



- “Indefatigable”?
- “Tireless”





Teamwork



Positive impacts of 'peer tutoring':

- Enables learning as higher comfort in clarifying
- Relationship building
- Social and mental health benefits
- (Focused communication channel)
- Improved academic performance

Working in pairs is particularly beneficial for developing problem solving skills



- A clear challenging goal
- Unified commitment to that goal
- A collaborative climate
- A results driven structure
- Standards of excellence
- Competent members
- Principled leadership

“Land a man on the moon by the end of the decade”

–J F Kennedy (1961)

Achieved 16 July 1969

Why was this an effective goal?



<https://airandspace.si.edu/explore-and-learn/topics/apollo/apollo-program/landing-missions/apollo11.cfm>



The goal of going to the moon





The goal of going to the moon

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25 PAGES TODAY

VOL. 51, NO. 21

CHICAGO DAILY NEWS SERVICE

HUNTSVILLE, ALABAMA, WEDNESDAY, APR. 12, 1961

ASSOCIATED PRESS — WIREPHOTO

45c PER WEEK

The Huntsville Times



Covers The Valley!

Man Enters Space

**'So Close,
Yet So Far,'
Sighs Cape
U. S. Had Hoped
For Own Launch**

CAPE CANAVERAL, Fla. (AP) — The Redstone rocket which the United States had hoped would boost the first man into space stands on a launching pad here. The Soviet Union beat its firing date by at least two weeks.

"So close, yet so far," commented a technician who is helping groom the Redstone to send one of America's astronauts on a short sub-orbital flight, hopefully late this month or early in May.

**Hobbs
Admits
1944**

"If we hadn't had those troubles last fall and on the chimp and Little Joe shots this year, we might have made it," the technician said.

"But you have to give the Russian scientists credit. They've ac-



**Soviet Officer
Orbits Globe
In 5-Ton Ship
Maximum Height Reached
Reported As 188 Miles**

MOSCOW (AP)—A Soviet astronaut has orbited the globe for more than an hour and returned safely to receive the plaudits of scientists and political leaders alike. Soviet announcement of the feat brought praise from President Kennedy and U. S. space experts left behind in the contest to put the first man into successful space flight.

By the Soviet account, Maj. Yuri Aleksyevich Gagarin, rode a five-ton spaceship once around the earth in an orbit taking an hour and 20 minutes. He was in the air a total of an hour and 48 minutes.

The whole sequence of events and the announcements relating to it raised a number of questions. The Soviet announcement said the flight took place today between 9:07 and 10:55 a.m., but some persons in

VON BRAUN'S REACTION:

***'To Keep Up, U. S. A.
Must Run Like Hell'***

<https://www.nasa.gov/topics/history/features/gagarin/gagarin.html>

https://www.youtube.com/watch?v=_RaRC6YuYcQ



The goal of going to the moon

“We choose to go to the Moon! ... We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard; because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one we intend to win ...”



How goals work



<http://www.dyson.co.uk>



http://www.woodweb.com/knowledge_base/Cyclones_for_Fine_Sanding_Dust.html



- **S**pecific, significant, stretching
- **M**easurable, meaningful, motivational
- **A**chievable, agreed upon, action oriented
- **R**esults oriented
- **T**ime-based

“Land a man on the moon by the end of the decade [1960s]”



Incident investigations



Engineers Australia competency standard includes:

3.1 Ethical conduct and professional accountability

- a) Demonstrates commitment to uphold the Engineers Australia - Code of Ethics, and established norms of professional conduct pertinent to the engineering discipline.
- b) Understands the need for 'due-diligence' in certification, compliance and risk management processes.
- c) Understands the accountabilities of the professional engineer and the broader engineering team for the safety of other people and for protection of the environment.



This is important:

- More than 1,000 people die each day from work-related accidents globally (ILO, 2019)
- 6,500 people die from work related diseases
- These figures are increasing
- There are regional variations:
 - Africa has the highest accident fatality rate per 100,000 workers
 - 65% of global work-related mortality is estimated to occur in Asia



Variation by industry:

Industry	No. fatalities (2018)	Fatality rate (per 100,000 workers)
Agriculture, forestry & fishing	37	11.2*
Transport, postal & warehousing	38	5.9
Mining	9	3.7
Construction	24	2.0
Electricity, gas, water & waste	3	2.0
Manufacturing	13	1.4

Engineers have an important role to play in preventing industrial incidents

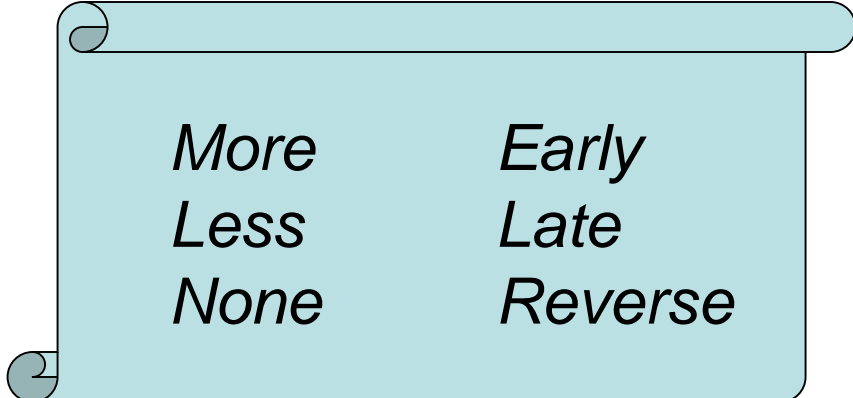
Prevention via risk management

Enterprise-wide approach

- Project, asset and operational risks
- Needs to be explicit
- Not about specific tools
- Reflected in the culture
- Approaches vary by and within industries and geographies

HAZOP to identify risks

- HAZard and OPerability study
- Systematic analysis with guide words



<i>More</i>	<i>Early</i>
<i>Less</i>	<i>Late</i>
<i>None</i>	<i>Reverse</i>

- Need expertise and familiarity
- Relies on critical thinking

Characteristics of incidents:

- Root causes are specific to an industry, however analysis of prosecutions in Victoria during the 1990s involved an injury or fatality from:
 - Machinery* (40%)
 - Falls (15%)
 - Workers hit by flying objects (8%)
 - Electrical hazards (5%)
 - Explosions (4%)
 - Exposure to chemicals (4%)

Media can influence public (and policy) debate:

- Able to amplify certain risks
- Tend to reduce the complexity in favour of drama
- Tone and content are most influential (vs volume of coverage)
- Headlines and photographs influence the emotional tone of reporting
- Thrive in the absence of Government messaging
- Public response to risk is determined by psychological factors



Quigley & Quigley (2013) key findings:

- Industrial failure coverage was more alarming (natural disasters more reassuring)
- Western media seeks to assign blame for failure (as do Governments) whereas citizens look to Government to respond

What are the assumptions made in Quigley & Quigley's research?

Overpass collapse (Canada)

Consequences:

- 5 people died and 6 were wounded in Sept 2006 when a 20-metre concrete slab fell on the road below

Multiple causes of failure:

- Technical (design codes, lifecycle management)
- Human (engineering supervision)

Results:

- Quebec government: CA\$11b on bridges and overpasses
- Commission recommendations included:
 - Changes to Canada's highway bridge design code
 - Competence-based selection for engineers (vs cost)



Longford gas plant explosion

Consequences:

- 2 workers died and 8 were injured in September 1998
- Victoria without gas supplies for 10 days

Causes:

- Royal Commission
- Safety Case inconsistently applied
- Training/procedures lacking for operations and no HAZOP undertaken

Results:

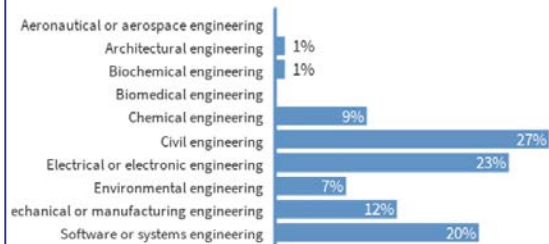
- Esso fined \$2m for breaching the OH&S Act
- Recommendations aimed to prevent recurrence eg. National safety case requirement for major hazard facilities



100 students responded to 4 questions

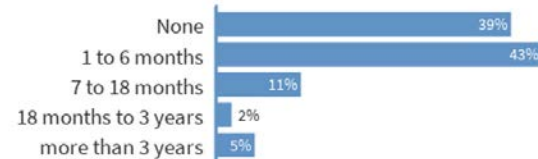
When poll is active, respond at [PollEv.com/janekeeeble818](https://poll.evm.com/janekeeeble818)
Text JANEKEEBLE818 to +61 427 541 357 once to join

Which of the following best describes
your engineering discipline?



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How much engineering work experience
do you have so far in your career? Note:
please include both graduate and
internship work experience.



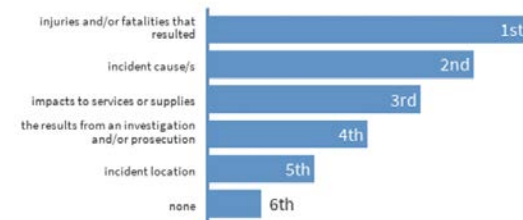
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Please name an industrial incident that
you can recall from the past:



When poll is active, respond at [PollEv.com/janekeeeble818](https://poll.evm.com/janekeeeble818)

What are the most prominent features
of this incident that you recall? (please
rank in order of prominence)

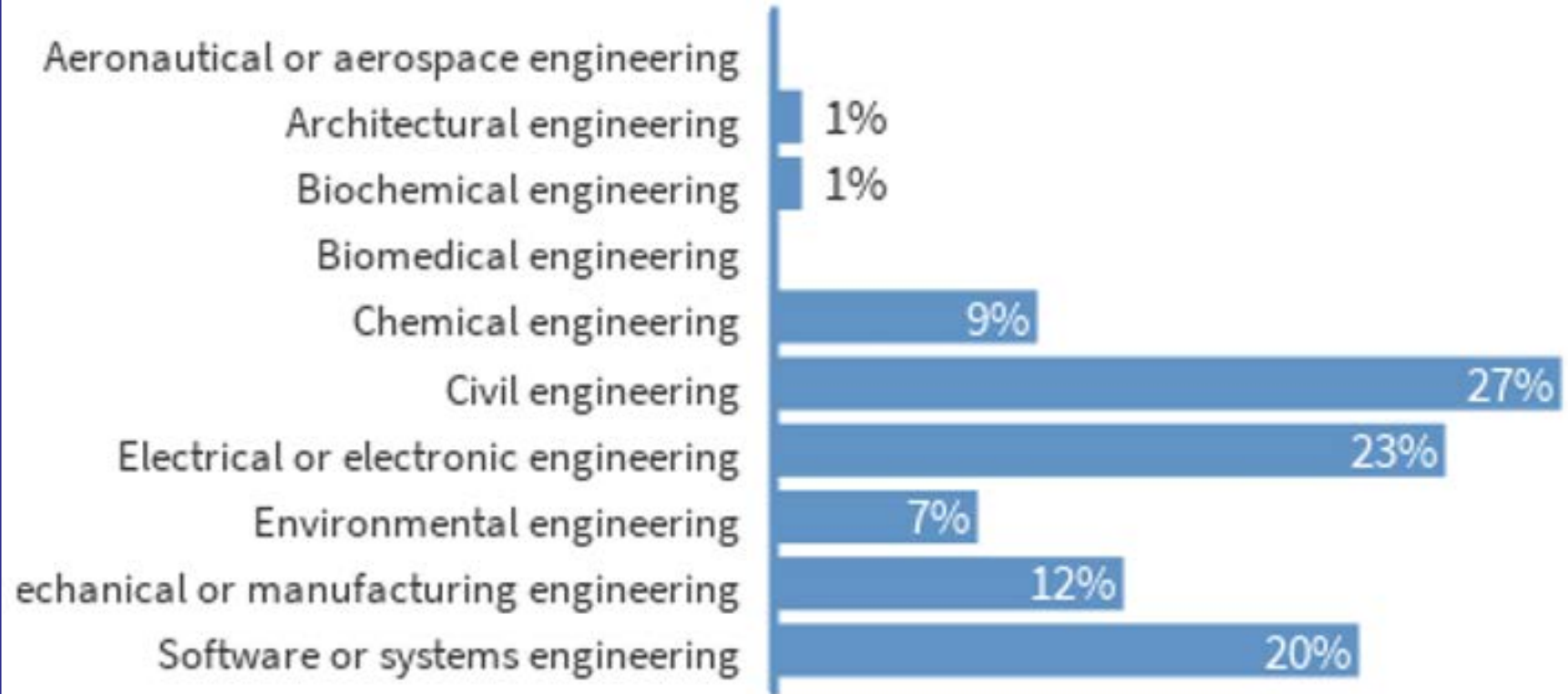




Q1

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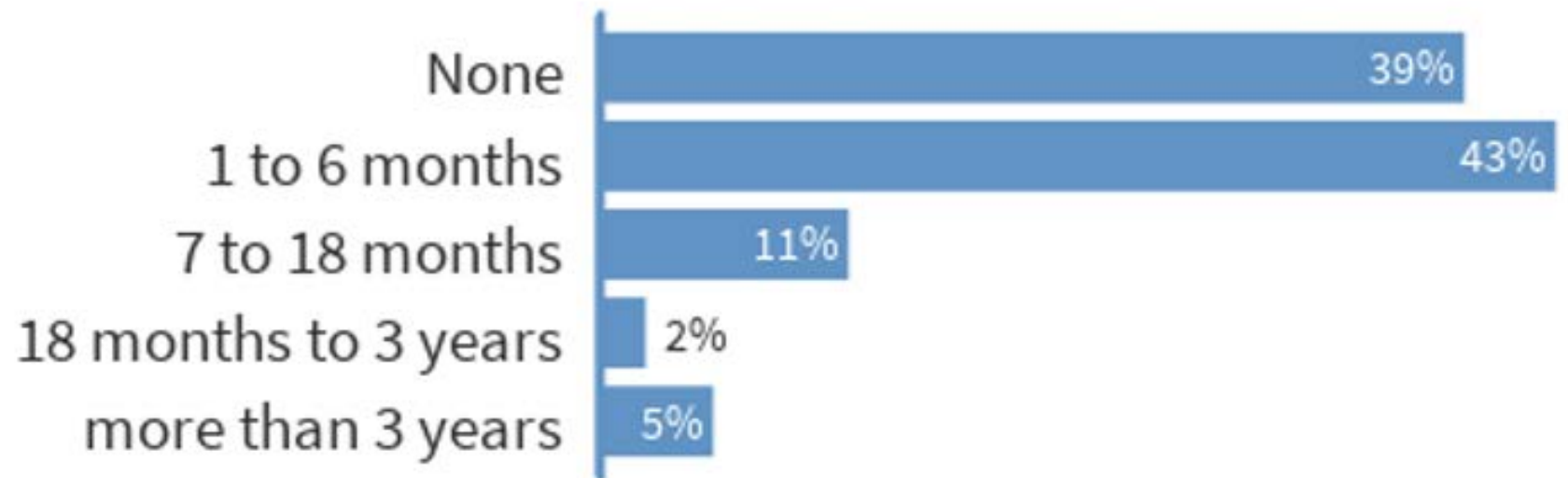




Q2

When poll is active, respond at PollEv.com/janekeeeble818
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How much engineering work experience do you have so far in your career? Note: please include both graduate and internship work experience.



JOURNAL OF THE ATMOSPHERIC SCIENCES SOCIETY OF AMERICA

Q3

🔗 When poll is active, respond at **PollEv.com/janekeeble818**

📱 Text **JANEKEEBLE818** to +61 427 541 357 once to join

**Please name an industrial incident that
you can recall from the past:**

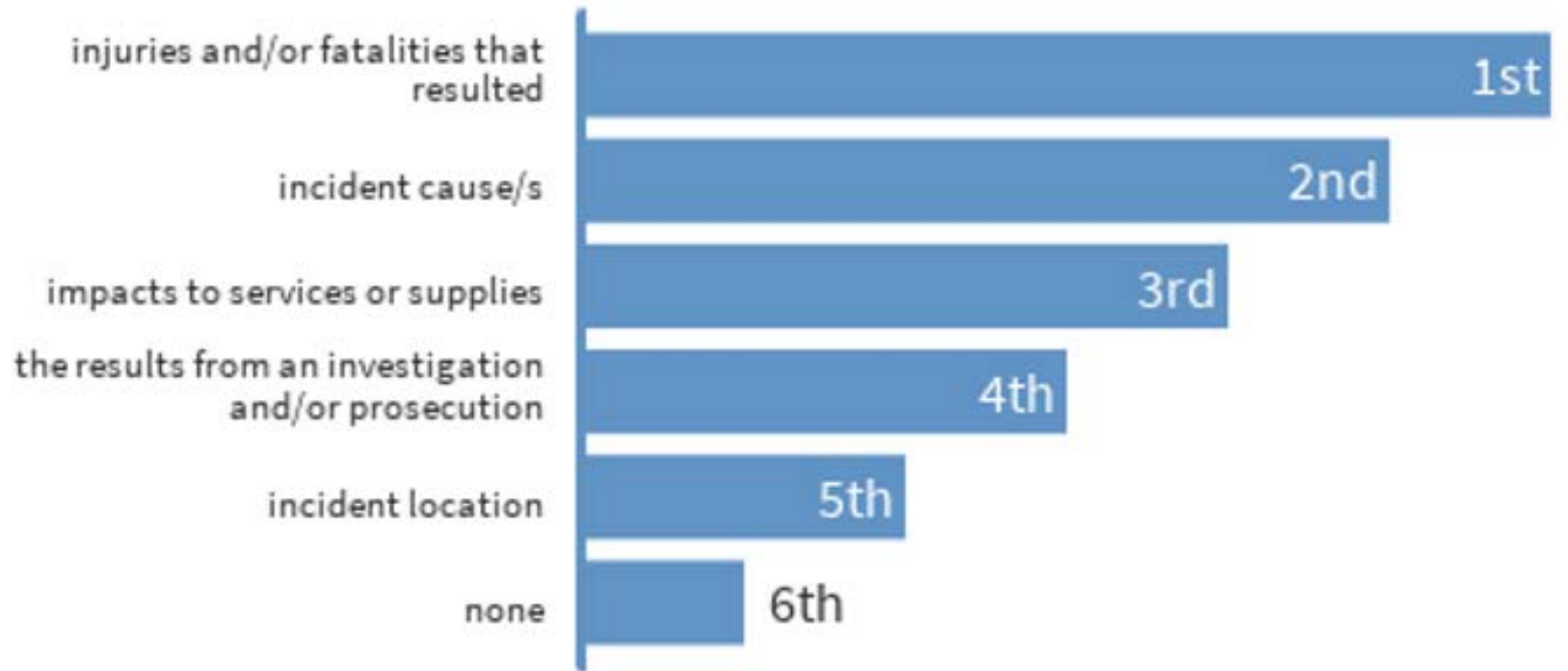




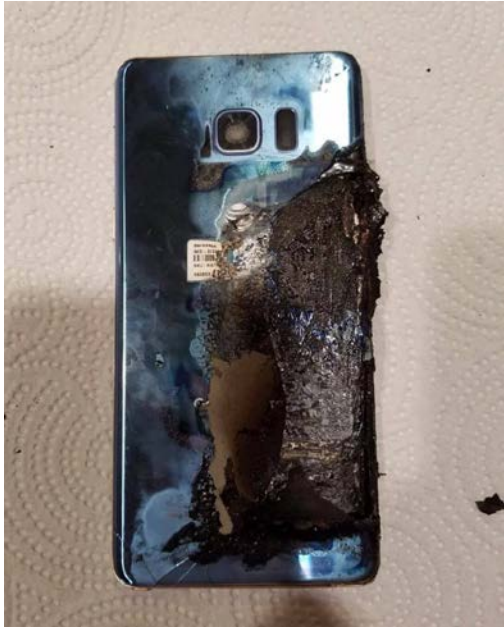
Q4

When poll is active, respond at PollEv.com/janekeeeble818

What are the most prominent features of this incident that you recall? (please rank in order of prominence)



Other examples of incidents



“Samsung owners
furious...”
The Guardian (2016)



“It’s been dubbed the ‘diesel
dupe’...”
BBC News (2015)



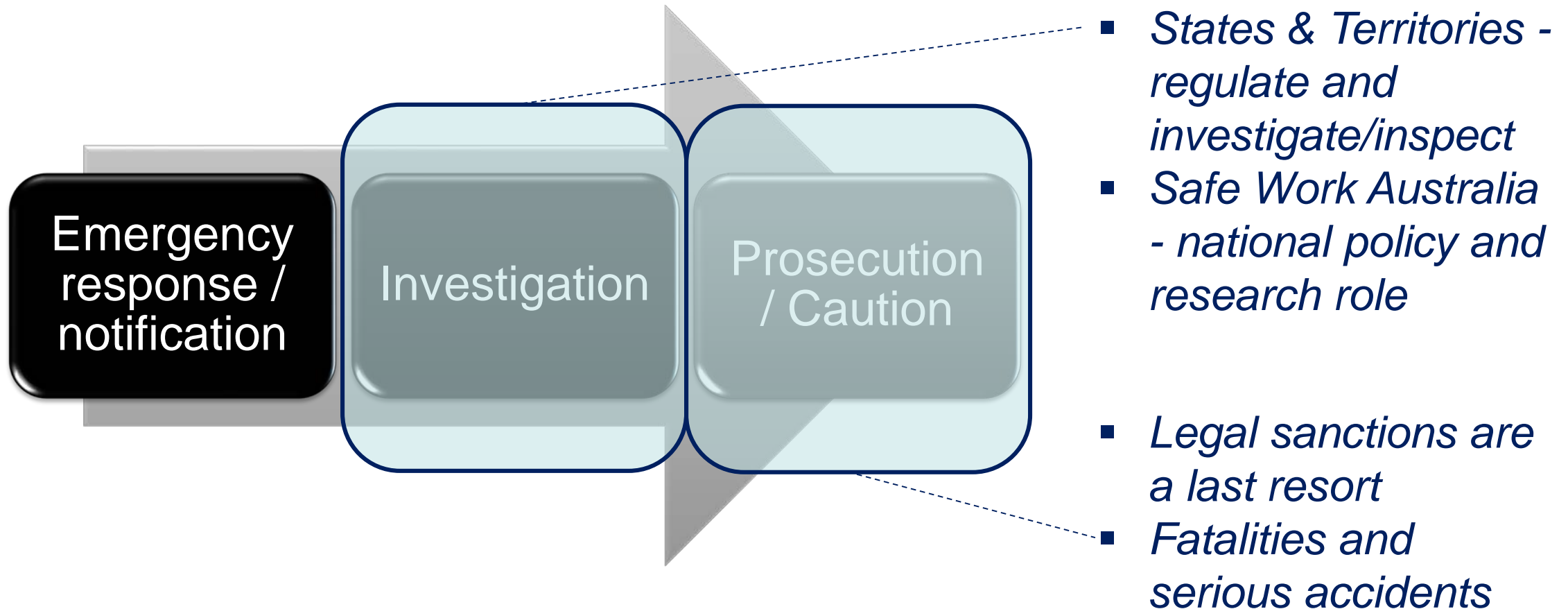
“Texas: city residents urged to evacuate
after chemical plant explosions...”
The Guardian (2019)



“NTSB calls for redesign of Boeing
737...”
ABC News (2019)

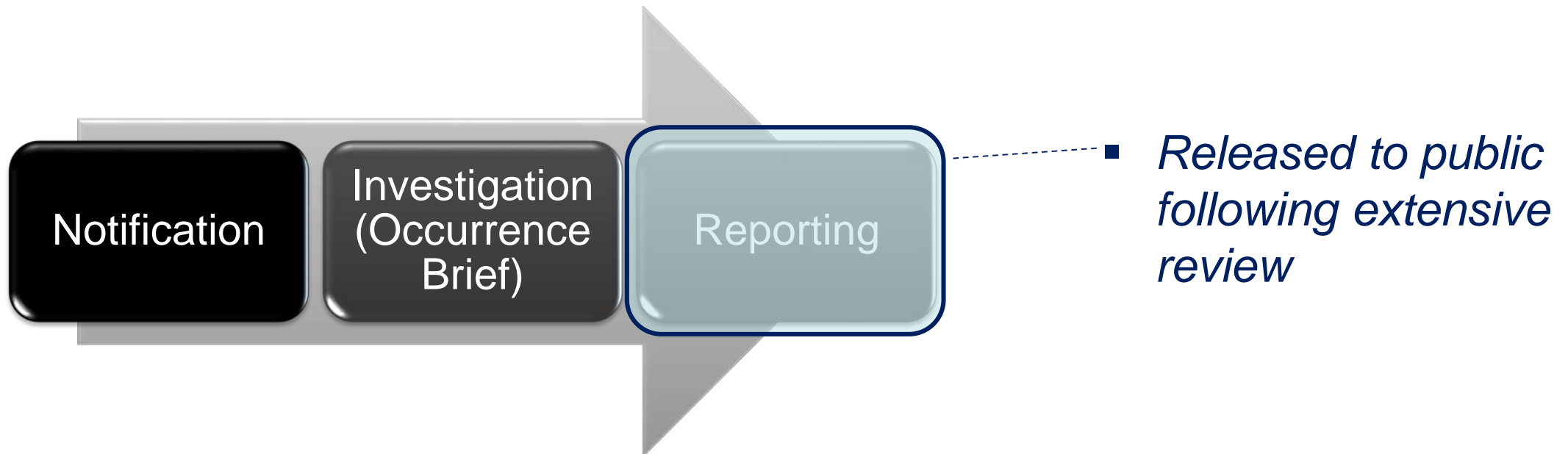
Incident investigations

What happens following a workplace incident?



What happens following a rail, marine or air transport incident?

- Transport Safety Investigations Act 2003 – ATSB does not seek to apportion blame, looks for systemic issues





Three-tiered legislative framework

- Act (broad statute) → Regulations (detailed standards) → Codes of practice (24x)
- Outcomes based and can be tailored by organisation
- Notifiable incidents (death, serious injury/illness, dangerous incident)
- Employer must notify regulator (eg. Worksafe Vic) immediately and preserve the incident site until inspector arrives



WorkSafe **investigator** starts the process on-site:

- Interviews with witnesses, employees, employer
- Consults **industry experts**
- Collects evidence
- Looks at company records (employment, training, medical)
- Report reviewed by **legal expert**



Less than 0.2% of inspections are prosecuted

Year	Inspection visits	Observations	Improvement Notices	Prohibition Notices	Prosecutions
1992-3	58,746	2,777	2,851	1,004	68
1993-4	70,208	1,586	1,798	870	64
1994-5	48,374	n/a	1,481	822	64
1995-6	44,461	n/a	2,001	975	76
1996-7	44,703	2,281	3,219	1,040	57

- Most cases are heard in the Magistrates' Court
- 83% guilty pleas during the 1990s
- Federal or State Royal Commission may be held for major natural disasters and industrial failures



Work Health & Safety (WHS) in Victoria

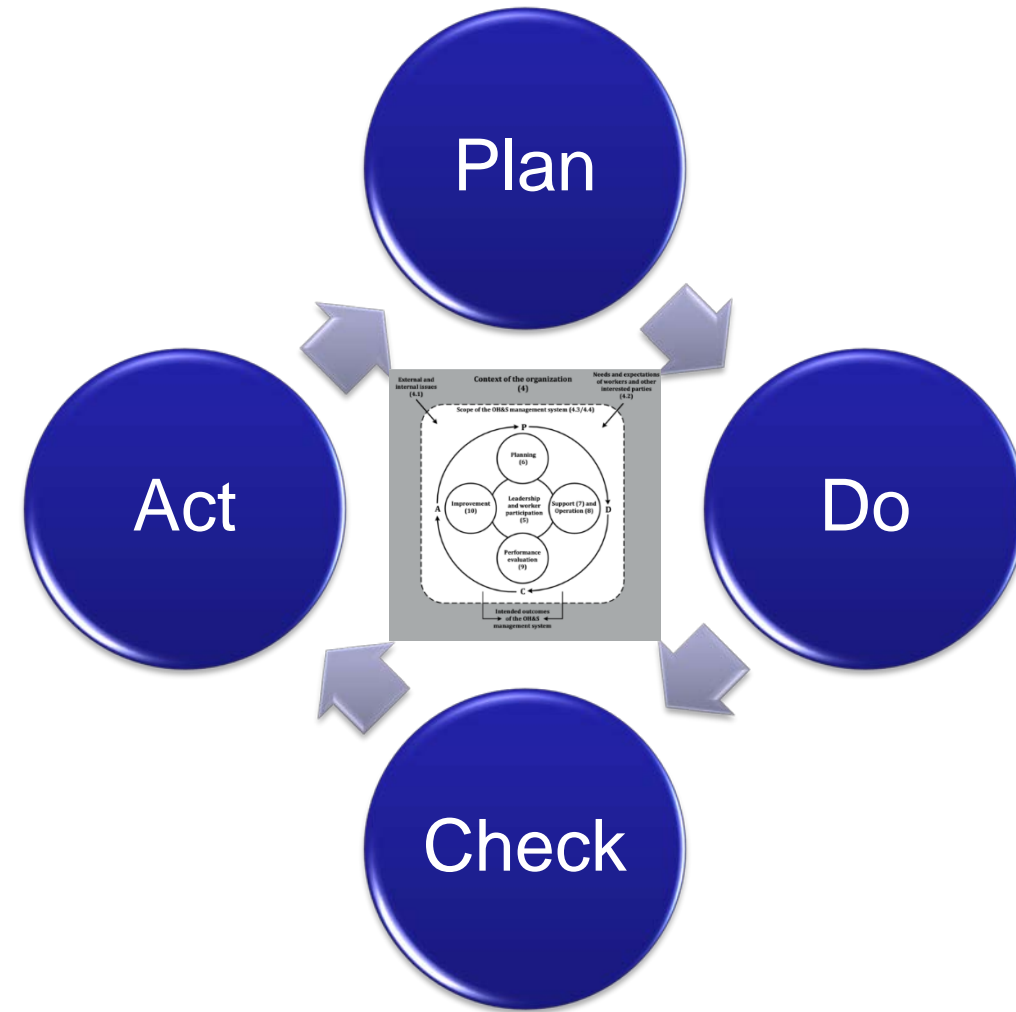
- Originally based on UK regulation (Factory & Shops Act 1885)
- 1970s reform resulted in OHS* Act development
- 1980s shift from detailed standards to 'duty of care' and hazard/risk based controls, higher penalties
- Considerable variation between countries eg. US has Federal regulation (OSHA) with industry agencies (CSB, NTSB) also investigating

*OHS = Occupational Health & Safety

Future directions (1)

Increasing focus on prevention

- A former emphasis on victim responsibility (individual) has shifted to those creating the risks (system-wide approach)
- ISO 45001:2018 (based on BS) founded on Plan-Do-Check-Act
- Results: reduction in the accident frequency rate

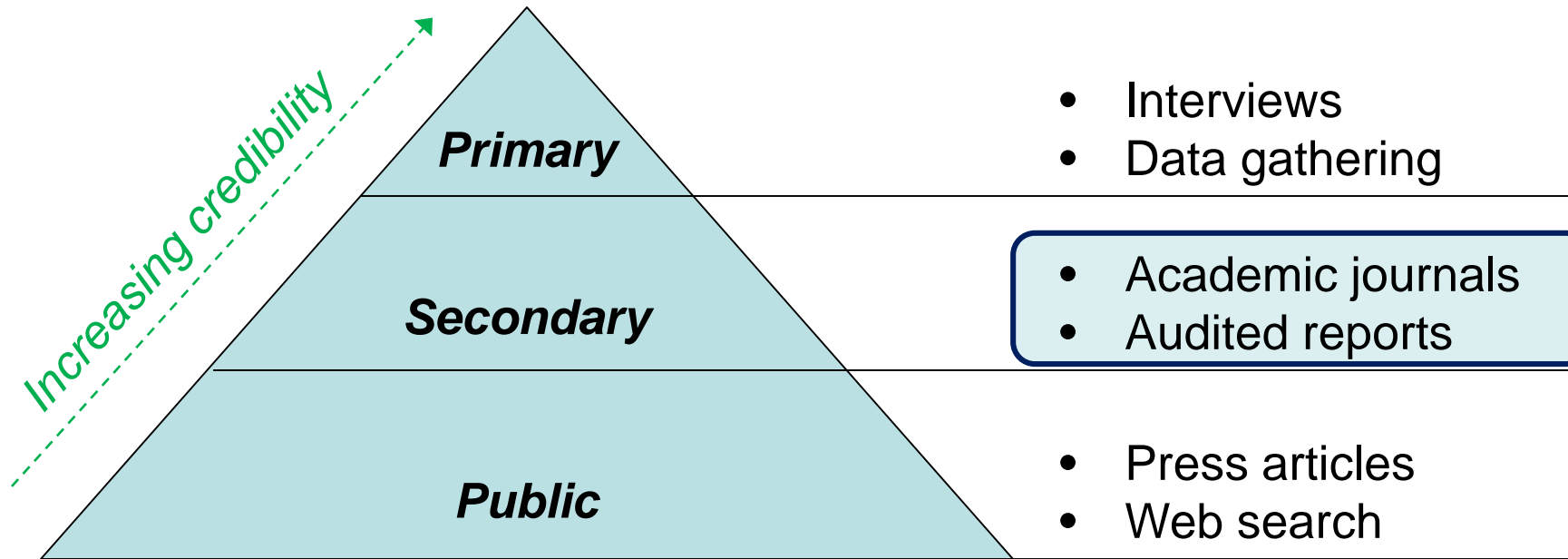




Translating insights from road safety:

- Young worker safety?
- Improvements in data collection/analysis?
- Rewards and incentives?
- Optimise auditing/inspection program?

Tiers of information sources:



- Further information on Canvas via the Library



Block 1:

- Assignment 1 submitted?
- Journal 1 now available

Block 2:

- Journals 2 & 3 (due Week 3 & 7)
- Team presentation (Week 5)
- Assignment 2 (due Week 6)



Further reading

- Engineers Australia (2019) *Code of Ethics – Demonstrate integrity*
<https://www.engineersaustralia.org.au/sites/default/files/resource-files/2020-02/Engineers%20Australia%20Code%20of%20Ethics%20November%202019.pdf>
- Johnstone, R. (2003) *Occupational health and safety, courts and crime: the legal construction of occupational health and safety offences in Victoria*. The Federation Press: Annandale, NSW.
<http://cat.lib.unimelb.edu.au/record=b2840615?>
- Locke, E and Latham G (2002) “Building a practically useful theory of goal setting and task motivation.” *American Psychologist* **57:9** 705-717.
- Safe Work Australia <https://www.safeworkaustralia.gov.au/>

