

HAZARD, RISK, AND SMS



If you're struggling with the difference between hazard and risk, and what to do about each, this is for you.

A 'hazard' is anything with the potential to cause harm. The 'risk' associated with that hazard is assessed by looking at the probability of that harm happening, together with the severity of the consequences if it did happen.

Think of an uncapped bottle of bleach left out on the kitchen bench during the school holidays. It's an obvious hazard, and the probability of it causing harm is high because it's opened and within reach of small hands. The consequences are also severe – eyes being splashed with it, for instance, should the worst occur. So it is high-risk.

But if that same bottle of bleach is now firmly capped, on a high shelf, and in a locked cupboard, the risk is much lowered because – while the consequences of a child getting hold of it are still very undesirable – the probability of them doing so are almost nil.

The placing of the bleach high in a locked cupboard is the 'control', reducing the risk to as low as reasonably practicable.

And that, in a nutshell, is a risk management process – one of the fundamentals of a safety management system (SMS).

Let's look at an aviation example. A maintenance engineer using an adjustable spanner may be a hazard. The risk of them doing that will be a combination of how probable it is, and its consequences for the airworthiness of the aircraft they're maintaining.

In a workshop lacking robust tool control, or appropriate tooling, the probability might be quite high.

But the following are all controls against the worst happening, aiming to lower the risk to as low as reasonably practicable:

- robust maintenance procedures, including strict tool control
- a positive safety culture throughout the organisation
- properly trained engineers who understand the significance of using appropriate tools
 - who are supervised, and
 - whose work is checked off by a superior.

First, the hazard

It all starts with identifying the hazard. CAA safety management systems specialist Trevor Jellie offers the following advice to operators struggling with that first step.

“Hazards will be identified from ‘walkaround’ hazard surveys, occurrence reporting, internal audits, safety investigations, change management, and management reviews.

“One of the most valuable sources of information is frontline staff who’re actually ‘doing the job’. For instance, the flight followers who identified weak points in a company’s emergency response plan. And the ground crewman who identified on-site hazards with farmers before a spray job.”

Trevor says experience has shown a staff get-together to brainstorm ideas is most effective if it's not attached to any other activity, like the monthly staff meeting where other agenda items are up for consideration. “In other words have a staff meeting *dedicated* to hazard brainstorming.”

Too small a group of people identifying the hazards in an organisation can lead to a narrow focus on one area. For instance, those of the ‘slips, bumps, and falls’ worksite variety. Trevor advocates for as wide an approach as possible.

The benefit of casting a broad net for information is illustrated by a story from Brian Dravitzki, Senior Base Engineer of Helicopters (NZ), in New Plymouth.

“An offshore operator had an inflight event where a shop rag was left accidentally in a tail rotor drive train area during maintenance and the rag became entangled with the driveshaft causing considerable damage to the driveshaft and tail boom wiring.

“The heightened awareness and the possibility of that happening to us meant rags quickly became an identified hazard. We assessed the risk of FOD (foreign object debris) such as these causing issues in the future and immediately came up with a process to control the use and storage of rags, the same as our tool control process.”

Trevor Jellie says a well-constructed register of hazards will include those associated with each type of operational activity. In heli ops, for instance, lifting, spraying, and passenger transport.

“There are also hazards related to ground activities, such as refuelling and loading of cargo. There are organisational hazards such as potential loss of key staff, and business hazards such as loss of insurance cover.” »

Trevor offers these ideas for effective hazard identification:

- Consider the complete cycle of each type of operation conducted. What hazards there could be from the beginning of the day when the pilot and aircraft are preparing to fly (pilot fatigue, improper fuelling) through all the activities of the day (poor weather decisions, time pressures) to the end of the day when pilot and helicopter are put to bed (rushed postflight check). The CAA’s SMS team call this the ‘day in the life’ approach.
- Brainstorm the collective knowledge in the organisation for ‘what has bitten us in the past?’ and ‘what gave us a fright?’
- Consider that what’s happened to other operators ‘could happen to us’.
- Break down each organisational exercise to human, human-machine interface, and procedural tasks, and look for the hazards associated with each.
- Undertake a trend analysis on what safety data has been collected. The amount of information might be small at the beginning of establishing an SMS but it could still be useful. A steady increase in occurrences will indicate, for instance, that a control is either weak or missing.

Trevor also says to successfully identify all the hazards in an organisation everyone needs to think beyond the obvious.

“Look for the more subtle dangers. For example, poor maintenance is obvious, but an overrun of a lifed component because the maintenance controller was overloaded by concurrent Part 145 commitments is not so obvious.

“Likewise, bad weather is an obvious hazard but pushing on through bad weather to get home at the end of a long, tough day indicates a hazard exists in pilot decision-making.”

Recording the hazard

Trevor Jellie says recording hazards must be simple, and every member of the organisation needs to be able to do it easily.

“One of the best hazard registers I’ve seen is a battered, well-used tablet carted everywhere by an operations manager. It has tabs for each type of operation, the base, and all the organisational stuff.”

That operations manager is Jason ‘JD’ Diedrichs, of Amalgamated Helicopters in Wairarapa.

“We went online to give staff easy access to hazard identification,” says JD. “We started out with general hazards then got more specific according to the task. If a pilot is going to a spray job, they can click on the appropriate tab and see each hazard, its associated risk, and the controls, for that job.

“We did have a paper hazard register but it was unwieldy, and it was hard getting staff to participate. This way is much easier and the staff are more forthcoming.

“We have all this information in hard copy document form as well, so if we lose connectivity for whatever reason, we have backup.”

Then, the risk

Noting a hazard and its associated risk in a folder or spreadsheet somewhere does not equate to controlling the impact of that risk.

“Some organisations I’ve seen pile their identified hazards into a register like it’s a ‘bucket,’” says CAA safety management system specialist Simon Carter.

“And then they rarely review the risks and stated controls. No one is monitoring properly what happens next.

“The risk associated with a hazard has to be assessed; then ranked (say, from intolerable to acceptable); controls to minimise the risk identified and put in place; and the effectiveness of those controls assessed.”



// There are many ways an organisation can assess risk. Here is one: a simple risk matrix. Each organisation, however, should do what works for them.



// A controlled burn in rural Wairarapa.

JD says all his staff were involved in an initial brainstorming session to identify hazards, and they were also involved in the process of assigning risk.

“There were multiple benefits. We got some different ideas about just how much risk a hazard presented, but also, everyone was involved in improving safety.

“With some of the younger employees, they can disengage when it comes to talking about safety and SMS and hazards and risk, so the more we can involve them, make them responsible for a particular area of SMS, the more connected they’ll be to what we’re trying to do.”

Having established the risk associated with a hazard, the next step is to nominate someone to be responsible (the ‘owner’ of the risk) for ensuring that controls are identified, developed, applied, and assessed. That person should not always be the safety manager.

A safety manager should make sure risk owners are managing their area of responsibility, Simon Carter believes, but the safety manager is not Ms or Mr Fixit for every risk in the organisation.

“They can’t necessarily be the owner of an operational risk, or a risk in the maintenance area – both may be completely out of their area of expertise.”

Once someone is identified as the owner of the risk, they need to follow through with identifying and developing controls against that risk.

“They are expected to see through the lowering of the risk to as low as reasonably practicable, but in some organisations some risk owners are not actually doing that,” says Simon.

“If it’s out of their area of expertise, they need to escalate it up the line to someone who can manage or reduce the risk. That needs to be done formally so it doesn’t fall through the cracks.”

That ties in with appropriate people being nominated as the owner of each risk in the first place.

“The person who’s accountable for accepting the stated risk controls must be someone who knows something about it, and who has the appropriate authority and resources to implement controls,” says Simon.

Now, the controls

The controls stated in the risk register have to be specific, robust, and their effectiveness measurable. A control against using an adjustable spanner has to be something more than ‘engineer awareness’.

Simon Carter believes the most effective thing an organisation can do is to establish a formal risk and control review programme.

“A formal meeting can be set at regular intervals, or in smaller organisations it could be just a ‘let’s get around the table’.

“Such a review looks at each risk with a really critical eye – the less tolerable the risk, the more closely it, and the effectiveness of its controls, is looked at.

“But a low risk should be examined carefully too. You need to consider, ‘is this rating still really appropriate? If not, could reality bite me?’” ➤