

Lecture Content:

Understand key terms

Develop an awareness of complexity- from *monocausality* to *multifactorialism*

Differentiate *individual accidents* from *organisational accidents*

Explore *Human Failure*

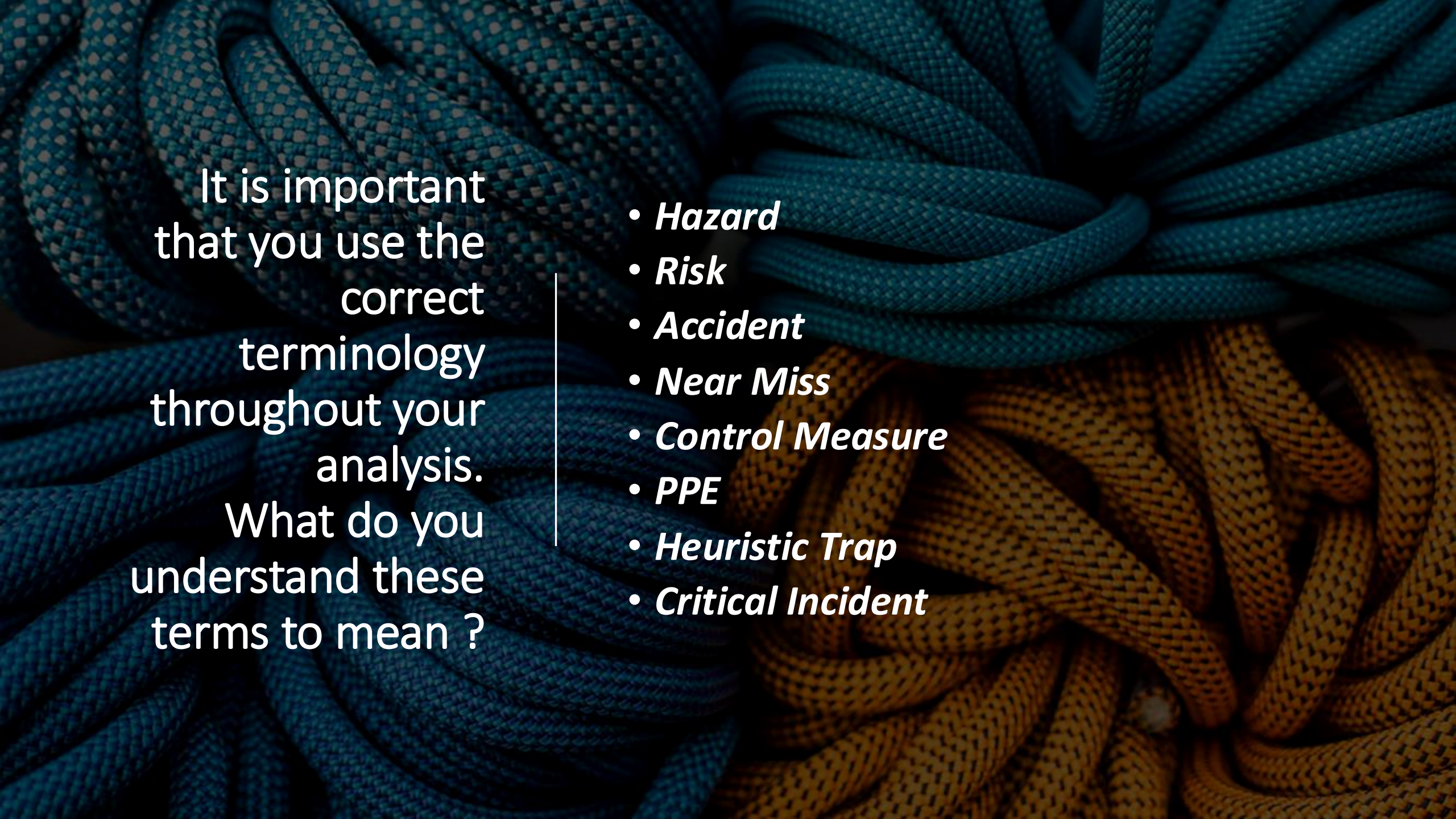
Introduce Reason's (1997) *Swiss Cheese Model* as a *systems thinking* approach to accident analysis

Introduce the hierarchy of control measures

Remember...

- We are looking at incidents involving real people- treat them with dignity and respect
- Others in your class might have had similar experiences or find aspects upsetting
- We are not looking to blame people or organisations, we are trying to objectively and critically explore the incident
- You can and should learn from other people's experiences, as well as your own
- **We all make mistakes!**



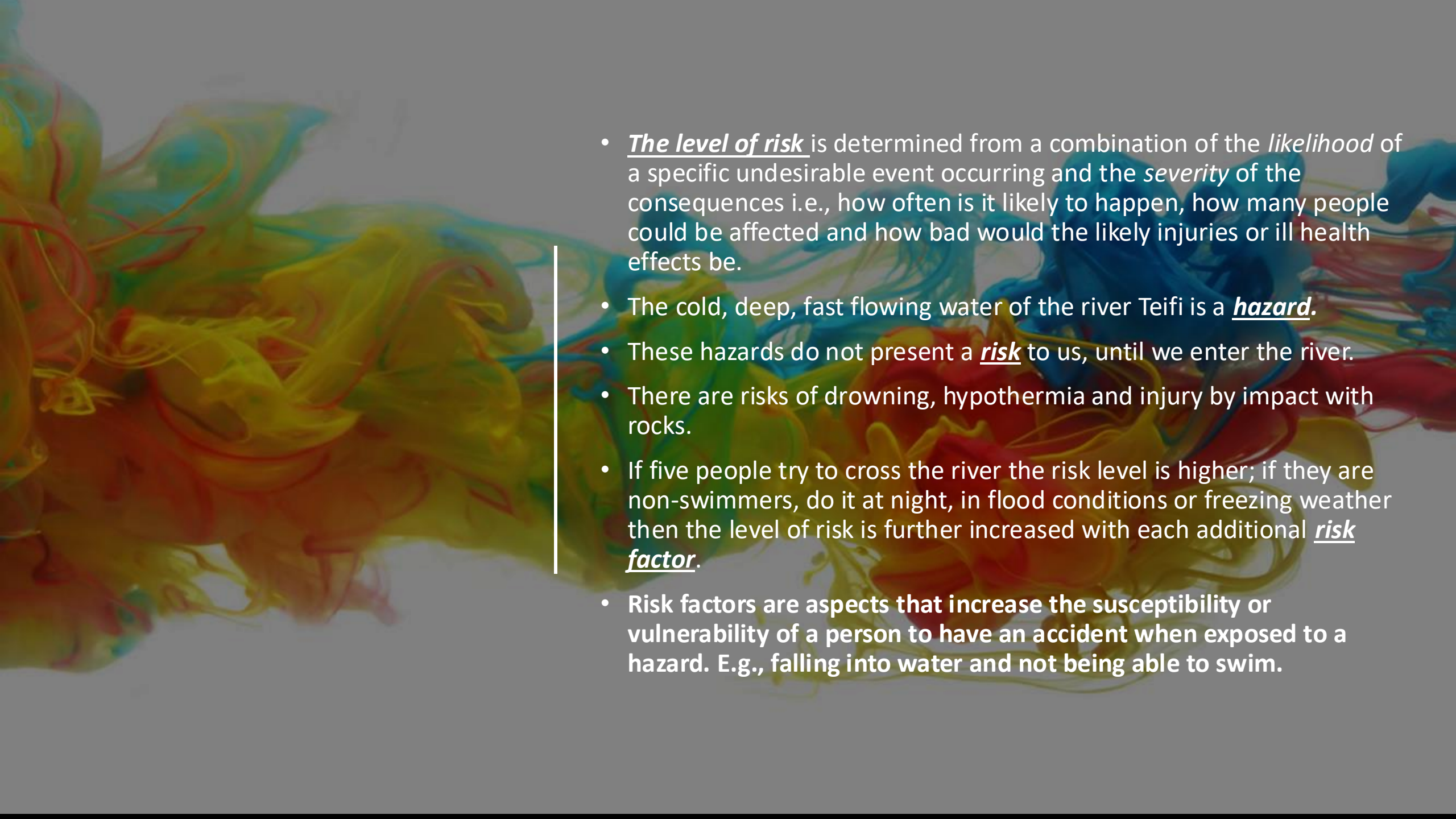


It is important
that you use the
correct
terminology
throughout your
analysis.
What do you
understand these
terms to mean ?

- *Hazard*
- *Risk*
- *Accident*
- *Near Miss*
- *Control Measure*
- *PPE*
- *Heuristic Trap*
- *Critical Incident*

Key Terms

- Hazard: a potential source of harm or adverse effect
- Risk: the likelihood and the degree that a person or possession may be harmed if exposed to a hazard
- Accident: an event that results in injury or loss. Accidents are unfortunate incidents that happen unexpectedly and unintentionally. They are however, not random or unexplainable (Johnson *et al* 2020)
- Near miss: an event not causing harm, but has the potential to cause injury/ loss (is near hit a better term?)
- Control Measure: precautions put in place to reduce the level of risk
- PPE: Personal Protective Equipment- protects the user against health or safety risks. It can include items such as safety helmets, gloves, eye protection, high-visibility clothing, safety footwear and safety harnesses (HSE, 2021).

- 
- **The level of risk** is determined from a combination of the *likelihood* of a specific undesirable event occurring and the *severity* of the consequences i.e., how often is it likely to happen, how many people could be affected and how bad would the likely injuries or ill health effects be.
 - The cold, deep, fast flowing water of the river Teifi is a **hazard**.
 - These hazards do not present a **risk** to us, until we enter the river.
 - There are risks of drowning, hypothermia and injury by impact with rocks.
 - If five people try to cross the river the risk level is higher; if they are non-swimmers, do it at night, in flood conditions or freezing weather then the level of risk is further increased with each additional **risk factor**.
 - Risk factors are aspects that increase the susceptibility or vulnerability of a person to have an accident when exposed to a hazard. E.g., falling into water and not being able to swim.

Heuristics and Heuristic Traps

Heuristics are *cognitive shortcuts* used in decision-making

Its about seeking patterns discounting interference/ noise to help us quickly navigate a complex world

They help to make decision making efficient; an important aspect in experiential learning

But...

Heuristic Traps, occur when things are over simplified or important cues/information are overlooked- this can to **human errors** (more later!)

“Adventure... professionals potentially discount situational information—lack of group cohesion and trust or recent heavy rains—in favour of heuristic strategies, such as consistency, familiarity, or affect”

(Zajchowski et al 2016)



Critical Incident

- The World Health Organisation (2006) defines a critical incident as 'an event out of the range of normal experience – one which is:
- sudden and unexpected,
- makes you lose control,
- involves the perception of a threat to life and
- can include elements of physical or emotional loss.

Often such events are sufficiently disturbing to overwhelm or threaten to overwhelm a person's coping capacity.



Fill in the health and safety blanks

Ice on a path is a _____. Anyone walking on the path is at _____ of slipping.

If someone slipped on the ice but managed to break their fall so that there were no significant injuries this would be classed as an _____

If someone slipped on the ice and hit their head on the floor, then there is a _____ of head injury. This would be classed as an _____

If access to the path was prevented by a physical barrier then the _____ would remain though the _____ would be minimised.

The barrier would therefore be an effective _____.
Other effective _____ would be an alternative path, crampons or personal protective equipment such as _____

If staff leading a school group slipped on the ice and were unconscious, leaving the children unsupervised, this would be a _____.

The staff decided that the path was safe to walk on, they had done it lots of times before without any slips. Their familiarity with the route was a _____.

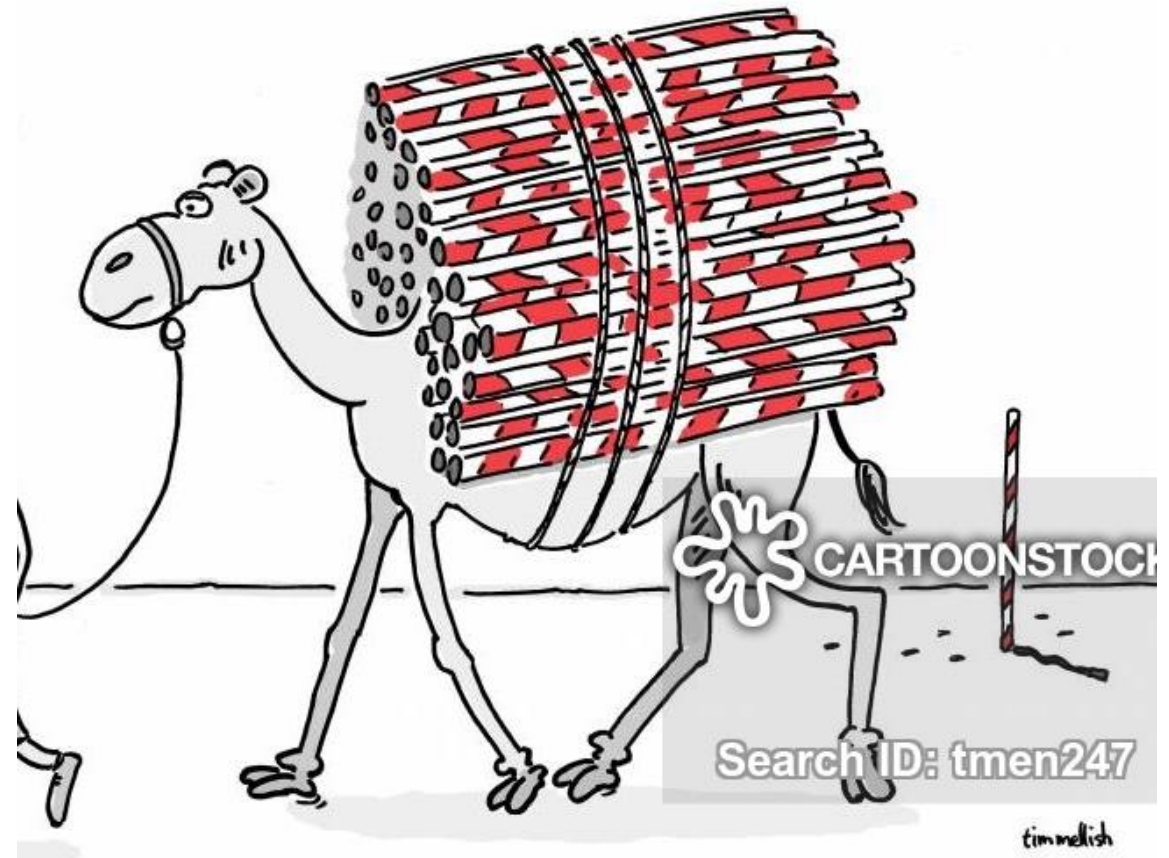


The straw that broke the camel's back

A camel had been loaded to the absolute maximum weight it could carry. When a single piece of additional straw was added to the load, the animal collapsed.

The idiom, 'the straw that broke the camel's back', describes the seemingly minor or routine action that causes an unpredictably large and sudden reaction, because of the cumulative effect of small actions.

It is used to refer to scenarios where *a certain number of precipitating factors combine to produce an undesirable outcome.*



**WE'LL HAVE TO COME BACK FOR THAT LAST ONE TOMORROW
JDDY... IT'S AN OCCUPATIONAL HEALTH AND SAFETY ISSUE!!**

The straw that broke the camels back, continued...

In most instances, it is only the final event that is most noticeable and is routinely considered as the 'unique cause' of the outcome.

The tendency for people to process events in this way, to otherwise implicate ***monocausality*** into their daily thinking, is simply a matter of habituation.

Conversely, when deliberating over causality on a deeper level... one has to advance rudimentary conceptions of causality to that of complexity and ***multifactorialism***

(Rothman and Greenland, 2005 as cited in Hulme and Finch, 2015)

Individual Accidents

- The Brave Dave Crib Goch incident was (arguably) an **individual accident**
- The accident happened to an individual who chose to participate and he was responsible for himself.



Organisational Accidents

- The causes of **organisational accidents** involve the actions of numerous people and different levels within organisations and communities
- They involve breaching measures that should protect vulnerable people from injuries



Human Failure

A cartoon illustration of Homer Simpson from The Simpsons, wearing a white shirt and a pink and orange striped tie. He is standing behind a complex control panel with various buttons, switches, and screens. He has a surprised or concerned expression on his face. Two blue thought bubbles are floating around him. The bubble on the left contains the text 'Human Error' in white. The bubble on the right contains the text 'Violations' in orange. The background is a solid blue color.

Human
Error

Violations

Human Failures



- The intention is to carry out task correctly
- Error comes from unintentional decision or action
- Intentional failures
- Choices made to ignore or override protocols and procedures etc.



Human Failure

Human
Error

Action Error

Thinking Error
(decision
making failures)

action based
slips

memory based
lapses

rule based
mistake

knowledge
based mistake

Heuristic Traps as Human Failures

McCammon 's work on avalanches identifies six domains of heuristic traps

Familiarity-I have done this lots of times

Acceptance- I am not chickening out, I am not going to be the one to call it!

Commitment- it's the last day of the trip

Expert Halo- uncritical trusting experts of experts- coasteering is a classic!

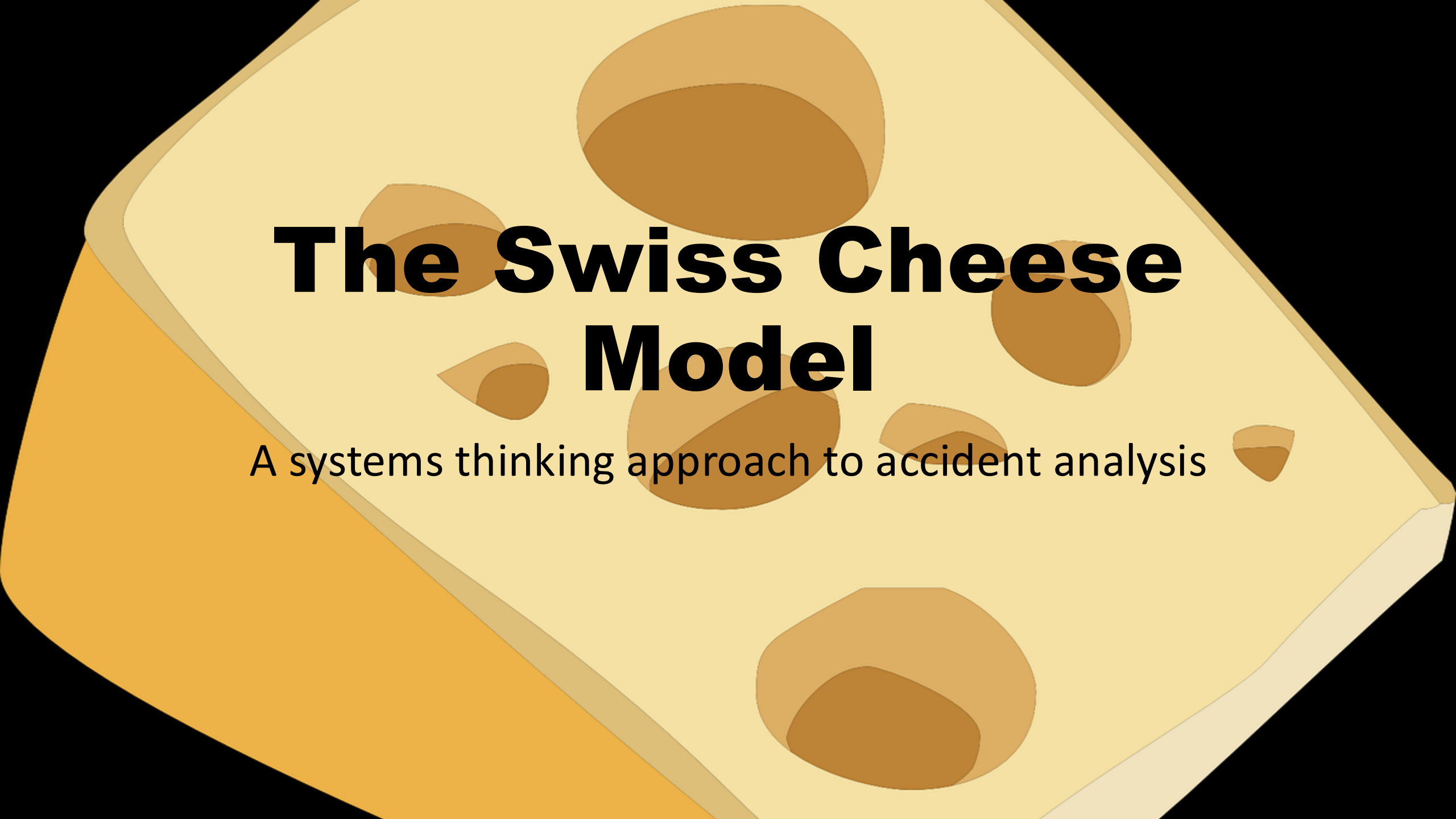
Tracks/ Scarcity – when conditions or resources are limited- last waves, first lines

Social facilitation/ proof- everyone else is doing it!

<https://www.youtube.com/watch?v=2sQL7K7eFqk&t=111s>

(McCammon,2002)





The Swiss Cheese Model

A systems thinking approach to accident analysis

Introduction to Reason's (1997) Swiss Cheese Model (SCM)

In the Swiss Cheese model, an organisation's defences or **control measures** against failure are depicted as a series of barriers, represented as slices of Swiss cheese.

Barriers can be physical (e.g., equipment) or behavioural (e.g., quality of supervision)

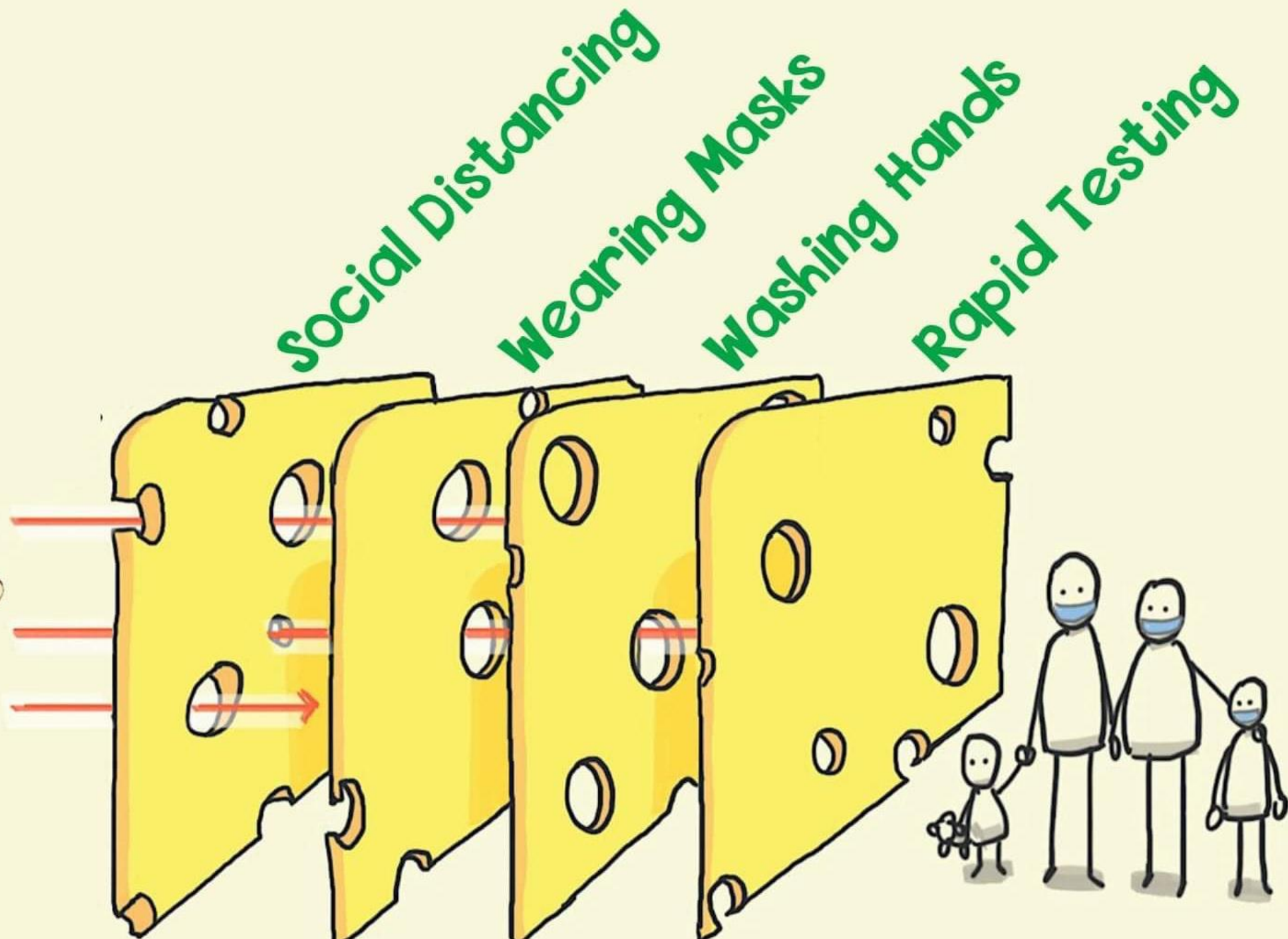
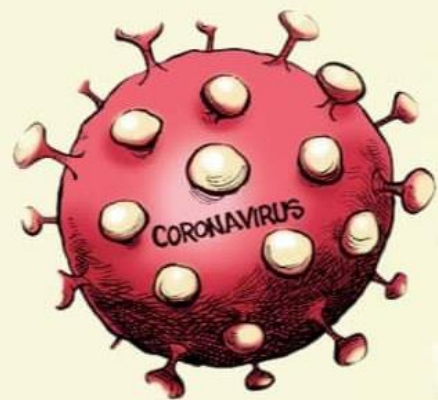
The holes in the cheese slices represent weaknesses in individual parts of the **system**.

These holes or gaps in the system, are considered **dynamic**; they are continually changing in size and position. If the holes from several layers happen to align, or a layer is removed or compromised, the system becomes permeable and the chances of a critical incident increase

Ideally each layer would be perfect, with no holes or weaknesses but in reality no layer is perfect, so the fewer holes and the more layers of safety the better

Reason's model suggests **multiple contributors** (the holes in cheese slices) must be aligned for adverse events to occur. Accidents are usually the end point of a series of events in which the situation becomes increasingly unsafe.

By looking beyond the immediate cause, back from the time the accident occurred and outwards, to the wider context, accident investigators can often identify weaknesses at the organisational level from which useful lessons can be learned. Reason illustrates how events can unfold in the form of an accident trajectory



Social Distancing

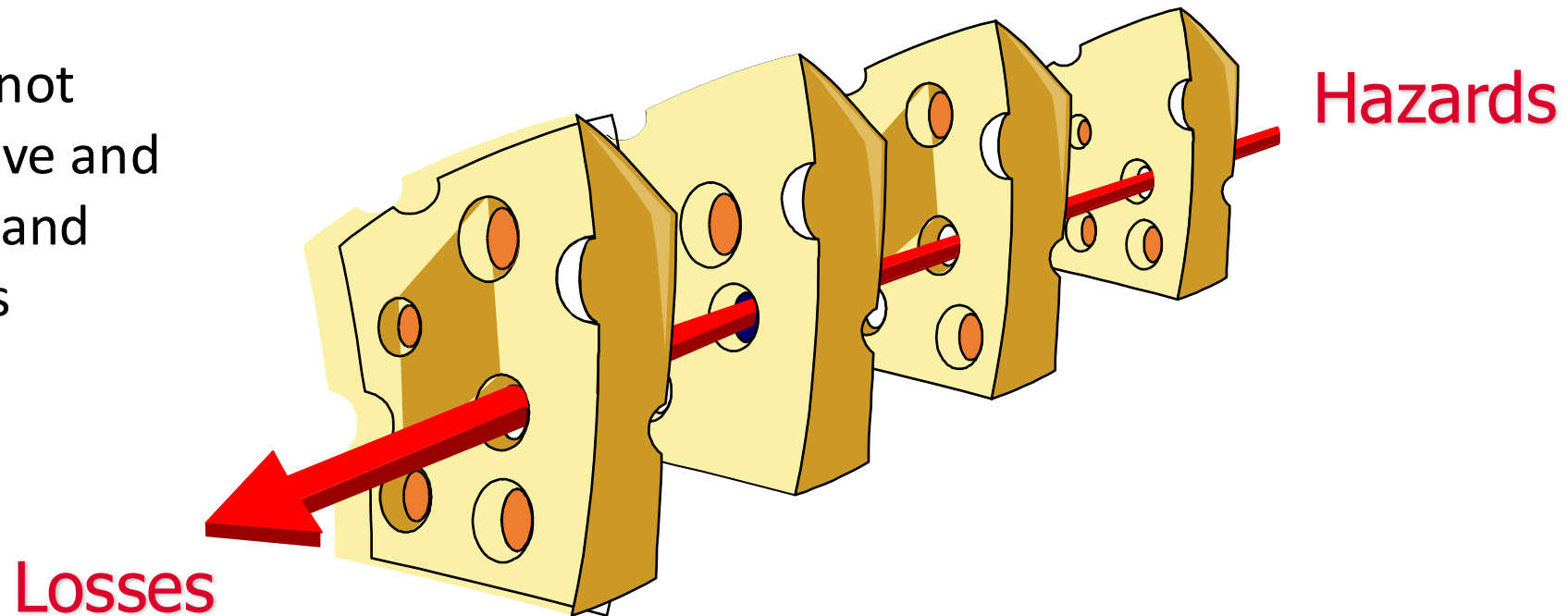
Wearing Masks

Washing Hands

Rapid Testing

Some cheese holes are due to **active failures**, e.g.,:
Errors and violations at the “sharp end”
These errors have a direct impact on the whole system

The holes are not
fixed: they move and
change shape and
size. The risk is
dynamic



Other holes due to **latent conditions**,
e.g., organisational culture

Foundations of the Swiss Cheese Model

- Accidents are often caused by the confluence of multiple factors.
- Factors can range from unsafe individual acts (human failure) to organisational errors.
- Humans are prone to operational errors which require properly designed systems to mitigate (counter act) the errors humans inevitably commit.
- Many contributing factors to an accident are latent errors – they're lying dormant waiting to be triggered by any number of active errors.

Active Failures and Latent Conditions

Active failures

- Active failures or active errors are the unsafe acts committed by people (human failures).
- They often have immediate consequences
- Usually made by front-line people such as drivers, instructors etc.

Latent conditions

- Latent conditions are usually hidden within an organisation until they are triggered by an active failure.
- Latent conditions are the managerial influences and social pressures that make up the culture ('the way we do things around here'), influence the activity programmes or safety systems, and define the hierarchy of supervision.
- Latent failures are made by people whose tasks are removed in time and space from operational activities, e.g. designers, decision makers and managers.

Active Failures

- E.g., an employee who chooses not to follow safety procedures like not checking the weather forecast thoroughly before entering a canyon
- But according to the Swiss cheese model, their active failure was not the ultimate cause of the accident.
- We all make errors irrespective of how much training and experience we possess or how motivated we are to do it right.
- There are other factors at play; cultural factors that influence behaviour.

Latent Conditions

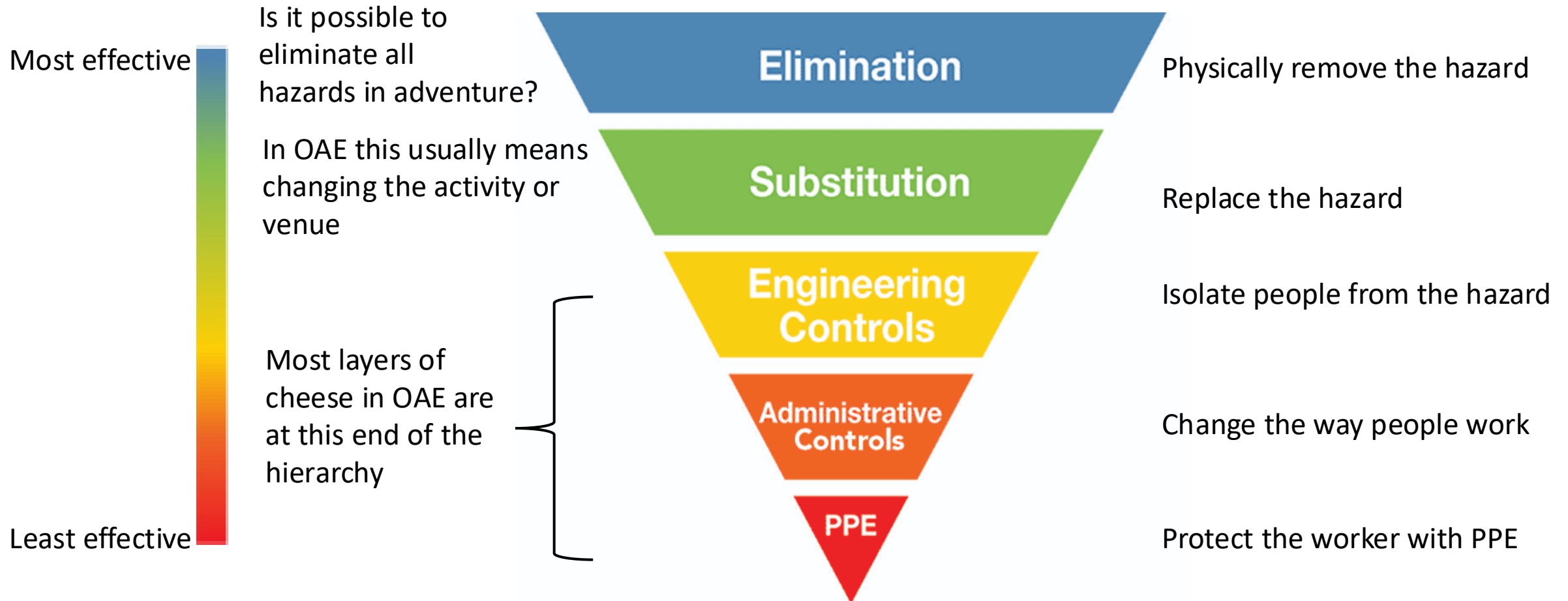
- Latent failures may occur when several latent conditions combine in an unforeseen way.
- Latent failures are typically failures in health and safety management systems (design, implementation or monitoring).
- E.g., Staff supervising residents overnight being expected to work the next day

Examples of the controls or cheese slices in Adventure:

Experience
and
Qualifications

Legislation –
HSE and AALA

The Hierarchy of Controls

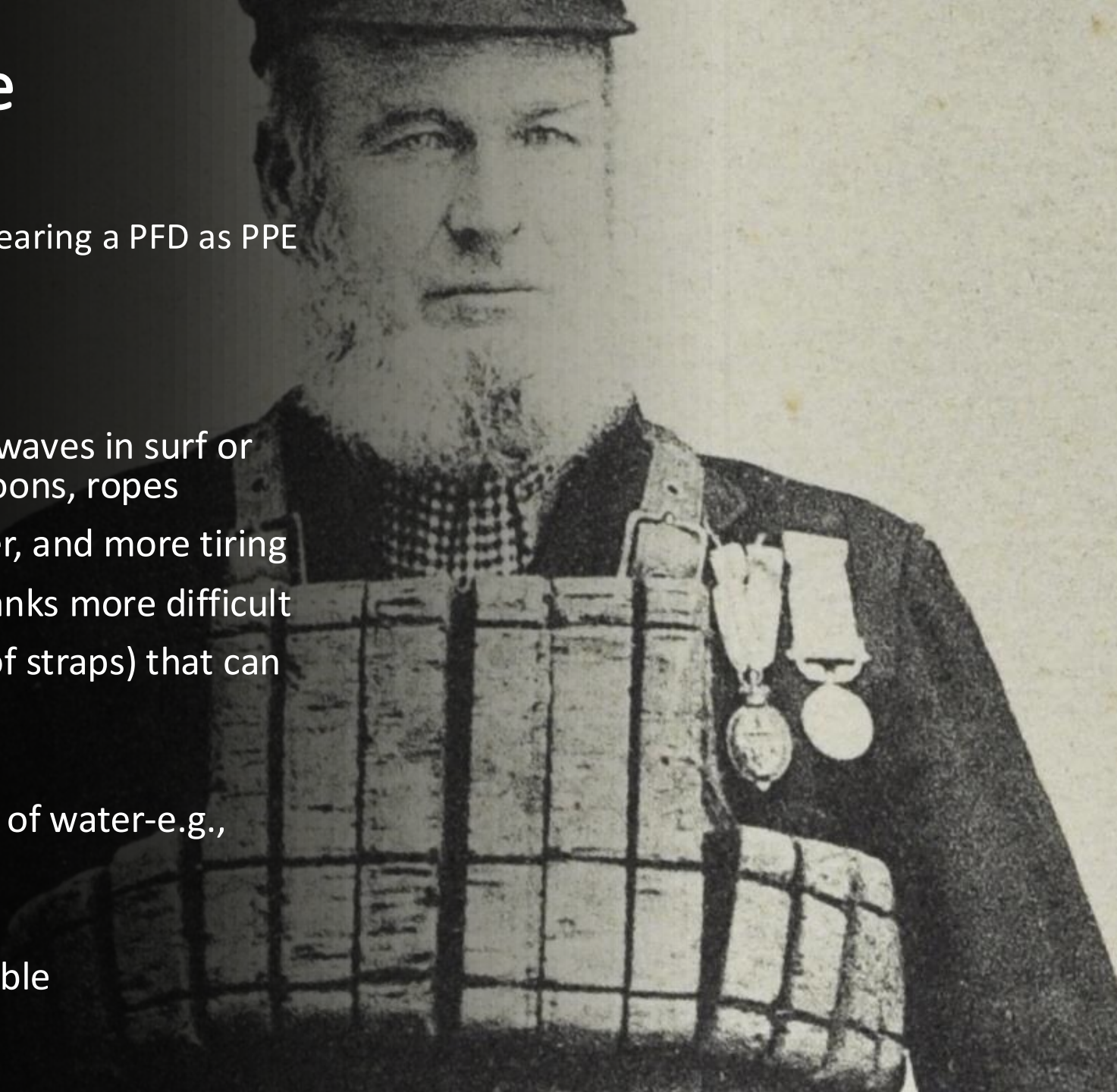


Controls can introduce additional risk!

For example, If there is a risk of drowning then wearing a PFD as PPE would seem a sensible precaution.

However, PFDs may actually introduce new risks:

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- They prevent duck diving/ swimming under waves in surf or avoiding surface obstacles, e.g., boats, pontoons, ropes
 - They can make swimming significantly slower, and more tiring
 - Often make climbing and walking on river banks more difficult
 - Create loops (arm holes) and tethers (ends of straps) that can lead to entrapment
 - They can make breathing difficult
 - Can keep a swimmer in recirculating pattern of water-e.g., Haverfordwest weir
 - Give a false sense of security
 - They need to be properly fitted and serviceable



Remember...

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FailArmy

- The link below is to a standard YouTube fails compilation:
- Some are a bit silly, but many are examples of human and other failures in outdoor settings?
- Can you imagine how some might be categorised as ***monocausality*** or ***multifactorialism***?
- ***Can you*** Differentiate ***individual accidents*** from ***organisational accidents***?
- Can you identify types of ***Human Failure***?
- ***Can you see layers of cheese that might be used to reduce incidence or severity of outcome?***
- <https://www.youtube.com/watch?v=WCLFHLDDdOoI>

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