Regional Training on Health and Safety in South Asia

26–29 August 2024 • Colombo, Sri Lanka

ADB Health, Safety and Security (HSS)

Awareness Training Course

MODULE 2

HSS Risk Management

Identify hazards and risks, assess their impact and how to control them

Hazard

A **hazard** is anything that has the ***potential*** to cause harm.

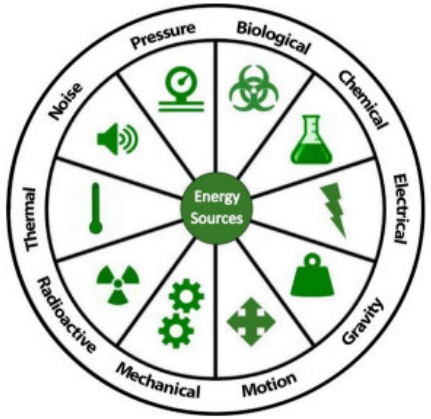
Hazard Wheel

Tool Box Talk

The Hazardous Energy Wheel

The Energy Wheel

The Hazardous Energy Wheel is a tool designed to improve hazard recognition. It is gaining traction in construction and other industries. It consists of 10 listed sources of energy that may be present in the workplace. Workers use the categories on the wheel to find previously unknown or unidentified hazards. Hazards may fall into one or more of the categories.



The 10 Hazardous Energy Sources

- **Biological** - Hazards created by living organisms. Examples include blood-borne pathogens, insects, animals, plants, viruses, bacteria, as well as psychological hazards like harassment, violence, stress, conflict, poor workplace relationships and culture, etc.
- **Chemical** – Hazards created by chemicals and their reactions to one another. Examples include corrosive products, cleaning agents and solvents, toxic or flammable fumes and vapours, carcinogens, oxygen-deprived or enriched environments, etc.
- **Electrical** – Hazards created by the presence of electrical charge or current. Examples include overhead power lines, static discharge, lightning, cords, plugs, transformers, etc.
- **Gravity** – Hazards created by the downward force of mass towards the earth. Examples include falls from heights, materials or tools dropped from heights, collapse of structures, etc.
- **Motion** – Hazards caused by the motion of objects, machinery and people. Examples include repetitive motions, manual or mechanical lifting or pulling, vehicles and equipment, projectiles, etc.
- **Mechanical** – Hazards created by mechanical means. Examples include gears, cogs, turntables, motors, pulleys, augers, powered tools, springs, conveyors, etc.
- **Radioactive** – Hazards created by subatomic particles, electromagnetic waves and ionizing radiation. Examples include ultraviolet rays from the sun, welding, X-rays, microwaves, naturally occurring radioactive material (NORMS), radioactive waste, nuclear substances, etc.
- **Thermal** – Hazards created by thermal differences. Examples include extremely hot or cold environments, humidity levels, open flames, steam, hot or cold surfaces, liquid nitrogen, friction, etc.
- **Noise** – Hazards created by audible vibrations that interfere with hearing. Examples include heavy machinery, equipment, powered or pneumatic tools, impact tools, ambient noise levels, etc.
- **Pressure** – Hazards created by objects or substances with a high force per unit area. Examples include hydraulics, compressed cylinders, tanks, vessels, pipelines, etc.

Practical Application

Hazard identification is an important aspect of safety. If we do not identify, we are not aware of what can hurt us. Using this tool correctly can increase the amount of hazards identified by 30%. Workers should use this after "obvious hazards" have been identified, as the tool does not replace their knowledge, but intends to question where additional hazardous energy may be present.

This was designed to be a visual aid. To utilize this tool effectively, it must be seen while the hazard assessment is taking place. Consider using this tool while completing your next hazard assessment.

Training is available for free from WorkSafe Saskatchewan here:

- *https://worksafesask.bluedrop.io/storefront/worksafesaskatchewan/online-registration/24070*

Hazardous Event

For a hazard to cause harm, a hazardous **event** must happen.

Assessing Risks

We need to understand the ***definition*** of **risk** and be able to evaluate and reduce it.

Perception of Risk

https://www.youtube.com/watch?v=OxOi_P1zdAo

https://www.youtube.com/watch?v=hVNbK3SovL8

Limited "Receptors" = Limited Risk

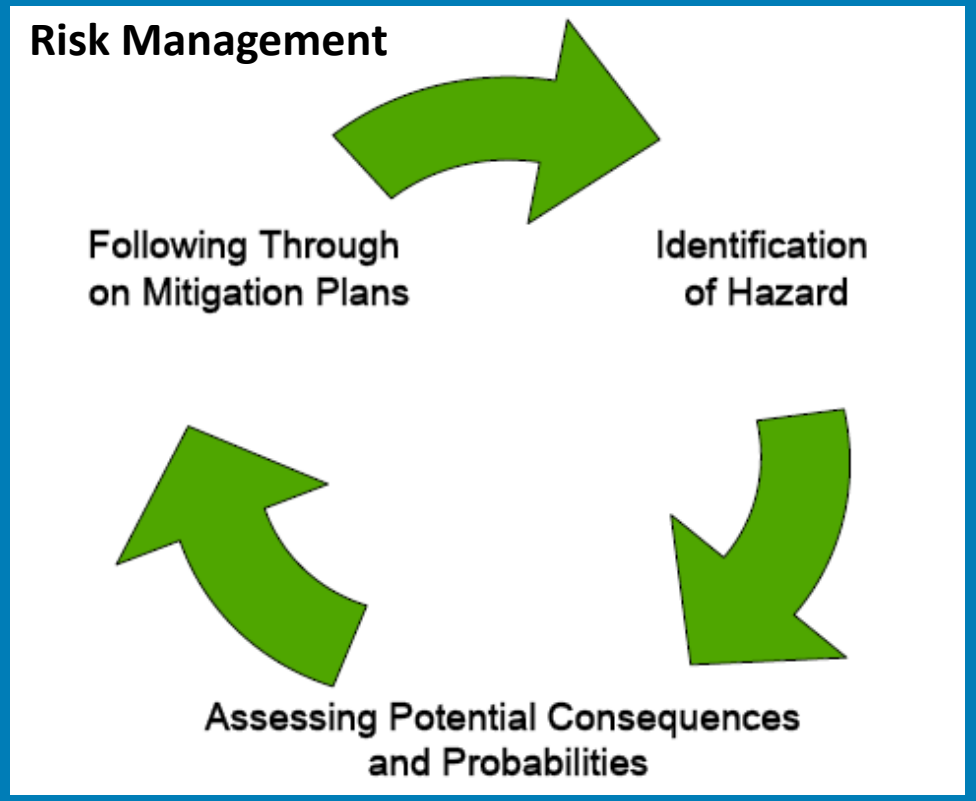
Add "Receptors" = Higher Risk

Risk

Risk is the combination of the ***likelihood*** of a hazardous event occurring, and the ***consequence***.

Risk = Likelihood x Consequence

Defining “Hazard” vs “Risk”



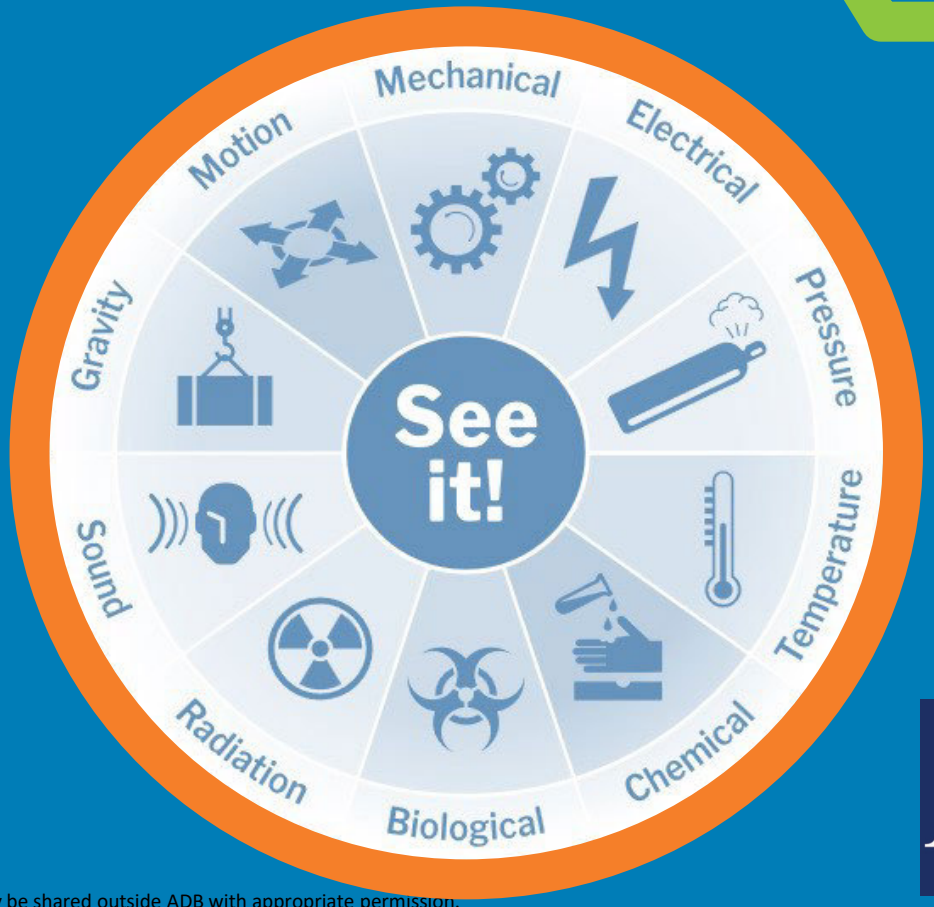
HAZARD

RISK

Hazard Event Consequences

Exercise

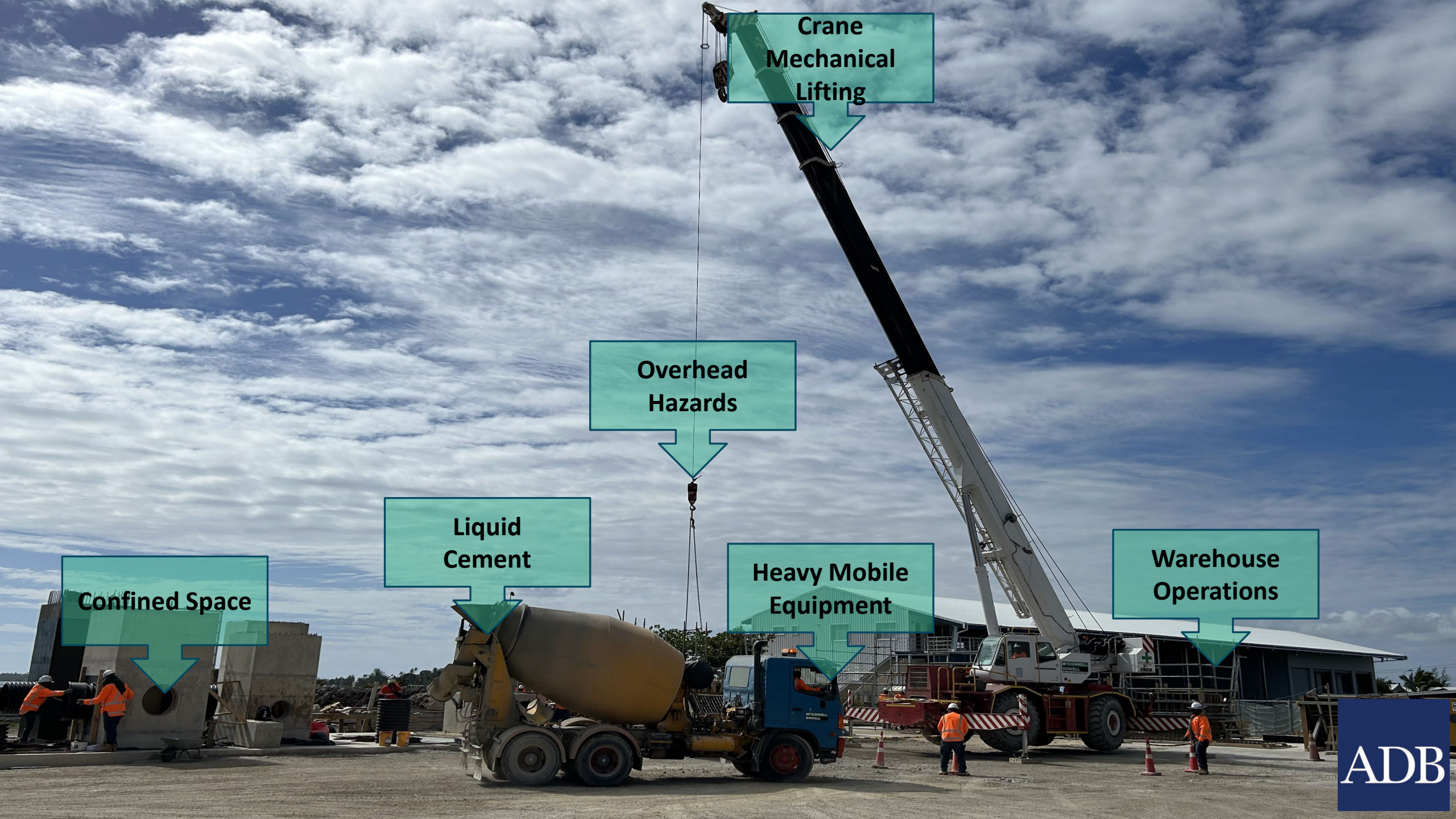
Provide an example of how a person could be harmed for each hazard group.




No PPE
No Fall Protection
No Fall Protection
Power Lines
Chemical Storage
Scaffold Lacks Toe Boards
Dropped Objects
Poor Housekeeping


High Voltage
Hi Pressure Vessel
Poor Condition Scaffolding
No PPE (hardhat, fall protection)
Poor Condition Ladder
Poor Condition Ladder
No PPE
Worker Under Dropped Object Hazards
Unmarked / Unlabelled Drum
Loose Cables / Trip Hazards
Chemicals
ADB


Overhead Powerline
Work at Height
Heavy Mobile Equipment
Fuel Storage
Security Breach
Restricted Space
Chemical Totes
Site Drainage / Runoff
ZINGO
ADB


Crane Mechanical Lifting
Overhead Hazards
Liquid Cement
Confined Space
Heavy Mobile Equipment
Warehouse Operations
ADB

Risk Management

Identifying and evaluating risks, and identifying mitigation measures, to reduce risk to "**as low as reasonably practicable**" (**ALARP**).

Using a Risk Matrix (Basic 3x3)

		Consequence		
		Slightly Harmful	Harmful	Extremely Harmful
Likelihood	Likely	Medium Risk	High Risk	Extreme Risk
	Unlikely	Low Risk	Medium Risk	High Risk
	Highly Unlikely	Negligible Risk	Low Risk	Medium Risk

Risk Matrix (many styles = same principles – e.g., 5x5)

Consequence

Likelihood

	Insignificant	Minor	Moderate	Major	Catastrophic
Very Likely	Low-Medium	Medium	Medium-High	High	High
Likely	Low-Medium	Low-Medium	Medium	Medium-High	High
Possible	Low	Low-Medium	Medium	Medium-High	Medium-Heigh
Unlikely	Low	Low-Medium	Low-Medium	Medium	Medium-High
Very Unlikely	Low	Low	Low-Medium	Medium	Medium

SAMPLE Corporate Risk Matrix

People	Environment	Assets	Reputation

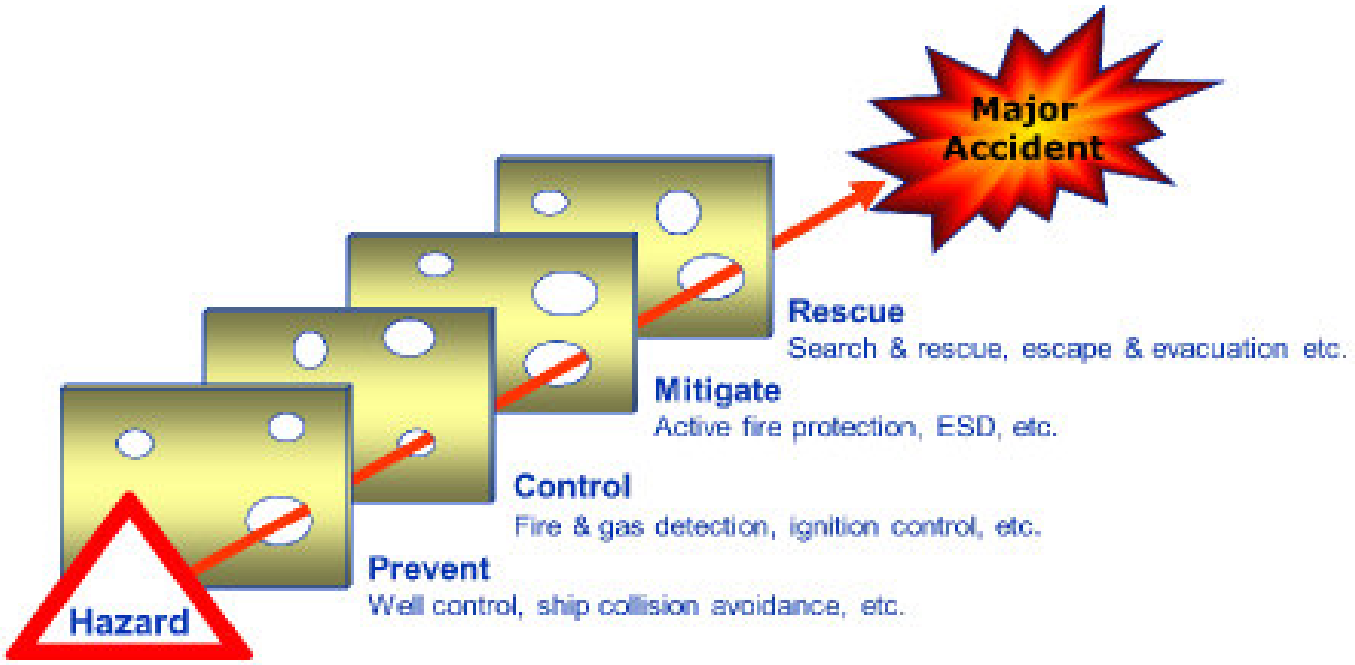
"PEAR" Principle

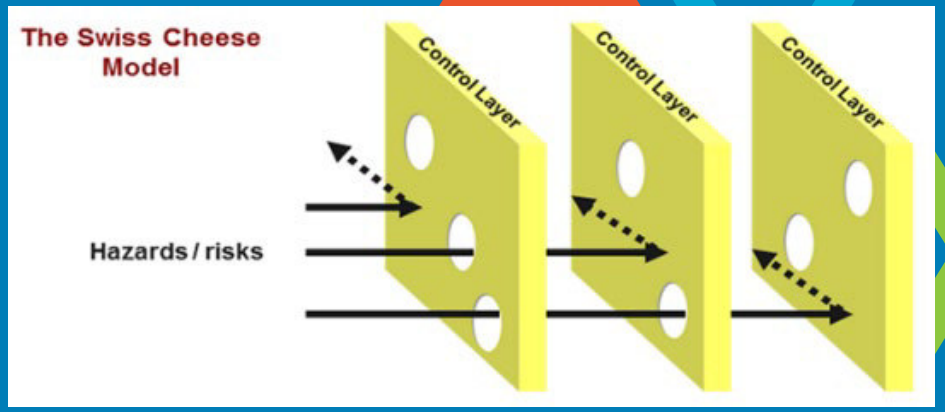
Consequence Severity	Health&Safety	Environment	Financial	Reputation	Probability / Likelihood			
					A - Remote	B - Unlikely	C - Likely	D - Frequent
1- Minor	-Minor Injury or illness -First Aid	-Minimal cleanup needed -Fully contained on site -Negligible impacts	Less than $10,000	-No public disruption -No media attention	A1	B1	C1	D1
2- Moderate	-Medical Treatment -Restricted Work	-Some clean-up offsite -Localized impacts	$10,000 to $100,000	-Regulatory attention/letters -Minimal public disruption - Briefly in local media	A2	B2	C2	D2
3- Major	-Lost Time Incident (LTI) -Multiple injuries	-Widespread but recoverable -Short term impacts	$ 100,000 to $ 500,000	-Regulatory action/fines -Local public disruption -Prolonged local media attention	A3	B3	C3	D3
4- Critical	-Fatality -Permanent health impact -Long term disability	-Widespread and irreversible -Long term impacts	Over $ 500,000	-Regulatory shutdown -Wide public disruption -Prolonged wide media attention	A4	B4	C4	D4

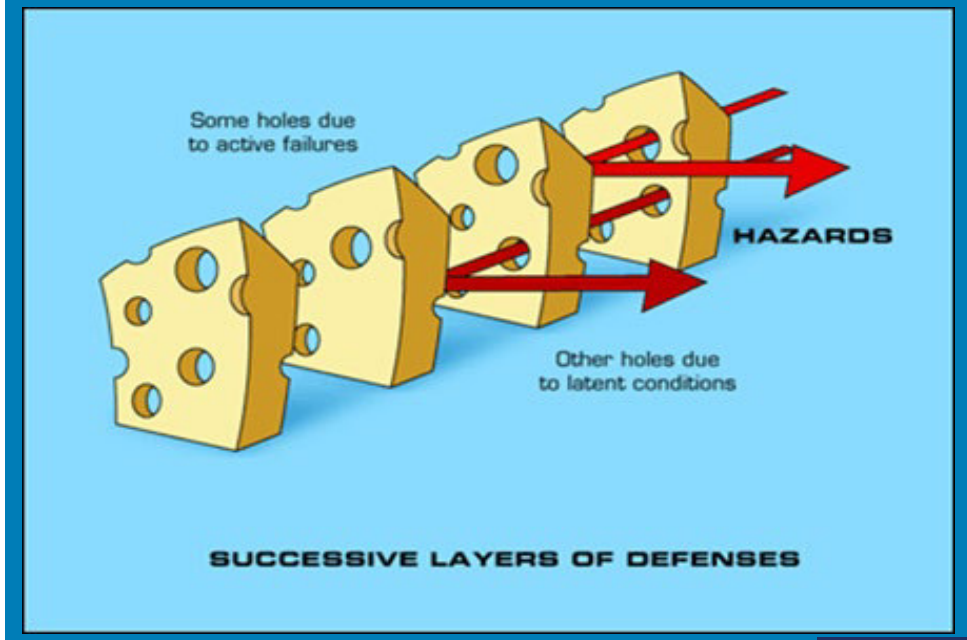
Risk Management – LAYERS of Protection

Swiss Cheese Risk Model

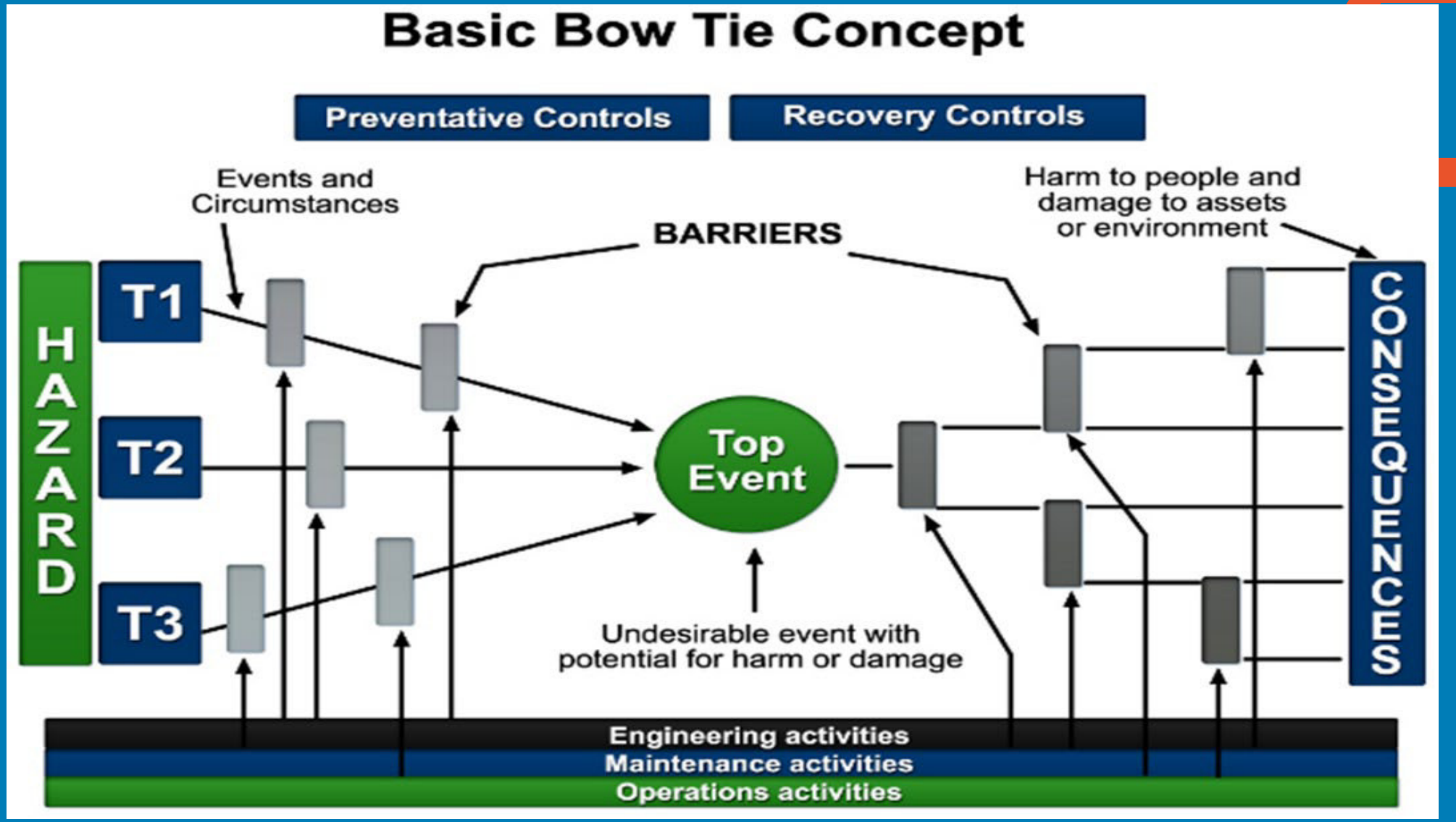
- Layers of protection needed for Emergency Prevention & Response







Risk Management – LAYERS of Protection



Discussion – House Fire: List out examples for "Prevention & Response"

Hierarchy of Controls

ADB Hierarchy of Risk Controls

HIERARCHY OF CONTROLS

Most Effective

Least Effective

Elimination — Physically remove the hazard

Substitution — Replace the hazard

Engineering Controls — Isolate people from the hazard

Admin Controls — Change the way people work

PPE — Protect the worker with personal protective equipment

PPE = Last Line of Defense !

Typical Life-Saving Rules

Other LSR online video summaries from IOGP

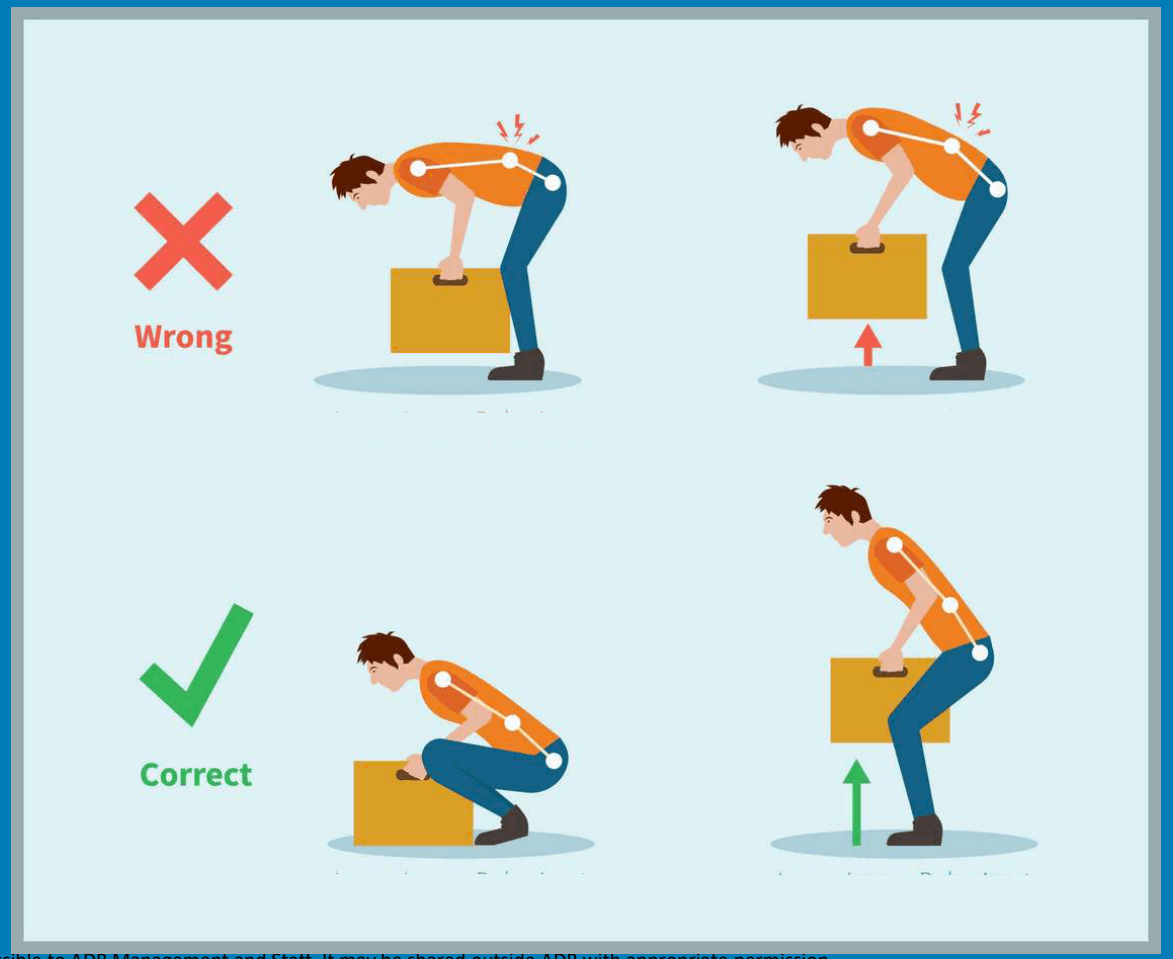
Links to all LSR videos (1-2 minutes each)

- Youtube:
  - https://www.youtube.com/playlist?list=PLt0-qTVCvEp1Dxe7j7SDbbiLrYIkUqYov

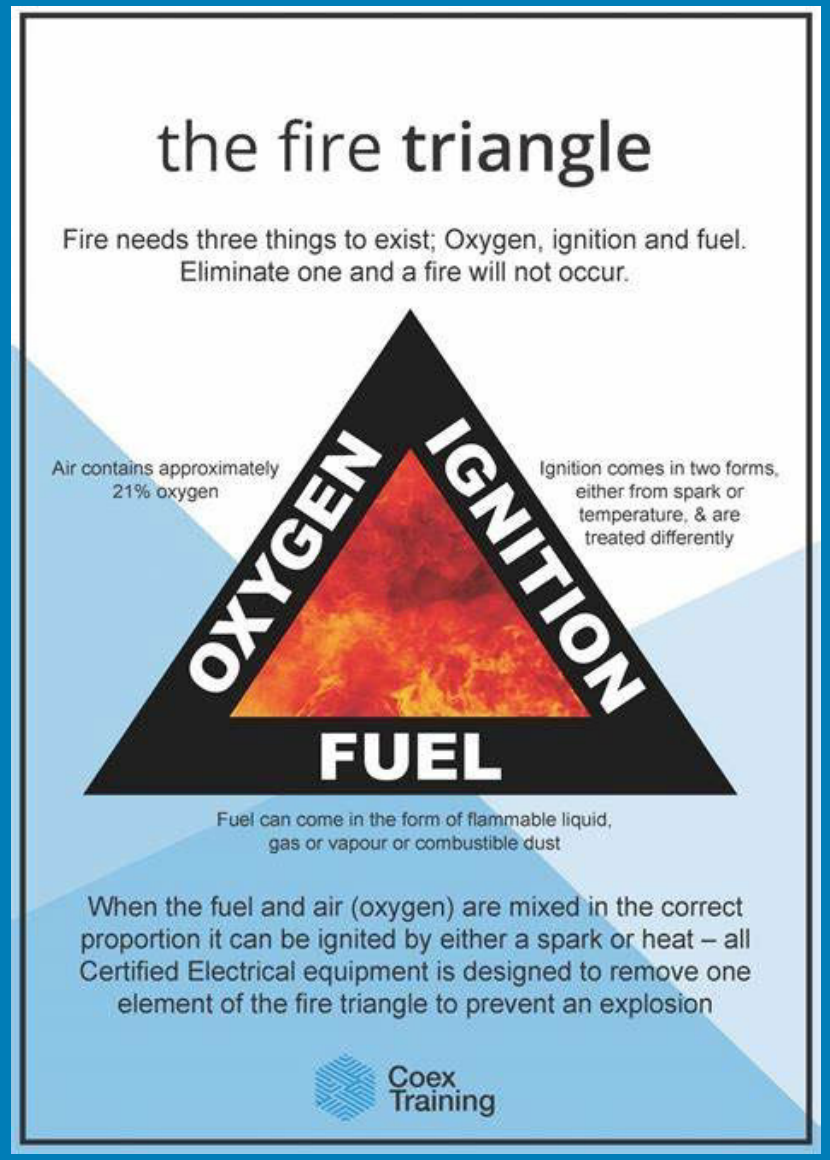
- Vimeo: (show Energy Isolation & Work at Heights)
  - https://vimeo.com/showcase/5939420

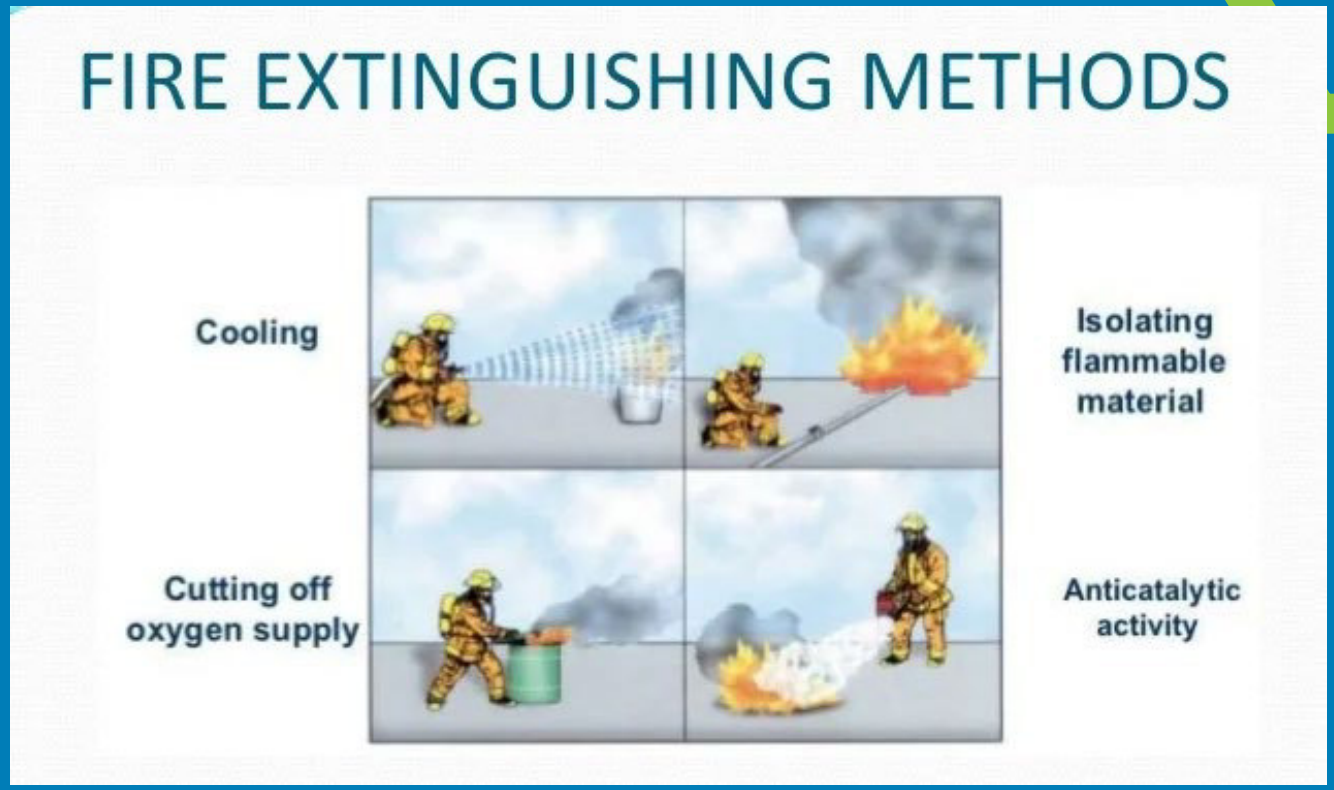
Office Safety - Controls

Office Safety - Controls



Example of Controls for Fire Protection





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

Example of Controls for Fire Protection

Symbols found on fire extinguishers and what they mean. FireArrest	Water	Foam Spray	ABC Powder	Carbon Dioxide	Wet Chemical
Class A Wood, Textiles & Paper	✓	✓	✓	✗	✓
Class B Flammable Liquids	✗	✓	✓	✓	✗
Class C Flammable Gases	✗	✗	✓	✗	✗
Class D Electrical Contact	✗	✗	✓	✓	✗
Class F Cooking Oils and Fats	✗	✗	✗	✗	✓

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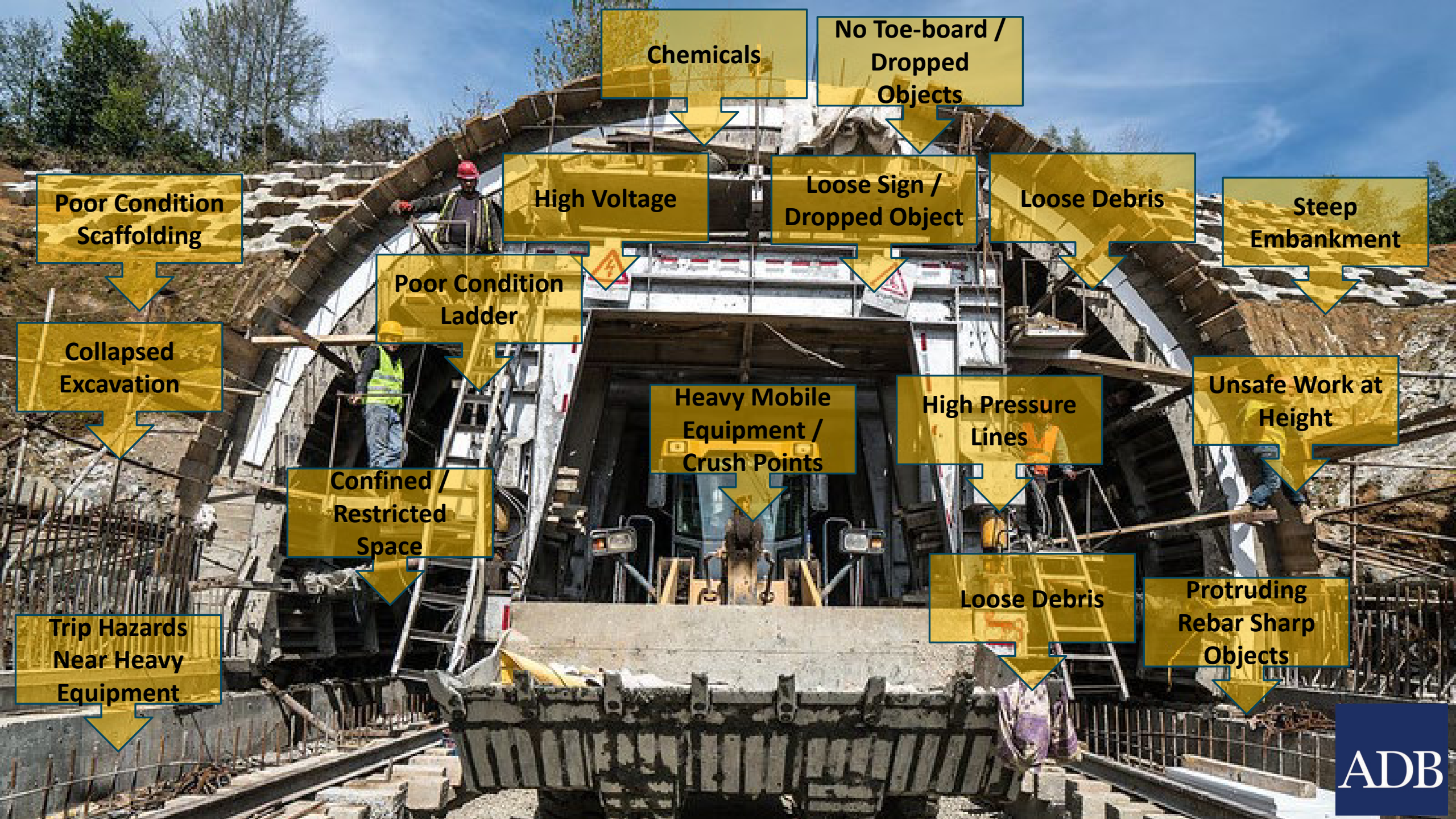
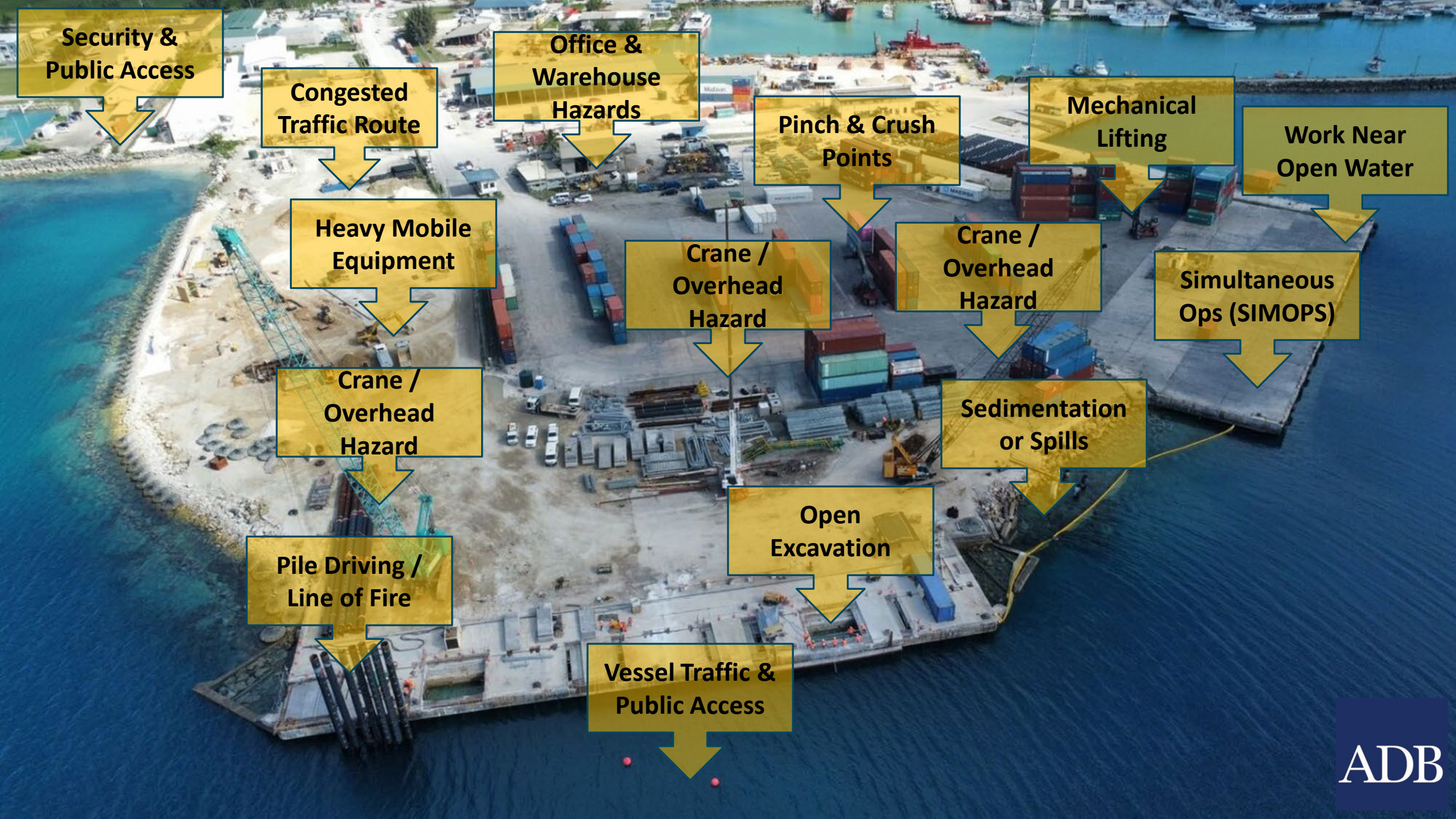
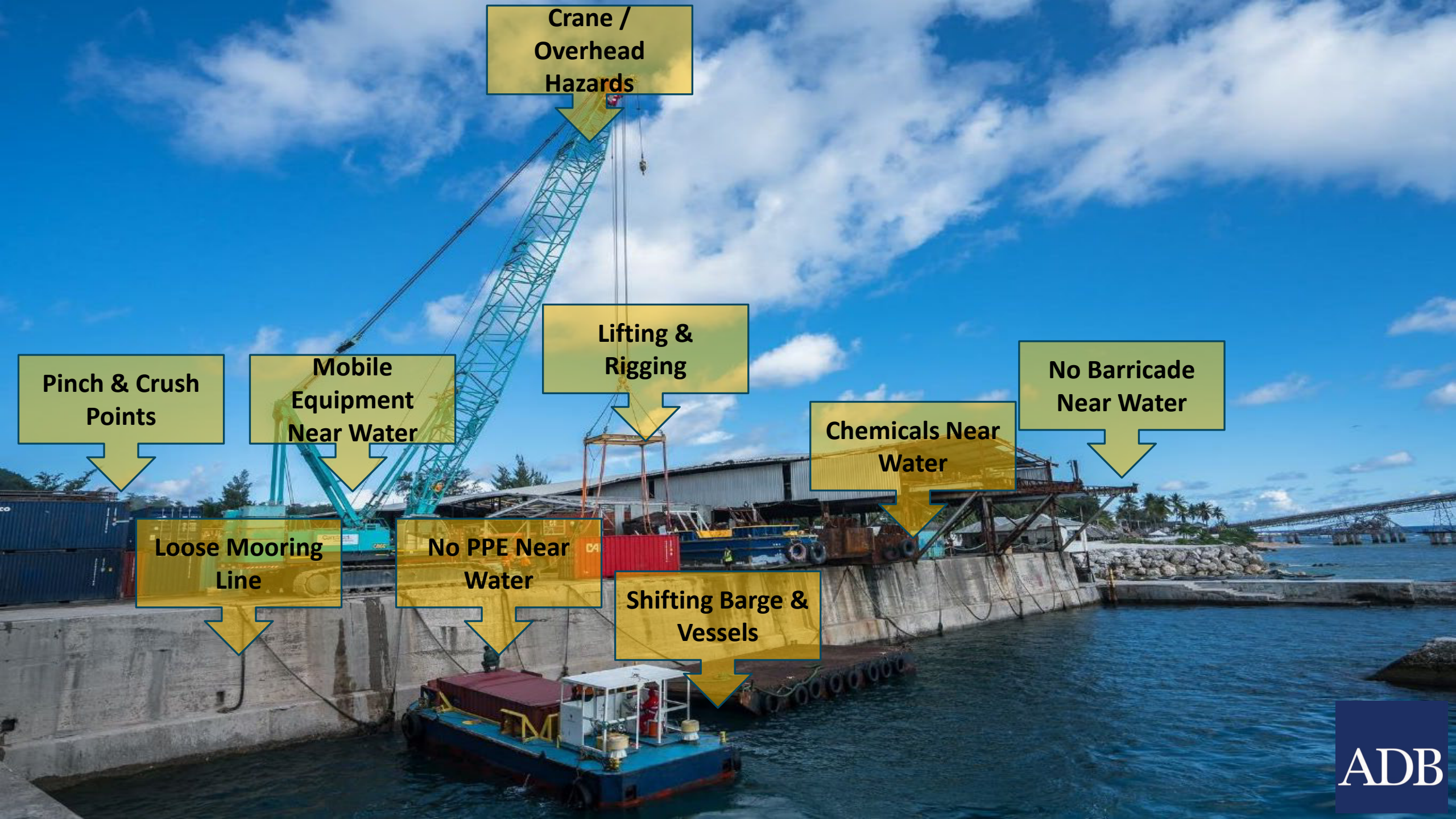
Signage & Barricades


Chemicals
No Toe-board / Dropped Objects
Poor Condition Scaffolding
High Voltage
Loose Sign / Dropped Object
Loose Debris
Steep Embankment
Poor Condition Ladder
Collapsed Excavation
Heavy Mobile Equipment / Crush Points
High Pressure Lines
Unsafe Work at Height
Confined / Restricted Space
Loose Debris
Protruding Rebar Sharp Objects
Trip Hazards Near Heavy Equipment
ADB


Security & Public Access
Congested Traffic Route
Office & Warehouse Hazards
Pinch & Crush Points
Mechanical Lifting
Work Near Open Water
Heavy Mobile Equipment
Crane / Overhead Hazard
Crane / Overhead Hazard
Simultaneous Ops (SIMOPS)
Crane / Overhead Hazard
Sedimentation or Spills
Open Excavation
Pile Driving / Line of Fire
Vessel Traffic & Public Access
ADB

Key H&S Risk
Mobile Plant Interactions

ADB


Crane / Overhead Hazards
Lifting & Rigging
Pinch & Crush Points
Mobile Equipment Near Water
No Barricade Near Water
Chemicals Near Water
Loose Mooring Line
No PPE Near Water
Shifting Barge & Vessels
ADB

Summary

- risk management applies across all sectors
- hierarchy of controls to minimize or eliminate a hazard
- all personnel are responsible for assessing and addressing risks
- this includes the Contractor supply chain !