Likelihood – Risk Management's Favourite Get out of Jail Free Card

It's a common view that the *AS ISO 31000:2018 Risk Management Guidelines* Standard mandates that two factors determine the severity of a risk – consequence and likelihood. In fact, the Standard suggests these are only two of the things to be considered when analysing a risk. Unfortunately though, likelihood and consequence almost exclusively drive risk severity in many risk management frameworks.

Both of these inputs can be difficult (if not impossible) to determine unambiguously, but likelihood is the most challenging. In my 2017 article "*Beware the devil in a deep green sea. When green risk is not good risk*" I discuss eight strategies used to "greenwash" or reduce the reported severity of a risk. Miscalculating or underestimating likelihood (inadvertently or deliberately) is one of these, and a common flaw in many risk assessments.

Let me start with the most basic challenge - humans are simply really bad at estimating likelihood. Most people could estimate the likelihood of flipping a coin and getting tails (50%). But without some training in statistics or probability, many people could not readily estimate the likelihood of getting four tails in four successive coin flips (6.25%). Throw in real world complexity and it gets worse. Asking a group of people the likelihood they will be involved in a serious car accident that year would result in wildly varying responses, most far removed from the actual likelihood an insurance actuary would provide. In his book *The Failure of Risk Management*, Douglas Hubbard notes "all people, including experts and managers, are very bad at estimating the probabilities of events". Even more dangerously, few people understand their limitations. Hubbard refers to "catastrophic" overconfidence, "almost everyone is naturally overconfident in their predictions."

Without training or relevant experience, people have great difficulty in appreciating what likelihood means. Improbable events, such as something described as 1 in a 1,000, seem unlikely and mysterious. If I were to offer you a $10,000 reward for opening a box that had a 1 in 1,000 chance of exploding and killing you, would you take the challenge? Clearly, risk appetite is a big factor here - $10,000 means different things to different people. However, there is one constant – changing the $ value of the reward is easier for people to understand than changing the probability of the box exploding. We know exactly what $10,000 is worth, we just don't know what a 1 in 1,000 chance means.

In this article, I expand on eight of the key challenges in considering likelihood or probability during risk analysis and provide some suggested tips to overcome them.

Phobias and the "Dread Factor"

Factors unrelated to the actual likelihood of an event can influence people's perceptions of its probability. Human biases such as phobias or the "dread factor" have a strong corrupting influence. For example, I watched the movie "Jaws" at too young an age and it scarred me for life. If you ask me to estimate the probability of being attacked by a shark swimming at the beach, I am going to give you a value far higher than it probably is in reality. People remember and overestimate the likelihood of things that scare or worry them. They pay attention to information that reinforces their phobia (confirmation bias) and ignore facts that might counter those views.

> **Management strategy.** Be alert to people who are too invested in the risk being analysed who may not be able to think objectively. Like everything in risk, collaborative and multi-disciplinary input is needed to smooth out individual human biases. (A marine biologist or professional lifeguard needs to give my biased shark-attack probability estimate a reality check.) Where available, real world data can help calibrate biased perceptions.

Confusing aggregate vs individual exposure

When probability is discussed in terms of a figure like '0.000001 occurrences per year' it can make the chance of an occurrence seem distant, almost impossible, and therefore of little concern. But what if 100 million people are exposed to this risk? Or if people will be exposed to the risk for an extended period of time? Airlines carefully assess the likelihood of many different kinds of accidents and incidents, most of which are individually very low. But they also understand that over decades of operating hundreds of aircraft, these individual probabilities become much higher in aggregate. Hence commercial aviation's laser focus on multiple layers of safety controls.

Conversely, it is unfortunately true that in most years, someone somewhere is killed in a commercial aircraft accident. For the industry as a whole, the likelihood of this occurring is therefore "almost certain". For the individual flyer, their exposure to the risk is much much lower.

> **Management strategy.** It is important to agree during the context setting phase the type and duration of exposure we are assessing. In this example, is it to the airline industry or to an individual passenger? Is it per flight or over a lifetime of frequent flying?

Misusing precedent

People can lock onto the probability of an event occurring based on real or perceived similarities with something that has occurred before. Referred to as the Representativeness Heuristic, people short-cut their analysis process, assuming that because something occurred that was superficially similar to the risk event you are analysing, the likelihoods

are probably the same. For example, "two other projects have been completed in the organisation and both were able to meet a key design metric in time. Therefore, the likelihood that my project will fail to do so and realise this risk is low."

> **Management strategy.** Challenge statements such as this. Similarities between the current and previous projects/organisation and the current and previous circumstances may be misleading.

Inadequate definition of likelihood terms

Likelihood is a key metric in many enterprise risk management frameworks, but most frameworks provide little help to people trying to estimate it. They often provide advice which is sparse or ambiguous at best. For example, likelihood is commonly rated on a four- or five-point scale defined by terms such as "rare", "unlikely", "probable", "likely" and "almost certain", etc. I've seen the "probable" level of likelihood defined solely as "might occur at some time". I have to wonder how is this remotely helpful?

In a 2018 Harvard Business Review article, Andrew and Michael Mauboussin extensively explored how differently people interpreted words or phrases such as "maybe", "might happen", "often", "almost always" and "slam dunk". The probabilities people associated with some of these words could span 60% or more between respondents. There were even systemic differences in interpretation between men and women, and native and non-native English speakers.

> **Management strategy.** If we are going to ask people to make likelihood estimates against labels, we should give them as much calibrating guidance as possible including probability bands, not just ambiguous words.

Optimism Bias

In the Journal of Personality and Social Psychology, psychologist Neil Weinstein noted people are "unrealistically optimistic" about their prospects. He had participants in his studies rate their chances of experiencing either positive or negative things during their lifetimes. They also rated the chances of other people experiencing the same events. They consistently rated the likelihood of their own success as being better than others. Both the German battleship Bismarck and the RMS Titanic had been enthusiastically described as unsinkable...

> **Management strategy.** Challenge people who assign low likelihoods to quite credible threats and who assign high probabilities of success to dubious controls and treatments. Remove their bias from the equation by asking them "if they were replaced in the project or organisation by another person, would that make the likelihood of the risk event higher?"

Neglecting common causes or shared risk triggers

Too often, risk assessments consider the likelihood of each risk in isolation and do not acknowledge that a common single cause might trigger multiple risks. In part, this is one reason why I refer to a set of risks as a "risk profile" – it is more than a collection of

individual risks. 10 medium level risks can be as dangerous as a single extreme one particularly if sources or causes overlap and there is the potential for risks to cascade and cause more severe effects.

> **Management strategy.** We need to understand causal and correlation relationships between our risks. Explicitly describing and analysing the causal factors for your risks can be helpful in identifying where a single causal factor might result in multiple risks being realised – a "likelihood spike". How alert are we to this potential mega-trigger and will we see it coming?

Mismatching likelihood with the appropriate consequence

The potential consequences of many risk events are not black and white – they could be realised on a scale or spectrum. Take for example the risk of having a car accident. The consequences of this risk event could be anything from a minor paint scratch to a massive multi-car pile-up with multiple fatalities. Obviously, the scratch is a more common occurrence and happens to most people every once in a while. In determining the likelihood of this risk event, it is important to have a clear view of what level of realised consequence we are estimating the likelihood of. Calculating risk severity by combining the consequence of multiple fatalities against the likelihood of a minor scratch is flawed.

> **Management strategy.** Agree during risk identification a shared view of the magnitude of the risk event. If agreeing a sensible consequence-likelihood match for a risk event isn't possible, it is likely the risk event is defined too broadly and might benefit from being broken into multiple risks, each looking at different scenarios of the risk being realised.

No empirical basis upon which to estimate likelihood

Methods commonly used to determine the probability of a risk include reviewing historical data (has this happened before?), structured calculation (for example, fault tree analysis), or analogy (is this happening to anybody like us?). What do you do if you have no basis at all upon which to estimate an absolute measure of likelihood? An example is the likelihood of a particular government or commercial building in a western country being targeted by a major act of terrorism in the next month. There is no meaningful basis upon which to estimate a useful absolute measure of likelihood.

> **Management strategy.** There are specialist disciplines such as security risk management and workplace health and safety that work routinely with high-consequence low-likelihood risks. They employ methods that substitute for absolute measures of likelihood. Research alternative concepts such as capability and intent, or exposure and hazard, to see if they can be applied to your risk environment.

Summary

I am well known for my views that considering current risk likelihood and consequence alone provides a poor basis upon which to make risk decisions. Indeed, high consequence outcomes may be so unacceptable that the frequency of occurrence is not a relevant factor. I feel that if a risk is relevant and has a potentially severe impact it should be addressed in some form, regardless its presumed likelihood.

If likelihood is part of your risk assessment process it is critical to ensure that it isn't used as a get out of jail free card. At a minimum, if we cannot overcome the biases and sources of error described above, we at least need to be aware of them and the significant impact they can have.

We should ask what are we doing to guide, train, calibrate and challenge the likelihood assessments we make? How are we addressing our natural overconfidence and notoriously flawed ability to estimate probability?

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Sal Sidoti has over 30 years' experience working with public and private sector organisations across Australia and further afield. He works with his clients providing premium risk management advisory services that support decision making in practice. Approaches that go beyond cut-and-paste compliance and death by spreadsheet. Sal is the Director and Principal Consultant of Crafted Solutions Pty Ltd. He is home based near Canberra, Australia.

https://au.linkedin.com/in/sjsidoti
enquiries@craftedsolutions.com.au