UPLOADS
Understanding and Preventing Led Outdoor Accidents Data System

TRAINING MANUAL

PART 1:

THE UPLOADS APPROACH TO ACCIDENT ANALYSIS

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THE THEORY BEHIND UPLOADS

Introduction

What will I learn in this chapter?

- The principles of a systems approach to accident causation and analysis;
- How the systems approach differs to other approaches;
- Rasmussen's (1997) Risk Management Framework; and
- How Rasmussen's (1997) Risk Management Framework (a system-based method) can be used to analyse incident data from the outdoor activity domain.

Why is this information important?

- The systems approach and Rasmussen's (1997) Risk Management Framework underpin all aspects of the UPLOADS project from the development of the taxonomy and database to the analysis of the industry dataset.
- We want the systems approach to underpin the led outdoor activity industries approach to accident analysis and prevention.
- We want **you** to use this approach when you collect data, analyse the incident reports and develop countermeasures.
- Accident analysis not underpinned by an appropriate method and theory can do more harm than good.
- The systems approach will enable a more holistic understanding of what is causing incidents and will inform more appropriate and far reaching countermeasures.

The principles of the systems approach

The systems approach involves three core principles.

Firstly**, behaviour and safety is impacted by the decisions and actions of everyone in the system, not just frontline workers alone**. In the outdoor activity context, this means that decisions and actions made by politicians, CEOs, managers, safety officers and work planners can play a role in accidents, just as those made by instructors and participants can. This also means that safety is the shared responsibility of everybody working within the led outdoor activity system.

Second, **near misses and adverse events are caused by multiple, interacting, contributing factors, not just a single bad decision or action**. For example, a flawed decision made by an instructor that led to an accident will likely have various upstream contributory factors-related to things like participants, training, procedures, management, equipment, program planning etc. This means that there is no root cause of an incident, and that human error should never be seen as the cause of an incident. Rather, we need to search for the reasons as to why that error occurred. It also means that the relationships between contributory factors are as important to take into account as the factors themselves.

Third, **effective countermeasures focus on systemic changes rather than individuals.** This means that countermeasures should generally focus on policies, procedures and infrastructure rather than on punishment, warnings or retraining. While changes to training programs at times may be appropriate, we need to recognise that it is very difficult to change individual behaviour, especially if the system does not support changes in behaviour. It is also not enough just to change the procedures and expect behaviour to change. We need to examine the factors that may potentially impact on the execution of those procedures – such as staffing, management or equipment availability.

Finally, as it is underpinned by the systems approach, the goal of UPLOADS is not to assign blame. Rather, we want to identify how factors across the led outdoor activity system combine to create injury causing incidents. In order to

encourage people to report incidents, you need to keep this in mind at all times – the goal of UPLOADS is to learn from incidents, never to assign blame to individuals.

How the systems approach differs to other approaches.

The systems approach differs from other accident approaches in a number of ways.

However, the key points are, firstly, that **human error is seen as the outcome of an incident, rather than the cause of incidents**. This is in contrast to person-based approaches which focus on who made the error rather than why.

Second, the **systems approach is interested in how the interactions between parts of the system lead to errors**. For example, how an inadequate training program and limited availability of equipment might interact to shape an instructors performance in a way that leads to an incident. This is in contrast to approaches that focus on the "hunt for the broken component" – such as Root Cause Analysis. Here the focus is on the instructor and their flawed performance in terms of what it was, not on the factors that interacted to create the flawed performance.

Overall, the person approaches and other approaches which focus on component failures discourage reporting because they focus on blame, and fail to address the underlying, system-wide causes of incidents.

Rasmussen's (1997) Risk Management Framework

Accident causation models are a way of representing your beliefs about how accidents occur. A model helps you determine what causes to look for, and brings order to the way that you investigate accidents.

Rasmussen's (1997) Risk Management Framework, shown in Figure 1, was selected for the development of the UPLOADS project for a number of reasons.

Firstly, it is domain-generic, so it can be readily applied to many different contexts, including outdoor activity provision. Second, it considers the entire led outdoor activity “system”, from the government to the activity environment.

Rasmussen’s framework is underpinned by the idea that systems comprise various levels; actions and decisions across these levels interact with one another to shape behaviour, safety, and accidents. Typically the following system levels are described:

- a *Government* level at which laws and regulations are developed;
- a *Regulatory* level at which industry standards are developed based on laws and regulations;
- a *Company* level where company policies and procedures based on industry standards govern work processes;
- a *Management* level where company policies and procedures are implemented;
- a *Staff* level representing the activities and characteristics of workers performing the processes; and
- a *Work* level representing the equipment and environment within the work context.

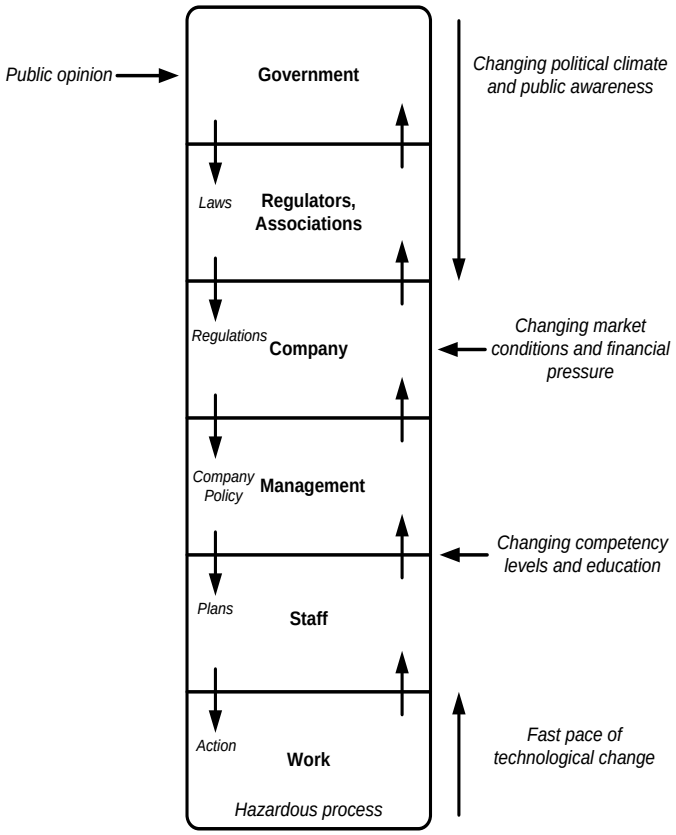

Figure 1 Rasmussen's risk management framework (adapted from Rasmussen, 1997).

In terms of accident causation, the framework argues that decisions and actions at all levels of the system interact with one another to shape system performance: safety and accidents are thus shaped by the decisions of all actors, not just the front line workers in isolation, and accidents are caused by multiple contributing factors, not just one bad decision or action.

The model also argues that for safe and efficient performance, the decisions and actions made at higher governmental, regulatory, and managerial levels of the system should propagate down and be reflected in the decisions and actions occurring at the lower levels. Conversely, information at the lower levels regarding the system's status needs to transfer up the hierarchy to inform the decisions and actions occurring at the higher levels. This is known as 'vertical integration' and is a key component of safe system performance.

We have adapted Rasmussen's Framework to describe the led outdoor activity "system" as follows:

1. *Government policy and budgeting*. The government policy and budgeting level refers to the government activities, decisions, actions etc. relating to the provision of led outdoor activities.

2. *Regulatory bodies and associations*. The regulatory bodies and associations level refers to the activities, decisions, actions etc. made by personnel working for led outdoor activity regulatory bodies or associations.

3. *Local area government, activity centre management planning and budgeting, schools and parents*. The Local area government, activity centre management planning and budgeting, schools and parents level refers to the activities, decisions, actions etc. made by personnel working in local government, at the senior managerial levels of the activity centre involved (e.g. executive board level), at the schools involved, and by parents of the participants involved in the incident. These factors are related to higher level management, planning and budgeting activities and typically occur before the incident itself (this can even be years preceding the incident);

4. *Technical and operational management*. The technical and operational management level refers to the activities, decisions, actions etc. made by personnel at the supervisory and managerial levels of the organisation providing the activity involved in the incident. These factors typically occur prior to the incident itself but can also include decisions and actions made during, or in response to, the incident.

5. *Physical processes and instructor/participant activities*. The physical processes and instructor/participant activities level refers generally to the activities undertaken 'at the sharp end' prior to, and during, the incident. It therefore describes the flow of events leading up to and during the incident

in question. This includes decisions and actions made by instructors, participants etc, but may also include decisions and actions made by other actors, such as supervisors, emergency responders, members of the public etc;

6. *Equipment and surroundings*. The equipment and surroundings level refers to factors associated with the equipment used in support of the activity, the physical environment in which the activity was undertaken, and the ambient and meteorological conditions prior to or during the incident;

In the UPLOADS project, this framework underpins the taxonomy that is provided to code the causal factors involved in incidents.

In conjunction with this framework, Rasmussen developed the Accimap technique to graphically representing the conditions that produce accidents (Rasmussen, 1997; Svedung and Rasmussen, 2002). Using Accimap involves constructing a causal diagram of the components, decisions and actions that interacted with one another to create the system in which the accident in question occurred, as well as the relationships between them.

As an example, the following section describes how this framework applies to the analysis of a major outdoor activity incident – the Magetopopo Gorge incident.

Example: Magetopopo Gorge incident Accimap Analysis

Here we present a description of the Mangatepopo incident to demonstrate how Rasmussen's risk management framework and associated Accimap method can be used to describe the causal mechanisms involved in led outdoor activity incidents.

The Mangatepopo tragedy occurred on the 15th April 2008 when a group of 10 college students and their teacher, led by an instructor from an Outdoor Pursuit Centre (OPC), were completing a gorge walking activity in the Mangatepopo

gorge in the Tongariro National Park, New Zealand. Due to heavy rain in the area, a flash flood occurred which led to increased river flow and a rising river level in the gorge. As a result, the group had to abandon the gorge walking activity and became trapped on a small ledge above the water. Fearing the group would be washed off the ledge, the instructor decided to attempt to evacuate the group from the ledge and gorge by entering the river, with poor swimmers tied to stronger swimmers, following which the instructor would extract them downstream using a 'throwbag' river rescue technique (whereby a bag attached to a length of rope is thrown to the person in the water and used to pull them to the river bank). After initiating the evacuation plan, only the instructor and two students managed to get out of the river as intended, with the remaining eight students and teacher being swept downstream and then over a spillway. Six students and their teacher eventually drowned, with only 2 of those swept over the spillway surviving.

In the aftermath of the incident, the coroner and an independent investigation initiated by the activity centre involved identified various failures on behalf of the instructor, her manager, the activity centre itself, the local weather service and government legislation and regulation (e.g. Brookes et al., 2009; Davenport, 2010).

We used the contributory factors identified in the investigation reports and placed them across the different Accimap levels, as shown in Figure 2.

The Accimap therefore shows how decisions, actions and failures across the entire system interacted to enable the tragedy to occur. Importantly, it shows how factors from other levels of the system – including legislation and regulation, activity centre operation, instructor supervision, equipment and environmental conditions – influenced the instructor's behaviour and decision-making during the incident. Thus, rather than lay the blame explicitly on the instructor, the description instead supports appropriate systems reform whereby inadequate conditions that shape instructor and participant behaviour are identified and removed.

Briefly, the Accimap depicts the failures across the led outdoor activity system that played a role. Starting at the bottom, examples of ‘equipment and surroundings’ factors include the adverse weather and conditions in the gorge, an incomplete weather report used in the morning staff meeting, and the radio used by the instructor (which was not waterproof and failed to work in the gorge due to poor reception).

Various ‘physical processes and actor activities’ were involved, including the instructor’s decision to undertake the activity in the first place given the conditions, her flawed evacuation plan, and her failure to impart the gravity of the situation to the students and their teacher.

‘Technical and operational management’ failures shaped the instructor’s performance on the day; she had limited experience of gorge-walking activities and lacked competence for them, both of which shaped her response to the unfolding incident. The centre’s field manager failed to check the weather map on the reverse side of the faxed weather report (this showed the correct forecast), did not cancel all gorge trips in response to the adverse weather conditions and failed to communicate his decision to cancel the downstream version of the trip.

‘Company management’ failures also played a role; Brookes et al noted that, at the time, the centre was operating under financial and production pressures, which ostensibly contributed to a poorly designed adventure program, a rush to get staff trained and competent for activities, and the use of only one instructor for activities during busy periods. The centre’s staff induction, mentoring and training programs, and risk-assessment and management systems, were also found to be inadequate. Other important factors identified included the centre’s ‘rain or shine’ culture with regard to the conduct of activities in adverse weather conditions, high levels of staff turnover, and the lack of an effective accident and near-miss surveillance system.

At the ‘regulatory factors’ level, the absence of a regulatory or licensing body for outdoor activity centres at the time meant that unsafe practices could continue unchecked without reprisals.

Finally, at the ‘government policy and budgeting level’, a lack of legislation to oversee the provision of led outdoor activities also enabled the centre to continue engaging in unsafe practices.

All of the factors outlined in the Accimap combined in a way that enabled the tragic accident to happen. It is important to stress that the decisions and actions made on the day by those involved were shaped by various factors at the higher levels of the led outdoor activity system. Most of these were present long before the accident happened; without examination of existing practices and incident data, these failures remained unchecked and the activity centre continued to drift towards catastrophic failure.

References:

Brookes, A., Smith, M., & Corkill, B. (2009). Report to the Trustees of the Sir Edmund Hillary Outdoor Pursuit Centre of New Zealand: Mangatepopo Gorge Incident, 15th April 2008.

Davenport, C.J. (2010). Mangatepopo Coroners Report, Auckland, 30th March 2010.

Salmon, P., Cornelissen, M., & Trotter, M. J. (2012). Systems-based accident analysis methods: A comparison of Accimap, HFACS, and STAMP. *Safety Science, 50*(4), 1158-1170.

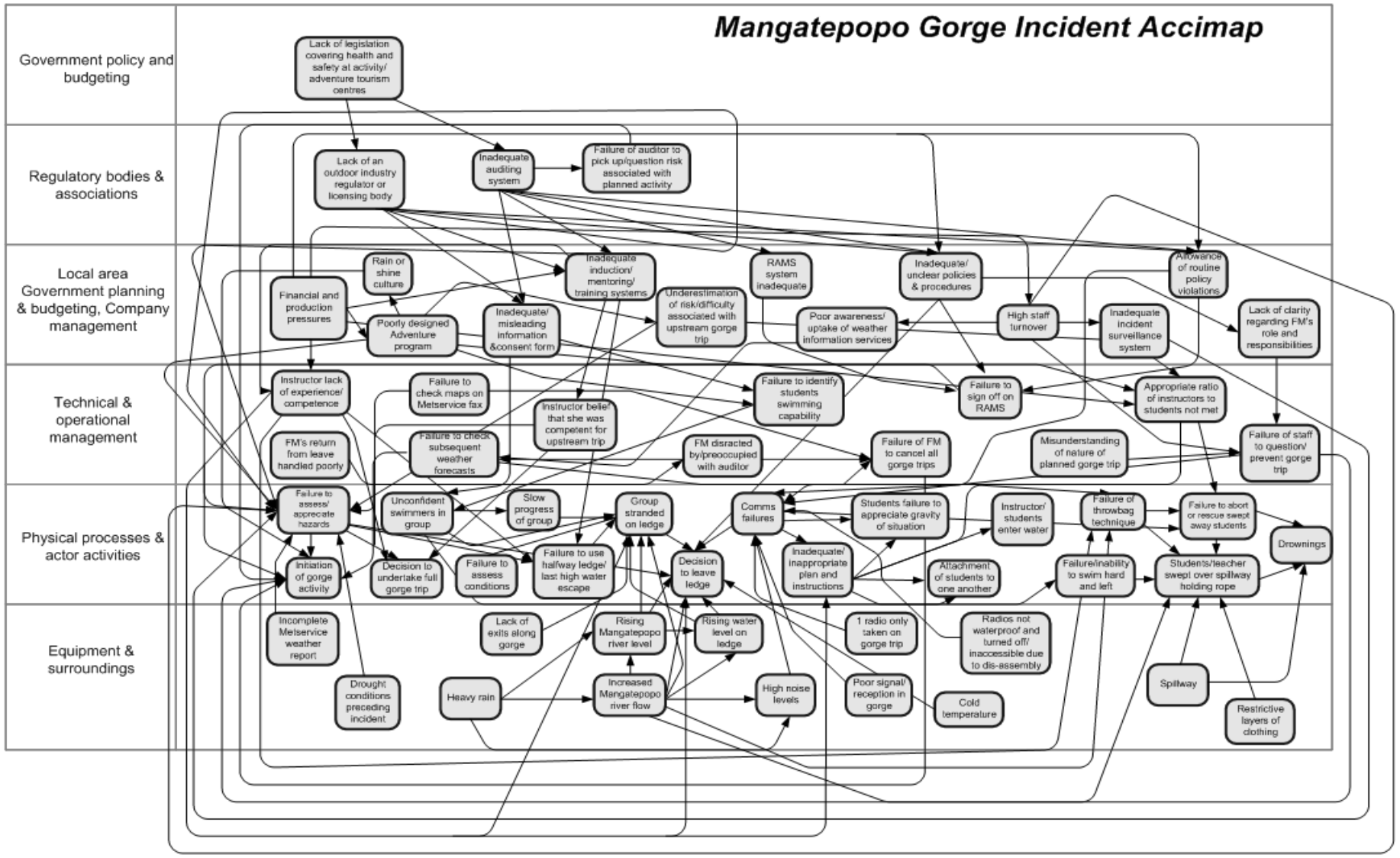

Figure 2 Mangatepopo incident Accimap.

COLLECTING INFORMATION ABOUT INCIDENTS

This section presents some guidance on collecting information about incidents including:

- The paper-based incident report;
- The type of incidents to report;
- How to rate the severity of an incident; and
- How to write a good (useful) incident description

This information is included in the “General Staff Member Training: How to report an incident” PowerPoint presentation.

To ensure that everyone knows how to report an incident, staff members should read the information contained in this section, or view the PowerPoint presentation.

Paper-based incident report

In addition to the software tool, a paper-based form is provided to collect incident data from those involved in incidents (e.g. instructors, teachers, participants).

You can download the paper-based form here:

http://uploadsproject.org/training-material/

This form should be made available to anyone who wants to report an incident. It may be useful to pin an example form on the noticeboard in your staff room, and email the form to all staff members.

From a practical point of view, it is better to encourage staff to fill in the form electronically and email it to you. This way you can copy and paste the details into the software tool.

What to report

The UPLOADS software tool has the capability to record data on incidents involving:

- Adverse outcomes; and
- Near misses.

An "**adverse outcome**" is defined as an event resulting in a negative impact, including: missing/overdue people; equipment or environmental damage; injury; illness; fatality; or social or psychological impacts.

A "**near miss**" is defined as a serious error or mishap that has the potential to cause an adverse event but fails to do so because of chance or because it is intercepted. For example, during a rock climbing activity an instructor notices that a participant's carabineer was not locked. If the student had fallen, this may have led to a serious injury.

Incident severity

A scale is provided to rate the severity of incidents. This scale is shown on the following page, and is also available here:

http://uploadsproject.org/training-material/

You need to rate each incident in terms of the *Actual Severity* and *Potential Severity*.

So the data contained in the National dataset is not biased towards more serious events, it is important that you:

- **Report any Adverse Outcome with an Actual Severity over 1; and**
- **Report any Near Miss with a Potential Severity over 2.**

Rate the ***Actual Severity*** of the incident in terms of the actual outcome of the event.

Rate the ***Potential Severity*** of the incident in terms of the worst possible outcome, given the scenario.

INCIDENT SEVERITY SCALE

	Severity Rating	Definition for Actual Severity Ratings	Definition for Potential Severity Ratings
0	***No impact***	Requires no treatment.	An incident where the potential outcome has a negligible consequence.
1	***Minor***	Requires localised care (non-evacuation) with short term effects.	An incident where the potential outcome to risks has a low consequence.
2	***Moderate***	Requires ongoing care (localised or external, i.e. evacuation or not) with short to medium term effects.	An incident where the potential outcome to risks can cause moderate injuries or illnesses.
3	***Serious***	Requires timely external care (evacuation) with medium to long term effects.	An incident where the potential outcome to risks encountered is such that it may cause major irreversible damage or threaten life.
4	***Severe***	Requires urgent emergency assistance with long term effects.	An incident where the potential outcome to risks encountered is certain death.
5	***Critical***	Requires urgent emergency assistance with serious ongoing long term effects.	NA
6	***Unsurvivable***	Fatality.	NA

How to write a good (useful) incident and causal factor descriptions

What we can learn from UPLOADS is dependent on the quality of the data that we collect. The old adage applies: garbage in = garbage out. In order to fully understand the factors that contribute to incidents we need to gather as much detail as possible about the circumstances leading up, during and after the incident.

A good incident description will include a timeline of events that addresses the following questions:

1. Prior to the incident: Are there things that happened prior to the incident itself that you think influenced behaviour in a way that enabled the incident to happen? For example,

    - Did any events on the day contribute to the incident?
    - What preparation or planning was undertaken to support the activity?
    - Was this type of incident predicted in training or planning for the activity?
    - Did other similar incidents occur prior to the one being reported?
    - Were there flaws with the training programs, procedures, risk management systems etc. used by your organisation?
    - Were activity programs sufficiently well designed?
    - Any other details you feel are relevant to the situation.

2. At the time of the incident:

    - What activity was being undertaken?
    - How many people were present (i.e. instructors, participants, teachers, volunteers, others), and who was participating in the activity?
    - What was the weather like?
    - What equipment was being used?

- Where adequate resources (equipment/staff) available to support the activity?
- Was adequate information available to support the activity (e.g. weather reports, maps, information on participant allergies, illnesses)?
- Were there any constraints that shaped how the activity proceeded (e.g. equipment and staff shortages)?
- Were appropriate communications taking place between activity centre staff?
- Any other details you feel are relevant to the situation.

3. After the incident:

    - What was the outcome of the incident or why was it considered a near miss?
    - What treatment was provided at the scene?
    - Was evacuation required? How did evacuation occur?
    - Did treatment/evacuation run smoothly?
    - Were adequate resources available for treatment/evacuation?
    - Any other details you feel are relevant to the situation.

You should then explain in detail what you think caused the incident, including any relationships between the causes identified. These conclusions should be based on the information you have provided in the incident description.

If possible, reporters and field managers should also make suggestions on how to prevent future, similar, incidents considering:

- What would have helped you understand the situation better?
- Would any specific training, experience, knowledge, procedures or cooperation with others have helped?
- If a key feature of the situation was different, what would you have done differently?

- Could clearer guidance from your company have helped you make a better decision?

Remember: the information included in the incident description section of the report should not include any identifying information. Refer to the people involved in the incident by their role e.g. participant, teacher, activity leader, camp organiser, field manager.

The section on “Incident Investigations” presents some general guidance on how to conduct more detailed incident investigations for serious adverse events or near misses. The information collected in these investigations can also be entered into the incident description and causal factor sections of the incident database.

Examples of good and bad incident reports

Example 1: Unopened can heated on gas stove

Good	Bad
It was the end of a long day of hiking. I was unpacking equipment from the car at the time of the incident. I had spoken to the two teachers present at the start of the day, and I was under the impression that they were going to supervise cooking the dinner. However, I am not sure now how clearly we discussed the issue, as they arrived at the campsite late, and we had little time to discuss our plans before we were scheduled to start the hike. Once we started hiking, we didn't get much time to discuss our plans as we were focussed on making sure everyone was involved in the activity. There were 30 students, and only three of us. At the time of the incident, the participants were cooking dinner using camp stoves. The participant who was injured placed an unopened can of food directly over the gas. I am not sure whether he thought that was the correct way to heat the food, or there was some element of "messing" around. It was a group of five boys, so potentially there was some element of showing off. The participant went to remove the can from the heat with a set of tongs - the can exploded, sending out piping hot food and shrapnel. Participant received burns and cuts to the face. No instructors were present at the time of the incident - we should have been supervising this activity, especially on the first day. There may have been some miscommunication - I was under the impression that the teachers were supervising dinner, but they were also absent at the time of the incident. I gave the participant immediate first aid at the scene – running his face under cold flowing water. One of the teachers called an ambulance, and fortunately we only had to wait 30 minutes for it to arrive. One of the teachers went with the participant in the ambulance. I notified the camp organiser, who said he would contact the boy's parents. From my perspective the causal factors involved in the incident were: Participant doing the wrong thing (unsafe acts); Participant inexperience with heating up canned food on gas stove; Showing off to the other boys; Peer pressure – a group of boys egging each other on; Miscommunication between instructors and teachers; I did not provide adequate instruction to the participants; Late arrival of school group at campsite; and lack of allocation of responsibilities on the schedule. Potentially, this problem could be avoided in the future by allocating responsibilities for supervision and organising equipment on the schedule prior to arrival. That way teachers and instructors would both know what they were required to do.	Boys doing the wrong thing heating unopened can on camp stove. Tom received severe burns to face and cuts from shrapnel from exploding can.

Example 2: Unexpected asthma attack

Good	Bad
The participants were completing an orienteering exercise in groups of three. Participant became short of breath while running and one of the group members came to get me (I was waiting at the end of the course). We ran back to where the participant was – she seemed to be having an asthma attack, but I wasn't sure and she couldn't speak. I asked her group members whether they were aware she had asthma – they said she had often had an asthma attack during running exercises at school. To my knowledge we had not been told by the school or parents that one of the participants had asthma. The girl didn't appear to have any medication with her, so I used the Ventolin inhaler out of the medical kit. After about half an hour, she used the inhaler three times, her breathing calmed down and we walked slowly back to camp. I gave her a glass of water and she sat quietly. She later told me that she had left her medication at home. I looked over the schedule, and we identified other activities that she thought might trigger another asthma attack. I did notice earlier in the day that she had been reluctant about the orienteering exercise, but she didn't tell me why at the time. I later looked at her records, and there is no mention of any medication or asthma. Potential causal factors: Lack of information from school/parents, Participant pre-existing medical condition, Lack of medication, Incorrect documentation, Participant information not communicated. This sort of incident has happened before – maybe we need to start asking participants if they have any medical conditions or injuries during the safety briefing, rather than relying on the consent forms from parents?	Participant had asthma attack while completing orienteering exercise.

Example 3: Incorrect use of abseiling equipment

Good	Bad
Participant was using the abseil rack for a third descent - he chose to adjust it to go faster. He went faster than he anticipated, and instead of letting go of the prussic, he held onto it tighter and therefore didn't slow down. He finally let go and the prussick stopped his descent but by this time had a reasonable rope burn to his brake hand. He continued the activity for another two hours – no first aid was required. Overall, the participant did not have the experience to know what to do when moving too fast. Next time I would place a safety line onto each person and retain control rather than rely on the participant to arrest themselves with a prussick back up.	Participant didn't use the prussick properly to slow down while abseiling.

INCIDENT INVESTIGATIONS

For more serious incidents or near misses you may want to undertake an investigation to gather more information about what happened. This section presents some general guidance on how to conduct investigations using the systems approach. The information collected in these investigations can also be entered into the narrative section of the incident database.

For readers who would like to develop their investigation skills further we recommend: *The Field Guide to Understanding Human Error* by Sidney Dekker. Much of the advice presented in this section is drawn from this book, which presents practical guidance on how to conduct incident investigations in the workplace. Although the examples are drawn from healthcare, aviation and industrial safety, the general principles also apply to the provision of outdoor activities.

Guiding principles

Investigations need to be driven by one guiding principle: human errors are never an explanation – they are symptoms of deeper trouble. People aren't perfect – they make bad decisions, they misunderstand each other – but we must avoid judging them for that. We want to go beyond what people should or could have done. Instead, we want to know "why" they did what they did. Why did their actions or decisions *make sense at the time?*

This means that you are only interested errors/mistakes or violations to the extent that they can tell you about the system. You need to ask the questions:

- What are the sources of people's difficulties?
- What are trade-offs were being made in that situation?
- What influence was technology or equipment having?
- What workload was present in the situation?
- How did communication help or hinder them? What uncertainties were there in the environment?

Potential sources of information about incidents

A number of sources of information can be used to gather information on why incidents happened:

- The documents that supported the activity (e.g. plans, schedules, checklists, SOPs);
- Instructor training manuals or guidelines;
- The documents that were used during the activity (e.g. equipment manuals, maps)
- Interviews with the people directly involved in the incident and those that planned/supported the activity.

Interviewing people

The people involved in the event are a key source of information. Interview those involved in the planning of the activity as well as those directly involved at the time of the incident.

A suggested method for interviews:

1. Start by telling them that the purpose of the interview is not to assign blame, but to understand why the incident happened, and prevent similar future incidents from occurring.
2. Let them tell the story from their perspective, without interruption for clarification.
3. Tell the story back to them, ask questions to clarify points you don't understand or where pieces of information may be missing. If they don't know "why" they made a certain decision that's OK, move on.
4. Help them to construct a timeline of events. At critical points in the timeline probe:
    - Cues: What where you looking at? What were you expecting to happen?

- Knowledge: What knowledge were you using to deal with the situation? Had you had any experience with similar situations?
- Goals: What were you trying to achieve at the time? Were there conflicts between your goals? Were you under any time pressure?
- Influences: How did other influences (in the environment, or organisational) help determine how they interpreted the situation and how they acted?
- Outcome: Was the outcome expected? Did you have to revise your assessment of the situation?

These questions are but a guide –with practice you will find your own way of gathering this information and asking these questions in your own words. Generate your own questions to gather the information that you feel is appropriate to your organisation and the activities you are running.

Dealing with inconsistencies

It is quite likely that different people will remember the event differently. That's OK – there is no one "true" course of events. Each perspective may have valuable pieces of puzzle to add to the "why" behind the incident. Here are some strategies for dealing with inconsistencies:

1. Make the disagreement and inconsistencies explicit in your account of the event;
2. If later statements from the same people are contradictory, decide which version you want to rely on and state why;
3. Do not see disagreements and inconsistencies as "problems". Potentially, they are also contributing factors to the incident. For example, they may point to conflicts between the goals of different people in the situation.

Traps to avoid when collecting data

Understanding incidents from the perspective of those involved is a tricky business. It's important not to become focussed on the "if onlys": if only they had paid attention to X, or decided not to do Y, then Z would never have happened. When this happens, focus shifts from *learning* to *blame*. Here are some common traps to avoid when collecting data:

- **Hindsight** biases your investigation towards issues that you *now* know are important. As a result, you may assess people's behaviour in light of what they *should* have known. You need to try and understanding the evolving situation from the point of view of the people who didn't know the outcome, to see why their actions and decisions made sense at the time.
- The "**root cause**" of an incident doesn't matter nor make sense. Typically, risk management plans include multiple defences against incidents occurring. Thus, multiple failures have to occur before these defences are broken. Expect to find multiple contributing or causal factors when investigating an incident.
- **Cherry picking** evidence to support initial hypotheses about the causes of incidents can lead to biased investigations. Generate your hypotheses, and then look for evidence that doesn't support your hypotheses to test them.