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Safety Conservation

Risk Assessment and Control

Modern Slavery .. further thoughts



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<https://www.ioshmagazine.com/2023/10/02/modern-slavery-n-o-excuses-employers>

Risk Assessment



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Risk assessment is the determination of the quantitative and/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)



- “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)



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.

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.

Risk Assessment Methods



- Five Steps to Risk Assessment (HSE)
- What-if analysis
- Fault tree analysis (FTA)
- Failure mode event analysis (FMEA)
- Hazard operability analysis (HAZOP)
- Incident BowTie
- Event Tree

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

What If Analysis ...



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A high-level systematic method for examining the responses of process systems to equipment failures, human errors, and abnormal process conditions

What If Analysis ... External Insulation Cladding to Residential Tower Blocks

Date: Team:

ID. No.	What if ...	Causes	Consequences	Controls	Recommendations
1.	The cladding breached fire safety compartmentation between floors and flats.	<p>Inadequate fire retardancy of the cladding, in all circumstances.</p> <p>Impact of budget for the project.</p> <p>Insufficient specification for the works.</p>	Rapid fire growth and preventing emergency, phased evacuation.	Manufacturer's statement regarding retardancy.	<ul style="list-style-type: none"> • Pause installation until appropriate, independent testing and certification of all cladding options – for this specific use. • Employ competent, expertise to advise the project on fire safety matters.
2.	Cladding already installed was found to assist the rapid spread of fire between floors and flats.	Inadequate fire retardancy of the cladding, in all circumstances.	Rapid fire spread, emergency evacuation plans no longer adequate and residents trapped in burning building.	Reliant on early alarm warnings and assistance from Fire Service.	<ul style="list-style-type: none"> • Plan developed for removal/ remediation of cladding. • Emergency measures implemented e.g. 'waking watch' • Collaboration with Fire Service to identify alternative arrangements.

Failure Mode and Effects Analysis



Process Step	Failure Mode	Failure Effects	S	Causes	O	Current controls	D	R P N	Rec. Action	Resp.
Bedrails installed to prevent patient falling from bed.	Patient becomes entangled in bedrails	Patient distressed. Patient injured. Patient asphyxiated.	?	Installed on wrong bed type. Unsuitable for patient. Wrong type of bed rails. Staff not trained or experienced Defect in bed rails and/or bed.	?	Safe working procedures Staff training. Supervision Patient risk assessment Planned, preventative maintenance.	?	?	xxxxx	CI

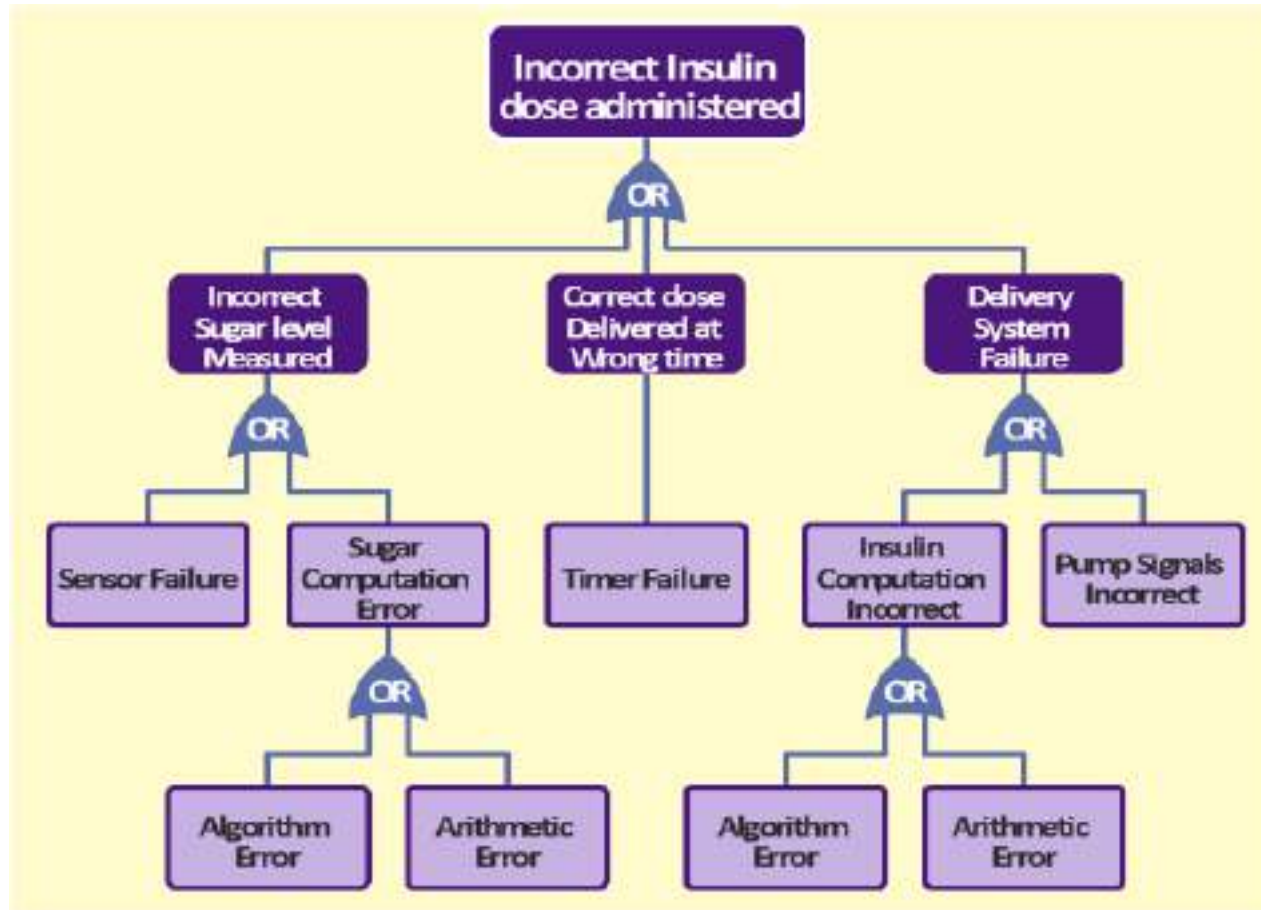
A step-by-step approach for identifying all possible failures in a design, a manufacturing or assembly process.

Fault Tree Analysis

A graphical tool used to explore the causes of system-level failures. A top-down approach to identify the component-level failures (basic events) that cause the system-level failures (top events).



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Fault Tree vs Event Tree



A fault tree is graphical representation of failures leading to a top event; failures and events are combined using logic gates, representing system functionality.

An event tree is a graphical representation of fault progression, showing a time sequence of how an event develops.

HAZOP



-
- A Hazard and Operability (HAZOP) study is a structured and systematic examination of a planned or existing process or operation in order to identify and evaluate problems that may represent risks to personnel or equipment, or prevent efficient operation.
 - The HAZOP technique was initially developed to analyze chemical process systems, but has later been extended to other types of systems and also to complex operations and to software systems.
 - A HAZOP is a qualitative technique based on guide-words and is carried out by a multi-disciplinary team (HAZOP team) during a set of meetings.

HAZOP – Hazard and Operability

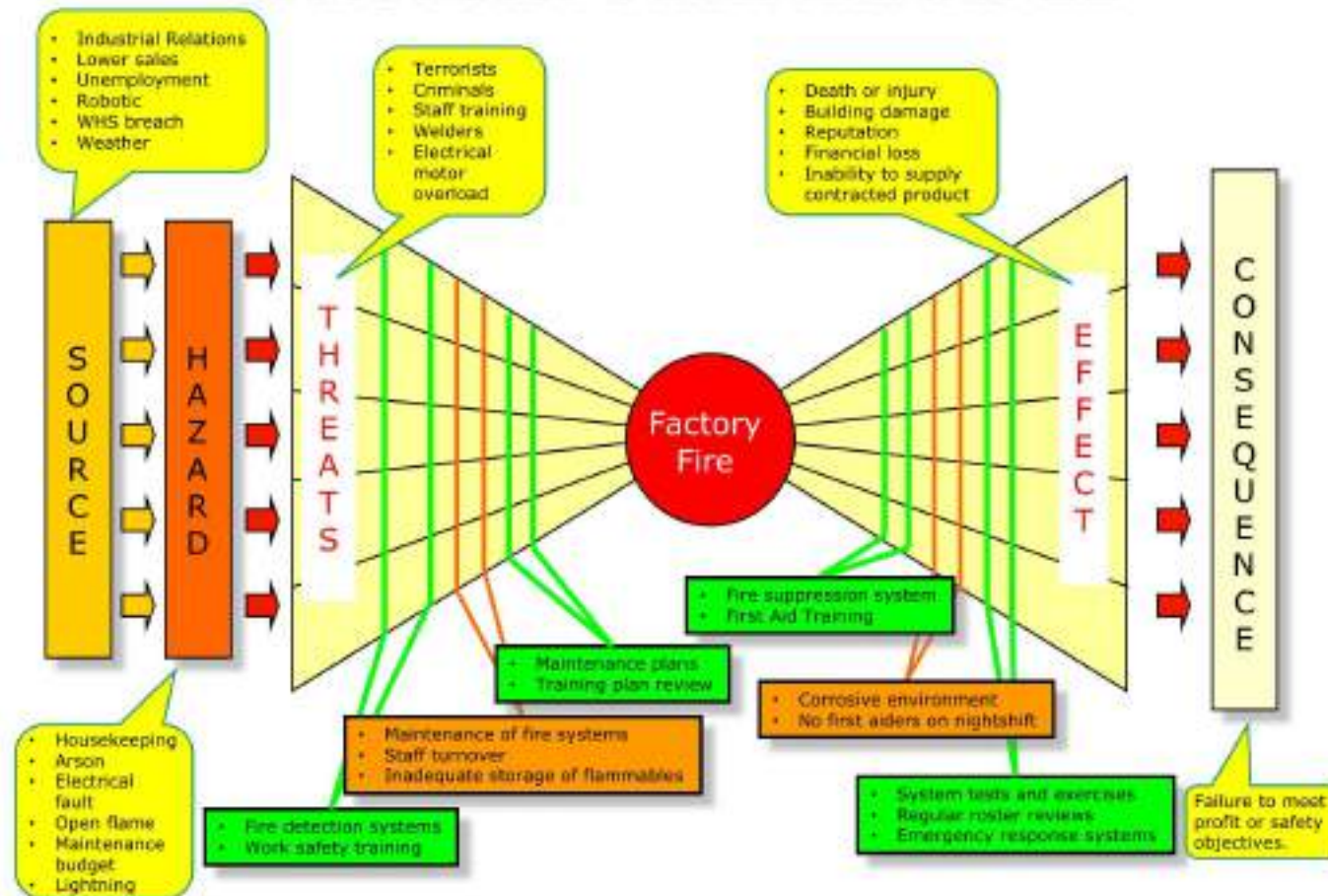
HAZOP Study Title: Transportation of Passengers							Reference:			
HAZOP Team:							Meeting Date:			
Part Considered (NODE)	Driving a coach full of passengers from Collection Point A to Destination Point B									
Design Intent	Material: Coach C Source: Coach Driver					Activity: Transport passengers safely from collection point A, not exceeding stipulated speed limits Destination: Point B				
No	Guide Word	Element	Deviation	Possible Causes	Consequences	Safeguards	Comments	Actions	Resp	
1	Unsuitable	Material: Coach	Coach unsuitable	Too big Too small Poor state of maintenance Inaccessible	Journey cannot take place. Road traffic accident/ Collision. Some passengers excluded.	Maintenance programme in place. Needs assessment at time of booking.	Situation not acceptable.	Pre-use driver checks required.	CI	
2	Unsafe	Source: Coach Driver	Driver unsuitable to ensure safe journey.	Lack of competency training. Incomplete health checks. Under influence of drugs or alcohol. Excessive demands. Tiredness.	Road traffic accident/ Collision.	CPC training in place. Driver licence checks in place. Periodic licence medicals.	Situation not acceptable.	Random/'for cause' substance testing. Biannual medicals Biannual 'stress' risk assessments. Robust investigation of any incidents.	CI	

'Bow Tie Method

A diagram that visualizes the risk you are dealing with in just one, easy to understand picture. It clearly differentiates between proactive and reactive risk management. Provides an overview of multiple plausible scenarios - a simple, visual explanation of a risk that would otherwise be much more difficult to explain.



FACTORY FIRE EXAMPLE



Risk Assessment – Common Terms



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

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



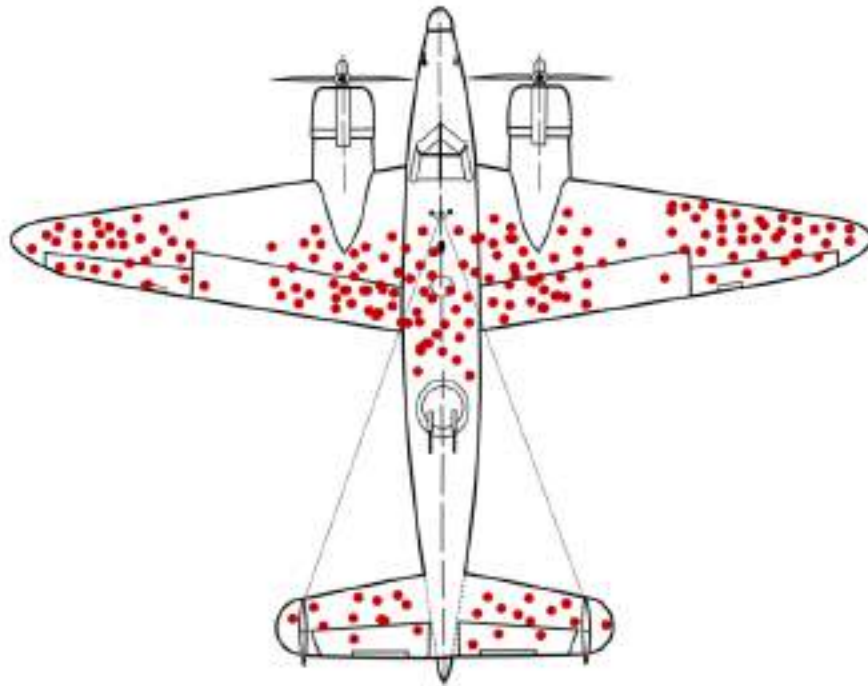
- MHSWR 1999 - every employer shall appoint one or more competent persons to assist him in undertaking the measures he needs to take to comply with the requirements and prohibitions imposed upon him by or under the relevant statutory provisions”.
- Competence = qualifications and experience
- OSH Consultants’ 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



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

Risk Registers and Risk Treatment Plans.

Management Regulations 1999

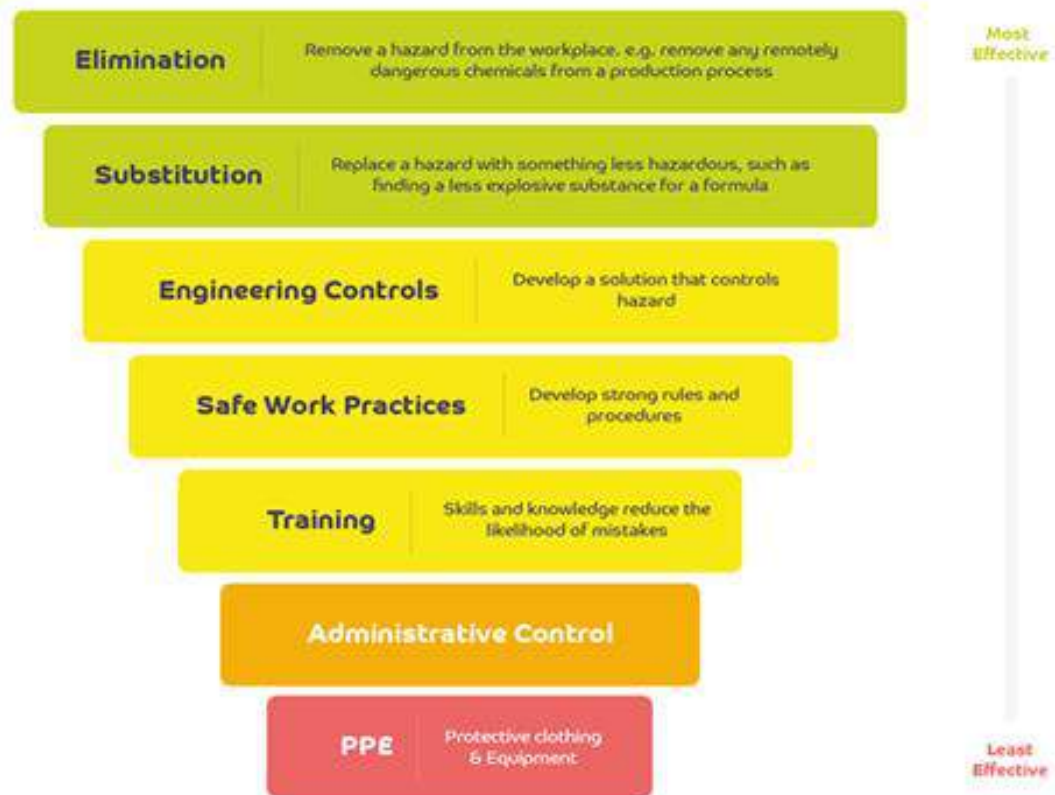
SCHEDULE 1 - GENERAL PRINCIPLES OF PREVENTION



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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**,
 - (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



- 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.

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The Assessment Brief

The Brief



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You have been asked to undertake a routine Occupational Safety and Health audit at a large DIY (Do it Yourself) and Gardening Centre. This has been directed by the new owners following a takeover of the retail chain. The branch you are auditing is one of 22 stores throughout the UK.

The premises consists of:

- A large retail floor with items stored on a variety of racks and shelves. Items can range from heavy building materials and equipment to smaller 'household' items.
- A mezzanine floor with kitchen and bathroom showrooms;
- A large warehouse for storage and distribution;
- A large outdoor area which sells a wide range of garden items e.g. garden furniture, sheds/stores, stoneware, plants, garden fountains etc and heavy building materials e.g. cement, sand, aggregates.
- A large café;
- A miniature railway attraction for children;
- A large car park for the public and a smaller compound for the store's fleet vehicles, which they use for deliveries.
- A small, outdoor 'urban farm' which will be developed with a local charity to provide children with access to small farm animals for education, handling, feeding.
- There is a range of equipment e.g. fork lift trucks, mobile elevated work platforms; scissorlifts, hoists, bolt cutters, drills, power saws (vertical and circular), power washers, paint mixers etc.
- The store pride themselves on employing a significant number of older people (65+) and younger trainees and neurodiverse staff.

The Questions ...



1. You have only been given limited time for your audit. Which three hazards would you focus on in these premises and, with reference to the literature, how would you justify their selection. N.B. these are hazards of your choice, which are relevant to the case study and for which you can explain why they should be prioritised. Each hazard attracts equal marks.

2. For each hazard you have identified, explain:
 - a. The principles involved in reducing the risk associated with the hazards;
 - b. The type of control measures you would expect to be in place to assure you that the hazard is well controlled;
 - c. What questions might you ask staff or the manager to determine how well the risk is controlled?
 - d. What documentation would you expect to see?

Case Study Continued ... Whilst you are conducting the audit you discover that there was a serious accident a few months ago which did not appear to have been reported to the enforcing authority. Paperwork available showed that a six-year-old child was running unsupervised through the outside garden centre and a stack of empty, heavy pallets fell onto him resulting in his leg being broken in several places. The child was taken straight to hospital, where they stayed for treatment for 7 days.

Questions continued ...



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3. With reference to appropriate accident causation model(s), discuss how you would investigate this accident and the role any active and/or latent failures might have played. What might you recommend to prevent a recurrence?

Case Study Continued ...The owners are pleased with the work you have done and ask you to assist them with a 'health and safety impact assessment' for introducing a bespoke cutting service for customers. This would allow customers to buy a range of materials and have it cut on site to their specification. The materials could include: wood, tiles, rainwater goods, cables/chains, paving stones, roofing tiles etc.

4. Provide a reasoned argument for the owners as to the advantages and disadvantages of introducing such a service. N.B. remember there may be a commercial imperative to offer the service and so being overly risk-averse without justification, may not be helpful to the owners.

Case Study Continued ...There is demand from customers that the store start to sell a range of Liquefied Petroleum Gas(LPG) cylinders for domestic use e.g. Propane or Butane cylinders for heating, caravans/camping, BBQs etc. They have not done this before.

5. Provide the owners with advice on the associated risks of stocking LPG and how the risk may be reduced in terms of quantities, delivery, handling and storage. Reference any relevant legislation/Codes of Practice/Guidance and how they might be applied

DIY Store



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DIY Store



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Mezzanine Floor



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Garden Centre



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Miniature Railway



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Urban 'petting' farm



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LPG Cylinders



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Cutting Service



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CUTTING SERVICE
COMPUTERISED CUTTING FOR ACCURATE CUTS
SHAWFIELD **TIMBER**
TRADE & DIY

TIMBER, DOORS,
PLYWOOD, MDF, SKIRTING
& MORE

Previous Pitfalls



- Poor proof reading prior to submission.
- Paraphrasing by changing words using 'synonyms' which change the meaning and context.
- Confused approach to referencing.
- Inappropriate, non-academic terminology used.
- Evidence of collaboration – either by sharing references/sources or the work itself – often without changing much of the text.
- Use of inappropriate sources, which are clearly not relevant for the case study.
- A small number of sources referenced (5 in some cases) and most of them were from websites, rather than peer reviewed articles.
- Making assertions with no citation to underpin them.
- Not answering all parts of each question and/or writing generically and losing sight of the question asked.
- Perfunctory answers, with no attempt to go into any depth to answer the question.
- Not appropriate for Level 7.



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**Risk Perception, Communication and
Identifying Common OSH Hazards**

Aims



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to review and critically evaluate how knowledge of the principles of risk perception and communication can contribute to the identification and control of OSH hazards.

By the end you should be able to:



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-
- Explain the principles and models of risk perception and risk communication
 - Critically evaluate the contribution of these models to identifying and controlling OSH hazards
 - Learn from practical examples



Who has done, or would like to do, these activities?



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Risk Perception



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Oscar Wilde (1854-1900) once said:

“A truth ceases to be a truth as soon as two people perceive it”. (Sutton, I 2014)

What do we think he means by this?

To what extent do you feel that it is true?



Risk Perception: definition and importance



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Risk perception refers to people's subjective judgements about the likelihood of negative occurrences such as injury, illness, disease, and death (Paek and Hove 2017)

It is important because it determines which hazards people care about and how they deal with them.

Risk Perception Exercise



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- Open and download Excel Spreadsheet from Blackboard. Save your own copy.
- Rank risks from 1 (highest) to 30 (lowest) – without reference to any external source or colleague.
- Save doc. With your initials and email it to me:

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