Human Element?

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It has consistently been reported in recent years that human factors account for 75-80% of marine accidents. That may (or may not) be true, but I would argue that there is insufficient aggregated data, either nationally or internationally to be able to have confidence in this claim.

Apart from the lack of aggregated data, just what exactly are the human factors that are being held to account for marine accidents? There seems to be little consistency in the definition of what constitutes a human factor.

While it is true that fatigue, the influence of drugs and alcohol, crew training and qualifications are certainly human factors and have been implicated in many a marine accident, a number of other so-called "human factors" may not in fact be so. For example, Issue No. 2 of Alert! contained an item on the Report on Marine Accidents 2002 by the Japan Marine Accident Inquiry Agency. Improper lookout and non-compliance with marine traffic rules are cited as accident causes, along with difficulties in communication between crew members.

While communication difficulties resulting from crew members speaking different languages and the impact of other cultural factors is certainly a human factor, I would argue that improper lookout and non-compliance with marine traffic rules are not in themselves human factors. Rather they are the result or symptom of another human factor or factors at work.

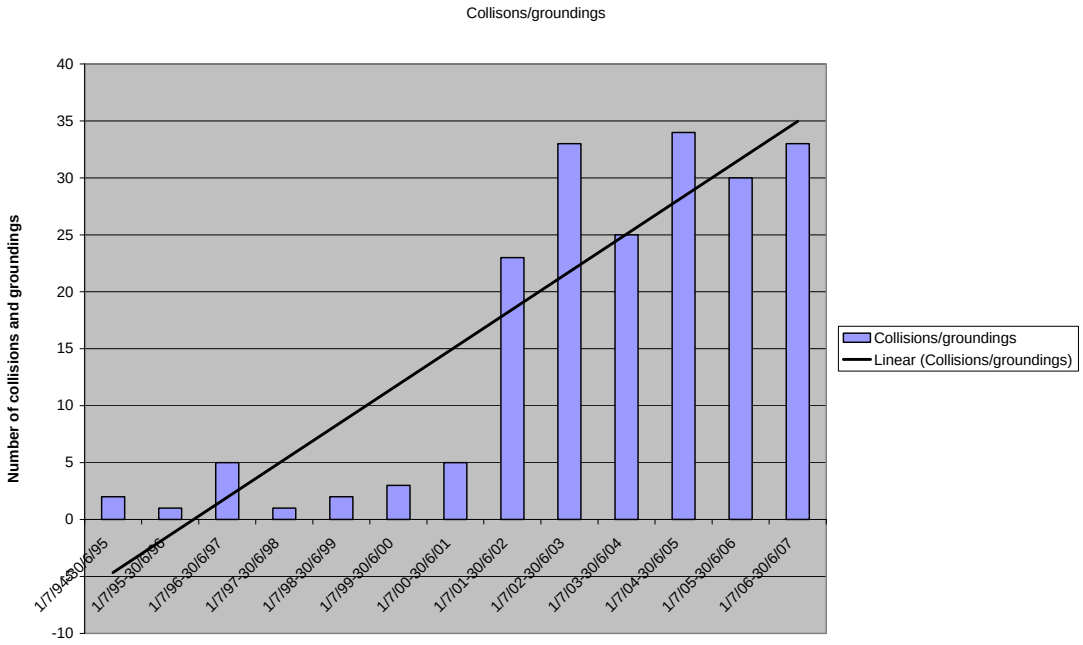
Improper lookout may be the result of fatigue or crew training and/or qualifications while non-compliance with marine traffic rules is most likely a result of a deficiency in crew training and/or qualifications. It is also possible that non-compliance with marine traffic rules was the result of a deliberate or wilful action by the navigation watch-keeper.

The Japan Marine Accident Inquiry Agency report also reports "dozing" as a cause of collisions and groundings. While "dozing" is a human factor, is it the result of fatigue or perhaps the excessive consumption of alcohol?

So, the first task in being able to accurately determine the impact of human factors in marine accidents is to develop a set of mutually agreed, recognised and accepted definitions of human factors. Once this has been achieved, national and international agencies can start collecting consistent data that can be analysed in order that strategies for reducing the impact of human factors in marine accidents can be developed and implemented.

DNV has recently noted (at the Connecticut Maritime Association conference) an increase in the frequency of serious maritime accidents since the start of the century. DNV suggest that growing crew incompetence, possibly as a result of poor retention, overwork and new recruits could be the reason for the increase. Australian data seem to support this view with a significant increase in the number of collisions and groundings occurring in Australian waters since 2001/02 (see below).

Fairplay Daily News 1/3/07 “Passage plans must be monitored” puts the cost of groundings under pilotage at US$8M each – from a research report published by the pilotage sub-committee of the international group of P&I Clubs. Therefore, there is significant economic advantage to be gained by reducing the number of these incidents.



There is a tendency also for accident causes to be attributed to human factors if nothing else is obvious - the “soft” option when other “harder” causes are not at first apparent. The following example illustrates this point.

When the BC Ferries Queen of the North sank with the loss of two passengers on 22 March 2006, the company in the days following indicated that no malfunctions in either the autopilot or the navigational systems had been found, leading it to conclude that human factors were the primary cause of the sinking. A later report from the company cited inadequate watch-keeping and poor seamanship. But was inadequate watch-keeping and poor seamanship the result of fatigue (perhaps resulting from inadequate manning) or was it due to a lack of adequate crew training and qualifications? Or were there other human factors involved? There is a tendency to confuse human factors causes with the symptoms or outcomes of human factors.

The Maritime Safety Committee of the IMO recently (as quoted in Safety at Sea International 03.2007 p.17) concluded that it was “difficult to draw conclusive analysis from existing casualty reports due to the lack of human element considerations during these investigations”. This theme was also picked up by CHIRP (the UK’s Confidential Hazardous Incident Reporting Program) who stated that the human element features in a high proportion of marine incidents, yet many reporting systems, including Safety Management Systems gather a relatively low proportion of human element data. A presenter at a recent seminar, Jan Erik Granholdt of DNV Maritime Solutions also stated that the ISM Code does not adequately address the human factor.

One of the speakers at the 6th LSM Asia-Pacific Manning and Training Conference in Manila made the point that human error is not the initial cause of most accidents occurring in the maritime industry, but rather a symptom of more deep seated problems within the human and organisational system. It was said that human error should be the starting point of each investigation and not its conclusion.

So what are the human factors that need to be considered when investigating maritime incidents? The effects of fatigue, drugs and alcohol and "workplace bullying" are well known.

Sensory overload can be considered as another of the human factors implicated in maritime incidents and is one of the factors involved in the phenomenon termed lack of situational awareness. Lack of situational awareness has been reported as a factor in many maritime incidents, but it is not in itself a human factors element – rather it results from one or more of the following: fatigue, sensory overload, effects of drugs and/or alcohol or mental condition arising from personal or work-related stressors.

Bridge Resource Management (BRM) was introduced to specifically tackle the issue of lack of situational awareness by having a team approach to issues, with each member of the bridge team responsible for particular aspects of every situation. Nonetheless, BRM does not address underlying human factors issues. Still, a team approach as in BRM will deliver better (probably optimum) outcomes even when there are no underlying human factors issues.

The Law of Conservation of Energy is fundamental to the science of Physics. Many psychologists also regard it as the underlying driver of normal human work behaviour (those suffering from obsessive-compulsive disorder are therefore excluded!) In other words, human beings will always seek to perform a task by the simplest, quickest, most easy method and because of this; it should be regarded as another human factors issue.

In a study of 4,000 seafarers reported in the Fairplay Daily News Service of 7 June 2006 under the heading – Posidonia: safety failings, half admitted to breaking safety procedures frequently. This should not be seen as the failure of individual workers; rather it should be regarded as a systemic failure of the management systems under which these workers were operating.

If established procedures/processes for doing a task are complicated and/or involved, they will not be followed – even if they are part of a quality management system. Continuous improvement should therefore carefully consider reducing the procedures and processes for all tasks to the minimum number of simple steps.

"It is relatively unusual for new types of accidents to occur on board ship, and many of those that continue to occur are due to unsafe acts by seafarers. These errors, or more often violations of good practice and established rules, can be readily avoided. They may have taken short-cuts they should not have taken. Most will have received training aimed at preventing them, but through a culture that is tolerant to the 'calculated risk', they still occur." This quote highlights what has just been discussed and indicates that the best way to avoid unsafe practices is to simplify operating procedures. If short-cuts are being taken, it is a sure sign that existing procedures are too complex and difficult to implement.

A further study by UK CHIRP (reported in Lloyds List DCN 13/7/06 p.14) concluded accidents are being caused by the inadequacy of operating and maintenance manuals supplied to ships. It was reported that manuals were not supplied or hard to understand, they were often poor, generic rather than ship specific and not necessarily supplied in a language understood by the crew. Here again it can be argued that the law of conservation of energy is involved.

Another human factor is fitness. Fitness can be defined as the absence of factors that would negatively affect human performance. To be considered fit, a seafarer must engage in an appropriate level of regular exercise, eat a balanced diet and avoid non-prescription drugs, alcohol and excessive amounts of caffeine while maintaining an appropriate weight.

Communication difficulty is another human factor. It results from different languages, cultures, customs and habits.

Summarising the human factors discussed to date we have the following:

- Fatigue
- Alcohol and drugs
- Crew qualifications and training
- Workplace bullying, including workforce characteristics, relationships, work systems and working conditions
- Sensory overload
- Fitness of crew members, including mental factors
- Crew communication difficulties
- Law of conservation of energy, including the involvement of established processes and procedures and operating manuals
- Deliberate or wilful behaviour.

To these we could probably add another – brain snap or explosion, where an action or behaviour by a crew member cannot be explained and there is no apparent underlying cause.

The list is possibly still incomplete as other human factors may yet be identified, but it should prove a useful as a starting point for a set of mutually agreed, recognised and accepted human factors. The next step is to provide appropriate human factors training to incident and accident investigators so that they are able to recognise and fully explore the human factors issues present in the incidents and accidents they are called upon to investigate.

Finally, once there is agreement on what the human factors are and how they are defined, there needs to be aggregated incident data collection and analysis. From this, future directions for reducing the number of maritime incidents and accidents can be determined.