

Accident investigations

Learning from failure or failure to learn?

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Behavioural sciences are increasingly becoming concerned with the learning that follows from accidents. Many scholars have questioned the underlying causes of ‘accidents’ and the conventional methods of accident investigations, but their conclusions vary.

- James Reason, widely cited for the famous ‘Domino effect’ and ‘Swiss cheese’ models, identifies accidents as the outcome of unsafe practices such as rule violations and ‘human error’. According to Reason, the investigation should begin by identifying unsafe practices.
- According to Andrew Hopkins, accidents result from corporate mindlessness and the desire for endless pursuit of profit. He believes investigations should focus on latent and organisational factors that motivate and shape the behaviour of employees.
- Charles Perrow does not consider accidents any different to normal operations, except that complex interaction between sociological, economic, technical and cultural forces results in an undesirable event. Such undesirable events are ‘normal accidents’ for Perrow.
- Erik Hollnagel considers that failures (and accidents) have much in common with success. Investigation should consider focusing on routine and normal work rather than the unusual circumstances surrounding an isolated case of accident.

These alternative perspectives are not merely abstract theories. They play an important role in how we analyse and investigate accidents.

In general, accidents are investigated for two reasons – to settle litigation and for professional objectives – that is, to prevent these issues occurring again. Litigation tends to be about apportioning blame and settling court cases. Unfortunately, the wording of the regulations often appears to promote finding fault rather than objective investigation.

Learning from failures

Accident investigations have a deeper purpose. To this end, the United Kingdom’s Merchant Shipping Regulation (Accident Reporting and Investigation) Regulation 2012 requires that the purpose of accident investigation ‘shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame’. Reputable independent organisations such as the UK’s Marine Accident Investigation Branch (MAIB) are equipped with the professional expertise and specialised knowledge to investigate accidents objectively and with the aim to prevent recurrences.

Many companies list similar intentions in their policy statements – but policy statements do not always relate well to practices at the grassroots. Of course investigation reports are not outright blame and finger pointing exercises, but the quality of investigations in many cases lacks rigour and shows traces of pre-conceived values and value-laden judgement. The knowledge and skills we acquire as professionals can come with baggage that frequently becomes a decisive factor in judging between right and wrong.

Realistic recommendations?

A recent official accident report stated that an accident could potentially have been avoided had the OOW made a ‘far greater’ course alteration, taking the vessel well clear of the hazardous situation that was developing. The same report highlighted the use of VHF in collision avoidance as a contributing factor leading to the accident. Furthermore, according to the investigation, drills and exercises onboard were conducted either through instructions or video-based training and were not of much practical value. Faced with an emergency, the Master was not fully confident to rely on his crew and chose to carry out most emergency and recovery functions on his own with the assistance of selected crew members.

However, identifying what the crew and the Master *should have done* does not help in addressing the underlying root causes of the problem. In such complex, dynamic and demanding situations, rule violations and deviant behaviour are neither surprising nor difficult to discover. What we need to know is *why* they took the actions they did.

Every navigating officer knows that any manoeuvres to avoid collision should be large and readily apparent to the other vessel. No navigational publication or procedures will suggest otherwise. Yet, failure to comply with the most basic collision regulations is the single greatest factor in many collisions. So why do these collisions happen?

In practice, large alterations of course or drastic reductions in vessel speed are not straightforward and easy choices. Consider everything which makes that choice more difficult, particularly for a junior officer; the pressure to make estimated arrival time at a port, the sudden revving and load increase on main engines, hierarchical crewing structures, the power distance between a junior officer from the Philippines and a senior officer from a ‘traditional’ seafaring nation, the electronic recording of every single manoeuvre during night watch, the possibility that the junior officer may be summoned to account for the deviation next morning in the Master’s office.

While the consequences of violating rules are both serious and obvious, the incentives and motivations for *following* those rules are invisible. Organisational KPIs rarely allow for factors such as the Master’s overriding authority to make the safe decision, junior officers seeking assistance at odd hours or vessels slowing down and missing port arrivals to ensure safe navigation. Never mind appreciation or appraisal; such actions are not even worthy of attention. On the other hand, the social recognition and financial incentives for making arrival timings despite fierce production pressures are plentiful.

Technological issues

There is no shortage of VHF, AIS or radar assisted collisions. Terms such as over-reliance and complacency are frequently associated with technology assisted collision. But these terms, too, raise many questions. At what stage does dependence on navigational and collision avoidance aids become over-dependence (or complacency)? While understanding the limitations of equipment is fundamental to safe navigation, how could one possibly understand all the complex operations that go on within electronics and computer based systems? This would require a whole new set of competencies, but neither the curriculum nor training institutes are geared up to embrace this challenge – let alone the manufacturer’s unwillingness to provide

access to anything beyond routine operations of technological systems.

Similarly, under the pressure of regulatory and commercial constraints, emergency drills and exercises have gradually shifted focus from ensuring organisational resilience (ie crew readiness and response to emergencies) to being compliance exercises aimed at meeting KPIs. Instead of considering context-specific emergencies relevant to key shipboard operations, drills and exercises are often drawn up to meet comprehensive statutory and commercial requirements. The average time spent on exercising and learning from drills has reduced considerably in recent years. On one ship, for example, the drill itself took less than fifteen minutes. The administrative work that followed took much longer since drills were entered in four separate records.

Between theory and practice

If operating ships were a matter of following a set procedure, monkeys could have successfully taken over long ago. Between procedure and practice lies the human ability to make decisions and use problem-solving skills to turn instructions into successful operations. Occasionally, these skills fail, resulting in an accident. At this point, it is easy to argue with hindsight that the rules and procedures should have been followed to the letter. Litigation thrives on this argument.

However, procedures and instructions are necessarily static – they cannot make allowance for context. In an ideal world, the professional would ascertain the situation by all available means before coming to a decision. In practice, however, there is a limit to cognitive knowledge, resources are constrained, time is finite and the outcome is uncertain. Moreover, goals are conflicting, and it is sometimes tacitly accepted that efficiency and profit far outweigh the official rule of ‘Safety First’. In one company, for example, the internal meeting started with a 30 second elevator speech about ‘Putting safety at the heart of every operation’. It was followed by a two hour presentation on improving efficiencies and enhancing customer satisfaction.

Methodological rigour

While most aviation incidents patiently and respectfully await the outcome of investigation, the maritime industry does not. Often, Masters are criminalised in public perception long before the facts are established. Sometimes, these value judgements are based on outdated perceptions. Technology has developed so rapidly that the perception of safe distance from a navigational hazard, for example, has already changed and may continue to change with the advent of state of the art positioning systems and highly reliable propulsion systems. Two decades ago, who would have imagined that positional accuracy of up to one metre was achievable?

In one case, a senior safety manager pointed at ECDIS as the reason for most accidents at sea. The comparison he made was with paper charts and his apprentice training that in his understanding kept ships safe and accident free. What rigour and objectivity can we expect from investigations that result in such value laden judgements?

The question here is who gets to draw the line between safe and unsafe practices, and on what basis? A large number of investigations are inundated with biases and judgements based on personal experiences and values that may have marginal temporal importance or contextual relevance. Adding to this, the methods of investigation are highly reductionist, breaking down complex dynamic situations into simplified stories of human errors and technical failures. The analysis becomes a question of ticking boxes to identify familiar errors such as fatigue, loss of situational awareness, lack of training, violation of procedures, etc. All too often, the underlying reasons behind these errors go uninvestigated.

The investigator's dilemma

Society as a whole views accidents as morally wrong and psychologically disturbing. Professional integrity and societal expectations create an immense burden to identify a reason for the

accident. Something is bound to have gone wrong, someone must have screwed up – there must be someone to blame. These issues constantly confront those who carry out investigations and analysis. The example of the fishing trawler *Trident* which sank off the North East coast of Scotland resulting in the loss of seven lives is of particular interest. The original inquiry that concluded one year after the accident found no major problems with the vessel, crew or management. It was considered a case of ‘normal accident,’ with the trawler being hit by successive waves. Such reports are shocking and disturbing for the families of dead and injured and for society as a whole.

According to Sidney Dekker in his 2015 Masterclass in safety management and human factors, the investigator is faced with a dilemma. Safety of personnel, assets or environment cannot be compromised. If that happens, searching for what went wrong is a matter of (professional) integrity – and there is an organisational and societal expectation that someone, or something, will be to blame. Of course, there are practical implications when resources are limited and deadlines are approaching. Faced with ethical, professional and practical constraints it is reassuring to refer back to rules and procedures to bring an investigation to a convincing closure. Once a case for rule violation or breach of procedures has been established, no further questions need arise. The onus is then on the mariners to undergo further training, follow procedures more strictly and strive for higher professional standards. Companies respond with enhanced internal controls and monitoring – increased inspections, more detailed procedures. And still the root cause goes unaddressed.

Conclusion and recommendations

Gaps between procedures and practice should not become the basis for conclusions about an accident. Such gaps are bound to exist, since modern ships are not laboratories for controlled experiments guided by rehearsed instructions. As accident investigators, the fundamental question that we need to ask is, why do such gaps exist? This question brings others in its wake. How do companies consciously and unconsciously encourage such behaviours? What is their culture of reward and incentivisation? How do they present success and failure?

The problem with continued success and improved profit margins is that they often imply that all is well and encourage further risk taking. Behavioural patterns are symptoms of organisational culture and motivational factors. Regardless of the safety talks, the posters on every bulkhead, the boardroom speeches and email footers, professionals are often caught in two minds between safety and commercial goals. Of course you should call the Master when in doubt – but make sure you have a convincing explanation why you have done so. Of course you should choose not to depart port if it means breaching rest hours – but you had better be ready for the resulting email traffic. Of course you should reduce to a safe speed if visibility is restricted – but be ready to miss out on your performance bonuses. What looks like rule violation and negligence on the surface can be a symptom of deeper organisational and motivational issues. ‘Human error’ should be the starting point for a serious investigation, not the conclusion of the report.

For accident investigations to be truly effective, it is important to look through the eyes of the professionals involved and develop a sense of ‘local rationality’. A competent officer does not intend to collide or run aground. Keeping hindsight aside (which is a challenge), the investigator’s role is to curiously and open-mindedly ask – why did those actions make sense at the time? If lessons are to be learnt, we need to consider that actions that made sense to one competent mariner may make sense to others. It is important that investigators engage critically and reflectively with their own experiences, views and values. The language of litigation and liability may not be much use given the room it creates for interpretive and subjective opinions that only serve vested interests. 🧐