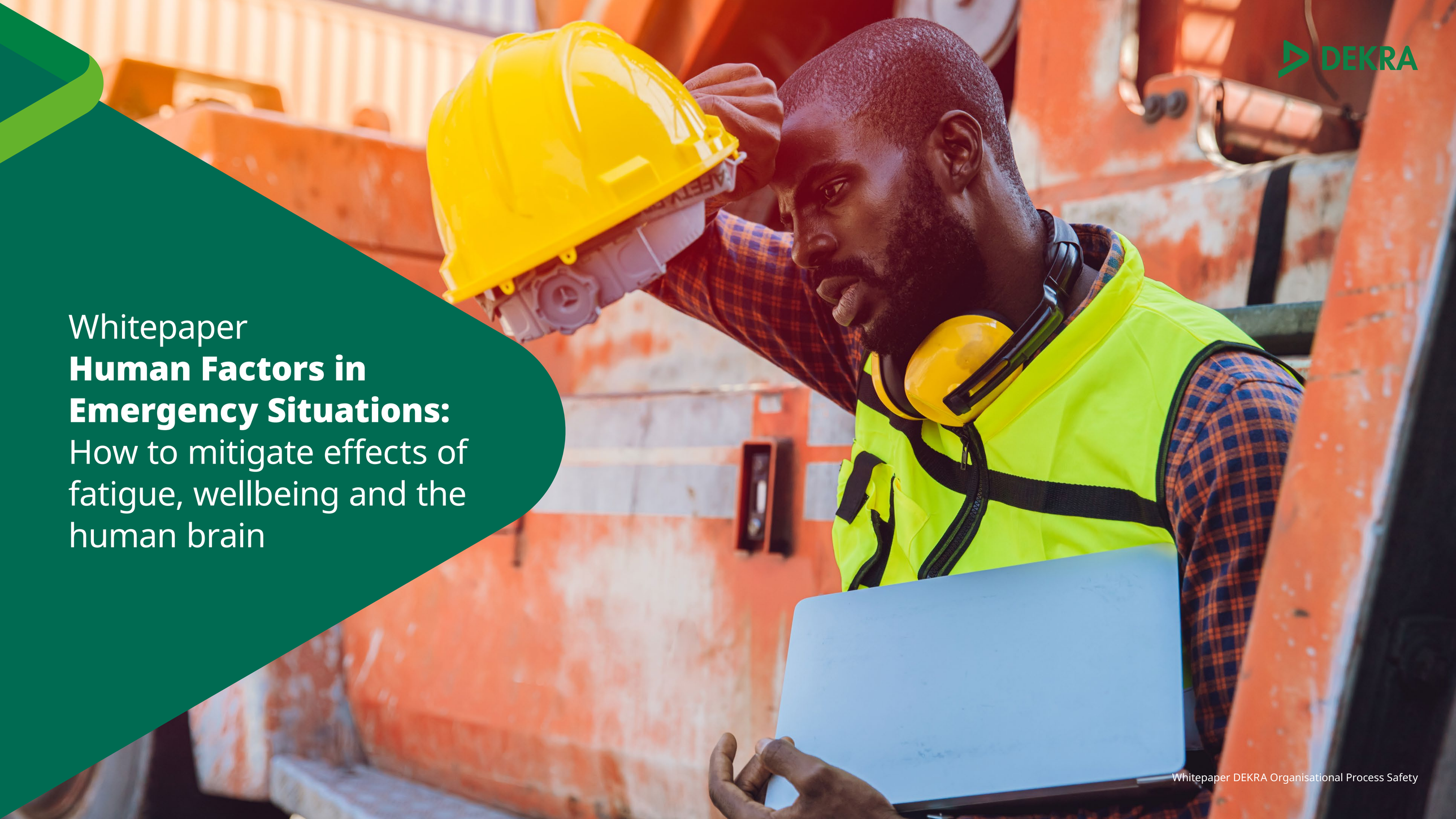

Whitepaper

Human Factors in Emergency Situations: How to mitigate effects of fatigue, wellbeing and the human brain

Fatigue is considered to be one of the root causes of accidents such as **Chernobyl, Texas City** oil refinery explosion or **Exxon Valdez** oil spill

Fatigue

Studies have shown that ‘a fatigued worker has approximately a 62% higher risk of accidents’ (Uehli, K et al, 2014). Fatigue is considered to be one of the root causes of accidents such as Chernobyl, Texas City oil refinery explosion or Exxon Valdez oil spill. It is very clear that effective fatigue management can save lives, assets and the environment.

In order to mitigate the effect of fatigue, it is crucial to understand what fatigue is, what are possible causes and how it impairs performance.

Fatigue can be described as a state of physical or mental exhaustion resulting from prolonged periods of physical or mental activity, inadequate rest or sleep, or a combination of both. Fatigue can manifest in various ways, including physical tiredness, lack of motivation, difficulty in staying awake or focused, slower reactions, and diminished decision-making abilities.

Fatigue can be caused by elements at work such as working shifts outside the normal circadian rhythm when alertness is compromised, excessive heat, poor lighting, high noise levels, vigilance decrement or monotony. Workers can also be impacted by factors outside of work, such as lack of sleep, stress or family commitments.

By **minimising fatigue** amongst the workers, it is possible to **minimise the consequences** that lead to incidents and crises

Research shows that some working patterns result in less fatigue than others. If adjusting the shifts is not possible, it is crucial to allow sufficient recovery time. It has been found that accident and injury risk is higher on night shifts, after a succession of shifts, when shifts are long or when there are not enough breaks.

By minimising fatigue amongst the workers, it is possible to minimise the consequences that lead to incidents and crises – underestimation of risk, slower reactions, lack of attention or reduced ability to process information.

Working during circadian 'nadir' when sleep propensity is maximised and alertness is compromised.

Vigilance decrement: The quality of attention declines over the period spent watching or monitoring the display or situation.

Tasks which lack complexity or interaction can quickly become boring, leading to decreased attention, concentration and increased fatigue.

Excessive heat, poor lighting, high noise levels and high levels of vibration can all lead to fatigue.

In the UK, an estimated **17 million working days** were lost due to work-related stress, depression, or anxiety in 2021/22

Wellbeing

When employees feel cared for, appreciated and able to speak openly and freely within an organisation, a higher level of Psychological Safety exists and a reduction in exposure to physical and mental risk is achieved.

In the UK, an estimated 17 million working days were lost due to work-related stress, depression, or anxiety in 2021/22 which amounts to over half of all lost working days. There were an estimated 914,000 cases of work-related stress, depression, or anxiety in 2021/22. These numbers show that there is a crisis in the wellbeing and mental health of the population. The effects of stress, depression, and anxiety can have a significant impact on an employee's life and on their ability to perform tasks at work.

Everybody's capacity to manage stress is different, which underlines the need for an individualised approach to stress management within organisations. Research (Champion health) shows that by far the most common source of stress for employees is workload, with other commonly mentioned issues including lack of support, lack of control and senior staff members' demands.

Protecting your employers from work-related stress makes sense from a moral, legal and financial standpoint. Employee wellbeing should be a priority for every organisation and organisations have a legal duty to respond to cases of work-related stress. From a business angle, work-related stress can cost the UK billions. **New mental health research conducted by Deloitte** has revealed that it can cost employers up to £56bn in 2020-21 compared to £45bn in 2019. There are many ways that organisations can aim to reduce workplace stress, from learning to recognise the symptoms of stress, addressing mental health in staff appraisals, understanding how to respond on a personal level, signposting to internal and external resources, supporting in developing stress coping skills and helping manage workload.

Poor mental health, stress and anxiety can impact human behaviour, particularly in emergency situations. It can hinder cognitive functioning, including attention, memory, and problem-solving abilities, it can narrow an individual's focus, leading to tunnel vision which can result in a limited perception of the overall situation. It can also trigger impulsive behaviour and panic responses.

Thanks to the research, we have developed **solutions** that organisations can implement to **minimise risk and exposure**

Brain-Centric Reliability™

While effective systems and robust safety protocols are critical in managing various hazards, the human factor in decision-making processes remains a significant concern. The brain, remarkable as it is, has inherent tendencies that may lead to errors in judgement, often resulting in safety lapses.

Neuroscience, the study of the nervous system and the brain, provides insights into how the human mind functions, including why it occasionally errs. Often, these errors are attributable to certain brain characteristics called Brain-Centred Hazards™. Although such characteristics enable the brain to operate efficiently, they can paradoxically increase exposure to errors and potential injuries.

Thanks to the research, we have developed solutions that organisations can implement to minimise risk and exposure. The solution? **Making Safe Decisions®**, a human performance reliability service anchored in neuroscience. This solution provides tools and techniques to understand the role of the brain in recognising potential harm. By learning how the brain supports or hinders actions, safety leaders can optimise real-time high-performance reliability and prevent unplanned incidents.

In conclusion, Brain-Centred Hazards™ should not be an afterthought and understanding them is key to improving safety in an organisation. **Making Safe Decisions®** offers a neuroscience-backed approach to enhance human performance, optimise real-time decision-making, and ultimately create a safer working environment. Human brain's role in safety is not only striving for zero harm but also laying the foundation for a more resilient, effective, and efficient operation.

7 Brain-Centered Hazards™

1. **Fast Brain Functioning**
   Conducting important tasks without conscious thought and reliance on habits.
2. **Visual Recognition**
   Missing important information due to the human visual system.
3. **Divided Attention**
   Attempting to multi-task leads to missed information and error.
4. **Memory**
   Operating on information that feels correct in the moment and relying on our memory system.
5. **Social Think**
   Our inner need to go along with our group/tribe prevents us from approaching others.
6. **Fatigue**
   When our brains or bodies are fatigued our risk for error increases significantly.
7. **Stress & Urgency**
   When we notice hints of urgency from others, we put pressure on ourselves to complete tasks.

Conclusion

In the face of emergencies, decision-making is of utmost importance. The relationship between fatigue, wellbeing, the human brain, and decision-making in emergency scenarios is critical. By recognising the impact of fatigue on performance and accidents, organisations can implement effective fatigue management strategies. Prioritising employee wellbeing and creating psychologically safe workplaces reduces stress, anxiety, and the associated risks to emergency response. Furthermore, understanding brain-centric hazards and utilising neuroscience-backed solutions can minimise errors and enhance human performance in real-time emergencies.

By addressing these interconnected factors, organisations can create a safer and more resilient working environment. Through these efforts, organisations can strive for zero harm, reduce risks, and cultivate a culture of safety and performance excellence. Ultimately, by integrating these strategies, organisations can establish a foundation for long-term success, resilience, and improved operational outcomes in emergency situations.

DEKRA Organisational & Process Safety **Contact**

DEKRA Organisational and Process Safety are a behavioral 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 behavioral change, we deliver the skills, methods, and motivation to change leadership attitudes, behaviors, 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 understand and evaluate their risks, and we work together to develop pragmatic solutions. Our value-adding and practical approach integrate specialist process safety management, engineering, and testing. We seek to educate and grow client competence in order 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 48,000 employees in 60 countries and five 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
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