Proposal for the introduction of "Shore to Ship Alert System"

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Abstract

Maritime accidents continue to occur despite advanced technology onboard and ashore assisting ships. Human error being the catalyst of most of the scenarios is evident. There are more than a few incidents which occurred in coastal waters, even with warnings and frequent attempts to call on Very High Frequency (VHF) by the Vessel Traffic Service (VTS). To identify the issue, an overview of the assistance of VTS and its contribution to the safety of navigation on board is going to be showcased with relevant past incidents. The present trend of VHF communication on board, its effective use, and instances when the VTS calls went unanswered on VHF will be emphasised and evaluated through case studies, qualitative and quantitative methods. To identify the gap in communications between the VTS and ships, the reasons for being unresponsive will be depicted through the methods of data collection.

This study intends to evaluate how the effective usage of VTS can mitigate maritime accidents and near misses, especially in the coastal waters within the range of VTS. In the meantime, it aims to propose a theory of a new system to be introduced to the maritime industry which could be a breakthrough to minimise navigational accidents particularly in the proximity of the coastal states.

The purpose of the theoretical solution is to improve the communication gap between shore to ship, especially in imminent danger by introducing a "Shore To Ship Alert System" (STSAS). This system could eradicate human error of being non-responsive to VTS advice or warnings. A complete framework of the functions will be described, and the advantages and disadvantages will be discussed for the reader's judgment.

Keywords: Marine accidents, human error, communication, unresponsive, shore to ship alert system.

Introduction

Every year Maritime accidents keep threatening the safety of life and the environment resulting in enormous losses to the owners and stakeholders. Accidents that occur particularly around the vicinity of coastal states pose a dire impact on the nearby community and the local biodiversity [1]. The tragedies not only cause a massive loss to the owners but equally dents their reputation in this extremely competitive industry.

One of the significant causes of accidents in the shipping industry is human error. It is estimated that human error contributes to between 75% and 96% of marine accidents [2]. Although there are several safety measures regulated and implemented by the governing bodies, maritime accidents still occur. The introduction of the Safety Of Life At Sea (SOLAS) convention in 1914 emerged in response to the Titanic disaster, which specifies the minimum standards for equipment, construction, and operation of ships [3]. The loss of the Herald of Free Enterprise in 1987 was a pivotal element in the introduction of International Safety Management (ISM) [4]. ISM has cemented a safety foundation and played an enormous role in improving safety standards. Statistics revealed in 2008, 130 ships sunk within a global fleet of 40,000 ships, and in 2016 less than 100 ships sunk in the global fleet of 80,000 ships [5]. The analysis certainly reveals the improvement of safety standards; however, the casualties continue to be present.

In the modern era, there are various resources available onboard assisting the seafarers with their ideology and decision-making skills in navigation. Additionally, there is a shore-based system known as VTS which plays a huge part in the coastal waters. VTS is a maritime safety mechanism that controls the flow of vessels and enhances the safety of the shipping on waterways [6]. VTS can be delivered on three different levels of service: Information Service (INS), Traffic Organisation Service (TOS), and Navigational Assistance Service (NAS) [7]. The VTS can ask questions to explain the ship's intentions, issue a warning, or even offer general advice, but once the ships have agreed on how they will meet, the VTS normally does not intervene [8]. There are more than a few occasions where the navigating officers failed to take heed of the VTS's advice that resulted in a disaster, and similarly, there are many occasions the ships averted an incident. It is up to the sagacious judgment of the seafarer to utilise the sources effectively.

The communication gap between the VTS and the ships has a significant impact on the maritime industry. Therefore, ships that do not respond to VTS calls need to be addressed and a suitable measure to circumvent vessels not being responsive needs to be established. Maritime experts

and governing bodies are constantly looking for innovative solutions to enhance the safety of navigation to minimise fatalities and maritime losses.

This paper aims to highlight the communication gap between the VTS and the ships. To bridge the gap, the author intends to propose a theoretical solution of a new system known as the "Shore to Ship Alert System" in the maritime industry.

Objective

The study intends to assess the effectiveness of VTS's role in the prevention of accidents in the Maritime Industry and the successful usage of VHF communication onboard. The gap in the communication between the VTS and the ship will be showcased through case studies. To improve the effectiveness of communication, a theory of a new system is proposed that can be implemented. The theory is projected to establish an alert from the VTS to the ships in case of any foreseen mishap.

Industry's approach to preventing accidents from recurrence.

The need for a new system in the maritime industry, despite many advanced technologies and systems available onboard and ashore, could be overlooked. However, with the hindsight of the accidents, this often paved a way for the maritime authorities and governments to find a solution from recurrence. The trend has been such that succeeding in an accident, many organisations narrow the events to find the root cause and establishing several barriers to avoid repetition. The typical approach to tackling protection in the workplace was by regulatory means or through physical barriers and related prevention steps that did not entail any extra care from the employee [9]. Another common approach to minimise the accidents was to instil a safety culture at work. The idea of 'safety culture' is demonstrating rising interest in many sectors around the world as a way of mitigating the risk for large-scale fatalities and accidents related to routine activities [9].

Case Studies

There are many maritime accidents where the VTS tried to call the vessel on VHF to alert and recheck her actions or seeking her intentions to assess the traffic situation, but the call is either not answered or delayed or not heeded. This is one of the major concerns which is less emphasised in the maritime industry. Furthermore, there are situations where the vessels responded to the VTS in time and averted an incident. There are several Mariners Alerting and Reporting Scheme (MARS) reports which stated VTS involvement, and VTS is not often

viewed in the most favourable light [10]. Let us look into a few cases to emphasise the importance of VTS's role in navigation.

Case 1*- Ignored VTS advice*: The Officer on watch (OOW) noticed two small islands on the radar and intended to navigate between them. After 30 minutes, the local coast guard warned on the VHF that they were on a dangerous course. The OOW acknowledged the call and did not take any action. Around nine minutes later, the local VTS called the vessel and warned about the hazard. Later the OOW swiftly altered the course to steer away, however still ended up grounding the vessel [11].

Case 2*- VTS call unanswered*: The recent case of a marine disaster that resulted in a total loss of the bulk carrier M.V. Wakashio is another example to exhibit. The internal investigation report released by MOL states, a few days before the vessel grounded, she altered her course to pass the island of Mauritius by 5 nautical miles. On 25th July 2020, the day of grounding, she further reduced the range to pass 2 nautical miles to seek a mobile phone signal. Crew members neglected watchkeeping duties both visually and by radar, the vessel ran aground in shallow water with a depth of 10 meters and 0.9 nautical miles off Mauritius coast [12]. As per the preliminary report, the ill-fated vessel later spilled oil and split into two. It is estimated that around 1,000 tons of fuel oil was spilled, causing severe ecological damage to the pristine shores of Mauritius [13]. The investigation of the flag state is still underway.

The first statement issued by Panama Maritime Authority stated, *"confirmed that Mauritius detected the change in the course, which previous reports said prompted repeated calls to the Wakashio from shore stations that went unanswered"* [14].

A report published in a journal stated that the Mauritius coast guard tried to call the ship for an hour, advising that its routing appeared risky. Eventually, the coast guard officials got through to the Master and the Master claimed the route was safe, a few minutes later the vessel radioed the local authorities and reported that she was grounded [15]. The possible cause and key issues onboard are being scrutinised. However, the safety culture appears to be lacking.

These cases have a significant part in the VTS. Prompt response from the bridge team to the VTS could have averted many incidents. Although VTS suggestion may not be suitable at times, however, it is the ship's navigation officer's judgements and state of alertness that plays a key role.

Given these cases, it is intriguing to know, why would the Bridge Team (BT) onboard not respond to the calls made by the VTS or take heed to its advice? What are the circumstances

that cause BT to ignore the VHF? Do we have an alternative source to alert a vessel for not being responsive?

Data collection

Convenience sampling was used to collect quantitative and qualitative data from the navigation officers in various sectors like dry, gas and oil using survey questionaries and semi-structured interviews. Primary data collected through UK Marine Accident Investigation Branch (MAIB) reports exclusively focusing on the incidents between VTS and VHF communications. Secondary data was collected via various online resources.

Discussions

A total of 208 participants answered the questionnaire. 102 Masters, 65 Chief Officers, 38 Junior Officers, and 3 were North Sea Pilots. 160 contributors had more than 15 years of sailing experience, 25 had 8 to 15 years of sailing experience and 23 were junior officers between 0 to 7 years of experience. Focusing on the reasons when the bridge team being unresponsive to VTS calls: The top three category results were, 200 participants agreed *"VHF volume levels being low"*, 141 agreed *"VHF switched off"*, and 57 agreed *"Monitoring inappropriate VHF channels"*.

Having identified the possible reason for being unresponsive, let us analyse what has led the bridge team to reduce the volume or VHF being turned off or monitoring inappropriate channels? The human error for switching off VHF or monitoring inappropriate channels can be questionable as this could be termed as a failure of bridge procedures. However, what could have led to the volume levels of VHF being inadequate is spotted in the next question. Participants were asked the possible reasons for the VHF volume levels to be inadequate: 199 acknowledged *"OOW reduced VHF volume intentionally due to the excess interference caused by fishing, coastal and other vessels and forgot to increase the volume later"*. 191 believed *"OOW may not have checked the VHF volume levels before taking over the watch"*.

To analyse the common practice of VHF volume levels onboard, a question was asked to find out how often the volume levels observed onboard were inadequate? It appears that only 1 participant experienced volume levels to be adequate, whilst the remaining 207 participants experienced once or more than once VHF volume levels being low during their tenure. This is evident to know that VHF volume levels onboard are inadvertently not been given much attention.

Participants were asked if they were involved in a situation where the VTS calls were unanswered by another vessel and eventually their vessel had to take a bold action to avoid a collision or a close quarter situation. 180 have faced such a situation and most mentioned the VTS locations. Whereas 25 admitted they have not experienced it and 3 did notice the situations with other ships.

The effectiveness of VTS was also questioned and all the participants agreed the VTS has a significant role in the safety of navigation. However, it is imperative for the mariners to optimise the VTS assistance and maintain effective communication to enhance safety, particularly in coastal waters.

A conversation with the London Harbour master revealed that not answering the VTS calls from some ships is a routinely experienced phenomenon. They go unnoticed or reported as they may have escaped an accident. He further stressed unless an incident occurs, the weak link is not highlighted.

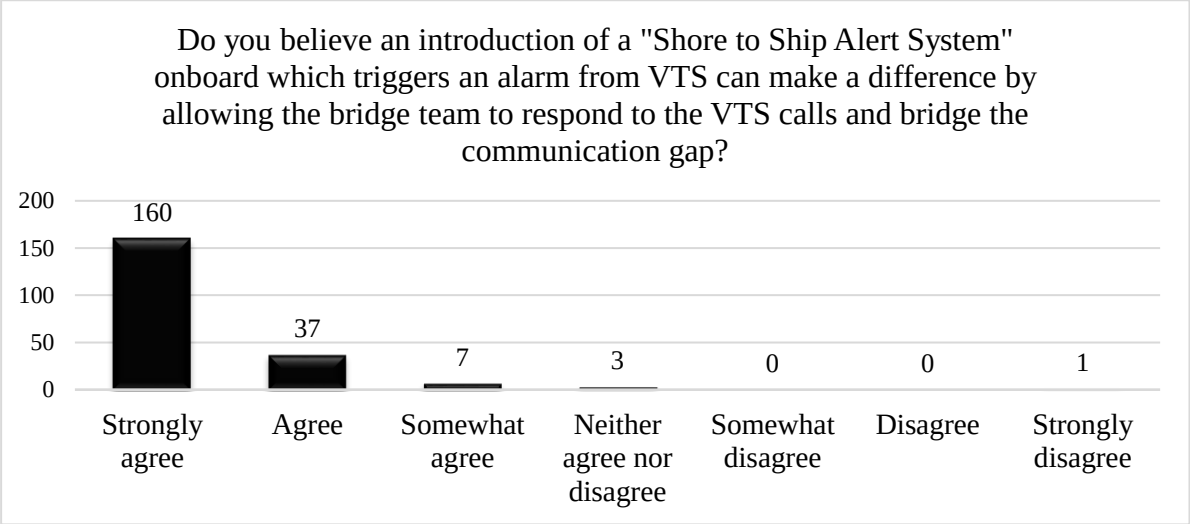
Functions of "Shore To Ship Alert System"

To ensure ships respond to VTS calls, a "Shore to Ship Alert System" could be the answer. This system intends to alert the ship from the VTS station by triggering an audio and visual alarm on the bridge in the event of a foreseeable emergency, provided the vessel being unresponsive after several attempts of VTS calls. The alarm trigger control is meant to be with the VTS centre. This system needs to be fitted on the bridge, display the VHF channel and blink as the alarm triggers on an LCD. The audible alarm is designed to be distinct from other bridge alarms. The volume levels of this system onboard need to be barred to ensure the alarm is audible when activated by VTS and to make sure the user intentionally or unintentionally does not reduce the system volume. Although in extreme situations the system can be isolated due to equipment malfunctions and to avoid alarm fatigue. However, malfunction of the system needs to be conveyed to the next port of call, owners, flag state and be rectified at the next opportunity.

A robust procedure is laid to ensure the alarm is effectively received on the bridge from the VTS. In the event, the alarm is not acknowledged, the escalating procedure is designed to achieve the ultimate goal for the vessels to respond. This is to ensure the ship crew attends the bridge and the VTS call to avoid an emergency. The alarm log is to be maintained in the radio logbook with brief notes of the VTS conversation. This equipment will be incorporated in Form 'R' of the Safety Radio Certificate.

Mariners Opinion on “Shore To Ship Alert System”

The STSAS was opinioned by the participants to know if this system can enhance the safety of navigation by allowing the bridge team to respond to the VTS calls and bridge the communication gap? 160 participants strongly agreed, 37 agreed, 7 somewhat agreed and 3 neither agreed nor disagreed and 1 strongly disagreed. Except for few participants who were unsure about the system, the remaining appeared to be positive and most of them firmly believed the new system could make a difference as displayed in the table below.



To avoid volume levels being tampered with onboard, the participants were asked if they agree about the volume controls on the alert system to be barred? 193 (93%) participants agreed, 9 were unsure whereas 7 disagreed. Once again majority have agreed to the fact that the alert volume levels remain barred.

The participants were asked if they believe the new system can assist to reduce maritime incidents around coastal areas? 194 were positive, 10 were doubtful and 4 disagreed. Nearly 93% expressed their concern and believed the new system can contribute to minimising maritime accidents.

The need for STSAS

The system is deemed to improve the communication between the ship and VTS thus enriching the safe traffic management in the coastal waters. By improving traffic management maritime accidents, ecological and maritime disasters could be avoided or minimised. Furthermore, alarm escalating from the bridge to cabins and common spaces allows the bridge watchkeeper to stay alert and provides a backup measure in case of an emergency. This system can be viewed as an alternative source of VTS communication. For instance, if the watchkeeper is unable to

communicate effectively due to a language barrier, the alarm itself allows the mariner to evaluate the situation and take action to avoid an emergency. Since insurance is in inverse proportion to the risks, the insurers may offer premiums reductions. This could be an incentive to the ship owners for investing and thus advancing their commitment to safety. Although ships that respond to the VTS calls may never have to experience an alarm, however, the sole purpose of this system is to raise an alarm to those ships that fail to respond.

It could be argued that the new system installation will incur additional investment and service costs. However, this system has the potential to reduce or avoid maritime accidents and thus saving on damage claims. Another concern is, not all the coastal waters in the world may have advanced VTS equipment. Nevertheless, the basic information can be shared with the vessels to avoid mishaps. To ensure STSAS is regulated worldwide, it needs to be approved by IMO member states, which is usually a lengthy process for ratification.

In a conversation with a North Sea Pilot, when asked about the need for STSAS. He opinioned due to the additional paperwork and commercial pressure on the bridge team, the focus on safe navigation is at times observed to be compromised. There were several occasions he felt that the bridge team gets distracted due to the last-minute correspondence with the company, agents, ship chandlers etc. He further added that due to the officers being rushed to gain the certificate of competencies, the lack of experience and chronic unease is noticeable in modern times. The need for an alarm with a volume control resistant and escalating function will make a difference in the safety of navigation as this is becoming more essential these days to ensure the OOWs are reminded about any unanticipated phenomena, he added.

Conclusions

The bridge team's swift response to the VTS does not guarantee an accident-free scenario. However, it allows the navigating officers to become acutely aware of a dangerous situation that could be developing within the vicinity. Although VTS regulates the traffic, assists the ships in navigation and provides information service, this does not transfer the liability of the vessel’s safety from the ship personnel to the shore operator. The ship’s personnel remain liable for their safety as they are on sight and are deemed to take the best action to avoid an emergency.

The new system could be incorporated into the present Global Maritime Distress and Safety System (GMDSS) to utilise the present resources available onboard. Secondly, the alarm escalating process can be considered with the Bridge Navigational Watch and Alarm System (BNWAS). However, this needs to be checked and scrutinised against the equipment

parameters and compatibilities. As this system needs an LCD to display the VHF channel and impose alarm volume restrictions, it could be worth investing in a small unit display in contrast to the colossal monetary and reputation loss to the ship owners.

Shipowners and management companies who take pride in themselves for maintaining high levels of safety standards and compliance will clearly see the advantage in such an alert system. However, given the stress levels, fatigue conditions and adhering to minimum manning levels on board, human error is highly likely. Complacency is another factor that may induce a lax safety culture. The vessels that make landfall are more susceptible to an accident than a vessel that is sailing in the high seas where the traffic and sea room are not a major concern.

To safeguard life, the marine environment, property and to protect the coastal waters, the introduction of a Shore to Ship Alert System is an additional measure to enhance safety. This system could serve to reduce human error and provide a method to the VTS to alert the vessel in a foreseen emergency. It is the responsibility of the ship owners, coastal states and governing bodies to ensure that they are taking every opportunity to safeguard ships in their waters to minimise accidents and provide a safe environment. The proposed system could act as a safeguard to significantly reduce accidents, marine pollution and near misses, especially in the coastal areas.

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To,

The Program Editing Committee,

International Association Of Maritime Universities Conference, AGA21,

Alexandria,

Egypt.

Dear Sir/Madam,

Thank you for accepting the abstract and providing the opportunity to submit the full paper. It is extremely pleasing to know that the theoretical solution has been considered for the next stage by the IAMUC committee. This manuscript is submitted for publication in the conference proceedings for the first time. The contents of the case studies were formally referred to reliable sources online and are included in references. Kindly let me know if there is any additional information that is needed to suffice the requirements.

Sincerely,

Daniel Isaac Edwin.

Biography

I am a motivated, reliable, and hardworking person with good communication skills. Presently pursuing “MSc International Maritime Business” course in Solent University from September 2020.

I have sailed on different types of dry cargo ships in the past 17 years. Started my carrier at sea in 2003 as a trainee seaman and gradually excelled in academics and achieved OOW COC (Unlimited) in 2009, Chief Officer COC (Unlimited) in 2014, and Master’s COC (Unlimited) in 2018. During the Chief Mates course in the year 2013, Lowestoft College has recognized my achievements both in academics and in extracurricular activities, and I was nominated for the “Student of the year”. The maritime studies gave me an excellent combination of knowledge and skills to navigate, strategic planning of stability, preparing the vessel for seaworthiness, training crew, and much more. Along with the course of studies and sailing experience, I have gained practical knowledge and a productive way to deal with issues on board. Due to my steadfast dedication and performance, I was promoted as a Chief Officer in 2015. Apart from the technical knowledge, I am keen to learn how the maritime industry functions and therefore engaged in a postgraduation course.

Having sailed around the world over the past decade, there were several occasions I noticed a few things that need to be addressed for sustainability and safer lives onboard. The maritime industry has undoubtedly allowed me to explore the world, overcome hardships, learn about different cultures, witness splendid nature, food and more. I have always had a strong desire to contribute to enhancing safety onboard for safer lives and seas. My project to propose the introduction of a new system arose from my experience and I believe it will contribute to enhancing shore to ship communication and minimising accidents in the coastal areas.