

# Risk assessment made easy!

## Identification, assessment and control of risks

Carrying out a risk assessment is nothing unusual.  
You do it all the time!

Suppose I were to place a plank of wood, say 10 cm wide, on the floor and call for a volunteer to walk along it, somebody would be willing to do it. It might be a bit odd, but somebody would do it.

Now, suppose I place the plank of wood over a ravine: two cliffs in the air with a 100 m drop between them. I suspect that I would have a lot more difficulty in finding a volunteer to walk the plank! Even though the likelihood of falling off the plank would be about the same, the situation is different. What is the difference?

In the first case, the consequences of falling off the plank are "a minor stumble". In the second case, the consequences of falling are "death". You have carried out a risk assessment and decided that the severity of the risk in the second case is very high and therefore you have decided not to do it.

If we go to the same ravine and I place a concrete bridge with 1.5 m handrails over it, I will again have a good chance of finding a volunteer to walk across. The consequences are the same: death if you fall. However, the likelihood of your falling is now so low that you are willing to do it – and enjoy the view!

A "hazard" is defined as "anything (including work practices or procedures) that has the potential to harm the health or safety of a person". Sometimes people speak of "hazard assessment" in place of "risk assessment".

In assessing risk, you take into account

- likelihood that something bad will happen
- consequences of the event

You process the information and use it to make a decision.

## **Identify, assess and control risks**

Both common sense and the law require that you

- identify
- assess
- control

risks.

Before you start, you need to consider who is involved, what physical factors are involved, etc. This is the “context”.

After you have finished the process, by controlling the risks, you need to “monitor and review” what happened. Maybe carrying out an experiment in the fume cupboard did not work since the suck of the fume cupboard was not enough; you need to review things and get the fume cupboard fixed.

All along the process, you need to keep people informed: the students and your colleagues. This is the need to “consult and communicate”.

Let us now look at the three stages in the process in turn.

### **Risk identification**

First, you should look at history: “Those who do not understand history are condemned to repeat the mistakes of the past.”

Consider the “accidents” and “near accidents” that have occurred at your school and similar schools. Brainstorm with colleagues over a coffee. Think laterally about the things that might happen. Go through checklists of possible bad things that might happen.

Identification of risks is better with more experience and more persistence.

### **Risk assessment**

As we saw before, to assess the severity of a risk, you need to consider

- consequences of an event
- chance that it will occur (likelihood)

There are different ways to combine the estimates of “consequences” and “likelihood” to decide whether to do something or not. The Australian/New Zealand/ISO Standard

		Consequences	
		Minor	Severe
Likelihood	Likely	?	X
	Unlikely	✓	??

✓ = low risk

? = medium risk  
CONSIDER OTHER OPTIONS

?? = high risk  
Either DON'T DO IT or  
PROCEED WITH GREAT CARE

X = extreme risk  
**DON'T DO IT!**

**Figure 2-1**  
A 2 x 2 risk matrix, the  
simplest possible risk matrix.

on Risk Management (AS/NZS ISO 31000:2009) is a good starting point for formal considerations of risk, as you are required to do in a school. It also has a guide (HB 436:2004), which is even more helpful.

### Risk matrix, 2 x 2

The simplest way to consider the consequences and the likelihood of a risk that has been identified is to use a 2 x 2 risk matrix (Figure 2-1). This matrix is also called a "risk level matrix and a "decision matrix".

There are four possible combinations of likelihood and consequences. Examples of the combinations are:

**unlikely/minor** = walking along a 10 cm plank on the floor.  
This is ok.

**likely/severe** = jumping off a balcony as a fast way of getting to the ground. This is not very smart. Don't do it!

**likely/minor** = bumping into a pointy door handle every time you try to get into a corner where your desk is situated.  
This won't kill you, but you get bruise upon bruise.  
You should consider fixing it.

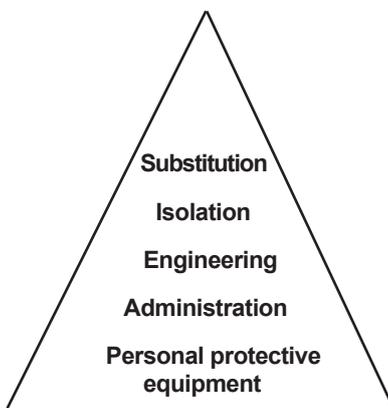
**unlikely/severe** = football match  
There is a small chance of something very bad happening: broken bones, spinal injuries, etc. You need to give serious consideration to such situations.

The unlikely / severe combination is the most troublesome:  
"She'll be right mate"  
"I've been doing this for 20 years and it never happened to me"

A 2 x 2 risk matrix is probably too simple for use in a school.  
A 3 x 3 risk matrix is the minimum (see later), viz. 3 levels of consequences and 3 levels of likelihood.

## Risk control

This is the third in the trinity of identify / assess / control.  
You should follow a logical hierarchy (Figure 2-2):



**Figure 2-2**  
*Hierarchy of control measures.*

**Substitution**  
Simply get rid of something that poses a significant risk,  
e.g. instead of potassium chromate, use food colour to give a yellow colour to solutions for demonstrations

**Isolation**  
Keep away from it,  
e.g. use a stick to poke something, rather than touching it directly

**Engineering**  
Use a device to protect you,  
e.g. carry out an experiment in a fume cupboard

**Administration**  
Arrange things so that people do not go near something risky,  
e.g. no use of ride-on lawn mowers during break or lunch periods

**Personal protective equipment**  
If all else fails, protect yourself and others,  
e.g. safety glasses

## The whole risk assessment process

We want to consider an “experiment”, or more generally, an “activity” [Figure 2-3, top], and end up with a “risk assessment” [Figure 2-3, bottom].

What are the intellectual processes involved in doing it?

First of all, you need a written procedure. You can (and often do) an assessment of risk for something entirely in your head, but in a school these days, you need a formal written procedure.

Next, an activity will involve, some or all of the following:

Equipment	e.g. Bunsen burner
Materials	e.g. paper
Chemicals	e.g. sodium chloride
Living organisms	e.g. millipede
People	e.g. students (special class of living organisms)

You can consider the “potential hazards” of each item **as it is generally used**.

e.g. Bunsen burner: lighting, using under tripod / gauze.

In general, there is a “standard handling procedures” for each item. e.g. place charcoal blocks in water to ensure they are extinguished before storing in a wooden cupboard over the weekend!

For chemicals there are also MSDSs, which are required by law.

For equipment, we speak of standard operating procedures.

These are usually of two kinds:

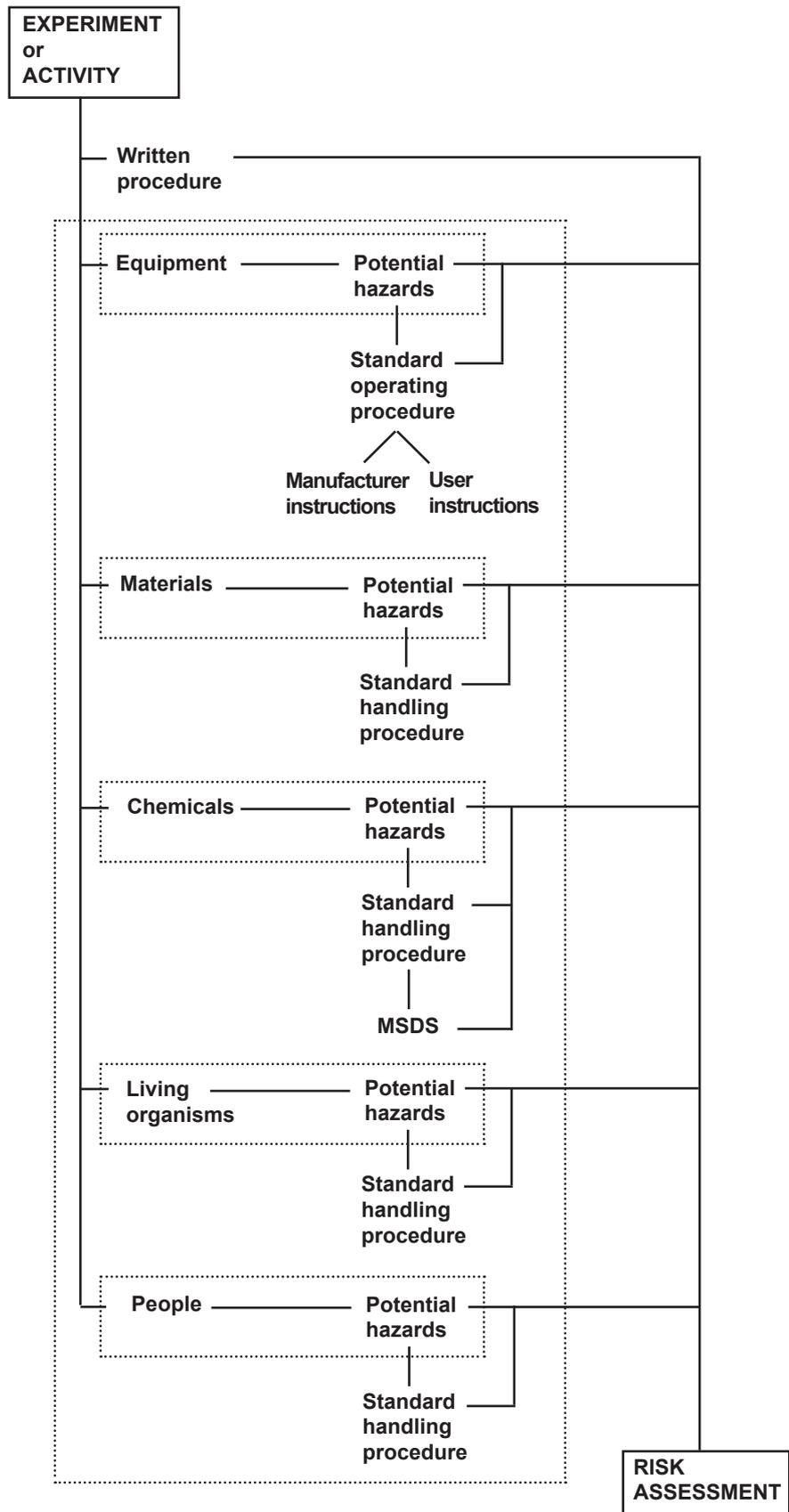
“manufacturer instructions” (often barely intelligible), and “user instructions” (simplification / translation produced by users).

**You can't carry out a risk assessment on an item without considering its use,**

e.g. you can't do a risk assessment on a chemical in isolation from its handling and use. A chemical in a sealed bottle poses different risks to the same chemical in an open container in a laboratory full of students!

If you are considering the toxicity of a chemical, you are assuming that someone has taken the chemical into his / her body by ingestion, absorption through skin, or by inhalation.

If the chemicals inside a mercury cell battery (for a camera) are eaten, severe poisoning is likely, but if the chemicals remain in the undamaged casing, there is very little danger; indeed the mercury cell is designed to be eaten by a child without ill-effects!



**Figure 2-3**  
Logic of a risk assessment.

*Small dotted rectangles indicate mini risk assessments of individual components of the activity.*

*Large dotted rectangle indicates the major risk assessment of the interactions between the components of the activity.*

*Most time and care is needed to identify and evaluate the interactions between components. Most injuries occur when interactions are overlooked.*

You need to carry out an assessment of risks on the whole of an activity, as it is actually carried out.

The risk assessment process involves carrying out “mini” risk assessments on the individual components of an activity [Figure 2-3, small dotted boxes], then a holistic assessment, taking into account the interactions between components [Figure 2-3, large dotted box].

It is essential to consider the interactions between components, since it is commonly the interactions that cause injury:  
e.g. sleeve of woollen jumper catches on rough edge of gauze on a tripod holding up a beaker of boiling water, which spills on student.

e.g. bottle of methylated spirits is used to refill a spirit burner when the flame is apparently extinguished but still burning with almost invisible flame, followed by an explosion of air/vapour mixture in the bottle, dropping of the bottle, smashing of the bottle, and burning methylated spirits spilt on nearby students.

## **Multilevel scale of consequences**

The earlier risk matrix with just two levels of consequences (minor, severe) and two levels of likelihood (likely, unlikely) is a little too simplistic for use in schools.

The Australian/New Zealand/ISO standard allows an organization to choose any risk matrix that makes sense within the context of the organization.

A 3 x 3 risk matrix has generally proven acceptable in schools, but your school is free to choose a different one if it wishes. Some organisations require larger matrices (commonly 5 x 5 or even 7 x 7).

In a 3 x 3 risk matrix, such as the one recommended in RiskAssess software, the three levels of consequence are:

Level 1 : first aid treatment at the school  
(Minor)

Level 2: treatment by a doctor  
(Moderate)

Level 3: immediate hospitalization  
(Severe)

## **Multilevel scale of likelihood**

Similarly, we can define three levels of likelihood for a 3 x 3 risk matrix:

Level 1: known to commonly occur; not unexpected in the class  
(Likely)

Level 2: uncommon, rare, but sufficiently frequent to have been witnessed by self or a known person  
(Unlikely)

Level 3: very rare; have heard of it happening; may possibly have been witnessed by self or a known person  
(Very unlikely)

## **Risk matrix, 3 x 3**

The resulting 3 x 3 risk matrix is shown in Figure 2-4.

We find it an acceptable risk if, at its worst, an activity could result in minor consequences (first-aid treatment in school). Otherwise, children would not be allowed to run around in the playground.

We also find it acceptable if the activity has a very unlikely chance of causing moderate consequences, for the same reason: a child may occasionally fall over and sprain/break a wrist, requiring a doctor.

If something is unlikely to cause moderate consequences, we need to consider it carefully; but if it is likely to have moderate consequences, we need to avoid it.

The situations where severe injuries (immediate hospitalization or death) may result should be prohibited at the levels of likely and unlikely.

If an activity is very unlikely to cause severe injuries, e.g. football or travel in vehicle, it may be allowable in the context of risk levels that are accepted in society: sporting injuries are accepted by society at a "very unlikely" level; motor vehicle injuries are accepted by society at a "very unlikely" level.

Where activities are carried out with the very unlikely/severe combination, every effort should be taken to reduce the risk, e.g. bus with seat belts, excellent driver, bus in good repair, etc.

## RiskAssess risk-level matrix

		Consequences		
		Minor	Moderate	Severe
Likelihood	Likely	✓	X	X
	Unlikely	✓	?	X
	Very unlikely	✓	✓	??

✓ = low risk

? = medium risk  
CONSIDER OTHER OPTIONS

?? = high risk  
Either DON'T DO IT or  
PROCEED WITH GREAT CARE

X = extreme risk  
**DON'T DO IT!**

**Table 2-4**  
RiskAssess risk-level  
matrix for calculating the  
severity of a risk.

## **Compliance with legal and school requirements**

To meet the requirements of legislation and to comply with the Australian/New Zealand/ISO Standard, you can operate either a paper-based or electronic system.

The advantages of an electronic system are as follows:

- typing of large amounts of information can be avoided, since an electronic system can provide a proforma automatically
- printing, if desired, can be optimised to conserve space and minimise paper consumption
- safety information from databases can be added automatically to assist in the risk assessment process
- storage of risk assessments can be provided electronically on a series of servers with well-maintained backup
- risk assessments can be copied easily, allowing sharing and quick customisation
- an electronic system can be web-based, so that there is no software to install on school computers and the system can be accessed from any point on the planet with an internet connection.

If you wish to learn more about a web-based system for carrying out risk assessments, please visit [www.riskassess.com.au](http://www.riskassess.com.au) to learn about RiskAssess. It provides the advantages listed above, complies with the Australian/New Zealand ISO Standard on Risk Management, and satisfies the requirements of school systems in all States of Australia, including the new DET requirements in Queensland and the new DEECD requirements in Victoria.