



***Serious Injury & Fatality:***  
***Where Occupational Safety, Organisational Safety and Process Safety Collide***

Whitepaper DEKRA Consulting

# THE 3 SAFETY DISCIPLINES



Serious Injury and Fatality (SIF) events are a major concern in all industries. These incidents can result in or have the potential to produce fatal or life-altering injuries or illnesses. By prioritising safety and allocating resources towards education, systems, and processes, employers are able to enhance their chances of averting SIF events. Nevertheless, it is crucial that these investments are directed specifically at identifying and mitigating SIF-related risks, rather than being dispersed in an undifferentiated manner.

To mitigate SIF events, it is essential to work on the three safety disciplines: **occupational safety, organisational safety and reliability** and **process safety**.

**Process safety** takes care of flammability, reactivity and loss of containment events, requiring a high degree of expert knowledge in understanding, quantifying, and then mitigating the risk.

**Organisational safety and reliability** focus on the human factor element - behaviour, culture, leadership, systems.

**Occupational safety** refers to the practices used to protect workers from hazards on the job. A safe working environment includes ensuring machinery is properly maintained, personal protective equipment is correctly specified and used, and safety procedures are in place.

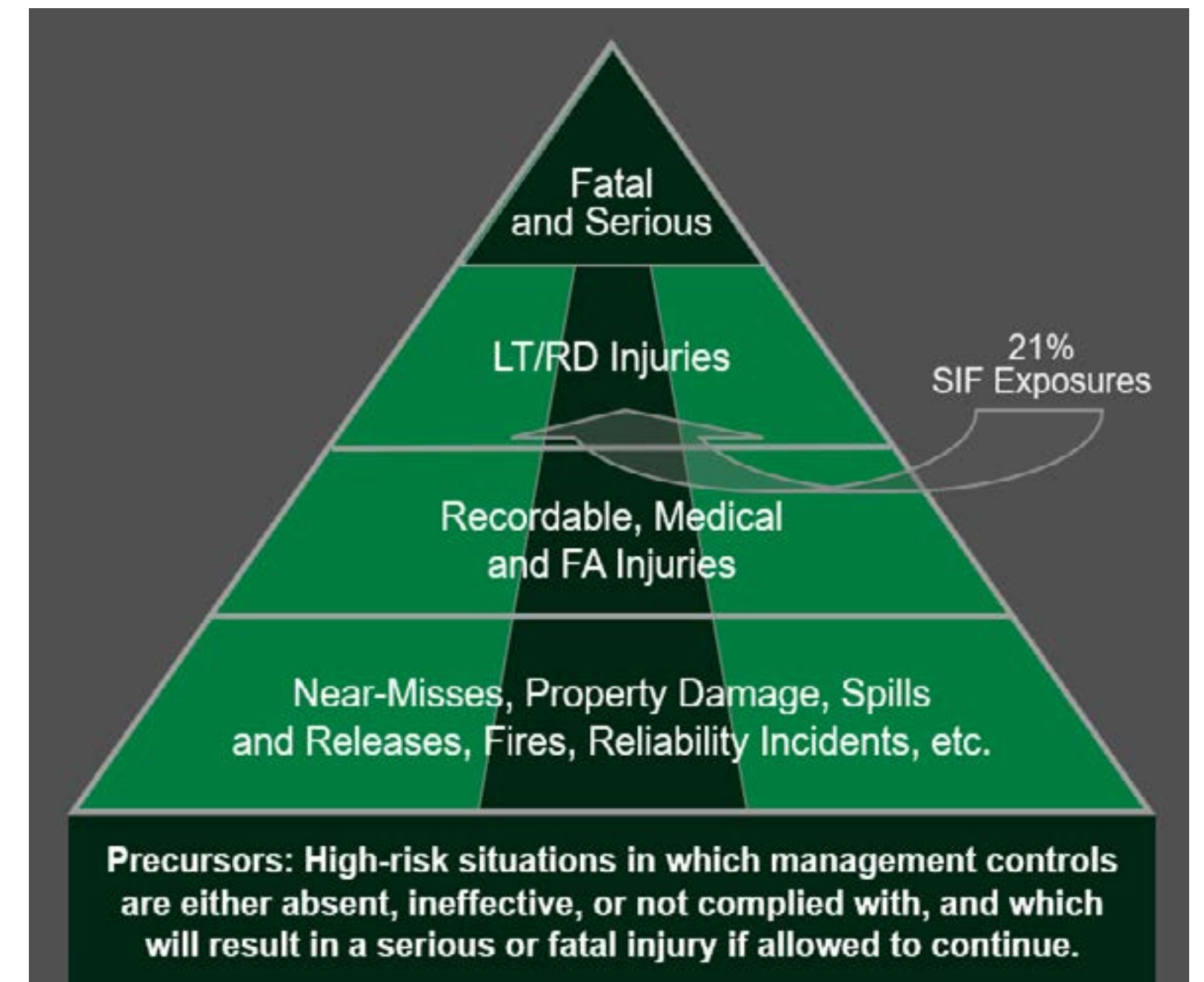
### **The method used by DEKRA**

DEKRA has been actively analysing historical data to identify and differentiate SIF exposures from more trivial safety exposures. The methods devised through this analysis emphasise the need to target and reduce the occurrence of SIF accidents. It has been determined that a successful approach requires the simultaneous and integrated application of the three key disciplines mentioned. The old method based on Heinrich's safety triangle, suggested that by working indiscriminately on the base of the triangle, the number of fatal accidents at the apex of the triangle can be reduced. This old paradigm has been considered true for more than 80 years in safety science.

The paradigm, however, highlights that causes and correlates of SIFs are different from non-SIFs. In other words, an indiscriminate reduction in less serious injuries does not necessarily correspond to a proportionate reduction in SIFs. It is also important to note that global organisations often use metrics that heavily emphasise recordable injury rates when evaluating the effectiveness of their safety management practices. This approach is flawed as it is based on the traditional safety triangle model, which assumes that reducing minor incidents will proportionally decrease major incidents, including those that can result in serious injury or fatality. As a result, leaders end up using the same metrics to evaluate all types of incidents, even though causes and outcomes can be vastly different. Finally, accident and near-misses reporting and investigation processes are key to understanding and mitigating the SIF exposure situation.

### **The Heinrich Triangle - Why is it outdated?**

While the Heinrich Triangle effectively illustrates that within any facility or company, minor incidents tend to occur more frequently than major incidents, when it comes to process safety, a different approach is necessary. Incidents in this area can have catastrophic consequences, so relying on lagging indicators, such as recordable injury rates is insufficient. Instead, a focus on leading indicators, such as near-miss investigations and infield verifications is essential in order to identify potential risks and prevent serious incidents from occurring.





In recent years, a perplexing injury pattern has emerged globally, where lost time injuries are decreasing steadily, while serious injuries and fatalities are either stable or increasing. This pattern is a direct contradiction of one of the fundamental models of modern safety science, Heinrich's safety triangle. The study has found that about 20% of recordable and lost-time injuries have the potential to be serious, and the underlying causes and correlates of these injuries are different from those of less serious injuries. Therefore, an indiscriminate reduction in less serious injuries does not necessarily correspond to a proportionate

reduction in serious injuries and fatalities. The study group has identified four elements that companies can do to prevent serious and fatal injuries, including educating the organisation on the new model, measuring serious injuries, fatalities and high potentials as one category, developing processes to identify and mitigate serious injury precursors, and integrating the findings of this study within existing safety systems. Finally, it is important to note that accident, near-misses reporting and investigation processes are key to understanding and mitigating the serious injury and fatality exposure situation.

## **Know your SIF Precursors**

Preventing serious injury and fatality in the workplace is a complex task that requires a multi-faceted approach. To understand and mitigate SIF events, it is crucial to understand the precursors that can lead to them. Precursors can be hidden in various areas of the organisation and may include situations like equipment failure, human error, or a failure to follow procedures. Identifying and understanding these precursors is key to reducing the risk of SIF events.

**Employers have a legal and moral responsibility to provide a safe working environment for their employees. Strategies to reduce the number of accidents include increasing awareness and education, implementing laws and regulations, as well as investing in research and development. As an example, employers can provide training and education for their employees on how to safely perform their jobs and their required tasks, but also on how to use the equipment and implement safety protocols such as regular safety inspections and hazard assessments.**

# PROACTIVE PREVENTION PROCESS

# REACTIVE PREVENTION PROCESS

## *A Proactive Path*

In DEKRA, two different paths are followed in the prevention process: reactive and proactive. The reactive path analyses all types of accidents for SIF potential, work on the incident investigation, do a precursor analysis, then apply corrective actions using the established hierarchy of controls.

The proactive path refers to working on high-risk situations and conducting infield verifications so that organisations deal and use the data to provide and develop actions using hierarchal controls.

Working on a reactive path to address SIF events is important, but it is not enough. This includes things like implementing robust safety systems, regular safety inspections and hazard assessments. By proactively identifying and addressing hazards, organisations can reduce the risk of SIF events before they occur.

# Must Do's to Eliminate SIF Events



## 1. Education

Senior leaders must be educated so that they can properly address SIF events.

## 2. Visibility

A decision tree is of great importance - a knowledgeable team for both occupational and process safety

## 3. Planning

Knowing the SIF precursors and properly addressing them

## 4. Integration

Integration into Safety Management System and Infield Verifications

### Must Do's to Eliminate SIF Events:

**1. Education** - Leadership needs to understand the nuances of SIF events. By ensuring that senior leaders receive proper education, they will be better equipped to address and manage these incidents effectively.

**2. Visibility** - Providing visibility to SIF exposure, either life-threatening or life-altering. This is followed by developing a logic system to properly classify any accident, and its calibration being based on data. Having a decision-tree is of mandatory importance in this process - a knowledgeable team for both occupational and process safety.

**3. Planning** - Knowing your SIF precursors. A SIF precursor is a high-risk situation in which management controls are either absent, ineffective, or not complied with and which will result in serious or fatal injury if allowed to continue in the same manner.

**4. Integration** - Integrate interventions into existing SMS (Safety Management Systems). When investigating an accident, all findings and conclusions need to be integrated into the safety management system such as Incident Management System, SIF Metrics, FVCC (Infield verifications), SIF education and training, pre-task risk assessment, pausing work, contractor management, life-saving processes, and other systems. This combined with the intervention based on infield verification data (culture, leadership, employee engagement), proactive action planning (use of the HOC, strong process safety management) and precursors identified in incidents (high risks, management controls, allowed to continue)

### ***SIF EXPOSURE - The conclusions***

The most significant study regarding SIF events was made in 2009 by seven companies working in different sectors. They studied more than 1000 cases of SIF and reached the following conclusion:

1. Assessing SIF exposure is crucial for any organisation. Moreover, a reliable system with well-defined rules should be employed to measure the potential for SIF incidents, enabling the organisation to gauge the extent of SIF exposure in relation to potential accidents.
2. Used in the field of safety science for over 80 years, the safety triangle tool categorises minor incidents at its base. Whilst the safety triangle is correct descriptively, it does not differentiate minor incidents with potential to be serious incidents.
3. SIF events can only be mitigated by working on the three safety disciplines.
4. As any other critical system implementation, SIF prevention requires the involvement of senior leaders, as well as integration into existing management systems.

## 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 continents. 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/](http://www.dekra-uk.co.uk/en/dekra-organisational-and-process-safety/)

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