MAJOR HAZARD INSTALLATION

WORKSHOP – GAUTENG

23rd November 2023

MIPP and PSM – D Mitchell

employment & labour

Department:
Employment and Labour
REPUBLIC OF SOUTH AFRICA

iSHEcon

CONTENTS AND OBJECTIVES

SECTION   **OBJECTIVE**

- Reg 11 & ANNEXURES -   what is required – MIPP and PSM

- PSM   -   What is PSM, what does it aim to do

- Occ Safety Vs PSM   -   Differences

iSHEcon

Major incident prevention policy

11. (1)   The duty holder must prepare and retain a <u>written major incident prevention policy</u>, as contemplated in **Annexure C**, on the–

(a)   **construction and building** of the establishment;

(b)   **change** in the establishment; or

(c)   **safe operation** of the establishment.

Major incident prevention policy

11. (2)   Every duty holder must, **within 36 months** after the entry into force of these Regulations, establish and have in record a major incident prevention policy.

Major incident prevention policy

11. (4)   A duty holder must **review** the major incident prevention policy, every **five years** or **when there is a change** in the establishment which renders the existing policy inadequate:

Provided that an **updated copy is available** for inspection by an inspector and a local government.

*Note - Regulation 4 (3) (j) requires you to include the **MIPP in your Notifications**.*

Major incident prevention policy

11. (3) The major incident prevention policy must provide for a high level of **protection for employees and the public** and **must include at least**–

(a) the **aims and objectives** of the policy;

(b) the **roles and responsibilities** of the establishment's management;

(c) process safety **performance indicators**;

(d) commitments towards the maintenance and **continual improvement** of the policy;

(e) the aims and objectives of the – (i) **emergency** plan; (ii) **evacuation plan** regarding the speedy evacuation of persons, roll-call after evacuation; and plant shut down;

(f) reasons for revision;

(g) mandatory agreements; and

(h) the **process safety management system** with principles specified in **Annexure D**.

ANNEXURE C - *Major Incident Prevention Policy*

The following principles should be taken into account when preparing a major incident prevention policy:

(1) *For the purpose of implementing the duty holder's major incident prevention policy and process safety management system, the following elements must be considered:*

    (a) *must be **proportionate to the hazards** associated with major incidents;*

    (b) ***duty holder's aims and principles** of action with respect to the control of hazards.*

    (c) *must include **resources for determining and implementing** the MIPP.*

ANNEXURE C

(2) *The following issues must be addressed by the **process safety management system:***

    (a) *organisation and personnel;*

    (b) *identification and evaluation of major hazards;*

    (c) *operational control;*

    (d) *management of change;*

    (e) *planning for emergencies;*

    (f) *monitoring performance;*

    (g) *audit and review.*

ANNEXURE D

(2)   A **process safety management system** must–

(a) be **proportionate** to the hazards, industrial activities and complexity of the organisation in the establishment;

(b) be **based on assessment** of the risks;

(c) include within its scope the general management system, including the **organisational structure, responsibilities, practices, procedures, processes and resources** for determining and implementing the major incident prevention policy.

ANNEXURE D

(3) The following matters must be addressed by the PSM system:

   (a) in relation to the **organisation and personnel**–

      (i)   the roles and responsibilities of personnel involved in the management of major hazards at **all levels in the organisation**, together with the measures taken to raise awareness of the need for continuous improvement;

      (ii) the identification of the **training needs** of such personnel and the provision of the training;

      (iii) the involvement of employees and of **subcontracted personnel** working in the establishment, who are important from the point of view of safety;

ANNEXURE D

(b) the **identification and evaluation of major hazards**: the adoption and implementation of procedures for **systematically identifying** major hazards arising from normal and abnormal operation, including **subcontracted** activities where applicable, and the assessment of their likelihood and severity;

ANNEXURE D

(c)   in relation to **operational control**–

(i)   the adoption and implementation of procedures and instructions for safe operation, including **maintenance of plant, processes and equipment**, and for **alarm management** and temporary stoppages;

(ii)   the taking into account of available information on **best practices** for monitoring and control, with a view to reducing the risk of system failure;

(iii)   the management and control of the risks associated with **ageing equipment** installed in the establishment and its corrosion;

(iv)   the inventory of the establishment's equipment, and the strategy and methodology for the monitoring and control of the **condition of the equipment**;

(v)   appropriate follow-up actions and any necessary countermeasures;

(d)   the **management of change**: the adoption and implementation of **procedures for planning modifications** to, or the design of, new installations, processes or storage facilities;

(e)   in relation to **planning for emergencies**–

(i)   the adoption and implementation of procedures to **identify foreseeable emergencies** by systematic analysis;

(ii)   the preparation, **testing** and review of emergency plans to respond to emergencies and the provision of **specific training for staff**, such training to be given to all personnel working in the establishment, including relevant subcontracted personnel;

ANNEXURE D

(f)   in relation to **monitoring performance**–

    (i)   the adoption and implementation of procedures for the **ongoing assessment of compliance** with the objectives set by the operator's major accident prevention policy and safety management system, and the mechanisms for investigation and taking **corrective action** in case of non-compliance;

    (ii)   the procedures must cover the operator's system for reporting major incidents or **'near misses'**, particularly those involving failure of protective measures, and their investigation and follow-up on the basis of lessons learned;

    (iii)   the procedures could also include **performance indicators** such as safety performance indicators and/or other relevant indicators;

(g) in relation to **audit and review**–

(i) the adoption and implementation of **procedures for periodic systematic assessment** of the major accident prevention policy and the effectiveness and suitability of the process safety management system;

(ii) the **documented review of performance** of the policy and process safety management system and its updating by **senior management**, including consideration and incorporation of necessary changes indicated by the audit and review.

SUMMARY - MIPP & PSM

Regulation 11 (3) – required considerations for implementing MIPP & PSM

ANNEXURE C – more details about the MIPP

ANNEXURE D – more details about PSM

iSHEcon
CHEMICAL PROCESS SAFETY ENGINEERS
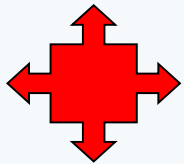
MAJOR HAZARD INCIDENTS

SWISS CHEESE MODEL

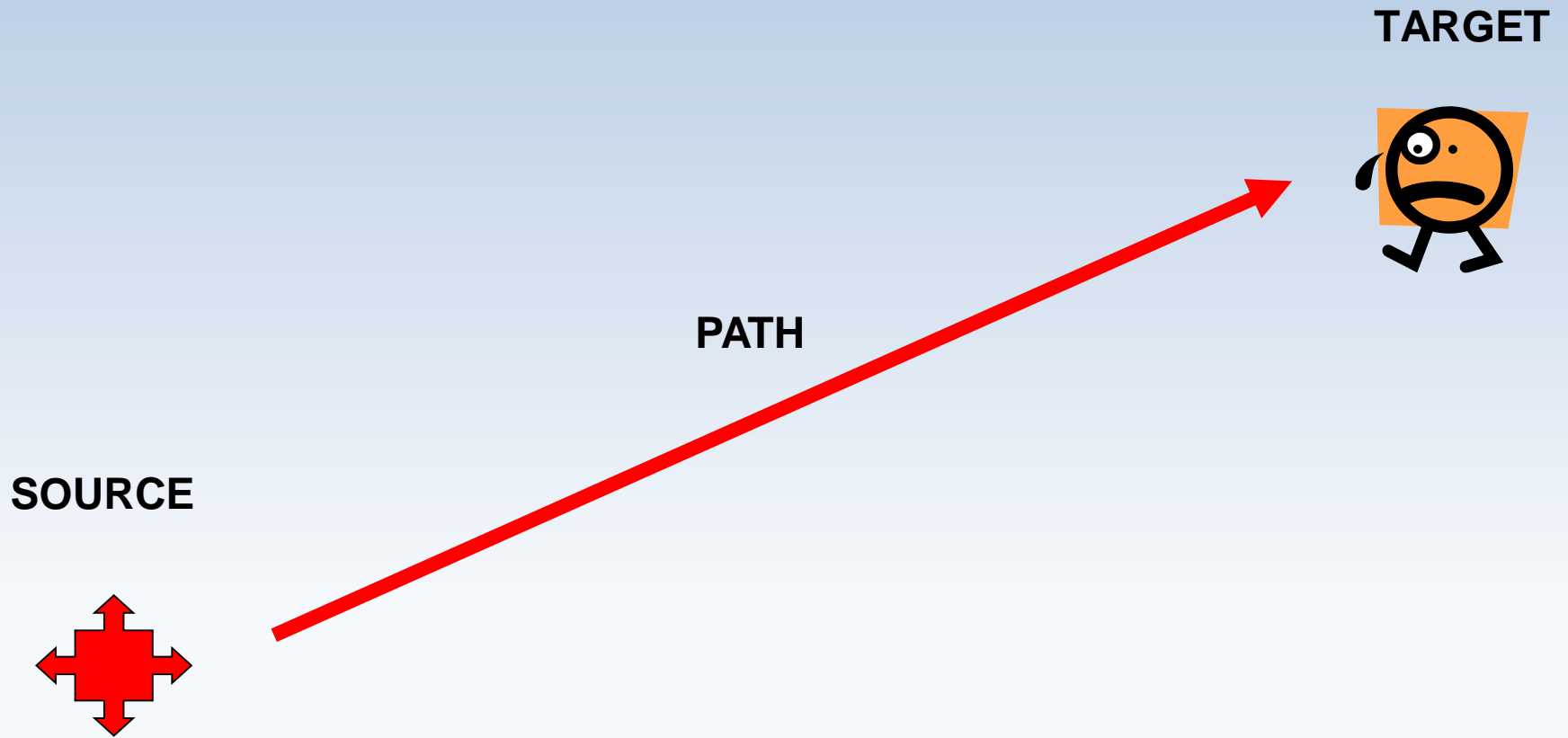James Reason – Managing the Risks of Organizational Accidents
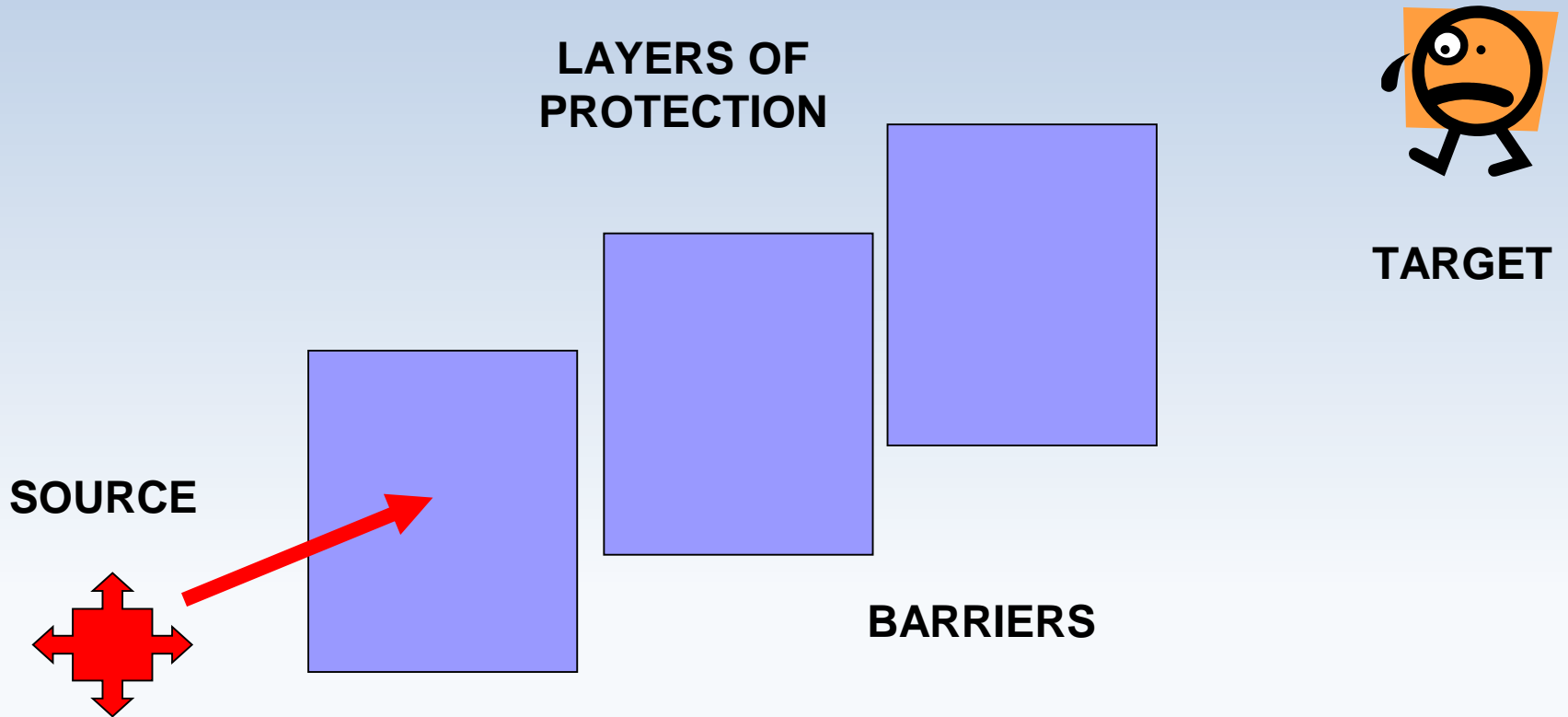
SWISS CHEESE MODEL

TARGET

SOURCE

SWISS CHEESE MODEL

TARGET

PATH

SOURCE

SWISS CHEESE MODEL

LAYERS OF
PROTECTION

TARGET

SOURCE

BARRIERS

SWISS CHEESE MODEL

A.
ORGANIZATION
ROLES
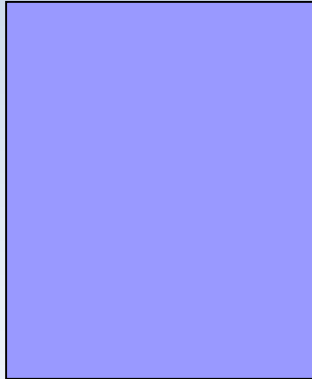
E.
EMERGENCY
PROCEDURES

C.
OPERATIONAL
CONTROL

iSHEcon

SWISS CHEESE MODEL

SWISS CHEESE MODEL

FAILURES OR GAPS IN THE SYSTEMS
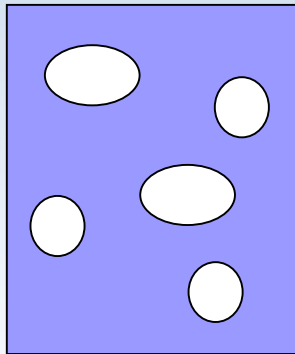
ORGANIZATION ROLES

EMERGENCY PROCEDURES
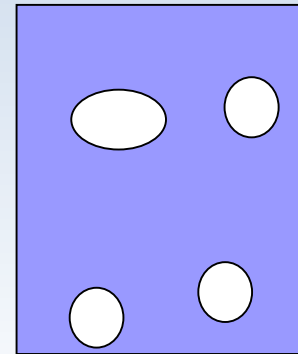
OPERATIONAL CONTROL
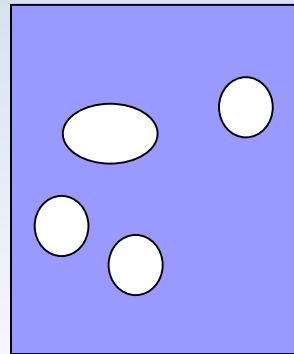
SWISS CHEESE MODEL

NO TRAINING

FAILURES OR GAPS IN THE SYSTEMS

NO DRILLS

ORGANIZATION ROLES

EMERGENCY PROCEDURES
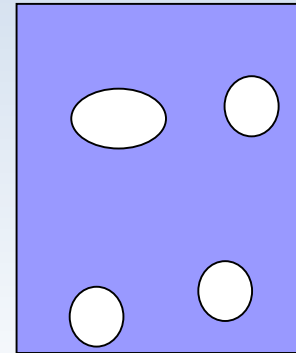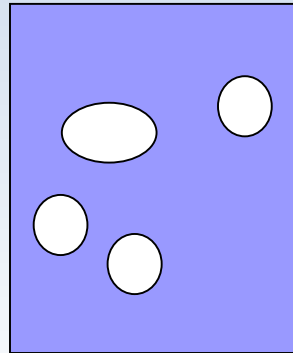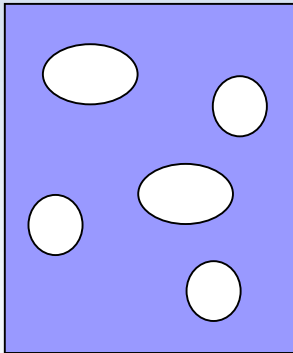
OPERATIONAL CONTROL

NO PERMIT TO WORK

iSHEcon

SWISS CHEESE MODEL

SOURCE

TARGET

SWISS CHEESE MODEL

HAZARD FINDS THE GAPS

SOURCE

TARGET
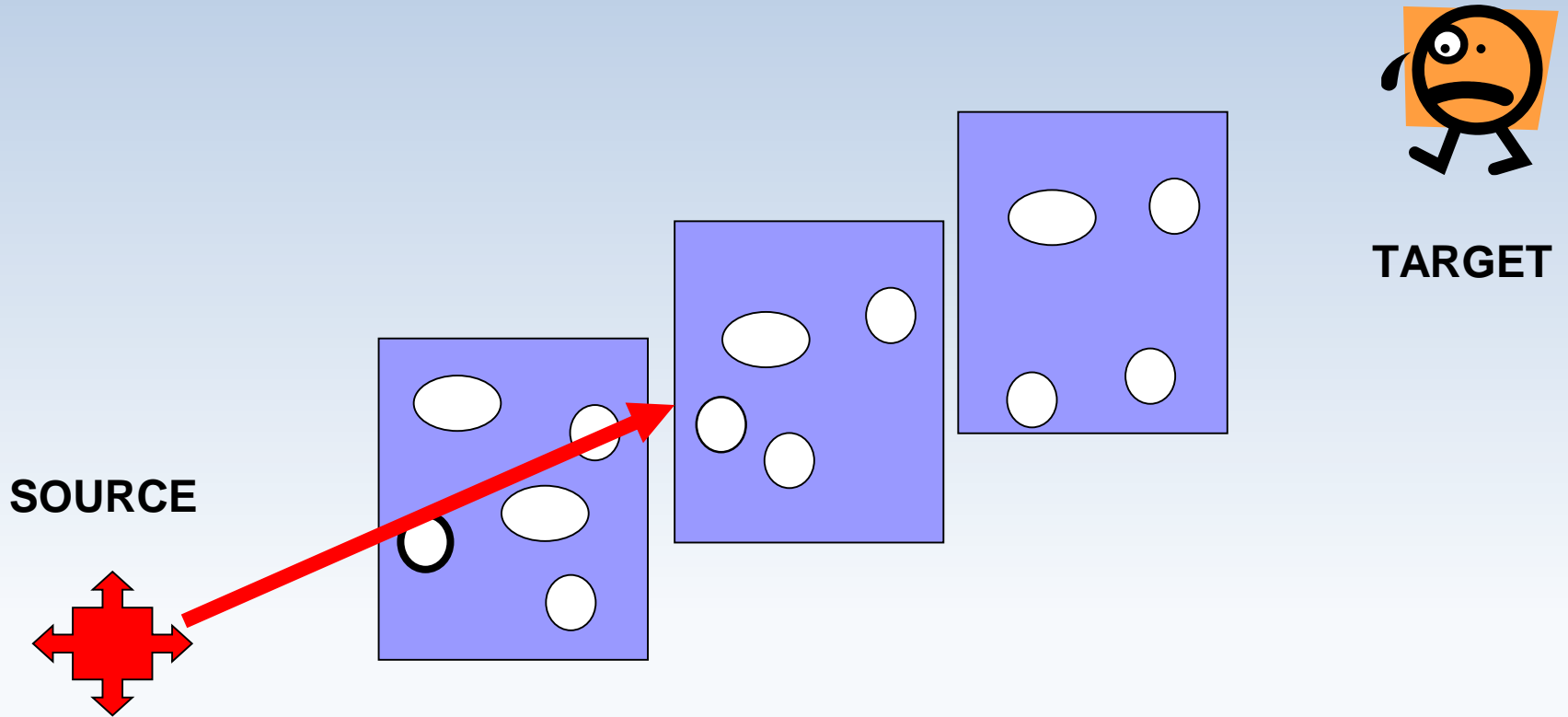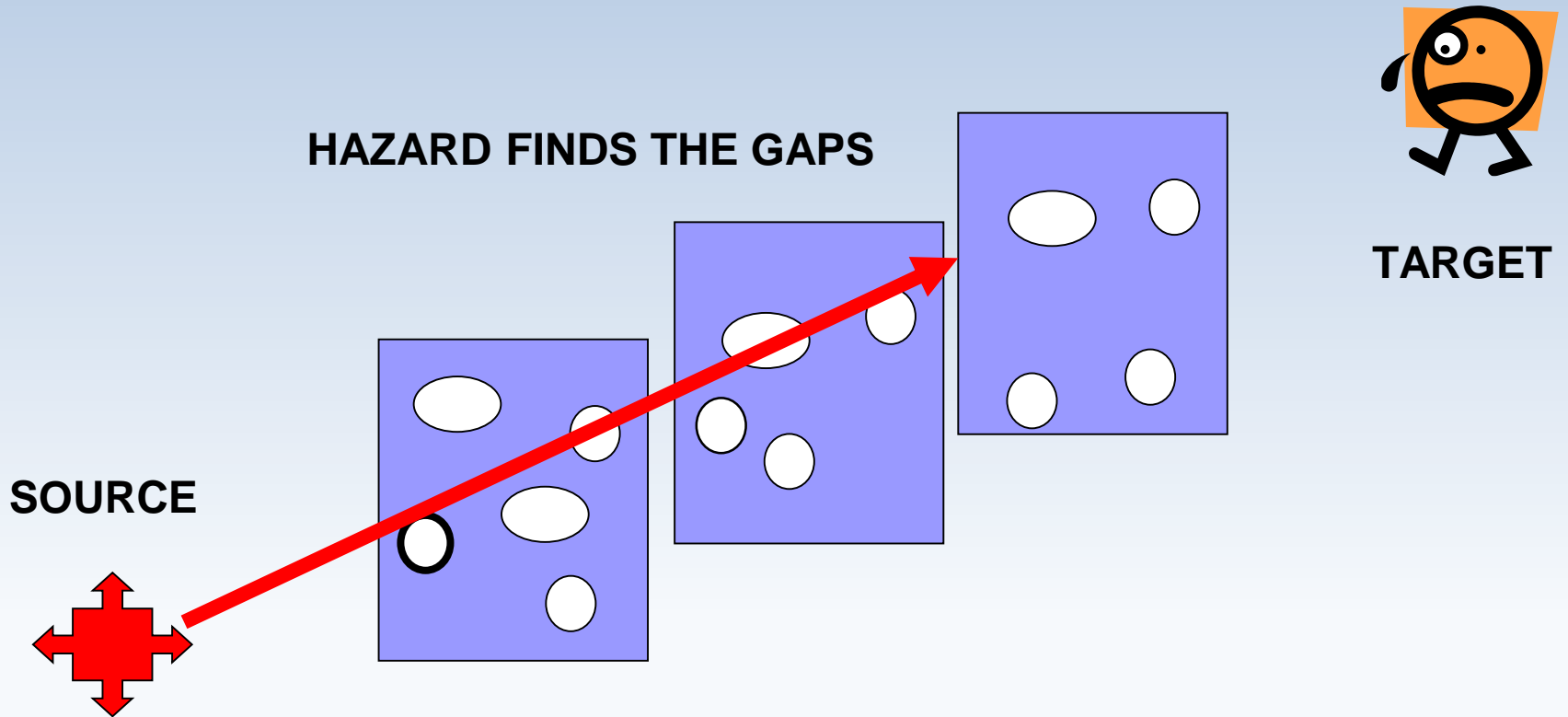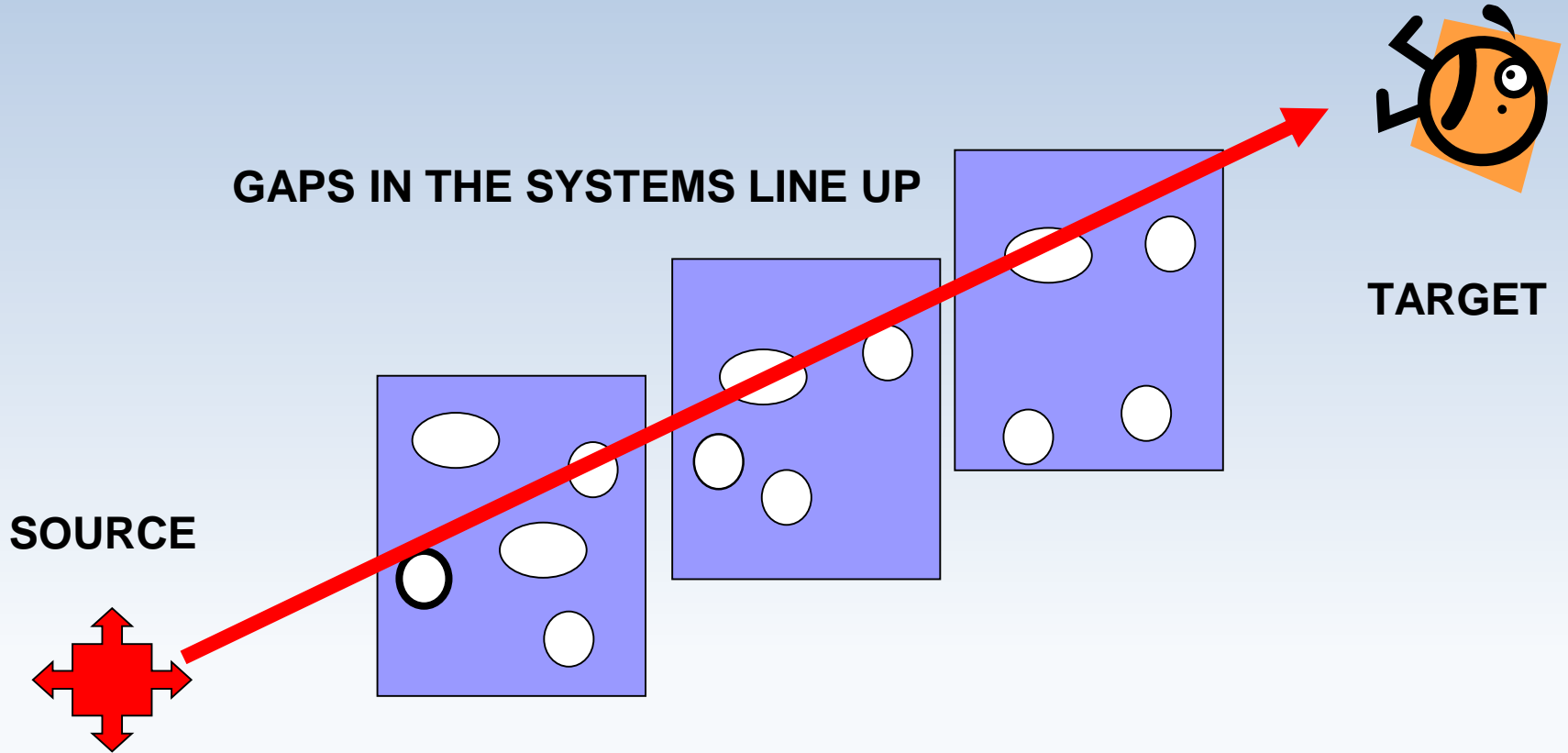
SWISS CHEESE MODEL
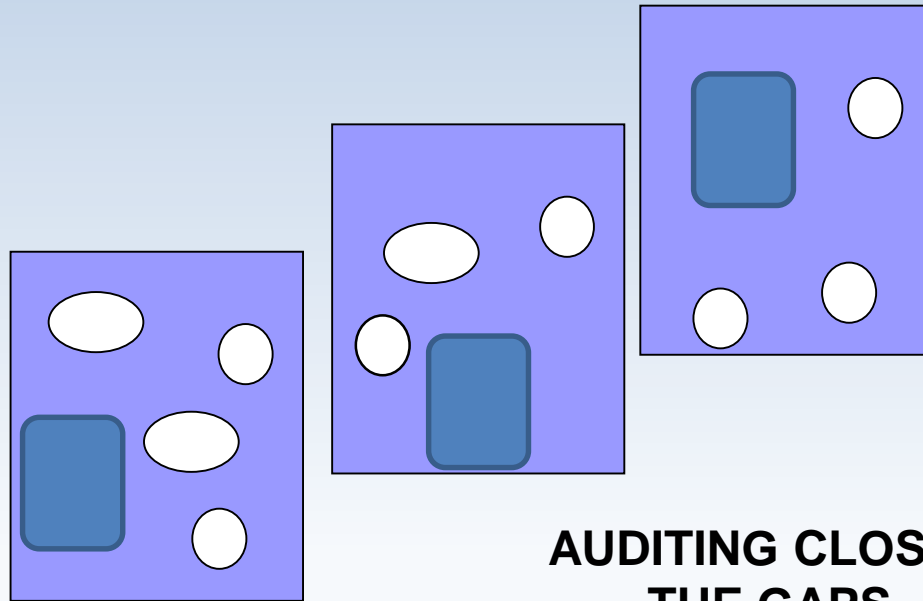
SWISS CHEESE MODEL

AUDITING CLOSES THE GAPS

SWISS CHEESE MODEL

GAPS CLOSED

TARGET

SOURCE
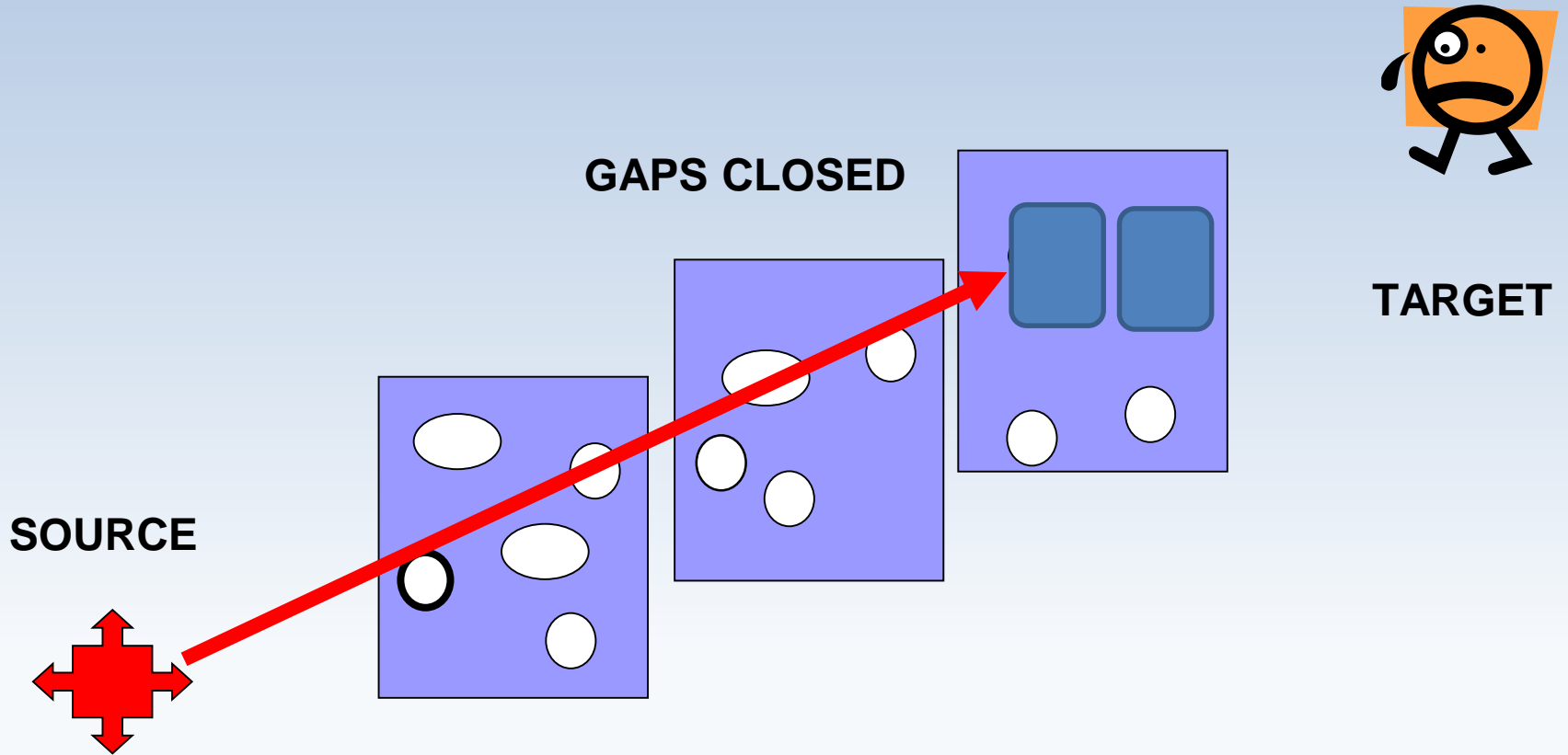
PROCESS SAFETY MANAGEMENT

=

BARRIER MANAGEMENT

MIPP and PSM - STRUCTURE

MIPP and PSM - STRUCTURE

POLICY = STATEMENT
(we will prevent major incidents and this is how)

MAJOR ACCIDENT PREVENTION POLICY

Costain recognises that some of its activities are associated with major accident or process safety risks to people, the environment and its business; we are committed to managing our activities in design, construction, operation and maintenance of facilities such that all reasonably practicable measures are taken to prevent major accidents and to limit their consequences to people and the environment. Our approach has four focus areas:

1. Process safety leadership (mindful leadership)

We will ensure that sufficient resources and personnel are in place to manage the potential major hazards of our operations effectively, allocating roles and responsibilities; we will identify competence requirements, then train or recruit suitable personnel and monitor their performance.

Costain's directors and managers will demonstrate commitment by upholding this policy in practice whilst engaging the workforce on the subject of major accident prevention in a two-way process. Similar communication processes will be developed with stakeholders including clients, neighbours, competent authorities and partners.

We will have a process to identify regulatory and other industry requirements and to verify compliance with these.

2. Risk identification and assessment

We will systematically identify and evaluate risk, and limit the consequences of major hazards associated with our activities, or the equipment and schemes we design, in both normal and abnormal conditions. This will also cover data and physical security.

We will adopt a hierarchical approach to risk reduction, starting with inherent safety, ensuring that measures are put in place to render the risks as low as reasonably practicable and that these are recorded so that the risks are clearly understood by management, clients and other stakeholders.

3. Risk management

We will develop procedures and systems of work, which allow safe and sufficiently secure design, construction, operation and maintenance of assets. This includes identifying and operating within safe limits and routine inspection and maintenance of safety-critical equipment.

We will manage any changes to facilities, structures, organisation, systems and procedures to ensure the continued effective control of major accident hazards, in particular assessing readiness for equipment safe start-up, temporary works or temporary conditions.

We will apply a systematic process to identify foreseeable major emergencies and prepare, test, review and update emergency plans to control major accidents.

4. Review and improvement

We will monitor the effectiveness of the SHE management system in achieving the objectives of this policy by the reporting of process safety performance indicators. This will include reporting, investigating and learning from major accidents, near misses and non-compliances and ensuring that any identified improvements are suitably prioritised, scheduled and progressed.

We will arrange for periodic, systematic audit of the continuing effectiveness of the Costain SHE management system in delivering this policy, recording any findings and implementing changes as necessary.

Signed: .... Date: 6th Feb 2015

A Wyllie (Chief Executive Officer)

EXAMPLE OF A

POLICY STATEMENT

MIPP

MIPP and PSM - STRUCTURE

POLICY (MIPP)

PROCESS SAFETY MANAGEMENT
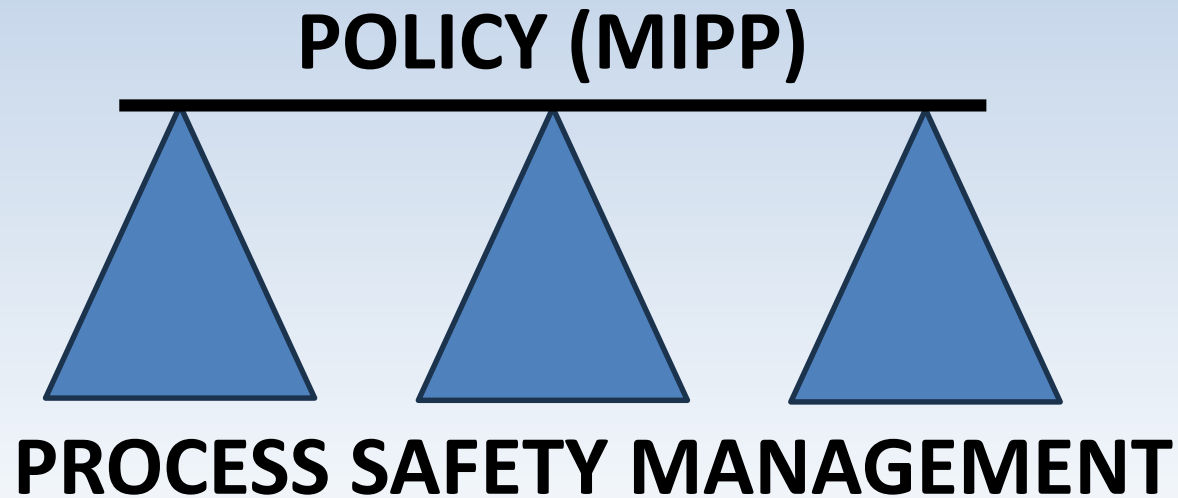
MIPP and PSM - STRUCTURE

MIPP
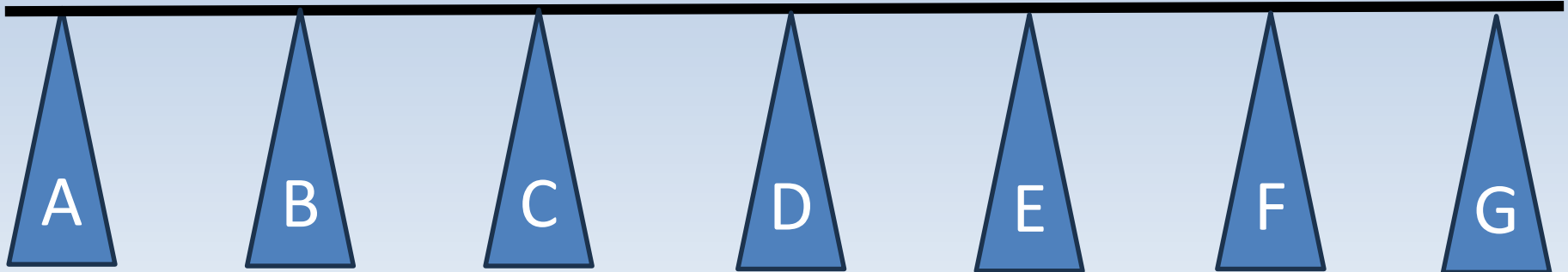
| A | B | C | D | E | F | G |

ORGANIZATION AND PERSONNEL

OPERATIONAL CONTROL

EMERGENCY PLANNING

AUDIT AND REVIEW

IDENTIFICATION OF HAZARDS

MANAGEMENT OF CHANGE

MONITORING PERFORMANCE

PSM – USA CCPS

PROCESS SAFETY MANAGEMENT SYSTEM

Pillars (left to right):

- Process Safety Culture
- Compliance with Standards
- Process Safety Competency
- Workforce Involvement
- Stakeholder Outreach
- Process Knowledge Management
- Hazard Identification and Risk Analysis
- Operating Procedures
- Safe Work Practices
- Asset Integrity and Reliability
- Contractor Management
- Training and Performance Assurance
- Management of Change
- Operational Readiness
- Conduct of Operations
- Emergency Management
- Incident Investigation
- Measurement and Metrics
- Auditing
- Management Review and Continuous Improvement

Foundation groups:

- COMMIT TO PROCESS SAFETY
- UNDERSTAND HAZARDS AND RISK
- MANAGE RISK
- LEARN FROM EXPERIENCE

iSHEcon
CHEMICAL PROCESS SAFETY ENGINEERS

PSM – USA CCPS

COMPARISON

Risk Based Process Safety (CCPS 2007)		OSHA	CAIA Responsible Care
Pillars	Elements	Elements	Elements
1. Commit to Process Safety	1.1 Process Safety Culture	-	1 Leadership and Culture
	1.2 Compliance with Standards	-	2 Compliance with Standards
	1.3 Process Safety Competency	-	
	1.4 Workforce Involvement	Employee participation	3 Workforce Involvement
	1.5 Stakeholder Engagement	-	4 Stakeholder Engagement
2. Understand hazards and risk	2.1 Process Knowledge Management	Process Safety Information	5 Knowledge Management (Process Safety Information)
	2.2 Hazard Identification & Risk Analysis	Process Hazard Analysis (PHA)	6 Hazard Identification & Risk Analysis
3. Manage risks	3.1 Operating Procedures	Safe Operating Procedures	7 Operating Procedures
	3.2 Safe Work Practices	Hot Work Permit	8 Safe Work Practices
	3.3 Asset Integrity & Reliability	Mechanical Integrity	9 Asset Integrity
	3.4 Contractor Management	Contractor management	10 Contractor Management
	3.5 Training & Performance	Training	11 Training & Performance Assurance
	3.6 Management of Change	Management of Change	12 Management of Change
	3.7 Operational Readiness	Pre-Start up Safety Review	13 Operational Readiness
	3.8 Operating Discipline	-	14 Operating Discipline
	3.9 Emergency Management	Emergency Response Plan	15 Emergency Preparedness and Response
4. Learn from experience	4.1 Incident Investigation	Incident Investigation	16 Incident Investigation
	4.2 Measurement & Metrics	-	17 Measurement & Metrics
	4.3 Auditing	Compliance Audits	18 Process Safety Auditing
	4.4 Management Review & Continuous Improvement	-	19 Management Review & Continuous Improvement

iSHEcon
CHEMICAL PROCESS SAFETY ENGINEERS

MANAGEMENT SYSTEMS - STRUCTURE

4. Act
Adjust, improve.
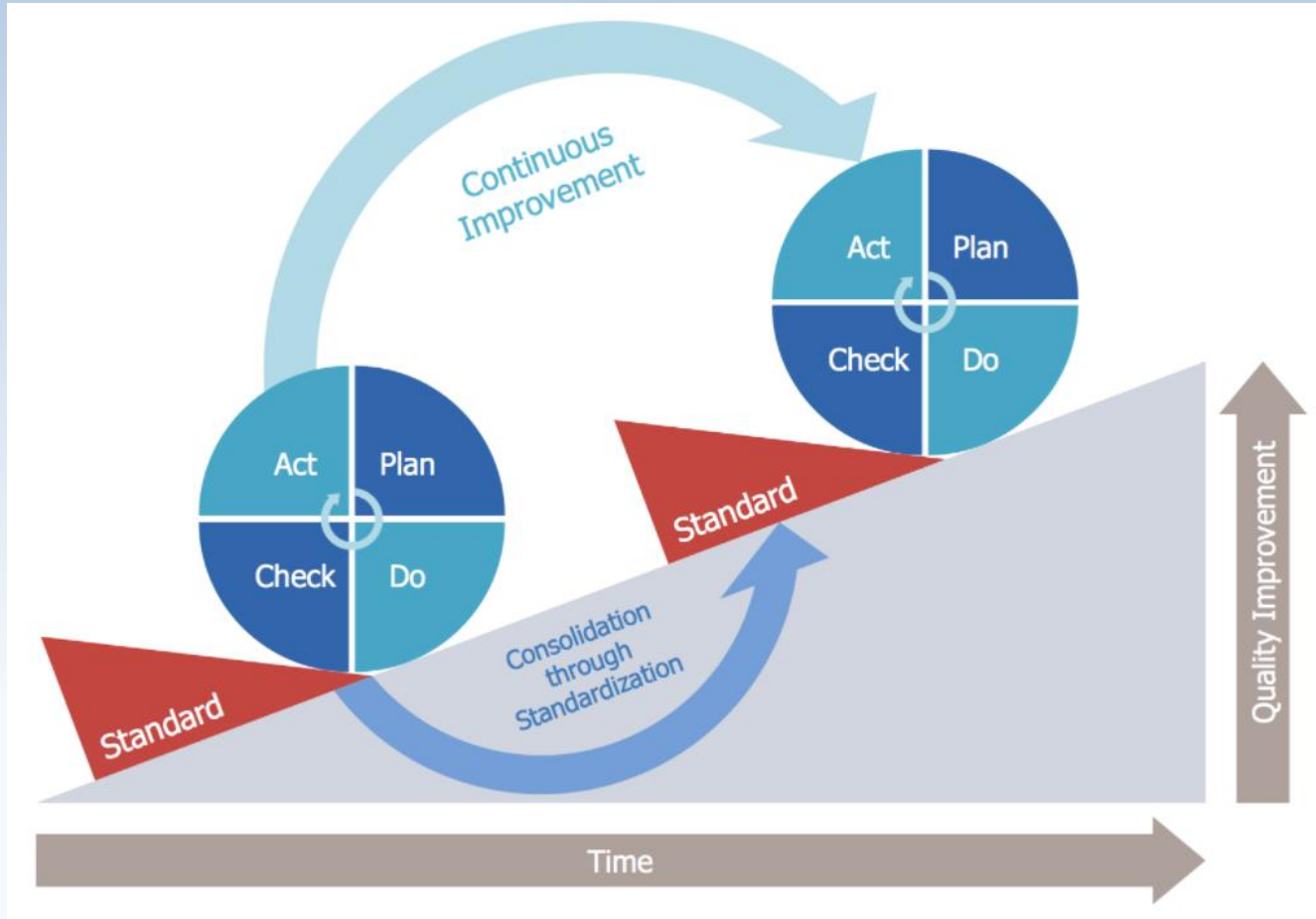
1. Plan
Establish objectives

3. Check
Gap analysis

2. Do
Carry out the objectives

MANAGEMENT SYSTEMS - STRUCTURE

MIPP and PSM - STRUCTURE

MIPP

PSM ELEMENTS

MIPP and PSM - STRUCTURE

COMPARISON

	Risk Based Process Safety (CCPS 2007)	OSHA	CAIA Responsible Care	
Pillars	Elements	Elements	Elements	
1. Commit to Process Safety	1.1 Process Safety Culture	-	1 Leadership and Culture	PLAN
	1.2 Compliance with Standards	-	2 Compliance with Standards	
	1.3 Process Safety Competency	-		
	1.4 Workforce Involvement	Employee participation	3 Workforce Involvement	
	1.5 Stakeholder Engagement	-	4 Stakeholder Engagement	
2. Understand hazards and risk	2.1 Process Knowledge Management	Process Safety Information	5 Knowledge Management (Process Safety Information)	
	2.2 Hazard Identification & Risk Analysis	Process Hazard Analysis (PHA)	6 Hazard Identification & Risk Analysis	
3. Manage risks	3.1 Operating Procedures	Safe Operating Procedures	7 Operating Procedures	DO
	3.2 Safe Work Practices	Hot Work Permit	8 Safe Work Practices	
	3.3 Asset Integrity & Reliability	Mechanical Integrity	9 Asset Integrity	
	3.4 Contractor Management	Contractor management	10 Contractor Management	
	3.5 Training & Performance	Training	11 Training & Performance Assurance	
	3.6 Management of Change	Management of Change	12 Management of Change	
	3.7 Operational Readiness	Pre-Start up Safety Review	13 Operational Readiness	
	3.8 Operating Discipline	-	14 Operating Discipline	
	3.9 Emergency Management	Emergency Response Plan	15 Emergency Preparedness and Response	
4. Learn from experience	4.1 Incident Investigation	Incident Investigation	16 Incident Investigation	CHECK ACT
	4.2 Measurement & Metrics	-	17 Measurement & Metrics	
	4.3 Auditing	Compliance Audits	18 Process Safety Auditing	
	4.4 Management Review & Continuous Improvement	-	19 Management Review & Continuous Improvement	

iSHEcon
CHEMICAL PROCESS SAFETY ENGINEERS

ELEMENT A

ORGANIZATION AND PERSONNEL

ASPECT – PROCESS SAFETY COMPETENCY

UK IChemE ISC – COMPETENCY FOCUS

Table 1: Organisational roles

Area	Role	Description
Front line	Operator	Front-line personnel responsible for operating the facility. Sometimes called a process operator, panel operator or process technician. Note: Self-directed roles may need to be supervisor level across some competencies, depending on the nature of the operation, eg nature of hazards, level of supervision available etc.
	Maintainer	Front-line personnel responsible for performing maintenance on the facility. Note: Self-directed roles may need to be supervisor level across some competencies, depending on the nature of the operation, eg nature of hazards, level of supervision available etc.
	Supervisor	Front-line supervisor responsible for managing operators or maintainers on a day-to-day basis. Could also be referred to as Operations Team Leader or Maintenance Team Leader.
Engineer	Integrity/ reliability	Specialist role responsible for maintaining the integrity or reliability of facilities, with expertise in areas such as corrosion management, rotating equipment, fixed equipment, etc. This also includes operational engineering activities eg safe operating envelopes.

iSHEcon

UK IChemE ISC – COMPETENCY FOCUS

Similar to Elements

Table 2: Competency topics

Elements	Topic
Culture	Safety leadership commitment, responsibility and workplace culture
Knowledge & competence	Process safety concepts
	Hazard identification and risk assessment
	Hazard awareness specific to the operation
Engineering & design	Safety in design
	Asset integrity
	Codes and standards
	Management of change
Human factors	Human factors
Systems & procedures	Systems, manuals and drawings
	Process and operational status monitoring and handover
	Contractor and supplier selection and management
	Safe systems of work
	Project delivery
	Management of major emergencies and emergency preparedness
	Incident reporting and investigation
Assurance	Legislation and regulations
	Audit, assurance, management review and intervention

From – IChemE ISC – PS Competency Guide 2nd Ed 2018

iSHEcon
CHEMICAL PROCESS SAFETY ENGINEERS

UK IChemE ISC – COMPETENCY FOCUS

Awareness

Has knowledge of the theory and displays conceptual understanding. Actively participates in discussions regarding the skill. Performs routine tasks with significant supervision. Learns how to do things.

Basic application

Performs fundamental and routine tasks. Requires occasional supervision. Increased functional expertise and ability. Works with others.

Skilled application or proficiency

Independent contributor. Integrates work with other disciplines. Frequently mentors or coaches others. Assesses and compares alternative options.

Mastery or expert

Advanced experience in the particular skill. Applies creative solutions to complex problems. Defines and drives critical business opportunities and needs. Represents the organisation internally and externally on critical issues. Sets standards within the organisation. Recognised as a subject matter expert.

iSHEcon
CHEMICAL PROCESS SAFETY ENGINEERS

UK IChemE ISC – COMPETENCY FOCUS

Element	Competency required	Competency level 1 – Awareness	Competency level 2 – Basic application	Competency level 3 – Skilled application/proficient	Competency level 4 – Mastery/expert
Systems & procedures	Process & operational status monitoring & handover	• Aware that safe operating envelopes exist. • Aware of the process and what can go wrong. • Aware of what is required to keep the process under control. • Aware of what to do in an abnormal/emergency situation. • Aware that controls have performance criteria and they need to be monitored.	• Utilises P&ID, cause and effect charts, process flow diagrams, and operations manuals to troubleshoot minor issues. • Able to safely operate the facility within the safe operating envelope. • Able to maintain a shift log. • Able to track and report control performance criteria.	• Recognises how to recover from an abnormal situation and manages startups and shutdowns. • Able to conduct effective shift handover. • Able to interpret weak signals, eg shift log details. • Able to mentor new operators.	• Understands and alters operating parameters using change management. • Monitors and or manages simultaneous operations. • Develops operations training materials and framework for competency. • Engages senior management in the development and review of process indicators.

iSHEcon
CHEMICAL PROCESS SAFETY ENGINEERS

UK IChemE ISC – COMPETENCY FOCUS

Competency element	Front line			Engineering									Support functions							Management			Executives			
	Operator	Maintainer	Supervisor	Integrity/ reliability	Technical authority	Project	Information technology	Process safety advisor	Process safety lead/ Manager	HSE site	HSE corporate	Quality control	Corporate assurance	Human resources	Finance	Procurement	Operational authority	Manager / Superintendent	GM/Site manager	Leaders/ MD/CEO	General board member	Board chair	Safety committee chair	Process safety specialist board member
Safety leadership commitment, responsibility and workplace culture	2	2	3	2	2	2	N/A	3	4 T	3	4 M	2	N/A	2	N/A	N/A	N/A	3	4 M	4 M	4 M	4 M	4 M	4
Process safety concepts	2	2	3	2	3	2	2	3	4	2	3	2	1	1	1	1	3	3	3	3	2	2	3	3
Hazard identification and risk assessment	2	2	2	2	4	2	2	3	3	2	2	1	1	1	1	1	2	2	2	1	1	1	2	2
Hazard awareness specific to the operation	2	2	3	3	4	3	3	3	4	2	3	2	2	1	1	1	3	3	3	2	1	1	2	2

From – IChemE ISC – PS Competency Guide 2nd Ed 2018

UK IChemE ISC – COMPETENCY FOCUS

Competency element	Front line			Engineering							Support functions								Management		Executives				
	Operator	Maintainer	Supervisor	Integrity/reliability	Technical authority	Project	Information technology	Process safety advisor	Process safety lead/Manager	HSE site	HSE corporate	Quality control	Corporate assurance	Human resources	Finance	Procurement	Operational authority	Manager/Superintendent	GM/Site manager	Leaders/MD/CEO	General board member	Board chair	Safety committee chair	Process safety specialist board member
Safety in design	1	1	1	2	4	2	2	2		1	2	1	1	N/A	1	1	1	1	1	1	1	1	1	1
Asset integrity	2	2	2	4	4	2	2	2	3	1	2	1	1	N/A	N/A	1	3	3	2	1	1	1	1	2
Codes and Standards	1	1	2	2	3	2	N/A	3	4	2	4	1	N/A	1	N/A	N/A	N/A	2	2	1	1	2	1	3
Management of change	1	1	2	3	3	2	2	2	3	2	4	2	1	2	1	2	3	3	2	2	1	1	2	2
Human factors	2	2	3	1	4	2	N/A	3	3	3	4	1	N/A	2	N/A	N/A	N/A	2	2	1	1	3	3	4
Systems, manuals and drawings	1	1	3	4	4	4	N/A	2	3	1	3	4	N/A	N/A	N/A	N/A	N/A	1	1	N/A	N/A	N/A	N/A	1
Process & operational status monitoring & handover	2	2	3	2	4	1	N/A	1	1	1	1	N/A	N/A	N/A	N/A	N/A	N/A	3	1	1	1	1	1	1

iSHEcon

UK IChemE ISC – COMPETENCY FOCUS

Table 1: Development areas

Learning and Development Area	Typical Development Activities
Learning through experience	Expanding your scope of work Applying learning in real situations Learning through new experiences
Learning through others	Receiving feedback Structured mentoring and coaching (both giving and receiving) Communities (eg industry groups, forums, conferences etc)
Learning through education	Formal training individual training education Professional qualifications and accreditation

From – IChemE ISC – PS Competency Guide –Supplementary Guide 2019

iSHEcon

ELEMENT - ORGANIZATION AND PERSONNEL: ASPECT - PSM COMPETENCY

INTERNAL AUDIT
MANAGEMENT REVIEW
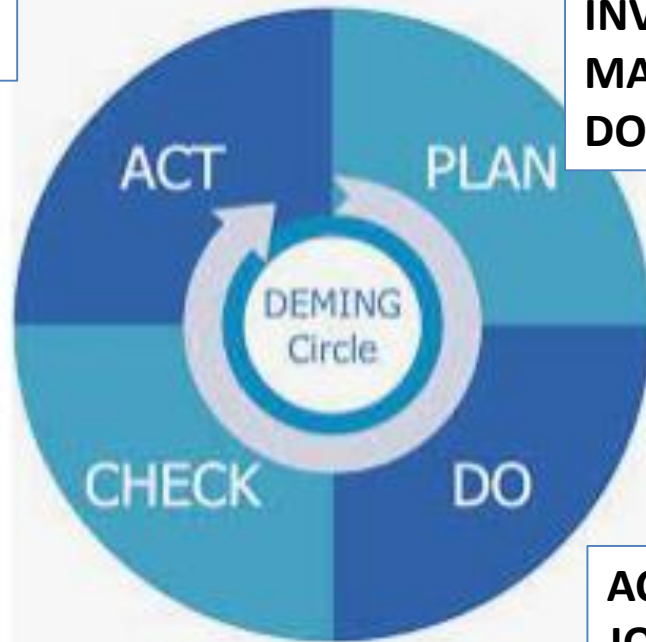
DEFINE ROLES
INVESTIGATE PSM COMPETENCIES
MATRIX
DOCUMENT PROCEDURES

GAP ANALYSIS
TRAINING KPIs

ACTUAL IMPLEMENTATION
JOB DESCRIPTIONS
APPOINT PERSONS
TRAINING PROGRAMS

iSHEcon

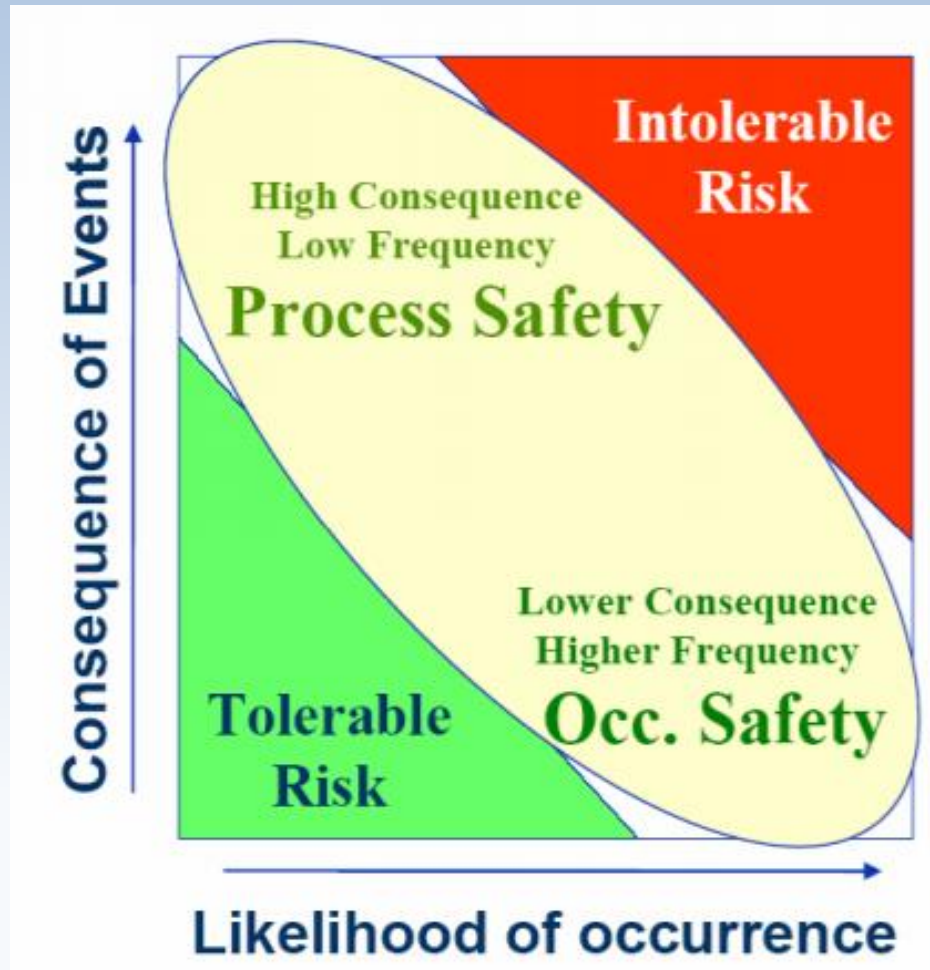# OCCUPATIONAL SAFETY AND PROCESS SAFETY

OCCUPATIONAL SAFETY AND PROCESS SAFETY

INTER-TWINED
INTER-DEPENDANT

Yet different

OCCUPATIONAL SAFETY AND PROCESS SAFETY

OCCUPATIONAL SAFETY AND PROCESS SAFETY

Occupational safety is focused on the safety, health, and **welfare of people at their workplace**, often referred to as hard-hat safety. It deals with things such as personal protective equipment (PPEs), noise exposure, vehicle accidents, slips, trips, and falls.

Process safety goes **beyond the confines of a workplace** and into the surrounding community. Its focus is on preventing catastrophic accidents from events such as the unintentional release of hazardous materials, fires, gas leaks, explosions, or structural collapses.

OCC S vs PSM – ELEMENT – PERMIT TO WORK

Occupational Safety – ELEMENT – PERMIT TO WORK

Companies often implement "Life Saving Rules".

These are introduced and managed as a set of <u>non-negotiable simple requirements</u>.

<div style="background:#F5B183;color:#C00000;font-weight:bold;text-align:center">No Permit No Work</div>

Process Safety - ELEMENT – PERMIT TO WORK

Both the design and the practical situation need to be taken into account.

Needs more flexibility.

Has to rely <u>more on advanced understanding and competency</u>.

<div style="background:#F5B183;color:#843C0C;font-weight:bold">How should we design and manage the Permits for this site</div>

iSHEcon

OCCUPATIONAL SAFETY AND PROCESS SAFETY

"An airline would not make the mistake

of measuring air safety

by looking at the number of routine injuries

occurring to its staff..."

Lessons from Longford – Andrew Hopkins, 2000

iSHEcon

THANK YOU

- CCPS   www.ccpsonline.org
- CSB   www.csb.gov
- IChemE Safety Centre www.icheme.org
- EPSC   www.epsc.org