RISK AND OPPORTUNITY —MANAGING RISK FOR PROJECT DEVELOPMENT

BY

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ALUMNI

EXECUTIVE

CAREER

OBJECTIVES OF THIS SECTION

- Introduce the concept of risk assessment and risk management Vis a vis opportunity.

- Emerging safety and security Risk in the Work Place.

- Understand the principles and practices of Enterprise Risk /project risk management
- - Identify and analyze project risks using various techniques
- - Develop effective risk response strategies and plans
- - Monitor and control project risks to ensure successful delivery

- HEMP/HAZOP/etc--------- A holistic approach to managing risk

- Innovation and Strategic framework

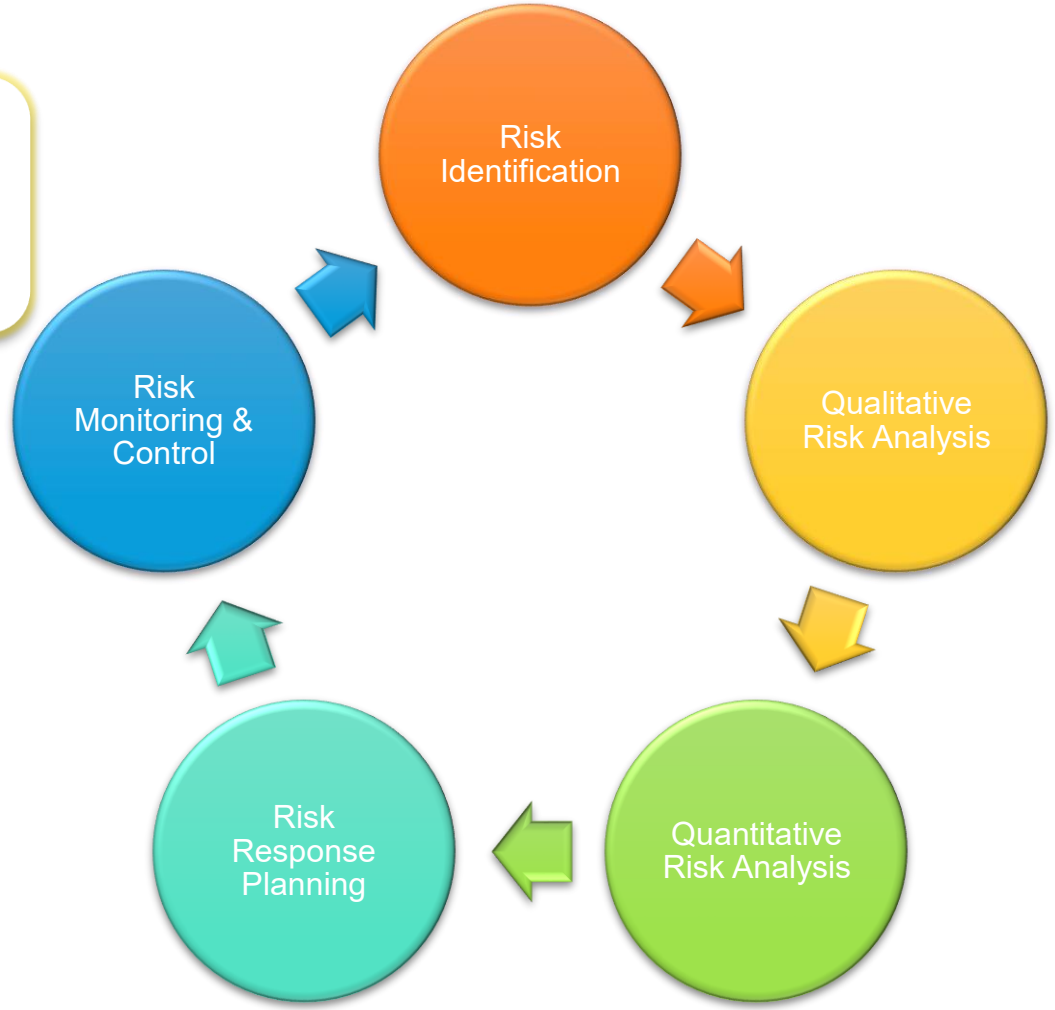
- Case studies.


“Risk is like fire:
If controlled it will help you;
if uncontrolled it will rise up
and destroy you.”
— Theodore Roosevelt

PRINCIPALS OF RISK MANAGEMENT

Risk Management can be defined as:

The eradication or minimization of the adverse effects of risks to which an organization is exposed.



The Risk Management Process

The potential to cause harm. Harm including ill health and injury, damage to property, plant products or the environment, production losses or increased liabilities.

Hazard

Risk

The likelihood that a specified undesired event will occur due to the realization of a hazard by, or during work activities or by the products and services created by work activities.

ENTERPRISE RISK MANAGEMENT FRAMEWORK

Risk Assessment Parameters

Impact	Likelihood	Control Effectiveness
This is the potential or actual effect (Financial or Non Financial) on the business unit should the risk crystallize. Impact Scale: 5. Catastrophic 4. Major 3. Moderate 2. Minor 1. Insignificant	The probability that the risk may occur in the near future. Likelihood scale: 5. Almost Certain 4. Likely 3. Possible 2. Unlikely 1. Rare	Control effectiveness describes the effectiveness of the existing controls related to the identified risk. Control Effectiveness Scale: 5. Excellent 4. Good 3. Fair 2. Poor 1. Very Poor

Combination of Risk Impact and Likelihood Parameters for Risk Ratings.

Almost Certain	5					
Likely	4					
Possible	3					
Unlikely	2					
Rare	1					
		1	2	3	4	5
		Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**

SUMMARY OF TOP RISKS AFFECTING BUSINESS

What are the top risks which can undermine our business model?

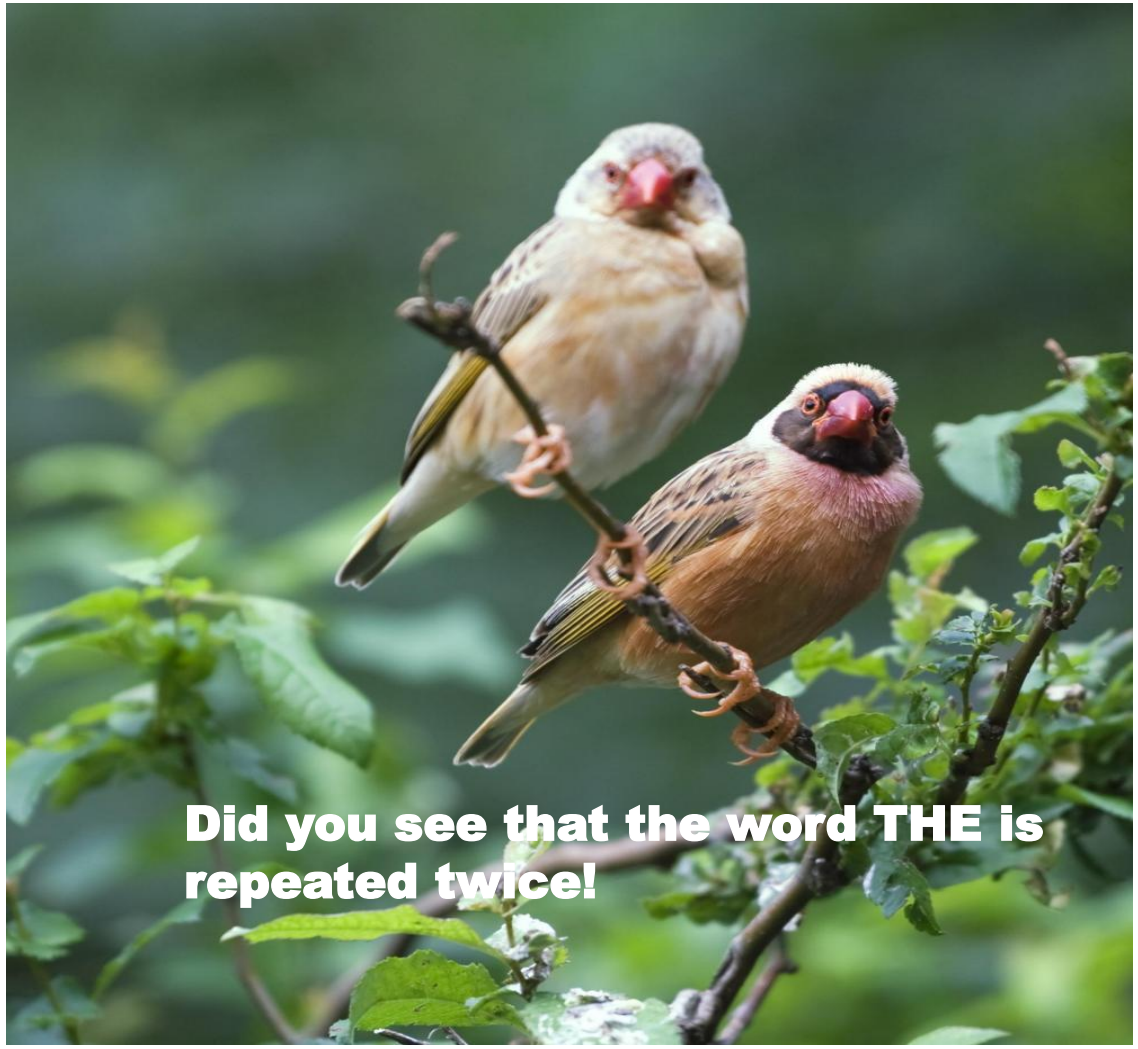
- Credit
- Process
- Insurance
- Exploration
- People
- Capital Availability
- Strategy and Business Model
- Legal and Contract Management
- Niger Delta Unrest
- Macroeconomic
- Liquidity
- Health, Safety, Security and Environment
- Regulation and Regulatory Compliance
- Project Execution and Monitoring
- Sociopolitical
- Relationship Management
- Impairment of Assets
- Reputation
- Supply Chain Management
- Derivative Usage
- Insecurity in the Northeast.
- Multiplicity of regulations and Tax Regime

Key enablers of effective risk oversight

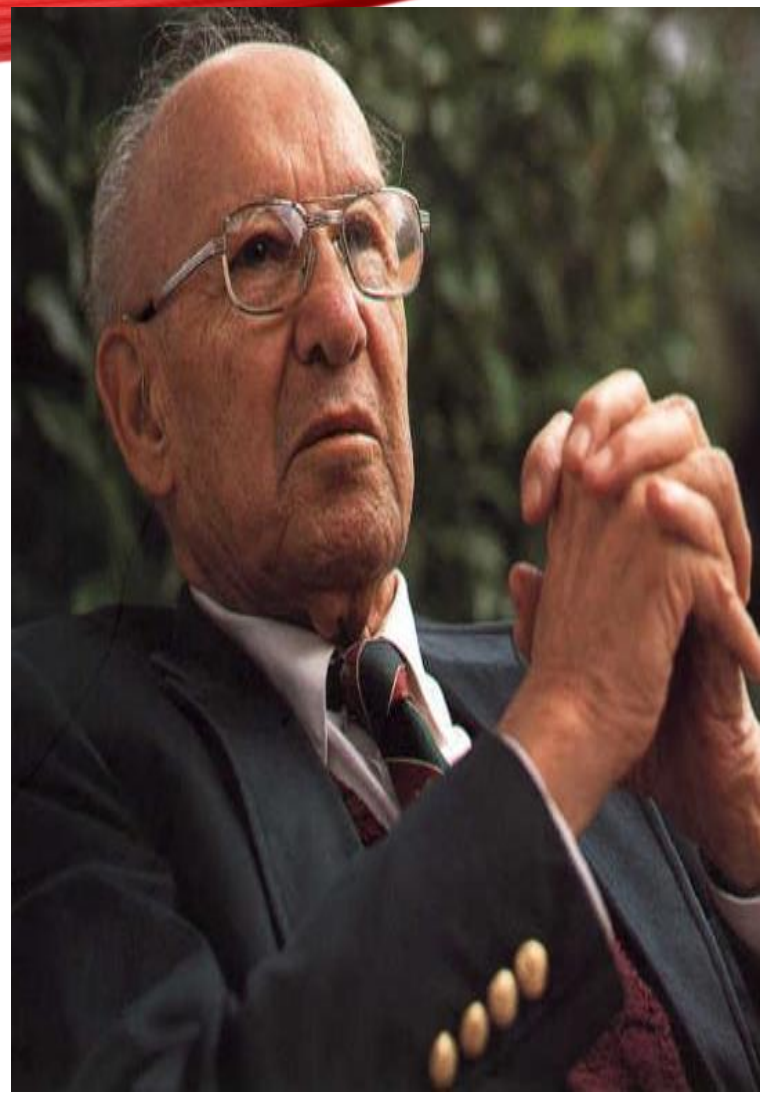
- Clarity on risk appetite
- Robust information and reporting architecture
- Risk management policy statement

More than likely you said, "A bird in the bush," and……..

Read out loud the text inside the triangle below



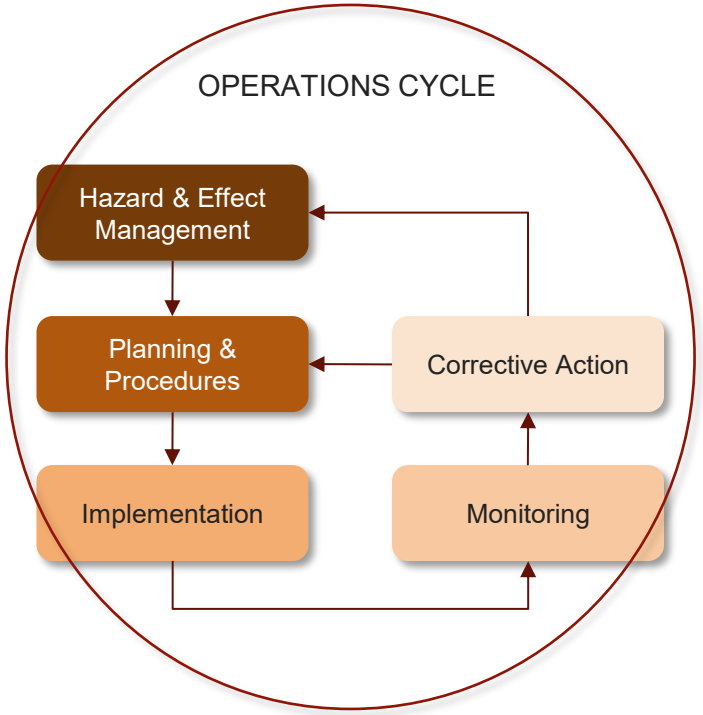
Business Survival



Peter F. Drucker

The first duty of business is survival, and the guiding principle of business economics is avoidance of loss - not maximisation of profit

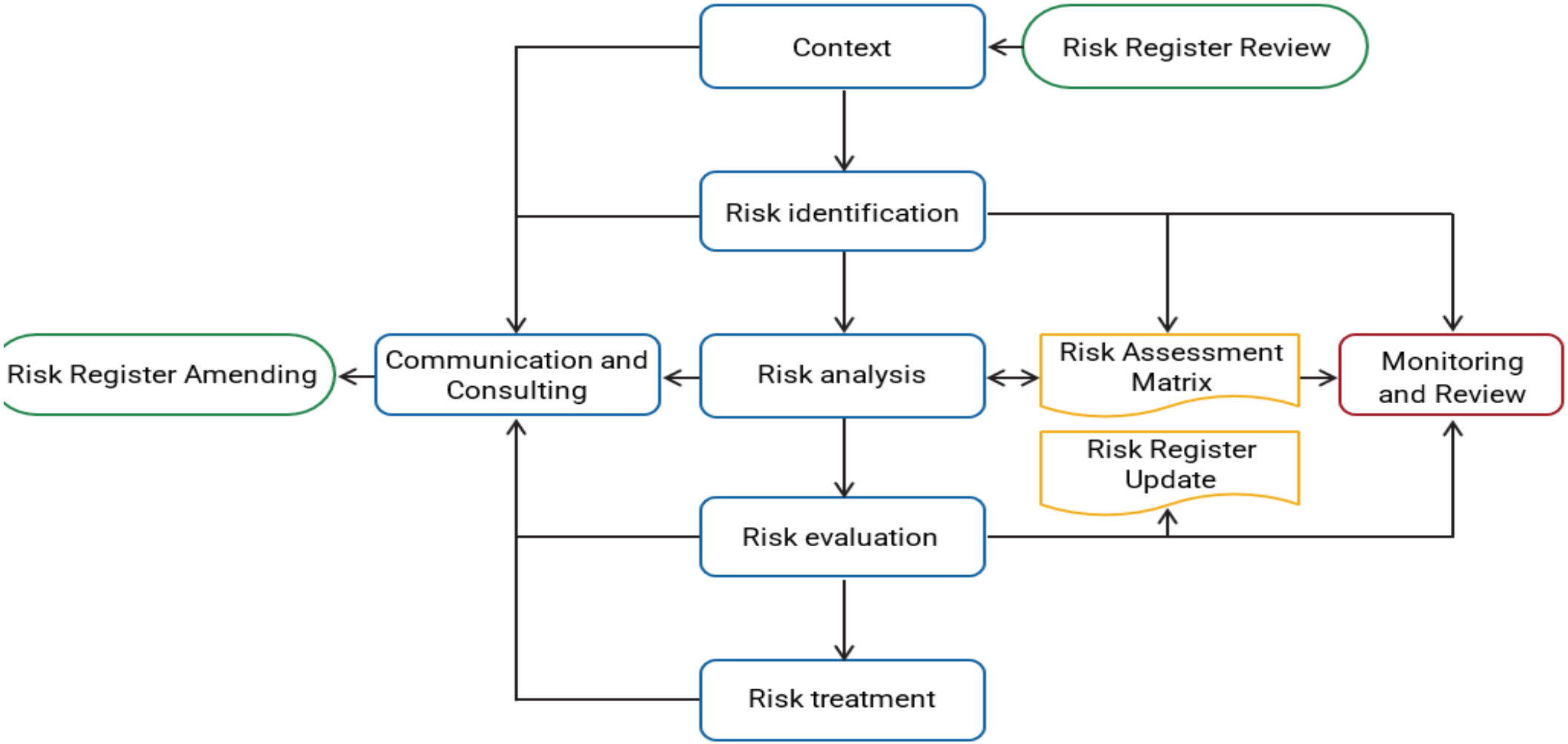
INNOVATION AND STRATEGIC FRAMEWORK



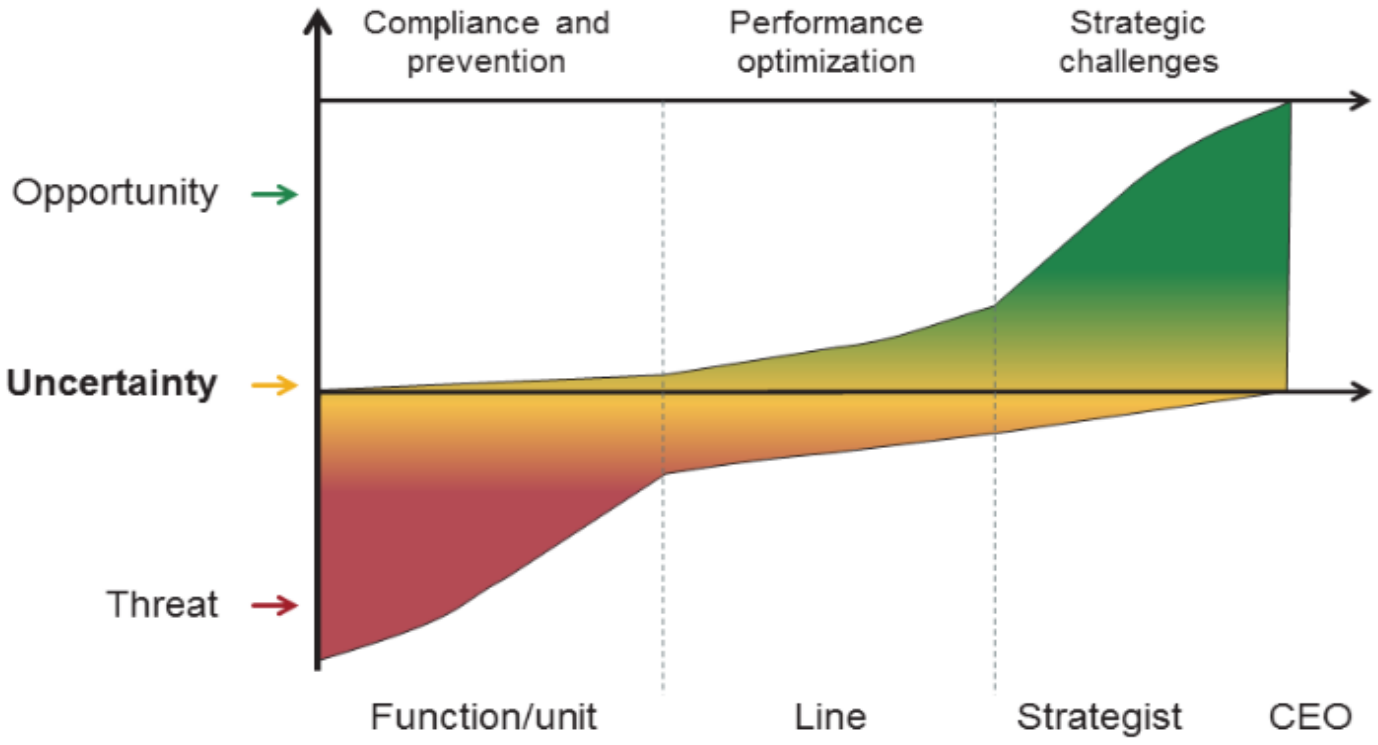
CULTURE

The Bedrock of any Transformation

RISK MANAGEMENT SUMMARY



Risk Perception in the Organization



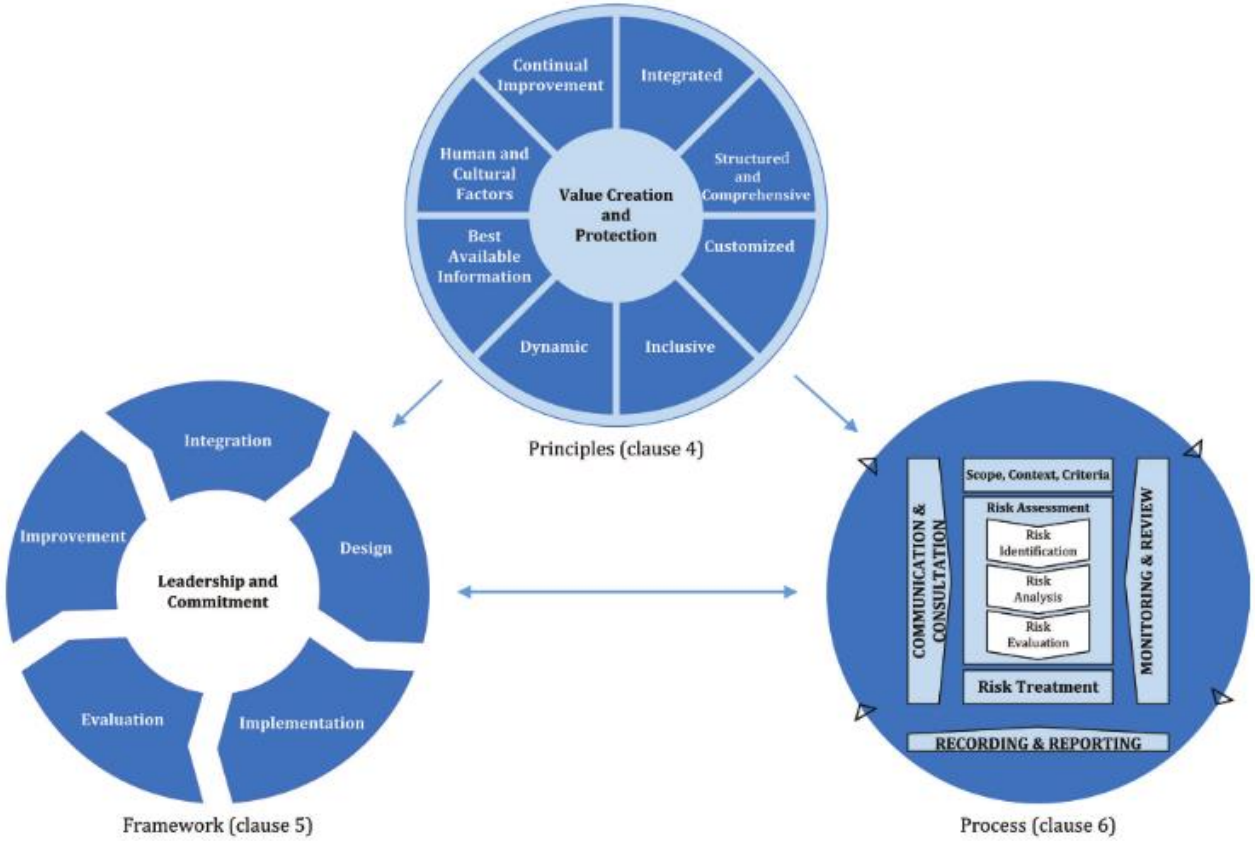


Figure 1 — Principles, framework and process

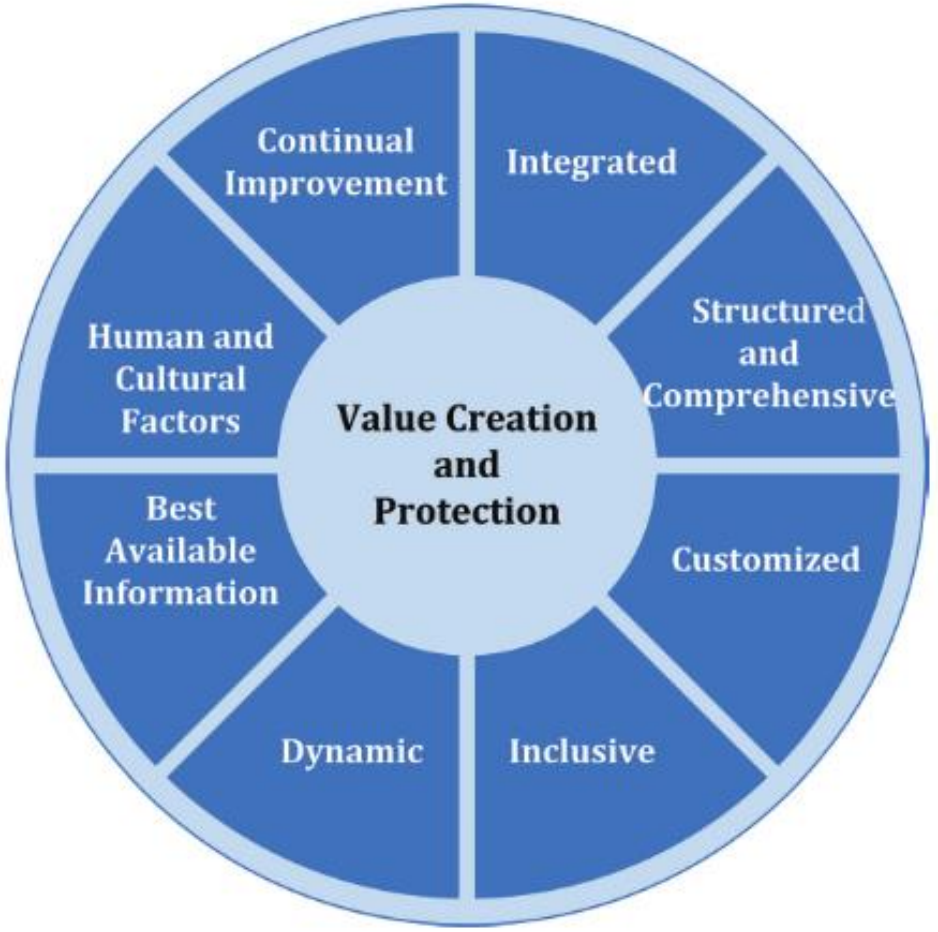


Figure 2 — Principles

PRINCIPLES

Effective risk management requires the elements of Figure 2 and can be further explained as follows.

a) Integrated

Risk management is an integral part of all organizational activities.

b) Structured and comprehensive

A structured and comprehensive approach to risk management contributes to consistent and comparable results.

c) Customized

The risk management framework and process are customized and proportionate to the organization's external and internal context related to its objectives.

d) Inclusive

Appropriate and timely involvement of stakeholders enables their knowledge, views and perceptions to be considered. This results in improved awareness and informed risk management.

e) Dynamic

Risks can emerge, change or disappear as an organization's external and internal context changes. Risk management anticipates, detects, acknowledges and responds to those changes and events in an appropriate and timely manner.

f) Best available information

The inputs to risk management are based on historical and current information, as well as on future expectations. Risk management explicitly takes into account any limitations and uncertainties associated with such information and expectations. Information should be timely, clear and available to relevant stakeholders.

FRAMEWORK

Figure 3 — Framework

PROCESS

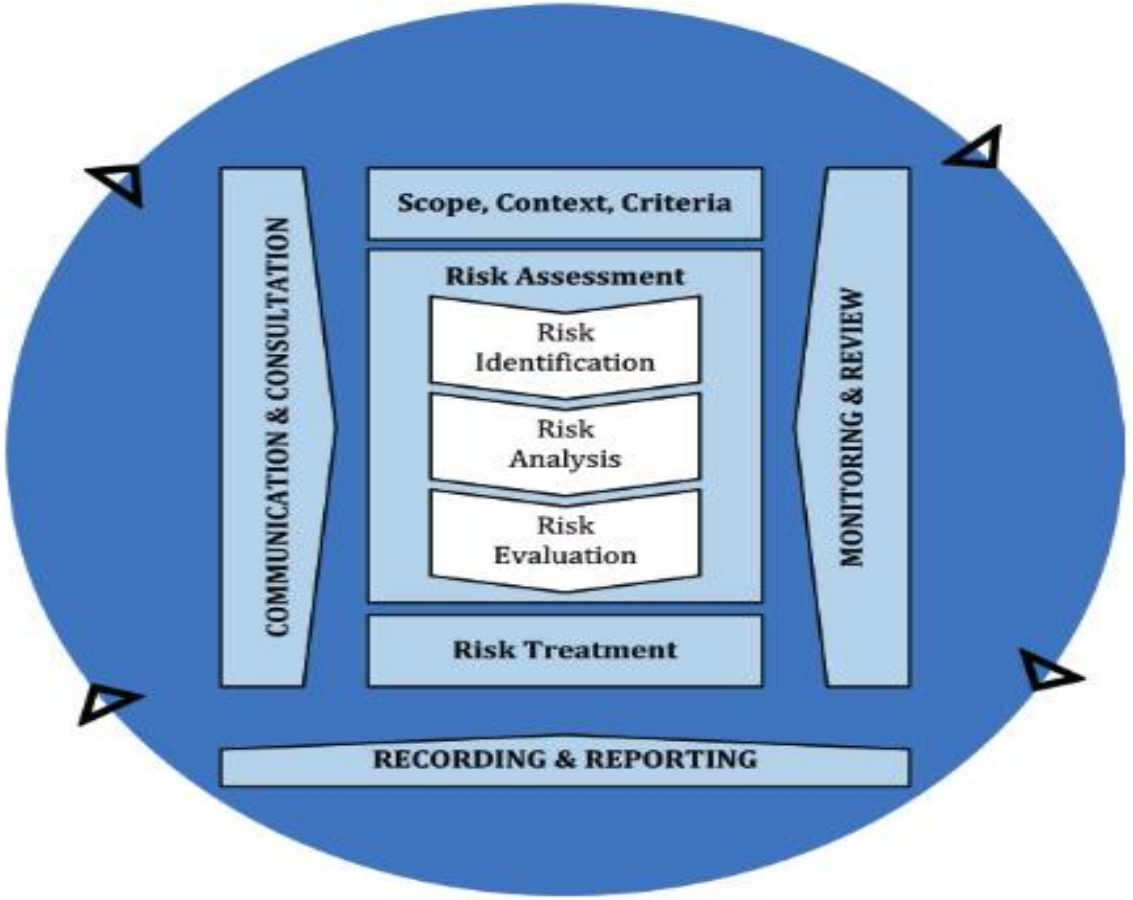


Figure 4 — Process

The Economic and Human Impact of Natural Disasters

UNISDR data from 2005 to 2014

$1.4 trillion

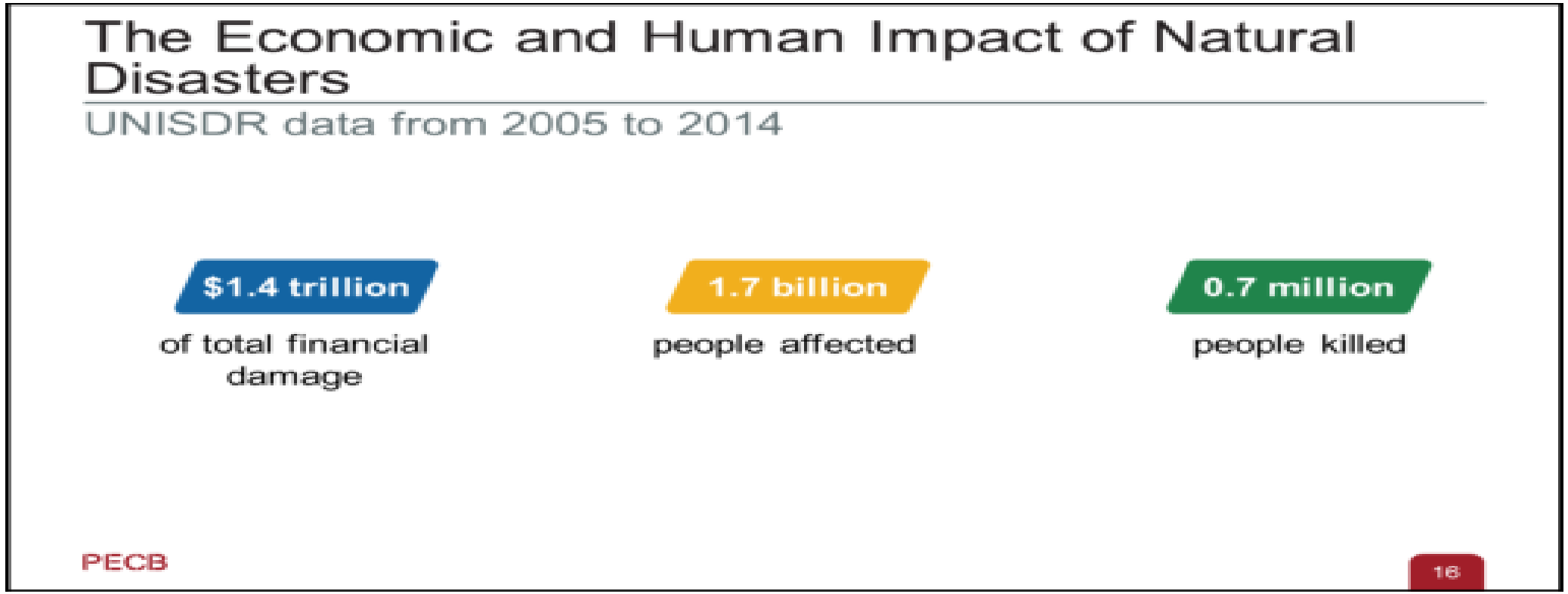
of total financial damage

1.7 billion

people affected

0.7 million

people killed



Risks can stem from a wide variety of sources. The data on the slide represent the economic and human impact of risks associated with natural disasters (i.e., floods, earthquakes, volcanic eruptions, hurricanes). Nonetheless, the training course aims to also tackle the impact of political risks, cultural risks, financial risks, etc.

Even though we cannot stop natural disasters from occurring, we can, however, assess, manage, and treat risks associated with such phenomena and therefore better manage their impact and lessen the financial burden.

Source: The United Nations Office for Disaster Risk Reduction. "The Economic and Human Impact of Disasters in the last 10 years." Accessed November 6, 2019. https://www.unisdr.org/we/inform/disaster-statistics

The Economic and Human Impact of Natural Disasters

Damages incurred by countries

- According to the United Nations Office for Disaster Risk Reduction (UNISDR), during the period from 2005 to 2014, China has faced the greatest number of disasters — 286 of them, totaling to over $265 billion in damages.
- The United States has had fewer disasters during the same period, but incurred the largest financial damage — $443 billion.
- Japan, on the other hand, although having far fewer disasters, its economic loss was almost as big as that of China's — $239 billion.

These figures (the financial damages) point out to asset values, risk assessment, risk management, and treatment. Whether done properly or not, it remains to be seen while we dive more in-depth to the topic of risk management.

Source: The United Nations Office for Disaster Risk Reduction. "The Economic and Human Impact of Disasters in the last 10 years." Accessed November 6, 2019. https://www.unisdr.org/we/inform/disaster-statistics

The Wells Fargo Case

- Wells Fargo was fined $100 million by the Consumer Financial Protection Bureau (CFPB) for the "widespread illegal practice of secretly opening unauthorized accounts." The bureau also required that Wells Fargo pay refunds to customers and hire an independent consultant to review their procedures.
- This example shows that risk can be found across sectors and that close attention must be paid to properly manage it in order not to incur such financial, human, and reputational losses.

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In addition, Wells Fargo incurred costs from refunds and lawsuits:

- $6.1 million in customer refunds due to inappropriate fees and charges
- $142 million in customer compensation due to a class-action settlement
- $480 million settlement for a shareholder class-action lawsuit
- $575 million 50-state Attorneys General (AG) settlement for a combination of opening unauthorized accounts and charging for unnecessary auto insurance and mortgage fees

Source: Consumer Financial Protection Bureau. "Consumer Financial Protection Bureau Fines Wells Fargo $100 Million for Widespread Illegal Practice of Secretly Opening Unauthorized Accounts." September 8, 2016. Accessed November 7, 2019. https://www.consumerfinance.gov/about-us/newsroom/consumer-financial-protection-bureau-fines-wells-fargo-100-million-widespread-illegal-practice-secretly-opening-unauthorized-accounts/

The Yucca Mountain Case

In 1987, the US government chose the Yucca Mountain in the state of Nevada as an appropriate nuclear waste depository.

The decision was strongly opposed by the locals since it would lead to water pollution and other safety and technical issues. Eventually, the plan failed.

Ever since the first attempts to build the site began in 1987, few administration changes occurred, the site is still not operational, and its future remains uncertain. It has cost taxpayers over $13 billion so far.

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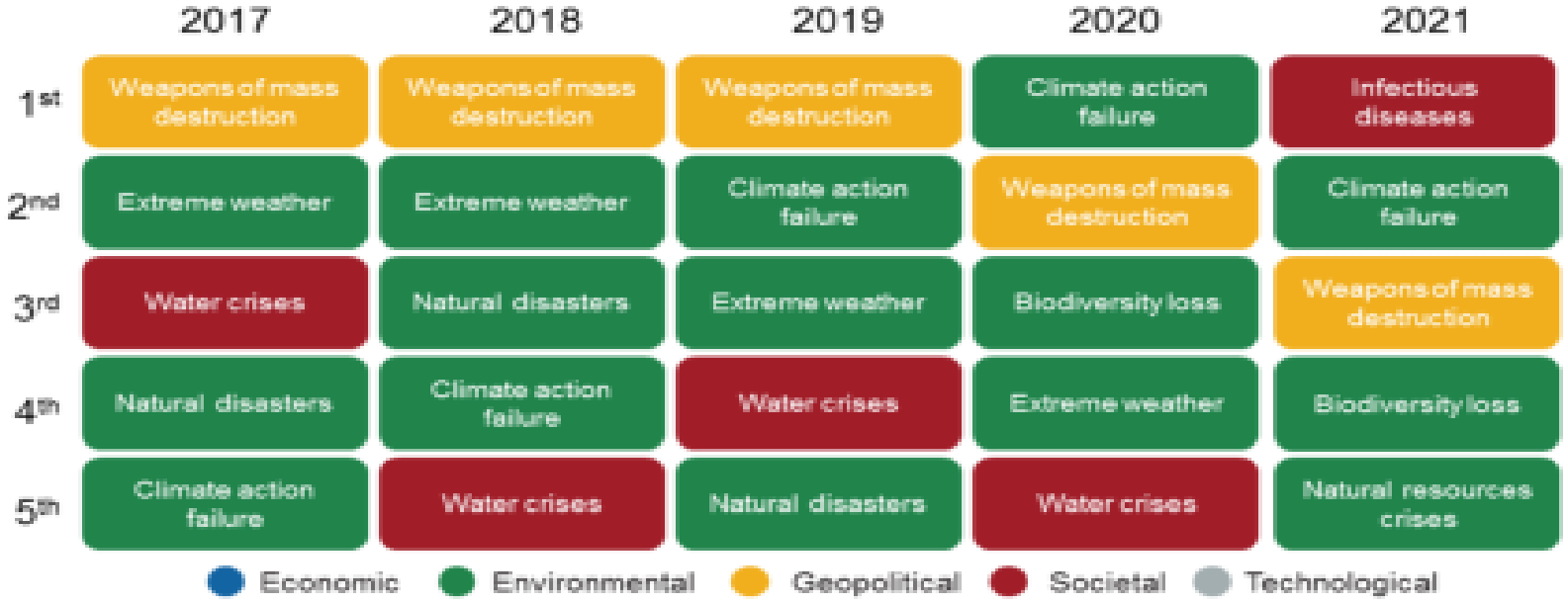
This is a case of governmental failure to properly assess the potential risks that such a decision could entail. The figures show clearly what losses can be incurred when risks are not managed properly or at all.

Source: Stephenson, Emily. "Q+A: Yucca Mountain nuclear waste controversy." *Reuters*, June 2, 2011. Accessed November 8, 2019. https://www.reuters.com/article/us-usa-nuclear-yucca-factbox/qa-yucca-mountain-nuclear-waste-controversy-idUSTRE7512TD20110602

Source: World Economic Forum. "The Global Risks Report 2021." Accessed May 19, 2021.

The Evolving Risk Landscape 2017–2021 (Cont'd)

Top five global risks in terms of impact



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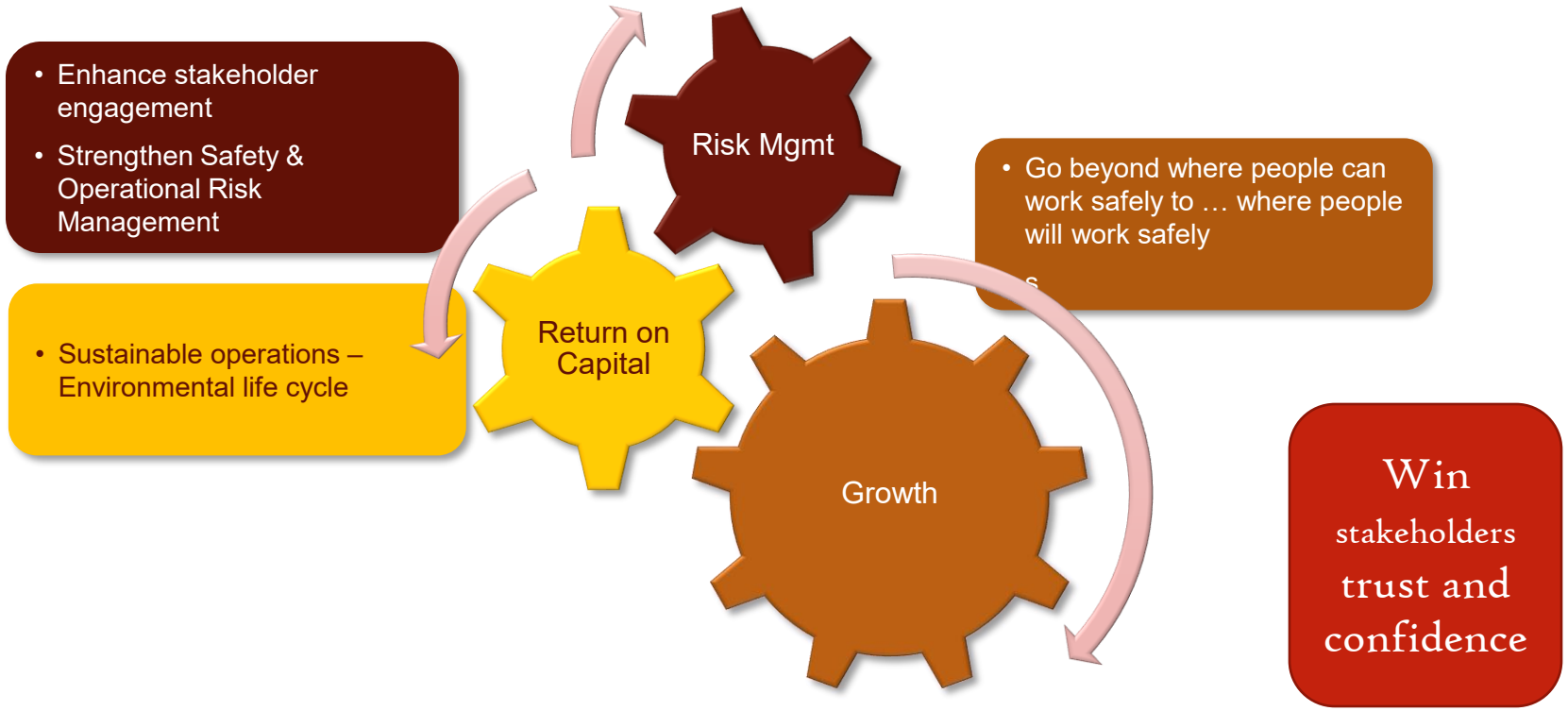
Source: World Economic Forum. "The Global Risks Report 2021." Accessed May 19, 2021.

STRATEGIC FRAMEWORK[26] . . . CULTURE . . . A KEY TO WIN

INSTITUTE THE CULTURE

Pathological → Reactive → Calculative → Proactive → Generative

FRAMEWORK FOR RESULTS



Risk and Consequence

Examples of links

Risk	Consequence
Theft of equipment	Monetary losses
Social unrest	Market uncertainty, financial losses
Unethical behavior from personnel	Lawsuits, reputational damage
Hacker	Information theft
Bad weather	Bad crops

The following is a list of several potential consequences that may affect the organization:

1. Financial losses
2. Loss of an asset or its value
3. Loss of customers or suppliers
4. Prosecution and penalties
5. Loss of competitive advantage
6. Loss of effectiveness or efficiency
7. Service interruption
8. Inability to provide a service
9. Loss of brand image, reputation, or credibility
10. Disruption of operations
11. Disruption of operations of external stakeholders (suppliers, customers, etc.)
12. Violation of laws or regulations or inability to fulfill legal obligations
13. Inability to meet contractual obligations

Criteria for Identifying Consequences

Organizations should identify the operational consequences of incident scenarios in terms of:

- The time lost (working time)
- The time needed to investigate the incident and repair the damage
- The financial cost to repair the damage
- The lost opportunities
- The health and safety of stakeholders
- The damage to reputation

Expressing the Magnitude of Consequences

Examples of negative consequences

			Consequence				
Scope	**Measure**	**Scenario**	Very high (a)	High (b)	Moderate (c)	Low (d)	Very low (e)
Reputation	Employee commitment	Key personnel turnover	20%	14%	7%	4%	2%
Occupational health and safety	Work safety	Workplace incidents	Casualty	More than one major wound	More than one minor wound	Minor wound	Local physical damage only

Expressing the Magnitude of Consequences

Examples of positive consequences

			Consequence				
Scope	**Measure**	**Scenario**	Very high (a)	High (b)	Moderate (c)	Low (d)	Very low (e)
Customers	Retail customer growth	New customers and retention of existing customers	+18%	12-18%	6-12%	3-6%	1.5-3%
Reputation	Public relations	New marketing campaign in social media	More than 10M views on social media	More than 5M views on social media	More than 2M views on social media	More than 1M views on social media	Less than 1M views on social media

Assessing the Consequences — Factors to Be Considered

ISO/IEC 27005, Annex B.3

Immediate (operational) impact is either direct or indirect.

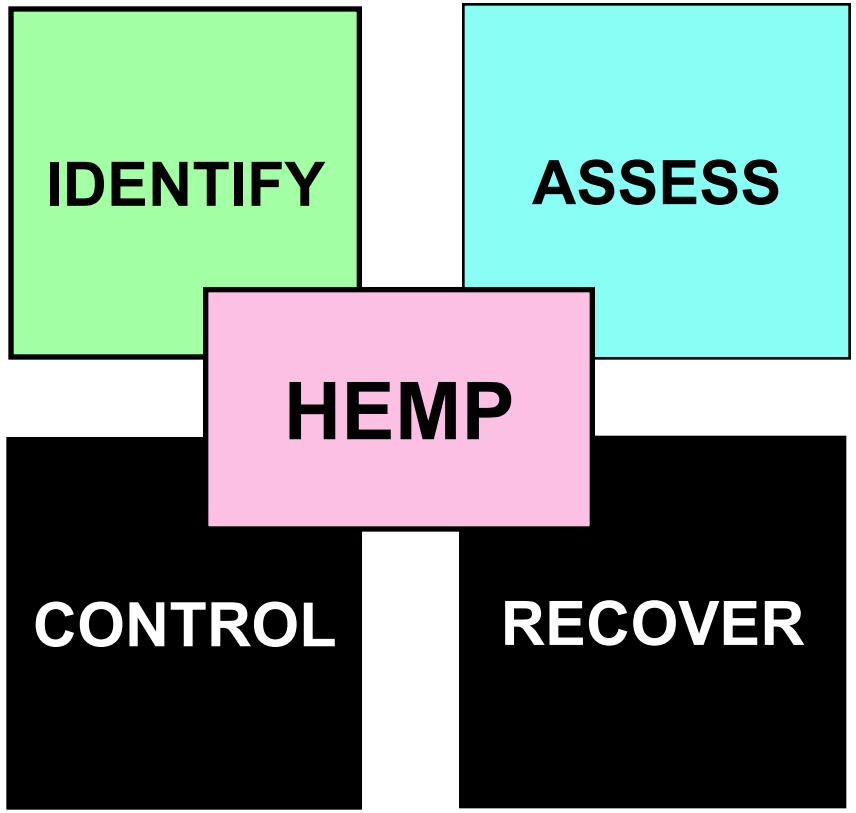
Direct

a) the financial replacement value of lost (part of) asset;
b) the cost of acquisition, configuration and installation of the new asset or back-up;
c) the cost of suspended operations due to the incident until the service provided by the asset(s) is restored;
d) impact results in an information security breach.

Indirect

a) opportunity cost (financial resources needed to replace or repair an asset would have been used elsewhere);
b) the cost of interrupted operations;
c) potential misuse of information obtained through a security breach;
d) violation of statutory or regulatory obligations; and
e) violation of ethical codes of conduct.

HAZARD AND EFFECTS MANAGEMENT PROCESS



THE 5 STEPS OF RISK ASSESSMENT

1. Identify the hazards.
2. Identify the people who might be harmed.
3. Evaluate the risk.
4. Record your findings.
5. Review the assessment as required.

Step 1:
Identify the Hazards

STEP 1: IDENTIFY THE HAZARDS

- Hazards can be categorised by type:
  - Physical.
  - Chemical.
  - Ergonomic.
  - Biological.
  - Psychological.
- Hazards could be identified by:
  - Inspections.
  - Accident/ill-health records.
  - Guidance documents/manuals.
  - Involvement of others.

CLASSIFY WORK ACTIVITIES

Possible ways of classifying work activities include:

- Geographical areas within/outside the organisation's premises.
- Stages in the production process, or in the provision of a service.
- Planned and reactive work.
- Defined tasks (e.g. driving).

IDENTIFY HAZARDS

Broad categories of hazard

To help with the process of identifying hazards it is useful to categorise hazards in different ways, for example by topic, e.g.:

- Mechanical.
- Electrical.
- Radiation.
- Substances.
- Fire and explosion.

HAZARD PROMPT LIST

During work activities could the following hazards exist?

- Slips/falls on the level.
- Falls of persons from heights.
- Falls of tools, materials, etc., from heights.
- Inadequate headroom.
- Hazards associated with manual lifting/handling of tools, materials, etc..
- Hazards from plant and machinery associated with assembly, commissioning, operation, maintenance, modification, repair and dismantling.

HAZARD PROMPT LIST

- Vehicle hazards, covering both site transport, and travel by road.
- Fire and explosion.
- Violence to staff.
- Substances that may be inhaled.
- Substances or agents that may damage the eye.
- Substances that may cause harm by coming into contact with, or being absorbed through, the skin.
- Substances that may cause harm by being ingested (i.e., entering the body via the mouth).
- Harmful energies (e.g., electricity, radiation, noise, vibration).

HAZARD PROMPT LIST

- Work-related upper limb disorders resulting from frequently repeated tasks.
- Inadequate thermal environment, e.g. too hot.
- Lighting levels.
- Slippery, uneven ground/surfaces.
- Inadequate guard rails or hand rails on stairs.
- Contractors' activities.

STEP 2:
IDENTIFY WHO MIGHT BE HARMED

- Which groups of people are at risk?
- Are certain groups especially at risk?
  - Young people.
  - New or expectant mothers.
  - People with disabilities.
  - People who work alone.
  - New starters and temps.

If so, record who they are.

STEP 3: EVALUATE THE RISK

What is risk?

A measure of the **likelihood** of harm occurring and the **severity** of that harm.

STEP 3: EVALUATE THE RISK

- Risk is a combination of two factors:
  - Likelihood.
  - Severity.
- The risk evaluation can be:
  - Qualitative, e.g. acceptable/unacceptable.
  - Quantitative.

STEP 3: EVALUATE THE RISK

Using a scoring system:

Likelihood:			Severity:	
Almost certain	= 3		Fatality/disabling	= 3
Likely	= 2	**x = ?**	Three day injury	= 2
Very low	= 1		Minor injury	= 1

1 = trivial risk 9 = high risk

STEP 3: EVALUATE THE RISK

- What is the **likelihood** of harm occurring?
- What is the **severity** of the foreseeable harm?
- Consider the controls already in place but also consider the possibility of failure.

STEP 3: EVALUATE THE RISK:

Existing Controls

- Safe working procedures.
- Checks and inspections.
- Training, instruction and information.
- Signs and alarms.
- Housekeeping.
- Supervision.
- Specialist assessments.
- Personal protective equipment (PPE).
- Planned preventative maintenance and testing.
- Environmental controls:
  - Light.
  - Temperature.
- Guards/barriers.

STEP 3: EVALUATE THE RISK:

What Does the Law Require?

- Sometimes there are very clear regulations and codes of practice to be met.

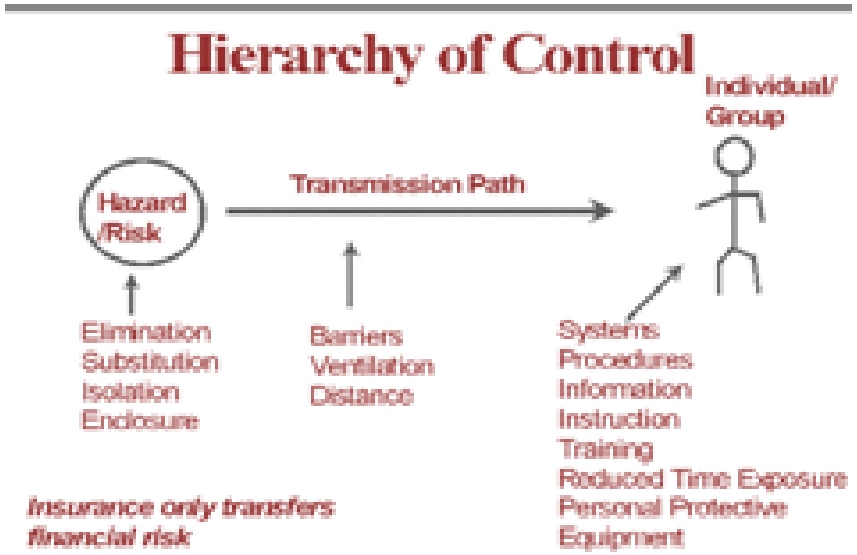
- Often there is no set standard in law – "reasonable practicability" applies.

"PRINCIPLES OF PREVENTION"

- Avoid risk.
- Evaluate where cannot avoid.
- Combat risk at source.
- Adapt work to the individual.
- Adapt to technical progress.
- Substitute.
- Develop coherent overall policy.
- Prioritise collective, protective measures over individual protective measures.
- Instructions.

Evaluation of Risk & Control Measures

E	Eliminate
R	Reduce
I	Isolate
C	Control
P	PPE
D	Discipline



ERIC - Prevents Death

STEP 3: EVALUATE THE RISK:

Further Action?

The Hierarchy of Control:

- Eliminate the hazard - *most effective*.
- Reduce the hazard.
- Isolate the hazard from people.
- Control the extent of exposure/contact.
- Personal protective equipment.
- Discipline (SSWs, information, training, supervision, enforcement) - *less effective*.

Remember ***ERIC Prevents Death!***

STEP 4: RECORD YOUR FINDINGS

Record:

- The significant hazards.
- The existing controls.
- Those at risk and those especially at risk.
- Further actions necessary.

QUALITATIVE RISK ASSESSMENT

Qualitative or Subjective Risk Assessment

- Very straight forward process based on judgment

- Requires no specialist skills or complicated techniques

STEP 4: RECORD YOUR FINDINGS

Risk Assessment Record	Likelihood Very Likely 3	Severity Major injury 3	**Dept.**				**Assessors:** **Date:**
	Likely 2 Unlikely 1	Lost time 2 Minor 1	**Area or Task:**				**Review date:**
Hazard	Who might be harmed?	Existing Controls		L	S	Risk Rating (LxS)	What further action is required?

STEP 5: REVIEW OF ASSESSMENT

- Assessments must be reviewed if:
  - There is reason to suspect it is no longer valid.
  - There has been significant change.
- It is best practice to review assessments periodically.

CONTROLS

- Engineering Controls
  - Guarding solutions
  - Local exhaustion ventilation
  - Use of low voltage tools – RCD's
  - Use absorption material to reduce noise
- Administration Controls
  - Reduced time exposure
  - Water based substance instead of solvent
  - Purchase 25kilo bags not 40kilos
  - Have cool water machines piped to mains through a filter, don't use bottles

RISK ASSESSMENT MATRIX AND RISK REGISTER

Risk consequence severity

Consequence type	Minor	Serious	Severe	Major	Catastrophic
Financial loss	<$1m	$1m – $5m	$5m – $10m	>$10m	Bankruptcy
Reputation loss					

Likelihood probability and frequency

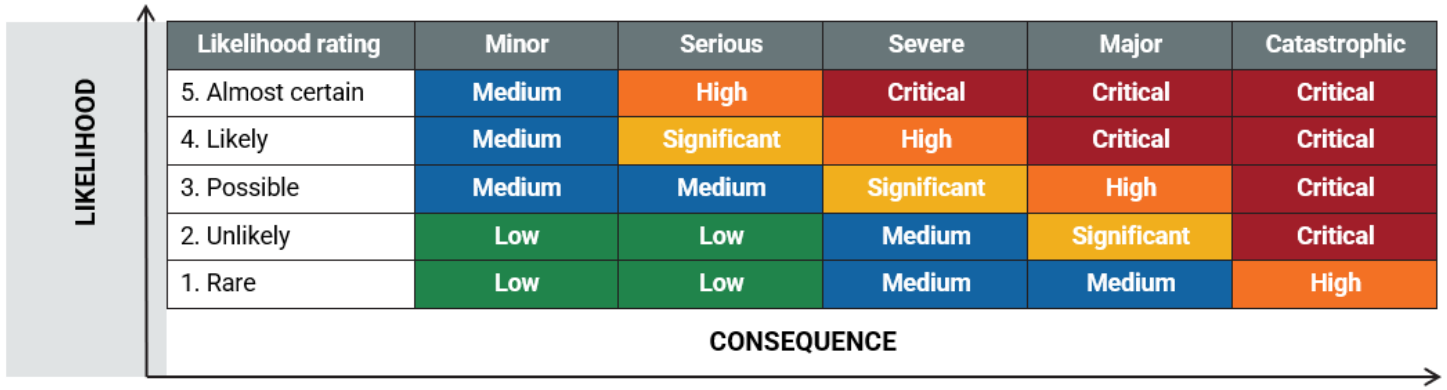
Likelihood rating	Description	Probability
Almost certain	Known to happen often	> 95%
Likely	Could easily happen	50% - 95%
Possible	Could happen and has happened before	15% - 50%
Unlikely	Has not happened yet but can happen	5% - 15%
Rare	Conceivable, but only under extreme circumstances	> 5%

CONTROL EFFECTIVENESS

Control effectiveness

Control effectiveness	Description
Effective	The control design meets the control objective and the control is operating during most of the time.
Partially effective	The control design mostly meets the control objective or the control is normally operational. Nevertheless, it is occasionally not applied when it should be or as it is intended.
Ineffective	The control design does not meet the control objective or the control is not properly applied.

Risk Assessment Matrix



Likelihood rating	Minor	Serious	Severe	Major	Catastrophic
5. Almost certain	Medium	High	Critical	Critical	Critical
4. Likely	Medium	Significant	High	Critical	Critical
3. Possible	Medium	Medium	Significant	High	Critical
2. Unlikely	Low	Low	Medium	Significant	Critical
1. Rare	Low	Low	Medium	Medium	High

Critical	Extreme risk — detailed research and management planning required at senior levels
High	High risk — immediate senior management attention needed
Significant	Significant risk — senior management attention needed
Medium	Moderate risk — management responsibility must be specified
Low	Low risk — managed by routine procedures

Risk register

No	Risk	Owner	Consequence	Likelihood	Inherent Risk Level	Controls	Control Effectiveness
	Risk Area						
1.	**Risk name and description**						

RISK ASSESSMENT MATRIX TOOL

	Consequence				Likelihood					
	People	**Assets**	**Environ - ment**	**Reputation**	**A** Never heard of in industry	**B** H eard of in industry	**C** Incident has occurred in our Company	**D** Happens several times per year in our Company	**E** Happens more than once per year per location	**Risk**
0	No injury / Health effect	No damage	No effect	No impact						
1	Slight injury Health effect First aid /MTC	Slight damage	Slight effect	S light impact						**L o w**
2	Minor injury Health effect LTI	Minor damage	Minor effect	L imited impact						**M e d**
3	Major injury Health effect PPD / Occ .ill	Local ised damage	Localised effect	C onsiderable impact						
4	PTD or 1 -3 fatalities	Major damage	Major effect	National impact						**H i g h**
5	Multiple fatalities >3	Extensive damage	Massive effect	International impact						

Low = Manage for continual improvement

Medium Risk = Incorporate in risk reduction programme

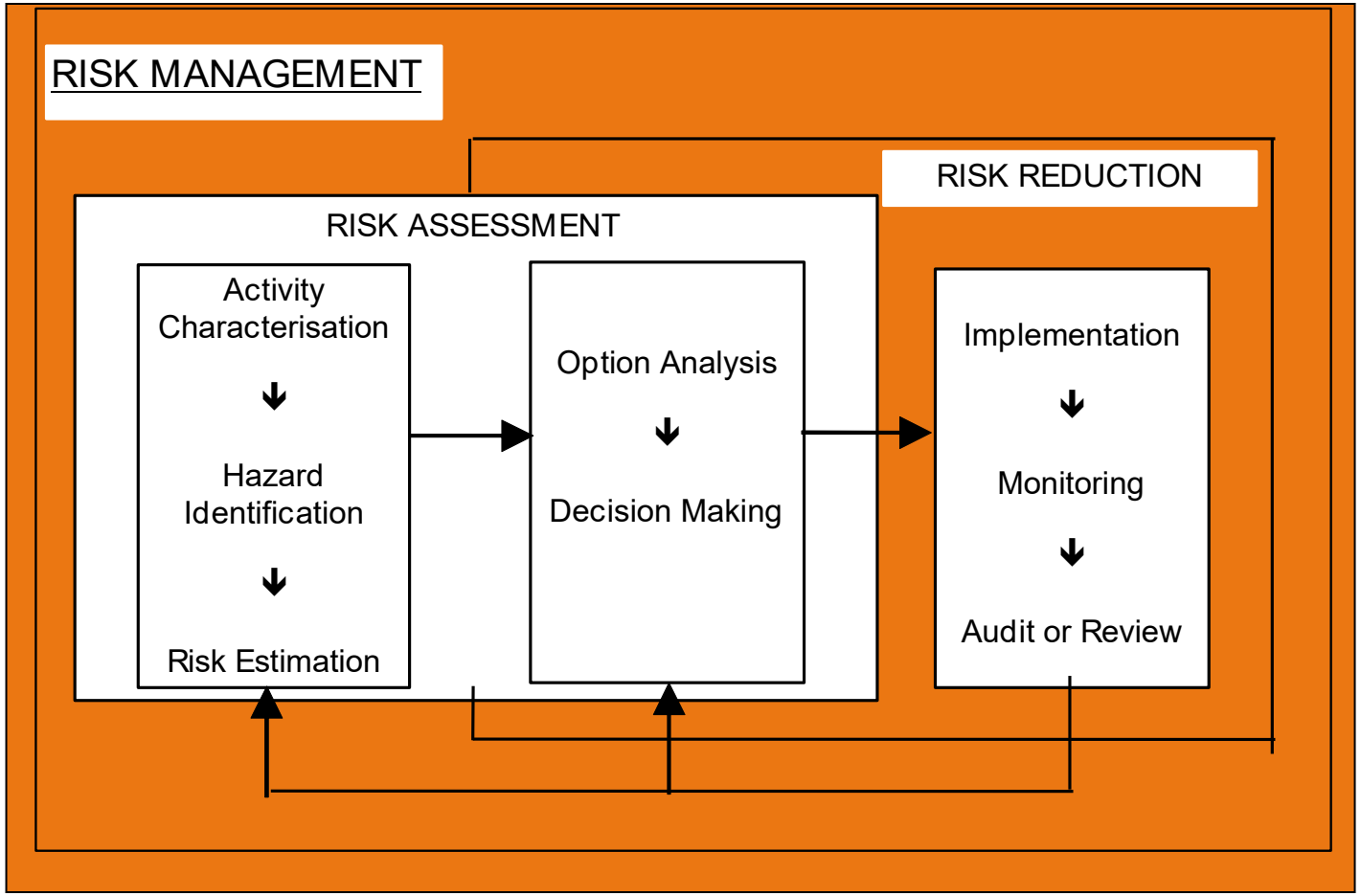
High Risk = Intolerable reduce to ALARP

ASSESSING THE RISKS - RISK ASSESSMENT MATRIX

Severity	Consequence (Effect or Impact)				Probability (Likelihood)				
	Harm to People	Damage to Assets	Effect on Environnent	Impact on Reputation	A Very Unlikely	B Unlikely	C Possible	D Probable	E Almost Certain
					Never heard of incident in the Energy sector	Incident has occurred in the Energy sector	Incident has occurred in Oando	Happens several times per year in Oando	Happens several times per year in an OANDO asset or facility
5 Catastrophic	Multiple Fatalities	Extensive Damage ≥ $500,000	Massive Effect Discharge greater than 100Bbls and not contained in bonded area	International Impact Incident reported in international Print Media				High Risk	
4 Major	Major Injury or Health Effect Fatality or Permanent Total Disability	Major Damage $250,000 to <$500,000	Major Effect Discharge 10 to 100 Bbls and not contained in bonded area	National Impact Incident reported in national Print Media					
3 Moderate	Moderate Injury or Health Effects LWC	Localised Damage $35,000 to <$250,000	Localised Effect Discharge 1 to 10 Bbls and not contained within bonded area	Considerable Impact Incident reported in regional print media		Medium Risk			
2 Minor	Minor Injury or Health Effects MTC	Minor Damage $3,500 to <$35,000	Minor Effect Discharge 1 to 10Bbls but contained within bonded area	Limited Impact Incident reported in local print media					
1 Insignificant	Slight Injury or Health Effects FAC	Slight Damage <$3,500	Slight Effect. Discharge < 1 Bbl	Slight Impact Public within immediate environment aware but incident not reported in print media	Low Risk				
0 Nothing	No Injury or Damage to Health	No Damage	No Effect	No Impact No public awareness					

A SIMPLE RISK BASE CONTROL PLAN

RISK LEVEL	ACTION
LOW	No additional controls are required. Consideration may be given to a more cost-effective solution or improvement that imposes no additional cost burden. Monitoring is required to ensure that the controls are maintained.
MEDIUM	Efforts should be made to reduce the risk, but the costs of prevention should be carefully measured and limited. Ideally work should not be started or continued until the risk has been reduced. Where the risk cannot be further reduced, there must be appropriate signoff for the work to start or continue.
HIGH	Work should not be started or continued until the risk has been reduced. If it is not possible to reduce risk, work has to remain prohibited.


RISK MANAGEMENT
RISK REDUCTION
RISK ASSESSMENT
Activity Characterisation
Hazard Identification
Risk Estimation
Option Analysis
Decision Making
Implementation
Monitoring
Audit or Review

ASSESSING THE RISKS

SUBJECTIVE RISK ASSESSMENT

- Qualitative risk assessment involves making a formal judgement on the consequence and probability using:

Risk = Severity x Likelihood

QUANTITATIVE RISK ASSESSMENT (QRA)

- Major hazards associated with complex chemical or nuclear plants, may warrant the need of techniques such as Quantitative Risk Assessment'.

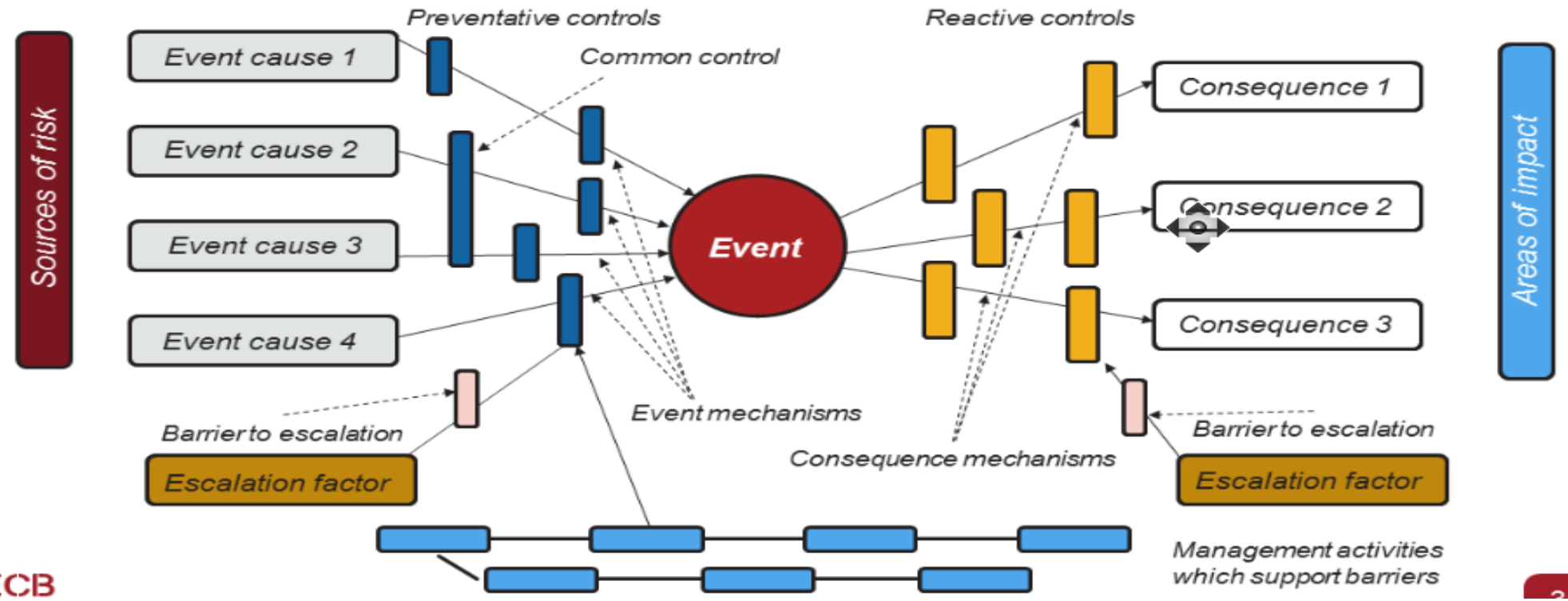
- In Quantitative Risk Assessment **(QRA)** a numerical estimate is made of the probability that a defined harm will result from the occurrence of a particular event.

Hazard Identification

Comparative Methods	• Checklists • Audits
Fundamental Methods	• Deviation analysis • Hazard and Operability Studies • Energy Analysis • Bow Tie Analysis • Failure Modes • Effects Analysis
Failure Logic	• Fault trees • Event trees • Cause – consequence diagrams

1. Bow Tie Analysis

IEC 31010, Figure B.2



PECB

ASSESSING THE RISKS

Qualitative risk assessment involves making a formal judgement on the consequence and probability using:

Risk = Severity of Harm x Likelihood of occurrence

This computation gives a risk value of between 1 and 9 enabling a rough and ready comparison of risks. The lower the number the greater the risks and so prioritises the hazards so that control action can be targeted at higher risks.

The likely effect of a *hazard* may be rated:

1. Major

Death or major injury or illness causing long term disability

2. Serious

Injuries or illness causing short-term disability

3. Slight

All other injuries or illnesses

The likelihood of *harm* may be rated:

1. High

Where it is certain that harm will occur

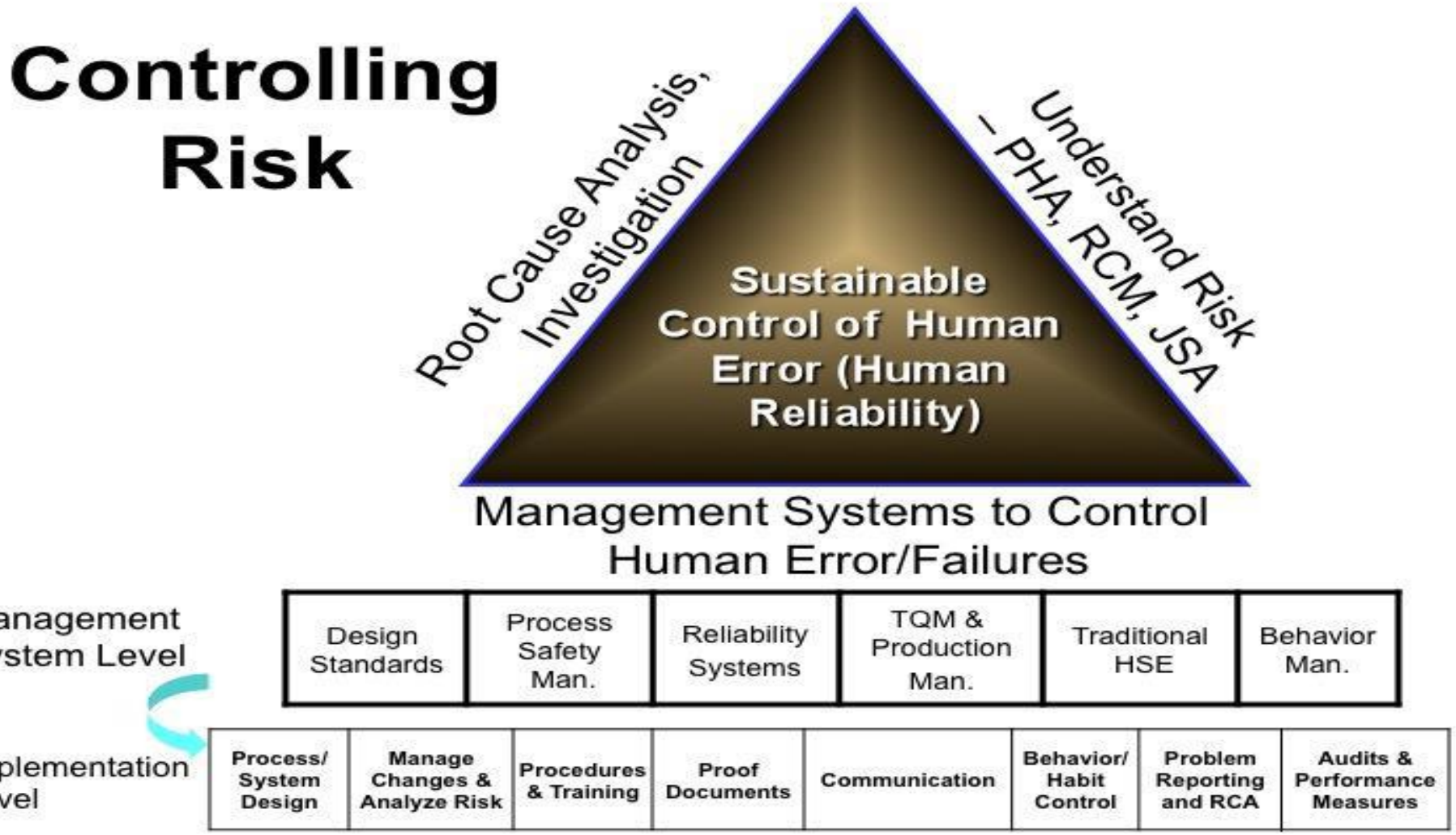
2. Medium

Where harm will often occur

3. Low

Where harm will seldom occur

CONTROLLING RISKS



CONTROLLING THE RISKS

Risk Avoidance

This strategy involves a conscious decision on the part of the organization to avoid completely a particular risk by discontinuing the operation producing the risk e.g. replacing a hazardous chemical by one with less or no risk potential.

Risk Transfer

This strategy is used when a risk cannot be avoided or reduced to be within the organisation's risk tolerance. The risk is transferred to a third party, e.g using insurance, performance bonds, warranties, guarantees etc.

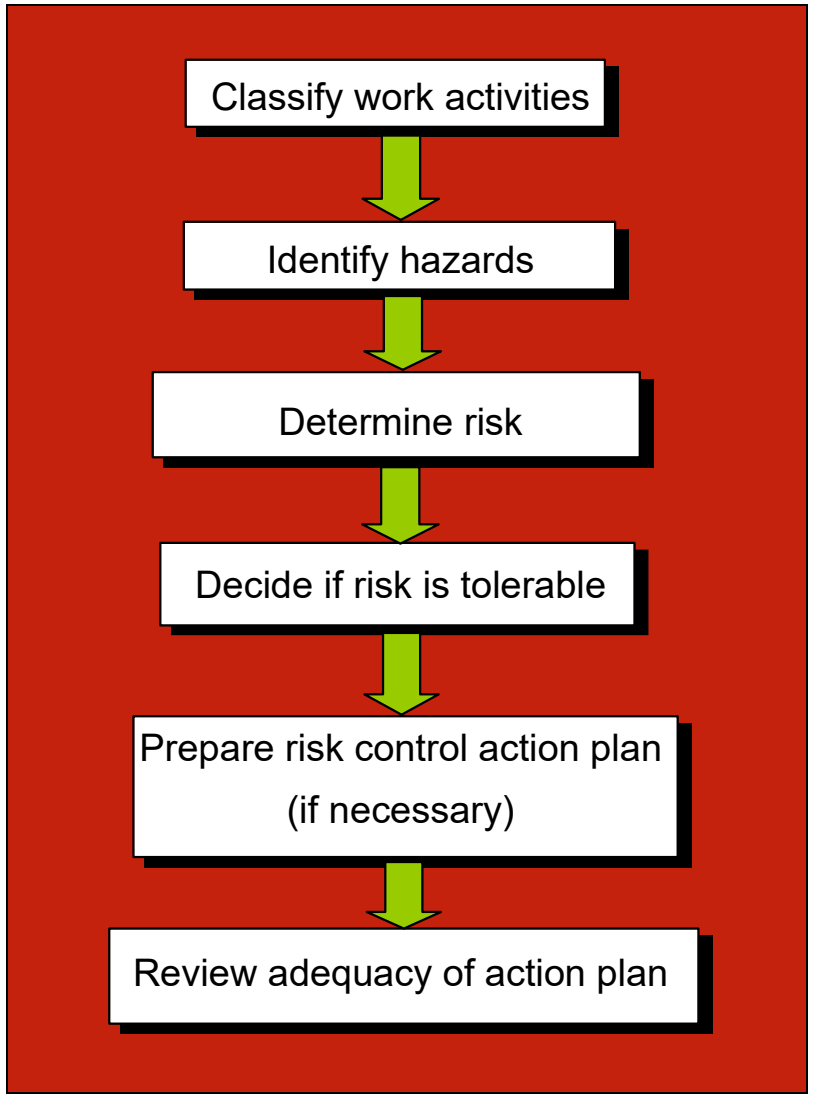
Risk Reduction

This strategy involves putting measures in place to reduce the likelihood (Probability) or the consequence (impact) of an unwanted event to levels within acceptable threshold limits, i.e within the organisation's risk tolerance.

Risk Retention/Acceptance

The risk is retained in the organisation where any consequent loss is borne by the organisation. There are two aspects to consider here, risk retention with knowledge and risk retention without knowledge.

PRACTICAL RISK ASSESSMENT (FROM BS8800)



SEVERITY OF HARM

Information obtained about work activities is a vital input to risk assessment. When seeking to establish potential severity of harm, the following should also be considered:

- Part(s) of the body likely to be affected;
- Nature of the harm, ranging from slightly to extremely harmful:
  - 1) Slightly harmful, e.g.:
    - Superficial injuries; minor cuts and bruises; eye irritation from dust.
    - Nuisance and irritation (e.g. headaches); ill-health leading to temporary discomfort.
  - 2) Harmful, e.g.
    - Lacerations; burns; concussion; serious sprains; minor fractures.
    - Deafness; dermatitis; asthma; work related upper limb disorders; ill-health leading to permanent minor disability.
  - 3) Extremely harmful, e.g.
    - Amputations; major fractures; poisonings; multiple injuries; fatal injuries.
    - Occupational cancer; other severely life shortening diseases; acute fatal diseases.

LIKELIHOOD OF HARM

When seeking to establish likelihood of harm the adequacy of control measures already implemented and complied with needs to be considered.

Issues considered:

- Number of personnel exposed.
- Frequency and duration of exposure to the hazard.
- Failure of services e.g. electricity and water.
- Failure of plant and machinery components and safety devices.
- Exposure to the elements
- Protection afforded by personal protective equipment and usage rate of personal protective equipment;
- Unsafe acts (unintended errors or intentional violations of procedures) by persons, for example, who:
    1. May not know what the hazards are.
    2. May not have the knowledge, physical capacity, or skills to do the work.
    3. Underestimate risks to which they are exposed.
    4. Underestimate the practicality and utility of safe working methods.

DECIDE IF RISK IS TOLERABLE

One simple method for estimating risk levels and for deciding whether risks are tolerable. Risks are classified according to their estimated likelihood and potential severity of harm.

	Slightly harmful	Harmful	Extremely harmful
Highly unlikely	TRIVIAL RISK	TOLERABLE RISK	MODERATE RISK
Unlikely	TOLERABLE RISK	MODERATE RISK	SUBSTANTIAL RISK
Likely	MODERATE RISK	SUBSTANTIAL RISK	INTOLERABLE RISK

PREPARE RISK CONTROL ACTION PLAN

Risk categories shown form the basis for deciding whether improved controls are required and the timescale for action.

The outcome of a risk assessment should be an inventory of actions, in priority order, to devise, maintain or improve controls.

A simple risk-based control plan

RISK LEVEL	ACTION AND TIMESCALE
TRIVIAL	No action is required and no documentary records need to be kept.
TOLERABLE	No additional controls are required. Consideration may be given to a more cost-effective solution or improvement that imposes no additional cost burden. Monitoring is required to ensure that the controls are maintained.
MODERATE	Efforts should be made to reduce the risk, but the costs of prevention should b e carefully measured and limited. Risk reduction measures should be implemented within a defined time period. Where the moderate risk is associated with extremely harmful consequences, further assessment may be necessary to establish more precisely the likelihood of harm as a basis for determining the need for improved control measures.
SUBSTANTIAL	Work should not be started until the risk has been reduced. Considerable resources may have to be allocated to reduce the risk. Where the risk involves work in progress, urgent action should be taken.
INTOLERABLE	Work should not be started or continued until the risk has been reduced. If it is not possible to reduce risk even with unlimited resources, work has to remain prohibited.

PREPARE RISK CONTROL ACTION PLAN

The action plan should be reviewed before implementation, typically by asking:

- Will the revised controls lead to tolerable risk levels?
- Are new hazards created?
- Has the most cost-effective solution been chosen?
- What do people affected think about the need for, and practicality of, the revised preventive measures?
- Will the revised controls be used in practice, and not ignored in the face of, for example, pressures to get the job done?

References

ISO Guide 73:2009
Risk management — Vocabulary

ISO 31000:2018
Risk management — Guidelines

IEC 31010:2019
Risk management — Risk assessment techniques

ISO/TR 31004:2013
Risk management — Guidance for the implementation of ISO 31000

Thanks