

THINK DIFFERENTLY

CHANGING BEHAVIOURS AND DECISION
MAKING TO PREVENT MAJOR ACCIDENT
HAZARDS INVOLVING DANGEROUS
SUBSTANCES



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INTRODUCTION

Process safety events (PSEs) can devastate organisations. At DEKRA we are determined to raise awareness of major accident hazards and help organisations understand through education and coaching how their decision making, behaviours, and interactions with systems and processes can collectively support catastrophic event prevention.

In many of the diagnostics undertaken at Major Accident Hazard sites, we have identified missing or ineffective barriers designed to guard against major incidents. This suggests high potential of a major incident as the organisation doesn't have the ability to prevent, detect, control, mitigate, rescue, or recover from something potentially catastrophic. Moreover, the level of understanding of process safety management and its concepts is often poor, especially among individuals closest to the hazards.

When frontline personnel lack the knowledge and skills to effectively control process safety risks, it is usually indicative of a Control of Major Accident Hazards (COMAH) plan primarily designed to satisfy regulations as opposed to strengthening team decision making and safe behaviours. Frontline workers need to be fluent in the content of this crucial document in order to turn the organisation's intent into the kind of action that is fundamental in creating a high-functioning culture of process safety.

We encourage leaders in high hazard industries to advance employee understanding of key process safety activities and ensure the workforce has the resilience and cultural support needed to prevent major accidents.

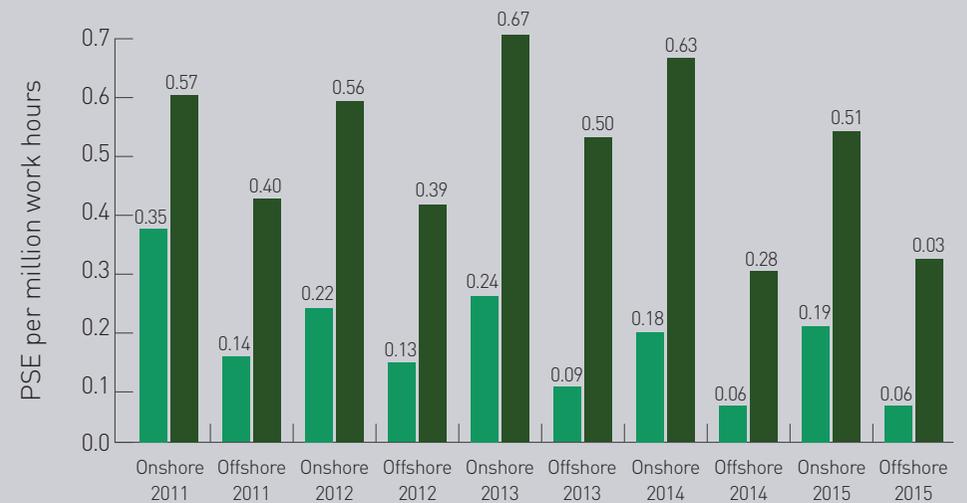
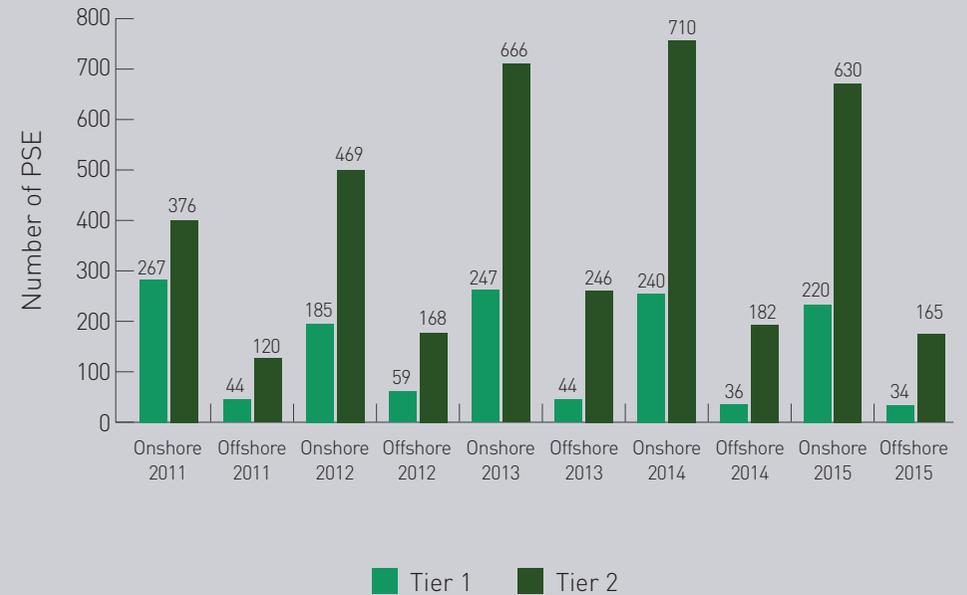
This eBook discusses an approach to developing the kind of resilience and cultural support needed to operationalise COMAH plans that control the risk of such hazards in a high hazard industry setting.

Why is Major Accident Hazards Prevention essential at high hazard sites?

Although catastrophic events like Texas City, Buncefield, and Richmond refinery are rare, their underlying causes continue to put not only oil and gas organisations at risk, but all high hazard sites that store and process threshold quantities of dangerous substances and chemicals.

In 2016, the International Association of Oil and Gas Producers (OGP) published their annual Safety Performance Indicators report outlining the number and causes of process safety events in 2015. It reported:

- a higher rate of PSEs for Tier 2 COMAH sites than for Tier 1 COMAH sites although they handle a lesser quantity of dangerous substances than Tier 1
- an onshore Tier 1 process safety event rate (PSER) is 2.5 times bigger than offshore Tier 1 PSER, and onshore Tier 2 PSER is 1.6 times bigger than the offshore Tier 2 PSER. The higher PSER onshore than offshore has been consistently reported by OGP.
- 254 (rate 0.14) Tier 1 events or loss of primary containment (LOPC) with the greatest consequences, and 795 (rate 0.44) Tier 2 events or LOPC with lesser consequences.



Source: OGP's Safety performance indicators – Process safety events – 2015 data report.

What role does Workforce Capabilities play in Major Accident Hazards Prevention?

In the same publication* OGP also reported the causal factors of Tier 1 events. Included in the top 10 causal factors were:

- Inadequate hazard identification or risk assessment
- Improper decision making or lack of judgement
- Violation of procedures (unintentional)
- Inadequate protective systems (warning systems, protective barriers etc.)
- Inattention/lack of awareness

Clearly, these findings indicate a real need for high hazards sites to reflect on their workforce capabilities. Do they have the right people with the right skills, knowledge and understanding to effectively manage the risks from Major Accident Hazards? Are all organisational elements aligned to support process safety and operationalise their COMAH plan? Is there a sufficient level of chronic unease to ensure success has not gotten in the way of diligence?

Effectively meeting COMAH standards and preventing major events requires organisations to strengthen workforce capabilities around process safety competency, risk management, and recognition of weak signals or warning signs—all characteristics of a **resilient organisation**.

COMAH REGULATIONS MAINLY APPLY TO THE FOLLOWING HIGH HAZARD INDUSTRIES:



Oil and Gas



Chemical



Petrochemical



Construction



Refining



Mining



Industries that handle dangerous substances, including agrochemicals, propellants, flammable liquids, or alcohol

*OGP's Safety performance indicators – Process safety events – 2015 data report.

What are the characteristics of a Resilient Organisation?

Resilience is the organisation's ability or capacity to prevent or recover quickly from an undesired event.



The three aspects of resilience* is the organisation's ability to:



Fundamental to this is a proactive mindset in that it views safety not as the absence of incidents but as the presence of barriers. Those within the organisation have an understanding of these barriers and a motivation to ensure their presence and efficacy.



*Westrum, R. (2006) 'Resilience typology.' In E. Hollnagel, D. Woods, and N. Leveson (eds). Resilience Engineering: Concepts and Precepts. Aldershot: Ashgate Publishing (p.59).

1. Preventing something bad from happening

Organisations that are able to predict danger and are therefore able to anticipate and manage the risks from that danger exhibit the following characteristics:

SAFE AND WELL-MAINTAINED EQUIPMENT

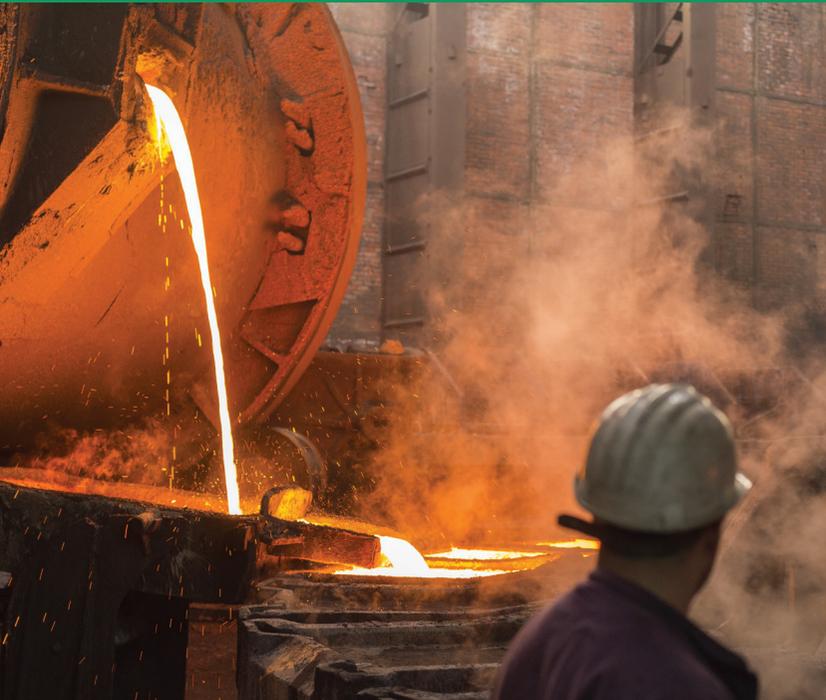
Plant and equipment is designed to assure safety continuously. Detection systems such as flame, smoke, and gas detectors, over- and under-pressurisation sensors, safety valves, and automatic trip and shutdown systems. These devices constantly monitor for danger and intervene when needed.

OPERATIONAL DISCIPLINE

Safety is supported by well-formed processes and procedures, such as: HAZOPS (hazard operability study), HAZID (hazard identification study), FMEA (failure modes effect analysis), risk assessments, permit to work.

A COMMITTED AND COMPETENT WORKFORCE

Employees exhibit proactive decision making and behaviour, including chronic unease or the state of constant wariness towards risk management. The workforce should be well-trained, well-informed, and capable of challenging biases and showing healthy scepticism around safety decisions.



2.

Preventing something bad from becoming worse

Organisations capable of maintaining control when something goes wrong, or bouncing back when it does, exhibit the following characteristics:

EFFECTIVE PLANT MAINTENANCE

Equipment does what it is designed to do, even when the asset is compromised.

DYNAMIC PROCESSES

Procedures are designed in a way that motivate a verification and check mindset in those who use them.

PEOPLE ARE MINDFUL

Active monitoring is “how we do things” and interventions are expected and delivered. Employees are active change agents; when they see something, they intervene to stop something bad becoming worse.



3. Recovering from something bad once it has happened

When things do go wrong, resilient organisations show the following characteristics:

EMERGENCY PROCEDURES WORK EFFECTIVELY

Protocols support competence, capability, and capacity to recover from the situation.

INDIVIDUALS KNOW WHAT TO DO

Those closest to the hazards know how to respond to low-probability, high-consequence events with confidence and care.

THERE'S A POSITIVE LEARNING ENVIRONMENT

Leaders engage in an open process to discover what went wrong and ensure lessons learned are applied to the site and across the organisation.

At DEKRA, we have applied these aspects of resilience as laid out by Westrum, when creating a framework for a Culture of Care that helps strengthening resilience.



How can you strengthen an organisation's resilience?

Organisations can build resilience against a PSE by increasing the level of care demonstrated by people in their decision making and behaviour.

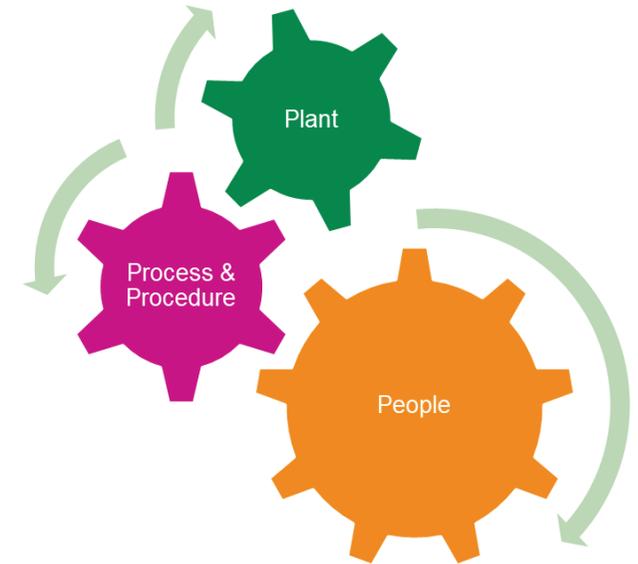
For us care does not only mean care for



A Culture of Care is one in which those working within it are collectively motivated to show interest in, and concern for, what is important. This mindset is evident through the decision making, behaviour, and language of leaders — the owners of the culture. It is felt by everyone who comes in contact with it: employees, contractors, and visitors, alike.

A Culture of Care motivates discretionary effort, values that procedures are understood and functionally applied, and expects people to protect each other from harm.

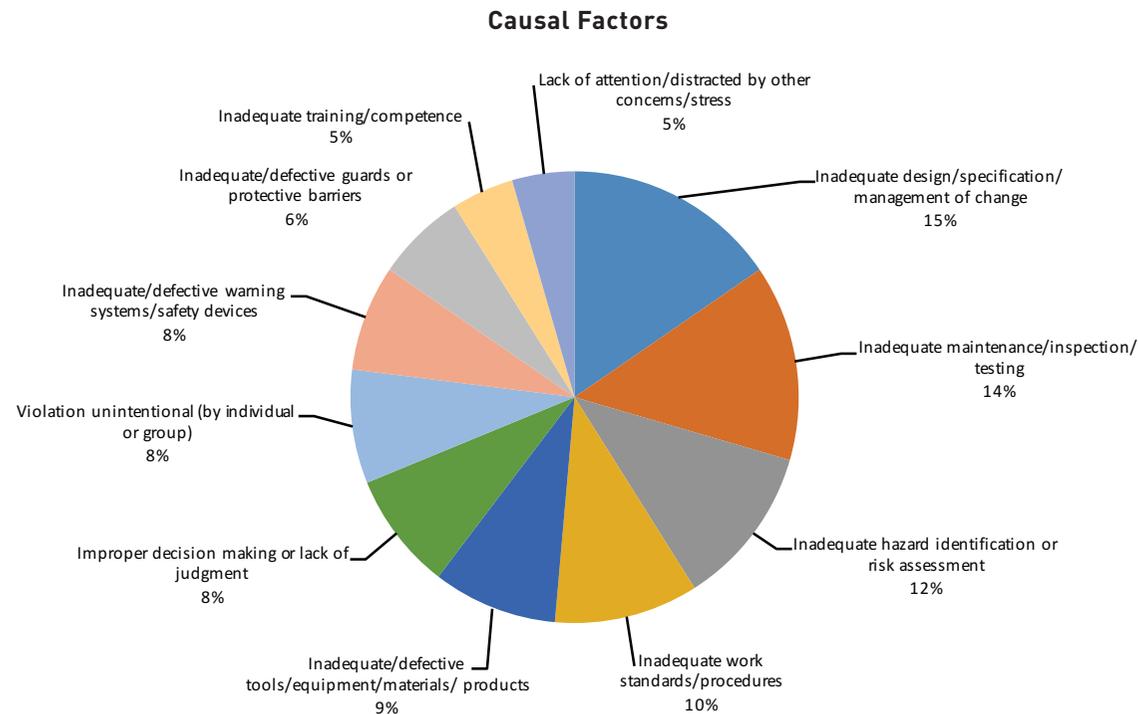
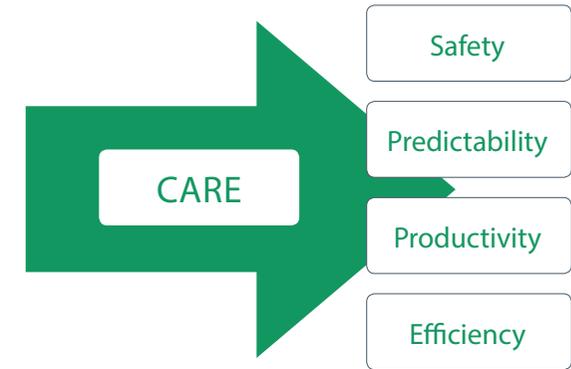
Fundamental to a Culture of Care are proactive behaviours rooted in an understanding that safety is not the absence of incidents but the presence of barriers. Those within the culture are both educated and fully informed of the barriers to prevent harm and are motivated, resourced, and led to ensure the efficacy of those barriers.



Why a Culture of Care can benefit your organisation?

The International Association of Oil and Gas Producers (IOGP) annual Safety Performance Indicators report in 2016 outlined the causal factors of process safety events (PSE). They all fall into at least one of the three elements of the Culture of Care: people, systems and processes, and plant equipment.

If care was demonstrated in these areas, the causal factors may not have existed and the process safety event could have been avoided. Furthermore, when care is demonstrated, organisations can also gain greater productivity, predictability, and efficiency in how things and people work. This drives the resiliency necessary to prevent, control, and respond to upset conditions.



What are the dimensions of Culture of Care?

The Culture of Care framework developed at DEKRA is based on research and our experience to help strengthen organisational resilience in preventing, controlling, and responding to upset conditions.

Senior managers often see a diagnostic or audit as a means of providing the “assurance” that things are as they should be. The problem with this approach is that when asking for assurance, that is usually what is given. Those carrying out the diagnostic may use euphemisms such as “improvement opportunities” or “challenges.” If the task is to provide some overall assessment of how well the organisation is being managed, the chances are the assessment will be positive*.

Leaders who want to go beyond “assurance” and pinpoint the unrecognised problems that may be lurking beneath the surface need to avoid any suggestion that they are asking for assurance that the system is functioning as intended. One way to overcome this is to identify the most significant safety issues confronting the organisation or site. The DEKRA diagnostic is executed using this principle.*

Authentic Leadership

The ability to create followers through genuine impact and understanding

Control of Work

Doing what we say we will do by having integrity in how we deliver work

Learning & Development

How competence is assured, how the individual and the organisation learn

Communication

Understanding and being understood, through meaningful dialogue and information-sharing

Role of the HSE Function

The role HSE plays

Workforce Engagement

The level of involvement by the workforce in HSE issues

*Hopkins, A., (2009). *Failure to Learn: the BP Texas City Refinery Disaster*. Sydney: CCH Australia Limited.

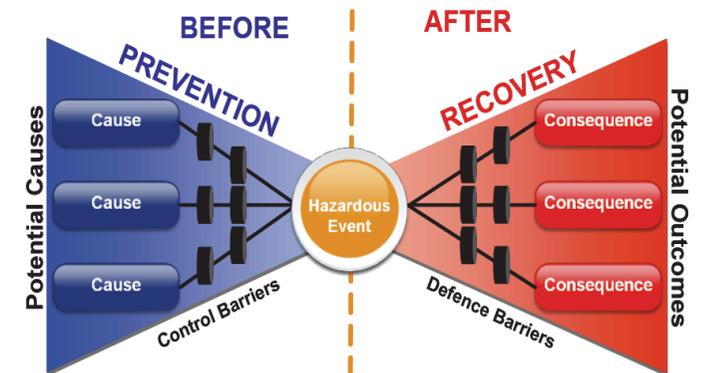
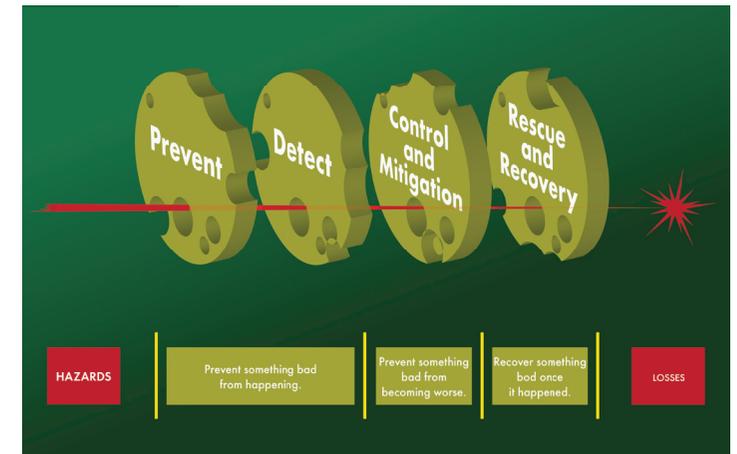
How can you leverage Barrier Models to Create a Culture of Care?

“Safety is not the absence of incidents but the presence of barriers.”

A barrier mindset understands that layers of protection are needed to defend against hazards. Barriers are “things”— plant and equipment, processes and procedures, or behaviours — that prevent a hazard from becoming an “event”, reduce the consequence of the event, or help the organisation recover after an event has happened.

This mindset understands that different barriers have different levels of effectiveness, and that prevention barriers are more robust and effective than mitigation barriers. They also understand that, as barriers are removed, the cumulative risk increases.

There are many barrier models that organisations can use to educate their people on the prevention of something bad from happening. Two examples of barrier models are James Reason’s Swiss Cheese Model and the bowtie—both do the same thing; they illustrate the barriers between a hazard and an event.



Why is Commitment to Care and Resilience important?

Almost every safety culture report states management’s commitment to safety to be amongst the top influencers on a safety culture. It is also a top cause of process safety events.

This finding was applied in our approach in creating a framework for a Culture of Care. With leaders demonstrating to the workforce their commitment to safety through their own behaviour and how they make decisions, the Culture

of Care increases and the workforce itself begins exhibiting the right behaviours. As the Culture of Care develops and expands, people look out for one another more and demonstrate greater commitment toward systems and processes, and their plant and equipment, thus ensuring all barriers to prevent something bad from happening are functioning effectively.

A lack of the demonstration of care can ultimately lead to resilience against process safety incidents.

THE RELATIONSHIP AND SIMILARITIES BETWEEN THE FACTORS WHICH INFLUENCE A SAFETY CULTURE (AND A CULTURE OF CARE) AND THE CAUSAL FACTORS OF PROCESS SAFETY INCIDENTS.

FACTORS WHICH INFLUENCE A SAFETY CULTURE

Management/Supervision

Commitment, actions, concern

Safety systems

Safety communication, safety instructions, PPE, the safety department

Risk

Risk perception, safety measures, accident causation beliefs

Work Pressure

Safety V production, work pace, stress, conflict

Competence

Safety training

Procedures/Rules

Existence and effectiveness

CAUSAL FACTORS OF PROCESS SAFETY INCIDENTS

Management/Supervision

Failure to plan, manage safety, prepare for an incident

Safety systems

Communication failure, ignoring “lessons learned”, asset integrity

Risk

Failure to identify risks, failure to implement procedures, failure of primary and secondary barriers, failure to inspect plant/facilities

Work Pressure

Reliance on human response under pressure, competing pressures

Competence

Failure to train personnel and contractors, failure to recognise and react to early warning signs, failure in emergency response, failure to respond to an incident

Procedures/Rules

Lack of written procedures, procedures unsafe, non-adherence

CLOSING

The purpose of the COMAH Regulations is to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any accidents which do occur. The intent of the regulations is clear, however turning that intent into action will be dependant on the decision making and behaviour of those operationally involved.

When major accidents occur, they do not only change people's lives - they also impact organisational reputation. It is important that in locations where major accident hazards exist, the risks from these hazards are managed and controlled. A Culture of Care is one where those within the organisation have a deep understanding of what it takes to prevent low probability yet high consequence incidents. A culture that behaves, makes decisions and operates on the principle that safety is not the absence of incidents but the presence of barriers, is operating at a level of maturity where safe outcomes become the norm. A Culture of Care socialises an approach to managing major accident hazards that assures barriers are in place and function, providing a level of resilience that is beyond a compliance approach.

DEKRA Organisational & Process Safety

DEKRA Organisational and Process Safety are a behavioural change and process safety consultancy company. Working in collaboration with our clients, our approach is to assess the process safety and influence the safety culture with the aim of 'making a difference'.

In terms of behavioural change, we deliver the skills, methods, and motivation to change leadership attitudes, behaviours and decision-making among employees; supporting our clients in creating a culture of care and measurable sustainable improvement of safety outcomes is our goal.

The breadth and depth of expertise in process safety makes us globally recognised specialists and trusted advisors. We help our clients to understand and evaluate their risks, and work together to develop pragmatic solutions. Our value-adding and practical approach integrates specialist process safety management, engineering and testing. We seek to educate and grow client competence to provide sustainable performance improvement; partnering with our clients we combine technical expertise with a passion for life preservation, harm reduction and asset protection.

We are a service unit of DEKRA SE, a global leader in safety since 1925 with over 45,000 employees in 60 countries and 5 continent. As a part of the world's leading expert organisation DEKRA, we are the global partner for a safe world. We have offices throughout North America, Europe, and Asia.

For more information, visit www.dekra-uk.co.uk/en/dekra-organisational-and-process-safety/

To contact us: dekra-ops.uk@dekra.com

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Please contact us at DEKRA for a consultation to better understand how we can support your efforts to operationalise your COMAH Plan.

Would you like to get more information?

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