ICAM LEAD INCIDENT INVESTIGATION | TRAINING COURSE

OHSA

Industry Leaders

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Glossary of terms

Some terms relevant to this course are defined below.

Condition	A permanent workplace situation such as the type of equipment or workplace layout.
Circumstance	A short-term situation which is relatively unusual e.g., a storm or when a key person is absent.
Hazard	Hazard means anything that may result in injury to the person or harm to the health of the person.
Incident	Unplanned consequence of events, or a missing or inappropriate response. Any occurrence/event arising out of and in the course of employment which results in personal or property damage.
Incident site preservation	In the event of a notifiable incident, it is the responsibility of the person with management or control of the workplace to ensure, so far as is reasonably practicable, that the site (including any plant, substance, structure, or thing associated with the incident) is not disturbed until an inspector arrives or otherwise directs.
Investigation	A systematic process of gathering and analysing information to identify the cause(s) of an incident.
Jurisdiction	Geographic area or division of industry or the community in which the government has the power and authority to administer and apply certain laws.
SDS	A Safety Data Sheet (SDS) contains critical information about the health effects and appropriate control measures for chemicals used in workplaces.
Near miss	A situation where no one is injured or damaged, but this could have been the case.
Person Conducting a Business or Undertaking (PCBU)	A person conducts a business or undertaking: (a) whether the person conducts the business or undertaking alone or with others; and (b) whether or not the business or undertaking is conducted for profit or gain.
Plant	Includes any machinery, equipment, appliance, implement or tool and any component, fitting or accessory.
Root Causes	The actions or deficiencies which allowed the direct cause to exist. These are usually the underlying causes of an incident.
Root Cause Analysis	A quality tool applying a multiple "why?" analysis, which is directed at identifying all causes responsible for an incident.
Worker	A person who carries out work in any capacity for a business as: (a) a worker; or (b) a contractor or subcontractor; or (c) a worker of a contractor; or subcontractor; or (d) a worker of a labour hire company who has been assigned to work in the person's business or undertaking; or (e) an outworker; or (f) an apprentice or trainee; or (g) a student gaining work experience; or (h) a volunteer.

1.0. INTRODUCTION

Workplace injuries, work-related illnesses, dangerous occurrences, incidents, accidents, serious accidents, and high-potential incidents can result in substantial costs to the companies and individuals involved.

There are obligations under both Mining and WHS/OH&S legislation for the person in charge of the business or undertaking (PCBU) / Site Senior Executive (SSE) to provide safe workplaces and systems of work.

Every workplace incident represents a failure in our Safety Management System, but it also gives us an opportunity to learn from the incident and improve our systems. So, it is crucial that we have processes in place when incidents do occur at our workplaces. Along with the first response of managing the emergency when needed to then have systems in place to respond to and investigate workplace incidents to ensure the effects of the incident are controlled, necessary reporting obligations are met, and an investigation is mounted to gain an understanding of both the immediate and underlying causes so that measures can be implemented to prevent a re-occurrence.

2.0 LEGAL REQUIREMENTS

Some jurisdictions require that the workplace has a process for investigating incidents. For example, the *Coal Mining Safety and Health Regulation 2017 QLD* states:

> **15 Investigating accidents and incidents**
> A coal miner's safety and health management system must provide for the following—
> the procedure for investigating accidents and incidents at the mine;
> making the investigation findings available to the

Similarly, the recently commenced Western Australia's *Work Health and Safety (Mines) Regulations 2022* (commenced 10 August 2023) states in section 622 that the mine must have a Safety Management System and that, amongst other things, it must have:

'(m) the procedures for responding to, and investigating, notifiable incidents and reportable incidents at the mine…'

In addition, the *Coal Mining Safety and Health Act 1999 QLD* at S.30 states that to achieve an acceptable risk, the mine should, amongst other things, have a process to:

> (d) investigate and analyse the causes of serious accidents and high potential incidents with a view to preventing their recurrence;

Metalliferous mines in Queensland under the Mining & Quarrying Safety and Health Regulation 2017 QLD at sections 4,15 & 16 report certain incidents to be reported and investigated using certain techniques.

> ***Reporting accidents and high potential incidents***
> *A mine's safety and health management system must include procedures for workers reporting accidents and high potential incidents to the site senior executive.*
>
> ***Site senior executive's investigation of incidents***
> *(1) In investigating the cause of an incident at a mine, the site senior executive must use techniques that—*
> *(a) are appropriate for—*
> *the nature of the incident; and*
> *the nature and level of the hazards involved; and*
> *are integrated with the risk management process; and*
> *involve appropriate participation by persons involved in the incident.*
> *(2) A mine's safety and health management system must provide for documenting the techniques that must be used for investigating incidents.*
>
> ***16 Giving inspector details of accidents and high potential incidents***
> *This section applies if an accident or high potential incident happens at a mine.*
> *If requested by an inspector, the site senior executive must give the inspector a plan, of the type and at the scale required by the inspector, or photographs, showing relevant details about the accident or incident.*

Severity of an incident

Workplaces will usually have a scale for determining the severity of the incident, which will usually determine the level of response, including the scale of an investigation, number and position of people to be involved and response time frame. This will vary from industry to workplace and might categorise incidents on scales for various Incident / Impact Types, i.e., Health & Safety, Environment, Social, Reputation, Legal & Financial. Each of these categories may then be allocated a Severity Level according to the Scale of the Impact.

Part 1, Division 5 Offences and Penalties of the *Work Health & Safety Act 2011 (Qld)* categorises incidents into three (3) levels of severity, including:

Category 1 Reckless Conduct Incidents – Fatalities, serious matters and serious matters of public concern.

These include:

- High potential for a fatal incident;
- Serious injuries;
- Serious incidents which place a number of people at risk;
- Repeat serious offences and
- Matters of political or community sensitivity (e.g., asbestos).

Category 2 Failure to Comply with Health & Safety Duty Incidents – Breaches of Legislation

All matters involving a serious breach of WHS/OH&S legislation.

Category 3 Failure to Comply with Health & Safety Duty Incidents – Compliance investigations

These matters generally arise from the suspected presence of particular hazards and possible breaches of the legislation.

The regulator will process the information they receive from complaints or reports (notifications). They categorise the information using a model similar to that above and respond accordingly. Category 1 incidents will be actioned immediately and may involve a formal investigation. Category 2 and 3 incidents will be prioritised according to information and resource availability. They may not involve attendance by the regulator, but if they do, they generally result in “on the spot” action, such as issuing a notice requiring the business to take action to control the risk. Similarly, some Mining regulators require specific actions to occur according to the ‘type’ of an incident. For example, in Queensland, Coal Mining incidents are categorised as Accident (S.15), Serious Accident (S.16) and High Potential Incident (S.17) and depending on which TYPE of incident it determines who should be notified, how they should be notified, by when and what must then occur including the provision of the site’s own incident investigation within a specified timeframe (S.198-201 & R. 15 & 16). Queensland Metalliferous Mines have similar requirements in the Mining & Quarrying Safety and Health Act 1999 QLD at sections S.16,17,19 and S195-198 and Regulation 14,15 & 16.

A number of jurisdictions have introduced **Industrial Manslaughter** provisions into their WHS / Mining Safety Acts, where it is an offence for a person conducting a business or undertaking (PCBU) or a senior officer to cause the death of a worker negligently.

Numerous jurisdictions have maximum penalties of up to 20-25 years imprisonment for an individual or $10-$16.5 million for a corporate body (as of 22.12.21).

3.0 COMMON LAW DUTY OF CARE

The Common Law is a body of law that has been built up over the centuries by the decisions of Judges, Courts & Tribunals.

One key aspect of the Common Law is of particular significance for WHS/OH&S as it has been incorporated into all Australian WHS/OH&S Acts. It is called the “General Duty of Care”. It is the duty not to foreseeably cause harm to others.

In its uptake into WHS/OH&S laws, the Duty of Care has been interpreted as the duty to protect workers’ health and safety; to not cause workers’ harm. As such, the general Duty of Care provides the fundamental performance target of the WHS/OH&S legislation; an obligation not to cause harm to anyone who comes in contact with the business.

So modern WHS/OH&S legislation is based on an expectation that organisations will have systems in place for identifying and managing the risks that may arise, and the business has the general “duty of care” to not cause harm to their workers, contractors, visitors and others who may enter or otherwise be affected by their workplace activities including neighbours or members of the public.

4.0 WHS/OH&S LAWS

A person conducting a safety incident investigation should have a thorough understanding of the relevant safety laws relevant to the site of the incident so that they can effectively respond to the incident.

Due to Australia being a federation, WHS/OH&S is the responsibility of the various States and Territories. In 2011, the States and Territories agreed to harmonise their WHS/OH&S legislation to eliminate some of the differences between jurisdictions. Not all States have introduced the harmonised WHS/OH&S legislation. Mining Safety Legislation has not yet been 'harmonised', though there have been attempts for this to occur. As such, each State may have its own Mining Laws, which may differ from State to State.

Regardless, the WHS/OH&S Acts are based on common principles that were adopted across Australia in the 1980s. Prior to the 1980s, WHS/OH&S legislation was very detailed, containing highly prescriptive requirements based mainly on manufacturing and construction activities and having origins in the UK.

Australian jurisdictions introduced a range of significant reforms in the 1980s, mainly due to the 1972 report of the UK Committee of Inquiry into Safety and Health at Work, chaired by Lord Robens. The Robens Report recommendations favoured a work health and safety system based on the Common Law General Duty of Care, capable of addressing safety in all workplaces and supported by consultative obligations and codes of practice.

4.1. Commonwealth, State and Territory legislation

Work health and safety legislation forms part of the Law, which is known as statute law because it is written down in statutes or Acts passed by Parliament. It is presented to Parliament as a Bill, and if passed, it becomes an Act or the Statute.

Commonwealth WHS/OH&S law covers the WHS/OH&S of Commonwealth workers and certain other categories of workers, such as those on Australian registered ships and on offshore drilling rigs in Commonwealth-controlled areas.

Each State and Territory in Australia has a separate **WHS/OH&S Act** which governs WHS/OH&S for all workplaces with the State or Territory, other than Commonwealth workplaces, where anyone conducts a *business*, which is generally where anyone conducts business or enterprise for profit, or *undertakings*, which is generally where anyone conducts non-profit making or non-commercial activities.

The harmonised WHS/OH&S Act introduced to most Australian jurisdictions imposes the broad general duties on a range of workplace participants, including those in charge of the business, self-employed persons, occupiers/controllers of workplaces, manufacturers, suppliers and designers of plant and workers. Victoria, with its OHS Act 2004, is now the only jurisdiction that hasn't adopted the harmonised WHS legislation, with Western Australia's Work Health and Safety Act 2020 (WA) commencing 20 June 2022 with their *Work Health and Safety (Mines) Regulations 2022 (WA)* commencing 10 August 2023.

Under the Act, there are **Regulations that** provide greater detail by outlining specific measures which must apply in certain circumstances.

Codes of practice (or Compliance Codes in Victoria) provide practical guidance on how to achieve particular outcomes. The Act and Regulations are both enforceable, the Codes of practice are not, yet they do provide a benchmark against which the arrangements and performance of organisations and individuals can be tested by the Courts if the organisations or individuals' own arrangements have been found to be wanting.

The term approved code of practice has a particular meaning under the Act. It provides minimum standards of health and safety and is intended to be used in addition to the Act and Regulations. A code of practice provides practical guidance on how a particular standard of health and safety can be achieved using the preferred methods or courses of action.

However, an approved code of practice allows the flexibility to use alternative methods provided they show that an equivalent or better standard of health and safety is achieved. An approved code of practice is therefore different from a regulation where the organisation must meet the requirements specified in the regulation.

There are other codes of practice developed by Safe Work Australia, used as guidance in complying with legislation. There is joint ministerial agreement that the states and territories will adopt national standards as a means to develop national uniformity across jurisdictions.

There are a number of Australian Standards covering an extremely broad range of topics and equipment. Australian Standards can have significance under health and safety legislation:

1. A standard might be referred to in a regulation with direct reference to providing information to relevant government agencies in accordance with Australian Standards (AS). In these circumstances, the Australian Standard becomes part of the regulation, and the PCBU or occupier should comply with the Australian Standard.
2. An AS could be approved by the relevant state or territory minister and gazetted as an approved code of practice. An example of an AS that has been through this process is AS 1657 Fixed Platforms, Walkways, Stairways and Ladders (South Australia 1995). This is of particular relevance to the regulation dealing with access and egress.
3. An AS that is relevant to health and safety and is not an approved code of practice or mentioned in the regulations cannot be ignored. It is incumbent that they are referred to where relevant.

There are other documents produced from time to time in the form of a **guidance note** or guide. They have no legal status but might assist in achieving a greater understanding of specific issues or in complying with particular regulations by providing a series of alternative solutions.

Regardless of the level of authority, you should establish which laws apply to the workplace where the incident occurred. If the incident occurred on a mine site, specific health and safety laws can apply, which will vary depending on the jurisdiction. The first step is to identify the jurisdiction.

WHS practitioners must ensure that they have a sound understanding of these legislative bases for systematically managing health and safety; and that they are familiar with changes that occur in the various pieces of legislation.

In some States, WHS/OH&S law is divided further into separate coverage of mining operations and mineral processing plants, petroleum facilities and other workplaces, with in some cases separate or partly separate administrative authorities, such as in Western Australia for example. New South Wales and Queensland also have had mines safety legislation separate from that for general workplaces, and the administration of that legislation lies with separate government authorities such as the Department of Natural Resources and Mines in Queensland. In most States and Territories, there is also separate dangerous goods legislation that generally applies in all workplaces.

Other important pieces of legislation relating to WHS/OH&S are radiation safety legislation and energy safety legislation, for example, electrical and gas safety legislation, which also apply generally to all workplaces.

Road safety and maritime safety are also covered by separate State and Commonwealth legislation, but generally, the WHS/OH&S legislation covering most workplaces also applies to road and marine workplaces.

Similarly, aviation safety is covered by Commonwealth Civil Aviation Safety legislation, but WHS/OH&S legislation also applies in some cases, such as in relation to the risks associated with working in the cabin of passenger aircraft.

5.0 INCIDENT RESPONSE POLICIES AND PROCEDURES

In order to comply with their legal obligations and as good business practice companies generally develop detailed policies and procedures to help govern the way those hazards should be managed, and incidents prevented. While there are many similarities between organisations' approaches to dealing with incidents at their workplace, each organisation's policies and procedures may vary due to such things as the industry involved, types of incidents, damaging energies present in their workplace, geographical location, jurisdiction, etc.

Policy

All businesses should have an Incident Investigation Policy that requires their business to respond to incidents and that all incidents including significant near misses, be investigated. The Policy is usually a set of principles or rules that provide a definite direction for an organisation and assist in defining what must be done when particular events occur. For every policy established, an organisation will need to create and document supporting procedures.

Procedure

An Incident Investigation Procedure is a clear step-by-step method for implementing the business's policy or responsibility. A procedure describes a logical sequence of activities or processes that are to be followed in the event of an incident and to guide health and safety investigation personnel through the process of identifying and reporting the underlying cause for a health and safety incident or near-miss. The Procedure may address such issues as:

- Identifying those people with responsibility to respond to incidents.
- Emergency response training.
- Assessing the incident scene.
- First aid for those injured.
- Initiating the response by the emergency services when appropriate.
- Evacuation.
- Securing the scene.
- Notifying the necessary internal people (managers and safety personnel).
- Notifying the relevant regulatory authority.
- Conducting an investigation to determine the root causes.
- Taking effective corrective action.
- Rehabilitating the incident scene environment.
- Returning to normal operations.

You should not wait for an incident to occur before you familiarise yourself with your own company's policies and procedures. Prior preparation is essential if your response to incidents is to be prompt and effective.

Duty to respond to incidents

Under the WHS/OH&S legislation and Mining Legislation, there are various duty or obligation holders, including employers (or know known as Persons Conducting a Business or Undertaking PCBU), Mine Owners or Operators, Mine Management (known as Site Senior Executive in some jurisdictions), those who manage, design, supply, install plant or structures, service providers, contractors, workers and others such as visitors etc.

All of these groups have differing duties in relation to providing safe workplaces and safe systems of work, and depending on the circumstances, these duty holders also have a range of responsibilities to respond to incidents. Part 3 of the WHS Act, for example, outlines Incident Notification obligations, including S. 35 What is a Notifiable Incident, S. 38 Duty to Notify of a Notifiable Incident and S.39 Duty to Preserve Incident Sites.

Incident Notification Requirements

The harmonised WHS Act requires the regulator to be notified of certain 'notifiable incidents' or 'prescribed incidents'. Those jurisdictions not harmonised have similar requirements. Mining in some jurisdictions also has a requirement that the regulator (and other parties) is to advise of certain notifiable incidents. For example, in Queensland, the *Coal Mining Safety and Health Act 1999 QLD* and the *Mining and Quarrying Safety and Health Act 1999 QLD* require the Regulator and the Industry Safety Representative (or District Workers Representative in Metalliferous Mining) to be notified of Serious Accidents and High Potential incidents.

Notifying the Queensland Petroleum and Gas Inspectorate about prescribed incidents is a requirement under Section 706 of the *Petroleum and Gas (Production and Safety) Act 2004 QLD*. Section 11 and Schedule 2 of *the Petroleum and Gas (Production and Safety) Regulation 2004* specify the prescribed incidents and notification requirements that apply.

A notifiable incident is an incident involving the death, serious injury, or serious illness of a person or a dangerous incident. A serious injury or illness is one that requires the victim to have medical treatment within 48 hours of exposure, immediate inpatient treatment in a hospital, or immediate treatment for a serious illness or injury such as a head injury, spinal injury, or burn.

It does not matter if the victim actually receives treatment; only if the injury could be reasonably expected to warrant treatment as described. Dangerous incidents are those that expose a person to a serious risk to their health or safety. Examples include an uncontrolled escape, spillage, or leakage of a substance, an electric shock, a fall from height, or the collapse of a structure.

Immediately after a notifiable incident occurs, the PCBU must notify the regulator by telephone or writing (including fax or email). The PCBU must provide any information requested. If notification is by phone, the regulator might require written notice within 48 hours.

Statutory reporting

The WHS/OH&S legislation places statutory reporting duties on the business in the event of certain types of incidents in the workplace. According to the harmonised WHS Act ***S.35 What is a Notifiable Incident*** is defined as:

- The death of a person, or
- A serious injury or illness of a person, or
- A dangerous incident.

According to the harmonised WHS Act ***S.36 What is a Serious injury or illness*** is defined as an injury or illness requiring the person to have:

- Immediate treatment as an in-patient in a hospital, or
- Immediate treatment for: o the amputation of any part of his or her body, or
- A serious head injury, or
- A serious eye injury, or
- A serious burn, or
- The separation of his or her skin from an underlying tissue (such as degloving or scalping), or
- A spinal injury, or
- The loss of a bodily function, or
- Serious lacerations, or
- Medical treatment within 48 hours of exposure to a substance.

According to the harmonised WHS Act ***S.37 What is a dangerous incident*** is defined as an incident in relation to a workplace that exposes a worker or any other person to a serious risk to a person's health or safety emanating from an immediate or imminent exposure to:

An uncontrolled escape, spillage or leakage of a substance, or
An uncontrolled implosion, explosion or fire, or
An uncontrolled escape of gas or steam, or
An uncontrolled escape of a pressurized substance, or
Electric shock, or
The fall or release from a height of any plant, substance or thing, or
The collapse, overturning, failure or malfunction of, or damage to, any plant that is required to be authorized for use in accordance with the regulations, or

Additionally, the harmonised WHS Act refers to ***S.38 Duty to Notify of Notifiable Incidents,*** including the respective reporting timeframes, and ***S. 39 Duty to Preserve Incident Sites*** discusses the requirements to preserve the incident scene and any exceptions due to particular circumstances such as making the scene safe etc.

There are slight differences in the ***Work Health and Safety Act 2022 (WA)*** *with respect to definition of* ***s.36 Serious Injury / Illness*** *adding:*
(d) that occurs in a remote location and requires the person to be transferred urgently to a medical facility for treatment; or
(e) that, in the opinion of a medical practitioner, is likely to prevent the person from being able to do the person's normal work for at least 10 days after the day on which the injury or illness occurs'.

Schedule 1 of the Coal Mining Safety and Health Regulation 2017 QLD states that the following types of High Potential Incidents must be reported to the Regulator.

Schedule 1 Types of high potential incidents for section 198 of the Act

1 An unplanned ignition of gas, dust, or a combination of gas and dust.
2 The spontaneous combustion of coal or other material in an underground mine. 3 The entrapment of a person.
4 An electric shock to a person.
5 An unplanned event causing the withdrawal of a person from the mine or part of the mine. 6 An abnormal circumstances declaration.
7 An unplanned event that causes only 1 escape way from the mine to be available for use. 8 A fire on a vehicle or plant.
9 An incident involving an explosive.
10 A following incident that endangers the safety or health of a person—
(a) a fire;
(b) a ventilation failure causing a dangerous accumulation of methane or other gas;
(c) an inrush;
(d) a coal or rock outburst;
(e) damage to, or failure of, haulage equipment used to transport a person in a shaft or slope;
(f) an unplanned movement of, or failure to stop, a vehicle or plant;
(g) the failure in service of explosion protection of explosion-protected equipment;
(h) a failure of electrical equipment or an electrical installation;
(i) an unplanned ignition or explosion of a blasting agent or explosive;
(j) a failure of strata control;
(k) the exposure of a person to a hazardous substance;
(l) an unforeseen hazard requiring a review of the mine's safety and health management system;
(m) the unplanned immersion of a person in liquid;
(n) an unplanned movement of earth or coal;
(o) a structural failure of equipment;
(p) a collision involving a vehicle or plant.

Notice of an Incident - Victoria

This information is a summary of the incident notification provisions and should be read in conjunction with the legislation.

Part 5 of the *Occupational Health and Safety Act* 2004 requires an employer or self-employed person to notify WorkSafe immediately after becoming aware of an incident at a workplace which results in—

- the death of any person; or
- a person requiring medical treatment within 48 hours of exposure to a substance; or
- a person requiring immediate treatment as an in-patient in a hospital; or
- a person requiring immediate medical treatment for—
  - the amputation of any part of his or her body; or
  - a serious head injury; or
  - a serious eye injury; or
  - the separation of his or her skin from underlying tissue (such as de-gloving or scalping); or
  - electric shock; or
  - a spinal injury; or
  - the loss of a bodily function; or
  - serious lacerations

Notice of Incident that Exposes a Person to Risk

An employer or self-employed person must notify WorkSafe immediately after becoming aware of an incident at a workplace which exposes a person in the immediate vicinity to an immediate risk to the person's health and safety through—

(a) the collapse, overturning, failure or malfunction of, or damage to, any plant that the regulations prescribe must not be used unless the plant is licensed or registered; or

(b) the collapse or failure of an excavation or of any shoring supporting an excavation; or

(c) the collapse or partial collapse of any part of a building or structure; or

(d) an implosion, explosion or fire; or

(e) the escape, spillage or leakage of any substance including dangerous goods as defined in the Dangerous Goods Act 1985; or

(f) the fall or release from a height of any plant, substance or object; or

(g) the following incidents in a mine:

(i) the overturning or collapse of any plant; or

(ii) the inrush of water, mud or gas; or

(iii) the interruption of the main system of ventilation

In addition to immediate notification, the employer/self-employed person must provide a written record of the incident to WorkSafe within 48 hours of becoming aware of an incident. This is the Approved Form for notification in writing.

An Approved Electronic Form is also available at **www.worksafe.vic.gov.au**

1. to Notify WorkSafe immediately, call 132 360
2. for written notification send this Incident Notification Form to WorkSafe within 48 hours:
   - electronically via the web or
   - by post to GPO Box 4306, Melbourne 3001 or
   - by facsimile to (03) 9641 1091 or
   - by post or delivery to WorkSafe at 222 Exhibition Street, Melbourne 3000
3. keep a copy of the written record for at least 5 years

Site Preservation

The site of a notifiable must not be disturbed until an inspector arrives or until directed by an inspector except to protect the health and safety of a person; or provide aid to an injured person involved in the incident; or to take essential action to make the site safe or prevent a further incident.

Part 9 of the *Equipment (Public Safety) Regulations* 2017 requires a person in charge of prescribed equipment at an equipment site to notify WorkSafe immediately after becoming aware of an incident involving the equipment which results in—

- the death of any person; or
- a person requiring medical treatment within 48 hours of exposure to a substance; or
- a person requiring immediate treatment as an in-patient in a hospital; or
- a person requiring immediate medical treatment for—
  - the amputation of any part of his or her body; or
  - a serious head injury; or
  - a serious eye injury; or
  - the separation of his or her skin from underlying tissue (such as de-gloving or scalping); or
  - electric shock; or
  - a spinal injury; or
  - the loss of a bodily function; or
  - serious lacerations

Notice of a Dangerous Occurrence

A person in charge of prescribed equipment at an equipment site must notify WorkSafe immediately after becoming aware of an incident involving the equipment which exposed a person in the immediate vicinity to an immediate risk to that person's health and safety through—

(a) the collapse, overturning, failure or malfunction of, or damage to, any item of plant listed in 45 of the *Equipment (Public Safety) Regulations* 2017 and the Australian Standards referred to therein; or

(b) an implosion, explosion or fire.

In addition to immediate notification, a person in charge of prescribed equipment must provide a written record of the incident to WorkSafe within 48 hours of becoming aware of the incident. This is the Approved Form for notification in writing.

An Approved Electronic Form is also available at **www.worksafe.vic.gov.au**

1. to Notify WorkSafe immediately, call 132 360
2. for written notification send this Incident Notification Form to WorkSafe within 48 hours:
   - electronically via the web or
   - by post to GPO Box 4306, Melbourne 3001 or
   - by facsimile to (03) 9641 1091 or
   - by post or delivery to WorkSafe at 222 Exhibition Street, Melbourne 3000

Site Preservation

The site of an incident must not be disturbed until an inspector arrives or until directed by an inspector except to protect the health and safety of a person; or provide aid to an injured person involved in the incident; or to take essential action to make the site safe or prevent a further incident.

In all Australian jurisdictions, the WHS/OH&S regulators have standard forms that people are required to use when making statutory incident notifications.

For example, in Queensland Office of Industrial Relations Form 3 – Incident Notification form should be used immediately to report a notifiable injury: See an example on the following page.

https://www.worksafe.qld.gov.au/ data/assets/pdf_file/0020/82505/incidents_form.pdf

A notifiable incident in Queensland Mines needs to be reported on Form 5A at:
https://mir.dnrm.qld.gov.au/mir/

WorkSafe Victoria requires Employers, occupiers and people who are in control of workplaces and high-risk equipment are **required by law to notify WorkSafe about incidents** involving workplace health and safety, dangerous goods as well as explosives. WorkSafe must be notified immediately by calling 132 360 and then in writing within 48 hours using one of the approved WorkSafe Victorian forms.

The statutory incident notification forms and related requirements are available on the relevant regulators' websites.

Businesses usually detail who holds the responsibility for statutory incident notification in their policy and procedures and duty statements. The notification must take place "immediately" after the business becomes aware of the incident. The "immediate" notification should be made by the fastest means, i.e., telephone, facsimile, email, or other electronic means.

Office of Industrial Relations

Form 3

Incident notification form

V4.11-2013

Work Health and Safety Act 2011
Safety in Recreational Water Activities Act 2011
Electrical Safety Act 2002

Incident details

Incident type
Please refer to the guide to work health and safety incident notification or electrical safety incident notification web page for assistance.

This is to notify of a: ☐ death ☐ serious injury ☑ serious illness ☐ dangerous incident ☐ serious electrical incident ☐ dangerous electrical event

Provide an explanation of the type of incident using the categories on the **guide to work health and safety incident notification or electrical safety incident notification web page** *(e.g. a category of 'serious injury' is 'immediate treatment for serious head injury'):*

Incident date, time and location

Date of incident:	Incident address:
Time of incident:	Postcode:

Describe the specific location of the incident *(e.g. aisle 3, plant operation room, tower crane the Elizabeth Street entrance side of the site.)*

Description of the incident *Please provide as much detail as possible, for instance: the events that led to the incident; the work being undertaken when the incident happened; the overall action, exposure or event that best describes the circumstances that resulted in the injury, illness, fatality or dangerous incident; the object, substance or circumstance which was directly involved in inflicting the injury, illness, death or dangerous incident; the name and type of any machinery, equipment or substance involved. Was anyone else involved? Was electricity or electrical equipment involved?*

(Attach a separate piece of paper if necessary)

Did the incident involve licensed work *(e.g. high risk work, electrical work?)*
☐ No ☐ Yes Please provide details of the type of licensed work:

Is the workplace a registered major hazard facility? ☐ No ☐ Yes

Queensland Government

Describe any actions taken immediately following the incident to prevent recurrence:
Describe any longer term action proposed to prevent a recurrence:

Notifier's details

Mr ☐ Mrs ☐ Miss ☐ Ms ☐ **First name:**		**Last Name:**	
Position at workplace:		**Contact phone number:**	
Email:			
Is this the person that should be contacted for further information? ☐ Yes ☐ No If no, please provide the name and contact details of the appropriate person should further information be required.			
Mr ☐ Mrs ☐ Miss ☐ Ms ☐ **First name:**		**Last Name:**	
Position:		**Contact phone number:**	

How to lodge the form

Notification must be by fastest possible means.

The options for lodgement are by email to **whsq.aaa@oir.qld.gov.au** or by fax to **(07) 3874 7730**.

NOTE: Notification to Workplace Health and Safety Queensland or the Electrical Safety Office is not a notification to WorkCover Queensland. Call 1300 362 128 if you have any questions about filling out the form. Please keep a copy of this form for your own records before submission.

PRIVACY STATEMENT: The Office of Industrial Relations respects your privacy and is committed to protecting your personal information. The information provided on this form is for the purpose of advising Workplace Health and Safety Queensland and/or the Electrical Safety Office of a reportable incident under the *Work Health and Safety Act 2011*, *Electrical Safety Regulation 2002* or *Safety in Recreational Water Activities Act 2011*. This information will be managed within the requirements of the current state government privacy regime. Our office may be required to disclose your personal information to other regulatory agencies such as the Queensland Police Service, WorkCover Queensland and other agencies in accordance with other law enforcement activities which may be conducted as part of an investigation. Further information on our privacy policy is available at **www.worksafe.qld.gov.au/Privacy**.

AE01:7/5166

Preserving the site of a reportable incident

The Model WHS/OH&S Act requires that the person with management or control of a workplace at which a notifiable incident has occurred must ensure, so far as is reasonably practicable, that the site where the incident occurred is not disturbed until an inspector arrives at the site or directs otherwise (whichever is earlier).

The Queensland Coal and Metalliferous Mining Legislation provides further detail about the scene of an incident in S.200 & S.201 of the *Coal Mining Safety and Health Act 1999 QLD* and at S.197 & s.198 of the *Mining and Quarrying Safety and Health Act 1999 QLD*.

> ***200 Site not to be interfered with without permission***
>
> *A person must not interfere with a place at a coal mine that is the site of a serious accident or high potential incident of a type prescribed by regulation, without the permission of an inspector.*
>
> *Maximum penalty—200 penalty units.*
>
> *Permission under subsection (1) must not be unreasonably withheld.*
>
> *For this division, action taken to save life or prevent further injury at a place is not interference with the place.*
>
> ***201 Action to be taken in relation to site of accident or incident***
>
> *(1) If there is a serious accident or high potential incident, the site senior executive must—*
>
> *carry out an investigation to decide the causes of the accident or incident; and*
>
> *prepare a report about the accident or incident that includes recommendations to prevent the accident or incident happening again; and*
>
> *if the accident or incident is a type prescribed by regulation—forward the report to an inspector within 1 month after the accident or incident.*
>
> *Maximum penalty—100 penalty units.*
>
> *The site senior executive must ensure that the place of the accident or incident is not interfered with until—*
>
> *all relevant details about the accident or incident have been recorded and, if possible, photographed; and*
>
> *sufficient measurements have been taken to allow the development of an accurate plan of the site; and*
>
> *a list of witnesses to the accident or incident has been compiled. Maximum penalty—100 penalty units.*

An incident site must be preserved as far as possible until an investigation has been completed. The site should remain as similar as possible as it was at the time of the incident.

If the site is altered because of a need to:

- Protect the health and safety of a person
- Aid an injured person
- Take action to render the site safe
- Take action to prevent an incident recurring

Steps should be taken to record details about the site before the changes and document steps taken.

The site can be preserved by limiting entry to those who need to enter only. This can be achieved through the use of hazard marking tapes or other physical barriers

Non-disturbance notices

An inspector has the power to issue a non-disturbance notice to the person with management or control of a workplace. The inspector must reasonably believe it is necessary to issue the notice to facilitate the exercise of their compliance powers.

Non-disturbance notices can instruct the person to preserve a site where a notifiable incident has occurred for a given period or prevent the disturbance of a particular site for a given and reasonable period. Preventing disturbance to a site includes the operation of plant. Non-districtance notices must specify the period for which they apply and cannot exceed seven days. It must set out the obligations of the person to whom the notice is issued, the measures to be taken to preserve or prevent disturbance to the site, and penalties for contravening the notice.

The site includes any plant, substance, structure, or other thing. A non-disturbance notice does not prevent any action to assist an injured person, remove a deceased person, which is necessary to make the site safe, that is associated with a police investigation or other action for which an inspector has granted permission.

Attend to the initial needs of the incident

Initial needs could include

- First aid
- Emergency clean-up
- Access to information
- Access to other areas of the site or building

A workplace incident can mean that any one or all of the following has occurred:

- People have been injured or made unwell by a work activity or event
- People could have been injured or made unwell by a work activity or event-this is referred to as a near miss
- Equipment has been damaged or could have been damaged, and, as a consequence, people are exposed to the risk of harm

The first responsibility of people in attendance at a workplace incident is to check the area and provide help where needed.

The following approach could apply:

Assess the situation

Assess the situation to ensure your own safety. This is because the safety of others might depend upon another person, and you will be of little assistance to others if you are also injured.

For instance, if a worker is overcome by toxic fumes, the person assisting could die in an attempt to help if the potential risks are not assessed accurately.

Provide first aid

The next step is to provide first aid. In some cases, it is appropriate to source first aid from another person. You must be satisfied that the area is safe and that first aid is provided within the provider's capabilities.

The process of ensuring the area is safe involves the following steps:

1. Visually observing the scene and assessing the situation.
2. Undertaking a risk assessment.

Important points to consider include:

- The presence of plant or equipment, whether anyone has been hurt
- Whether anyone could have been hurt by the hierarchy of control
- The presence of substances
- Whether the presence of plant, equipment and/or substances has contributed to the injury, the risk of immediate or further exposure
- The presence of particular hazards such as fire or electricity

Plant and equipment

Plant can include things such as presses, computers, scaffolding, lifts, escalators, tractors, hand trolleys, cranes, welding equipment, electric power tools, forklift trucks and excavators; however, plant and equipment can also include a much broader range of machinery found in one form or another in every workplace.

Some examples of plant-related injuries include:

- Crushing
- Runovers by powered mobile plant such as forklifts
- Rollovers relative to tractors and earthmoving machinery
- Falls from plant
- Entrapment and amputation
- Electric shock

Actual and potential injuries

Workplaces have many hazards and, if not managed properly, can lead to incidents. The object of most WHS/OH&S legislation, be it in civil or mining, is to protect the safety and health of persons that might be affected by that business activity or operation and to require that the risk of injury or illness to any person resulting from those businesses operations be at an acceptable level. Invariably, the hazards won’t be adequately managed, and as a consequence, an incident will occur.

Actual and potential injuries are caused by hazards. Physical and/or psychological harm can occur as a result of the following hazards:

1. **Mechanical energy hazards.** Mechanical energy hazards involve system hardware components that cut, crush, bend, shear, pinch, wrap, pull, and puncture. Such hazards are associated with components that move in circular, transverse (single direction), or reciprocating back-and-forth motion.
2. **Electrical energy hazards.** Electrical energy hazards have traditionally been divided into categories of low voltage electrical hazards (below 440 volts) and high voltage electrical hazards (above 440 volts).
3. **Chemical energy hazards.** Chemical energy hazards involve substances that are corrosive, toxic, flammable, or reactive, involving a release of energy ranging from non-violent to explosive and capable of detonation.
4. **Kinetic energy hazards.** Kinetic energy hazards involve things in motion and impact and are associated with the collision of objects in relative motion to each other. This would include the impact of objects moving toward each other, the impact of a moving object against a stationary object, falling objects, flying objects, and flying particles.
5. **Potential energy hazards.** Potential energy hazards involve stored energy. This includes things that are under pressure, tension, or compression or things that attract or repulse one another. Potential energy hazards are associated with things that are susceptible to sudden, unexpected movement. Hazards associated with gravity are included in this category and involve potential falling objects, potential falls of persons, and the hazards associated with an object's weight. This category also includes the forces transferred biomechanically to the human body during manual lifting.
6. **Thermal energy hazards.** Thermal energy hazards involve things that are associated with extreme or excessive heat, extreme cold, sources of flame ignition, flame propagation, and heat-related explosions.
7. **Acoustic energy hazards.** Acoustic energy hazards involve excessive noise and vibration.
8. **Radiant energy hazards.** Radiant energy hazards involve the relatively short wavelength energy forms within the electromagnetic spectrum including the potentially harmful characteristics of radar, infra-red, visible, microwave, ultraviolet, X-ray, and ionizing radiation.
9. **Atmospheric hazards.** These hazards are associated with atmospheric weather circumstances such as wind and storm conditions, geological structure characteristics such as underground pressure or the instability of the earth's surface, and oceanographic currents such as wave action.
10. **Biological hazards.** These hazards are associated with poisonous plants, dangerous animals, biting insects and disease carrying bacteria.

Some organisations have quite extensive hazard lists or categories that they are required to refer to such as the following Generic Energy Hazard Table.

Generic Energy Hazard	Definition
Biological	Potential for positive or negative impacts resulting from interaction of activities with biological agents. This could be harmed by exposure to biological hazards, flora and fauna including insect stings, bites, bacteria and other disease agents, viruses and natural poisons or environmental harm to biodiversity.
Chemical	Potential for harm by chemicals, includes acids, alkalis, organic substances (e.g., gases, fuels, lubes, degreasers, solvents, paints), ozone-depleting substances etc.
Climate / Natural Events	Potential for harm by exposure to extreme natural, environmental or climate sources and events (including lightning, high winds flooding).
Dust / Inhalable Particulates	Potential for harm by exposure to fine dry particles of matter in the air. Dusts, mists, vapours and aerosols (Coal dust, silica dust, environmental nuisance/community complaints).
Electrical	Potential for harm to people, equipment/assets or the environment by exposure to electrical sources.
Ergonomics	Potential for exposure to physical actions or forces, including poor design, thus presenting the potential for harm associated with exertion, excessive, unnatural or repetitive movement, poor posture or other undesired physical stress on the human body.
Explosives	Potential for harm by exposure to explosive material (e.g., unexploded detonators, tie down lines etc.).
External Threats	Potential for harm resulting from an external event outside of the operations direct control (e.g. legislation, government actions, community lobby groups etc.).
Fire	Potential for harm by exposure to a burning mass of material (e.g., building fires, spontaneous combustion).
Gravitational (Objects)	Potential for harm by exposure to falling objects, unexpected movement (ground, slope, structure) due to uncontrolled gravitational forces.
Gravitational (People)	Potential for harm to people caused by their being subject to falling, unexpected movement or in any other way resulting from their being exposed to uncontrolled gravitational forces (including slips, trips, and falls).
Land	Potential harm on the naturally occurring environment due to the use or management of land resulting from pollution, clearance or any other degradation.
Lighting	Potential for harm resulting from excessive light or inadequate lighting in the workplace.
Mechanical (Fixed)	Potential for harm by exposure to interaction with sources of fixed mechanical energy (including those powered by electrical, hydraulic, pneumatic, combustion etc.).
Mechanical (Mobile)	Potential for harm by exposure to interaction with sources of mobile (self-propelled) mechanical energy (including those powered by electrical, hydraulic, pneumatic, combustion etc.).
Magnetic	Potential for harm to people, equipment/assets or the environment by exposure to magnetic sources (including handling metal objects in strong magnetic fields).
Noise	Potential for harm by exposure to sudden or prolonged exposure to excessive noise or community complaints.
Personal/Behaviour	Potential for harm associated with intentional undesired behavioural actions, stresses or stressors.
Pressure/Explosions	Potential for harm by exposure to sudden release of pressure from a specific source (including pressure waves from explosions, pressurised systems, cylinders, springs, chains, flying bits, or community complaints associated with air blast overpressure etc.).
Psychological	Potential for harm associated with stressors from situations, conditions or events that could create negative emotional, cognitive or behavioural outcomes.
Radiation	Potential for harm by exposure to radiation waves whether natural or manufactured sources (characterised as either ionising or non-ionising sources).
Social / Cultural	Potential for positive or negative impacts resulting from interaction of business activities with social or cultural expectations (includes social licences to operate).
Thermal	Potential for harm by exposure to or variations in temperature (hot or cold) but excludes anything that is on fire which has a separate category.
Vibration	Potential for harm resulting from prolonged exposures to excessive vibration or blast vibration.
Waste	Potential for harm caused by the inappropriate use of resources, inadequate management or disposal of waste material (including pollution and greenhouse gases).
Water	Potential for harm caused by the inappropriate use of water resources or inappropriate management or disposal of water.
Other	Potential for harm by exposure to other hazards/aspects e.g., friction, biochemical.

Types of incidents

In most workplaces, there is also a wide range in the potential nature and severity of the incidents that may occur. According to *the Australian Standard 1885.1 – 1990 Measurement of occupational health and safety performance Part 1: Describing and reporting occupational injuries and disease known as the Workplace injury and disease recording standard (pending revision, although current as of December 22,2021)* incidents are coded into four principal items: the breakdown event, the breakdown agency, the mechanism of injury/disease and the agency of injury/disease.

The *breakdown event* is the first event in the chain which eventually led to the most serious injury or disease, that is, the point at which things started to go wrong. The *breakdown agency* refers to the object, substance or circumstance that was principally involved in, or most closely associated with, the breakdown event. The *mechanism of injury/disease* is the action, exposure or event which is the direct cause of the most serious injury or disease. The *agency of injury/disease* refers to the object, substance or circumstance directly involved in inflicting the injury or disease. Codes should be allocated for the mechanism of injury/disease as follows:

1. Falls from a height
2. Falls on the same level (including trips and slips)
3. Hitting objects with a part of the body
4. Exposure to mechanical vibration
5. Being hit by moving objects
6. Exposure to sharp sudden sound
7. Long term exposure to sounds
8. Exposure to variations in pressure (other than sound)
9. Repetitive movement with low muscle loading
10. Other muscular stress
11. Contact with electricity
12. Contact or exposure to heat and cold
13. Exposure to radiation
14. Single contact with chemical or substance (excludes insect and spider bites and stings)
15. Long term contact with chemical or substance
16. Other contact with chemical or substance (includes insect and spider bites and stings)
17. Contact with, or exposure to, biological factors
18. Exposure to mental stress factors
19. Slide or cave-in
20. Vehicle accident
21. Other and multiple mechanisms of injury
22. Unspecified mechanisms of injury

Codes should be allocated for the breakdown agency and the agency of injury/disease as follows:

1. Machinery and fixed plant
2. Mobile plant
3. Road transport
4. Other transport
5. Powered equipment, tools and appliances
6. Non-powered hand tools
7. Non-powered equipment
8. Chemicals
9. Non-metallic substances
10. Other materials, substances or objects
11. Outdoor environment
12. Indoor environment
13. Underground environment
14. Live animals
15. Non-living animals
16. Human agencies
17. Biological agencies
18. Non-physical agencies
19. Other agencies
20. Unspecified agencies

Businesses need to protect against all of these events from happening. So, incident prevention can be seen as a very complex problem which often results in an equally complex set of arrangements being applied to prevent them from happening.

Ensure the integrity of the site.

Once the area has been checked and people have been cared for, you must ensure the integrity of the site and safety of personnel is established and maintained in accordance with legal requirements. Health and safety legislation requires that the site not only has to be safe but must also be secured to avoid possible alterations to the scene.

This is important because in some cases, an investigation might be necessary and maintaining the integrity of the site ensures personnel safety and unnecessary disruption or tampering of evidence.

The period prior to the investigation is referred to as a non-disturbance occurrence and might happen when there are injuries resulting in amputation, loss of consciousness, major damage to plant and equipment and/or uncontrolled fire and explosion. In these cases, the site must not be disturbed to establish and maintain the integrity of the site and protect evidence.

Evidence must be preserved in order to ensure that the gathering of information is not complicated by unnecessary alterations to the scene. Retaining the incident scene as close as possible to what it was prior to the incident also assists the investigator to maintain objectivity.

The following actions can be considered:

1. **Close off the area.**

The area must be physically barricaded or marked as a no-go zone. This can be done by using barriers or special-purpose tape. When barricading the area, you should take into consideration that any barriers might have the potential to cause an injury, and care must be taken to reduce this risk. For example, if witches' hats are to be used, they should be placed in full view of pedestrians so people entering the site are not likely to fall or trip over them. Another point to consider might include the possibility of using barriers and forcing pedestrians into an area which is not safe.

2. **Identify and advise relevant personnel.**

Where people have been harmed or injured, a record must be made of injuries or illnesses that have been observed. Witnesses and others who could assist in describing the events that led to the incident must also be identified and their details recorded.

3. **Protect evidence.**

Ensure that any items of plant, substances or work procedures are secured. This can be done by preventing evidence from being removed or altered. Where relevant, it could also be necessary to identify samples of equipment and substances that could have a bearing on the investigation; however, where a formal investigation is to be conducted by a regulatory authority, the evidence must not be disturbed until the investigating officer has given approval for such samples to be collected.

4. **Observe and note conditions.**

This could include a notation of any obvious damage to plant, equipment or premises as well as underlying environmental conditions such as temperature, wind, dust or odours. Observation should be done with the intention to ensure the integrity of the site so that, as much as it is possible, conditions that prevailed at the time of the incident are preserved. This can assist the investigation team to understand what occurred more easily.

Legal requirements state specifically that an investigator has the power to direct either in person or in writing that the workplace not be disturbed and:

- In conducting an investigation, an investigator can give a direction to: remove an immediate threat to the health or safety of any person, allow the inspection, examination or taking of measurements of, or conducting of tests concerning, a workplace or any plant, substance or thing at a workplace direct, by written or verbal notice given to the person who is responsible that a particular workplace, or a specified part of a particular workplace, or particular plant, or a particular substance or thing not be disturbed for the period deemed necessary in order to remove the threat or to allow the inspection, examination, measuring or testing to take place
- The direction can be renewed by the giving of another direction
- Where an investigator gives a notice to a person, that person must cause the notice to be displayed in a prominent place at the workplace until the direction has expired, been revoked or been varied

You should also as soon as is reasonably practicable after giving the direction, take all reasonable steps to notify:

- The owner of the workplace, plant, substance or thing to which the direction relates
- A health and safety representative {HSR)
- A PCBU who has control over the workplace, plant, substance or thing to which the direction relates, and whose workers use the workplace, plant, substance or thing in the performance of work for the PCBU

An important point to note is that pursuant to health and safety legislation, a PCBU who breaches these directives could be subject to civil action or a criminal prosecution. Information relating to the obligation to maintain the integrity of any site or personnel can be sourced by contacting the Australasian Legal Information Institute.

The legislation says that:

- The direction must include the reasons for the giving of the direction
- An investigator can revoke or vary a direction given by giving written or verbal notice

In the case where an investigator gives oral notice that the work site cannot be disturbed, you must ensure direction such as this is only given when the investigator:

- Considers on reasonable grounds that it is necessary to give the oral direction in order to: remove an immediate threat to the health or safety of any person; or
- Allow the inspection, examination or taking of measurements of, or conducting of tests concerning, a workplace or any plant, substance or thing at a workplace; and
- Considers on reasonable grounds that there is not adequate time available to make a direction by written notice

The direction can be revoked by informing the PCBU or the organisation’s officers and at that time, the workplace can be re-entered.

6.0 ACCIDENT CAUSATION THEORY

Introduction

Accidents have been broadly defined as:

a short, sudden and unexpected event or occurrence that results in an unwanted and undesirable outcome … and must directly or indirectly be the result of human activity rather than a natural event'. (Hollnagel, 2004, p. 5)

Understanding how accidents occur is vital to establish interventions to prevent their occurrence. Since the early 1800's there have been a variety of approaches. There are linear models which suggest one factor leads to the next and to the next leading up to the accident, and complex non-linear models which suggest multiple factors are acting concurrently and by their combined influence, lead to accident occurrence. Some models help in aiding our understanding of how accidents occur, whilst others are useful for supporting accident investigations to systematically analyse an accident in order to gain an understanding of the causal factors so that effective corrective actions can be determined and applied.

History

The earliest documented approach was that of the Du Pont company which was founded in 1802. They had a strong emphasis on accident prevention and mitigation. The company founder E.I. Du Pont (1772 – 1834) is noted as saying “we must seek to understand the hazards we live with''. The design and operation of DuPont explosives factories, over the next 120 years, were gradually improved as a result of a consistent effort to understand how catastrophic explosions were caused and prevented.

Between the two World Wars Accident research was also reported as being part of the work of the British Industrial Health Board. The history of accident modelling itself can be traced back to the original work by Herbert. W. Heinrich, whose book *Industrial Accident Prevention* in 1931 became the first major work on understanding accidents. Heinrich stated that his fundamental principles for applying science to accident prevention was that it should be: “(1) through the creation and maintenance of an active interest in safety;
(2) be fact finding; and
(3) lead to corrective action based on the facts” Heinrich’s book, now in its 5th edition, attempted to understand the sequential factors leading to an accident and heralded in what can be termed a period of simple sequential linear accident modelling. While sequential linear models offered an easy visual representation of the ‘path’ of causal factor development leading to an accident they did not escape the widely accepted linear time aspect of events which is tied into the “Western cultural world-view of past, present and future as being part of everyday logic, prediction and linear causation” (Buzsáki, 2006, p. 8).

The history of accident models to date can be traced from the 1920s through three distinct phases (Figure 1):

- Simple linear models
- Complex linear models
- Complex non-linear models. (Hollnagel, 2010).

Each type of model is underpinned by specific assumptions:

- The simple linear models assume that accidents are the culmination of a series of events or circumstances which interact sequentially with each other in a linear fashion and thus accidents are preventable by eliminating one of the causes in the linear sequence.

- Complex linear models are based on the presumption that accidents are a result of a combination of unsafe acts and latent hazard conditions within the system which follow a linear path. The factors furthest away from the accident are attributed to actions of the organisation or environment, and factors at the sharp end are where humans ultimately interact closest to the accident, the resultant assumption being that accidents could be prevented by focusing on strengthening barriers and defences.

- The new generation of thinking about accident modelling has moved towards recognising that accident models need to be non-linear; those accidents can be thought of as resulting from combinations of mutually interacting variables which occur in real world environments, and it is only through understanding the combination and interaction of these multiple factors that accidents can truly be understood and prevented. (Hollnagel, 2010).

Figure 1 portrays the temporal development of the three types of models and their underpinning principle. The types of models, their evolution, together with representative examples are described in the following sections.

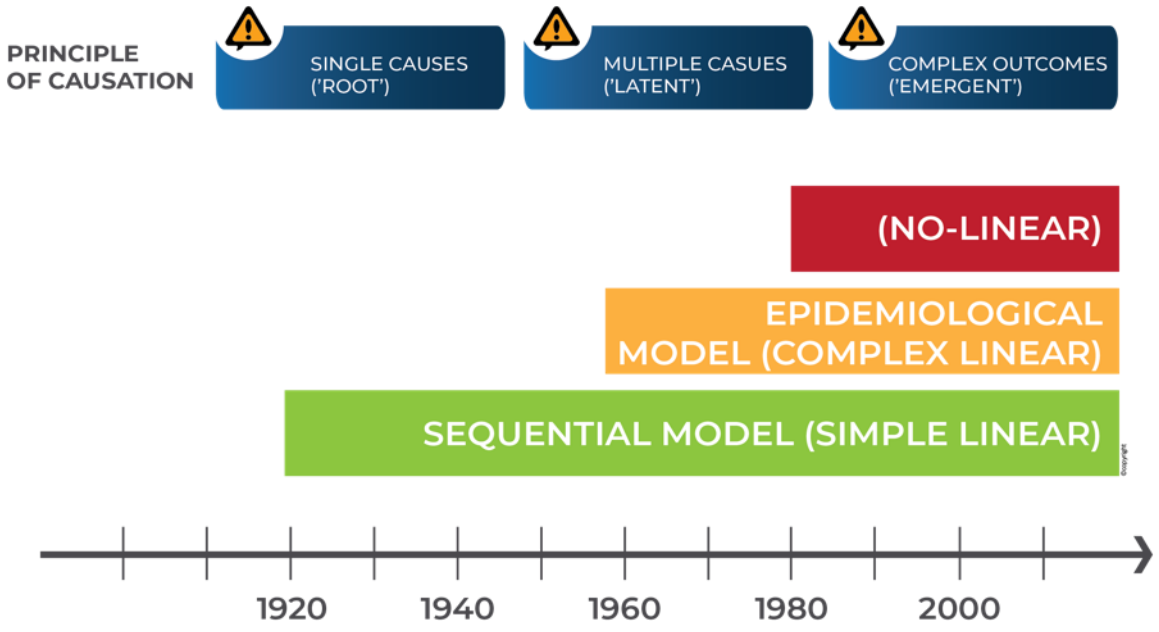


Figure 1: Summary of a history of accident modelling.

Simple sequential linear accident models

Simple sequential accident models represent the notion that accidents are the culmination of a series of events which occur in a specific and recognisable order (Hollnagel, 2010) and now represent the "commonest and earliest model of accident research ... that describing a temporal sequence" where the "accident is the overall description of a series of events, decisions and situations culminating in injury or damage ... a chain of multiple events" (Surry, 1969).

Heinrich's Domino Theory

The first sequential accident model was the 'Domino effect' or 'Domino theory' (Heinrich, 1931). The model is based in the assumption that:

The occurrence of a preventable injury is the natural culmination of a series of events or circumstances, which invariably occur in a fixed or logical order … an accident is merely a link in the chain. (p. 14).

This model proposed that certain accident factors could be thought of as being lined up sequentially like dominos. Heinrich proposed that an:

… accident is one of five factors in a sequence that results in an injury … an injury is invariably caused by an accident and the accident in turn is always the result of the factor that immediately precedes it. In accident prevention, the bull's eye of the target is in the middle of the sequence – an unsafe act of a person or a mechanical or physical hazard (p. 13).

Heinrich's five factors were:

- Social environment/ancestry
- Fault of the person
- Unsafe acts, mechanical and physical hazards
- Accident
- Injury.

Extending the domino metaphor, an accident was considered to occur when one of the dominos or accident factors falls and has an ongoing knock-down effect, ultimately resulting in an accident (Figure 2).

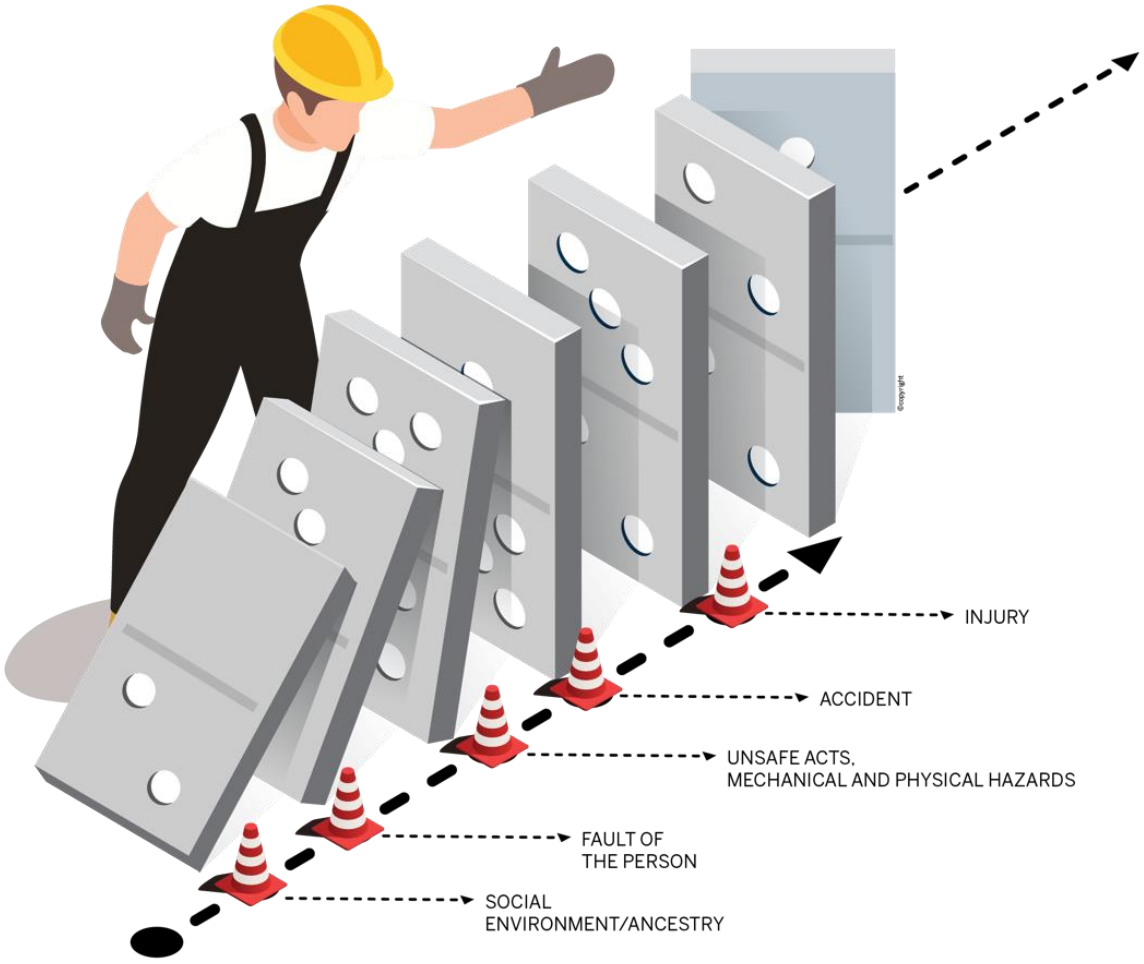
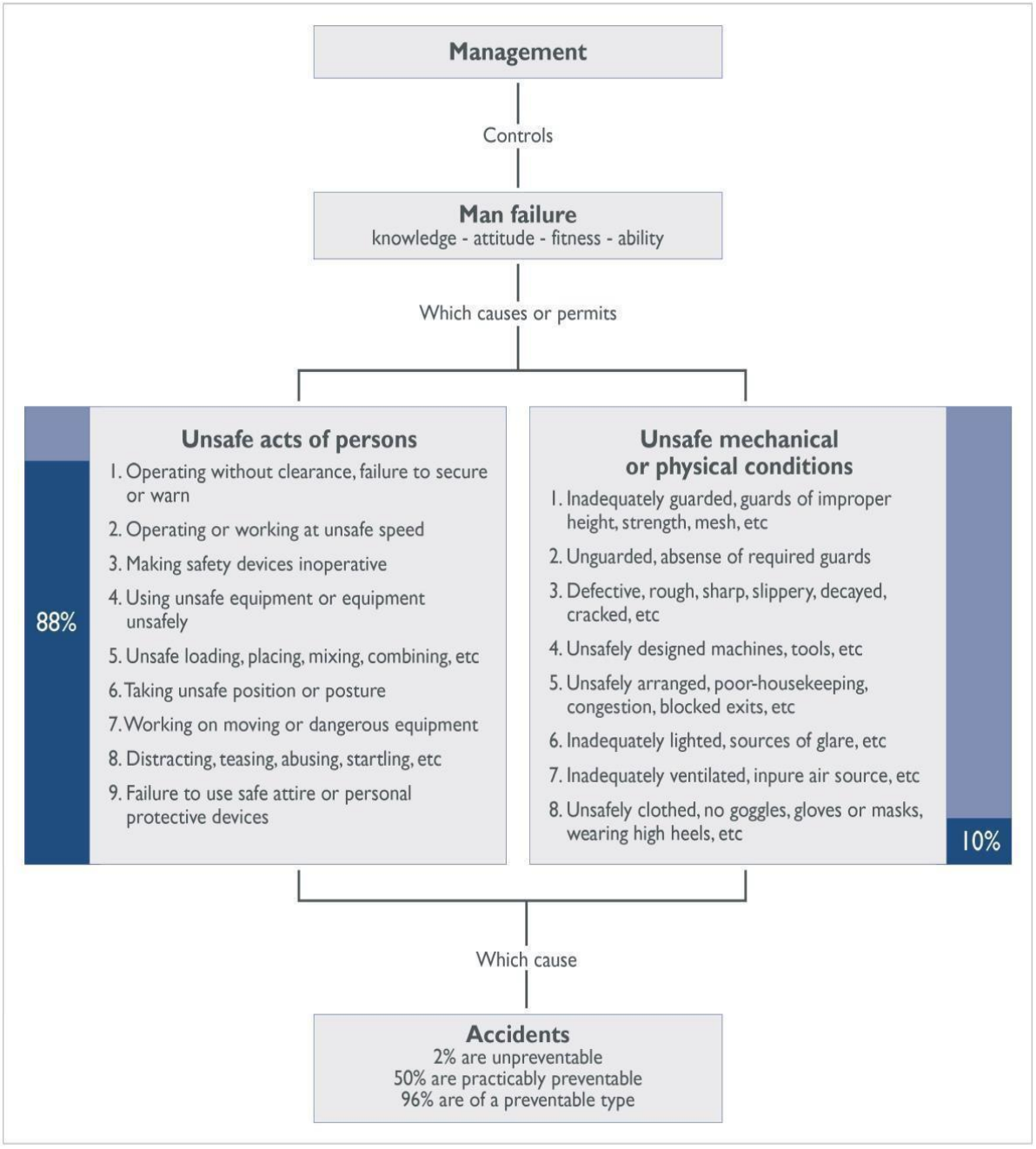


Figure 2: Domino model of accident causation (modified from Heinrich, 1931)

Based on the domino model, accidents could be prevented by removing one of the factors and so interrupting the knockdown effect. Heinrich proposed that unsafe acts and mechanical hazards constituted the central factor in the accident sequence and that removal of this central factor made the preceding factors ineffective. He focused on the human factor, which he termed “Man Failure”, as the cause of most accidents. Giving credence to this proposal, actuarial analysis of 75,000 insurance claims attributed some 88% of preventable accidents to unsafe acts of persons and 10% to unsafe mechanical or physical conditions, with the last 2% being acknowledged as being unpreventable giving rise to Heinrich’s chart of direct and proximate causes (Heinrich, 1931, p.19). (Figure 3)

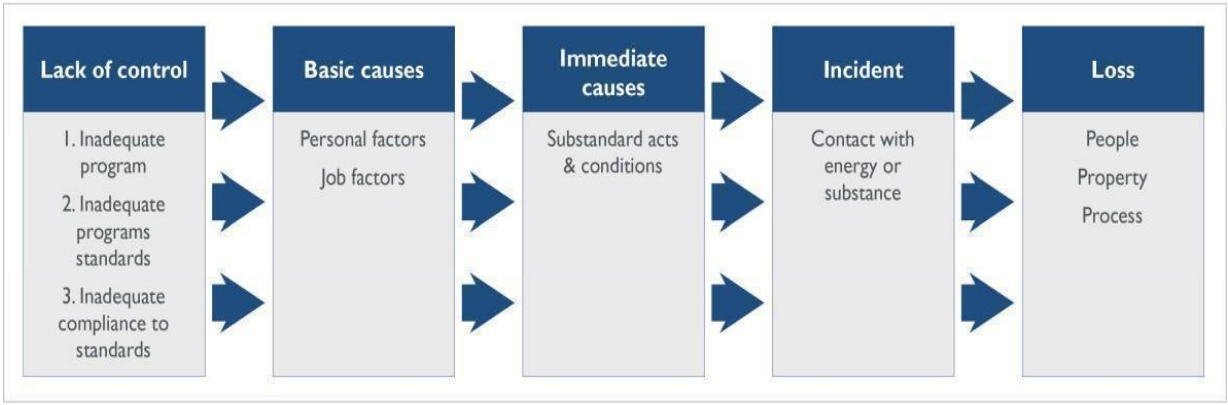
Figure 3: Direct and proximate accident causes according to Heinrich (1931)



Bird and Germain's Loss Causation model

The sequential domino representation was continued by Bird and Germain (1985) who acknowledged that the Heinrich's domino sequence had underpinned safety thinking for over 30 years. They recognised the need for management to prevent and control accidents in what were fast becoming highly complex situations due to the advances in technology. They developed an updated domino model which they considered reflected the direct management relationship with the causes and effects of accident loss and incorporated arrows to show the multi-linear interactions of the cause-and-effect sequence. This model became known as the *Loss Causation Model* and was again represented by a line of five dominos linked to each other in a linear sequence (Figure 4).

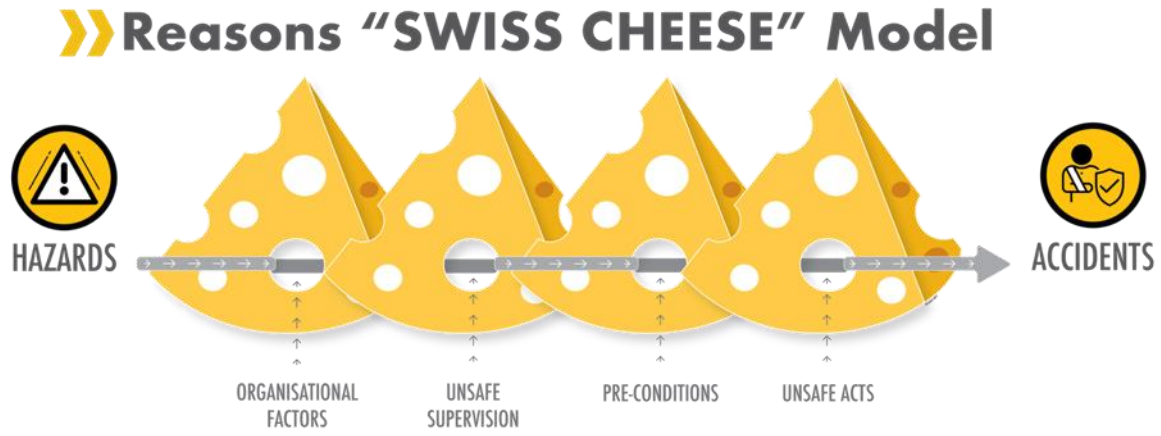
Figure 4: The International Loss Control Institute Loss Causation Model (modified from Bird and Germaine, 1985)



Complex linear models

Sequential models were attractive as they encouraged thinking around causal series. They focus on the view that accidents happen in a linear way where A leads to B which leads to C and examine the chain of events between multiple causal factors displayed in a sequence usually from left to right. Accident prevention methods developed from these sequential models focus on finding the root causes and eliminating them or putting in place barriers to encapsulate the causes. Sequential accident models were still being developed in the 1970's but had begun to incorporate multiple events in the sequential path. Key models developed in this evolutionary period include energy damage models, time sequence models, epidemiological models and systemic models.

Reason's early work in the field of psychological error mechanisms (Reason 1975; 1976; 1979) was important in this discussion on the complexity of accident causation. By analysing everyday slips and lapses he developed models of human error mechanisms (Rasmussen 1982). Reason (1990) went on to address the issue of two kinds of errors: active errors and latent errors. Active errors were those "where the effect is felt almost immediately" and latent errors "tended to lie dormant in the system largely undetected until they combined with other factors to breach system defences" (p. 173). Reason, unlike Heinrich (1931) and Bird and Germain (1985) before him, accepted that accidents were not solely due to individual operator error (active errors) but lay in the wider systemic organisational factors (latent conditions) in the upper levels of the organisation. Reason's model is commonly known as the Swiss Cheese Model (see Figure 5).



Unlike the modelling work of Heinrich (1931) and Bird and Germain (1985), Reason did not specify what these holes represented or what the various layers of cheese represented. The model left the OHS professionals to their own investigations as to what factors within the organisation these items might be.

The "Swiss Cheese" model was only one component of a more comprehensive model he titled the *Reason Model of Systems Safety* (Reason 1997) (Figure 6).

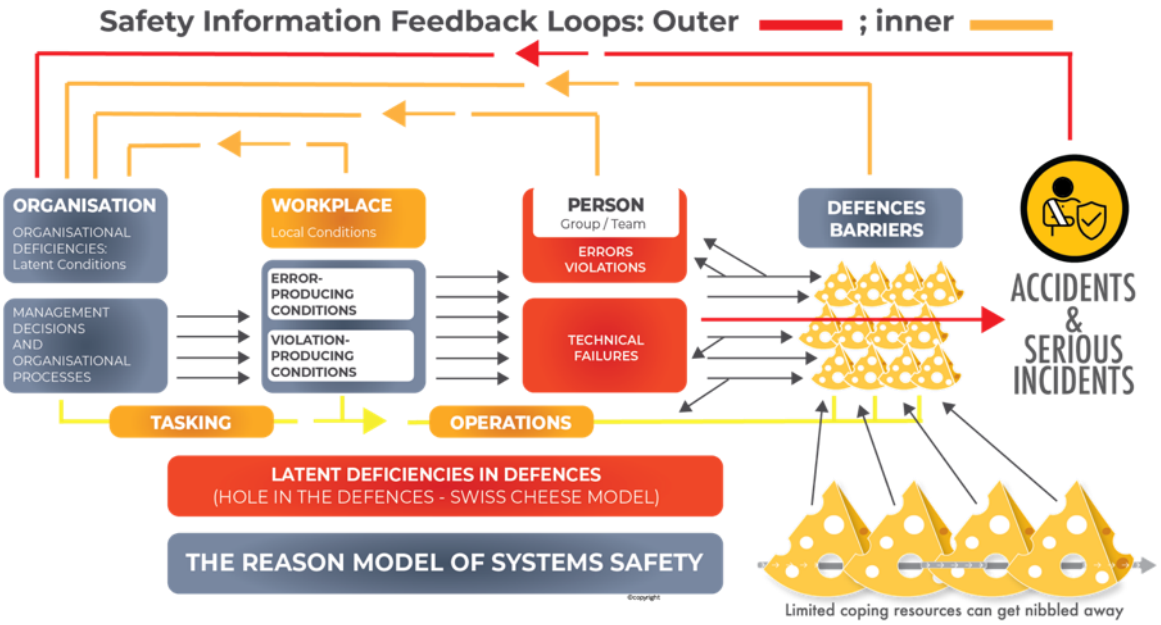


Figure 6: The Reason Model of System Safety

Reason had a major impact on OHS thinking and accident causation in that he moved the focus of investigations from blaming the individual to a no-blame investigation approach; from a person approach to a systems approach; from active to latent errors; and he focused on hazards, defences and losses. Reason's Swiss Cheese and Systems Safety models were an attempt to reflect these changes.

James Reason (1997) highlights the role of information and consultation in determining the safety culture when he states that the key to a safety culture is an effective safety information system enabling an informed culture. He describes four underpinning cultures that combine to make an informed culture – a reporting culture, a just culture, a flexible culture and a learning culture. The description of each of these 'cultures' (given below) highlights the pervasive role of information, communication and consultation, and the environment in which this occurs, in an effective WHS/OH&S organisational culture.

A reporting culture

A reporting culture is where people not only report incidents but feel 'safe' in reporting where they feel there is potential for things to go wrong or a weakness that should be addressed. There are many reasons why people may not wish to report incidents – extra work, fear of getting themselves or others into trouble, past experience of little or no follow up action.

A just culture

Trust, and therefore a reporting culture, is not possible where there is a climate of blame; however, a 'no-blame' approach is neither feasible nor desirable. A just culture is an atmosphere of trust where people are encouraged and rewarded for providing essential safety-related information – but there are also clear lines between acceptable and unacceptable behaviour.

A flexible culture

Organisational flexibility means possessing the culture capable of adapting effectively to changing demands.

Some organisations have the ability to reconfigure themselves when faced with a high work tempo or certain kinds of danger. A flexible culture involves shifting from the conventional hierarchical structure to a flatter professional structure where control passes to the experts on the spot and then reverts back to the hierarchical mode once the emergency has passed. This type of response is most often seen in high-risk areas where failure cannot be tolerated (High Reliability Organisations) such as air traffic control or warships.

Such flexibility requires shared values and assumptions and respect for the skills and experience of the workforce, especially first line supervisors and technicians.

A learning culture.

An organisation must have the willingness and competence to draw the right conclusions from its WHS/OH&S information system, and the will to implement major reforms when the need is indicated.

Collective mindfulness

One of the investigators in the Piper Alpha explosion commented that 'when you only receive good news you start to worry'. This theme is carried on by James Reason (1997) who states that:

A safety culture should be the 'engine that continues to propel the system towards the goal of maximum safety and health, regardless of the leadership's personality or current commercial concerns'. The power of this culture should be 'not forgetting to be afraid'.
(Reason, 1997).

Safety Triangle

In 1969, a study of industrial accidents was undertaken by Frank E. Bird, Jr., who was then the Director of Engineering Services for the Insurance Company of North America. He was interested in the accident ratio of 1 major injury to 29 minor injuries to 300 no-injury accidents first discussed in the 1931 book, Industrial Accident Prevention by. H. W. Heinrich (see Figure 8).

Since Mr. Heinrich estimated this relationship and stated further that the ratio related to the occurrence of a unit group of 330 accidents of the same kind and involving the same person, Mr. Bird wanted to determine what the actual reporting relationship of accidents was by the entire average population of workers. H.W. Heinrich's classic safety pyramid is now considered the foremost illustration of types of employee injuries.

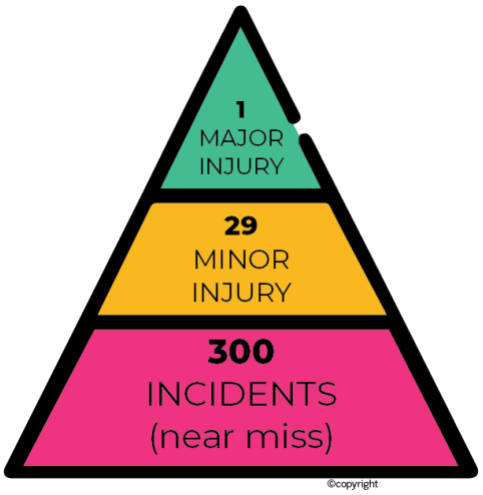


Figure 7: Heinrich's Incident Pyramid

There Bird analysed 1,753,498 accidents reported by 297 cooperating companies. These companies represented 21 different industrial groups, employing 1,750,000 employees who worked over 3 billion hours during the exposure period analysed. The study revealed the following ratios in the accidents reported:

For every reported major injury (resulting in fatality, disability, lost time or medical treatment), there were 9.8 reported minor injuries (requiring only first aid). For the 95 companies that further analysed major injuries in their reporting, the ratio was one lost time injury per 15 medical treatment injuries

Forty-seven percent of the companies indicated that they investigated all property damage accidents, and eighty-four percent stated that they investigated major property damage accidents. The final analysis indicated that 30.2 property damage accidents were reported for each major injury.

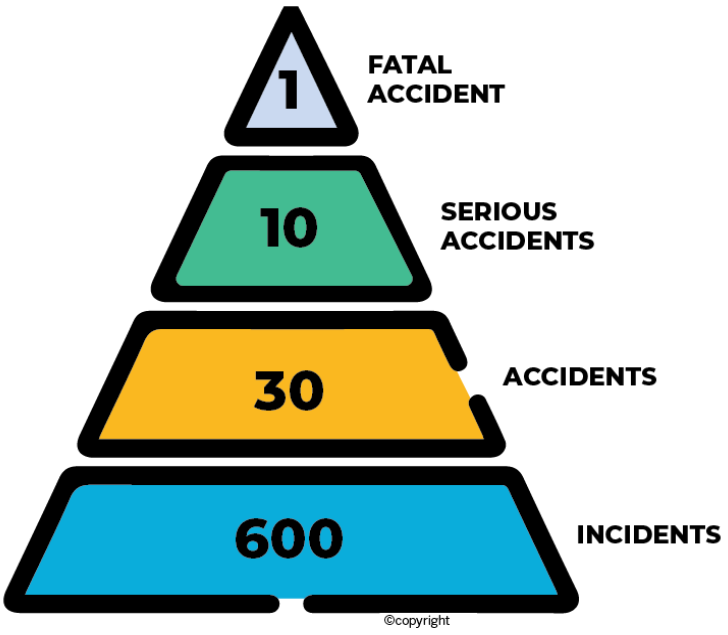
Part of the study involved 4,000 hours of confidential interviews by trained supervisors on the occurrence of incidents that, under slightly different circumstances, could have resulted in injury or property damage. Analysis of these interviews indicated a ratio of approximately 600 incidents for every reported major injury.

In referring to the 1-10-30-600 ratio detailed in a pyramid, it should be remembered that this represents accidents reported and incidents discussed with the interviewers and not the total number of accidents or incidents that actually occurred (refer to Figure 9).

Bird continues, as we consider the ratio, we observe that 30 property damage accidents were reported for each serious or disabling injury. Property damage incidents cost billions of dollars annually and yet they are frequently misnamed and referred to as "near-accidents". Ironically, this line of thinking recognises the fact that each property damage situation could probably have resulted in personal injury. This term is a holdover from earlier training and misconceptions that led supervisors to relate the term "accident" only to injury.

The 1-10-30-600 relationships in the ratio indicate clearly how foolish it is to direct our major effort only at the relatively few events resulting in serious or disabling injury when there are so many significant opportunities that provide a much larger basis for more effective control of total accident losses.

Figure 8: Bird's Accident Ratio Pyramid



It is worth emphasizing at this point that the ratio study was of a certain large group of organizations at a given point in time. It does not necessarily follow that the ratio will be identical for any particular occupational group or organization. That is not its intent. The significant point is that major injuries are rare events and that many opportunities are afforded by the more frequent, less serious events to take actions to prevent the major losses from occurring. Safety leaders have also emphasized that these actions are most effective when directed at incidents and minor accidents with a high loss potential. There is always a large variation between the most serious and no-claim incidents, as shown in both pyramids.

In 2003, ConocoPhillips Marine conducted a similar study demonstrating a large difference in the ratio of serious accidents and near misses (refer Figure 9). The study found that for every single fatality there are at least 300,000 at-risk behaviours, defined as activities that are not consistent with safety programs, training and components on machinery. These behaviours may include bypassing safety components on machinery or eliminating a safety step in the production process that slows down the operator. With effective machine safeguarding and training, at-risk behaviours and near misses can be diminished. This also reduces the chance of the fatality occurring, since there is a lower frequency of at-risk behaviours. The variation can be explained by distance or time – for example, the injury was missed by one second or by one inch. Machine safety can make a material. The difference in widening the variation, favourably impacting the frequency and severity of claims and, therefore, workers' compensation premiums.

Figure 9: ConocoPhillips Incident Ratio

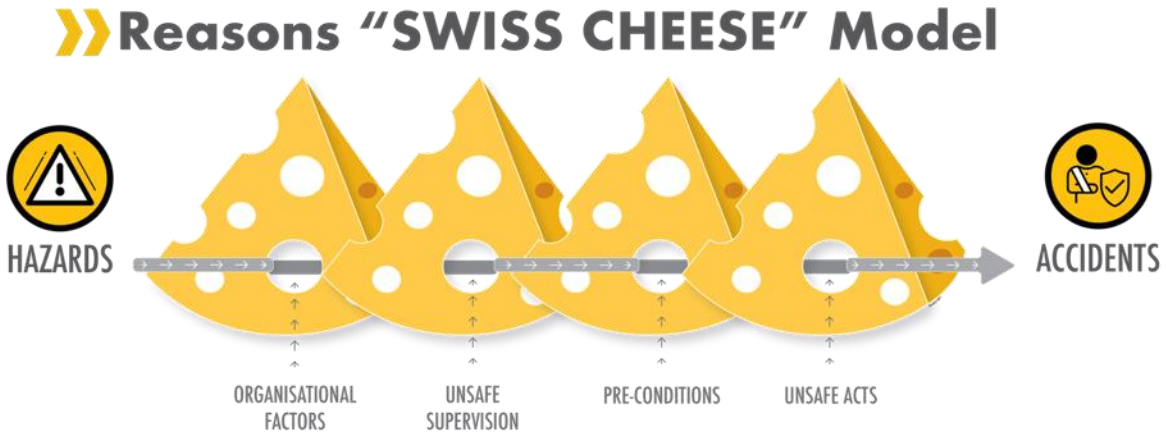
SWISS CHEESE MODEL

The **Swiss Cheese model** of accident causation model was developed by Dante Orlandella and James T. Reason of the University of Manchester (refer Figure 10). It describes how a series of breaches in an organisation's safeguard can result in an incident. The slices of Swiss cheese stacked side by side represent differing layers and types of an organisation's defences against failure.

Reason stated that "if we were to make defenses against errors out of cheese, we would use cheddar. But in actuality, they are more often like Swiss cheese - the defences are full of holes. In real life, unlike cheese, the holes are dynamic, constantly opening and shutting. Dame Misfortune is out there, trying to find a way through the holes. That happens quite rarely, because the holes don't line up that often."

The holes in the slices represent weaknesses in individual parts of the system and are continually varying in size and position across the slices. The system produces failures when a hole in each slice momentarily aligns, permitting (in Reason's words) "a trajectory of accident opportunity", so that a hazard passes through holes in all of the slices, leading to a failure. Reason suggested that most accidents can be traced to one or more of four failure domains: organisational influences, supervision, preconditions, and specific acts. The Swiss Cheese model includes both active and latent failures. Active failures encompass the unsafe acts that can be directly linked to an accident often referred to as the 'sharp end' of people doing the task. Latent failures include contributory factors that may lie dormant for days, weeks, or months until they contribute to the accident and are often referred to as the 'blunt end'. Latent failures span the first three domains of failure in Reason's model. The model is useful in a systems approach to understand the causes of incidents.

Figure 10: Reason's SWISS Cheese Model



7.0 ICAM

ICAM stands for Incident Cause Analysis Method. In April 2000, BHP officially launched its new safety occurrence investigation method, ICAM (Incident Cause Analysis Method).

ICAM is an industrial safety initiative that draws on the work of the eminent organisational psychologist and human error expert Professor James Reason (University of Manchester, UK). The ICAM methodology was developed with the assistance of Professor Reason, the Australian Transport Safety Bureau and Dédale Asia Pacific, in consultation with safety representatives from all BHP business units.

ICAM is a holistic method. It aims to identify local factors and failures within the entire organisation system (e.g., communication, training, procedures, incompatible goals, equipment, etc.) that contributed to the incident. Through the analysis of this information, ICAM provides the ability to identify what really went wrong and to make recommendations on what needs to be done to prevent recurrence. It is directed towards building error-tolerant defences against future incidents.

7.1 Objectives

The objectives of an ICAM investigation are:

- Establish the facts.
- Identify contributing factors and latent hazards.
- Review the adequacy of existing controls and procedures.
- Report the findings.
- Recommend corrective actions that can reduce risk and prevent recurrence.
- Detect organisational factors that can be analysed to identify specific or recurring problems.
- Identify key learnings for distribution.

ICAM investigations are **not** used to apportion blame or liability.

The ICAM investigation process involves:

- Data collection using the PEEPO tool.
- Data analysis.
- Develop recommendations using the Hierarchy of control and Benefit assessment tool.
- Key learnings presented in an ICAM Investigation Report.

ICAM seeks to look further beyond a single root cause and focuses on:

- *Immediate causes*
- *Contributing factors*
- *Underlying causes*

ICAM encourages organisations to look beyond human error and identify organisational factors and better defences.

Immediate Cause

This is usually as a result of one or more errors or unsafe conditions that directly led to the incident.

Contributing Factors

The ICAM process organises findings into five (5) elements:

- Non-Contributing Factors
- Absent or Failed Defences
- Individual / Team Actions
- Task / Environment Conditions
- Organisational Factors

Non- Contributing Factors

This category is for incident findings for items that are fact however are not contributory to the outcome such as the date of the incident.

Absent Failed defences

Absent or failed defences are described as the 'last-minute' measures which did not prevent the outcome of the incident or mitigate/reduce its consequences' such as detection systems, protection systems, warning systems, guards or barriers, recovery, escape, rescue, safety device operation, personal protective equipment, hazard identification and control systems.

Individual & Team Actions

These are errors or violations that led directly to the incident. They are typically associated with personnel such as operators and maintainers having direct contact with equipment or material. They are always committed 'actively' (someone did or didn't do something) and have a direct relation with the incident'.

Task & Environmental Conditions

Task and environmental conditions are those conditions in existence immediately prior to or at the time of the incident that directly influences human and equipment performance in the workplace.

Organisational Factors

Organisational factors are those aspects that can be implicated in producing the task/environmental conditions, individual or team actions, or absent/failed defences that have allowed the incident or accident to happen.

These factors usually arise from organisational shortcomings which produce adverse conditions in the workplace. They can be hard to detect at times until combined with other local conditions such as leadership issues or errors in planning etc. As the name implies, organisational factors are controlled by the organisation itself, and the improvement of those factors can only be achieved through the utilisation and constant upkeep of the management systems in place.

7.2 Human Error

Human error is the failure of actions to achieve their desired ends, intentions or desires. Everyone can make errors no matter how well-trained and motivated they are. However, in the workplace, the consequences of such human failure can be severe. Analysis of accidents and incidents shows that human failure contributes to almost all accidents and exposures to substances hazardous to health. Many major accidents, e.g., Texas City, Piper Alpha, and Chernobyl, were initiated by human failure.

In order to avoid accidents and ill health, companies need to manage human failure as robustly as the technical and engineering measures they use for that purpose. The challenge is to develop error-tolerant systems and to prevent errors from initiating; to manage human error proactively, it should be addressed as part of the risk assessment process, where:

- Significant potential human errors are identified,
- Those factors that make errors more or less likely are identified (such as poor design, distraction, time pressure, workload, competence, morale, noise levels and communication systems) - Performance Influencing Factors (PIFs)
- Control measures are devised and implemented, preferably by redesigning the task or equipment.

7.3 Types of Error

There are two (2) main types of human failure (see Figure 11):

- Human error is an ***unintentional*** action or decision.
- Violations are ***intentional*** failures – *deliberately* doing the wrong thing

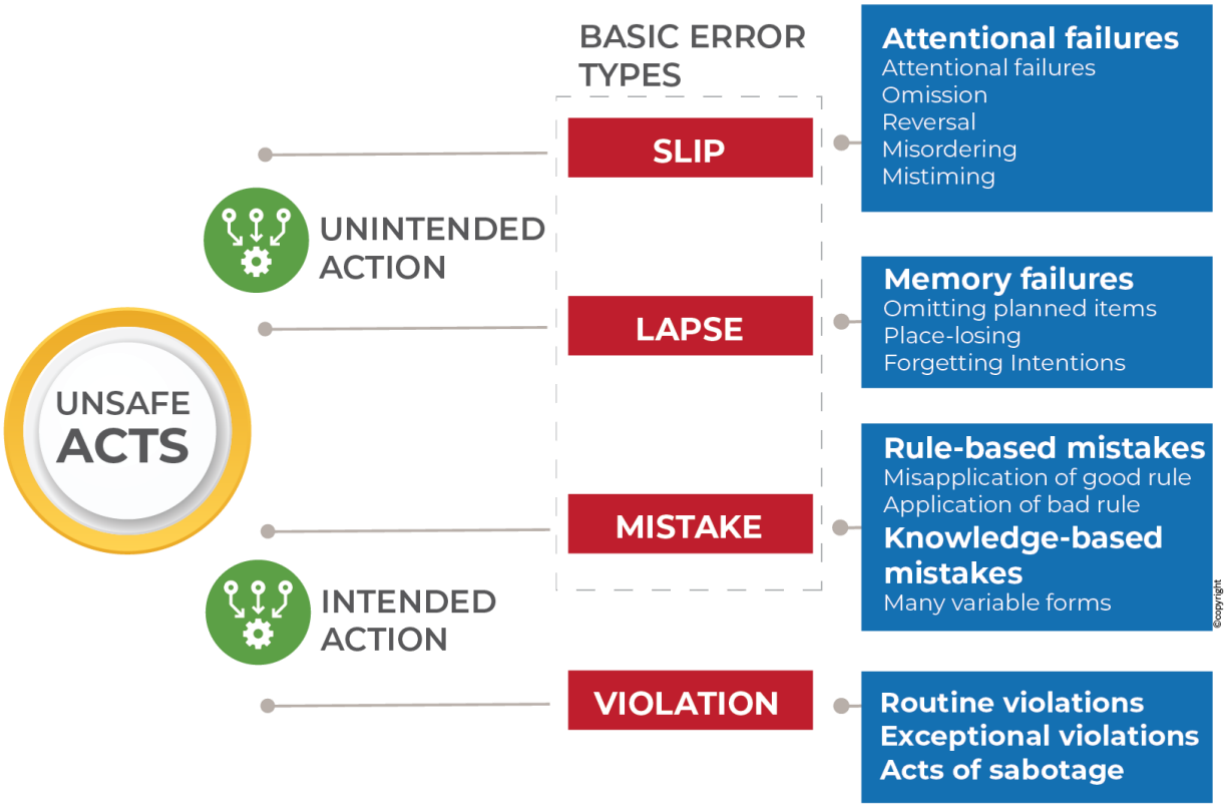


Figure 11: Types of Human Error

There are three (3) types of unintended human error: slips, lapses (skill-based errors), and mistakes. These types of human error can happen to even the most experienced and well-trained person.

Slips and lapses

Slips and lapses occur in very familiar tasks that we can carry out without much conscious attention, such as driving a vehicle. These tasks are very vulnerable to slips and lapses when our attention is diverted, even for a moment.

Slips

Slips and lapses occur when:

the task is very familiar and requires little thought; people confuse two similar tasks;
tasks are too complicated and long-winded;
the main part is done but the finer details are missed; steps in a procedure don't follow naturally; and
there are distractions and interruptions.

How to reduce slips and lapses:

make all workers aware that slips and lapses do happen;
use checklists to help confirm that all actions have been completed;
include in your procedures the setting out of equipment, site layout and methods of work to ensure there is a logical sequence;
make sure checks are in place for complicated tasks; and
try to ensure distractions and interruptions are minimized, e.g., mobile phone policy.

Remember, simply adding more training will not eliminate slips and lapses. Effective procedures are required.

Ask yourself: 'How can I make sure my workers understand that they are vulnerable to slips and lapses?'

('Whoops') 'Not doing what you're meant to do'.

Examples of slips include:

- Performing an action too soon in a procedure or leaving it too late, e.g., not putting your ear defenders on before starting the drill; omitting a step or series of steps from a task, e.g., forgetting to switch the kettle on while making a cup of tea;
- Carrying out an action with too much or too little strength, e.g., over-torquing a bolt;
- Performing an action in the wrong direction, e.g., a MEWP operator pushing the joystick to the left instead of the right;
- Doing the right thing but on the wrong object,
- E.g., selecting the wrong size nail for the job and
- Carrying out the wrong check but on the right item, e.g., checking a dial but for the wrong value

Lapses

'Forgetting to do something or losing your place midway through a task.'

- Examples of lapses include:
- Forgetting to nail down a joist;
- Taking your mask off to talk to a colleague and then forgetting to put it back on, failing to secure scaffolding because of an interruption, and
- Forgetting to remove a radiator before removing the wallpaper.

Mistakes

Mistakes are decision-making failures. The two main types of mistakes are rule-based mistakes and knowledge-based mistakes. They arise when we do the wrong thing, believing it to be right.

Examples of mistakes include:

- Making a poor judgement when overtaking, leaving insufficient room to complete the manoeuvre in the face of oncoming traffic, and
- An operator misinterpreted the sound of a machine breakdown and failed to switch off immediately.
    - Why do mistakes occur?
- Doing too many things at the same time.
- Doing too many complex tasks at once.
- Time pressures.
    - Factors that contribute to people making mistakes
- The work environment – e.g., too hot, too cold, poor lighting, restricted workspace, noise.
- Extreme task demands – e.g., high workloads, boring and repetitive jobs, jobs that require a lot of concentration, too many distractions.
- Social issues – e.g., peer pressure, conflicting attitudes to health and safety, conflicting attitudes of workers on how to complete work, too few workers.
- Individual stressors – e.g., drugs and alcohol, lack of sleep, family problems, ill health.
- Equipment problems – e.g., inaccurate or confusing instructions and procedures.
    - Organisational issues – e.g., failing to understand where mistakes can occur and implement controls, such as training and monitoring

- *How you can reduce mistakes*
- To avoid rule-based mistakes, increase worker situational awareness of high-risk tasks on site and provide procedures for predictable, non-routine, high-risk tasks.
- To avoid knowledge-based mistakes, ensure proper supervision for inexperienced workers and provide job aids and diagrams to explain procedures.
- *Ask yourself: 'how can i reduce the likelihood of mistakes occurring on this site?'*

Violations

These are intentional failures – 'deliberately doing the wrong thing'. The violation of health and safety rules or procedures is one of the biggest causes of accidents and injuries at work.
Workplace rules are broken for many different reasons:

Typical violations include:

- I felt I had no choice' – (intentional due to the situation or rules).
- 'I didn't care about the consequences' – (intentional violations).
- Scaffolders not clipping on their harnesses above 4 m;
- Dumper drivers not wearing seat belts;
- MEWP operators not carrying out pre-use checks;
- A site manager allowing untrained drivers to operate plant;
- A tradesman starting work on a new site without reporting to the site manager or receiving a site induction and
- A worker thinks a rule is unsafe and takes off their safety goggles to improve visibility.

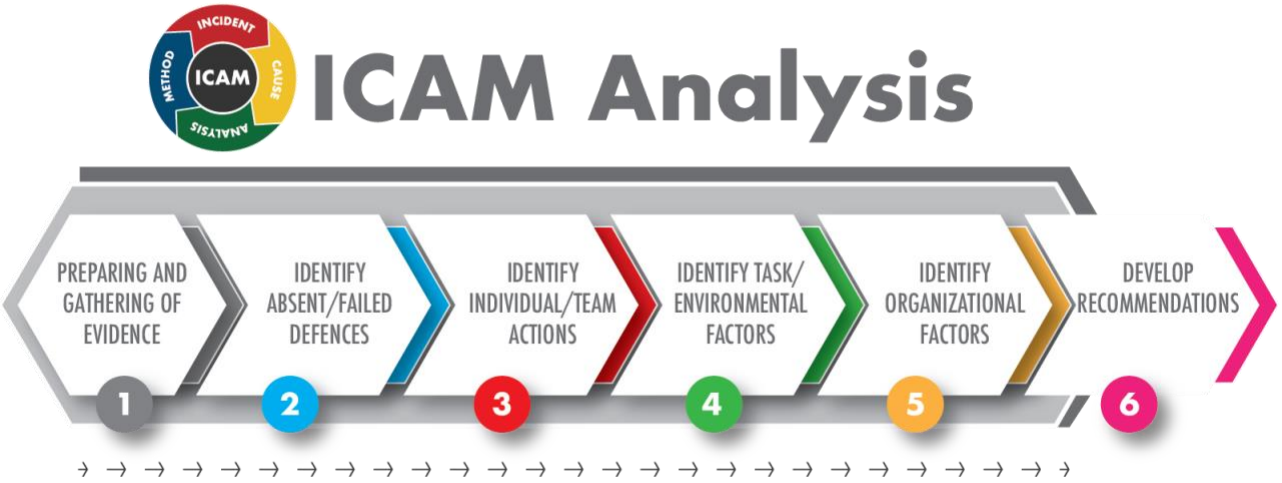
Typical causes of violations include

- Workers thinking rules don't apply to them;
- Being under time pressure;
- Not having enough workers to do the work;
- Not having the right equipment;
- A lack of understanding of why the rule is in place;
- Perceptions that rules are too strict or unnecessary – i.e., the perceived benefits outweigh the perceived penalties;
- Wanting to take the easy option;
- Perception that they won't get caught, and peer pressure.

How you can reduce violations

- You can increase the chances of spotting violations by increasing routine monitoring.
- Make sure rules and procedures are relevant and practical. Are procedures hard to read or out of date? Explain to workers the reasons behind any rules and procedures and their relevance.
- Ask the workforce to get involved in changes to rules to increase their acceptance.
- Improve the working environment. Is the environment unpleasant (e.g., dust, fumes, extreme heat or cold)? Have workers got enough space to work in without discomfort or difficulty completing the task?
- Provide workers with appropriate supervision.
- Improve planning for all jobs to ensure the necessary resources (workers, equipment and time) are allocated.
- Encourage the reporting of any problems (such as job pressures) through open communication. Provide training for abnormal and emergency situations.
- Always think about the possibility of violations when carrying out risk assessments. Try to reduce time pressures on workers to act quickly in unusual situations.
- Assess the use of personal protective clothes and equipment (ppe). Have workers got the right equipment to do the job? Is the ppe difficult to use or uncomfortable?
- *Ask yourself: 'is there any work activity on your site where rule breaking has become the norm?*

8.0 ICAM PROCESS



8.1 Immediate Action

Emergency Response

Sites will have a process for responding to emergencies, which will usually involve initiating their site emergency response plans according to the level of the incident. Investigators will be directed by the site emergency response coordinators. Investigators are required to follow all necessary safety instructions issued to them by those responsible for managing the response stages of an emergency/incident.

Identify Location

It is important to understand where the incident is. This may exclude certain people that may have been selected for the incident investigation due various factors including:

- Location – if people have to travel away from home or overnight, they may not be able to be on the team. Also, if the site requires certain authorizations, inductions etc. it may be better to select someone already cleared for that site. Many locations require certain medicals and immunization clearances (i.e., Q Fever vaccination to enter abattoirs)
- Physical abilities – if they are required to climb up onto equipment or enter confined spaces or go underground, they may not medically fit to do so.
- Psychological attributes – if they need to go underground, climb heights or enter confined spaces they may not be capable.

Assess Severity

The size and composition of the team will also be dependent on the Level / Severity of the Incident. Most workplaces have a process for determining the level of the risk, time to respond and the degree of the response required.

	LIKELIHOOD	DESCRIPTION Considering the present and magnitude of the hazard and the exposure to that hazard. Number of people and frequency of the tasks exposing those people and also the status of existing controls
5	Almost Certain	The unwanted event is almost certain to happen within the life of the project. In the case of repetitive/ frequent task the unwanted event has or will occur in order of one or more time per year. In terms of major events, as also in the case of long-term health, environmental or social impacts, it may happen only once in the LOM.
4	Likely	There is a high probability that the unwanted event is almost certain to happen within the LOP. In the case of repetitive/ frequent task the unwanted event has occurred or is likely to occur in order of less than once per year. In terms of major events, as also in the case of long-term health, environmental or social impacts, it may happen once in the LOP.
3	Possible	It is possible that the unwanted event can occur within the LOM. In the case of repetitive/ frequent task the unwanted event has occurred or is likely to occur in order of 5-10 years. In terms of major events, as also in the case of long-term health, environmental or social impacts, it may possibly happen once in the LOM.
2	Unlikely	There is a low probability that the unwanted event to occur within the LOP. In the case of repetitive/ frequent task the unwanted event has occurred sometime or is likely to occur not more than 10-20 years. In terms of major events, as also in the case of long-term health, environmental or social impacts, there is a low probability for the event to happen in the LOP.
1	Rare	There is a very low probability that the unwanted event to occur within the LOP. In the case of repetitive/ frequent tasks there are no records of the event occurring or it is highly unlikely that it will occur within the next 20 years. In terms of major events, as also in the case of long-term health, environmental or social impacts, there is a very low probability for the event to ever happen.

RISK ANALYSIS MATRIX - LEVEL OF RISK

	CONSEQUENCES				
LIKELIHOOD	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A Almost Certain	HIGH (11)	HIGH (16)	EXTREME (20)	EXTREME (23)	EXTREME (25)
B Likely	MODERATE (6)	HIGH (12)	HIGH (17)	EXTREME (21)	EXTREME (24)
C Possible	LOW (3)	MODERATE (8)	HIGH (13)	EXTREME (18)	EXTREME (22)
D Unlikely	LOW (2)	LOW (5)	MODERATE (9)	HIGH (14)	EXTREME (19)
E Rare	LOW (1)	LOW (4)	MODERATE (7)	HIGH (10)	HIGH (15)

LEGEND:

E:	Extreme Risk;	Immediate Action Required
H:	High Risk;	Senior Management Attention Needed
M:	Moderate Risk;	Management Responsibility Must Be Specified
L:	Low Risk;	Management By Routine Procedures

Consequence Level - Consider the maximum reasonable potential consequence of the event						
Impact Type (Additional 'Impact Types' may exist for an event; identify & rate accordingly)		Minor 1	Low 2	Medium 3	High 4	Major 5
S	Harm to People - Safety	First aid.	Medical treatment.	Lost time.	Permanent disability or single fatality.	Numerous permanent disabilities or multiple fatalities.
H	Harm to People – Occupational Health	Exposure to health hazard resulting in temporary discomfort.	Exposure to health hazard resulting in temporary alterations/n limitations (no time lost).	Exposure to health hazards/agents resulting in reversible impact on health (with time lost).	Exposure to health hazards/agents resulting in irreversible impact on health with loss of quality of life or single fatality.	Exposure to health hazards/agents resulting in irreversible impact on health with loss of quality of life of a numerous group/population or multiple fatalities.
E	Environmental Impact	Lasting days or less; limited to small area (metres) receptor of low significance/sensitivity (industrial area).	Lasting weeks; reduced area (hundreds of metres); no environmentally sensitive species/habitat.	Lasting months; impact on extended area (kilometres) area with some environmental sensitivity (scarce/valuable environment).	Lasting years; impact on sub-basin; environmentally sensitive environment/receptor (endangerous species/habitats).	Permanent impact affects a whole basin or region; highly sensitive environment (endangerous species, wetlands, protected habitats).
C	Social / Community Impact	Minor disturbance of culture/social structures.	Some impacts on local populations, mostly repairable. Single stakeholder complaint in reporting period.	Ongoing social issues. Isolated complaints from community members/ stakeholders.	Significant social impacts. Organised community protests threatening continuity of operations.	Major widespread social impacts. Community reactions affecting business continuity. "Licence to operate" under jeopardy.
L&R	Legal & Regulatory	Technical non-compliance; no warning received; no regulatory reporting required.	Breach of regulatory requirements; report/-involvement of authority. Attracts administrative fine.	Minor breach of law; report/investigation by authority. Attracts compensation/ penalties/ enforcement action.	Breach of law; may attract criminal prosecution of Operating Co. and/or of Directors/Managers and penalties/ enforcement action. Individual licence temporarily revoked.	Significant of the law; may attract Individual or class action lawsuits, criminal prosecution of Co. Directors/Managers . Suits against parent Co.; permit to operate substantially modified or withdrawn.
M	Material Losses/ Damage/ Business Interruption	< 0.01 % of Annual Revenue/ Total Assets.	0.01 – 0.1 % of Annual Revenue/ Total Assets.	0.1 – 1.0 % of Annual Revenue/ Total Assets.	1 - 5 % of Annual Revenue/ Total Assets.	> 5 % of Annual Revenue/ Total Assets.
R	Impact on Reputation	Minor impact, awareness/ concern from specific individuals.	Limited impact; concern/ complaints from certain groups/ organisation (e.g. NGOs).	Local impact; public concern/ adverse publicity localised within neighbouring communities.	Suspected reputation damage; local/ regional public concern and reactions.	Noticeable reputation damage; national/ international public attention and repercussions.

The following is a guide only of when an ICAM could be used in an incident investigation.

LOW	Incident Report/ICAM Optional	Supervisor Lead
MEDIUM	ICAM/Incident Report	Manager Lead
SIGNIFICANT	ICAM Mandatory	Manager with independent ICAM Team Leader
HIGH	ICAM Mandatory	

Define Scope

The scope of the investigation refers to how detailed the analysis should be. Specifically, this could relate to the resources to be allocated or what the investigation will or will not cover. This is particularly important because, in some cases, the incident does not warrant an extensive investigation, and in others, a more far-reaching scrutiny is appropriate. Significant occurrences will require a far more detailed investigation than minor events. Likewise, incidents that involve injured workers or could have potentially injured workers demand significant investigative effort.

Form Team

It is important to ensure that the appropriate investigation team is selected to investigate the incident. Investigators should be skilled to facilitate an appropriate investigation. Organisations will often provide guidelines according to the nature and severity of the incident.

The team should consist of people who are familiar with the tasks and the work environment or sourcing assistance from an investigation team with specialist knowledge. In any case, the line manager or immediate supervisor is usually involved because they are more able to inform the team about the work processes related to the incident. If the line manager or immediate supervisor is involved in the investigation, consider the possibility there could be a conflict of interest. If the causative factor was inappropriate action by the line manager, it would not be appropriate to invite that person to be on the investigation team. Likewise, it is also not appropriate to expect decision-makers to evaluate their own decisions during the investigation. Therefore, officers should not be included in an investigation team if there is a perception that they could bring a biased view to the investigation.

Technical expertise

Specialist technical personnel may need to be sourced either from within your organisation or external expertise may need to be sourced.

Incident sensitivity

If the incident has a sensitive or cultural aspect, then the team may need to engage someone familiar and skilled with dealing with that aspect.

Health and safety representatives

The Health and Safety Representatives / Site Safety Representatives have a legal entitlement to be part of a WHS/OH&S incident in their area of delegation.

Team Skill

The team should have the necessary incident investigation skills:

- Incident investigation techniques include gathering witness evidence via interviews.
- Technical skills and or specialist knowledge relating to work processes, equipment and workplace layout.
- Investigative skills, including an ability to observe and note details, take photographs, sketch maps and write reports.
- Familiar with and understand the company's incident investigation policy, procedure and necessary forms and processes.

Establish Roles

Most businesses have a roles and responsibilities matrix for level of involvement according to the differing levels of incident severity i.e., Management, Supervisors, Workers, HSR's, and Safety Advisors etc.

Gather Resources

Ensure the team has the appropriate team composition for the investigation and has the necessary equipment to conduct the investigation. It is good practice for workplaces to have an investigation tool kit stored in a central accessible location. We suggest the equipment gets stored in a secure light weight, hard plastic case.

Investigators Tool Kit

People involved in the investigation can require some or all of the following equipment:

- Notepad and pen
- Clipboard, lined paper and graph paper
- Digital camera and film which is preferably digital with a date recording facility
- Digital video camera
- High-vis barrier tapes
- Tape measure
- Torch with batteries
- Safety Clothing PPE i.e., safety helmet, safety glasses, hearing protection, high visibility clothing, long-sleeved trousers and shirt, safety gloves, respirator, safety shoes/boots;
- Sunscreen, sunglasses and hat
- High visibility barrier tape,
- Compass,
- Identification Tags / Labels
- Collection containers / plastic zip-lock bags/pens
- Incident Investigation Report Form / Procedure
- Witness Statements and Forms
- Digital voice recorder and batteries
- Personal Danger and Personal Isolation Locks
- Caution Magnifying Glass,
- Crayons, chalk, fluorescent spray paint
- Hand wipes
- Spring force gauge / Digital Electronic Force Gauge
- Backpack (if having to climb up onto plant and maintain three points of contact)
- / Out of Service Tag

Identify Barriers

Be aware that during any investigation, there may be barriers, including people's attitudes about the intention of the investigation (i.e., culture of blame), language and cultural issues, political/community sensitivity, timing (i.e. incident occurred some time ago and site may have materially changed), legal and regulatory matters (i.e. non-disturbance notice issued or business preventing access to the incident location), environment (for instance testing equipment may not be able to be used due to explosive atmospheres etc.), geographical location (there may be restrictions on who can access certain areas due to site / cultural and other matters).

Secure Site

The team leader should ensure that once the scene has been deemed safe, the site is secured to prevent any contamination of the scene and alteration of any of the physical evidence. This can be done by barricading, blocking of roads, the appointment of a spotter, etc. The team should establish if there has been any material change to the site since the incident, i.e., removal of plant, equipment, documentary evidence, etc. and if so, any relevant evidence that has been removed will need to be inspected/recovered.

Keep Safe

It is vital that the team only attend the scene if it is safe to do so. Team members should exercise all reasonable care which includes wearing all necessary PPE and following all relevant safety instructions. Sometimes natural inquisitiveness can be the undoing of safety investigators particularly when they try and recreate the incident to understand what happened.

Get Authority

The team should only enter the scene if they have the necessary site or emergency coordinator authority/clearances to enter the scene. There may be other regulatory agency non-disturbance notices, etc., preventing access to the scene, i.e., coroner, police, and inspectors.

8.2 Plan Investigation

The investigation will be carried out in accordance with the company's incident investigation policy and procedures. Usually, someone will be nominated as the incident lead investigator, depending on the nature and severity of the incident. At this stage, the incident category and scope of the investigation should have already been determined, and the appropriate team formed with roles understood.

Good ICAM teams should have a diverse background and some degree of independence. It is essential that the ICAM leader has sufficient seniority in the business to control the process and be willing to identify quality Organisational Factors. Depending on the severity of the incident a team might comprise an ICAM leader, a facilitator, a peer (from another shift usually, maybe a safety rep) of the person involved in the incident, a technical subject matter expert, and maybe a safety advisor from the area also.

Prior to attending the scene, it is good first to ensure everyone understands the site safety procedures, people are properly inducted or escorted, all investigators are wearing appropriate PPE and all necessary tools and equipment for the investigation have been gathered and are in working order and necessary escorts are in place.

Usually, it is good for the team members to have a briefing of the site, operations, incident, sequence of events, outcome and any remedial actions. This should be conducted by an authorised management representative with sufficient knowledge of the incident. Also, the site will usually provide any preliminary information to the team about the incident, including any relevant incident data collected. You may need to request this information.

The team should then seek to identify suitable site resources to conduct the investigation, including:

- Venue for team to operate from
- Access to necessary resources – phones, photocopiers, computers
- Identities, locations and contact details of key site personnel
- Document control and evidence security

The team should then aim to determine the Terms of Reference of the investigation, including:

- Objective of the investigation
- Roles and Authority of the Investigation Team
- Task and time frame
- Access to relevant areas, documentation and personnel
- Scope and boundaries/limits
- Site requirements
- Report Format
- Recipient/s of Report

The team should then put together an Action Plan detailing:

- Incident investigation overview
- Incident investigation team overview
- Incident investigation strategy
- Consultation and communication strategy
- Risk management plan
- Timeline of events
- Mitigation strategy
- Reporting and monitoring requirement

8.3 Collect Incident Data

The investigation team gathers as much evidence as possible at this stage to determine the incident and the preceding events. The ICAM process uses the following PEEPO data collection process. It is important to gather all relevant conditions, actions and deficiencies which may have contributed to the incident.

Data Category	Method of Collection
People Names / Witnesses Competency Fitness for work	Records Interviews Statements
Environment Incident Scene Condition Weather Time of Day	Observation Inspection Event Reconstruction
Equipment Plant Tools Machines Vehicles	Observation Inspection Testing Operation Records
Procedures Method Instructions Plans	Interviews Records Reviews
Organisation Management Training Supervision Policies	Interviews Records Reviews Reports

Collecting data, including conducting interviews, may occur at any time in an investigation; however, they are usually conducted in the early stages of an incident investigation and often during the PEEPO stage. To determine what is required during a PEEPO, the team can locate a whiteboard and some small sticky notes. Give the sticky notes to the team members and ask them to write anything they would like to know in the form of data under any of the PEEPO (People, Environment, Equipment, Procedures, Organisation) categories.

The ICAM leader/facilitator could ask a team member for them to jot down on the sticky notes what they would like to know about the incident that might help them understand what happened. That note should then be stuck up on the whiteboard under the relevant PEEPO category. Once completed the team can then gather the notes and then use that as a guide for what the team should ensure they gather in the investigation. The team can reconvene at a later date to determine what data has subsequently been collected and hopefully sufficient data has been collected in the various PEEPO categories for the formation of a timeline.

8.3.1 People

	**PEOPLE**

Conducting Interviews

People often know a lot about what happened. Often, we fail to adequately gather the information available to us through those that either were involved in the incident or witnessed the incident. To ensure we get a good picture of what happened we should aim to:

- Identify all persons who were involved directly or indirectly with the incident
- Identify all people who witnessed the incident and establish their role, location, any involvement or ownership over the incident/plant / process

It is best to try and keep the witnesses apart and preferably interview them at the scene as soon as practical after the incident. You be conscious of any post-traumatic stress indicators and if you suspect that the person is showing signs of PTSD that you refer that to their supervisor of the company management for any critical incident debriefing and referral to an Employee Assistance Program for counselling. Persons being interviewed should be reassured of the reason for the interview, the allowance of a support person to be present (i.e., an HSR) and that the interview is trying to establish the reasons and not apportion blame (i.e., Just Culture Process).

Try and get the following information from the witness

- What they saw
- Where were they there
- What experience/training/competency do they have
- What they think happened
- Where they were located and what they were doing at the time
- Who and what plant was involved
- What was the condition of the environment at the time
- What did they do when they saw it happening
- Has this happened previously
- Why they think the incident happened
- How could it have been prevented

PEEPO CATEGORY	PEOPLE	
CHRONOLOGY		
BEFORE	DURING	AFTER

FACTOR	INFORMATION	CHECK
Ability	Training, Experience, Competence	
Attitude	Risk Taking Behaviour, Blasé, Poor Compliance	
Awareness	Knowledge of hazard / situation / potential	
Communication	Type, Frequency, Adequacy, Delivery Mode	
Fatigue	Roster, Work Cycles, Time Sheets, Mental & Physical Fatigue, Life events	
Psychology	Mental Stress, Poor Motivation, Conflict, External Social / Domestic Influences	
Physiology	Physical stress, condition, substance abuse, illness, age	
Supervision	Amount, quality, level of supervision	
Teamwork	Poor coordination, workload sharing etc.	
Records	Training register, licenses, permits, incident history, competency, personal, medical	
History	Previous 72-hour history of key people involved	
Individual / Team Factor (not specified)		

8.3.2 Environment.

	**ENVIRONMENT**

It is important to inspect the physical location of the incident as soon as possible as it can change very quickly. By attending the incident location promptly, you can gather valuable information about whether any local environmental conditions contributed to the incident. You will be able to determine:

- Weather conditions
- Understand the scene and the location of other relevant connected features
- Time of day & lighting/sun direction
- Glare, noise, dust, fumes, vibration, temperature
- Workplace conditions
- Condition of Plant & Equipment
- Location of Plant and Equipment
- Housekeeping

Taking Photos / Video

Recording the scene with still and motion photography is an excellent way to record the event and can become very powerful and useful data in an incident investigation. Here are some tips when taking photography

- Attempt to obtain an overall picture of the scene, taking several photographs from different angles, both close up and wide-angle views
- Photograph the ground surface, indicating the general condition and slope
- Photograph individual items that can be relevant to the investigation such as barriers, guards, markings and signage
- Photograph plant and equipment involved in the accident
- Place an object such as a ruler against the item to be photographed to indicate dimensions or provide perspective
- Do not include people unrelated to the incident in the photograph
- Ensure the photograph includes: the name of the person taking the photo, the date and time that the photo was taken, a notation as to the location where each photograph was taken a brief description indicating what the photograph is showing the orientation of where the photograph was taken from.

PEEPO CATEGORY	ENVIRONMENT	

CHRONOLOGY		
BEFORE	**DURING**	**AFTER**

FACTOR	INFORMATION	CHECK
Acceleration / deceleration	Adverse forces due to change of velocity	
Air / liquid pressure	Sudden changes in air liquid pressure for example blast, release, decompression, etc.	
Contaminants	Natural or man-made, smoke, dust, gases, chemicals, etc.	
Electricity	Natural or man made	
Equipment design / construction	Faulty or unsafe equipment used	
Illumination	Too much / little light	
Noise	May include loud, sudden, etc. which interferes / disrupts a worker in carrying out tasks	
Precipitation	Water, moisture, rain, etc.	
Procedures	Poor, inadequate procedure / documentation	
Radiation	for example, X-rays, sunlight, UV, laser	
Repetitive operation		
Temperature / humidity	May include extreme or abnormal high / low temperatures or sudden variations	
Unstable strata		
Vibration		
Wildlife	Action / presence of animals causing adverse effects.	
Wind / turbulence	Natural or man-made causing adverse effects	
Work surface / space	for example, holes, rough, slippery, confined	
Task / environment factor (not specified)	Used to state that 'Yes' a task / environment factor was involved but was not specified / identified / categorized.	
Other task / environment factor		
No task / environment factor involved		

8.3.3 Equipment

	**EQUIPMENT**

It is very important that the team inspect any plant, tools or equipment that were involved in the incident. Particular attention should be given to the state and condition that the equipment was in, any damage, mark, scratches, deformation etc. Also, regard should be had to determine whether it was the appropriate equipment for the task as per the work instructions, safe work method statement, lift plan and whether the equipment is still within its inspection maintenance date and is current. Record any labels, tags, marks, identification, serial numbers, SWL's, last test date, maintenance records, last calibration date, and pre-start books. Ensure that the equipment was fit for its purpose and if required it had the relevant Australian Standard marking on it etc. Record the name, brand, manufacturers' details, registration number, plant identification of each item of equipment. It is good practice to also photograph this information.

The investigating team should try and determine if the equipment was a contributing factor by asking the following example questions

- What equipment was being used at the time?
- Is that the usual equipment used for the job?
- Was it the correct equipment according to the work procedures/instructions?
- Did the equipment contribute to the incident?
- What was the condition of the equipment?
- Were any substances being used at the time?
- What competency do workers need to use this equipment?

PEEPO CATEGORY	EQUIPMENT	
CHRONOLOGY		
BEFORE	DURING	AFTER

FACTOR	INFORMATION	CHECK
Design	The design of the equipment or tools were fit for purpose and met the requirements of the task and the operating conditions in which the task is being performed.	
Construction	The equipment was safe by design and constructed to the relevant safety standards required in that jurisdiction	
PPE Requirements	The PPE used was appropriate to the task / energy / contaminant / SDS and the condition of the protective clothing and accessories were in good condition and selected, used and fitted appropriately.	
Testing	The equipment was tested, inspected and maintained in accordance with the manufacturer requirements of relevant industry standards.	
Inspection	The equipment was inspected at scheduled intervals in accordance with the manufacturer's specifications and industry standards upon initial delivery, periodically and during critical times	
Maintenance	The equipment should be maintained to the manufacturer's recommendations to maintain the original design performance safety and reliability standards	
Modification	Equipment modification should be carried out by controlled procedure to ensure performance, safety and reliability are not adversely affected and should also account for changes to maintenance and inspection procedures, ergonomics and human factors	

8.3.4 Procedures.

	**PROCEDURES**

All relevant work procedures, instructions or approved methods should be reviewed to determine whether this contributed to the incident. The investigators should ensure that the instructions are available, correct, updated and appropriate for the task being undertaken. The following example questions could be asked:

- Was there a work procedure or instruction for the task?
- Did you use those procedures?
- Was it appropriate for that task on that day?
- Did you have it available to you?
- Were risk assessments conducted on this task?
- What tools, plant or equipment were available for the task?
- Were they appropriate and used in accordance with the procedure/instruction?
- Were there any safety devices?
- Were they used for that task?
- Were any lock-out procedures required for the task?
- Were they used?

PEEPO CATEGORY	PROCEDURES	

CHRONOLOGY		
BEFORE	**DURING**	**AFTER**

FACTOR	INFORMATION	CHECK
Usage	The documented procedures within the organisation should be used for conducting the operation in a correct, safe and efficient manner	
Content	The documented procedures are required to match the scope of the work. The procedure should cover all tasks, be technically correct, contain emergency provisions, contain work-around provisions, cover exemptions where the entire procedure does not apply.	
Criteria	The procedures should contain all the necessary information in a user - friendly language and format.	
Review and Monitoring	The procedures should be regularly reviewed and updated, if necessary, by qualified people. The procedure needs to be relevant to the current state of the equipment or task.	
Document Control	The procedure should have a method of revision control to ensure only current procedures are available to workers.	

8.3.5 Organisation.

	**ORGANISATION**

The business and its management have a statutory duty to ensure that the workplace is safe. In any incident investigation, the role of the management and supervisors needs to be considered. The following questions are examples of what could be asked:

- How were you instructed to do that task?
- What safety instructions were given to you by your supervisors?
- Were you supervisors aware of how you performed that task?
- Were you supervisors regularly present whilst you were working?
- Did your supervisors conduct regular safety observations of the work that was being performed?
- Would the supervisors correct unsafe work practices if they saw them?
- How were unsafe practices and conditions detected in your workplace?
- What processes did you have available to you if you identified a hazard that you couldn't control?
- Would unsafe conditions get corrected promptly?

PEEPO CATEGORY	ORGANISATION	
CHRONOLOGY		
BEFORE	DURING	AFTER

FACTOR	INFORMATION	CHECK
Culture	The organization should have a systematic approach to WHS. There should be evidence of management leadership and commitment to high standards for safety, quality and productivity. Factors to be measured could include organizational structure, people management, safe provision of plant, tools and equipment, regular scheduled maintenance, communication etc.	
Training	There should be evidence of structured effective training for technical skills, safety awareness and knowledge with ongoing competency reviews.	
Resourcing	There should be appropriate resourcing for operational staff including provision of appropriate staffing, suitable fit for purpose equipment and material and adequate facilities and services.	
Operational Feedback	The business should have a formal and effective feedback system for monitoring and continuous improvement.	

8.3.6 Other Data Sources

The following data sources can also prove valuable in the collection of relevant incident data.

Sketches and measurements

Measurements, diagrams and sketches at the scene of the incident provide an overall perspective of people and machinery in relation to the incident. Sketches can be drawn freehand into the notebook being used to record observations of the scene. All sketches should be drawn with a pen and should represent an accurate projection of the item or map being drawn. This can be done by including a scale and orientation on the sketch. Ideally sketches are best done on graph paper. The scale can be calculated by taking a measurement of the area and using a simple conversion for representation on the sketch. If the area is 10 millimetres in length, a simple scale might be one centimetre is equal to one metre etc. The orientation can be shown on the sketch by using a compass rose and indicating north. Sketches should be dimensionally accurate.

Maps

Maps are very useful to show location of incident relative to other important locations. It can help explain time delays for response, access difficulties, size of an area etc. It is particularly useful for people not familiar with the location to understand time and distance etc.

Samples

A sample is any substance that is collected from the scene of an incident. It can be in the form of a liquid, gas or solid including powder or dust. When collecting samples, it is important to avoid damaging or contaminating the sample because it can provide valuable evidence.

When participating in the process of collecting samples, you should ensure all team members are using appropriate Personal Protective Equipment (PPE) including masks, protective eyewear, or gloves. In some cases, samples will be collected for analysis by specialist agencies or testing laboratories. These agencies can have specific requirements in relation to the way in which the sample is collected and presented.

When taking samples, you should:

- Make sure they take enough of the substance for the type of analysis or examination to be undertaken
- Ensure that in collecting the sample, they do not damage other evidence
- Divide the sample into two separate parts and seal each part in a suitable container and label each container to avoid confusion about the contents
- Keep a separate record of the samples taken and the arrangements for testing
- Keep at least one of the samples stored securely
- Include the investigator's name, the time and date that the sample was taken, location of where the sample was taken, the sample number and a brief description

Documentary Evidence and Data Preservation

Documentary evidence includes any document containing writing or printing that is relevant to the investigation. This includes operating manuals, company records, training records, plant and chemical registers, medical and health screening records and other documents. Data needs to be stored in some instances for 30-40 years for certain health records. Construction SWMSs are required to be kept for 2 years if there is an incident with that task and legal departments would advise that incident records be kept for much longer periods. Handwritten notes, drawings, and sketches, photos etc. should all be kept and stored in accordance with site procedures.

Confidentiality, privacy and legal implications

In collecting evidence, the investigator must regard a range of issues that have implications for the final outcomes of the investigation, including the acceptance of the report. In the course of the investigation, the investigator might collect information about particular individuals that is of a private or personal nature.

The investigation team must give due regard to privacy considerations in the collection and reporting of any information. Any information not directly relevant to the incident such as the person's employment history must remain confidential and is not to be included in any report. Personal details are also not to be discussed with other individuals such as co-workers or supervisors.

In the event an external contractor is sourced to assist with the investigation, be mindful of corporate confidentiality. Trade secrets and confidential information that relates to the organisation's business should be protected from disclosure to competitors. Information relating to production techniques, production schedules and rates are matters that many businesses prefer to keep confidential.

As a precautionary measure, you can ask the contractor to sign a confidentiality agreement to ensure that any sensitive information gathered in the course of your investigation is not provided to competitors. Notwithstanding the need to maintain the confidentiality of certain information, you can be obliged to provide relevant information to regulatory authorities. In this case, it is important to provide all necessary assistance and cooperation to any investigation that is being conducted by a health and safety inspector of a regulatory authority. This is also a legal requirement.

It is essential to ensure all evidence obtained is relevant and admissible. This to consider include:

- Whether the evidence was legally obtained: Eg. Did the investigation team have authority to access a particular document/s, security clearance for the investigation and in some jurisdictions the use of recording devices may not be legal.
- Relevance of the evidence: Evidence that, if it were accepted, could rationally affect (directly or indirectly) the assessment of the probability of the existence of a fact in issue in the proceeding. Another element of relevancy would be whether the witness is credible.

Interviewing Techniques

The interview must be documented, and the facts must be carefully recorded. This is particularly important where:

- The incident is serious
- People involved in the incident make allegations or contradictory comments about what occurred.

The interview process must be fair and impartial, and the interview must be recorded accurately. You can do this by following interview principles.

Approach	The interview process must be fair and impartial, and the interview be recorded accurately.
Ground Rules	Let witnesses know that the purpose is to find out what happened
Just Culture	Ensure witnesses understand that the organization adopts a 'No Blame' Approach
Time	Conduct the interview as soon after the incident
Prepare	Attend scene, gather relevant information, understand basic facts of incident, have relevant information on hand
Venue	Select private venue, minimize distractions
Prioritise	Create interview list and priority order
Introduce	Introduce witness to interviewers, explain purpose, build rapport, emphasis Ground Rules
Document	Understand content before recording information
Good Listener	Show interest, adopt interested body language
No jargon	Use simple language, avoid acronyms and clarify understanding of technical matters
Structure	Use appropriate questioning techniques
Emotional Support	Monitor witness, consider support person, provide breaks, refer to EAP / Counselling
Recommend	Ensure the interviewee is asked how the incident could have been prevented
Future	Advise of possible further interviews, way of providing additional information to the team
Finish	Thank the witness
Follow up	Encourage witnesses to contact the team if further information is recalled. Contact witness if required to clarify new information. Good practice to re-contact witnesses to determine their recollection and if new information has been remembered.

Be a good listener

As well as asking the right questions, the interviewer also needs listening skills. This involves carefully following what a speaker is saying because the person being interviewed can introduce new information that can warrant irrelevant pre-planned questions.

Skilful listening also requires you to suspend judgement about interviewees and their views. This is because preconceived prejudices or stereotyping can lead to a situation where the interviewer hears what they expect to hear rather than what is actually said.

Ask the right questions.

It is helpful in commencing an interview to ask the person to explain in their own words what happened. This helps you to obtain an overall picture of the incident and can also serve to put the interviewee at ease. The interview should be clear and concise and should gather all relevant information. This can involve bringing the interviewee back to the question by discouraging digressions and unnecessarily long answers. The interviewer should identify any omissions, errors or contradictions emerging from the interview and resolve these with the interviewee.

Be familiar with technical terms and jargon

Where necessary, clarify these matters in the course of the interview, ensuring that where first names are used the interviewee is asked to provide the full name of the person and if possible, the person's job title.

Never suggest possible answers.

During an interview, situations can arise where interviewees will say things that might be ambiguous or confusing. In these cases, you might need to repeat a question or rephrase a response. This can provide a useful opportunity to check any interpretation and confirm the interview is an accurate reflection of the incident. An important point to consider at this stage is that the interview is not a forum by which to assign blame.

Quality questioning techniques Free Recall / Narrative
This style of question asks the witness to recreate the incident mentally. An example would be:

'Can you explain to me whatever you can remember about the incident.'

Open Ended Question

Each question should start with one of the following words - Who what when where how why. You could ask 'How did the accident happen?

This is an open question and one that will not result in a yes or no answer. The person conducting the interview should also ask one question at a time and wait for the answer to be completed before continuing. A short pause after each question can allow for the person responding to think about their answer prior to providing information. Another useful technique is to ask concise questions using simple, easy-to-understand language. Where technical terms or jargon is used, you should ask the interviewee to explain what they mean.

Closed-End Question

This style of question is used to clarify and confirm understanding of certain matters. Questions such as '*So the accident happened at 7 am?*' '*You were driving on the haul road at the time of the accident*?'

Paraphrasing

This style of question is attempting to summarise the information provided to confirm understanding. Sometimes, the interviewer misunderstands what has been said or makes assumptions. Repeating back to

the interviewee what you think has been said will confirm whether what you think has been said is, in fact, correct. An example might be:

'So, you said as you were driving along the East Haul Road, travelling about 50kmph, your mobile phone rang, so as you reached down to grab it off the passenger's seat, you heard a loud bang and a kangaroo came flying through the front window, have I got it right so far?'.

Active Listening

Active listening requires that the **listener** fully concentrate, understand, respond and then remember what is being said. The listener should show interest in what is being said with appropriate verbal and body language ques. Examples of good active listening are good eye contact, nodding of the head, leaning forward, not getting distracted, using appropriate verbal cues 'Yes, ok, right..'

There are certain types of questions that should be avoided when conducting an interview, such as:

Leading questions

These are questions that lead the interviewee to provide a particular response. Some examples include:

'You saw Patrick near the machinery, didn't you?' 'Laura tripped on the slippery floor, didn't she?'
'The travelator stopped when it became overloaded, didn't he?'

Double-barrelled questions

A double-barrelled question is where more than one question is asked in a single sentence. This is confusing for interviewees and will often result in poor responses. This type of questioning should be avoided. Examples of double-barrelled questions include:

'What is your role in the company and how long have you been doing this?'
'What action has the company taken to prevent this incident from happening again and do you agree with it?'

These questions are better presented as separate questions without a request to provide an opinion.

Questions that reveal attitude or opinion

Questions that express particular views or attitudes about the incident or related matters should be avoided. The following questions are designed to reveal attitudes or opinions:

'I know that we have had trouble with Dave in the past, but...' 'It is obvious you do not like the supervisor, does this mean...'

You should not give any indication as to any uncertainty or lack of knowledge about a situation. An inappropriate way to begin a question would be to suggest that something might not be very important, and to ask the question regardless.

Interview difficulties

In the course of interviewing people, difficult situations can arise. These difficult situations can be created by those who feel they are being blamed or by those seeking to blame others. In some cases, the interviewee can become hostile or angry. In these situations, selective questioning can steer the

interview away from sensitive issues. You should:

- *Stay calm*
- *Stick to the facts*
- *Put the interviewee at ease and to clarify the purpose of the interview*
- *Not take sides*
- *Involve one or more team members in the interview when the interviewee is likely to be aggressive*

Asking questions designed to find out why and how rather than what

Asking questions focusing on what caused the incident can lead to simplistic and subjective conclusions such as:

- *The machine was not guarded, and this is the cause of the accident*
- *The worker was neglectful to put their hand where it would get caught*

Both cases ignore the fundamental issue of why the machine was unguarded and how the work system failed in such a way that an injury occurred—asking questions designed to find out why and how rather than what can assist the investigation team to focus on the system of work rather than individual actions which form part of that system.

Many of the questions asked during interviews can easily be classified as binary or yes/ no, or true/ false questions. While they can be posed in an open-ended fashion, it is clear from the phrasing and tonal inflection what response is desired. In other cases, the questions probe the existence of behavioural characteristics that a worker is not likely to deny. Examples of obvious yes questions include:

'Did you follow the procedure?'
'Were you concentrating when you completed your lift?'
'Are you aware of the safety regulations governing that task?' 'Did you take appropriate precautions.

Questions limited to the elicitation of yes answers will result in predictable responses and you could make it too easy for the interviewee to misrepresent themselves and to give the answer that they think is wanted.

Forced choice questions

To obtain a more precise answer you can use a forced choice question. This format requires the interviewee to rank a series of possible responses in order of accuracy.

In response to the question, how many hours of overtime do you normally work per week, the options could range from zero hours to a higher amount. By phrasing the question this way, you can source more precise insight into the interviewee's perspectives. This could be useful in the event the investigation team wants to ascertain whether fatigue is a causative factor.

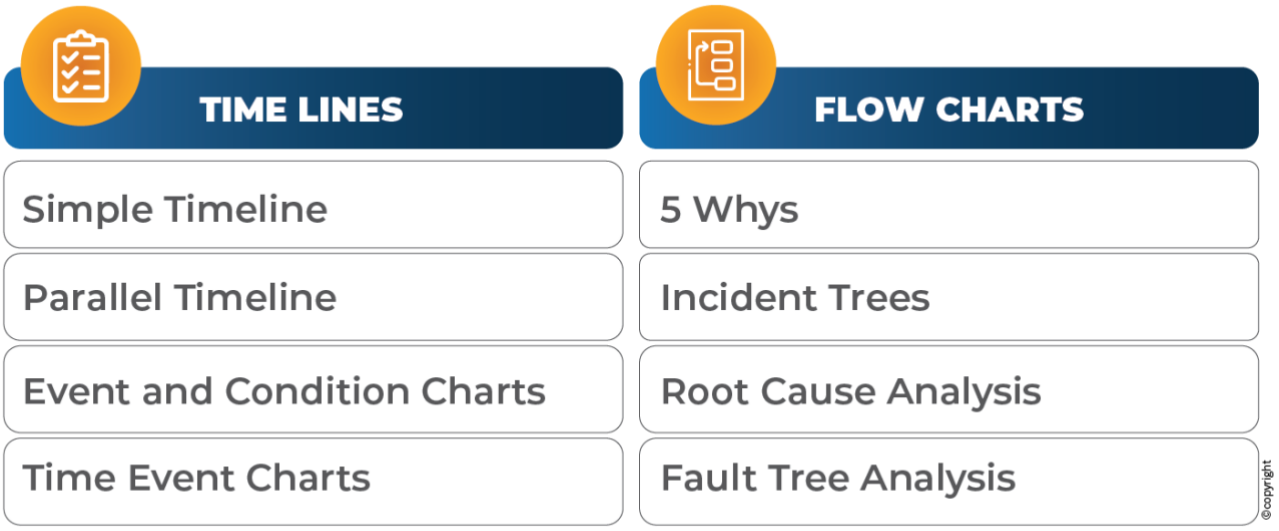
Forced choice questions can be used throughout the investigation process but are best employed to either discount workers or determine a group for inclusion in further investigative activities early on in the investigation process. You could ask how much time workers spent on a particular activity in terms of the number of hours between zero and six, or how many times the activity has been completed within a certain amount of time. This can assist you to analyse which workers might have knowledge of causative events or which workers might be overworked.

8.4 Organise Data

Upon completion of the collection of the incident data, it should then be organised in a methodical and logical manner for the analysis. If this is done well the investigation team will be able to identify any gaps in information or any hypothesis that can't be supported with evidence. There are a variety of data organising techniques that can be used to assist with the correlation. The method/s used should meet the following requirements:

- Provide a structure to organise the data collected.
- Assist in ensuring the investigation follows a logical path.
- Aid in the resolution of conflicting information and the identification of missing data.
- Provide a visual display of the investigative process for management briefing.

There are a variety of data organisation tools available – they can either be timeline or flowchart based as listed below.

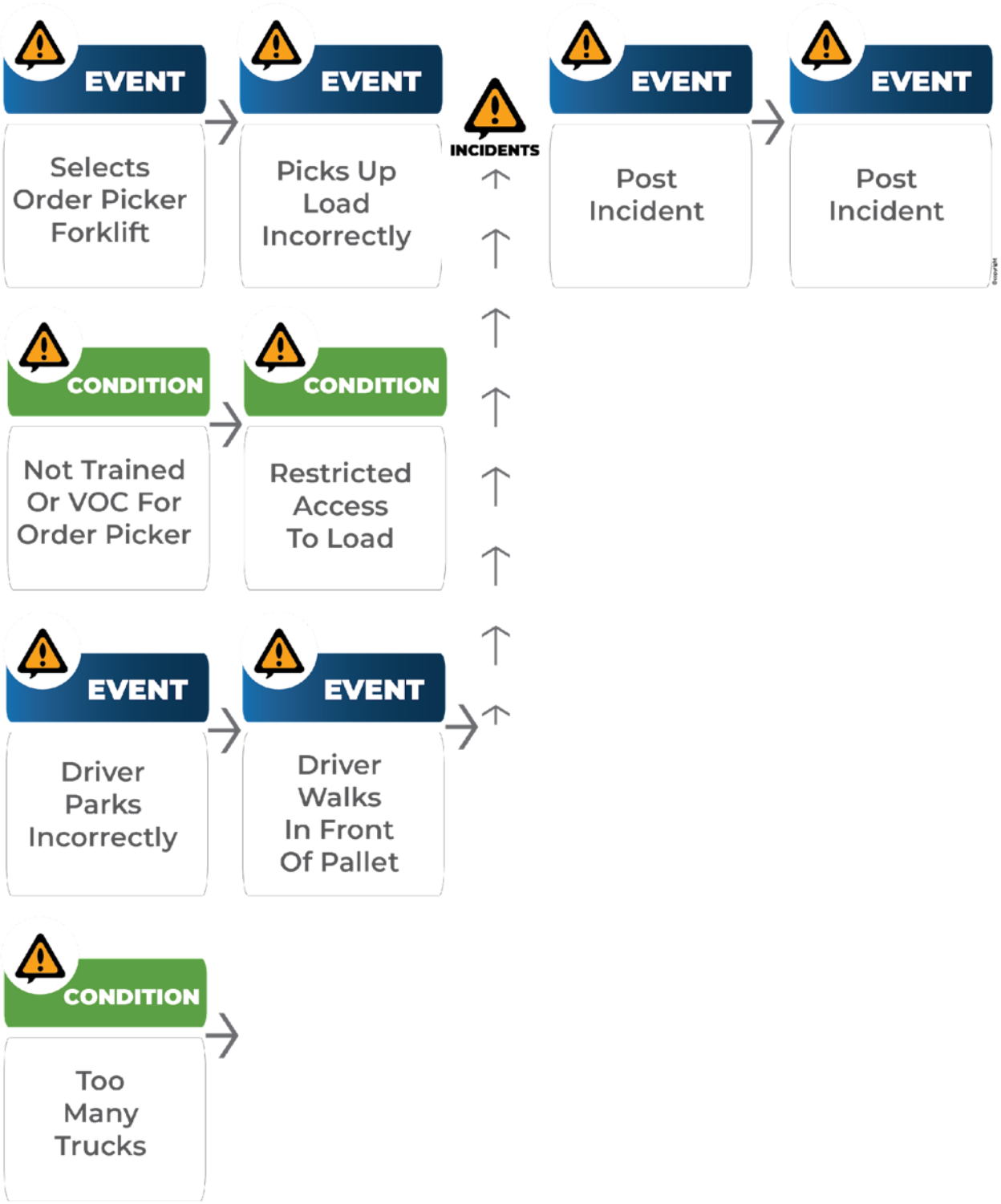


The ICAM guideline recommend the following methods:

- Event and condition Charts
- Whys
- Incident Trees

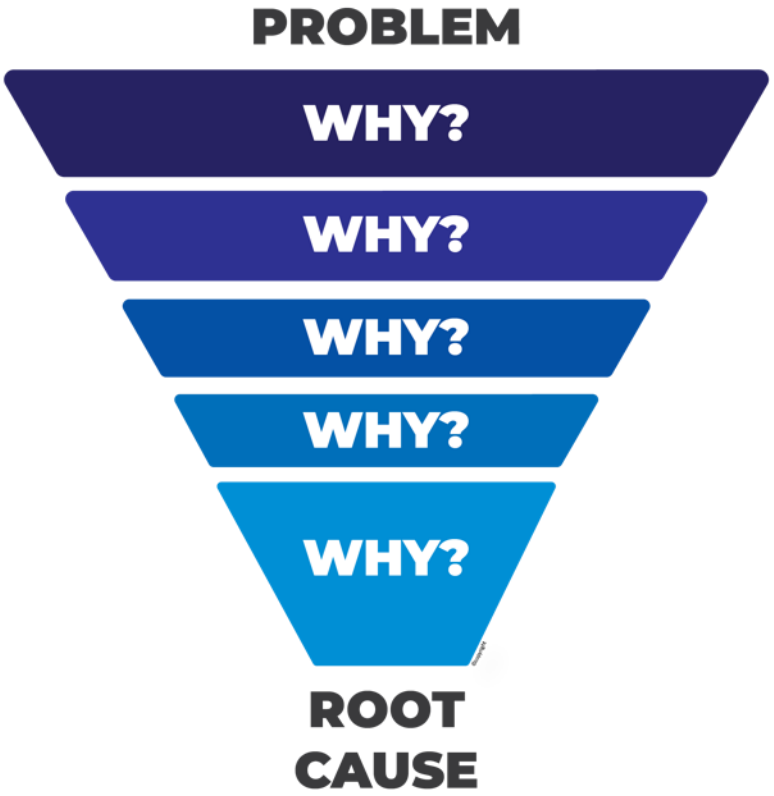
8.4.1 Event and Condition Charts

Event and causal factor charting are a written or graphical description for the time sequence of contributing events associated with an accident. They are easy to construct and are a good way of showing often complex events in a logical way. The information/events can be displayed on a whiteboard, wall (with sticky notes) or a large sheet of paper, arranging them in a timeline starting from left to right. This can contribute to developing the timeline/sequence of events for future analysis. If there are parallel events that interact or converge into each other to create an incident, separate timelines are constructed showing the inter-relationship between those events. The following chart illustrates this.


EVENT
Selects Order Picker Forklift
EVENT
Picks Up Load Incorrectly
INCIDENTS
EVENT
Post Incident
EVENT
Post Incident
CONDITION
Not Trained Or VOC For Order Picker
CONDITION
Restricted Access To Load
EVENT
Driver Parks Incorrectly
EVENT
Driver Walks In Front Of Pallet
CONDITION
Too Many Trucks

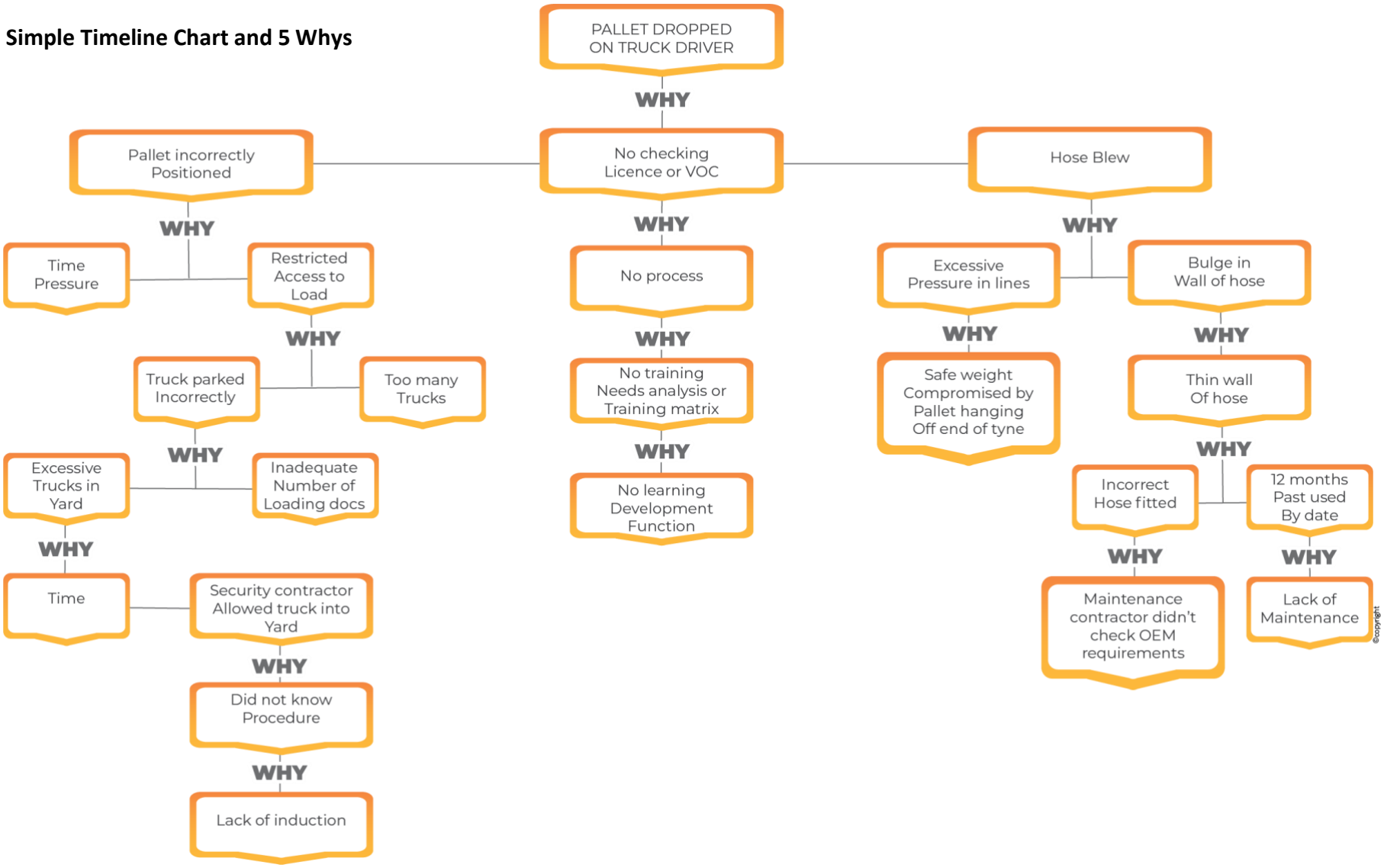
8.4.2 5 Whys

The 5 Whys technique was developed by Sakichi Toyoda and was used within the Toyota Motor Corporation. The primary goal of the technique is to determine the root cause of a defect or problem by repeating the question "Why?" Each answer forms the basis of the next question. The concept is to ask why an event happened or a condition was present and continue asking why until the question can no longer be answered. When the question can no longer be answered you have reached either a control point (Organizational Factor) a point that is beyond organizational control or a point at which more data needs to be gathered.



Example 5 Whys

Simple Timeline Chart and 5 Whys



8.4.3 Incident Trees

An Incident Tree is a useful way of guiding the investigation process. It arranges the facts in a logical and sequential manner. It provides a cascading display of information that assists the team in recalling what facts need to be considered, how they relate to other facts/events, and what information is missing or conflicting. It is often used to analyse process or equipment failure. It can also help determine possible causes and discard other information that is not supported by the facts.
An example is provided here:

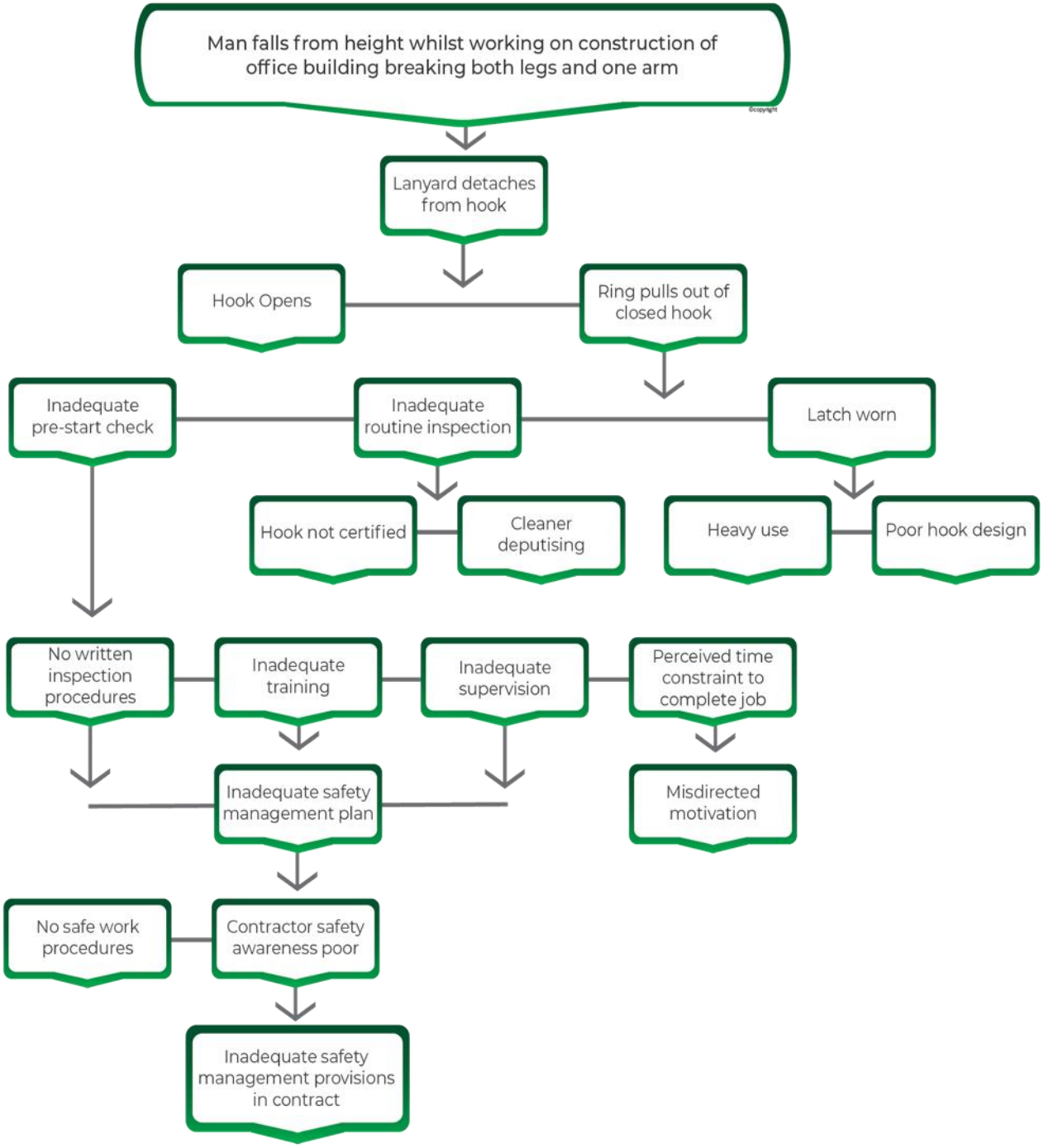
8. 5. Analyse Data

The investigation team should at this stage have gathered their initial findings and will now proceed to start analysing the data and transferring it onto the ICAM Chart.
Each piece of factual information gathered in the investigation findings to date should be classified in accordance with the following categories:

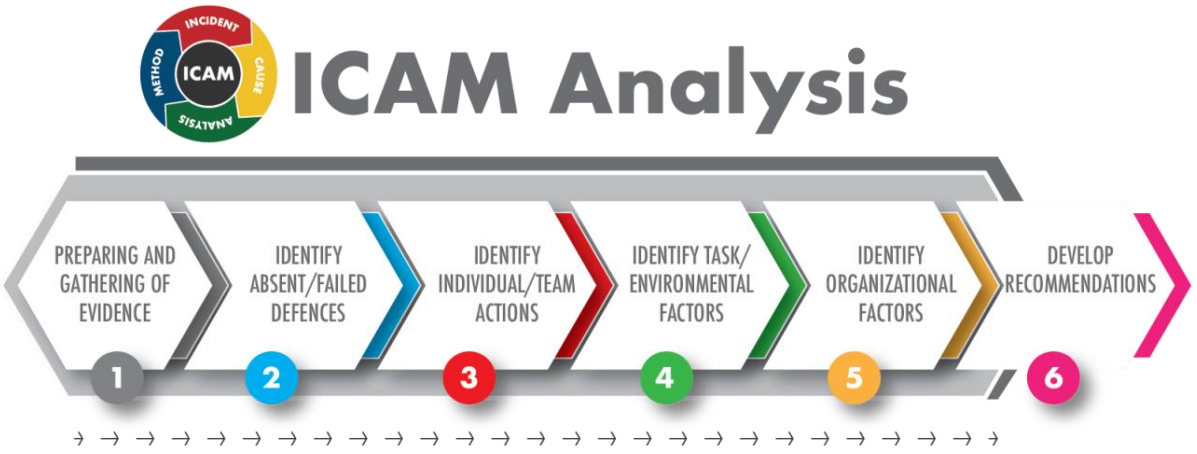
- Contributory Factors / Non-Contributory Facts
- Absent or Failed Defences
- Individual / Team Actions
- Task / Environmental Conditions
- Organisational Factors

Non-contributory facts are facts that exist but have not contributed to the incident. Items like injured person name, the time of the event etc. are examples.

The next step is to work through each of the findings, determine whether they are relevant and if they are deemed to be a contributing factor, classify them into the categories so that they can be included in the ICAM Chart and included in the report to management.


Man falls from height whilst working on construction of office building breaking both legs and one arm
Lanyard detaches from hook
Hook Opens
Ring pulls out of closed hook
Inadequate pre-start check
Inadequate routine inspection
Latch worn
Hook not certified
Cleaner deputising
Heavy use
Poor hook design
No written inspection procedures
Inadequate training
Inadequate supervision
Perceived time constraint to complete job
Inadequate safety management plan
Misdirected motivation
No safe work procedures
Contractor safety awareness poor
Inadequate safety management provisions in contract

The following process is suggested to construct the ICAM Chart.



8.5.1 Identify Absent / Failed Defences

Absent or failed defences are described as the 'last minute measures which did not prevent the outcome of the incident or mitigate/reduce its consequences'. ICAM lists these as: detection systems, protection systems, warning systems, guards or barriers, recovery, escape, rescue, safety device operation, personal protective equipment, hazard identification and control systems. These defences are inanimate and may fail or be absent due to an Individual / Team Action, Task / Environment Condition or Organisational Factor.

The following table outlines the successive layers of defence when each layer comes into play on the failure of the previous defence.

DEFENCE	FEATURE	EXAMPLE
Awareness	These are circumstances where people understand the potential for damage and injury by those doing the work or supervising the task.	Induction, Training, Communication, Hazard ID, Hazard Recognition and Reporting i.e. lack of knowledge about the hazards of driving on a wet haul road.
Detection	Controls that provide an indication of the presence of a hazardous situation	Alarms, Alerts, Monitoring Equipment, Warning Lights, Sensors etc. i.e. Traction control warning if vehicle begins to lose traction.
Control and Interim Recovery	Restoring process / people to safe state with negligible damage.	Emergency Stops, RCD's, By Pass Valves.
Protection and Containment	Limits effects and or contains any release of an unplanned energy, spills, etc.	Bunded Areas, PPE, Fire Extinguishers, Spill Kits
Escape and Rescue	Process to evacuate people from the danger as quickly and safely as possible.	Emergency Exits, Assembly Points, Emergency Planning, Drills, Communication, etc.

8.5.2 Identify Individual / Team Actions

These are the errors or violations that led directly to the incident and are typically associated with personnel having direct contact with the equipment, such as operators or maintenance personnel. Individual or Team Actions are always 'actively' committed and are directly related to the incident. Professor Reason categorised Human Error into the four types.

Slips
These occur when you know what to do and are in the process of doing it correctly; however, at some point, a step is forgotten or put in, but it's out of order.

Lapses
Refers to the failure to carry out an action due to forgetting.

Mistakes
Are more complex. They occur when you think you are doing the right thing, but in reality, you are headed for an incident. This stems from our method of planning and determining the consequences of our actions.

Violations
Are a deliberate deviation from a rule or from a procedure? There are 3 types of violations:

- *Routine* - where the violation has become a normal way of working
- *Situational*- Breaking the rules due to pressures of the job
- *Exceptional-deliberate* sabotage

8.5.3 Identify Task / Environmental Conditions

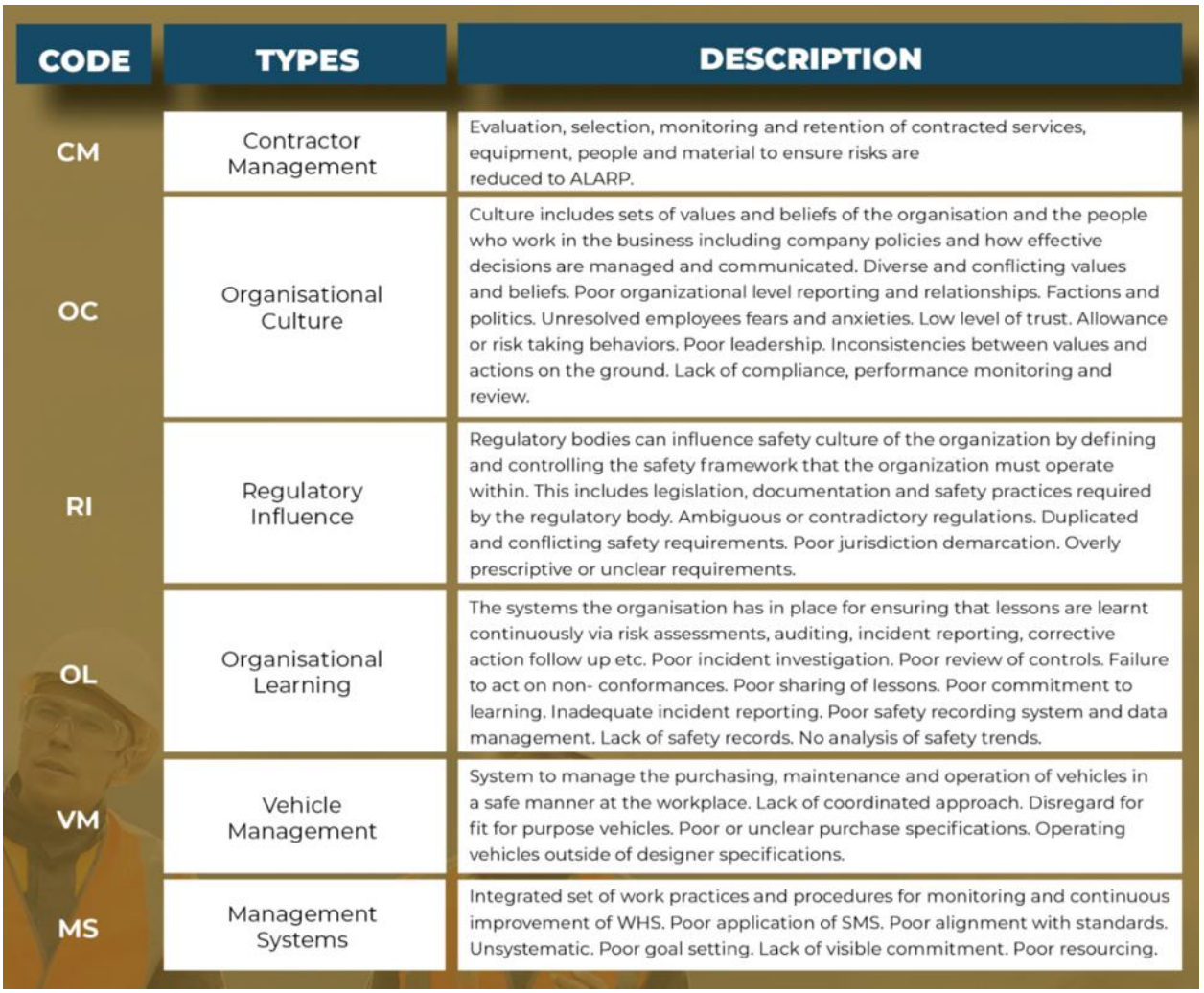
These are the conditions in existence immediately prior to, or at the time of the incident that directly influence human and equipment performance in the workplace. These are the circumstances under which the errors and violations took place and can be embedded in task demands, the work environment, individual capabilities and human factors. The Task / Environmental Conditions can be categorised in two (2) groups: Workplace Factors and Human Factors.

8.5.4 Identify Organisational Factors

These are the underlying factors that often produce the conditions that affect the work performance. They often lie dormant undetected for a considerable time within an organisation and only become apparent when they combine with other factors. Most, if not all incidents take root in organisational factors. Investigators should look beyond human errors, for example, or an equipment failure, without taking into account the system that helped shape the conditions for people's performance and the design, maintenance, inspection and use of that equipment.

ICAM classifies the system failures into 16 Organisational Factor Types (OFT's) as follow.

CODE	TYPES	DESCRIPTION
HW	Hardware	The quality, availability and position of the tools and equipment - this factor is concerned with the quality of the existing equipment and it's materials rather than the design or poor maintenance.
TR	Training	The provision of the correct skills and knowledge of the employees for them to do their job safely. Failures may include lack of, insufficient, poor or too much training, lack of resources or assessment or mismatch or ability to task.
OR	Organisation	Failure or deficiency in structure of responsibility and accountability. Poor co-ordination, poor supervision, insufficient provision of information and or feedback.
CO	Communication	Failure to communicate or failure to communicate adequately. If there is no procedure for communication of hazards in the business, this becomes an Organisational Factor.
IG	Incompatible Goals	Presence of conflicts between goals between different groups. Failure to communicate task priorities. Conflicts in safety planning, implementation, economic goals, and production goals.Production vs Safety conflict.
PR	Procesures	Failure in writing, development and testing of procedures. Procedures not accurate or understandable or not known and used. Poor document control.
MM	Maintenance Management	Appropriateness of the management of maintenance system involving planning, resourcing and procurement. Poor practices involving procedures, tools and training. Absent maintenance manuals. Shortage of specialized maintenance contractors.
DE	Design	The way in which equipment is constructed which may leave vulnerabilities in the way the equipment is used or operated. Poor or inadequate design not fit for purpose using safe by design principles for the full life cycle of the plant.
RM	Risk Management	Application of risk management policies, processes and procedures within the organization to reduce risk to ALARP. It also refers to the ongoing process of risk management within the workplace. Poor hazard identification. Inappropriate use of risk tools. Poor selection of risk controls. Lack of competency for those tasked with risk management assessments.
MC	Management of Change	How well change is managed within the organization including changes to operations, processes, equipment, services and people's roles and accountability. Poor implementation. Change introduced too quickly.



CODE	TYPES	DESCRIPTION
CM	Contractor Management	Evaluation, selection, monitoring and retention of contracted services, equipment, people and material to ensure risks are reduced to ALARP.
OC	Organisational Culture	Culture includes sets of values and beliefs of the organisation and the people who work in the business including company policies and how effective decisions are managed and communicated. Diverse and conflicting values and beliefs. Poor organizational level reporting and relationships. Factions and politics. Unresolved employees fears and anxieties. Low level of trust. Allowance or risk taking behaviors. Poor leadership. Inconsistencies between values and actions on the ground. Lack of compliance, performance monitoring and review.
RI	Regulatory Influence	Regulatory bodies can influence safety culture of the organization by defining and controlling the safety framework that the organization must operate within. This includes legislation, documentation and safety practices required by the regulatory body. Ambiguous or contradictory regulations. Duplicated and conflicting safety requirements. Poor jurisdiction demarcation. Overly prescriptive or unclear requirements.
OL	Organisational Learning	The systems the organisation has in place for ensuring that lessons are learnt continuously via risk assessments, auditing, incident reporting, corrective action follow up etc. Poor incident investigation. Poor review of controls. Failure to act on non- conformances. Poor sharing of lessons. Poor commitment to learning. Inadequate incident reporting. Poor safety recording system and data management. Lack of safety records. No analysis of safety trends.
VM	Vehicle Management	System to manage the purchasing, maintenance and operation of vehicles in a safe manner at the workplace. Lack of coordinated approach. Disregard for fit for purpose vehicles. Poor or unclear purchase specifications. Operating vehicles outside of designer specifications.
MS	Management Systems	Integrated set of work practices and procedures for monitoring and continuous improvement of WHS. Poor application of SMS. Poor alignment with standards. Unsystematic. Poor goal setting. Lack of visible commitment. Poor resourcing.

8.6 Validate the Organisational Factors

It is recommended to work through each OFT towards the incident. As an example, the team could ask 'Was Design a factor in this incident?

8.7 Coding of the ICAM Elements

The following Tables contain the coded contributing factor types which organisations may wish to include in their investigation. Question 24 of the Queensland Department of Natural Resources and Mines 'Queensland Mining Industry reporting manual' August 2015 requires the mine to identify these contributing factors stating:

> *'Describe the incident in terms of all relevant contributing factors (organisational factors, task/environment conditions, individual/team actions and absent or failed defenses). These factors should be considered as the root causal factors that led to the incident occurring. Select from the drop down lists in each of the corresponding causal factor categories. If entering more than one code per category, then the codes should be entered in order of greatest to least significance in contributing to the incident. Unfortunately, only the top three causal factors per category can be recorded.'*

ICAM CODES

There are a few different versions of the coding for the ICAM elements. There is no legal framework or standard for the coding. Here is one of the more common coding systems.

CODE	Contributing Factor Types ABSENT / FAILED DEFENCES
DF1	Awareness – hazard identification
DF2	Awareness – communication
DF3	Awareness – competence/knowledge
DF4	Awareness – supervision
DF5	Awareness -work instruction/procedure
DF6	Detection – visual warning systems
DF7	Detection – aural warning systems
DF8	Detection -speed/movement detectors
DF9	Detection – vigilance/fatigue
DF10	Detection – gas/substance
DF11	Control and Recovery – procedures
DF12	Control and Recovery – bypass valves/circuits
DF13	Control and Recovery – emergency shut down
DF14	Protection and Containment – PPE
DF15	Protection and Containment – fire fighting
DF16	Protection and Containment – spill response
DF17	Protection and Containment –bunding/barricading/exclusion zones
DF18	Escape and Rescue – safe access/egress
DF19	Escape and Rescue – emergency planning/response
DF20	Escape and Rescue – emergency communication
DF21	Other...

CODE	Contributing Factor Types INDIVIDUAL / TEAM ACTIONS
IT1	Supervisory error or violation
IT2	Operating authority error or violation
IT3	Operating speed
IT4	Equipment use error or violation
IT5	PPE use error or violation
IT6	Procedural compliance
IT7	Change management error
IT8	Equipment/materials handling error or violation
IT9	Horseplay/thrill seeking error or violation
IT10	Hazard recognition/perception
IT11	Hazard management error or violation
IT12	Work method error or violation
IT13	Occupational hygiene practices
IT14	Other...

CODE	Contributing Factor Types TASK / ENVIRONMENT CONDITIONS - WORKPLACE
TE1	Task Planning / Preparation / Manning
TE2	Hazard Analysis / Job Safety Analysis / Take 5
TE3	Work Procedures availability and suitability
TE4	Permit to work availability and suitability
TE5	Abnormal operation situation / Condition
TE6	Tools / Equipment condition / Availability
TE7	Materials availability and suitability
TE8	Equipment integrity
TE9	Housekeeping
TE10	Weather conditions
TE11	Congestion/ Restrictions / Access
TE12	Routine / Non-routine task
TE13	Fire and / or explosion hazard
TE14	Lighting
TE15	Equipment / Material temperature / Conditions
TE16	Noise
TE17	Ventilation
TE18	Gas, dust or fumes
TE19	Radiation
TE20	Chemical
TE21	Wildlife
TE22	Surface Gradient / Conditions
TE23	Reduced / Restricted visibility
TE24	Other Factor...

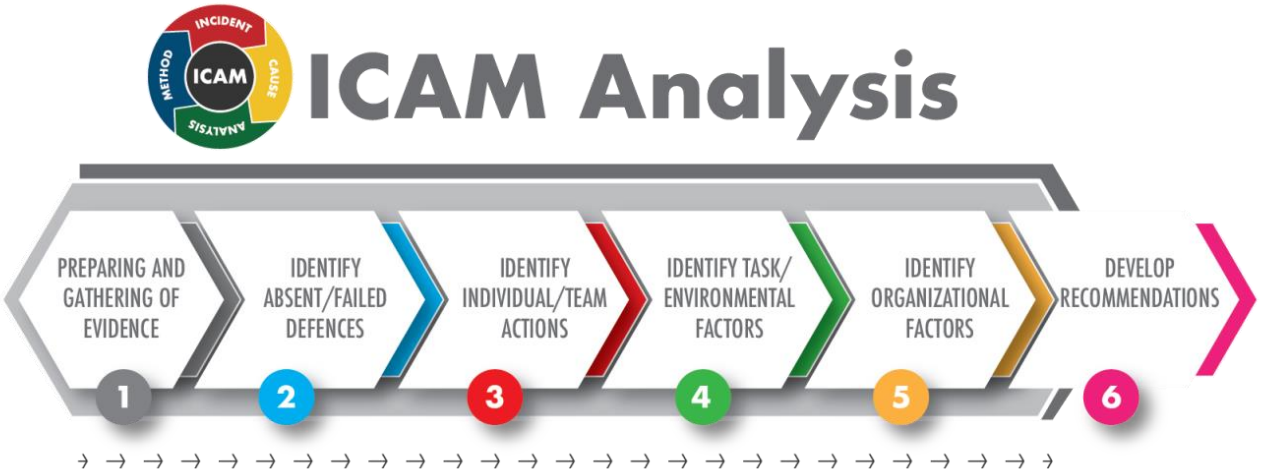
CODE	Contributing Factor Types TASK / ENVIRONMENT – HUMAN FACTORS
HF1	Complacency/motivation/desensitization to hazard
HF2	Drugs/Alcohol influence
HF3	Familiarity with task
HF4	Fatigue
HF5	Situational awareness
HF6	Time/productivity pressures
HF7	Peer pressure/supervisory example
HF8	Physical capabilities
HF9	Mental capabilities
HF10	Physical stress
HF11	Mental stress
HF12	Confidence level
HF13	Secondary level
HF14	Personal issues
HF15	Distraction/pre-occupation
HF16	Experience/knowledge/skill for task
HF17	Competency
HF18	Behavioral beliefs (gains – risks)
HF19	Personality/attitude
HF20	Poor communications
HF21	Poor shift patterns & overtime working
HF22	Passive tolerance of violations
HF23	Perceived license to bend rules
HF24	Change of routine
HF25	Reliance on undocumented knowledge
HF26	Other Human Factor...

CODE	Contributing Factor Types ORGANISATIONAL FACTORS
HW	Hardware
TR	Training
OR	Organisation
CO	Communication
IG	Incompatible Goals
PR	Procedures
MM	Maintenance Management
DE	Design
RM	Risk Management
MC	Management of Change
CM	Contractor Management
OC	Organisational Culture
RI	Regulatory Influence
OL	Organisational Learning
VM	Vehicle Management
MS	Management Systems

8.8 ICAM Analysis

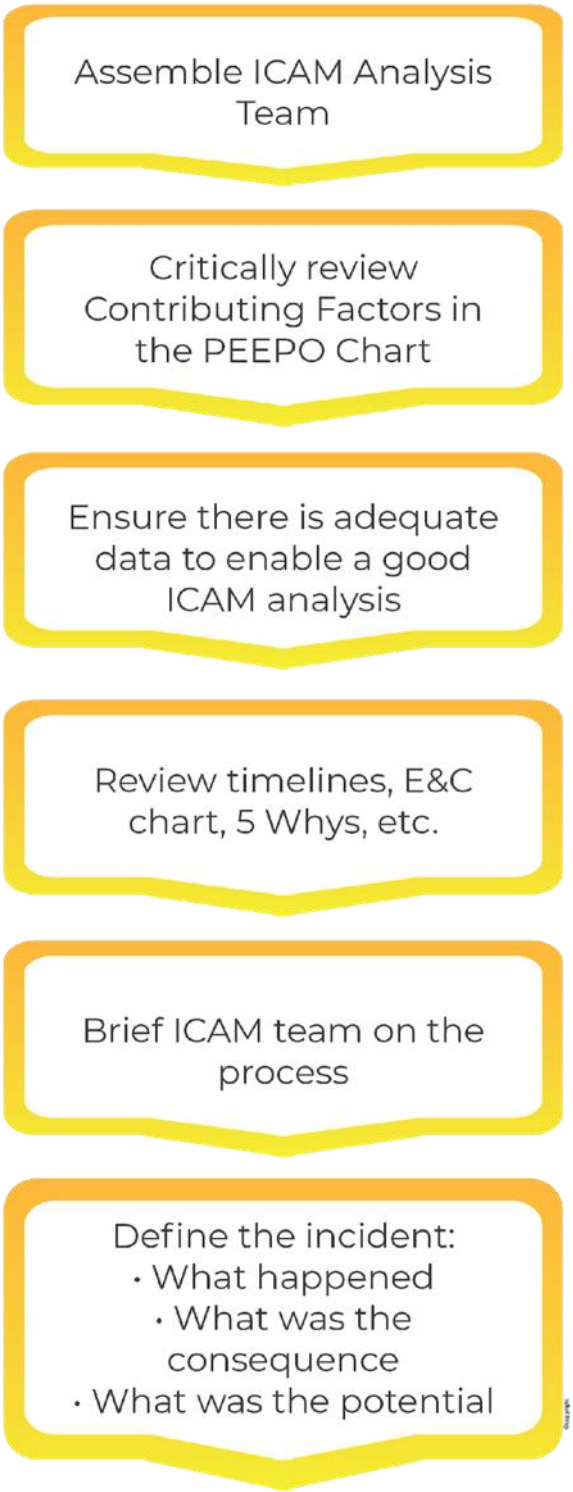
The following six steps are recommended when facilitating the incident analysis:

4 Preparing and Gathering of Evidence
5 Identify Absent / Failed Defences
6 Identify Individual / Team Actions
7 Identify Task / Environment Conditions
8 Identify Organisational Factors
9 Develop Recommendations



The process is depicted in the following flow charts.

1. PREPARATION



Guide:
Small team depending on severity of incident

Tip:
Use Post-It Notes

Example:
Operator falls from the step ladder hurting his back and misses his next two shifts

2. IDENTIFY

Ask the team...
What is the first defence that should have prevented this incident?

Tip:
Use the timeline

Ask the team...
What is the next defence that should have prevented this incident?

Tip:
You should have identified 3 to 5 failed defences

Continue until all the failed defences are identified

Consider:
An absent defence is a reasonable expectation of what should have been in place

Ask the team...
What defences should have been in place to prevent this incident?

Tip:
Some defences are containment not preventative. e.g. seatbelts

Ask the team...
What defences could have minimised the damage/harm?

Example:

No barrier to protect run off to adjacent roadway

3. IDENTIFY ACTIONS

Ask the team...
Who was directly involved?

For each person involved, ask the team.... What errors

Tip:
Avoid opinions or emotive terms

Tip:
Ensure there is a verb

Tip:
Driver exceeded the posted speed limit

4. IDENTIFY CONDITIONS

Ask the team...
What conditions influences the behaviours?

Example:
Road was contaminated with mud

Ask the team...
What conditions influences the risk level?

Tip:
Review identified defences and actions and try to identify conditions that influenced them

Ask the team...
What conditions undermined the system defences

Example:
Sun aspect made the stoplight hard to see

5. IDENTIFY ORG FACTORS

Ask the team...
"What Org Factors produced the behavioural influences"

Ask the team...
"What Org Factors

Tip:
Try to establish the underlying causes of poor system defences

Ask the team...
"What Org Factors allowed adverse conditions to go unaddressed?

Example:
OL Despite many hazard reports, trees were allowed to overhang road signs

Ask the team...
"What Org Factors promoted or passively tolerated risk taking

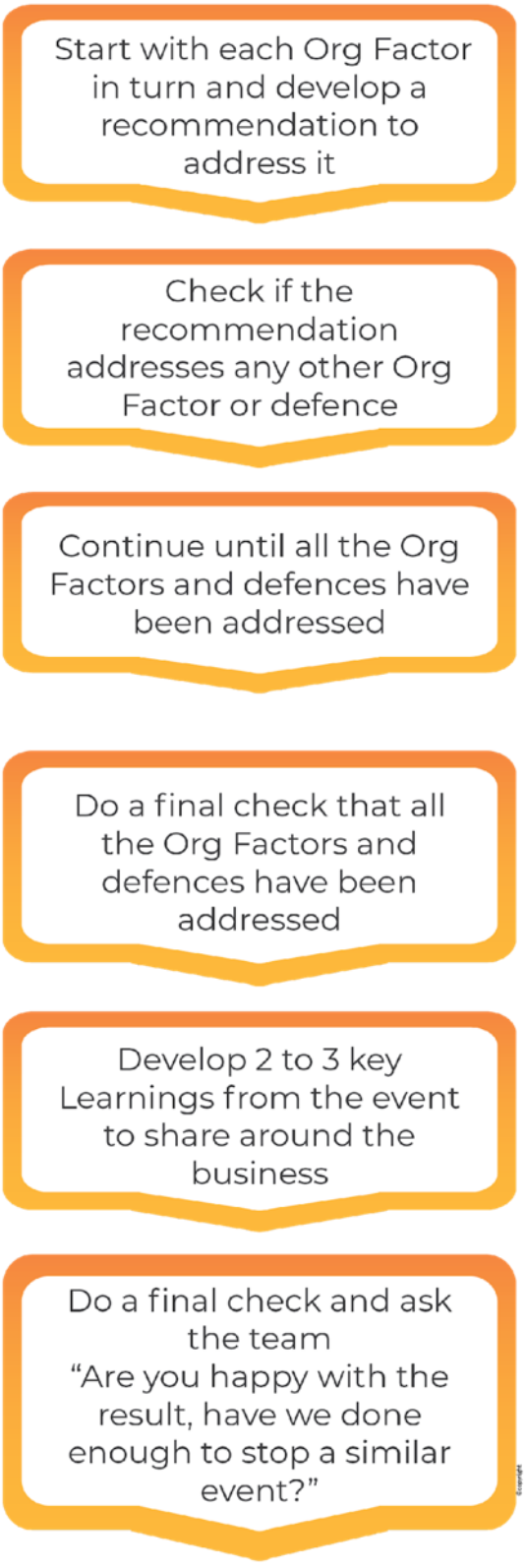
Tip:
Evaluate mgt response to previous events

Ask the team...
"What Org Factors removed or undermined the system defences

Assist the team in categorising the Org Factors into the 16 OFT's

Consider:
An Org Factor can be categorised into more than one OFT's

6. DEVELOP RECOMMENDATIONS



Example:
Poor- Review site traffic management
Good- Conduct speed audits on site main access road

8.9 Form Recommendations & Report

The investigation must make appropriate recommendations for corrective actions, each contributing factor to prevent a similar event. This can be achieved by addressing all factors identified in the absent / failed defence and organisational factors during this analysis. Not all factors will be able to be eliminated or managed properly due to various other competing agendas; however, it is the investigation team's responsibility to present all recommendations to management for them to determine what is practical at that point and put in place an action plan to remedy the various causes of the incident. Recommendations should be SMARTER:

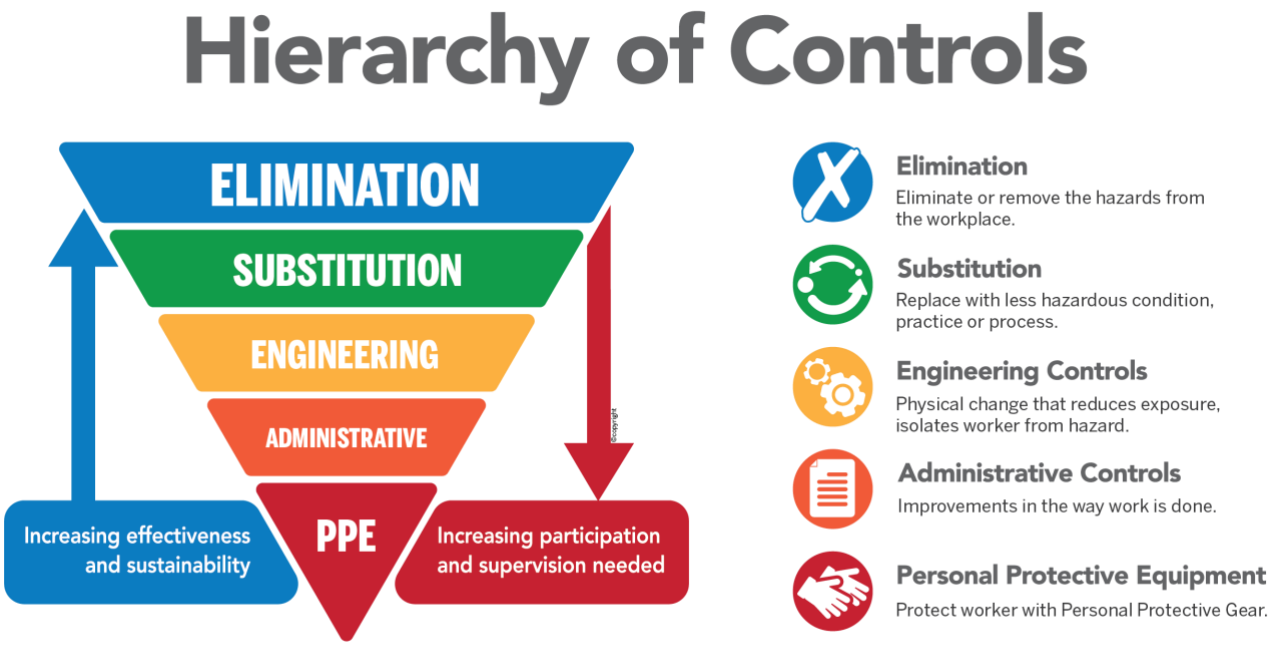
Specific - recommendations are activities that can be undertaken by a work group and not general motherhood statements. e.g., "all people to take care"
Measurable - to determine if recommendations are effective
Achievable - recommendations are feasible and practical
Realistic - recommendations must be relevant, proportional to the risk and within our control (e.g., you may not be able to fix the pothole as it is a public road. However, you can notify the Main Roads Department)
Timely - recommendations must be completed in appropriate timeframes
Effective – does the control reduce the risk of recurrence
Reviewed – reassess controls implemented to ensure they remain effective The team should review each contributing factor and should outline:

- Appropriate recommendations that should, if implemented, mitigate the risk to an acceptable level
- Improvements to the system's defences to limit the consequences of the contributing factor
- Suggest interim short-term solutions for immediate corrective action

Management should thoroughly review each recommendation. They should determine the benefits of any corrective action and the implication to other parts of the system should the corrective action be implemented.

WHS/OH&S legislation requires that a business eliminates the hazard and where it is not practicable to do so they must adopt the risk management process to an ACCEPTABLE LEVEL of risk which is as AS LOW AS REASONABLY ACCEPTABLE (ALARA). Risk controls should be selected given consideration to the Hierarchy of Controls, with Elimination as the most preferred and PPE (or behaviour in some businesses' Hierarchy of Control Diagrams) the least.

HIERARCHY OF CONTROL DIAGRAM



Evaluating and prioritising actions - Payoff matrix

Once there is a comprehensive list of corrective actions to address the root causes, a payoff matrix may be used to evaluate and prioritise actions.

The payoff matrix helps to evaluate the proposed corrective actions with respect to their ease of implementation.

It may be useful to write up the matrix on a flipchart or whiteboard to discuss with the investigation team.

When using a payoff matrix you may choose to start with a simple 2 x 2 matrix like below.

An example of the matrix in action. Using an incident where a pallet fell off a forklift the following recommendations and matrix has been created.

RECOMMENDATIONS:

4 Review / improve security contractor induction
5 Complete forklift licence reviews for all operators
6 VOC for all operators
7 Review traffic management plan and implement training for all workers
8 Buy all new forklifts
9 Review maintenance schedule and complete full checks on all forklifts

8.10 Conclude the Investigation

The investigation team must not only have the skills and knowledge to initiate, plan and conduct the investigation. They must also know how to conclude the investigation in accordance with their organisation's policy and procedures. The team should:

- Review all documents, evidence and facts to ensure that the evidence supports the corrective actions recommended and that the recommendations are proportional to the risk, feasible and realistic.
- Review all witness statements and interview notes to ensure nothing has been missed
- Determine what form and type of report needs to be compiled, who the recipients of that report are and when that report should be provided to those groups.
- Identify whether their incident report findings are only relevant to that site or whether they have broader implications to the business or industry.
- Draft a report and disseminate for comment to the relevant stakeholders for comment and feedback.

8.11 Report the Findings

The Incident Investigation Report should be a presentation of the investigation findings and recommendations. Whilst there is no rule on what structure, layout or form a report should take it is advisable to include the ICAM chart to assist management in understanding the various factors that have contributed to the incident. It is generally recommended that a report should include:

4 Incident Description
5 Key Findings
6 Root cause
7 Conclusion and Observations
8 Recommendations including implementation details
9 Significant Learnings
10 Appendices
11 ICAM Analysis
12 Corrective Action
13 Report Sign Off

Students will be provided with Template Incident Investigation Reports at the course.

Remember the fundamental aim of any incident investigation is to understand what happened so we can prevent it from happening again!

APPENDIX 1: INCIDENT INVESTIGATION CHECKLIST

ACTION	YES	NO	N/A	COMMENTS
Secure scene				
Immediate preventative actions				
Internal notifications (immediate supervisor, WHS/OH&S team, senior managers, legal team, PR team)				
External notifications to regulators (e.g., Safe Work, EPA)				
Notify next of kin if required				
Offer employee assistance program (EAP) if relevant				
Complete internal reporting requirements				
Determine level of investigation				
Appoint investigation team				
Identify information to be gathered (use PEEPO as a prompt)				
Conduct site inspection				
Interview witnesses / others				
Collect other information				
Release the scene (if notifiable, this requires regulators' approval)				
Establish sequence of events				
Develop incident (why) tree				
Determine causes				
Conduct ICAM analysis				
Determine recommendations				
Submit report				
Management review of report				
Agree corrective actions and responsibilities				
Communicate findings				
Follow up and check actions				

APPENDIX 2: INCIDENT INVESTIGATION QUALITY REVIEW

Does the investigation include the following?	YES	NO	COMMENTS
Is there Clear Executive Summary?			
Is there a clear description of the incident? • Date, time and location • Who was involved? • The immediate cause(s) of the incident • Details of Injury/ Harm/ Consequences • Sequence of events • Emergency response and immediate corrective • actions			
Is there a review of absent/ failed defenses (risk controls)? • Did they work? • Why / why not?			
For individual / team actions involved, did we investigate: • Were errors or violations involved? • Why did people act as they did?			
Does the investigation identify contributing factors (ICAM categories)? • Absent/ failed defenses • Individual / team actions • Task / environmental condition • Organizational factor s (underlying causes)			
Will recommended corrective actions prevent a similar incident in the future? • Improve risk controls (absent / failed defenses) • Address organisational factors identified			
Does the report identify lessons learned that can be communicated across the organisation?			
Is the report written clearly and in plain English?			
Is the report free of errors and inconsistencies?			
Are the conclusions supported by information and free of speculation?			
Does the report identify what information was gathered during the investigation (e.g., using PEEPO)? • What documents were reviewed • Whether the scene and equipment were inspected (possibly including photos or pictures) • Who was interviewed? • Other sources of information			
Has the report been signed off by team members and the report been circulated to required stakeholders?			

APPENDIX 3: SAMPLE ICAM REPORT TEMPLATE

(to be provided at the course)

Appendix 4 - ICAM CODES AND DESCRIPTION

CODE	ABSENT OR FAILED DEFENCES
DEFINITION	***Awareness: (Noun) knowledge or perception of a situation or fact that may lead to an adverse outcome.***
DF01	**Awareness: Hazard Identification:** The evaluation if any particular thing/situation/item/condition etc may have the potential to cause a negative outcome (damage/harm etc) E.g. Risk assessment not completed. Risk assessment failed to identify all likely hazards
DF02	**Awareness: Communication:** The imparting or exchanging of information by speaking, writing, or using some other medium. E.g. Control did not communicate the change of conditions, The radio used by the driver was not working
DF03	**Awareness: Competence / Knowledge:** The ability to do something successfully or efficiently. This is usually associated with a failure. E.g. Failure to verify if the person was trained, or a failure to effectively train the person.
DFO4	**Awareness: Supervision:** The action of overseeing something or someone. Supervisory failures may be: Direct – E.g. Supervisor was not present when they should have been / Supervisor did not 'supervise' effectively. Or Indirect – E.g. The supervisor did not effectively provide remote supervision of the task.
DF05	**Awareness: Work instruction/procedures** A step-by-step set of guidelines that must be followed when performing work-related tasks to achieve desired results. The procedure failure may either mean, the procedures may have been poorly written/missing steps, or the worker has failed to follow the procedure.
Definition	***Detection: The action or process of identifying the presence of a threat to the desired outcome***
DF06	**Detection: *Visual* warning system** The visual identification of any system deployed to inform of a future danger to achieving the desired result. E.g. The vehicle's flashing beacon was not working.
DF07	**Detection: Aural (auditory) warning system** The hearing of a system deployed to inform of a future danger to achieving the desired result. E.g. The reversing alarm was not functioning
DF08	**Detection: Speed and or movement detectors** The rate at which someone or something moves, or devices that use sensors to detect motion. (E.g. Speed or motion detectors)

	E.g. The vehicle's speedometer was not functioning
DF09	**Detection: Vigilance / Fatigue** Vigilance relates to the action or state of keeping careful watch for possible danger or difficulties. Fatigue is a feeling of tiredness and exhaustion, physical or mental or both. E.g. The worker had poor sleep immediately before completing the task, Or The vehicle driver vigilance system was able to be bypassed
DF10	**Detection: Gas/substance** A detection system that is biological or technical in nature and used to detect a gaseous substance in an area where it may be hazardous. E.g. The gas detector was faulty (or was not used correctly) and did not alert control of a leak.
Definition	***Control and Recovery: The action of a system or individual trying to prevent a system or process from exceeding a defined limit and then returning it to a nominal state.***
DF11	**Control and recovery: Procedures** An established series of steps designed to manage a system or process that has exceeded or is on a trajectory to exceed a set limit. E.g. Code red/blue checklists.
DF12	**Control and recovery: Bypass values/circuits** A backup device (valve) to allow continuous operation in case of failure. Examples may include, bypass valves, backup generators etc. E.g. The emergency generator did not start up
DF13	**Control and recovery: Emergency shutdown** Safety systems comprising detection, signalling, logical control, valves which can, in tandem with alarm controls etc may enable the safe and effective shutdown of plant/machinery in a controlled manner. E.g. The e-stop button failed to turn off the water
Definition	***Protection and Containment: Systems and processes to prevent people or things from being harmed or damaged by a system that is operating outside normal parameters following the failure of the primary control mechanism.***
DF14	**Protection and Containment: PPE** Equipment worn to minimize exposure to hazards that cause workplace injuries. E.g. Seatbelts, hardhats, steel capped boots, gloves etc. Safety glasses were not worn during the task
DF15	**Protection and Containment: Firefighting** The action/process of extinguishing a fire. Automatic (E.g. sprinkler systems etc) or manual (fire extinguisher etc) E.g. The fire extinguisher was not operational, or the automatic fire suppression system failed
DF16	**Protection and Containment: Spill response** Action taken to control and unintentional release of a substance E.g. There was no spill kit available
DF17	**Protection and Containment: Bunding/Barricading/Exclusion zones** Bunding: a form of secondary containment consisting of a raised, impermeable barrier used to retain liquids. E.g. The bunding was not large enough to contain the volume of the leak. Barricading: To block off or seal up, used to stop entry into the designated area. E.g. The barriers were not installed properly to prevent access

	Exclusion zone: An area into which entry is forbidden. E.g. There was no clearly marked exclusion zone
Definition	***Escape and Rescue: Actions taken in an emergency aimed at saving or being saved from danger.***
DF18	**Escape and rescue: Safe access/egress:** The safe means of entry/exit to a place of safety. E.g. The emergency exit was blocked.
DF19	**Escape and rescue: Emergency planning / response:** The intended response to a dangerous occurrence that should form part of the WHSMS, practiced regularly and well documented. E.g. The emergency response plan did not identify the risk of explosion
DF20	**Escape and rescue: Emergency communication:** Provides a means of communicating with people before, during and following a crisis. E.g. There was no communication device available to communicate with the fire wardens.
DF21	**Other:** (If not found above)

CODE	INDIVIDUAL/TEAM ACTIONS
IT01	**Supervisory:** The supervisor in charge of being responsible for directing and coordinating the operation of system, equipment, people make an error or commits a violation. E.g. The supervisor provided inadequate direction
IT02	**Operating authority:** The limits of authorised use of a piece of equipment. E.g. The worker was not authorised to use the piece of equipment
IT03	**Operating Speed:** The speed at which a person operates a piece of equipment. E.g. The operator drove the dozer 5km above the site speed limit.
IT04	**Equipment use:** The inappropriate use of equipment for a particular purpose. (Not fit for purpose) E.g. The worker used an order picker forklift instead of a forklift
IT05	**PPE use:** A device that is worn to protect against hazards. E.g. The operator wore safety glasses instead of a full-face shield
IT06	**Procedural Compliance:** Following the established way of doing something E.g. the worker deviated from the published method
IT07	**Change Management:** The steps taken to prepare, support, and help workers/teams in making organisational change. E.g. The work team kept digging a trench deeper than permissible when they realised the pipe was deeper than anticipated resulting in a bank cave-in.
IT08	**Equipment / Materials Handling Error or Violation:** A failure in the method or equipment used for the movement, storage, control and protection of materials, products, and people. E.g. The operator slewed the excavator bucket without allowing adequate clearance over the building.
IT09	**Horseplay, Thrill-seeking:** Horseplay; Foolish actions or behaviour outside of known rules. Thrill-seeking; Participation in exciting activities that involve physical risk. E.g. The crane driver waited to move the port-a-loo until someone was using it.
IT10	**Hazard Recognition/Perception:** Part of the risk assessment in which hazards are identified for further investigation. Perception is the ability to see, hear or become aware of something through the senses. E.g. The dozer operator did not effectively evaluate the risk posed by passing motorists
IT11	**Hazard Management Error or Violation:** Management of hazards within the operating area/workplace that have the potential to cause harm or disruption. E.g. The operator failed to drive to conditions on the unsealed road
IT12	**Work Method Error or Violation:** A procedure, or way of doing something was not followed. E.g. The operator failed to follow the work method instruction given by the supervisor.
IT13	**Occupational Hygiene Practices:** Anticipating, recognising, evaluating, and controlling health hazards in the working environment. E.g. The technician did not effectively determine the need for respiratory protection based on incorrectly taken dust samples.
IT14	**Other**: If not found above

CODE	TASK / ENVIRONMENTAL CONDITIONS WORKPLACE
TE 01	**Task Planning / Preparation / Staffing:** The process of planning staffing and resource requirements to complete job tasks. E.g. There were not enough resources to complete the task effectively and on time
TE 02	**Hazard Analysis / Job Safety Analysis / Take 5:** A documented process that breaks each task down into its basic steps and identifies and controls potential hazards. E.g. the risk assessment (JSA) was not sufficient for the task
TE 03	**Work Procedures Availability and Suitability:** Procedures are provided for specific tasks, are suited to the task and readily available for the workforce. E.g. The task did not have documented procedures
TE 04	**Permit to Work Availability and Suitability:** A systematic process used to authorize controlled work in nonstandard, potentially hazardous conditions. It should be written and identify hazards and necessary controls to ensure the work is completed safely. E.g. A permit to work system was not in place
TE 05	**Abnormal Operational Situation / Condition:** A situation that is inconsistent with the normal condition identified that may indicate a malfunction of a component or a deviation from normal operating conditions. E.g. the machine was operating at maximum capacity for an abnormally long duration outside of OEM recommendations
TE 06	**Tools/ Equipment Condition / Availability:** Job-specific tools are provided for the task that are maintained in good working order. E.g. The machine was missing a guard
TE 07	**Materials Availability and Sustainability:** Having the appropriate type, quantity and quality of a particular material to complete a job to the required standard. E.g. The wrong grade of steel was used to protect the electrical components
TE 08	**Equipment Integrity**: The management of equipment to ensure that it is designed and installed correctly and that it operates and is maintained correctly. E.g. The brakes were defective and past their service life
TE 09	**Housekeeping:** The routine cleaning and organisation of a workplace to ensure the area is free of trip/slip/fall/fire hazards etc. E.g. The clutter on the warehouse floor created tripping hazards
TE 10	**Weather Conditions:** Refers to the meteorological conditions that influenced the task and or behaviours that led to the adverse outcome. E.g. Strong winds placed load on the light pole causing it to fall
TE 11	**Congestion/Restriction/Access:** An area that may be blocked or crowded that may restrict access to certain equipment or materials and may impact access and egress from a workplace. E.g. The tight space didn't allow the operator to manoeuvre the machinery effectively.
TE 12	**Routine / Non-Routine Task:** Repetition of one or more tasks at regular intervals/tasks performed so infrequently that the details of the task itself, the hazards and controls may not be fully developed and or understood by those performing the task. E.g. Using a drop saw is not a routine task for the operator.
TE 13	**Fire and or explosion hazard:**

	Combustible and flammable liquids and substances present in the work environment or caused by the task being performed (E.g. hot work) E.g. The operator was working with explosive products.
TE 14	**Lighting:** The amount of light available in the workplace/area to ensure appropriate illumination or visibility. E.g. The lights in the warehouse were not bright enough for the work performed
TE 15	**Equipment/Material Temperature / Conditions:** The temperature of the operating environment or the equipment being used at the time. E.g. The operator was working with hot metal.
TE 16	**Noise:** Unwanted sounds that are loud or unpleasant and may cause disturbance or distraction. E.g. Noise from the surrounding traffic made it difficult to hear the approaching excavator.
TE 17	**Ventilation:** The provision of fresh air into a building, room, or workplace. E.g. There is no fresh air coming into the building
TE 18	**Gas, Dust, Fumes:** The presence of airborne contamination in the work area that impact on the ability to complete the tasks. E.g. Fumes from the exhaust pipe entered the building.
TE 19	**Radiation:** The presence of ionizing or non-ionising particles that have the potential to cause harm. E.g. Radiation from the x-ray machine was leaking.
TE 20	**Chemical:** Any basic substance that is used in or produced by a reaction that involves changes to atoms or molecules. Chemical hazards are the risk involved in using a chemical and presents an occupational hazard caused by the exposure to chemical. E.g. Sealer was leaking from the container.
TE 21	**Wildlife:** The presence of wildlife in the work area that impacts the task being conducted. E.g. A snake was present in the work area
TE 22	**Surface Gradient/Condition:** Surface gradient is the degree to which a surface rises and falls along its length. Surface condition refers to the smoothness or roughness of a surface. E.g. The steep ramp without friction treatment made it slippery to walk on
TE 23	**Reduced/restricted visibility:** Reduction in how far one can clearly see in a particular weather, light or environmental/workplace conditions. E.g. the fog made it difficult to see more than 20 metres in front of the car
TE 24	**Other Factor:**

CODE	TASK / ENVIRONMENTAL CONDITIONS HUMAN FACTORS
HF 01	**Complacency / Motivation / Desensitisation to Hazard:** General desire or willingness to do something/being so familiar or having long term exposure to a hazard that they have a diminishing emotional response to it and perceive the risk as lower than it actually is. E.g. Worker had a complacent attitude towards working around high voltage electricity as they do it all the time.
HF 02	**Drug/Alcohol Influence:** Intoxication caused by the use of alcohol and or drugs. Drugs can be referring to prescription medication as well as illicit substances. E.g. The worker was impaired by alcohol.
HF 03	**Familiarity with Task:** The state of knowing how to complete a task well. E.g. This was the first time the operator undertook the task
HF 04	**Fatigue:** Tiredness that results from mental or physical exertion or tiredness brought on by lack of sufficient or lack of quality rest/sleep. E.g. The driver had completed a 17-hour night shift and fell asleep at the wheel
HF 05	**Situational Awareness:** Knowing and being aware of what is going on around us. E.g. the operator was unaware of the risk present on the site
HF 06	T**ime/Productivity Pressure:** Being provided less time than what is required or deemed necessary to complete a task. E.g. The employee was rushing to make the short deadline.
HF 07	**Peer Pressure / Supervisory Example:** The direct influence of one's peers on one's behaviour such as changing of attitudes and behaviours to conform with those of their peers or supervisor. E.g. The worker felt pressured by the managers lax attitude to PPE compliance and hence continued to work without safety glasses following the managers' example.
HF 08	**Physical Capabilities:** The degree to which a person is able to perform a physical task. E.g. The employee was trying to lift a 50 kg container without a lifting aid.
HF 09	**Mental Capabilities:** The degree to which a person is able to perform a mental task. E.g. The employee did not have the mental capacity to complete the task due to a lack of education.
HF 10	**Physical Stress:** The outcome of extended operation without appropriate recovery time being made available. E.g. The employee's legs fatigued from the continuous lifting
HF 11	**Mental Stress:** The expectations placed upon an individual to complete a task.

	E.g. The manager provided the worker with an unrealistic time frame to complete the task resulting in the employee experiencing a high degree of personal pressure.
HF 12	**Confidence Level:** Belief in one's own abilities to perform a certain task. E.g. The operator's confidence level far outweighed their ability to complete the task appropriately and due to the worker's lack of ability an adverse outcome resulted.
HF 13	**Secondary Goals:** Other goals that do not form part of a primary goal. E.g. The company placed more focus on production than safety
HF 14	**Personal Issues:** Things of a personal nature that can cause distraction in the workplace. E.g. The employee was going through a relationship breakdown which was on their mine resulting in a lack of concentration to the task.
HF 15	**Distraction/Pre-Occupation:** Anything that prevents someone from giving their full attention. E.g. The employee was distracted by the large volume of vehicles that were entering the site
HF 16	**Experience / Knowledge/Skill for Task:** Having the required level of workplace experience/knowledge of what is required to perform a task. E.g. the employee only has limited experience in driving this type of equipment
HF 17	**Competency:** The ability to complete a task safely, efficiently and to the required standard. E.g. The employee was not competent to drive the forklift
HF 18	**Behavioural Beliefs:** The belief that a certain behaviour will produce a given outcome where the gains of engaging in the behaviour outweigh the risks involved. E.g. The employee thought it was ok to grind metal for a short period without wearing safety glasses.
HF 19	**Personality/Attitude:** The combination of characteristics or qualities that form an individual distinctive character. An individual way of thinking or feeling about something E.g. The supervisor's persuasive personality influenced other workers to follow their lead even though they did not follow all steps of the procedure.
HF 20	**Poor Communication:** A discrepancy between what is said by one person and what is heard by the other. (misunderstanding) The driver did not hear the spotter's instruction to stop as no communication standard had been established.
HF 21	**Poor Shift Patterns and Overtime Working:** Exposing or demanding that staff spend extended periods of time in the workplace that are inappropriate to managing the fatigue risk. E.g. The employee shift pattern had not been assessed for fatigue risk and resulted in the worker being in a fatigued state when commencing day 7 of their roster.
HF 22	**Passive Tolerance of Violations:**

	Acceptance of unsafe behaviour and unsafe conditions by not verbally or actively denouncing them. E.g. The manager saw the electrician working on equipment that was not isolated but did nothing about it.
HF 23	**Perceived Licence to Bend Rules:** The belief that one has the authority to not implicitly follow the rules as they believe that the rule is unimportant, that no harm can come from it, and that there may be benefit from doing it their own way. E.g. Due to a lack of standard processes to check performance workers conducted tasks in their own manner.
HF 24	**Change of Routine:** Deviation from what would be considered normal activity or normal practice and would imply that the activity or process is not familiar to the person completing it. E.g. The driver was allocated a different to normal delivery route and subsequently got lost
HF 25	**Reliance on Undocumented Knowledge:** Important knowledge and information on business processes, practices and complex systems is largely undocumented which resulted in key information being known to very few individuals or teams and is not available to others through procedures and formal training. E.g. With no written procedures to refer to, the worker acted on the verbal instructions of another worker.
HF 26	**Other Factor:**

Code	ORGANISATIONAL FACTORS
CM	**Contractor Management:** The evaluation, selection and retention of contracted services, equipment, personnel and material to ensure risk to people, the environment, equipment or property are reduced to a level which is As Low as Reasonably Practicable (ALARP).
CO	**Communication:** Failures to communicate when the target is known but the message fails to get through or is late. Involves inadequate hardware and miscomprehension by those involved. Failure to validate reception.
DE	**Design:** The way in which equipment is constructed to make certain operations difficult or allow unexpected usage. Poor design may require extra effort. Inadequate design capacity may lead to extending the equipment beyond limits. Many design failures result from the physical and professional separation of the designer and end user
HW	**Hardware:** The quality, availability and position in the life cycle of tools, equipment and components. It is concerned with the materials selected rather than design or poor maintenance of the equipment.
IG	**Incompatible Goals:** The presence of conflicts between production, safety, planning, and economic goals as well as conflicts between group and peer pressures and personal goals.
MC	**Management of Change:** The systematic assessment of change to operations, processed, equipment, services and personnel for potential risk and the application of appropriate action to ensure existing performance levels are not compromised.
MM	**Maintenance Management:** The appropriateness of the management of the maintenance system, involving planning, resourcing and type of maintenance rather than the execution of maintenance jobs. (Poor practices involving procedures, tools and training are covered elsewhere)
MS	**Management Systems:** An integrated set of work practices, beliefs and procedures for monitoring and improving the safety and health of all aspects of operations. Ineffective application of Safety Management Systems may lead to safety deficiencies and increased risk. Includes inadequate safety assurance systems (audits/investigations etc)
OC	**Organizational Culture:** Includes the set of beliefs, values (what is important), norms and fundamental assumptions (the way we do things here) that define the organization. The shared values and beliefs interact with an organization's structures and control systems to produce a set of 'unwritten rules' that govern behavioural norms.
OL	**Organizational Learning:** The strategies that organisations have in place for ensuring lessons are learnt from the occurrence investigations, corrective actions implementation, audit findings, risk management processes and reviews.
OR	**Organization:** Deficiencies in the structure of responsibility and accountability that are not appropriate to current work. May involve coordination, supervision and provision of communication and feedback as well as a lack of adequate resources.

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