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# **Regulation of Occupational Safety and Health**

Recap and Further Consideration

# Context

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- Industrial Revolution and the ‘need’ for regulation.
- Drivers and barriers.
- Health and Safety at Work etc Act 1974
- 50 years of regulation – European Union
- Risk-based.

# How the law in the UK works

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- Civil Law
- Criminal Law
- Duties under criminal law:
  - Absolute
  - Practicable
  - Reasonably practicable

# Enforcement in the UK

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- Enforcing Authorities
- Powers of Inspectors
- Enforcement Action:
  - Advice
  - Fees for Information
  - Improvement Notice
  - Prohibition Notice
  - Prosecution
  - Disqualification of Company Directors
  - Imprisonment

# Corporate Manslaughter and Corporate Homicide Act 2007

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- The case of R v Adomako (1994) sets out the current test to prove the offence.
- An individual commits (involuntary) manslaughter when he causes a death through gross negligence.
- Historically linked to ‘identification doctrine’ i.e. identifying the ‘controlling mind of a company’
- Led to failures in prosecution of high profile disasters in 1980/90’s – e.g. Southall Rail Crash.

# Corporate Manslaughter and Corporate Homicide Act 2007 (2)

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- “death or personal injury, resulting from major disasters, was rarely due to the negligence of a single individual - but was more likely to be the result of the failure of systems controlling the risk, with the carelessness of individuals being a contributing factor” (HSE)
- Led to the CMCHA 2007.
- Offences can only be committed by organisations.
- Breach under Common Law of negligence.

# Corporate Manslaughter and Corporate Homicide Act 2007 (3)

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- Can only be committed by organisations and not by individuals
- Requires a breach of the duty of care under the law of negligence
- Requires that the breach is a gross breach, i.e. where the conduct of the organisation falls far below what should reasonably be expected
- Requires that a substantial element in the breach is the way in which the organisation's activities are managed or organised by its senior management
- Is committed only where death is shown to have been caused by the gross breach of duty.

# Corporate Manslaughter and Corporate Homicide Act 2007 - sanctions

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- Unlimited fines
- Publicity Orders
- Remedial Orders



# CMCH Act 2007 – case law

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R v Cotswold Geotechnical (Holdings) Ltd. (2011)

R v JMW Farms Ltd. (Northern Ireland) (2012)

R v Mobile Sweepers (Reading) Ltd. 2014

# Discussion

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Has the UK learned the lessons of the past?

What are the current challenges to the health and safety of people at work?

# Recent OSH Related Incidents

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- Grenfell Tower Fire –
  - Seventy-two people died, two later in hospital,
  - More than 70 injured and 223 escaping.



- £6.7 million fine for Network Rail



- Crumbling concrete in schools



# What's Changed?



## McDonald's fined for under-age jobs



## Gangmasters Licensing Act 2006

## Modern Slavery Act 2015

## Slaves working in UK construction and car washes, report finds

Labour abuse authority finds 17 sectors of British economy are  
high-risk for exploitation



Construction, recycling, nail bars and car washes were among the top sectors where the  
Government said it found forced labour and human rights abuses. Photograph: Alan...

# Modern Slavery and OSH

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<https://www.youtube.com/watch?v=XaqYwGn75ro>

# Gig Economy

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# What Next for OSH?

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(ILO) cite four categories:

- Technology – robotics, AI, telematics
- Demographics – young or older workers
- Sustainable Development – climate change
- Changes in work organisation – e.g. longer hours, flexible working, temporary work, part-time work, ‘gig economy’, remote working.

# Summary

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- The UK has a strong recent history of legislation aimed at protecting health and safety at work – dating back to 1802.
- Until 1974 it was largely piecemeal and reactionary. Owners of large companies had influence over it at various times, watering it down.
- Robens Report led to the Health and Safety at Work etc Act 1974 – groundbreaking, goal-orientated, concept of self-regulation, liability placed where it belonged.
- Can see how Case Law at Common Law actually helped frame the Act.
- Pressure in UK politically at various times to review ‘bureaucratic red tape’ – Loftstedt Review showed this was a misperception. Maybe a new review because of Brexit.
- The future will bring new hazards to the world of work. Are we ready?





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# Safety Conservation

## Understanding Risk

Risk Management, Risk Assessment, Risk Treatment and Risk Control.

# Aims

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To review and critically evaluate how knowledge of the history and theory of risk management can inform how occupational, safety and health risk is assessed and treated.

## By the end you should be able to:



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- Explain the history and development of risk management.
  - Critically evaluate various conceptual models on how risk can be approached.
  - Explore how risk can be controlled and treated; including defining the ultimate aim.

# Terminology

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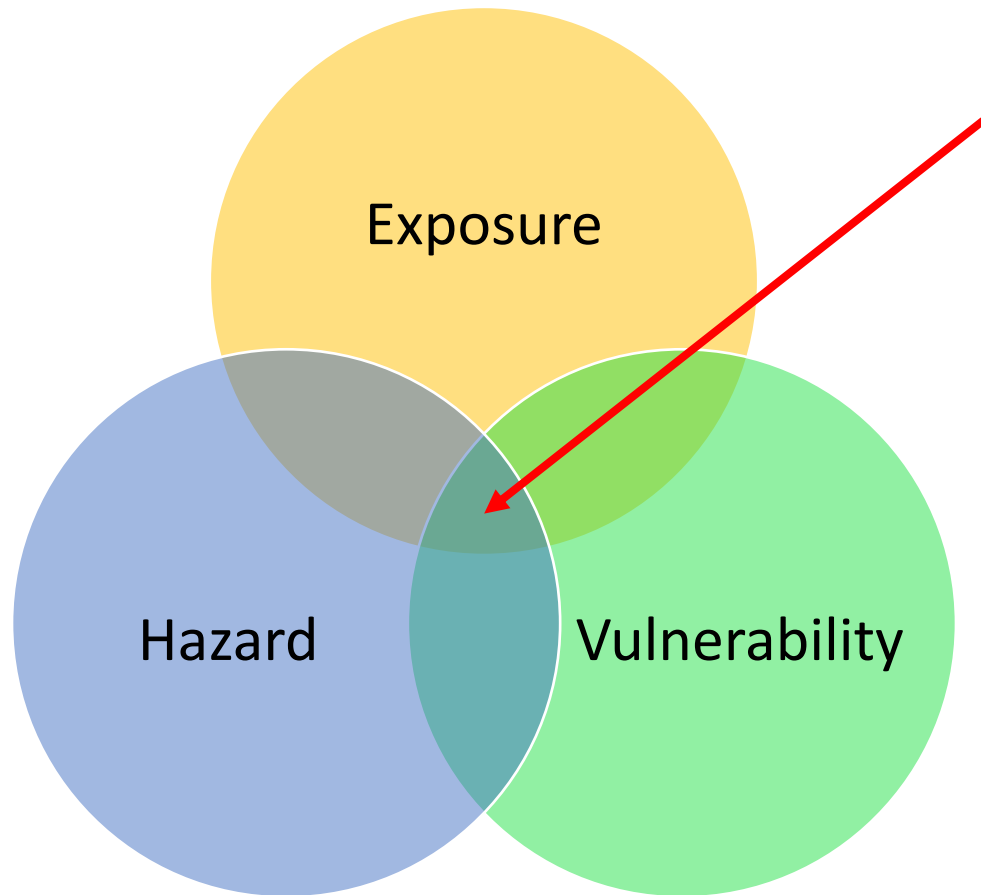
- What is a hazard?
- What is a risk?
- Risk Assessment/analysis

# Risk

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**RISK**

# A History of Risk Management



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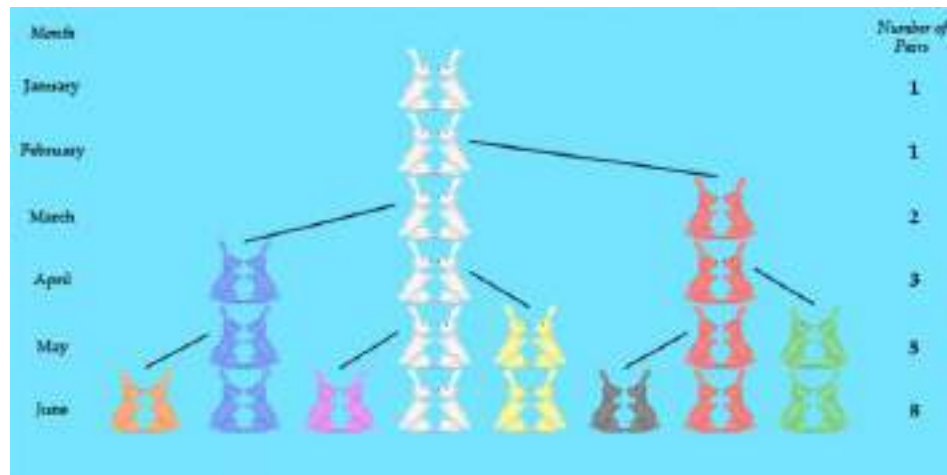
- Bernstein (1996) argues that the concept of risk dates back over 2400 years – Athenians offering their capacity of risk before making decisions.
- Brahmagupta



# A History of Risk Management (2)



- Stahel et al (2017) cite the introduction of a Hindu-Arabic numbering system in Italy in the early 1200s.
- Leonard Pisano (or Fibonacci) – published Libro Abacci (Book of Calculation). Challenges existing Roman numbering system which did not allow for mathematical calculations (no Zero!)



Source: Mathcentre.  
Oxford.Emory.Edu

# A History of Risk Management (3)



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- All significant inventions, innovations, and developments in the past 200–300 years originated from the ability to predict future events and to make conscientious, balanced decisions on the risk and probability of our actions (Stahel et al 2017)
  - Before 16<sup>th</sup> Century people were guided by their faith and belief in fate and divine intervention.
  - The revolutionary “risk movement” was capitalized during the Renaissance and brought to fruition in the sixteenth and seventeenth century by a few selected risk-takers who dared to think outside of the religious boundaries of their time.
  - These heuristic thinkers and pioneers showed courage in defying the state-of-the-art rules which had historically been defined and enforced by society and religion..



# A History of Risk Management (4)

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- Resistance to Fibonacci for over 200 years, until ...
- Gambling - Luca Pacioli (a Franciscan Monk) and Girolamo Cardano (Italian Physician) provided a formal mathematical analysis of the probabilities in dice throwing.
- Cardano's book, *Liber de ludo aleae* in 1564 ("The Book on the Game of Dice") was the first serious attempt at elaborating on statistical probability.
- Cardano's legendary quote "the greatest advantage from gambling comes from not playing it at all."

# A History of Risk Management (5)



- Blaise Pascal, the “father of the modern theory of decision-making”.
- Constructed a systematic method for analyzing the probability of future outcomes using a simple triangle.
- Pascal’s triangle was published in his seminal work *Traité du triangle arithmétique* in 1653



# Intuitive versus Deliberate Decision-Making



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- Kahneman, (2002), described human decision making using two interacting systems. System 1 (intuition) is fast, automatic, and effortless, while System 2 (deliberative thinking) is slow, controlled, and effortful.
  - In this model System 1 quickly proposes solutions, and System 2 monitors System 1, helps solve problems where the answer is not readily apparent, and attempts to monitor and correct any biases of System 1 (Kahneman & Frederick, 2005).
  - **Systems 1** – intuitive thinking
    - personal expertise, mastery, and heuristic dependence
    - Can't be switched off
  - **System 2** – deliberate thinking
    - Deliberative, evidence-based

Ref: The role of intuition and deliberative thinking in experts' superior tactical decision-making

Moxley a, K.; Ericsson; Charness ; Krampe

Cognition Volume 124, Issue 1, July 2012, Pages 72-7 <https://doi.org/10.1016/j.cognition.2012.03.005>

# Deliberate Decision Making

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1. “What is the best thing that can happen if I take the risk?”
2. “What is the worst thing that can happen if I take the risk?”
3. “What is the best thing that can happen if I don’t take the risk?”
4. “What is the worst thing that can happen if I don’t take the risk?”

Carson (2008)

# The Handling of Risk



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Arthur Rudolph (1906–1996), was a German rocket engineer during World War II who later developed the Pershing missile and Saturn V rocket for NASA. He stated after the successful moon landing in 1969:

“You want a valve that does not leak and you try everything possible to develop one. But the real world provides you with leaky valves.

You just have to determine how much leaking you can tolerate.”



Stahel et al (2017, pp7)

# The Handling of Risk (2) – risk compensation and cultural theory

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John Adams (1996) argues that there are three categories of risk:

- **directly perceived risk** e.g. climbing a tree, riding a bike, or driving a car to the channel tunnel

Changed little, intuitive, everyone is a Risk Manager.

- **quantified risk** - probabilistic estimates of failure, such as those made for new vaccines, bridges, or the reinforced concrete in the tunnel

# The Handling of Risk (3) – risk compensation and cultural theory

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- **virtual risk** - the scientists and statisticians don't know or cannot agree e.g. the likelihood of a terrorist planting a bomb in the tunnel that will kill hundreds of people.

Management guided by belief, conviction and superstition – in the ‘realm of the Gods’

In the Risk literature, they are known as ‘uncertainties’ but Adams argues that we don’t respond blankly to uncertainty, we impose meaning – meaning that isn’t routed in science.

# The Handling of Risk (4) – risk compensation and cultural theory

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**Risk Compensation** means that safety interventions are likely to be frustrated by behavioural responses that reset the overall level of risk to the original level. Two related types of this phenomenon are the distribution of risk from one type of person to others (which also may mean that the total risk for all of society may actually increase) and that positive effects of safety measures are used for performance improvement, restoring the original level of risk.

**Cultural Theory** is one way to illuminate a world of plural rationalities. Where scientific facts fall short of certainty humans are guided by assumptions, inference and beliefs. That means that risk is culturally constructed.

(Adams 1995 in mindtherisk.com last accessed 130922)



# The Handling of Risk (5) – risk compensation and cultural theory



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- Are the potential safety benefits of implementing control measures or other interventions consumed by performance benefits?
- Adams takes the idea from road safety and posits that ‘the safer people feel, the greater risks they take’.



# The Handling of Risk (6) – risk compensation and cultural theory

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- Adams (1995) argues that people rarely make risk decisions with quantifiable probabilities, yet decisions get made nevertheless.
- ‘Real people’ do not aim for zero risk, but there is a huge industry (formal and informal) trying to reduce risk and help balancing the various risks (mindtherisk.com last accessed 130922)
- **Kelvinist Approach to risk?** - Lord Kelvin once said “Anything that exists, exists in some quantity and can therefore be measured” (quoted in Beer 1967)

# What is risk anyway?

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- But, is there a distinction to be made between, real, actual, objective, measurable risk that obeys the formal laws of statistical theory and subjective risk inaccurately perceived by non-experts ?
- Is there such a thing as “objective risk”?
- Is risk “culturally constructed”?

# The Handling of Risk (7) - Risk Thermostat (Adams 1999)

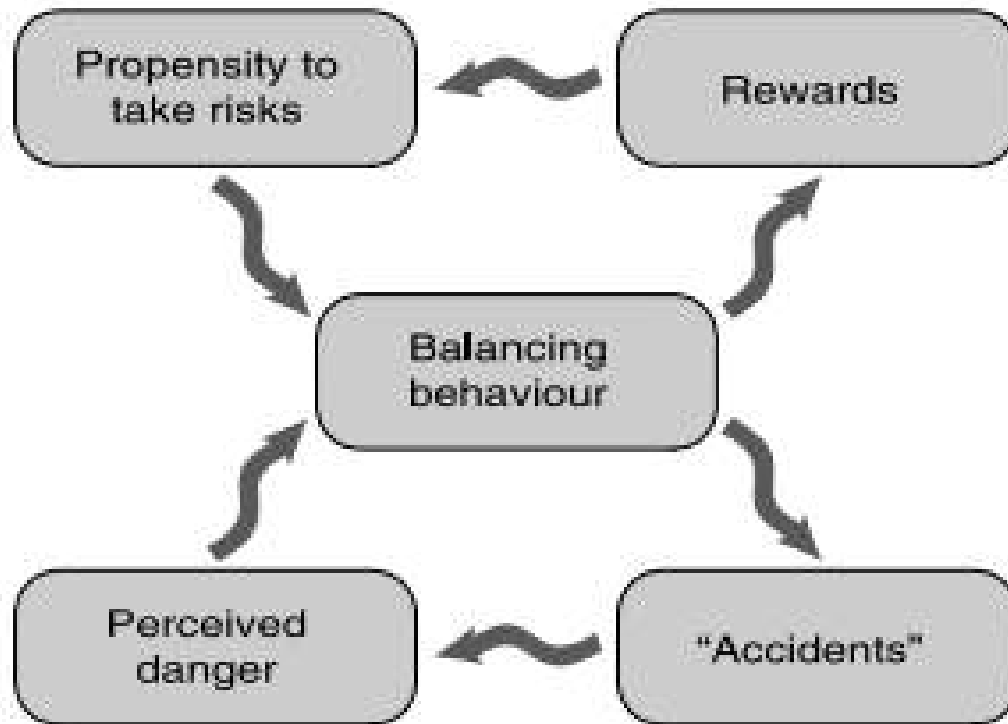


Figure 1 The Risk thermostat

# The Handling of Risk (8) – myths

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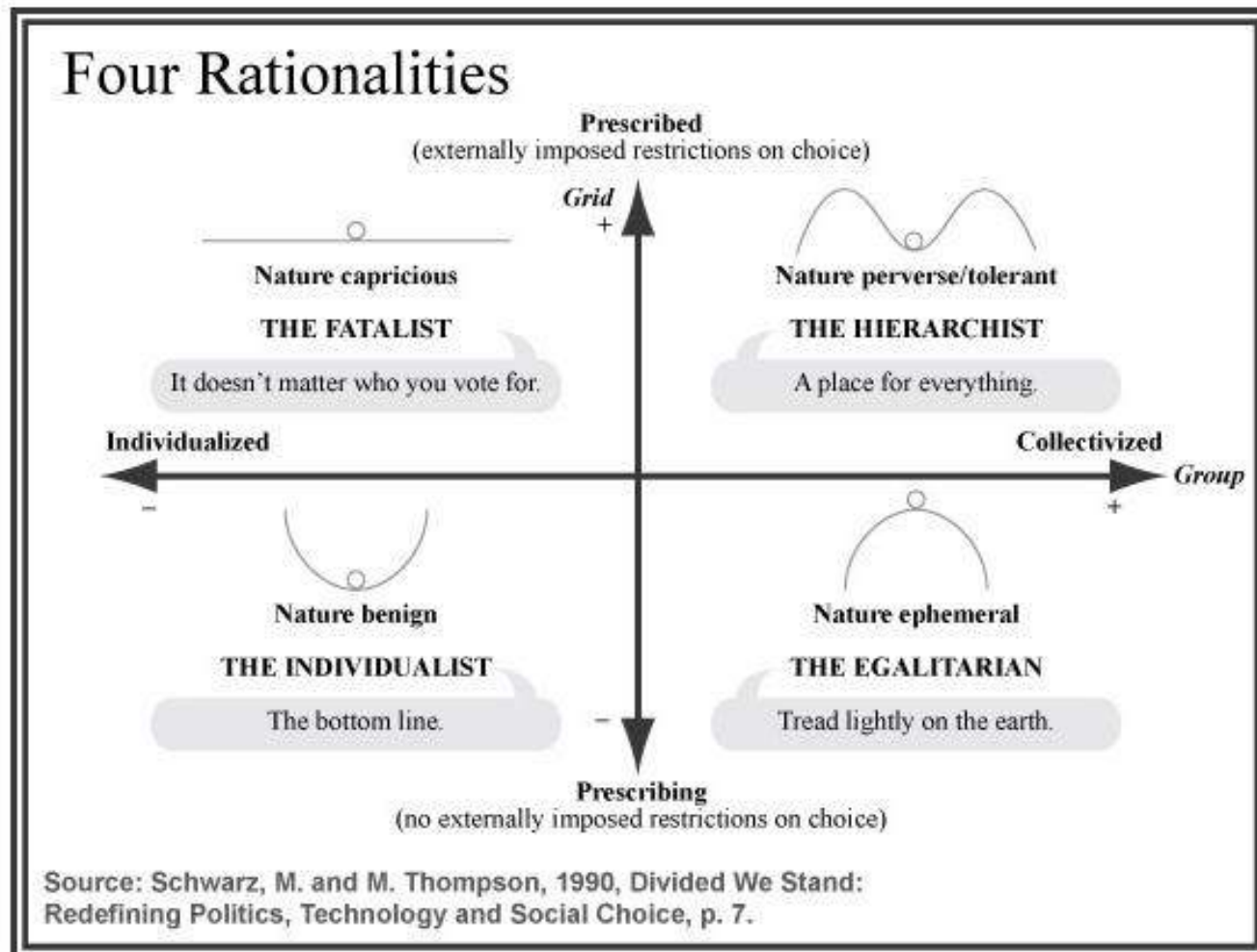
Adams (1995) argues that:

- ‘risk perceived is risk acted upon’.
- ‘The future is uncertain and inescapably subjective; it does not exist except in the minds of people attempting to anticipate it’.
- ‘Anticipations are formed by projecting past experience into the future, but when we anticipate harm, we take avoiding actions’.

To what extent do you agree with these statements?

- This is one reason that accident rates are a very weak measure of risk.
- Douglas and Wildavsky: “Can we know the risks we face now and in the future? No, we cannot; but yes, we must act as if we do”.

# Cultural Theory of Risk



# The Handling of Risk (12) – the Four Myths of Human Nature (Adams 1995)

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Wildavsky (1988):

“Safety results from a process of discovery. Attempting to short-circuit this competitive, evolutionary, trial and error process by wishing the end - safety - without providing the means - decentralized search - is bound to be self-defeating.

Conceiving of safety without risk is like seeking love without courting the danger of rejection”.

# The Handling of Risk (13) – Beyond Adams?

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Roquarth (2021) argues against Adams and this school of thought and believes it is dangerous and does not stand up to scrutiny.

Roquarth (2021) agrees that safety measures are not inherently beneficial, but posits that “at best, risk compensation is something that happens at the level of the individual but rarely, if ever, fully offsets the social benefits of an effective safety regulation. At its worst, risk compensation is just kneejerk libertarianism masquerading as fundamental insight into human nature”.

Does this view shift responsibility from those who create the risk to those who work with them?

Was Risk Compensation at play during the Covid-19 pandemic?



# Risk Assessment

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**Risk assessment** is the determination of quantitative or qualitative estimate of risk related to a well-defined situation and a recognized hazard (Ubongeh 2022)

## Qualitative

- Most common form of risk assessment e.g. workplaces.
- Based on the personal judgement and expertise of the assessor – including discussion with those carrying out the activity and researching best practice.
- Health and safety risk assessments often start out with a simple qualitative assessment.
- The assessor will categorise risk into levels, usually high, medium or low.

# Risk Assessment (2)

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- “A qualitative risk assessment should be a systematic examination of what in the workplace could cause harm to people, so that decisions can be made as to whether existing precautions or control measures are adequate or whether more needs to be done to prevent harm”.

HSE Good practice and pitfalls in risk assessment pg. 13

- Just because a qualitative risk assessment doesn't need to involve numbers, the risk is still calculated (by the severity of harm x likelihood of harm).
- A qualitative risk assessment involves making a formal judgement on the consequence (severity) and probability (likelihood).

# Risk Assessment (3)

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## Quantitative

Numbers are attributed, rather than H, M, L.

Two mathematical values are needed:

- The magnitude of the potential loss (L), and
  - The probability (p) that the loss will occur.
- 
- Methods include:
    - What-if analysis
    - Fault tree analysis (FTA)
    - Failure mode event analysis (FMEA)
    - Hazard operability analysis (HAZOP)
    - Incident BowTie
    - Event Tree

# Risk Assessment (4)



- In carrying out quantitative risk assessments, special quantitative tools and techniques will be used for hazard identification, and to estimate the severity of the consequences and the likelihood of realisation of the hazards. Ref: HSE

**5x5 Risk Matrix**

Severity —

	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Death
1 Rare	1	2	3	4	5
2 Unlikely	2	4	6	8	10
3 Possible	3	6	9	12	15
4 Likely	4	8	12	16	20
5 Certain	5	10	15	20	25

Likelihood —

www.hse.gov.uk

Often a 3x3 or 5x5 Risk Matrix is used.

This does not turn a qualitative risk assessment into a quantitative one – if it is primarily based on the assessor's judgement.

# HSE 'Five Steps to Risk Assessment'

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1. Identify the Hazards.
2. Assess the Risks.
3. Control the Risks.
4. Record your Findings.
5. Review the Controls.

# HSE Risk Assessment Template



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Health and Safety  
Executive

## Risk assessment template

Company name:

Assessment carried out by:

Date of next review:

Date assessment was carried out:

What are the hazards?	Who might be harmed and how?	What are you already doing to control the risks?	What further action do you need to take to control the risks?	Who needs to carry out the action?	When is the action needed by?	Done

# Risk Assessment – Common Terms

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- Generic Risk Assessments.
- Site-Specific Risk Assessment
- Task-based Risk Assessment
- Dynamic Risk Assessments
- Competence
- Suitable and Sufficient

# Suitable and Sufficient (HSE)

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- Do you include all the steps in the risk assessment process?
- Do you focus on prevention and organisational level solutions?
- Do you include provision for dealing with other issues, eg individual issues?
- Do you ensure commitment from all parties (senior management, employees and their representatives)?
- Do you have arrangements to identify those aspects of the work, organisation or environment that are known to be risk factors for work related stress?
- Does your approach highlight the extent and nature of the gap, if any, between the current situation, and what is seen as good practice, eg 'the states to be achieved' in the Management Standards, for each of the identified stress risk areas?
- Do you involve the workforce:
  - By asking about their views regarding good and bad features of workplace conditions?
  - By seeking their suggestions, advice and comments on potential solutions to problems (eg improvements to working conditions, changes in the way work is organised, etc)?
  - By ensuring that people are empowered to contribute and feel that their views are listened to and acted on?
  - By communicating outcomes (eg action plans)?
- Do you seek to develop and adopt solutions that are 'reasonably practicable'?
- Do you provide documentation to show what you have done at each stage of the process and that you are implementing the recommended actions?



# Failure to Provide a Suitable and Sufficient Risk Assessment

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- A metal company (ATI Speciality Materials Limited) has been fined £160,000 plus costs of £72,321 after one of its workers was accidentally killed by a crane swinging and hitting him in the head.

The HSE investigation found:

- The company had not reviewed its risk assessments for 9 years.
- No refresher training had been given to crane operators for 6 to 10 years.
- Training for new starters was inadequate.

- A manufacturer of road surfaces (Rettenmaier Uk Manufacturing) was fined £300,000 over the death of a worker who was dragged into an industrial blender.

The HSE investigation found:

- No safe system of work for locking off.
- No training for staff.
- No risk assessments for the task.

# Failure to Provide a Suitable and Sufficient Risk Assessment (2)

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- A small building contractor (PW Joinery and Building Services) was fined £10,000 and £19,000 in costs as a sub-contractor fell through a gap in flooring joists and was fatally injured.

The HSE investigation found:

- There was no suitable risk assessment.
  - No safe system of work.
  - Failure to plan and supervise work at height.
- 
- Direct Extensions Limited was fined £8000 and costs of £3964.56 for breaches of Control of Asbestos Regulations 2012. No-one has died or had serious health effects (the symptoms can take up to 30 years to present themselves).

The HSE investigation found:

- There was no suitable and sufficient risk assessment.

# Failure to Provide a Suitable and Sufficient Risk Assessment (3)

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- Sally Williams the owner of Cremtor was fined £45000 and £8180.44 in costs after she engaged a self-employed agricultural engineer to undertake ancillary jobs relating to the chimney of the incinerator, and he fell through a hole in the roof and sustained fatal injuries.

The HSE investigation found:

- There were no risk assessments conducted on the work.
- There were no safe systems of work.
- There were no health and safety documents in relation to this work.

# Competence

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- MHSWR 1999 - every employer shall appoint one or more competent persons to assist him in undertaking the measures he needs to take to comply with the requirements and prohibitions imposed upon him by or under the relevant statutory provisions”.
- Competence = qualifications and experience
- OSH Consultants’ Register in the UK
- Importance of consultation, especially with Trade Unions.
- Ethical Practice

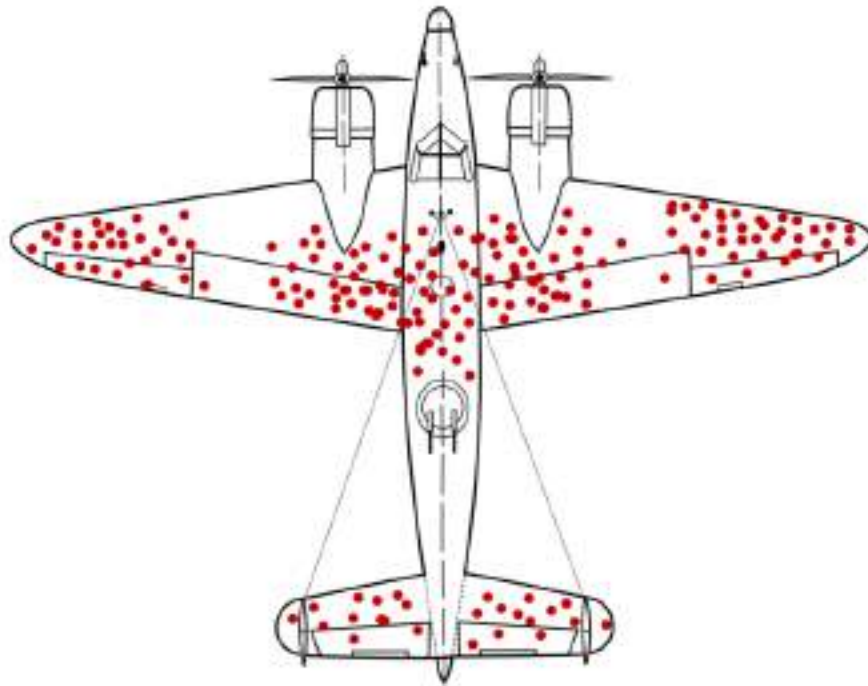
# Treatment of Risk – survivorship bias

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<https://youtube.com/watch?v=ZyLVlvBidIA&feature=share>



# The Treatment of Risk

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1. Avoidance.
2. Reduction and Loss Prevention (Mitigation)
3. Transfer
4. Acceptance (Tolerate)

Risk Registers and Risk Treatment Plans.

# Management Regulations 1999



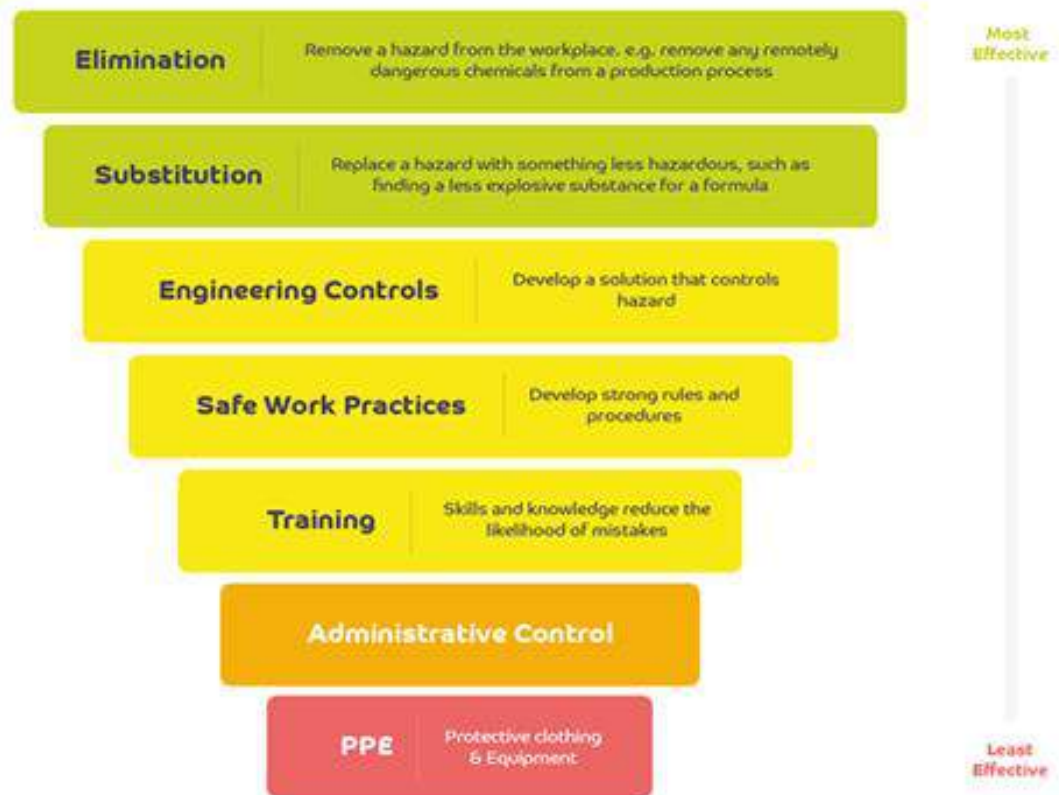
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## SCHEDULE 1 - GENERAL PRINCIPLES OF PREVENTION

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- (a) avoiding risks;
- (b) evaluating the risks which cannot be avoided;
- (c) combating the risks at source;
- (d) adapting the work to the individual, especially as regards the design of workplaces, the choice of work equipment and the choice of working and production methods, with a view, in particular, to alleviating monotonous work and work at a predetermined work-rate and to reducing their effect on health;
- (e) adapting to technical progress;
- (f) replacing the dangerous by the non-dangerous or the less dangerous;
- (g) developing a coherent overall prevention policy which covers technology, organisation of work, working conditions, social relationships and the influence of factors relating to the working environment;
- (h) giving collective protective measures priority over individual protective measures; and
- (i) giving appropriate instructions to employees.

# Hierarchy of Control





# Should the established Hierarchy of Controls really be the Selection of Controls ...



Ref: Long 2022

# Summary

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- Scholars have grappled with the concept of risk for centuries.
- There is some debate as to whether assessing risk is an objective science or a construct.
- There is also some disagreement on what the ultimate goal of risk management should be. Is ‘zero risk’ possible or desirable?
- Is there some ‘risk compensation’ for every control measure or even to use the process to drive greater efficiency.
- Are these only considerations at a societal level?
- In the workplace, HSE’s goal is rather more simplistic – which stills owes much to subjective, qualitative judgement.