Accident/Incident/Near Miss Investigation - Human Factors and "The Dirty Dozen"

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Accident/Incident /Near Miss investigation why bother?- Just look at the scale of the problem in the UK currently!

0.5 million Work-related musculoskeletal disorder cases (new or long-standing) in 2019/20
0.8 million Work-related stress, depression or anxiety cases (new or long-standing) in 2019/20
1.6 million Work-related ill health cases (new or long-standing) in 2019/20
0.7 million Workers sustaining a non-fatal injury in 2019/20
65,427 Non-fatal injuries to employees reported by employers in 2019/20
111 Fatal injuries to workers in 2019/20
38.8 million Working days lost due to work-related ill health and non-fatal workplace injuries in 2019/20
12,000 Lung disease deaths each year estimated to be linked to past exposures at work
2,446 Mesothelioma deaths in 2018 with a similar number of lung cancer deaths linked to past exposures to asbestos

* Published November 2020

More information about HSE data sources can be found at [www.hse.gov.uk/statistics/sources.htm](http://www.hse.gov.uk/statistics/sources.htm)
One definition of an Accident - there are many others

“an unplanned & uncontrolled event that led to, or could have led to:
- injury to persons*, (Including fatality)
- damage to property/plant/equipment,
- or some other loss to the company/organisation”

Didcot, 2016  Paddington, 1999  Cardiff, 2000
Where things can go wrong with investigations:
Investigations often stop when someone is found to blame (or worse case scenario they don't even start because someone already “knows the answers”)
Investigations often fail to get to underlying or root causes
Managers/supervisors or colleagues, may prejudge based on a person or contractor’s previous reported behaviour

Even where there is an investigation:
There is often failure to implement or monitor full implementation of investigation findings
There is often a failure to systematically record and share findings, so that lessons can be learnt throughout the organisation
A brief reminder - Stages and Process in an Accident/Incident Investigation

- Deal with immediate risks.
- Select the level of investigation.
- Investigate the event.
- Record and analyse the results.
- Review the process.
We will take a brief overview of Rasmussens’ SRK Skills, Rules and Knowledge, Reason’s Human Error Models and Management, HSG 48 Reducing Error and Influencing Behaviour, & look in more depth at Dupont’s Dirty Dozen.

(using Skybrary for references)
Human factors?

HSE definition is: ‘Human factors refer to environmental, organisational and job factors, and human and individual characteristics which influence behaviour at work in a way which can affect health and safety’.

A simple way to view human factors is to think about 3 aspects: the job, the individual and the organisation and how they impact on people’s health and safety-related behaviour.

Human factors causing accidents are those factors that contribute to an accident which are directly attributable to the operator, worker, or personnel involved in an accident.
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<thead>
<tr>
<th>Job factors</th>
<th>Organisation (and management factors)</th>
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<td>illogical design of equipment and instruments</td>
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<td>poorly maintained equipment</td>
<td>inadequate responses to previous</td>
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<td>high workload</td>
<td>incidents</td>
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<td>noisy and unpleasant working conditions</td>
<td>management based on one-way</td>
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<td>communications</td>
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<td>deficient co-ordination and</td>
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<td>responsibilities</td>
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<td>poor management of health and safety</td>
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<td>poor health and safety culture</td>
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<th>Individual factors</th>
<th>Risk perception? (not often cited but worth consideration)</th>
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<td>low skill and competence levels</td>
<td>The human factors include but also go beyond</td>
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<td>tired staff</td>
<td>wilful violations of safety rules or</td>
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<td>bored or disheartened staff</td>
<td>blatantly engaging in risky behaviour.</td>
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<tr>
<td>individual medical problems</td>
<td>They include factors such as</td>
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<tr>
<td>Risk perception? (not often cited but worth</td>
<td>inattention, fatigue, and impairment</td>
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<td>considered)</td>
<td>from drugs or alcohol</td>
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Factors that can impact on an investigation
The model is about Cognitive activity during a decision-making process. It defines 3 different levels of activity:

**Skill based level,**

**Rule based level**

**Knowledge based level**

Depending on the experience of a pilot and the task to be fulfilled, either 1, 2 or all 3 levels are ‘active’ during a decision-making process.

But what does it mean exactly?

According to Rasmussen

**SKILL** - routine and automation. It is the most ‘basic’ level in a decision-making process. In aviation it can be seen as the ‘aircraft handling’ level. It is the level of manual flying and is highly linked to good practice and flight training. Most decisions are based on what a pilot has learned during training and practicing and usually has a ‘reactive character’.

E.G. When the stall warning becomes active during a climb usually pilots will push the controls and decrease the angle of climb in order to gain speed.

**RULE** - procedures. It is a ‘higher’ level in the decision-making process since the cognitive capacities required are higher. In aviation it does not mean simply following the checklist / procedure (the rule how to do it), it also means if there is no obvious rule, pilots will ‘look’ for their own rules based on past experience.

E.G. A rough running engine in a general aviation aircraft leads the pilot to call for the emergency checklist and work through it.

**KNOWLEDGE** This is the ‘highest’ level in a decision-making process. It is about handling unknown/novel situations. In aviation this would be handling non-standard emergencies. There have to be a lot of factors included in the decision-making process.

E.G. Emergency landing on the Hudson river. Although there are certain rules for ditching, deciding to land in the river involved consideration of all options, knowing about the hazards and risks involved and then **consciously executing** such decision.

There is an “Unfortunate But” - All of the levels are prone to error. Wrongly trained skills could lead to wrong actions (skill-based level), old checklists could endanger the safest possible operation of the aircraft (rule-based level), missing items during the risk analysis could lead to wrong decisions (knowledge-based level).

In order to prevent this as much as possible pilot training is targeting all 3 levels. “Being able to conduct perfect landings in all weather conditions only does not make someone a good pilot. It is the mixture of skill, following rules and procedures and knowledge what makes the Pilot.”

According to Rasmussen human decision making can be split in three different levels. Each level can be prone to error.

**Nevertheless, good pilot training is key to safe flying since it will ‘train’ in all levels**
According to Reason, J

The human error problem can be viewed in two ways: the person approach and the system approach. Each has its model of error causation and each model gives rise to quite different philosophies of error management.

Understanding these differences has important practical implications for coping with the ever present risk of mishaps in clinical practice.

Summary points

Two approaches to the problem of human fallibility exist: the person and the system approaches

**The person approach** focuses on the errors of individuals, blaming them for forgetfulness, inattention, or moral weakness

**The system approach** concentrates on the conditions under which individuals work and tries to build defences to avert errors or mitigate their effects
The longstanding and widespread tradition of the person approach focuses on the unsafe acts—errors and procedural violations—of people at the sharp end: nurses, physicians, surgeons, anaesthetists, pharmacists, and the like.

It views these unsafe acts as arising primarily from aberrant mental processes such as forgetfulness, inattention, poor motivation, carelessness, negligence, and recklessness.

The associated countermeasures are directed mainly at reducing unwanted variability in human behaviour.

These methods include poster campaigns that appeal to people’s sense of fear, writing another procedure (or adding to existing ones), disciplinary measures, threat of litigation, retraining, naming, blaming, and shaming.

Followers of this approach tend to treat errors as moral issues, assuming that bad things happen to bad people—what psychologists have called the “just world” hypothesis.
The basic premise in the system approach is that humans are fallible and errors are to be expected, even in the best organisations.

Errors are seen as consequences rather than causes, having their origins not so much in the perversity of human nature as in “upstream” systemic factors. These include recurrent error traps in the workplace and the organisational processes that give rise to them.

Countermeasures are based on the assumption that though we cannot change the human condition, we can change the conditions under which humans work.

A central idea is that of system defences.

All hazardous technologies possess barriers and safeguards.

When an adverse event occurs, the important issue is not who blundered, but how and why the defences failed.

(The person approach remains the dominant tradition in medicine).
Defences, barriers, and safeguards occupy a key position in the system approach.

High technology systems have many defensive layers: some are engineered (alarms, physical barriers, automatic shutdowns, etc), others rely on people (surgeons, anaesthetists, pilots, control room operators, etc), and yet others depend on procedures and administrative controls.

Their function is to protect potential victims and assets from local hazards.

Mostly they do this very effectively, but there are always weaknesses. In an ideal world each defensive layer would be intact.

In reality, however, they are more like slices of Swiss cheese, having many holes—though unlike in the cheese, these holes are continually opening, shutting, and shifting their location. The presence of holes in any one “slice” does not normally cause a bad outcome.

Usually, this can happen only when the holes in many layers momentarily line up to permit a trajectory of accident opportunity—bringing hazards into damaging contact with victims (figure).

The holes in the defences arise for two reasons: active failures and latent conditions. Nearly all adverse events involve a combination of these two sets of factors.
**Active failures** are the unsafe acts committed by people who are in direct contact with the patient or system. They take a variety of forms: slips, lapses, fumbles, mistakes, and procedural violations.

**Latent conditions** are the inevitable “resident pathogens” within the system. They arise from decisions made by designers, builders, procedure writers, and top level management. Such decisions may be mistaken, but they need not be. All such strategic decisions have the potential for introducing pathogens into the system.
<table>
<thead>
<tr>
<th>Accident, industry and date source HSE 48* and presenter’s research**</th>
<th>Consequences</th>
<th>Human contribution and other causes</th>
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<tbody>
<tr>
<td>Texaco Refinery, Milford Haven Chemical processing 1994*</td>
<td>An explosion on the site was followed by a major hydrocarbon fire and a number of secondary fires. There was severe damage to process plant, buildings and storage tanks. 26 people sustained injuries, none serious.</td>
<td>The incident was caused by flammable hydrocarbon liquid being continuously pumped into a process vessel that had its outlet closed. This was the result of a combination of: an erroneous control system reading of a valve state, modifications which had not been fully assessed, failure to provide operators with the necessary process overviews and attempts to keep the unit running when it should have been shut down.</td>
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<tr>
<td>Piper Alpha Offshore 1988*</td>
<td>167 workers died in the North Sea after a major explosion and fire on an offshore platform.</td>
<td>Formal inquiry found a number of technical and organisational failures. Maintenance error that eventually led to the leak was the result of inexperience, poor maintenance procedures and poor learning by the organisation. There was a breakdown in communications and the permit-to-work system at shift changeover and safety procedures were not practiced sufficiently.</td>
</tr>
<tr>
<td>Clapham Junction Transport sector 1988*</td>
<td>35 people died and 500 were injured in a triple train crash.</td>
<td>Immediate cause was a signal failure caused by a technician failing to isolate and remove a wire. Contributory causes included degradation of working practices, problems with training, testing quality and communications standards, poor supervision. Lessons not learnt from past incidents. No effective system for monitoring or limiting excessive working hours.</td>
</tr>
<tr>
<td>Care sector 2013**</td>
<td>1 resident in a care home died after moving and handling incident</td>
<td>Immediate cause was a care worker lifting a sling hook off the hoist, while resident was in the sling, it slipped through her hands, resident fell headfirst onto a metal hoist leg and died of depressed skull fracture. Care worker did not follow the correct procedure despite evidence of training and competence.</td>
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<tr>
<td>Care sector 2012**</td>
<td>Resident died after care worker walked backwards into lift shaft</td>
<td>An engineer had advised that lift doors on the second floor could not be used, but staff routinely used an emergency key to override it when they did not open. On 06/03/12, a carer walked backwards into the lift while moving a resident in a wheelchair. The lift platform was not there and they fell 20ft (6m) down the shaft. The resident died instantly and the carer received life-threatening injuries. The owner of the care home was cited as “acquiescing but not encouraging” the emergency key override use.</td>
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</table>
People can cause or contribute to accidents (or mitigate consequences) in many ways.

Through a failure, a person can directly cause an accident.

However, people tend not to make errors deliberately.

We are often ‘set up to fail’ by the way our brain processes information, by our training, through the design of equipment and procedures, and even through the culture of the organisation we work for.

People can make disastrous decisions even when they are aware of the risks.

We can also misinterpret a situation and act inappropriately as a result.

Both of these can lead to the escalation of an incident.

On the other hand we can intervene to stop potential accidents.

Many companies have their own anecdotes about recovery from a potential incident through the timely actions of individuals.

Mitigation of the possible effects of an incident can result from human resourcefulness and ingenuity.

The degree of loss of life can be reduced by the emergency response of operators and crew.

**Emergency planning and response including appropriate training can significantly improve rescue situations.**
The consequences of human failures can be immediate or delayed

**Active failures** have an immediate consequence and are usually made by front-line people such as drivers, control room staff or machine operators.

In a situation where there is no room for error these active failures have an immediate impact on health and safety

**Latent failures** are made by people whose tasks are removed in time and space from operational activities, e.g. designers, decision makers and managers.

Latent failures are typically failures in health and safety management systems (design, implementation or monitoring).

Examples of latent failures are:

- Poor design of plant and equipment;
- Ineffective training;
- Inadequate supervision;
- Ineffective communications;
- Inadequate resources (e.g. people and equipment); and
- Uncertainties in roles and responsibilities.

Latent failures provide as great, if not a greater, potential danger to health and safety as active failures.

Latent failures are usually hidden within an organisation until they are triggered by an event likely to have serious consequences.
Investigating the causes of accidents where human factors are involved

After an accident involving human failure the investigation into the causes and contributing factors often makes little attempt to understand why the human failures occurred. Finding out both the immediate and the underlying causes of an accident is the key to preventing similar accidents through the design of effective control measures. Typical examples of immediate causes and contributing factors for human failures are given below:

**Job factors:**
- illogical design of equipment and instruments;
- constant disturbances and interruptions;
- missing or unclear instructions;
- poorly maintained equipment;
- high workload;
- noisy and unpleasant working conditions.

**Individual factors**
- low skill and competence levels;
- tired staff;
- bored or disheartened staff;
- individual medical problems

**Organisation and management factors**
- poor work planning, leading to high work pressure;
- lack of safety systems and barriers;
- Inadequate responses to previous incidents;
- management based on one-way communications;
- deficient co-ordination and responsibilities;
- poor management of health and safety;
- poor health and safety culture.
<table>
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<tr>
<th>Human Factors</th>
<th>Gordon Dupont’s (Air Canada) Dirty Dozen</th>
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<td>Slips of Action</td>
<td>Lack of Communication</td>
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<td>Rule based mistakes</td>
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<td>Routine</td>
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<td>Skill based errors</td>
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<td>Lapses of Memory</td>
<td>Lack of resources</td>
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<td>Mistakes</td>
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<td>Situational</td>
<td>Lack of assertiveness</td>
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<td>Knowledge based mistakes</td>
<td>Stress</td>
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<tr>
<td>Exceptional</td>
<td>Lack of awareness</td>
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<tr>
<td>Knowledge based mistakes</td>
<td>Norms</td>
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Surprisingly there is only one clear overlap around Knowledge!

There may be added value in planning your investigations by giving due consideration to a variety of models, to try to fully capture any human failings.
The Dirty Dozen refers to 12 of the most common human error preconditions, or conditions that can act as precursors, to accidents or incidents.

These 12 influence people to make mistakes. The Dirty Dozen concept developed by Gordon Dupont, 1993, whilst working for Transport Canada, formed part of an elementary training programme for Human Performance in Maintenance. It has since become a cornerstone of Human Factors in Maintenance training courses worldwide, as exemplified in UK CAA CAP715 see references for link.

The Dirty Dozen is not a comprehensive list of human error accident precursors, e.g. ICAO Circular 240-AN/144 lists over 300 human error precursors. Since 1993 all areas of the aviation industry, not just maintenance, have found it a useful introduction to open discussions into human error in their businesses, organisations and workplaces. You can find “Dirty Dozen” lists for pilots, ramp workers, air traffic controllers and cabin crew.

**After today, try writing one for your own industry or Team to assist in future investigations.**

### Countermeasures

Whilst The Dirty Dozen human factors have increased awareness of how humans can contribute towards accidents and incidents, the aim of the concept was to focus attention and resources towards reducing and capturing human error.

For each element on The Dirty Dozen we can list typical countermeasures designed to reduce the possibility of any human error from causing or developing into a problem, accident or incident.
Poor communication often appears at the top of contributing and causal factors in accident reports and is therefore one of the most critical human factor elements.

Communication refers to the transmitter and the receiver, as well as the method of transmission.

Transmitted instructions may be unclear or inaccessible.

The receiver may make assumptions about the meaning of these instructions, and the transmitter may assume that the message has been received and understood.

With verbal communication it is common that only 30% of a message is received and understood.

Detailed information must be passed before, during and after any task, and especially across the handover of shifts.

Therefore, when messages are complex, they should be written down, and organisations should encourage full use of logbooks, worksheets, and checklists etc.

Spoken/verbal messages can be kept short, with the most critical elements emphasised at the beginning and repeated at the end. Assumptions should be avoided and opportunities for asking questions both given and taken.

There is an old WW1 Myth where a spoken message “Send reinforcements we are going to advance” Changes to “Send 3 (shillings) and fourpence we are going to a dance”

Or poor instruction for lifting- “1,2,3 lift and some lift on 3 and some lift on lift”
Distraction can be anything that draws a person’s attention away from the task on which they are employed.

Some distractions in the workplace are unavoidable, such as loud noises, requests for assistance or advice, and day-to-day safety problems that require immediate solving. Other distractions can be avoided, or delayed until more appropriate times, such as messages from home, management decisions concerning non-immediate work (e.g. shift patterns, leave entitlement, meeting dates, administrative tasks etc), and social conversations.

Distraction is the number one cause of forgetting things: hence the need to avoid becoming distracted and to avoid distracting others. We tend to think ahead, so when returning to a task, following distraction, we have may think we are further ahead than we are.

This can lead to missed vital steps in a process and an incident.

To reduce errors from distraction it is best to complete a task before responding to anyone.

If the task cannot be completed without hurrying, then we can prominently mark (or “lock off”) the incomplete work as a reminder to ourselves and anyone else who may complete the work. When returning to work, after being distracted, it is a good idea to commence at least three steps back, so that we re-trace some steps before picking up the task again. If necessary, having someone else double-check our work using a checklist may be appropriate and useful.

Management have a role to play in reducing the distractions placed on employees. This may involve good workspace design, management of the environment, and procedures that create “safety zones”, “circles of safety” or “do not disturb areas” around workers engaged in critical tasks.

In Health and social care Nurses issuing medication wear a “do not disturb tabard”, to prevent distraction and reduce medication incidents (which can be fatal). I have witnessed them being interrupted in both a hospital and care setting by patients/visitors, and worse still by colleagues.
If all the parts are not available to complete a maintenance task, then there may be pressure on a technician to complete the task using old, or inappropriate parts.

Regardless of the task, resources also include personnel, time, data, tools, skill, experience and knowledge etc.

A lack of any of these resources can interfere with one’s ability to complete a task. It may also be the case that the resources available, including support, are of a low quality or inadequate for the task.

When the proper resources are available, and to hand, there is a greater chance that we will complete a task more effectively, correctly and efficiently.

Therefore, forward planning to acquire, store and locate resources is essential. It will also be necessary to properly maintain the resources that are available; this includes the humans in the organisation as well.

Improvisation can be good, but often safety requires the right or equipment tool for the job to maintain health safety and wellbeing of staff.

On investigating incidents identify the correct tools for the job and were they used? Were they in service date?
4 - Stress - acute and chronic

Acute stress arises from real-time demands placed on our senses, mental processing and physical body; such as dealing with an emergency, or working under time pressure with inadequate resources.

Chronic stress is accumulated and results from long-term demands placed on the physiology by life’s demands, such as family relations, finances, illness, bereavement, divorce. When we suffer stress from these persistent and long-term life events, it can mean our threshold of reaction to demands and pressure at work can be lowered. Thus at work, we may overreact inappropriately, too often and too easily.

Early visible signs of stress include changes in personality and moods, errors of judgement, lack of concentration and poor memory. Individuals may notice difficulty in sleeping and an increase in fatigue, as well as digestive problems. Longer-term signs of stress include susceptibility to infections, increased use of stimulants and self medication, absence from work, illness and depression.

It is important to recognise the early signs of stress and to determine whether it is acute or chronic. Coping with daily demands at work can be achieved with simple breathing and relaxation techniques.

More effective is having channels of communication readily available through which to discuss the issue and help to rationalise perceptions. Some of these channels involve social interaction with peers.

As with fatigue, sleep, diet and exercise are all important factors in helping to reduce stress and build resilience to stressors.

If the stress is chronic, then lifestyle changes will be required. Organisations should develop employee assistance (or wellbeing) policies that include stress reduction

Why do work related stress incidents need investigating? just look at HSE stats on the first slide

0.8 million Work-related stress, depression or anxiety cases (new or long-standing) in 2019/20
Complacency – “a feeling of self-satisfaction accompanied by a loss of awareness of potential dangers”.

Such a feeling often arises when conducting routine activities that have become habitual and which may be “considered”, by an individual (sometimes by the whole organisation), as easy and safe.

Relaxation of vigilance results and important signals will be missed, with the individual only seeing what he, or she, expects to see.

Complacency can also occur following a highly intense activity such as recovering from a possible disaster; the relief felt at the time can result in physical relaxation and reduced mental vigilance and awareness.

Too much pressure and demand causes over-stress and reduced human performance, too little can result in boredom, complacency and reduced human performance.

It is important, when conducting simple, routine and habitual tasks, and when fatigued, to maintain an adequate, or optimum, level of stress through different stimulation.

**Always expect to find a fault!**

Following written instructions, and adhering to procedures that increase vigilance, such as inspection routines, can provide suitable stimulus.

It is important to avoid working from memory and assume something is ok when you haven’t checked it; and, signing off work that you are unsure has been completed.

**Teamwork, mutual cross referencing and checking can provide stimulus when fatigued.**
6 - Lack of Teamwork

Many tasks and operations are team affairs; no single person (or organisation) can be responsible for the safe outcomes of all tasks. But if one person is not contributing to the team effort, this can lead to unsafe outcomes. Workers must rely on colleagues and other outside agencies, as well as give others their support. Teamwork consists of many skills that each team member will need to prove their competence.

Some of the key teamwork skills include: leadership, followership, effective communication, trust building, motivation of self and others, and praise giving. To create an effective team it is necessary that the following issues, as appropriate, are discussed, clarified, agreed, and understood by all team members:

- A clearly defined and maintained aim, or goal(s)
- Each team member’s roles and responsibilities
- Communication messages and methods
- Limitations and boundaries
- Emergency procedures
- Individual expectations and concerns
- What defines a successful outcome
- Debriefing arrangements
- Team dismissal arrangements
- Opportunities for questions and clarification

A team’s effectiveness can also be improved through the selection of team members to reflect a broad range of experience and skill sets, and also through practice and rehearsal.

Some incidents may need in depth investigation of team competence and dynamics, one such example I had to investigate involved an attempted suicide during work where manager had not listened to a worker’s concerns, not met with him at a prearranged time and failed to take into account his worries and fears of his competence.
We may expect pressure in a dynamic environment, but when pressure to meet a deadline interferes with the ability to complete tasks correctly, and safely - then it is too much.

Quantity versus Quality; and we should never knowingly reduce the quality of our work.

Pressure can be created by lack of resources, especially time; and also from our own inability to cope with a situation.

We may come under direct, or indirect, pressure from the Company, from clients and even our colleagues.

One of the most common sources of pressure is ourselves. We put pressure on ourselves by taking on more work than we can handle, especially other people’s problems, by trying to save face, and by possibly promoting super-powers that we don’t possess.

These poor judgements are often the result of making assumptions about what is expected of us.

Let’s take the right route

Learning assertiveness skills will allow a worker to say ‘No’, ‘Stop!’, and communicate concerns with colleagues, customers and the Organisation.

These skills are essential, and when deadlines are critical, then extra resources and help should always be obtained to ensure the task is completed to the required level of quality.

When investigating incidents consider if the worker under too much pressure, were they afraid, or did they have the training or capability to say no, or strength to ask for support?
8 - Lack of awareness

Working in isolation and only considering our own responsibilities can lead to tunnel vision; a partial view, and a lack of awareness of the affect our actions can have on others and the wider task.

Such lack of awareness may also result from other human factors, such as stress, fatigue, pressure and distraction.

It is important to build experience throughout our careers, especially concerning the roles and responsibilities of those we work with, and our own place in the wider Team.

Developing our foresight is essential in pre-empting the affects our actions may have on others.

This is an attitude of professionalism and involves constant questioning “what if …?”

Asking others to check our work and challenge our decisions is useful in gaining the relevant experience and expanding our awareness.

Vigilance is closely related to situational awareness, and workplace procedures, such as scanning, two-way communication and use of checklists will help to maintain vigilance.

Following an incident did the worker need help? Did they ask? Was it freely available? Had requests for help traditionally been refused? Was it the norm for people to work in isolation?
Lack of knowledge

Regulatory requirements for training and qualification can be comprehensive, and organisations should strictly enforce these requirements.

Lack of on-the-job experience and specific knowledge can lead workers into misjudging situations and making unsafe decisions.

Many Computer, Manufacturing and Aircraft systems are so complex and integrated that it is nearly impossible to perform many tasks without substantial technical training, current relevant experience and adequate reference documents. Systems and procedures can change substantially and knowledge can quickly become out-of-date.

It is important for employees to undertake continuing professional development and for the most experienced workers to share their knowledge with colleagues.

Part of this learning process should include the latest knowledge on human error and performance.

It should not be taken as a sign of weakness to ask someone for help or for information; in fact, this should be encouraged.

Checklists and publications should always be referred to and followed, and never make assumptions or work from memory.

Post incident it is critical to ask if on top of job training, were the employee or colleagues involved up to date with relevant role specific knowledge and CPD?
Fatigue is a natural physiological reaction to prolonged physical and/or mental stress.

We can become fatigued following long periods of work and also following periods of hard work.

When fatigue becomes a chronic condition, it may require medical attention but, workers should never self-medicate! As we become more fatigued our ability to concentrate, remember and make decisions reduces.

Therefore, we are more easily distracted, and we lose situational awareness. Fatigue will also affect a person's mood, often making them more withdrawn, but sometimes more irrational & angry.

It is a human problem that we tend to underestimate our level of fatigue and overestimate our ability to cope with it. Therefore, it is important that workers are aware of the signs and symptoms of fatigue – in themselves and others.

Fatigue self-management involves a three-sided approach to regular sleep, healthy diet (including reduced use of alcohol and other drugs), and exercise.

Work of a critical and complex nature should not be programmed during the low point on the body's circadian rhythm (usually 03:00 – 05:00am); and, when fatigued always get someone else to check your work.

Post incident Consider working hours, shift patterns, break between shifts, night worker risk assessment. Consider home factors that may have impacted, health, carer responsibility issues.
Lack of assertiveness

Being unable to express our concerns and not allowing others to express theirs, creates ineffective communications and damages teamwork.

Unassertive team members can be forced to go with a majority decision, even when they believe it is wrong and dangerous to do so. (Danger of groupthink* often associated with Cuban missile crisis).

Assertiveness is a communication and behavioural style that allows us to express feelings, opinions, concerns, beliefs and needs in a positive and productive manner.

When we are assertive, we also invite and allow others to assert themselves without feeling threatened, undermined or that we've lost face. Speaking your mind assertively mustn’t be confused with aggression. Communicate directly, but honestly and appropriately; respect the opinions and needs of others, without compromising our own standards.

Assertiveness techniques can be learned, and they focus on keeping calm, being rational, using specific examples rather than generalisations, and inviting feedback. Most importantly, direct any criticisms at actions and consequences rather than people and personalities; this allows them to maintain their dignity, and a productive conclusion may be able to be reached. Developing Assertiveness can allow workers to express their concerns about unsafe Norms.

Investigating incidents where this has been an issue can be difficult, as staff may be blamed for failing to raise their objections or accused of not raising objections strongly enough at the time.

(*the practice of thinking or making decisions as a group, resulting typically in unchallenged, poor-quality decision-making)
Workplace practices develop over time, through experience, and often under the influence of a specific workplace culture.

These practices can be both, good and bad, safe and unsafe; they are referred to as “the way we do things round here” and become Norms.

Unfortunately, such practices follow unwritten rules or behaviours, which deviate from the required rules, procedures and instructions.

These Norms can then be enforced through peer pressure and force of habit. It is important to understand that most Norms have not been designed to meet all circumstances, and therefore are not adequately tested against potential threats.

Rules and procedures should have been designed and tested, and therefore ought to be enforced and followed rigorously.

Where workers feel pressure to deviate from a procedure, or work around it, then this information should be fed back so that the procedure can be reviewed and amended, if necessary.

Wall collapses are scarily common

During an investigation into a newly built severe wall collapse 10M x 2M, the construction was found to be faulty, no pillars, poor foundations and rushed.

When interviewed the “competent” brick layer said “I would not have built it that way, its just my boss told me to build it just like the wall next door, so I did as I was instructed, not what I knew was correct”
Thankyou

Thanks for your time and I hope attending today has been of value to you.

If you are new to a Health and Safety role, or new to Accident Investigation, and trying to establish a recording system, please feel free to get in touch.

or Just in from HSE email alert yesterday is a new book a Near Miss book for recording and reporting near misses at work (to go with their accident book)

Sources, References and Further Reading

HSG 245 Investigating accidents and incidents A workbook for employers, unions, safety representatives and safety professionals

HSG 48 Reducing Error and Influencing Behaviour

Health and Safety at work Summary Statistic for Great Britain 2020

https://www.hse.gov.uk/humanfactors/toolkit.htm

UK CAA Civil Aviation Publication 715 - An Introduction to Aircraft Maintenance Engineering Human Factors for JAR 66

IČAO Circular 240-AN/144 Human Factors Digest No7 - Investigation of Human Factors in Accidents and Incidents

Transport Canada - Human Performance Factors for Elementary Work and Servicing TC14175

Related Articles

Communication: Linguistic Factors (OGHFA BN) Complacency Cross-checking Process Commercial Pressures Stress Stress and Stress Management (OGHFA BN)

Well-Being (OGHFA BN) Situational Awareness Attention and Vigilance (OGHFA BN) Group Norms

Further Reading

EUROCONTROL Human Factors Module Interpersonal Communication


Advisory Circular 120-72A: Maintenance Human Factors Training. FAA, 2017


Aircraft Ground Handling and Human Factors - A Comparative Study of the Perceptions by Ramp Staff and Management. NLR, 2010

Canada Defence Flight Comment Issue 1, 2012, pages 10-12 Mr Murphy and Swiss Cheese

UK CAA Standards Document No. 80, Version 1, Alternative Training and Qualification Programme (ATQP). July 2013

https://aviatortraining.net/2018/08/02/rasmussens-srk-model/

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1117770/