Risk Revolution: Navigate, Mitigate and Dominate

by

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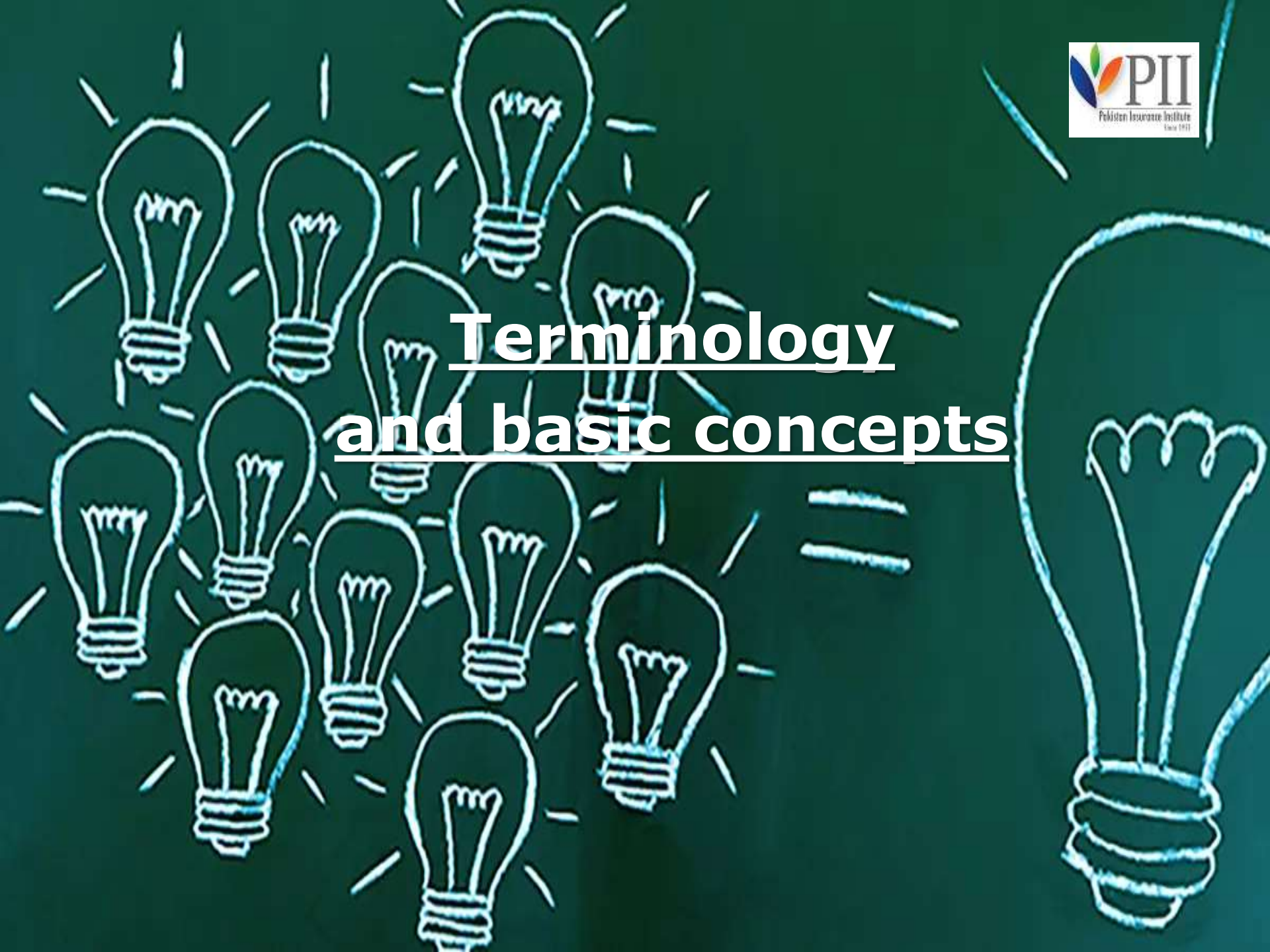


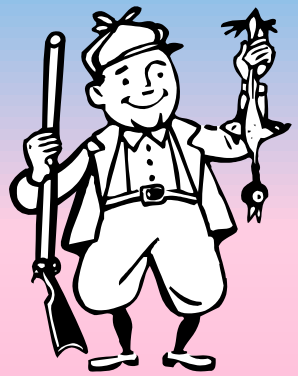
Terminology and basic concepts

Caution!

lay public uses

Hazard, Risk, Peril *and* **Danger**

as synonyms and relates them to safety



Risk

- *risk refers to the possibility that something unpleasant or dangerous might happen.*
- *risk is a condition where there is a possibility of an adverse deviation from a desired outcome.*
- *defined in two dimension: impact and probability*

- Risk = probability * severity

PROBAILITY	SEVERITY
Frequent	Catastrophic
Occasional	Important
Unlikely	Marginal
Very unlikely	Insignificant

Risk Acceptance??

- 1,000 car accidents in a year
- 1,000 train accidents in a year

Peril

Is the prime cause that give rise to the loss, often beyond the control of anyone.

example: storm, fire, theft, motor accident, explosion, flood

Hazard

- *factors (physical or chemical) which may influence the outcome.*
- *the conditions that increase the severity of the loss or the conditions affecting perils*.

- *not themselves cause of loss, but can increase or decrease the effect, in case a peril operates*

- *example - proximity of house to river*
  - use of solvents

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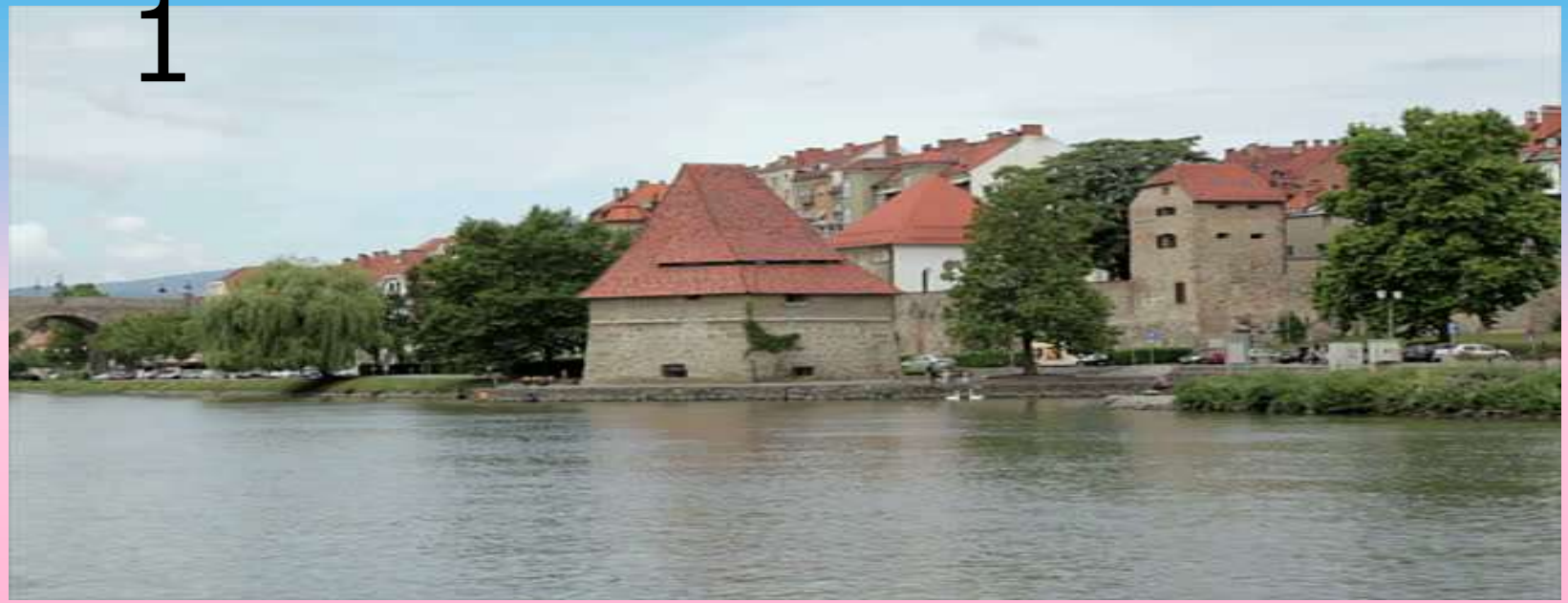

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Types of Hazards

Physical Hazard

- *relates to the physical characteristics of the risk*

  example

  - construction of a building

  - security protection

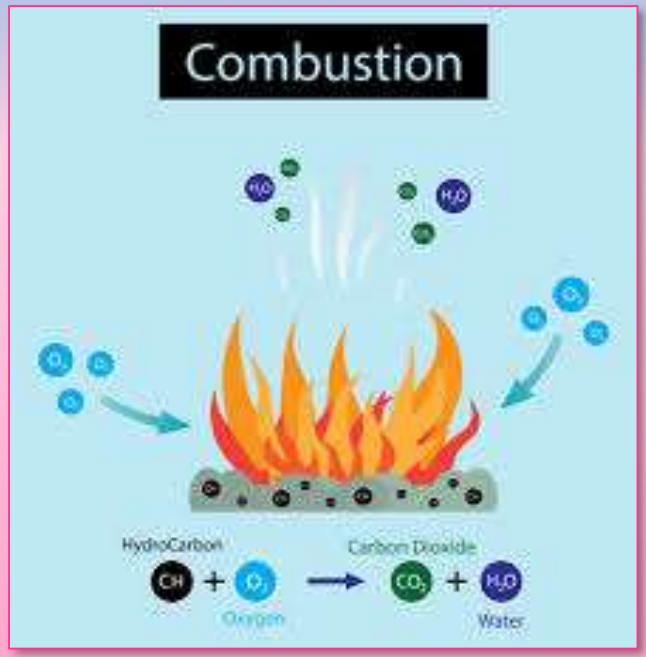
  - proximity to river

Moral Hazard

- *concerns human aspects which may influence outcome.*
- *usually refers to the attitude of the insured person*

Principles (behavior) of Fire

Fire/combustion is a Chemical Reaction (uncontrolled fast oxidation) that involves evolution of light and energy (heat) in significant amount



Fire Triangle

Energy (heat) causes vaporization of fuel in and results in thermal decomposition in presence of Oxygen (Chemical Reaction)

4 basic ways to extinguish fire

- *Physically separating the combustible substance from the flame*
- *Removing or diluting the oxygen supply*
- *Reducing the temperature of the combustible or of the flame*
- *Introducing chemicals that modify the combustible chemistry*

Classes of fire

Class	Combustibles	Examples
A	Charring solids	Wood, paper, fibers, plastics
B	Liquids, melting plastics	Ethanol, gasoline, oils, gasses, patrol
C	Gases	Methane, Propane, Butane, Nitrogen, Ammonia
D	Metals	Magnesium, titanium, Sodium
E	Live electrical equipment	Motors, switches, cables

Extinguishing Agents

Gaseous	Liquid	Dry Chemicals
• CO_2 • Nitrogen • Water stream	• Water • Water with additives • Foam	• AB - Powder • B – Powder • D - Powder

Action of Extinguishing Agents

Extinguishing Agent	Cooling	Block Oxygen	Reduce heat of combustibles	Chemical action with flame
Water	++	+		
Foam	+	++	+	
AB-Powder		+		++
B-Powder				
D-Powder		++		++
CO_2	+	++		

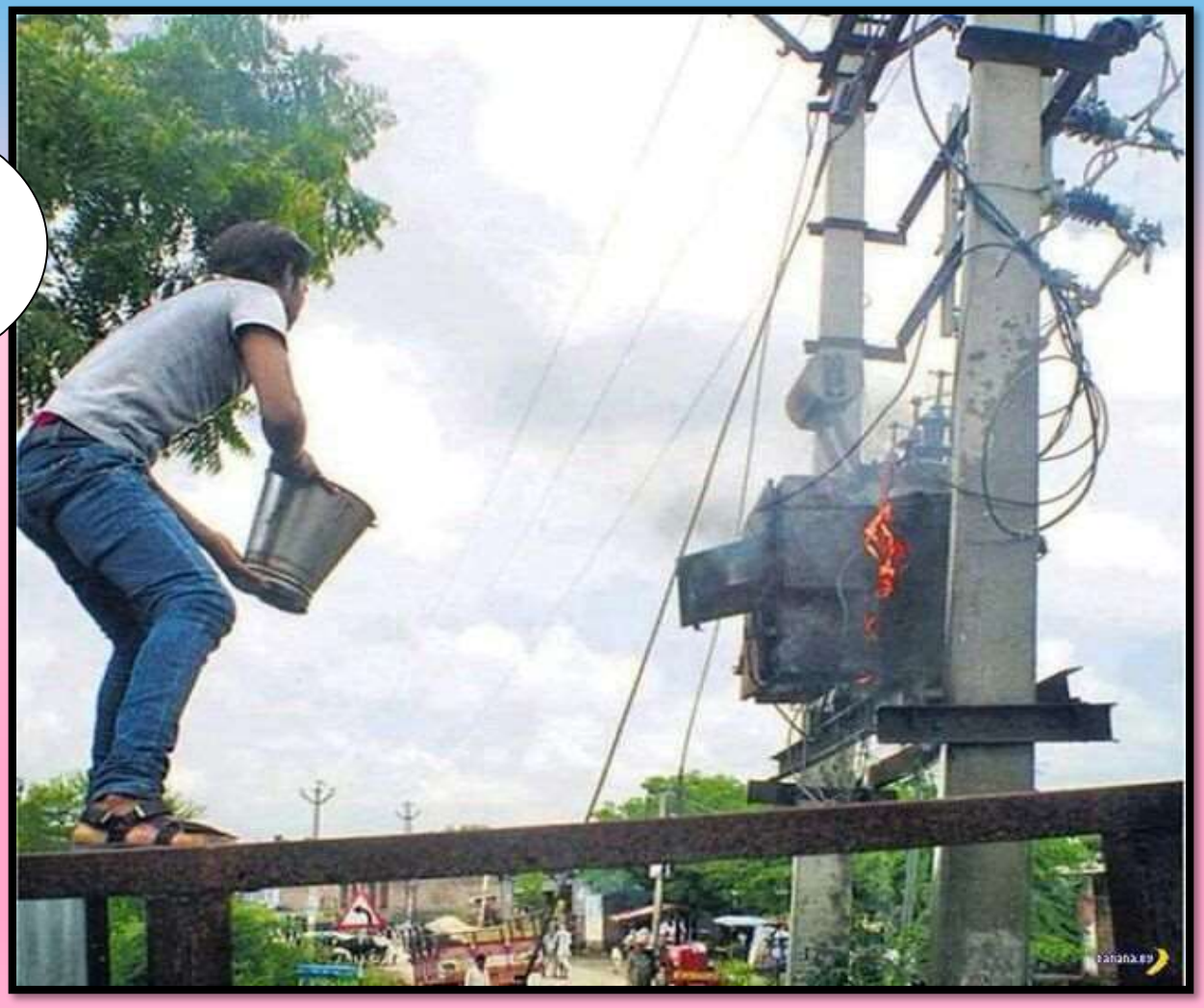
++ main effects **+ secondary effects**

Extinguishing Agents-Effects

Class of Fires	A (solid)	B (liquid)	C (gas)	D (metals)	E (EE)
Water (full jet)	++	-	-	--	-
Water (spray)	++	+/-	+	++	+/-
Foam	+	+	-	--	-
AB-Powder	+	+	+	--	+/-
B-Powder	++	++	--	+	+
D-Powder	-	-	++	-	
CO_2	-	+	+/-	--	++

++ very suitable + suitable +/- limited efficiency - not suitable -- dangerous

Any guess what's wrong !



RISK MANAGEMENT PROCESS

Risk Management - definition

"The identification, analysis and economic control of those risks which can threaten the assets or earning capacity of an enterprise"

Risk Management - process

- *Identify risk*
- *Analyze/ Evaluate risk*
- *Risk Control (Treatment)*
- *Risk Transfer (unacceptable risk)*
- *Regular review*

Risk Identification

- *Identify any activity that may give rise to risk*
- *Determining what the risks are that pose a threat to the company or business that if realized could prevent company from achieving its goals (economic)*

Risk Evaluation

- *To understand relevance of those risks to the individual operation and organization as whole*

- *Both the likely frequency of the risk incident happening and potential severity of the damage*

Risk Mitigation

- *Once identified and analyzed, the organization has many options to mitigate the risk effects:*

  - reduce the risk

    Physical/Non physical controls

  - retain the risk

    not to affect - acceptable

  - transfer the risk

    e.g insurance

Risk Management and Insurance

Risk Management and Insurance

- *Risk transferred to insurance company becomes insurer's risks*

- *Company intend to carry out internal risk management to decide upon risk identification, reduction, retention and transfer…*

Risk Management Policy

- Risk Policy
  - ✓ *defines the conditions of acceptable risks*
- Risk Strategy
  - ✓ *defines how to transfer the unacceptable risks*
- Risk Control
  - ✓ *defines the conditions for control and minimizing the risks*

Risk Identification

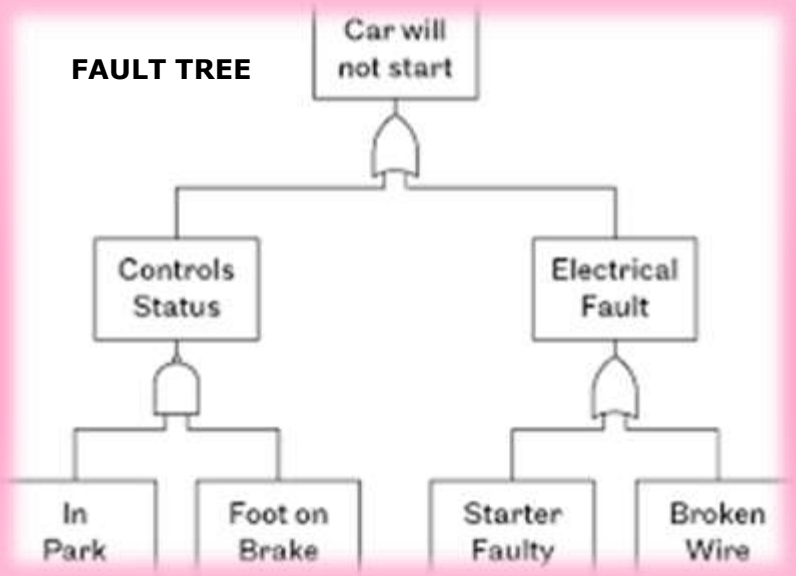
- *Information gathering to be structured with end objective always clear in mind*

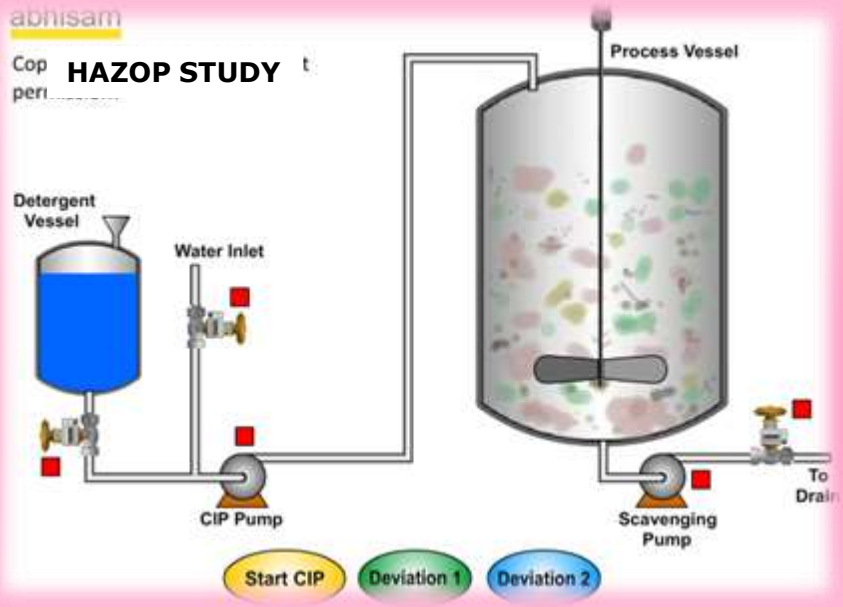
Sources of information

- *Internal*
  (officials, documents, layout, plans etc.)
- *External*
  (consultants, insurers, govt. depts.,)
- *Others*
  (newspapers, associations, internet)

Techniques to identify risk

- *Organizational chart | Flow Chart*
- *Checklist and questionnaires*
- *Physical Surveys | Brainstorming*
- *Fault tree*
- *Hazard & Operability Studies (HAZOP)*





Risk Survey - an effective tool…

- *Risk identification*
- *Risk reduction (RIR)*
- *Underwriting support (fire/property)*
- *Risk retention (EML/MPL/PML)*
- *Risk transfer (reinsurance)*

Risk Survey - advantages

- *Clear and personal picture of risk*
- *Face to face conversations*
- *Other tools like questionnaire and checklist can be used during survey*
- *Survey report conclude with recommendations for improvement risk or reduce impact – dual purpose i.e. identifying and managing*

Risk Survey - disadvantages

- *Survey exposure present and visible on the day of visit*
- *Expensive – time and money*
- *Raise confidence unrealistically*
- *Related third party premises can not be surveyed*
- *Factory Manger may abdicate his responsibility*

Site Engineering Survey

- *Before Site Visit*
  - *Site Information Request*
- *During Site Visit*
  - *Plant Tour*
  - *Interviews with Key Staff*
- *After Site Visit*
  - *Site Report*
  - *Risk Improvement*
- *Conclution*
  - *Estimated Maximum Loss (EML)*
  - *Assessment of Risk*

video

Risk Assessment

Areas of Potential Hazards

- External Exposures
  - *Location*
  - *Earthquake/Tsunami*
  - *Weather (Extreme) Pattern*
  - *Lightning*
  - *Neighbors (Arson/Fire)*
  - *Falling Aircraft*
  - *Sabotage/Terrorism*
  - *Vehicle/Vessel Impact*
  - *Flooding*
  - *Natural Hazards (Rain/Wind Storm etc.)*

Risk Assessment

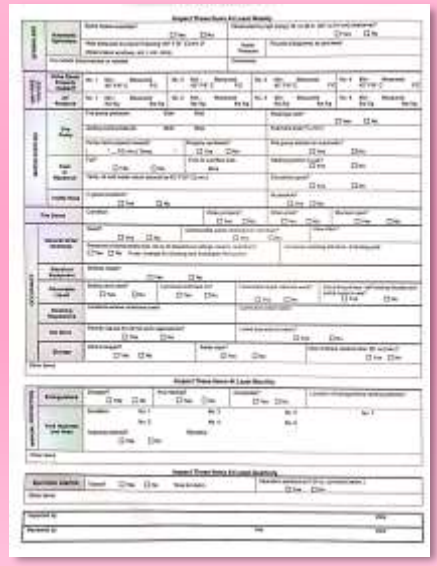
Areas of Potential Hazards

- Management Systems (Internal Exposures)
  - *Operations/Process*
  - *Construction*
  - *Maintenance*
  - *Inspection Procedures*
  - *Engineering*
  - *Safety*
  - *Security*
  - *Housekeeping*
  - *Storage Arrangements*
  - *Pressure Vessels*
  - *Flammable Liquids*

Risk Assessment

Controls

- Plant Protection System
  - *Active Process Protection (Emergency shut down)*
  - *Passive Process Protection (Permit system)*
  - *Active Fire Protection (Automatic Deluge)*
  - *Passive Fire Protection (Fire proof walls/doors)*
  - *Site Protection (Fencing/access control)*



Likelihood	Consequence					
		Insignificant	Minor	Moderate	Major	Severe
	Almost certain	Medium	High	High	Extreme	Extreme
	Likely	Medium	Medium	High	Extreme	Extreme
	Possible	Low	Medium	Medium	High	Extreme
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

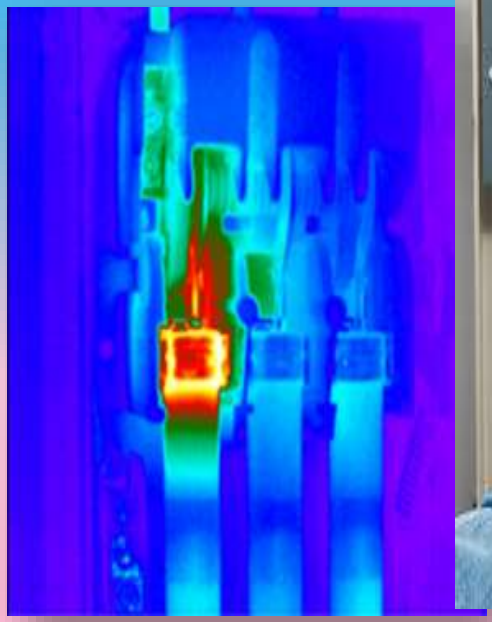
Two variable risk matrix

Risk Improvement Recommendations Examples

Risk level / score	Recommended action
Very High (72 -150)	**Act Now:** Steps must be taken to lower the risk level to as low as reasonably practicable using the hierarchy of risk controls;
High (48 -71)	**Act Today:** Highest management decision is required urgently
Medium (24 – 47)	**Follow management instructions:** The supervisor must review and document the effectiveness of the implemented risk controls.
Low (6 – 23)	**OK for now:** Record and review if any equipment/ people/ materials/ work processes or procedures change. Managed by local documented routine procedures which must include

Risk Improvement Recommendations

- *Objective is to reduce risk of a major incident*
- *Based on insurance company experience of world class*
- *Review progress on previous survey recommendations*
- *Underwriters give credit for progress on recommendations*




No access to unauthorised personnel
Hazardous area
DANGER Chlorine Gas
DANGER Toxic Hazard


Estimation
of
Loss Potential

- **MPL=Maximum Possible Loss***

  The Maximum Possible Loss is that which may occur when the most unfavorable circumstances are more or less exceptionally combines and when, as a consequence, the fire is not or unsatisfactorily fought against and therefore is only stopped by impassable obstacles or by lack of combustible material.

- **EML=Estimated Maximum Loss***

  The extent of the fire likely to occur in the normal conditions of activity, occupancy and fire-fighting of the range of buildings concerned. Unusual circumstances (accidental or extraordinary) likely to modify the circumstances of the risk are left out.

➢ **MPL/EML are insurance technical terms.**
Loss Potential is measured in <u>monetary terms</u>

** Swiss Re*

Maximum Loss

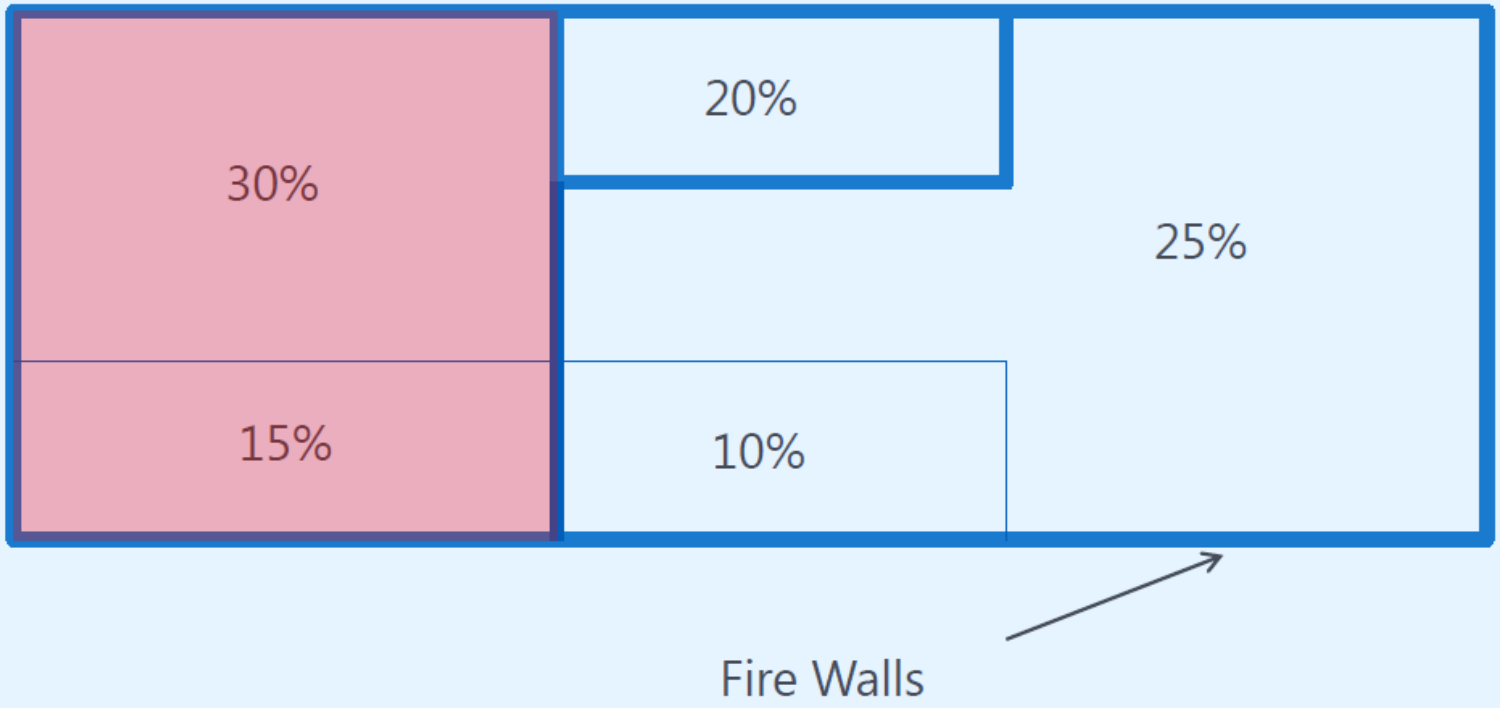
Plant Value Distribution

- *Passive Fire Wall Protection Around Some Areas*
- *Smoke Detection Installed in Ceiling of All Areas*
- *Water Sprinkler System Installed in All Buildings*

Maximum Probable Loss (MPL)

Fire Protection Systems

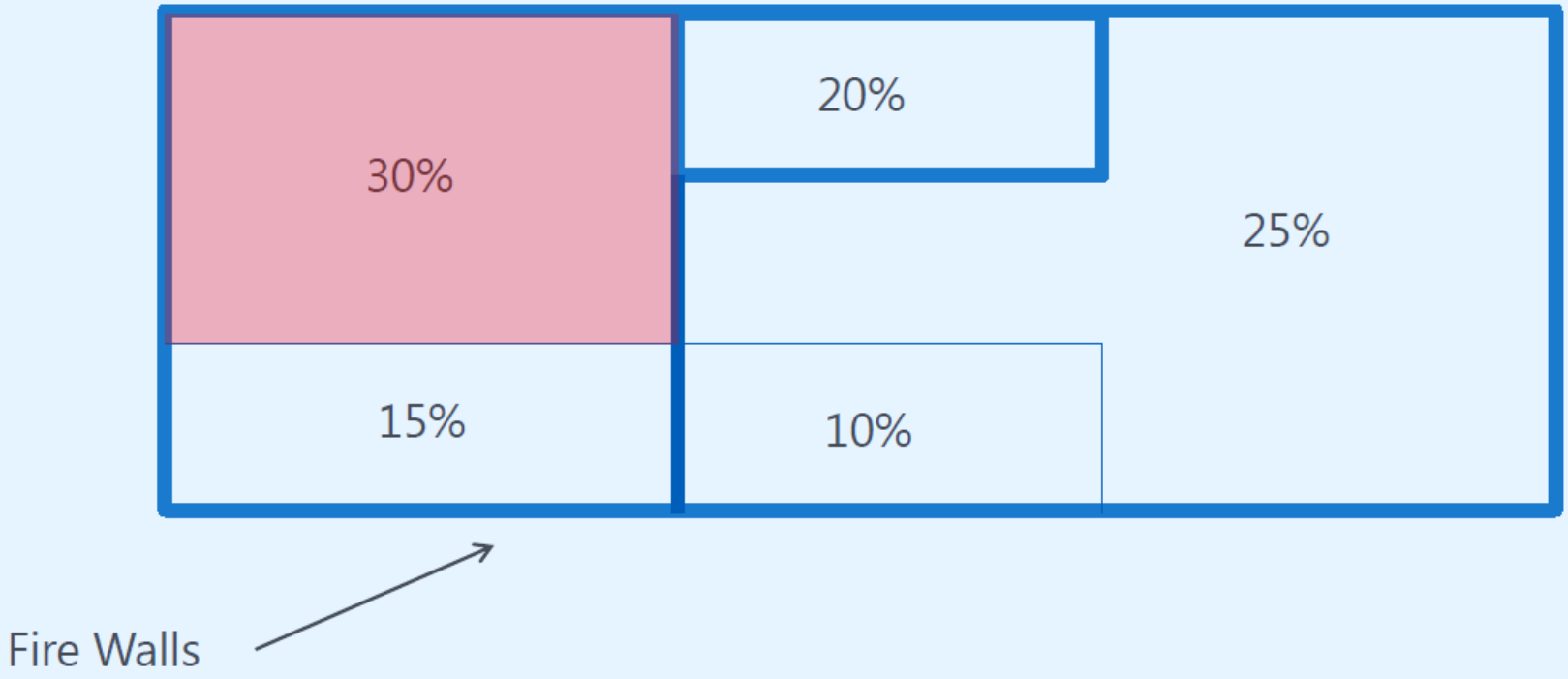
- *Smoke Detection and Water Sprinkler Systems fail to operate*
- *Only fire protection is Passive Fire Wall*
- *Fire spreads throughout largest unprotected area*
- *Results in loss of 45% of Total Value*



Estimated Maximum Loss (EML)

Fire Protection Systems

- *Smoke Detection and Water Sprinkler Systems operate effectively minimizing fire damage*
- *Fire limited to area with single largest value*
- *Result in loss of 30% of Total Value*

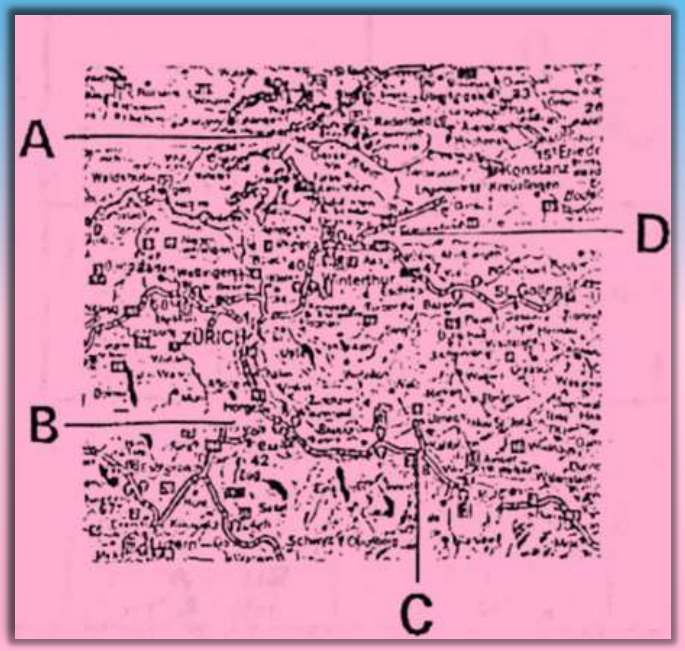


Difference between underwriting based on the Sum Insured (SI), MPL and EML basis

- *SI basis capacity is not fully utilized.*
- *Not attractive for fire risks*
- *MPL basis of underwriting provide more capacity*
- *The insurer should have expertise in determining MPL*

1. *Example (various locations):*

- *The K-Group owns operating units, which are all included in one policy, but spread across various locations:*



Locations	Sum Insured (millions US$)	MPL (millions US$)	EML (millions US$)
A	30	20	10
B	20	8	4
C	10	3	2
D	40	25	5
TSI	100		

Assuming insurer has capacity of US$ 5m.

SI Basis

TSI = US$ 100m

Underwriting Capacity = US$5m

Written Lines = 5% of TSI

MPL Basis

TSI = US$ 100m

MPL = 25% (highest)

Underwriting Capacity = US$ 5m (MPL basis)

Written Lines = 5/25% = 20% of TSI

EML Basis

TSI = US$ 100m

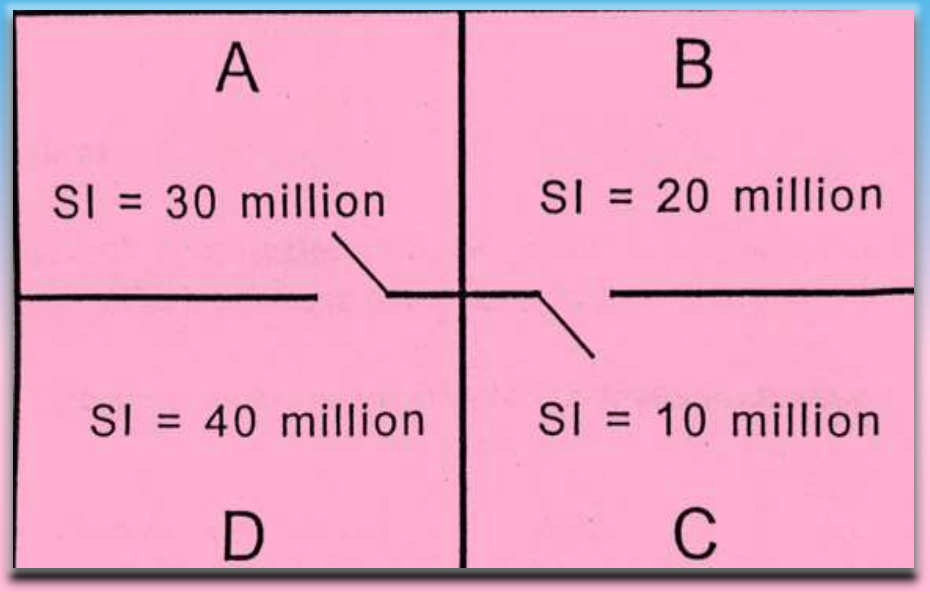
EML = 10% (highest)

Underwriting Capacity = US$ 5m (EML basis)

Written Lines = 5/10% = 50% of TSI

2. *Example (segregation):*

- *The K-Group moves into a single building complex. Facilities A & D are perfectly separated from B & C (MPL separation). Units A & D and units B & C are fitted with fire proof doors (EML separation):*



Risks	Sum Insured (millions US$)	MPL (millions US$)	EML (millions US$)
A	30	45	10
D	40		5
B	20	11	4
C	10		2
TSI	100		

Assuming insurer has capacity of US$ 5m.

SI Basis

TSI = US$ 100m

Underwriting Capacity = US$5m

Written Lines = 5% of TSI

MPL Basis

TSI = US$ 100m

MPL = 45% (highest)

Underwriting Capacity = US$ 5m (MPL basis)

Written Lines = 5/45% = 11.11% of TSI

EML Basis

TSI = US$ 100m

EML = 10% (highest)

Underwriting Capacity = US$ 5m (EML basis)

Written Lines = 5/10% = 50% of TSI


Q
&
A


THANK YOU