

# **Predicting safety:** analytics comes to OHS

*Safety can benefit significantly from the application of analytics. Craig Donaldson speaks with a number of experts about this process and examines the steps required for OHS leaders to improve their safety analytics capability*



**A**dvanced and predictive analytics is reshaping many industries globally by helping businesses gain deeper insights and deploy often limited resources in an optimal way in order to deliver the best result.

OHS is a relative newcomer to the field of analytics. A recent whitepaper, *Predictive analytics in workplace safety: four 'safety truths' that reduce workplace injuries*, observed that safety can provide a rich and large source of safety data, with research suggesting that workplace injuries and safety incidents can be predicted before they happen with

accuracy levels between 80 and 97 per cent.

Most organisations have mastered the basics in terms of standard reporting and statistical analysis (for example, what happened, how many times, where, how often, what actions are needed etcetera) but often struggle with achieving dramatic workplace safety results thereafter; "that is, answering the 'why is this happening' and 'what will happen next'. To that end, from our experience, most organisations continue to struggle with undertaking safety-related data analytics, particularly predictive analytics," says Michael Negendahl, who

specialises in WHS as assistant manager in the HSE team under EY's climate change and sustainability services practice. There are a number of reasons that may explain this, including:

- safety-related metrics being focused on lag indicators
- siloed systems that do not integrate and thus key data points not being used
- poor quality of the data being collected and analysed
- lack of the skillset and tools to undertake such advanced analysis.

Phil Bolton, an analytics strategy adviser and director in PwC's consulting

practice, also says it's fair to say that most organisations could be doing a lot more in safety analytics. Bolton agrees that one of the reasons for this is that there is a "strong anchoring to entrenched safety analysis 'looking backwards' and reporting norms and metrics within both the safety profession and a lot of organisations. This generally takes the form of producing a monthly safety report that contains information such as TRIFR/LTIFR, number of field leadership observations, bodily injury locations, and so on. However, to avoid injuries and detect 'black swan' events or systemic issues, more advanced analytical approaches are required," he says.

PwC works with clients who have a range of safety analytics maturity levels – from very basic and who are only just starting to explore their safety data, through to teams which are pushing the traditional boundaries of HSE by accessing and analysing operational data in ways that have never been done before. "A current client of ours is analysing their vehicle fleets' in-cab GPS data in combination with rosters, their dispatch system, weather and leave patterns to better understand fatigue," says Bolton. "However, most organisations are generally down the low end of the analytics maturity curve, and very few are utilising predictive analytics or prescriptive analytics techniques."

Analytics in general is still a maturing field in Australia, according to How Boon Tay, lead safety data analytics director at Deloitte, who says this is certainly the case in terms of executives and boards understanding the very tangible value that it can generate. "It can be very industry specific in terms of that maturity scale. For example, in finance it's pretty high, but in safety, typically organisations are pretty low on the maturity scale," he says.

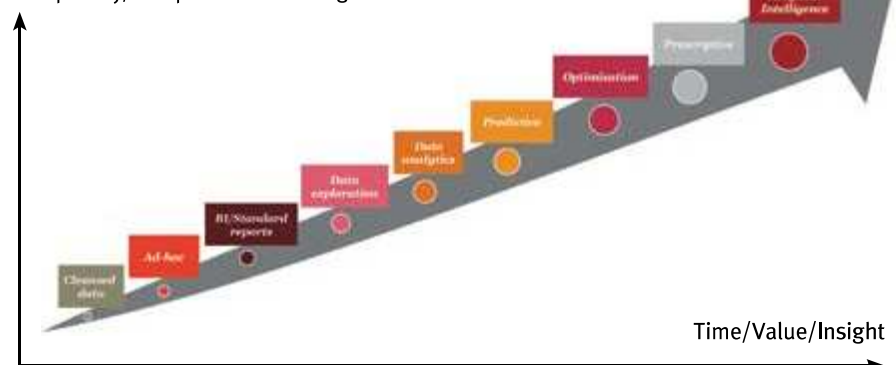
"While organisations do have forms of analysis, a lot of this is focused on lag indicators, so this includes calculations or reporting on what has happened, or the scale of the incidents, or the type of injury. However, a lot of it isn't about the causes."

### Safety analytics trends

Organisations' safety teams are just starting to explore their own data, according to Bolton, who says this is most commonly done through data visualisation – but most teams are

## Analytics maturity curve

Complexity/Competitive Advantage



Source: PwC

limited by the world of "data dumps in Excel". There are also more ideas around how to collect more and varied data (such as wearables, apps, tracking and sensors), but he says there is still not enough thinking about how the data could actually be analysed and used. "GPS data is a good example of sensor technology that is now much more mainstream for most large fleets, and some safety teams are starting to tap into that organisational data asset to better understand the workforce and quantify risks rather than relying on anecdotes," he says.

"We are seeing organisations becoming more interested in the possibilities that advanced analytics has to offer the safety profession in providing new insights and the ability to test specific hypotheses, and bust long-standing organisational safety myths. While organisations are becoming more aware of advanced analytics, they still typically lack the skills and knowledge to know how to go about it," he says.

Boon Tay observes that there is increased interest from some organisations in tackling high-risk incidents and understanding the root cause of these incidents. "I think we've exhausted the traditional type of root cause analysis and what valid data can tell us about this. So now there is emphasis on exploring this data to actually predict, profile and use leading indicators of high-risk incidents," says Boon Tay, who adds that another important factor is the operational side of reducing safety costs, workers' compensation costs and insurance costs, as well as lost productivity associated with these. "If we recognise the commercial climate that we're in, there is a strong focus on cost," he says.

## 5 common pitfalls in safety analytics

Michael Negendahl, assistant manager in EY's HSE team, says there are five common challenges that organisations face in safety analytics:

- 1. Poor data** – i.e. quality and completeness are common challenges facing organisations starting their data analytics journey
- 2. "Challenges in combining data sources"** is the top issue to overcome when implementing any data analytics project
- 3. Lack of skillset** and tools in the business to analyse the data
- 4. Poorly defined strategy** to deployment and lack of clear ROI measures
- 5. Lack of funding** necessary for moving to more advanced tools

Negendahl also notes that there is a trend towards leveraging additional data sources. With the advent of "big data", cheapening storage solutions and powerful tools to synthesise the data, he says business can now effectively incorporate more data points when building safety "models" – "for example, the combination of employee-centric data points (such as incident reports, absenteeism, roster scheduling, training, leave balances and tenure) with factors (such as production, maintenance and jobsite data) and other external open-source data sources (such as weather, cultural and geospatial data)."

### Safety analytics steps

There are a number of important steps organisations can take on the safety analytics journey, and one of the most important is senior executive support,

## Skilling up the OHS function for analytics

Michael Negendahl, assistant manager in EY's HSE team, says the OHS function needs a specific number of requirements and skillsets in order to deliver safety analytics:

1. Having a basic understanding about statistical analysis can obviously help the OHS professional begin to analyse and interpret any data they collect.
2. Successful deployment requires three distinct skillsets:
  - **Technical skills** – to understand the organisation's systems and advise on acquiring additional technology
  - **Domain knowledge** – familiarity with the relevant risk areas in the business and the ability to interpret analytics results in the context of the organisation
  - **Data analytics (e.g. data science) expertise** – mathematical, computer science and business intelligence techniques, such as pattern recognition, statistical analysis, query design and data visualisation.
3. Systems and tools to be able to run the safety analytics data through and also populate the outputs with insightful commentary.

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according to Tony Morris, head of workplace health & safety sustainability services at Deloitte. “It's got to come from the top down. If it's a token effort it will fizzle out pretty quick. Then beyond that, it's about making it real. You could do a lot of fancy analytics and employ very advanced artificial intelligence techniques, but unless it delivers real, tangible information which leads to decisions that are acted upon – with resulting benefits – then we can lose focus about what the analytics are driving,” he says.

“Organisations need to think about the data collected for health and safety. It should be aligned with strategy, so go back to this and what's important for your organisation and your risk profile, and make sure that you start collecting and analysing data around that.”

Boon Tay also observes that one thing that prevents organisations from beginning the journey is a belief that the data quality or availability isn't up to scratch. As such, he says there is a reluctance to even begin the journey. “That's such a limitation that they put on themselves, but there are a lot of ways we can deal with data quality,” says Boon Tay, who explains that one of the ways is to start with “bite-sized chunks” – which starts with organisational strategy and key questions in relation to business objectives, related safety improvement initiatives and key stakeholder challenges.

“A change in safety performance isn't just in the answer that analytics provides, but what we normally tease out are the cultural and process issues in the organisation. For example, we might on-board contractors quite differently to employees despite the fact that we think we treat them the same. So we're challenging a lot of long-held beliefs and then giving them the facts to substantiate that – this is quite a useful way of getting initial buy-in,” he says.

Similarly, Bolton says the best place to start is to try and analyse existing safety data, then the gaps, data quality challenges, inconsistent use of incident classifications, limitations around merging and joining onto different datasets and access to the right analytics skills/talent within the organisation will soon become evident. “One of our clients has just started analysing their training data in combination with their incident data to measure the impact of their training interventions and inform their training calendar and spend for

next year. Then once you've delivered on a pilot project and the value has been proven, taking the next step is to hire or contract the right talent for ongoing access to insights,” he said.

Another important step for safety leaders is to start socialising and creating an awareness among their leadership teams about what's possible, and challenging their current safety reporting approach and targets. “To be able to make progress, safety analytics should really be featuring in your multiyear safety strategy and be planned and budgeted for. But to get support for this, key decision makers in your business will have to have an understanding of what's possible and what you're trying to achieve,” he said.

### Skillsets for safety analytics

Analytics is not something most OHS professionals are traditionally trained or skilled in, and dedicated analytics professional(s) who bring the necessary skills to be able to source, prepare and analyse organisational data are critical. “Otherwise you'll only ever be doing just the 'basics'; i.e. a long way from predictive,” says Bolton, who adds that another valuable skillset to look for is their ability to interpret the analysis and work side by side with the HSE teams to co-design and test interventions.

As for the broader team, HSE is typically an experience-driven profession, and Bolton says this is where decisions are based on gut instinct and organisational myths from years of experience in the field, for example: “contractors are more dangerous”. “You need a HSE team that is going to be open to insights generated from data analysis and who are prepared to challenge their own beliefs about what might be the drivers of unsafe outcomes or considered as 'high risk',” says Bolton.

Boon Tay observes that individuals who have seen the power of data in other previous professions or organisations bring a different perspective, and particularly when they're from the utilities sector, or sometimes from the UK and other parts of the world. “They've seen data actually make a tangible difference, and that's actually stirred conversations about, ‘Well, what is this big data thing and how can we exploit it?’” he says.

While analytics professionals are very good at their job, Morris points out that “they're not work health and safety professionals either. In other words, the

work health and safety professional has a significant part to play in the analysis and the assessment of the data, with the analytics technician to interpret what the data is telling them,” he says. “No one knows their organisation better than the in-house work health and safety professional, who has been there for years, so they should be able to sit down with data analytics professionals to work out what the data means in the context of the business’s environment.”

### Common safety analytics challenges

In starting out on the safety analytics journey, it is important for the OHS team to think laterally and more broadly across the enterprise in terms of the information the organisation is already collecting, and how those data sources could be used in safety analytics. Successful analytics extends beyond training, payroll and HR data, into operational, maintenance and other data sources from different functions, says Bolton. “A project delivered recently tapped into over 20 different organisational data assets – most of which had never been accessed by the safety team before. When you start analysing larger and more complex data sets, then you need to also start leveraging more sophisticated analytics tools and techniques,” he says.

“There is a wide range of analytics tools and techniques that are already well tested in other areas of business,

for example, pricing, supply chain, marketing, and so on. Another common trap is hiring a HSE professional into a HSE data analyst role and thinking you’re going to get ‘data analytics’. You would often be far better off hiring a credit analyst from a bank into the HSE team – they know a lot more about what’s possible with data and analytics and you can teach them what they need to know about safety,” he says.

Another important factor to remember is that the process is still about people and the need to engage key stakeholders in the process, rather than reports being generated by an analyst in a back room and handed to the business for action. As such, key stakeholders should be involved in the process so they are brought into the concepts and the outcomes, Bolton says. “This begins with creating an awareness of the process and approaches that will be used, involvement in generating hypotheses and organisational safety myths, validating insights and outcomes and co-designing initiatives,” he says.

### The role of the OHS leader in analytics

Advancing the case of safety analytics in the OHS function is primarily the responsibility of the OHS leader. Even though they don’t need to be a technical expert in analytics themselves, they play a critical role in the success of any analytics projects or initiatives, according to Negendahl. “The role

of the OHS leader is to develop and champion the narrative for the benefits of applying predictive data analytics to the management of safety,” he says.

“To do this, the OHS leader must articulate the potential cost savings through improved productivity and loss mitigation as well as the obvious benefits of staff satisfaction and wellbeing. The role of the OHS leader is to also collaborate with other parts of the business for data points and insights.”

Similarly, Bolton says it is important that OHS professionals recognise that in the future, every facet of an organisation is going to be data-driven, and that leaders are going to want evidence-based decisions. “It’s unavoidable and it’s already happening,” he says. “The OHS leader needs to be able to drive that change within their own HSE team, but also across the organisation and the executive, to be able to move their organisation towards a culture of making fact-based decisions.”

To drive this change, the OHS leader needs to first get informed about what’s possible when it comes to advanced safety analytics, so they are in a position to influence internal stakeholders, create a vision for the future and drive change. OHS leaders should also be including safety analytics capabilities in their multiyear safety strategies, if they are serious about driving a shift in their department’s capabilities and the value they can deliver to the organisation, Bolton adds. ■

## Six important steps

Michael Negendahl, assistant manager in EY’s HSE team, says there are six important steps in the safety analytics journey:

### The data

#### What data is available? Understanding your data landscape.

The first step would be getting an understanding of what data your organisation collects. This can be a difficult process, with many organisations having a number of standalone systems that are not integrated with each other, therefore, having oversight over what systems exist and what data they collect is a challenge.

#### Is the data any good? Determining the quality of your data.

Once the systems and the data they collect have been identified, the next step is to determine the quality of the data being

collected. Data quality is generally about how well the data is fit for the purpose of assisting in the planning and decision-making process. Reliability of the data is also important – are all fields completed, are they accurate, do we report everything?

#### Do I need to collect more data?

##### Determining the gaps in your data.

If the answer is yes, then commitment from across the organisation is required to collect the necessary data to integrate into the analysis.

### The purpose

#### What questions am I trying to answer?

##### Being clear about the goal.

The type (and hence sophistication) of data analytics will be determined by the questions you are seeking to answer.

Where and when will injuries happen next?

#### How will I measure success?

##### Being clear about your ROI.

Any data analytics project, especially in the area of predictive analytics, should have a clear ROI and quantifiable measures of success to enable reporting to management and the board.

Investments in data analytics can be large, and as such, clear measures of success are critical to management acceptance.

#### Am I ready to action what I find?

##### Understanding if the organisation is ready to action the results.

Organisations need to understand how they will use the results they generate and identify if the business is ready to implement the necessary changes (if applicable) so that they can successfully leverage the insights gained.