SAFETY

Using emerging technology to drive the evolution of safety.

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>
> **James Pomeroy**
> Group Health, Safety, Environment and Security (HSES) Director at LR

Technologies of the fourth industrial age have the potential to transform safety, opening up new ways to save lives, prevent injuries and protect assets.

Every year, 2.8 million people around the world die because of workplace accidents or work-related diseases. Every day, over 6,000 people do not return home from work, and a further 860,000 are injured on the job. Apart from the emotional impact on loved ones, there is a significant economic burden. The International Labour Organisation (ILO) estimates that 4% of global GDP ($2.8 trillion) is lost due to the costs of poor occupational health and safety (OHS).

There is an urgent need for new approaches

In many developed economies, OHS performance has plateaued. James Pomeroy, Group HSES Director at LR, is not surprised: “How society thinks about risk and the methods used to keep people safe has not changed in decades, yet long held theories – such as the way to avoid serious accidents by focusing on minor incidents – are increasingly being challenged. While the number of minor injuries has fallen in almost all developed economies, the number of serious and fatal injuries has plateaued and is even increasing in some countries. We urgently need new technology and thinking because the ways that people lose their lives today are the same ways people were dying on the job 30 to 40 years ago.”

There is a burning need to rethink how we approach OHS and, importantly, to change attitudes towards safety risks. Dr Ruth Boumphrey, Director of Research and Strategic Programmes at the Foundation explains: “There should be a sense of outrage at the levels of fatalities and life-changing injuries. They are unacceptable and we should collectively aspire to achieve zero harm. This is the only way that we will drive the development of fresh approaches.”

Applying technology and data analytics

The technologies and data of the fourth industrial age offer new ways to keep people safe, and James Pomeroy sees a role for these in two primary areas. Firstly, evidential thinking: “We need to understand what the data is telling us, conduct pilot studies and increase research to understand what we know and – importantly – don’t know. The second aspect centres on how we apply technology. There simply hasn’t been a technological transformation in safety like we have seen in other areas. Indeed some organisations still use primitive control measures to keep people safe, such as paper-based processes. We also see lots of untapped sources of data, such as incident reports and inspection records, almost all of which cannot be analysed because they are not digital. In safety, we have lots of information, but lack real insight to improve performance. There is a need for more data-driven understanding and technology – such as fatigue monitoring or drone inspections – to be deployed to reduce risk.”

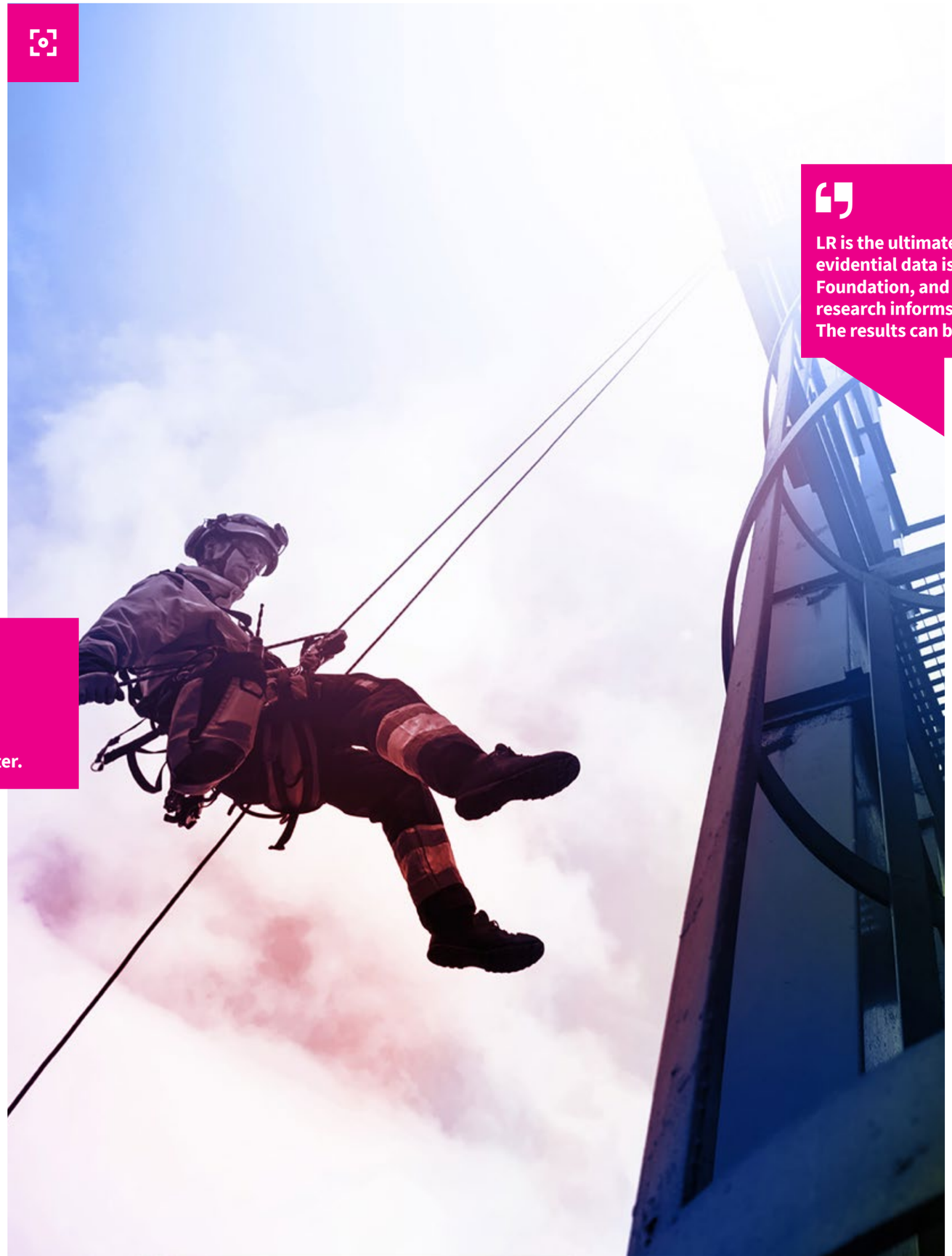
Understanding human factors

Many accidents originate from human behaviour, therefore an improved understanding of human factors and psychology is key to keeping people safe. For example, it’s staggering to think that a quarter of deaths in confined spaces involve people attempting to rescue others. There is a need to understand the limitations of people’s physical abilities, how humans behave in different environments, as well as personal risks related to fatigue or stress. Local cultures, standards and economics also play a part. Senior Principal Human Factors Consultant, Jo Stokes, outlines the breadth of LR’s work: “We bring together expertise from ergonomics, psychology, physiology, sociology, anthropometrics and biomechanics to enhance health, safety, usability, performance and user experience. For example, we identify at an early stage in the workplace design who will be on the ship bridge, their roles, the systems and controls they need to reach and in what sequence, who they will need to talk to and how to minimise errors.” As safety systems become more complex and interconnected, the immediacy and consequences of human errors will be much greater. Assets, such as vessels and refineries are becoming larger and more complex, and these will affect how people respond in an emergency. The application of human factors will help us better understand and counter potential errors within design, while also planning for emergencies.

However, instilling a zero harm culture is not a quick process. There need to be policies, procedures and supporting systems in place, as well as organisational factors around values and beliefs. Jo adds: “Applying our proven culture model that sets out the elements that need to work well, we identify areas for improvement. For example, there is an optimal level of responsibility and workload to avoid complacency or – at the other extreme – errors stemming from stress or fatigue.”

Joining the dots between research and practice

LR is uniquely able to leverage the research and insights of the Foundation, the only global charity dedicated to safety. Dr Ruth Boumphrey, points to the immense value in bringing together research with practice and evidence from real-world problems. “LR is the ultimate safety laboratory; evidential data is fed to the Foundation, and the Foundation’s research informs LR’s work. The results can be eye opening.” For example, the insight provided by the Foundation’s Foresight review of robotics and autonomous systems contributed to LR’s guidance for Unmanned Aircraft Systems certification.



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Director of Research and Strategic Programmes at the Foundation

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Jo Stokes
Senior Principal Human Factors Consultant at LR

As a charity, the Foundation is able to focus on problems that are hidden or not talked about and take a long-term view on future challenges. Society has a history of learning from catastrophic events such as Deepwater Horizon and Challenger, yet large numbers of people die at work every day in less high profile ways.

The Foundation’s purpose is to engineer a safer world and it works with Non-Governmental Organisations (NGOs) to speak out and find solutions – it could be something as simple as providing fishermen with phone apps so they can have appropriate weather forecasts.

James Pomeroy also highlights the demographic angle to safety: in some countries, half of the population is aged under 25, so there is a relatively small pool of experienced people from whom to transfer knowledge. Conversely, in many developed markets, work patterns are shifting as people work to a later age or as part of the gig economy, which raises questions about training, equipment and policies, as well as how to empower these people to speak up about their own safety.

As James summarises: “The pace of industrial growth is dizzying, particularly in South East Asia and Africa, and developments are happening in three to four years that previously would have taken 50 years. There is a real need to think differently. We need to be curious, courageous and harness expertise from different disciplines. Together, LR and the Foundation are uniquely able to bring to bear the deep expertise developed over their 260 year history, and to draw on specialist knowledge from academia and beyond.”

CASE STUDY

LR develops new AI solution to reduce injuries to customers and employees.

The challenge

Separate tools and systems for managing Health, Safety and Environmental (HSE) issues have been developed over the years. These are now being integrated to provide organisations with the assurance that critical HSE risks are effectively recorded and managed.

Most organisations are currently at a transitional level, moving from a traditional, paper based HSE process to a digitalised HSE data capture system. However, many now require more enhanced systems to not only capture data in a digital format but to also draw meaningful insights from the data.

We are continually looking to improve our safety environment in all locations across the UK. Based on initial trials with LR, we anticipate that LR SafetyScanner™ will help us create an even safer environment for our customers and employees.

Darren Read
Fire, Health & Safety Manager, Mitchells & Butlers

The solution

Developed by our digital innovation practice, LR Aurora, LR SafetyScanner™ uses unique Artificial Intelligence (AI) and Natural Language Processing (NLP) technologies to quickly and easily collect raw accident description data from multiple formats, transforming it into meaningful insights that highlight areas of high HSE risk.

Traditional
Paper based HSE processes and systems.

Data exists but not in a format that is usable.

→

Transitional
Digitised HSE data capture systems.

Data is digitised but not integrated to offer decisions making insights.

→

Leading edge
Integrated digital HSE system with applied predictive analytics and AI.

Latest technology leverage to unlock insights and create value for the business. This is an ongoing journey.

Two years in the making, we have harnessed cutting edge digital technology and data science to develop LR SafetyScanner™. Winning business has shown that it appeals to customers across very different sectors, including maritime, oil and gas and hospitality. I am truly thankful to the hidden champions from across all of our business streams that collaborated to make this a reality.

Ran Merkazy
VP, Product & Service Innovation at LR

The result

LR partnered with the Environment, Health and Safety team at Mitchells & Butlers (MAB), one of the largest operators of restaurants, pubs and bars in the UK, to deploy LR SafetyScanner™ to reduce injuries to customers and employees across MAB's 1,700 outlets throughout the UK.

These data insights can be cross-referenced with claims data to highlight trending incident patterns and areas of claims risk. This allows a clearer view of performance over time to more effectively identify areas of improvement. This information will help MAB reduce the risk of accidents or incidents in the future and create safer locations for both employees and customers.

CASE STUDY

Minimising safety risk through the use of drones.

The challenge

It can be challenging for our surveyors to work in confined spaces and hazardous locations. Equally, our clients are keen to avoid the costly disruptions associated with surveys and inspections.

Adani Ports and Special Economic Zone Ltd (APSEZ) is India's largest private port operator and an end-to-end logistics provider. The organisation owns 10 strategically located ports and terminals, which represent 24% of India's port capacity. The availability of the port cranes is essential to the entire port operation. Periodically, these port cranes are subjected to inspection to identify areas that require maintenance, repair, or replacement. Conventional closed-up visual inspection poses operation risk and can also be time consuming.

The solution

Using drones for remote inspection is an effective solution that provides a win-win for both client and surveyor. To realise this opportunity, LR has introduced the use of Unmanned Aircraft System (UAS), more commonly known as drones, as part of our portfolio.

For APSEZ, a proof-of-concept project was set up to explore the feasibility of using drones to complement conventional closed-up visual inspection of the port cranes. The project was broken into two stages:

- Stage 1 – Unmanned Aircraft System (UAS) service provider suitability and capability assessment using LR's guidance notes.
- Stage 2 – Drone data capture and data interpretation by an experienced and qualified LR inspector.

LR's guidance notes were developed to provide a framework to allow for the assessment and selection of a qualified service provider. The guidance notes allow LR to systematically assess a service provider through desktop review, office audit, and capability assessment. Upon successful selection of the suitable vendor, LR worked with the vendor to select the most suitable UAS and camera by taking into consideration different aspects including operation risk and camera resolution.

After a rigorous selection and preparation process, the project team, consisting of LR port crane in-service inspection specialists, the selected UAS service provider, and a member of our innovation team, attended the site to perform the inspection.

The result

The project proved that:

- Existing enterprise grade UAS can be used to assist port crane in-service inspection as the image and video qualities are suitable for preliminary engineering judgement to be made.
- The use of UAS is useful for areas which are difficult to access such as the forestay, backstay, underneath of back reach, underneath of boom, and A-frame-to-stays connections.