Over the past five years, these navigational claims have amounted to \$376m: This means that in US dollar terms, 80% of the club's claims over \$1m are directly related to navigational issues. Looking at the industry, navigational claims could be aggregating approximately \$880m per year for P&I losses alone and the indication is that this trend is getting worse.

The club's data on collision claims shows that from 2000 to 2010, the average number of collisions per ship is steadily increasing – a near 50% increase. The graph below shows the average number of collision claims per entered ship.



^ Collision Claims 2000 to 2010. Average number of collisions per ship.

What is not clear are the underlying reasons. It would be expected that as ships have become more reliable in a technical sense and more automated with sophisticated bridge equipment, there would have been a decrease in navigational accidents. We would normally assume that with any human endeavour we get better, but this does not appear to be the case with navigation.

The introduction of electronic charts, ECDIS and automatic identification system (AIS), bridges equipped with two global positioning system (GPS) units, more reliable radars, the increased use of traffic separation schemes and port vessel traffic systems (VTS), better and bigger tugs, etc. should have made the life of the navigator easier. The apparent increase in incidents is not caused by the machine – it is down to the humans operating and using the equipment. It is caused by the human element.

Analysing the collision statistics of tankers entered into the club over the past ten years has also revealed a surprising fact. The improved operational management of tankers – much of it as a result of the demands made by the oil majors through their enhanced inspections and officer training requirements – is not apparently reflected on the bridges of tankers. You could ask whether these 'regulatory' regimes are too focused on the machine and not enough on the human skills needed to run the ship.

The following graph shows the average collisions per tanker ship vs the average number of collisions per container/general cargo ship for the last 10 year period.



## **TRAINING STANDARDS**

### STANDARDS OF TRAINING, CERTIFICATION & WATCHKEEPING (STCW) AND THE HUMAN ELEMENT

It is strongly suspected that the role of the Flag States in controlling the quality of navigational training is failing in many cases. The STCW, through the Manila amendments, has recognised that the human element issues surrounding accidents needs to be addressed and this human element training may produce improvements in navigational-type incidents.

The club held a series of seminars on the human element in four major shipping locations in 2011. The goal was to highlight the fact that understanding the human element is critical when trying to prevent major catastrophes, including navigational incidents. One of the main concerns of members was the perceived navigational competence of seafarers. In all seminars, the second most concerning worry after piracy was bridge competence and, more specifically, navigating in high traffic density areas such as the Singapore Straits, Chinese coastal waters and the English Channel.

The book *The Human Element – human behaviour in the shipping industry* (to which the club contributed through a consortium headed by the UK Marine and Coast Guard Agency) states that it takes ten years of experience to achieve mastery in any role and this point should be appreciated by those manning and managing ships.

The club's experience is that, without doubt, understanding the 'human element' is central to reducing incidents and in particular navigational incidents.

### BRIDGE TEAM MANAGEMENT OR BRIDGE RESOURCE MANAGEMENT (BTM/BRM)

BTM/BRM is said to be the effective management and utilisation of all resources, human and technical, available to the bridge team to ensure the ship's safe navigation. A key safety aspect of BTM/BRM is the implementation of defences against single-person errors with the aim of avoiding serious incidents. Case studies consistently show that this 'challenge and response' aspect to BTM has failed.

In a significant number of navigational incidents, the watchkeepers have had bridge team management training and so this questions, therefore, the effectiveness of bridge team management training. There is strong evidence that this training is, in many instances, not being conducted well. This training is costly and it is assumed that owners would want to know that it was effective. It is difficult to get statistics, but it is known that high-profile navigation incidents have occurred where the full bridge team did indeed have BRM training or an equivalent. The evidence is there that many BRM or equivalent courses are not effective and the outcome of the training is poor.

To provide some context into this apparent failure of BTM/BRM, we can quote the Norwegian Accident Investigation Board's (AIBN) report into a bulk carrier grounding in 2008.

"Based on conversations with pilots and bridge crews, the AIBN believes that lack of an effective bridge team is not unique to this accident. Although both the ship's officers and the pilot have attended BRM courses, this appears not to have been sufficient to introduce a practice where the ship's bridge crew and the pilot together form a well-functioning bridge team. Both ship management companies and the pilot services are still lagging behind in establishing how to introduce the BRM principles in practice."

Subsequent to the grounding and based on the internal investigation, the ship management company decided to send the ship's navigators on another BRM course.

# **BRIDGE WORK**

#### MONITORING THE SHIP'S POSITION

The navigator must accurately establish the ship's position at appropriate intervals and use this information to keep the ship on a safe track, taking into account navigational risks. If this simple task was performed effectively, many groundings would be prevented.

The traditional skill of looking out of the bridge windows and confirming what you see with what you see on the chart, electronic or otherwise, is fundamental for safe navigation.

Fixing the ships position:

- fix at appropriate regular intervals
- fix at more frequent intervals using visual, GPS and radar in confined waters
- if there are discrepancies in the positions to the planned track then this should be investigated, or when under pilotage, brought to the pilot's attention
- parallel indexing should not replace checking the ship's position on the chart at regular intervals.

#### CHANGE OF THE WATCH

Poor watch handover practices are often an underlying cause of major grounding and collision incidents. and sometimes the use of checklists appears to be covering up the fact that officers consider a good bridge handover needs only a completed checklist without having a proper briefing or exchange of relevant information.

Owners should highlight that changing over the watch:

- is an important part of the navigational watch
- should be carried out effectively whatever the situation
- cannot be replaced by a checklist
- requires that the position, course and traffic is checked within a short time
- should be considered as a key part of bridge training.



#### CASE STUDY

A loaded, chemical tanker on a trans-Pacific passage ran aground on an uninhabited but clearly charted coral atoll, 4 kilometres across. All deck officers had joined the ship and owner for the first time, and the master had also just joined the ship a few weeks previously.

The ocean passage plan showed that the course had been drawn inshore of the 200 metre line when passing the atoll. GPS position fixes were put on the chart every two hours; however, ECDIS displays showed a track at 0.5 mile from the centre of the atoll where the water depths were from 0 to 30 metres.

On the morning of the grounding, the weather and visibility conditions were good and the chief officer arrived on the bridge minutes before 0400 hours to take over the watch. The radar showed an echo at 11 miles, which the second officer reported was a cloud. The chief officer then sat on a stool in the corner of the bridge to smoke a cigarette and drink a cup of coffee. The radar target of the 'cloud' was deselected, now preventing the Automatic Radar Plotting Aid (ARPA) from alarming. At 0400 hours, with the ship's speed at 16 knots, the second officer left the bridge with the island now six miles away, providing a distinct radar echo. At 0430 hours, the chief officer made another cup of coffee and the ship grounded on the atoll six minutes later. There was no other land within 1,200 miles.

#### LESSONS LEARNT

- masters should check the passage plans as well
- watch handover briefings should be comprehensive
- the officer taking over the watch should confirm the ship's position and passage plan
- the officer taking over the watch should confirm the targets and traffic on the radar
- procedures should ensure that masters assess the navigational competence of officers.