Best Practices in near-miss reporting

The role of near-miss reporting in creating and enhancing the safety culture

Master of Science Thesis in Nordic Master in Maritime Management, NOMAR

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Göteborg, Sweden, 2011
Report No. NM-11/21

Table of Contents

ABSTRACT

The ISM Code requires that hazardous situations are to be reported to the company, investigated and analysed in order to prevent future happenings. Near-miss reporting gains importance in this respect, because, near-misses are believed to represent experiences and mistakes that should be shared to learn from in order to prevent bigger accidents.

However, the general belief is that near-misses are not reported at the level as expected by the authorities. Some studies have been carried out to find out main barriers to reporting.

The main objective of this study is to find out some best practices about near-miss reporting from the companies that are active in Swedish and Finnish shipping industry and believed to have high level of safety understanding within their organization. In addition, external reporting systems such as Insjö and newly developing ForeSea have been investigated in this study. The study is based on interviews with a total of 32 representatives, both shore-based and ship-based, from four different companies. Also, one representative from Insjö has been interviewed.

It is found out that the representatives from these companies claim to have progressed in achieving 'No-blame culture' within their organization. Besides, they have achieved to put a reporting system in use and try to make it work as good as possible.

The representatives claim that they are interested in having a more international reporting system where they can share experiences. The providers of such systems try to improve their systems. However, the actual current benefit of a such system is unclear.

The majority of the participants believe that near-miss reporting in principle has a significant effect creating and enhancing the safety culture. However, the actual benefits of the near-miss reporting are reported as being limited. Further, it seems that the companies are not yet utilizing the reported data for establishing trends to improve the follow-up and the awareness within the organization.

1 Introduction

1.1 Background

Written procedures in the maritime industry have always gained criticism due to being impractical to carry out and being away from the reality of the job on board. Thus, safety management systems are perceived as being a group of procedures which are too formal. Antonsen et al. (2008) discusses in their study that safety is considered as a mixture of professional judgment and practical work experience. The more it is fitted into written procedures, the more resistance it gains from the seafarers. However, it is hard to claim that it might be possible to achieve a better safety level without formal procedures. The reasonable solution should be finding a meeting point for the formal procedures and the way that the work is actually done on board. This can bring us to the importance of team management, crew's involvement in the decision process, the importance of mutual feedback and last but not least, being fluent in making changes, in other words, toning down the bureaucratic process as much as possible (Bourrier, 2005).

Safety is the main concern of many different industries, such as air, chemical, nuclear industries among many others. Comparisons can be made to some extent as well as being possible to learn lessons from each other. However, sharing experiences within your own industry should not be underestimated either. One distinguishing feature of maritime industry is, being so dependent on the national and/or company level success. It can be interpreted that administration is believed to remain a bit slow to respond to the needs of the industry. Therefore, the shipping companies are the organizations with high flexibility in creating safety management systems. When considered that maritime industry does not only consist of merchant vessels trading around the world but also comprises small fishing, sailing boats, mooring boats, drilling installations among many others, it is clearly realized that safety level varies a lot within the industry. In addition, it also depends on the resources inside the company which can be poor in small companies due to financial reasons. Sharing experiences of the ones that have a high level of safety on board and revealing best practices may help to raise the general level of safety culture.

Near-miss is defined as the sequential happenings that haven't resulted in loss and/or injury but has the risk to do so. Loss can be a personal injury, environmental damage and/or negative financial effect on the trade. Mentioned loss has been prevented by a fortunate break in the chain of events (IMO MSC-MEPC.7/Circ.7, 2008). In view of its definition, reporting near-misses gains an important role in learning from mistakes, preventing accidents and suffering from their serious consequences. Section 9 of the ISM Code requires companies to establish procedures for the reporting and investigation of hazardous situations together with the implementation of corrective actions (The ISM Code). IMO has a guidance to encourage near-miss reporting, not a mandatory regulation. Therefore, companies and the national authorities are the ones who take initiatives. Every company forms its own reporting system, either a paper reporting procedure or a computer system. After all, crew's understanding of it and involvement in the reporting are the core values to achieve the intended level of reporting, both within the company and at the national level. Same point was stated by Bråfelt and Larsson (2000) more than 10 years ago in their article explaining the principle of a national reporting system.

Countries around the Baltic Sea area use different types of voluntary reporting systems to create a database of accidents, incidents, near misses and non-conformities and share them with the vessels

carrying their flags. Insjo and ForeSea for Sweden and Finland; Nearmiss.dk for Denmark are the ones in operation at the moment. In fact, ForeSea will be fully operational by 2013 (ForeSea, 2011). The idea is the same with all of the national reporting systems. Reports are stored in a database which is not open to public. Special log-in is needed to get into the system (Zachau, 2008). Depending on the system used inside the company, it is usually possible to forward a near-miss, reported by a vessel to the company, by pressing a button by DPA (Designated Person Ashore) to Insjö, for instance. Then, Insjo sends an e-mail to the DPA which contains the similar cases reported before with the corrective and preventive actions. The commonly used IRIS (Incident Report Information System) system by many Scandinavian companies gives that opportunity to sent reports to Insjö. ForeSea has not been integrated to IRIS yet, however, it is one of the plans to be achieved. One of the advantages of ForeSea is all reports sent in Finnish or Swedish will be translated into English (ForeSea, 2011). Idea of making one reporting system for the Baltic Sea region and for all flags generally attracts seafarers.

1.2 Research questions

The main questions which determine the scope of this study are:

1. What are the existing reporting routines in passenger ferries and tankers, since they are believed to have a high level of safety culture?
2. Are there any best practices that can be proposed to maritime industry to reach a better reporting level?
3. The role of near miss reporting in creating and enhancing safety culture in the eyes of maritime personnel?
4. What are the opinions of maritime personnel about the new developing reporting system 'ForeSea'?
5. What are the major challenges concerning external/national reporting systems?

Literature review was, first, carried out to create a template for the interview. Besides, searching through the scientific background was a clarification and confirmation to carry out this study, not to repeat an already done research, due to having unanswered questions from previous studies and propose some different aspects for the future improvement.

1.3 Objective

The objective of this study is to investigate the progress of near-miss reporting deeper, both on the company side and on board the vessels that have good safety levels and try to find the answers to the questions that are arisen from the previous studies which are to be presented in the literature review. The specific questions which are aimed to be solved out in this study are already mentioned above, under Research Questions title.

Overall aim is to collect best practices inside the industry and make the others that are aiming a better level of safety culture, to be aware of them and make use of them. To be able to reach the main purpose, existing situation of safety culture, in connection to near-miss reporting, will be investigated, especially, by means of unanswered questions before. This will form the supportive part which includes questions of: comparison of paperwork to any computer based reporting system, the role of near-miss reporting for creating a safety culture, the roles of external reporting systems together with their

advantages and disadvantages and last but not the least the effects of the difference between management's understanding of safety and that of seafarers' in the improvement of reporting level.

Finally, the results of semi-structured interview[1] are introduced with a summary of remarkable and possible best practices for the industry. Besides some discussions that can constitute the scope of further studies is included.

1.4 Limitations

Shipping business is a huge industry including various sizes of companies in a large variety of business areas, such as off-shore operations, drilling, sailing, small boat services among many others. Moreover, not all them are ruled by the same administrative levels. Therefore, the findings of this study are not relevant for the whole industry as well as the whole industry is not the target group of this study.

This study is limited to a target group of people working on board RoPax and Ro-Ro type vessels. The reason for that is, it is believed and proved by flag state and port state controls' reports that they have a high level of safety culture on board. Inside the target group there is also a limitation which depends on the willingness of the companies to participate in the interviews.

Number of people involved in the study is another limitation. There is always room for including more people depending on the time restriction, the condition that where the visits are made to ships, for instance, when ship is at port, number of people interviewed can be less than normal. In addition, people's willingness to participate in the study has an effect on the limitation of the study.

It is worth mentioning that, concerning the number of interviews made, the results would highly likely to stay same, even if more people were included. There are studies carried out with more people having parallel results with this study, such as Lappalainen & Salmi (2009), Oltedal & McArthur (2011) among others. Mentioned studies didn't directly focus on near-miss reporting or some other issues which are the aims of this study. However, they investigated the issues concerning the ISM Code which might be interpreted as a similar type of qualitative research. Therefore, it is believed that the number of interviewees doesn't have a big effect on the results of the study.

2 Literature Review & Scientific Background

In this part of the study, the topics which are highly related to near-miss reporting and safety culture and which are mentioned in the previous studies are given in details with a scientific background. It is important to focus on them, because they have a considerable effect on both people's resistance to report and for the future development to achieve a successful reporting level and process. Besides, these points have formed the frame of the interview study.

At first an introduction is given about the focus on the previous studies, which is followed by detailed information on the same focus areas. At the end, it becomes more clear what is done with this study is complementary and brings some novelty.

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[1]   Semi-structured interview is explained under Chapter 3 called Methodology

2.1 Focus of Previous Studies

Studies have been carried out since the ISM Code came into force. The focus has been the implementation of the ISM Code at first. While searching on that many issues came to surface, such as it has been perceived as a huge paper work and time consumption instead of focusing on the practical issues (Knudsen, 2009).

Later, the studies focused on more detailed issues which might be the reasons for the ISM Code to gain some resistance from seafarers. Near-miss reporting has been concluded as being the failing part of the ISM Code's implementation (Lappalainen, 2011). In many ships it is reported on a paper format which is again perceived as another extra paper work. As the company has a big role on creating its own safety management system, criticisms started on that side, especially about the communication between ship and company, feedback process and differences in the understanding of safety between seafarers and company responsible people. Generally speaking, company has represented the 'written procedures' while the seafarers has represented 'the way that the work actually done on board' which are believed not to match each other (Dekker, 2003; Bourrier, 2005). Recommendations and/or practical applications from other industries, such as nuclear, chemical, have been proposed in the same studies. Then, the last but not least, the issue of 'blame culture' has appeared to be considerable effect on the reluctance of near miss reporting. Opposite results have appeared from different studies. While a diary study (Schaaf & Kanse, 2004) showed that people on board doesn't really care about being blamed or ashamed if they report, Withington (2006) has seen the blame culture having a remarkable effect on poor reporting. Blame culture leads us to the matter of being anonymous in reporting and human behaviour against all these.

All these mentioned are mostly investigated separately, however, they all led us at the end to think about creating safety as a 'culture' both in the company, including all management levels, and on board the ships, in the minds of seafarers. Although 'culture' itself is a complex issue, the aim with the ISM Code is identifying hazardous occurrences including the risks to individuals, ships and marine environment, then reporting them regularly to the company and continue with proposing corrective and preventive actions with an end to apply them to reduce those identified risks (IMO MSC-MEPC.7/Circ.7, 2008). Under the light of this approach, previous studies has tried to be found about the connection between creating a safety culture and near-miss reporting.

More information about the above mentioned issues from the viewpoints of previous studies together with their findings are written under separate titles below.

2.2 Computer system versus Reporting on paper

One of the challenges in the maritime industry is paperwork which is seen as a big work load for seafarers.

It has always been criticized by seafarers and gained resistance since the ISM Code was introduced. Knudsen (2009) clearly explains the reasons of this resistance, such as being a time consumption where that time can be spend on more important works on board, because it is claimed by the seafarers that checklists, forms require more time for themselves to understand and complete the task, they don't make people to pay attention to safety. It is also stated that it is a matter of matching conditions each other. For instance, when a high amount of paperwork is introduced, the number of crew working on board, the schedule of ships should also be considered. If the number of people onboard stays the same

or even decreases together with tight schedule, that causes high workload for people and a compromise for safety. As a result of conducted studies, it is agreed that paperwork should be reduced (Ellis 2005). It is a matter of adaptation which was also mentioned in Dekker's (2003) study. No matter how much a computer system is believed to be user friendly, substantial amount of time is needed for full implementation; fully accepted in mind by the people who use it. Therefore, when a new technology is introduced to be used on board, managers should not assume that it is well done when just completing the technical installation and leaving a user manual to be read and applied. They should pay attention to the process and try to catch the weak points in order for a better utilization.

2.3 Importance of feedback – Crash between shore management and shipboard personnel

The study carried out in 2006 in Norwegian controlled 83 liquid and dry bulk cargo vessels showed that feedback from the company is a positively influencing factor for reporting more frequently (Oltedal & McArthur, 2011).

The interview results from previous studies clearly show that, especially, experienced seafarers perceive some of the events not worth to report. They think that those events are somehow inevitable and do not compromise safety. When they are required to report even those minor ones, their perception is that this reporting scheme is being made more bureaucratic which is considered as a negative factor. Dekker (2005) investigated the ambiguity of being 'normal', not worth to report when it comes to near misses, however, same occurrences become the 'cause' or 'contribution' in the accident report when an accident occurs at the end. Bureaucracy and tendency to break it bring us to the matter of procedures and deviation from procedures which concerns safety at the same time. It was studied earlier by Dekker (2003) from the view of adaptation, developing skills to take initiatives in an unexpected situation where procedures are not the real guide and showing that how the process of deviating from procedures is a result of the imbalance between procedures and practice. His statement is, in fact, a self-explanatory to the components of how being off-track from the procedures is seen as normal;

'Empirical success is not proof of safety. Past success does not guarantee future safety. Borrowing more and more from safety may go well for a while, but you never know when you are going to hit.' (Dekker 2005).

His suggestion to managers is to observe the outcomes of the applicability of procedures from the people who apply them in the workplace and accept the fact that checklists and written procedures are not the job itself. Therefore, skills of people and the ability of using those skills in emergency situations to take the right decisions are important and they should be encouraged for improvement.

Bourrier (2005), as well, studied the 'procedures' and 'the way work is actually done' and the interaction between them by means of the safety organizations in nuclear plants. However, safety is relevant for all industries, especially, the part dealing with the safety procedures, management side and human factor as the workers who are the real actors that carry out the work practically is worth to mention for all industries. Therefore, her results might also be beneficial for the maritime industry. She pointed out 3 items which was the outcome of a real event in an American nuclear plant as an example of how to make adjustments to existing procedures in the way of making them more practical but still

safe. They were;

- Ø Feedback from bottom to top about the applicability of the procedures
- Ø The adjustment should be made by the proposal of the real workers who carry out the job.
- Ø Time needed for the revision should be kept as short as possible. It shouldn't take months to make a revision.

However, it stays unanswered in her study how to find the optimum level of mixing procedures and self-rules. After all, these 3 items are perfectly useful as a starting point to create a good communication between crew on board and the management side. Same study also points out that formality has an important effect on the people who really carry out the job. It is meant by formality is the management takes the problem, which is the gap between procedures and the work practically done, really seriously and tries to solve it by using all its opportunities.

Court report of M/V Herald of Free Enterprise's formal investigation (1988) shows those weak points that are explained in Bourrier's (2005) study. Management's failure to install some indicators on the bridge which show the position of bow and stern doors, was one of the reasons of the disaster at sea. It was required by the ship's crew, however, perceived in a not very polite way on the company side. The suggestion from the ship side was based on their experience. What is dramatic is, after the accident, even within a very short time, subject indicators were installed on the remaining ships. Had the experience of the crew were taken seriously, feedback system functioned well, there would have been a high chance to avoid a disaster. Antonsen (2009) studied the safety with comparison from a point of culture and power by means of explosion of space shutter *Challenger*. At one point it is stated how an organization start putting emphasize on commercial concerns and more surprisingly how this deviance can be perceived as normal by the powerful ones, so to say by the managers. Therefore, both culture and power should worth to be evaluated on the understanding of safety by the parties.

According to Antonsen et al. (2008) first step to match procedures and the way the work practically done is to simplify the procedures. That interview study, with the Norwegian oil industry, also proved that simple systems are more likely to be used when compared to complex systems. It is worth mentioning that while making the procedures simple it should be careful not to make them too general. They should be explanatory but not complex.

Same study supported the findings of Bourrier (2005) as well that the people who exactly carry out the job are satisfied with being included in the development process. Being involved in the decision process is said to have a positive effect on people as they feel that their ideas are cared about by the company instead of by just being ordered to do what should be done.

Antonsen (2009) refers to worker's involvement from the view of power and its effect on the organizational safety. The example used in that study was the explosion of the space shutter *Challenger* in 1986 where the cause was attributed to a rubber O-ring and how their exposure to icy weather could compromise safety. Engineers made their warning by stating their concern and advised to delay the launch. However, NASA officials had the sufficient authority over the engineering company which could make them to change their wordings. During the investigation period, one of the engineers stated that their opinion and concern due to cold weather launching was not considered in the final decision process. Or else, even the engineers had pointed out their concerns in the process, the opinions of lower ranks usually would not appear in the final decision.

2.4 Blame culture – Human behavior

A diary study (Schaaf & Kanse, 2004) which was carried out with the workers of a chemical plant that requires them to write down the cases they have faced during their working shifts for 15 days, including day and night shifts, surprisingly showed that being ashamed/blamed has almost no influence on not reporting near misses. Instead, 'perceived importance' has a big effect which means, people see the happenings having no consequences, the case is recovered immediately, not applicable to report and no learning takes place from them.

However, there exist also the opposite results, for instance, according to Withington (2006) being blamed has a remarkable effect on people which leads them not to report to avoid being criticized.

Human make mistakes. There are both individual and organizational influences on mistake-making. Individual influences can be stress, fatigue, insufficient training and experience, inadequate communication while the organizational influences can be inadequate time, poor design of equipment, inadequate manning and inadequate safety culture. *MCA Guide on Human Behaviour (2010)* explains the effect of a good safety culture as the serious approach of the senior management towards all these mentioned factors that have influences on mistake-making. Senior management is waited to invest on these factors. It emphasizes that people also attach a meaning to the absence of these investments. Then, the risk of making mistakes increase even more (MCA, 2010).

When it is clear that it is normal for people to make mistakes, it is also clear at the same extent that organizational factors has a considerable effect on helping to create the human behaviour which includes mistakes as well. This leads us to shift from the 'blame culture' to a 'just culture' (MCA, 2010). Same issue is emphasized by *IMO Guidance on Near-miss reporting* that company should adopt a 'just culture' to encourage reporting (IMO MSC-MEPC.7/Circ.7, 2008).

The first principle to create a 'just culture' is to accept that the human error is inevitable, therefore, policies, processes and interfaces in an organization must be monitored and improved all the time. This requires a reporting system which is not sufficient itself and should be together with developing trust that allows people to reveal mistakes (MCA, 2010).

In the same guidance open communication, discussion and team management issues are also addressed which are believed to have effect on a 'just culture'.

2.5 Safety culture and near-miss reporting

Creating a safety culture, in the most effective way, has always been an issue for the maritime industry. Not only the duty of ship is to create safety culture on board and maintain it but also so many other organizations such as port states, owners, operators, national and international organizations among many others are included in the creation, review and feedback process (Ek & Akselsson, 2005). The ISM Code was the attempt to form the safety culture in the maritime industry. After ISM Code was introduced, studies have been carried out to see how much successfully it has been implemented and what criticisms it has gained. Near miss reporting has seen as the failing part of ISM code's implementation and received resistance from the users (Lappalainen, 2011).

Safety culture is a complex issue to define with only one sentence however, the definition of IMO

Maritime Safety Committee is that "it is a culture in which there is considerable informed endeavour to reduce risks to the individual, ships and the marine environment to a level that is as low as is reasonably practicable" (IMO MSC-MEPC.7/Circ.7, 2008).

Dekker (2005) introduces a concept called 'drift into failure'. Accident is at the end of the drift which is caused by a chain of events. It is claim in the study that none of the accident happens as a result of an immediate action. This term is clearly illustrated with an example of Alaska Airlines 261 accident where the root cause is found to be, simply and at first place, the poor maintenance. Actually it was about only one single unit, jackscrew-nut assembly, which makes it more dramatic. However, when it is digged more inside the chains that led to the failure of one single unit, it is found that greasing that jackscrew assembly is crucial and recommended to be carried out every 300 to 350 flight hours which at the same time means that doing that every few weeks. The accident happened in 2000, this maintenance recommendation goes back to mid 1960s when the aircraft first launched. Over this time period, the interval of maintenance had started to increase due to several reasons such as commercial concerns, adaptation of technological developments decided by local decision makers, are some of those. Consequently, the maintenance interval went up to 2550 hrs at the time of accident. Yet, when the screw was investigated after the accident, the guess was that probably it had been exposed to a proper maintenance more than 5000 hrs ago. These are all the drifts that lead to failure at the end. Same logic can be adapted to the Herald of Free Enterprise accident where the conclusion was basically human error, however, in deep inside, it reaches along the chains to the management failure to install a equipment on board and also unstable design of the vessel (Grech & Horberry & Koester, 2008).

Under the light of all these approaches near miss reporting gains more importance in catching the weak chains before drifting into failure. The main points of reporting near misses are learning from others' experiences and avoid accidents. It can be said, in other words, that it is big resource for the companies especially for the small ones to have a bigger pool of occurrences on board and their corrective as well as preventive actions. Then, it becomes easier to manage safety related issues on board, such as technical failures among many others. It was realized, for instance, by Norsk Hydro in the late 1980s and they tried a new system to start near miss reporting which led them at the end to the decreased number of accidents as a result of learning from small happenings (Lindberg & Hansson & Rollenhagen, 2010). Near-miss and accident reporting systems are the ways of sharing experiences. Reporting as many near-misses as possible is the factor that can lead to better safety level as a result of learning from small mistakes and avoiding them to turn into accidents.

2.6 External reporting systems

The aim in this section is not to analyse all the external reporting systems. Instead, to give a general idea about them, especially about Insjö and ForeSea which are relevant to the target group of this study.

Insjö was started in Sweden in 2002. It is voluntary system which aims to create a database of near misses collected from registered companies to help to increase safety level on board Swedish flag ships by sharing experiences. Reports coming from the ships, after evaluation, are simply sent by the DPA to Insjö system. This can be done with a log in to the system and entering the report there manually. Another option is, for the ones that use a computer system, which is connected to Insjö to forward the

report by pressing a button. Identifiable infromation is removed by the administrator of the system. Report can be in English or in Swedish (Insjö, 2011).

ForeSea has the same principle as Insjö, which is operated by the same administrator as well. The aim is to include the Finnish maritime industry into the system of sharing experiences. ForeSea is not fully in operation now. When it is as planned by the year 2013, it will be more demanding from the registered companies to be active; to contribute with a defined number of reports every year. Some new features are also planned to add to ForeSea, such as the report flow has been extended with an additional 'Loop', can be seen in *Figure 1*, that the DPA can come back to a previous reports to add new corrective and preventive actions (ForeSea, 2011).
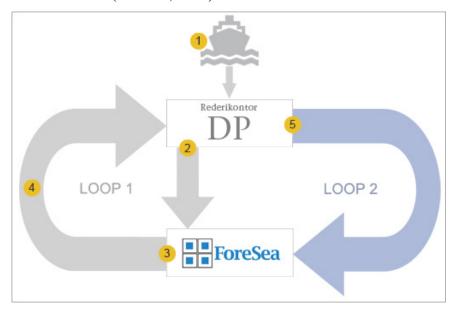

Figure 1[2] Report flow in the ForeSea System

In both systems, anonymity of the reporter has an importance to encourage people to reveal mistakes in order to stop them happening continuously. Besides, it makes it easier for the companies to comply with the requirements of the ISM Code (ForeSea, 2011).

2.7 Why this study?

Overall aim of this study is to find out some best practices about near-miss reporting from the companies who are believed to achieved a good level of safety. It is important to go through the scientific background to draw a line for the scope of the study. All the above mentioned issues were researched mostly separately or a few of the together. Therefore, it is aimed to include them all in the interview questions to find out where these companies stand in the near-miss reporting, whether the similar barriers, challenges are relevant to them and how the level of reporting has been evolved since the latest researches.

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[2]   Retrieved from http://www.foresea.org/about_flow.aspx

In addition, the relation between the near-miss reporting and formulation of safety is not purely questioned. Ideas of the seafarers are important to understand if it is accurate and necessary to put this much influence on near-miss reporting and how they perceive the role of reporting in the continuous improvement of safety level at sea.

Moreover, existing situation on the Insjö and ForeSea side together with some numbers and planned dates are aimed to be gathered directly from the administrator of the system, as a first-hand information.

3 Methodology

Under methodology section, data collection together with the details of interviews, which is the method used in this study, are introduced in details. The profile of the companies and people involved in the interviews, interview questions and also the data analysis process are the main titles of this section which ends with a review of validity, liability and objectivity.

3.1 Topic Selection

The idea of this study has started with the project called CAFE (Competitive Advantage by Safety) and a specific work package in the same project which focuses on investigating incident reporting. The aim is to focus on several issues concerning incident reporting, such as comparing the international reporting system examples, investigating the experiences of the companies on near-miss reporting among other safety related issues (CAFE, 2011).

The information collected from the interviews are to be used in the CAFE project as well as it is in this study. The project is coordinated by the Kotka Maritime Research Center in Finland together with the members as Centre for Maritime Studies at the University of Turku, Aalto University School of Engineering, Turku University of Applied Sciences and Kymenlaakson ammttikorkeakoulu University of Applied Sciences. The project is funded by the European Union together with several partners and the time span for the project is from October 2010 to August 2013 (CAFE, 2011 & Merikotka, 2011).

3.2 Data Collection

According to Glenn (2010) research question is the first step that actually determines the method. His opinion about qualitative research is that it is more human centered and tries to find out the solutions by asking *how* and *why* questions besides *what*, *where* and *when*. Qualitative research as a method of research is actually an old method, however, during the time when quantitative methods were introduced, it lost a bit reputation which was gained again in 1970s.

In many previously made studies, (Lee, 1998 – Schaaf & Kanse, 2004 – Håvold, 2010 – Oltedal & McArthur, 2011), about safety culture, reporting practices and bias in incident reporting, among different industries, quantitative method of research were used as structured questionnaires, diary studies, and afterwards, they are analyzed by applying mathematics and creating graphs as Glenn (2010) mentions that is not the case with the qualitative research. Questionnaires and similar methods can be useful to collect supplementary data in a specific issue in contrary to a widespread subject including people from different ranks with different experiences (Rugg, 2007). Furthermore, Guldenmund (2007) questioned the use of questionnaires, specifically, in the research of safety culture

issues. According to him, questionnaires are the method for making quick categorization and comparison and hence, deciding further research group, for instance. Therefore, in this study, where the aim is to get answers to What? and even to Why? questions, questionnaires are not preferred.

Interviewing is one of the ways of gathering qualitative data. There are 3 types of interviews as: *structured*, *semi-structured* and *unstructured*, where all are self explanatory by their names. In this study *semi-structured interview* type is used which includes preset topics within a frame, but at the same time allows the interviewees to bring some interesting points. Moreover, preset questions are generally *open questions* which requires more information from the interviewee than barely 'Yes' or 'No' answers which are required by *close questions*. There is a risk with open questions that the topic can spread away than it is intended and which is hard to categorize and analyze (Rugg, 2007). This problem is minimized in this study by carrying out a deep search inside previous studies to be able to find out the best questions covering all the aspects, which is intended to investigate inside a very clear frame in order to make the interviewees to stay inside the limits.

Direct observation is also used as a supportive data to the interviews made on board by joining the vessel for the trip. Observation, as a method, has an advantage of whether supporting and maybe more clarifying to the answers that have been told by the same people or realizing the contradictory between them if there is any. There is no oral communication in observation which makes it less filtered. Besides, if everything is in order for making the observation and if there is a bit of luck, it provides quite sufficient data in all respects (Rugg, 2007). In this study, spending some time in the bridge with the officers, in the mess room with all crew together, watching maneuvering and mooring and visiting the engine room have provided a clearer idea about some core points that the interviewees refer to as an answer, reason or solution to the questions.

3.3 Details of Interviews

This section includes the interview questions and explains how they are formed and how they are analyzed afterwards. Besides, a detailed overview of participants of the interviews is provided to enable the readers to get a deeper understanding of target group.

3.3.1 Overview of Participated Companies and People

Totally 32 people were interviewed which includes 4 DPAs, 1 Superintendent, 1 Insjö Administrator from shore side, 6 masters, 4 chief engineers, 5 chief officers, 1 officer and 10 Able Seamen. 20 of those were Swedish, 10 were Finnish and 2 were Filipinos. All the participants were males. Ages were approximately between 25 and 65. All the companies participated are believed to have achieved a good level of safety both on board and on shore. It is decided, for some of them, according to their contribution to Insjö database, for the rest, according to their interest on the safety related projects.

Companies and people involved in the interviews were told to be confidential, therefore, they are named as numbers. These companies have been chosen according to their involvement in the safety related projects which are held within European Union and/or Nordic countries. Besides, their contribution, interest and initiations in the external reporting systems within Sweden and Finland. Therefore, they are considered as being on top-of-the-list concerning safety level in their organization.

Company 1 is a Finnish company having 7 Ro-Pax type vessels. They operate both cruise and route traffic. The interview was carried out with the Superintendent of the company who is the first responsible person that takes care of the reports sent by the vessels. In the company, they were in the process of organization where in the existing organization DPA is also a member of Board Director which makes his duties a bit different than that of a normal DPA's. In the planned organization, another person is intended to be DPA and take over its duties.

From Company 1, people on board in two different ships were interviewed. 1st ship was at port and the interview was carried out with the Master. He has long experience, more than 10 years, both at sea and on board that ship.
Interview with the people in the 2nd ship was carried out during a day trip in the route traffic. Master, Chief engineer, Chief officer, a Deck officer and 2 Able Seamen were interviewed during the time. All have long-year, more than 10 years, experience both at sea and in the company, except one AB. He was a temporary worker who had a training period to complete to reach a specific rank. They were all Finnish.

Company 2 is a Swedish company which is a part of big business group. The business area that the interview was carried out was the company having ferry lines, Ro-Pax vessels and also cruise traffic.

From Company 2, people on board in two different vessels were interviewed during a-day long voyage. Master, Chief engineer, Chief officer and 2 Able Seamen were interviewed from each ship. They all had more than 10 years experience at sea. They were all Swedish.

Company 3 is a Swedish company whose business areas have different sections having off-shore vessels together with Ro-Ro carriers. They have offices in Sweden, Norway, Finland, Russia, UK and they are opening a new office in Denmark. The interview was carried out with 2 DPAs. The interviewees had the insight to Ro-Ro part of the company.

From Company 3, people on board in two different Ro-Ro vessels were interviewed while they were at port. Master, Chief engineer, Chief officer, one AB and 1 Repairman was interviewed from the first ship. Master, Chief officer ad 2 ABs were interviewed from the second ship. A master was Finnish and 2 Abs were Filipinos.

Company 4 is a Finnish tanker company having various types of tankers and some tugs. DPA of the company was interviewed. Unfortunately, on board interviews could not be arranged from this company.

An Insjö Administrator was interviewed to get a better understanding how the data analysis and feedback are carried out on that side and why they believe that an external system is beneficial to have.

3.3.2 Question Formulation - Interview Process

Rugg mentions in his book '*A Gentle Guide to Research Methods'* (2007) that there are 2 types of questions in the interviews, *open* and *close questions*. In the close type of questions the interviewee is expected to give short answers such as 'Yes' or 'No'. In contrary to close questions, for open type 'What', 'How' and 'Why' questions are asked more frequently which requires more information and

more opinion about the issue. While creating the questions, this fact was taken into account. It is supported by a literature review to determine the general frame of the interview. In order to avoid the spread of the interview out of the frame, a small briefing was provided to interviewees about the study at the beginning of the speech. Briefing is an important element of interview studies and the difficulty in providing a sufficient briefing is dependent on the balance between the information that people want and that of they need, especially when the interviewee is an expert (Rugg, 2007). Therefore, utmost attention was paid to briefing.

Both open and close type questions were included in this study, however, it is endeavored to include more open type questions. These questions are grouped according to;

- Ø The reporting system in use in the company, number of reports made so far, advantages, disadvantages of the system.

- Ø Ideas about an external reporting system such as, Insjö / ForeSea. Are any of these in use?

- Ø Comparison of internal and external systems.

- Ø The feedback process together with follow-up.

- Ø Near-miss reporting and its effect on creating and improving the safety culture.

In addition to these questions, anonymity in reporting, blame culture, a kind of rewarding system to encourage reporting more and the differences in understanding safety culture between management and shipboard personnel issues were touched on. It is the nature of semi-structured interviews.

Participants of the interviews were native speakers of Finnish and/or Swedish, except an Estonian officer and 2 Filipino ABs. The language of the interview was in English which can be interpreted as an advantage, because there was no need for any translation process which can cause uncertainty or misunderstandings. Besides, it was a foreign language both for the interviewer and the interviewees which is an advantage of being more open in giving ideas and feeling more comfortable in using the language, where it could be a bit stressful to build the conversation between two people in a language which is the mother tongue for one person but not for the other. There could be difficulties at the level of conversation and understanding.

All the interviews were carried out face-to-face in the offices of the companies or on board the ship. All of them were recorded by a voice recorder. They were written down as soon as possible, usually the day after, when the reflects of interview and the information were still fresh.

Interviews on the company sides were carried out first, before going on board the ships. They were informed about the subject generally. On the ship side, they were either informed by the company people with the e-mail prepared by the interviewer or directly contacted by the word of the DPAs. All the company people were interviewed in their head offices. Insjö administrator was interviewed in a conference. The interviews on board 3 ships were carried out while they were at port. In the remaining 3 ships, interviews were carried out during a trip. An interview with a company responsible person took approximately 1 hour. Interview with the master or an officer took around 45 minutes while it took 30 minutes with an AB.

3.4 Data Explication

Interviews, as a qualitative research method, should be interpreted by the researcher and results should be drawn clearly for others to take the benefit from it (Jacelon & O'Dell, 2005).

Phenomenological approach is one of the methods used to analyze qualitative data. The focus is the experiences of people and their perception of the world. It is to understand how an existing reality is seen by the others (Research Methods, 2006). Therefore, the title of 'Explication' is used instead of 'Analysis' since it doesn't fit exactly to phenomenological approach. Analysis requires data to be broken into parts whereas explication is the explanation or unfolding of the existing phenomenon (Groenewald, 2004).

One of the challenges with the phenomenological approach is that researcher should put aside the pre-understanding of pre-existing or emergent theory; even though in many methods it is allowed to use those theory to make comparisons. It is believed to be hard to ignore the pre-understanding. However, it is important to avoid interpretation of the data, instead it is to unfold it and expose the variety of perception of the participants (Thorne, 2000).

All the interviews made for the study were recorded by the permission of the participant. They were listened back and written down as soon as possible; later same day of the interview or the following day. They were written according to the same order of the interview questions to make it easier to compare while writing down the final results. Results are the subjective ideas/experiences of the participants.

3.5 Validity and Reliability

Validity and reliability are the concepts to explain the quality of a quantitative research and always gained criticism that they are not completely applicable to the qualitative research in the same meaning (Stenbacka, 2001).

The validity of a research is questioned by whether the intended measurement has actually been measured or not. However, in the qualitative research the aim is not to measure something. Therefore, according to Stenbacka (2001), if we look for validity in a qualitative research, we should focus on finding out if the phenomenon is valid which means that if it is in a problematic area and the participants belong to that area. Besides, the participants should be allowed to express their idea freely on their expert areas. Therefore, when the phenomenon is decided and when the participants are well-chosen accordingly, validity is achieved in the qualitative research (Stenbacka, 2001).

Stenbacka (2001) discusses reliability concept for the qualitative research as well and states that the main issue with reliability is to be able to produce the same results by the time which proves the ability of measurement method. She believes that since there is no measurement in the qualitative research, the term is irrelevant. If the reliability of a qualitative research to be questioned, it should be looked for in the whole process of research, such as preparation, data gathering and analysis and whether all these are visible (Stenbacka, 2001). We can match this conclusion also with the idea of Patton (2002) that the reliability is the consequence of the validity in a study.

Under the light of above explanations to the concept of reliability and validity in qualitative research, it is believed that in this study validity is achieved by choosing the participants in connection to the selected phenomenon and they are given the opportunity to speak freely with semi-structured interviews. As a result of achieving validity, reliability has automatically succeeded in addition to making the whole process visible.

4 Outcomes of the Interviews

In this part findings from the interviews are to be listed, separately from the shore-based and onboard organizations' perspectives, respectively. At first, existing reporting practices are to be explained and then the answers to the questions which came up from scientific review to investigate deeper and/or non-researched issues are listed under sub-chapters.

4.1 Interviews with the shore organizations

4.1.1 Reporting practices

3 out of 4 companies use IRIS system on board vessels to report near misses. One uses the AMOS for 4 years. These softwares serve to same purpose with differences in appearance, usage and ownership of the softwares. One of the companies which has been using IRIS system uses it for 7 years, while the other two have been using it for around 1,5-2 years. In all the systems in use, everybody onboard has the access to make reports. No interviews on board the ships that the AMOS system is in use could be made. Therefore, there are no reflections of people on board about that system.

In one company, superintendent is the responsible person to take care of reporting. In the other companies, DPAs are the responsible persons. All of them believe that the number of reports have been increased when they changed to existing computer system, from a paper system or another computer system which is not easy to use. In one company DPAs say that number of deficiencies written by port state controls have been decreased in the recent year and they believe that it is due to having a better follow up with this system. They all state that making report in the existing system is very easy. DPA of the company which uses AMOS believe that even though the system is easy to use when someone is used to it, it is still not very user friendly. Therefore, they are changing to a new version of the same system which is more simple. It is expected to be implemented fully to all ships by the year 2013.

The best statistics from these companies is approximately one report per ship per month. In one company this number is a bit under this average. All of them believe that this number doesn't show the reality and they should be better at reporting. The content of the reports is mostly technical issues about equipment failures. One DPA compared the content as 60% technical errors, 40% human mistakes. Many agree on that it is easier to report technical failures.

The number of reports collected in the reporting system has not been investigated systematically, since the aim of the study is more qualitative based. However, below table shows a brief statistics from the companies regarding the number of near-misses reported, together with the number of ships they have and for how long time they use the reporting system:

	Number of vessels	Number of near-miss reports	System in use for how long
Company 1	7	8 reports per vessel/year	1,5 - 2 years
Company 2	10	12 reports per vessel/year	7 years
Company 3*	13	Less than 1 report per vessel/year	1,5 – 2 years
Company 4	11	12 reports per vessel/year	4 years

Table 1[3] Statistics showing number of near-miss report in 4 interviewed companies

* It should be stated regarding the Company 3 that they operate in a business area with different type of ships, other than Ro-Ro vessels which are the focus of this study. In that area, the reported near-misses are 3 times more than the number showed in the above table. They say that they aim to bring all the business areas to the same level.

Three out of four companies advise their crew that they should report everything. The DPA of the fourth company believes that if they are advised to report every small detail, reporting losses its importance and reality. He thinks that crew can make that judgment what to report and not to report. He say that the way to achieve making crew capable of deciding themselves is communication. They put near miss reporting in the agenda for all the safety meetings and encourage them discuss near misses there. After discussion, he says that probably 9 out of 10 happenings end up with formal reporting. Half of the participants believe that getting more reports should be the first goal, while the the rest think that there is more need in good quality reports.

They all think that number of near misses is not an indication of safety level on board. The Superintendent says that number of accident can be an indication because they can not be hidden, must be reported. Since not all the near misses are reported, there are hidden ones, they can not be an indication of anything. Two DPAs give an example of two masters that one reports many while the other report 1 or 2 or not during their contract on board. They add that the safety level on board these two ships are the same. The master who doesn't report many thinks that they have already discussed and took the action on board and there is no need to share it with the others, whereas the other master thinks in the opposite way. Therefore, they say that it is not an indication of safety level on board.

4.1.2 Feedback and follow-up

Feedback process works quite similar in all the companies with small differences. In three companies reports come to the responsible person for the reporting system, DPA or Superintendent, then distributed to technical or marine superintendents depending on the nature of the near miss. In one company it is distributed to all superintendents. In one company reports are handled by the superintendents first. After all, DPA gets the report and add his ideas and forward it to the ship. In the same company, DPA makes a self-criticism that they are not very good at providing a fluent and quick feedback. He says that it is due to operation department of the company. The Superintendent are not very good at checking the reports frequently and taking actions as quick as possible. He says that they see reporting as the duty of the ISM Department only. Therefore, he reminds them all the time to take care of the reports which is a time consumption. In the other company an approval from the ship that they acknowledge the receipt of the reports is received. Otherwise there is no follow-up system in any of the companies to check whether the preventive actions have been implemented on board or not. The Superintendent says that even though they receive an acknowledgement they never know if even the lowest rank has received the information. In one company completed reports are shared with all fleet. In the others, it is shared with all fleet or only with sister ships depending on the subject of the near miss. In one company there are time limits to handle a report which comes from the ship, such as 3 days to take care of it; forward it to responsible technical or marine superintendents and 3 months to take the complete action and close the report. Others try to make the feedback process as fluent as possible. In the IRIS system there is a 'lessons learnt' section where safety alerts and all the near misses from other ships of the company are listed. Masters have access to that section. The company using

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[3] Source: Statistics of participated companies

AMOS system prepare a quarterly report including all near misses and non-conformities and share it with all fleet.

4.1.3 Anonymous reporting - Blame culture

There is also a possibility to make anonymous reports. Even though 2 out of 4 companies has never experienced any anonymous reports they all agree that it is good to have the possibility. In one company an anonymous letter was received by Filipino crew which was a complaint about the master on board. DPAs say that they took it very seriously because they see it as an improvement on the rating side that they start to complain with the happenings that they are not happy with. In another company one anonymous report was experienced as well. DPA says that it was a serious case and they did further investigation to correct it.

All the companies believe that they have achieved no blame culture and everybody on board is aware of it. In one company DPAs say that they have made a remarkable improvement on that in the recent year and they should still continue on the same way. The Superintendent of the other company thinks that achieving no blame culture doesn't have a big effect on reporting, that they already achieved it and many of the crew members have been working in the company for many year, however, they are not at the desired level so far. Another DPA says that company side should repeat the importance of reporting all the time and show the crew members that reporting is not exposing their inability. It shows, on the contrary, that they are clever enough to bring up problematic issues to correct and prevent them happening again. All agree on it is a matter of time to create and increase the safety culture on board continuously. They say that no miracle happens in the maritime industry from one year to another.

4.1.4 Campaigns to increase reporting frequency

Three out of four companies don't have any kind of rewarding or performance system to encourage increasing the number of reports. One of these companies believe that it is worth to try and it can help to increase reporting practices. One DPA says that they discussed that idea in the company and decided that it is not a good idea to connect safety with some money. He says that they support innovations, but safety is something that should be built as as culture. He adds that they care about safety more than anything and try to show it to the crew. For instance, they provide an extra fire training for the crew which is not required by the Administration. He adds that it is actually a big cost for them. However, when it comes to emergency preparedness and people's readiness to it, that is worth to spend. Another two DPAs don't support the idea either. One of those say that it is better to include safety issues more during the education process of young seafarers. In one company there is a performance system in place for almost a year. Near miss reporting has 10% influence in the matrix. DPA says that they are planing to increase the percentage to 15% - 20% in the coming year. He says that there is a little increase in the number of near misses compared to last year although they have 2 ships less this year and he believes that it is because of the performance system. When it comes to the quality of the reports, he says that it is dependent on the individuals; some are good at writing, reporting happenings whereas some are not. In the same company there are remarkable differences in the number of reports among the ships. According to DPA it is due to the management in the ship. Some are more sensitive to safety issues while some are not. In the other two companies there is not a big difference in number of reports among the ship. In the fourth company there is a difference between the industrial shipping section, where there are Ro-Ro, bulk carriers, and off-shore section. They think that it is due to having more strict regulations and demands from oil companies on the off-shore side.

4.1.5 The usage of an external reporting system

Companies using IRIS system contribute to Insjö as well, as the system has automatically connected to it with a button. Company using AMOS has no connection with Insjö, or ForeSea, therefore, they haven't sent any report there. No interviews on board the ships that the AMOS system is in use could be made. Therefore, there are no reflections of people on board about that system.

IRIS system is connected to Insjö reporting with a button, which means that by just pressing the button the report which comes from the ship can be sent to Insjö. Afterwards, a similar report from the Insjö database is received as an e-mail, to be shared with the ships. In all the companies that contribute to the Insjö, not all the reports are sent. Responsible person in the company selects the reports that are thought to be helpful for the other companies and ships. The Superintendent criticizes the external systems that they are not well presented. Some small companies need them more as they don't have enough resources inside the company, however, they are not very familiar with the benefits of an external system.

The company using AMOS system has no connection with an external system. DPA says that he has the log-in to the ForeSea system, however, he hasn't entered any report there. He says that it is time consuming to enter a report manually that he hasn't time for that, and the only way to make it work is to connect the system to the one they use and make it as easy as possible to send a report there.

All of them agree on the idea of having a more international external sharing system. They insist on that the only way it can work is to make it as simple as possible to use. A DPA says that even though they are happy with Insjö, a more international external system means more reports which may have a disadvantage for the people on board and their time to put on reading those reports. He says that he has asked the people on board and the answer is that they don't have time for it. He thinks that it is not good but it is the reality we have. However, he emphasizes on the importance of learning from each other.

4.1.6 Barriers to reporting

All the companies complain that there are not many reports coming from the rating side. The company using the reporting system for longer year than others say that they believe the reporting system is implemented completely on board the ships, however, including the rating side actively in the reporting process should be their next goal. According to companies some barriers to reporting are;

- Ø Natural human behavior; hiding mistakes, being ashamed,

- Ø Human tend to obey the rules. Near miss reporting is not perceived as mandatory by many seafarers yet. The Superintendent gives an example of high ranked officer in their ships who consistently resists to report. He says that whatever company procedures tell about near miss reporting and its role in the ISM Code, he still thinks it is voluntary and he refuses to do it.

- Ø Cultural differences; in one company DPA says that when they first started to work with Polish crew in one of their ships, it was the worst ship in number of report, however, they were very good at taking actions and keeping the vessel in good condition. He says that it was the feeling of shame that restricted them to report. Therefore, they decide to go on board and tell the crew that it is about their own safety. He says that when people are convinced that it is beyond being a 'must' or a 'procedure', they are more successful at reporting.

- Ø Non-user friendly system; DPA of the company which uses AMOS system thinks that it might be the reason for specifically the rating side not to contribute reporting. He says that the system

is still too complicated for many of them.

4.1.7 The role of near-miss reporting in creating and enhancing the safety culture

All the company people say that near-miss reporting is the vital part of ISM Code and it is the way to create and enhance safety culture on board. The superintendent says that learning from mistakes, sharing experiences create resources for the company. He says that everybody on board and in the company has a high workload of carrying out many duties. If near misses are shared more, workload becomes less by learning from each other and making use of them, instead of being surprised and losing time to correct them when they are suddenly experienced. A DPA adds that it is the company's duty to make the system as simple and practical as possible for the people on board. He says that the idea of safety culture should be implemented in the company's top management at first in order to be successful at adapting the same culture on board.

4.2 Interviews onboard

4.2.1 Reporting practices

When people on board were asked to compare the system they use now with the system they used before, in most cases it is a paper system to make reports, different ideas has come up. Most of the participants think that computer system is easy to use and most agreed that it has created more and easier follow up. Besides, there is an idea of that it also included more people into reporting. Many masters state that it has provided the possibility to see the reports from the other ships of the company which they can also benefit from. Some state also that number of reports has increased after changing to computer system from the paper version. However, many don't connected the number of reports to the system change. All are agree on that safety thinking has been increased when compared to 10 years ago, but the number of near miss reports hasn't shown the same level of increase. One master stated that he prefers paper system which is more tidy and they can store them in the files. He feels that in the computer system the reports disappear somewhere. Another master and a chief officer stated that paper system feels a bit more usable while adding that computer system should be much easier and better, however, it is only technically implemented. Therefore, their minds are still on the paper reporting version.

Many of the participants agree on that number of reports is not a direct indication of safety level on board. Most of them say that they often discuss the happenings and take the actions immediately, however, they don't make any report. They believe that their ships have high level of awareness even though it is not reflected by the number of reports. Another idea is that in some ships everything could really be in order and there exists not so many to report. Therefore, comparing the vessels by looking at the number of reports that they produce doesn't give an idea of safety level on board that ship.
Two masters and an AB think on the opposite side. They believe that a ship reporting more than others would have a higher awareness on the safety issues.

4.2.2 Feedback and follow-up

When it comes to the feedback from company, everybody agrees on that it is important to get feedback, especially fluent and practical feedback is desired by the officer side.

In one company, a master states that he is not happy with the feedback from the company due to it is being very late. He gives an example to prove that the reports are not read frequently by the DPA when they had a problem with thrusters they sent many reports about it but couldn't get any proper solutions. Then, they decided to solve it via telephone or mail communication. In the same ship chief engineer evaluated the feedback from the company is being in the middle. He says that they should visit the ships more rather than writing down the regulations from the book. Chief officer of the same ship also states the similar idea that he is not happy with the feedback at the moment, because the company has recently faced an organizational change, it is a bit on the worse side now. He believes that it will soon be improved.

One master and two chief engineers say that the quickness of feedback is dependent on the nature of the near miss. Some of those require more time to take actions. For the others, the action is usually taken already.

A chief officer state that he is happy with the feedback but its distribution to all people on board is strongly dependent on the master, because he is the one who reads the reports from the system first. Therefore, he says that if the master is not interested in safety issues enough, it is possible that the information flow stops there.

In the company where the reporting system is in use for longer years, officer side is quite happy with the feedback. A master criticizes the evaluation process afterwards. He prefers more active follow up with the company and together with sister ships when necessary.

Rating side get the feedback during the safety meetings, or some reports, safety alerts are posted on a board that they can read. It should be mentioned that only in one of these companies, all crew are included in the safety meetings. In the others, the highest rank from each department takes part in those meetings. ABs who don't participate in the safety meetings generally happy with the system. They wouldn't like to participate in other words. Same Abs say that they get a kind of feedback a couple of times in a year and they are also happy with this.

4.2.3 Anonymous reporting – Blame culture

All of them state that they have never experienced an anonymous reports. In one ship, master states that the usual practice is to discuss near misses in the safety meetings first, therefore, there is no usage of anonymity. Most of them believe that it is good to have the possibility due to cultural differences or different personal perceptions. However, there are exceptions. Two masters state that a near-miss might be seen as a small happening and it might be fine to stay anonymous, however, some of those near-misses might require further investigation which includes specific questions about the happening to the person who experiences it. Therefore, the person making the report should put his/her name under it to make further investigation. The situation can be dependent on that person's safety perception, for instance, some happening may not be that dangerous from the view of chief engineer.

A master states that since they believe that there is no blame culture in the company, therefore, there is no need for the anonymous log-in to the reporting system.

A chief officer says that even though it is called anonymous, it doesn't work anonymous in all cases. Due to the nature of the happening, anyone can understand who has done it. He gives an example of occurrence during mooring maneuvering in which the fault can easily be seen as the master's and he hasn't made the report.

Another chief officer and a chief engineer state that it has both advantages and disadvantages where it might be used for personal purposes.

One AB says that it is not very important to have anonymous reporting. Another AB states that he is not sure if there is a need for it.

Another AB states that he doesn't want to include his name under a report while he says that there is no blame culture in the company. He states no reason why he wants to be anonymous.

All the participants state that there is no blame culture in their company. A chief officer says that there was a bit blame culture in their company before but they have improved a lot on that side in the recent years. Many exemplified it that when they report a serious happening to the company they never ask a name. One chief officer tells about a small accident where they hit the berth due to wrong indication of propeller. Company listens to VDR records after the incident however, no one is blamed. On the officer side many said that there is no blame culture and they believe that rating side is also aware of that. On the rating side again many directly say that no blame culture exists. One AB, who is a temporary unexperienced worker on board, states something about being insulted by some old experienced seafarers. He adds that they are not many but they still exist. A few chief officers support his expression by saying that usually the barrier is not due to being afraid of being blamed, but often due to the feeling of shame. They say that on the rating side they haven't got the culture of seeing near misses as purely near miss, but they perceive them as being not capable of doing their job. One other chief officer says that there is no blame culture on the company side but there is still a blame atmosphere on the ship side in some of the ships. One chief engineer state that there is still blame culture on the ship side. He supports his idea that before he became a chief engineer he worked with many other chief engineers and masters who are still working in the company and they look for a specific person when something happens. A chief officer believes that the trust between the ratings and the officer side is beyond the blame culture that company has already achieved. He says that they are the ones who carry out many jobs on board. Therefore, they are the witnesses of near misses. If there is no trust to the officer, they prefer to hide the happening most of the time.

4.2.4 Viewpoint of the seafarers to a rewarding system

A rewarding system, with a bonus, to encourage more reporting sounded not being the right approach to safety thinking according to many participants. They believe that it should come naturally and there is no need to increase the number necessarily. However, there is a need of safety culture and reporting qualitative near misses. In one company, innovations are rewarded. A chief officer and a master state that innovation idea is a good approach, while another chief officer says that the reward is too little. Therefore, people usually prefer no to share their brilliant ideas for a small bonus. He gives some examples of shore companies form other industries where the innovations are rewarded with higher prices. One chief officer states that maybe it makes people more aware of near miss reporting when there is a reward. Another chief officer states a similar approach that it might be good to make people aware and increase the number of reports even though many of those reports could be unnecessary. A master and an AB say that it can be tried. Another AB also believes that it is good to state some goals too reach, such as a certain number of report in a year. Therefore, it is good to try. One master says that it is not the right approach, however, maybe the best report of the year, within the company can be rewarded. Finally, one Ab is not sure what to say about that kind of system.

4.2.5 The familiarity with the external reporting systems

Most of the participants are not very familiar with the external systems, such as Insjö, ForeSea. When they are mentioned a more international system many find the idea helpful and states that we can learn from others' experiences and sharing mistakes with each other.

One master state that he visited the Insjö's website, but couldn't go further into reports, due to limited access. A chief engineer proposes that if it becomes more open for people to search inside the database, it would be better for them to search about the issues that they are interested in. Another chief engineer says that the only way it can work and to make people make use of it is to make the reports as short and clear to read as possible. Otherwise, people lose interest in reading long, written with a hard language reports.

A master says that in the existing system there are not so many companies contributing, therefore, it is easy to guess where the reports come from. When it becomes more international it becomes more anonymous and maybe people become more willing to report there.

A chief engineer says that it could be very helpful, especially learning from the near misses which happen very seldom.

Many has concerns about having so many reports that can cause a risk of ignorance. They add that if it works properly, it becomes helpful.

Most of the ABs say that they can be interested in reading reports from other companies. One states that it strongly depends on the personal interest and not all the people interested in reading such reports. However, it is good to take attention of those people and start the improvement process with them.

Many state that reading or making reports is not a workload.

One master states that they don't have time to read reports coming from an external system. He believes that a person can only learn from his/her own experiences/mistakes. According to him, some reports coming from classification societies are helpful, but to a certain extent, not very much.

4.2.6 Barriers to reporting

As a general view, officer side think that the number of reports they make in their ships doesn't show the reality, there are some hidden ones while on the rating side the general thought is the number shows the reality, there are no hidden near misses. This result is subject to a few exceptions on both sides. When the ones that are not satisfied with the number of reported near misses are asked about what could the main barriers be not to report which is resulted as below;

- Ø Being ashamed, not blamed. A master says that when the ISM Code first implemented in the company, many of his colleagues thought that they were subjected to expose their skills.
- Ø Matter of age. Some believe that younger generation is more aware and sensitive to safety issues while the older ones see it as an extra work.
- Ø Time restriction. While many on the officer side see near miss reporting not a workload, rating side often see it as a workload that they say they don't have time for it. They see it as a part of their work, therefore, they don't want to spend their free time to write down reports. Although it is seen as a work, it is still perceived as an extra due to having so many other duties to carry out first.
- Ø Pure laziness, nature of seafarers and traditional nature of maritime industry. It is believed that new things gain resistance from seafarers at first and it takes time to implement them. Usually, action is directly taken to avoid a near miss at firs place, however, it is forgotten ot ignored to make the report afterwards.
- Ø When the person to whom they report, such as chief officer or another officer for a rating, doesn't show so much interest or say that it is not important enough to report it or doesn't pay a remarkable attention, then people feel discouraged to report again and again.
- Ø 'Nothing is wrong in my ship' approach. A master says that many of his colleagues think this way that they don't want to show weaknesses of their ships.

- Ø Interpretations of rules are made differently by the countries. Therefore, it is hard to build up a common behavior to safety thinking.
- Ø Time restriction to put more focus on it. A chief officer states that it is important to communicate with the crew and tell them the importance all the time. However, some other duties, such as handling the invoices in a Ro-Pax ferry, some other paper work, take so much time of them, especially the time of chief officer and master. Therefore, they can't find enough time to spend with the crew, which is a disadvantage on the creating safety culture.
- Ø No clear definition of near miss – Not being sure of what to report and not to report. A chief engineer says that it would be better to have a more clear definition of the near miss. A chief officer states that it is hard to make the judgement of what to report and not to report. Therefore, that would be good to have more information flow to see what other ships are reporting, and to compare them with the happenings on our ship and then probably deciding what to report would be much easier.

4.2.7 The role of near-miss reporting in creating and enhancing the safety culture

When it comes to the effect of near miss reporting in creating and enhancing safety culture on board, majority of the participants think that it is important with many of those say that it is almost the most important improvement which was brought by the ISM Code. According to them, it has an effect from different aspects, such as;

- Ø Sharing experiences and avoiding possible serious accidents,
- Ø Some near misses happen very seldom. Therefore, it is good to share them,
- Ø It is also an indication that the safety culture has been created on board and that there is a free atmosphere to report openly. They are all connected to each other.

One chief engineer says that since they don't report many near misses, they don't have an effect on the culture on board as today. However, it will in the future.

Only one master states that near miss reporting is a workload. Safety meetings, discussions are enough to share and take actions, therefore, we can live without near misses. He adds that communication, team work, open culture and discussing the happenings are the ways to keep the safety level up all the time.

4.3 Insjö and future plans with ForeSea from the Administrator of the systems

The information provided in this section is a very brief explanation to get an insight to latest situation on the Insjö side and what the plans are with the new developing ForeSea. The administrator of the systems was interviewed for this purpose. Information gathered from the interview is to be presented here. There are other studies which provide more information about Insjö, such as Zachau (2008) *'Near-Misses and Accidents in Proactive Safety Work. A study of human and other factors in near-miss and accident databases'.*

The idea of starting a system like Insjö was a request from the Swedish shipowners. 30 companies gathered together and created the initial database for Insjö. Then they worked on the taxonomy. According to Insjö Administrator the major difference of the Insjö system from many other similar systems is, it is a collection of what ships send to the system as a near miss. Many other systems collect

specific happenings such as only navigational errors to make an easier categorization. He says that when a system is built from what you want to gather it doesn't serve to everyone and also failures occur in the system.

Reports coming to the system are evaluated by him. Some information are removed to comply with the anonymity of the companies and ships. There are 60 companies which are members to Insjö. DPAs have access to the system to make search but not full extent. Active companies are less than 10 and only a few of them make complete reports. He says that many times reports are not full that all the required information is not provided. There is a call back function and he sac turn back to DPAs and ask to provide more more information. The companies using IRIS system are the most active ones, however he says that there are also other computer system which are connected to Insjö with a button like IRIS. As a company type, tanker companies are the most active one. He believes that it is due to the requirements of oil companies and those companies have a better culture both on board and on shore.

There are 2639 reports in the system so far and nearly 29 different taxonomy is created which he says that it is sufficient.

According to him the reason for poor reporting should be searched in the company side. Creating the reporting culture is the duty of company to a large extent. To convince companies sending reports to Insjö can be achieved by showing them that they can make use of the system, such as taking the benefit of 'lessons learnt' section which provides them advance actions to take before making the mistakes themselves.

They have meetings with DPAs of contributing companies to Insjö twice a year. These meetings have very beneficial outcomes for Insjö. Even though companies have different approaches to near miss reporting, they see that the problems they have with safety issues are very similar and they are not alone in their organization.

He believes that if a ships sends at least 10 reports in a year which can be forwarded to Insjö, they will have very good database of reports. Nowadays, 1 report is entered in the system per day which changes from time to time, such as a bit increase happens before holidays. He says that there is a need for more dedicated middle management in the companies to create a safety culture both on board and in the company.

He says that reports with the reflection of DPAs are much preferred rather than directly forwarded reports. However, most of the companies sent the report coming from the ships directly to Insjö.

The number of reports in the database has shown a continuous increase since Insjö was started. However, there is a bit decrease in the recent years due to changing flags of many Swedish ships.

Feedback from Insjö to the company is given immediately. He says that if the number of reports increases with good quality reports , it becomes easier to give more efficient feedback. As a self-criticism he says that they should be better in 'lessons learnt' and 'safety alert' parts and also feedback function can be improved with providing a search function in the system.

There is a risk assessment part inside IRIS system which he believes that it will be very helpful fro the companies. It is not fully implemented fully yet however it is one of the plans with ForeSea.

In the ForeSea the technical platform is more advanced. There will be a function that DPAs go back to the reports in the system and make additions, in the cases where corrective/preventive actions are taken or improved later. Search function is planned to be more advanced. All the Finnish and Swedish reports

will be translated into English, while keeping the original reports in the system. Planned deadline to start with ForeSea is July 2013.

4.4 Best-Practices in summary

- Ø Trying to design a reporting system which is one of the central tasks to create a 'just culture' (MCA, 2010). Although implementing a properly working system is a very hard process, being aware of it and has already taken some steps into it is the good sign.

- Ø No blame culture is reported as being achieved.

- Ø Investment on training. Organizations that make investment on training create the control of their own future (MCA, 2010).

- Ø Open communication among people and trust atmosphere. Discussion brings creativity (MCA, 2010).

- Ø Team work which again brings us to mutual trust, effective communication issues. It is easy to define what a team is and how a team should work to achieve the goals (MCA, 2010).

However, in reality it is not that easy to implement team management. It is hard to say that the observation part of this study is sufficient to claim that team management has been achieved in the target vessels. However, especially the interviews that were carried out during a trip which provides the possibility to monitor some operations on board and some examples given by the crew members about how they handled some situations, even though they were not reported formally, draws a clear line that they are very well aware of the importance of working as a team.

4.5 Further research - Recommendations

A few participants have had individual experiences in the airline industry. While discussing reporting and safety culture, they often mentioned it and tried to compare shipping with the airline industry. They say that the safety thinking starts at the clap/amateur level no matter if it is civil or navy or small aircraft and the same quality is achieved for all of those in the airline industry. However, in the maritime industry, there are small boats, sailing yachts which are regulated or controlled by different organizations. The problem is that they all navigate in the same waters. One of the masters made me listen to a communication, that he had recorded, between his ship and another ship which they have a close-quarters situation. It was a tanker and even though she was the give-way vessel, according to COLREGs (The International Regulations for Preventing Collisions at Sea), she didn't take any action. When she was called on the Vhf, the communication was ended up with a big misunderstanding by that ship again, which changes the situation completely and makes it even worse. Master's criticism was both about education and the high bureaucracy of the maritime authorities. The education of seafarers seem to differ among countries. When an incident happens, a report is required to make to many authorities in different formats which makes bureaucracy higher and how this is to be avoided in the airline industry. When companies are the authorities to form their own SMS (Safety Management System), differences in the quality becomes bigger. Should Administration take an initiative? Although the industries differ a lot from each other in nature, a further research can go deep into a comparison of two industries.

Another issue has arisen during the interviews was the education of people working in the companies. Is being a seafarer, master or chief engineer, enough to work in the management of the company? This might be another further research area.

Man Machine Interface (MMI) or Human Machine Interface (HMI) has been mentioned by two masters while talking about near-misses' contents; human error or technical failures. These issues may also be further researched.

More international campaigns take more attention, such as concentrated inspection campaigns by Paris MOU (The Paris Memorandum of Understanding on Port State Control). A similar campaign by the port state or flag state authorities could be an initiative to make people more aware of near-miss reporting.

5 Discussion

The four selected companies are in general regarded as being on 'top-of-the-list' with respect to safety culture within the maritime industry. There would be very few companies believed to have even better safety culture than these companies. Therefore, the views expressed by the people from these companies should be expected as being representative for current best practices within the industry.

From the outcomes of the interviews it is clear that these companies have achieved a systematic reporting system with a functioning feedback between shore and ship organizations. The representatives of these organizations claim that there is an established no-blame culture within their organization.

There are slight differences between companies and also between shore and ship organizations. One major difference is companies using a system to report for longer years, which is shown in Table 1 under section 4.1.1, have a more stable statistics of reports. They show a difference, especially, in the feedback process as well. People onboard working in the ships of these companies are generally, more satisfied with the quickness of the feedback. They don't feel like the reports disappear somewhere in the system.

The difference between the shore organization and onboard organization is that people on the shore side think that corrective and preventive actions to the near-misses should be proposed by the people onboard. They expect this approach for at least the 90% of the happenings. On the contrary, people onboard claim that if they already state the actions and take those actions directly, what are the benefits of reporting to them. They would like to see the shore representatives in the action proposing stage of the near-miss reporting. Or that the shore organization - as they claim that corrective and preventive actions should be proposed by the people onboard - should find some practical ways of showing the benefits of their expectation.

There is also a difference in the understanding of reporting level between the officer side and rating side. Rating side believe that they report sufficient number of near-misses whereas the officers think that there must be some hidden near misses that are not reported due to different reasons.

When it comes to safety culture and the role of near-miss reporting in creating and enhancing safety culture continuously, both shore personnel and people onboard agree that the system has an important role in the continuous improvement of safety onboard and that it should be maintained. However, they actually provide limited evidences or examples to show that they have actually benefited from near-

miss reporting on the safety side, such as any decrease in the number of accidents or incidents which was done by the Norsk Hydro in the late 1980s (Lindberg & Hansson & Rollenhagen, 2010).

As an example, one of the interviewed masters complains about the further follow-up in the system, especially for the rarely happening near-misses. He says that people onboard sometimes lose the track of the investigation of a near-miss after some regular feedback. These cases are usually rarely happening events. Therefore, people onboard expect more information flow on those event from the shore organization in order to fully utilize the reporting system.

Companies seem to lack of utilization of the existing system to create some trends for themselves to see their weak points and in which points they need to make an improvement. Same trends might also be used for the motivation of people onboard.

In the same context, another master mentions that when an accident has already happened, it is easy to connect every small detail to it, as a part of chain theory and safety pyramid (Safety culture Plus, 2008: *Safety Pyramid developed by H. W. Heinrich*). It should be more focused on what to be done before it happens and how to capture the benefits from near-miss reporting and present them to the people onboard should.

The situation with an external system is very similar to the outcomes about the safety culture. People have the perception of that having such a system shows that they are somewhere in the upper level in the safety understanding, however, benefits have not been fully realized or captured yet. The development seems to occur mutually because an external system needs some reports firsts to create the necessary database to give feedback to the users.

Another outcome of this study, which is clearly exposed, is the situation in the maritime industry when it comes to involving the different ranks in the reporting process. When asked, the personnel from the rating side seem not to be willing to make the reports themselves. The results of previous studies (Bourrier, 2005; Antonsen, 2009) showed that all ranks' involvement is one of the fundamentals for the effectively working safety & quality systems in high-risk industries. A chief engineer mentions many important near-misses during the interview which he admits that he didn't reported which he also adds that others could learn from those near misses. Therefore, where the situation is that even there is not full involvement on the officer side – even though there is a difference in the awareness between the officer and rating side generally - putting emphasize on the ratings to write down reports into the system might not be the first step to take.

6 Conclusion

The aim of this study was to look into the near-miss reporting situation in the companies which are known to achieved a certain level of safety culture within their organization. Specifically, it is aimed to find out the level of best practices as practiced in the industry. Even though authorities still are not happy with the number of near-misses reported there are certain points that are achieved by these companies which put them at a high level when compared to many others in the industry.

- Ø A system to make the reports systematically has been created by these companies. It is a part of creating 'just culture' versus 'blame culture'.
- Ø No blame culture seem to have been achieved clearly.

- Ø It is perceived that training has an importance to keep the seafarers up-to-date to safety related issues.
- Ø Open discussions with all ranks and trust atmosphere between officers and ratings seems to have been achieved. This is also connected to the team work.

Observation of the team work has a small portion in the methodology of this study, however, it brought a clear understanding which is parallel to the things that interviewees has mentioned many times.

General reporting practice is that officers make the reporting into the system. Rating side is happy with the existing structure that they report to their nearest boss. It differs in this respect from other industries in terms of including all ranks actively in the reporting procedure.

Anonymous reporting is not common, however, many has agreed that it is good to have the possibility in case any cultural differences or individual differences. There are examples that it worked to take some actions by the company although it is not many in number.

People are satisfied with the feedback they get from the company. Some of them criticized the follow up/investigation process afterwards that people should be included more in it. Besides, an issue about the interaction between technical equipment and human being has arisen. It is called Man Machine Interface or Human Machine Interface. As many of the reported near-misses are technical failures, masters mentioned that they are not purely technical. They are result of interaction between the equipment and the human being.

There are different ideas whether the number of reports is an indication of safety level onboard the ship or not. Many think that it is not an indication because they have discussions onboard and they take the actions immediately but still not report them officially in many cases. According to the majority of the participants from both onboard and shore organization, providing more qualitative and rarely happening near misses to the reporting system is more important with regard to the actual purpose of the near-miss reporting.

A rewarding or performance system is not seen beneficial by most of the participants. One of the companies has recently started such a system which seems to have created a little increase in the number. It is believed that first the number increases maybe but then it should be followed with an increase in reporting qualitative and rarely happening near-misses.

External systems are not very well known but considered as being one step forward in the industry for the countries having it. It is seen as a high awareness of safety issues. Many has emphasized on that it should be as simple as possible to use. Otherwise, it doesn't take attention and people don't use it. A more international system is supported by most of the participants. However, it is added that they should be presented to the industry in a better way. It brings the issue of using the benefits of a system like that. Although everybody is aware of that it is purely beneficial to have the system, they are not very clear about the benefits.
On the administration side of the external reporting system, it is believed that there is a need to improve the 'lessons learnt' part and show the industry how they make use of a national reporting system.

When the whole maritime industry is considered, the outcomes from the interviews as the main barriers to reporting and to benefit from the near-miss reporting are seen as;

- Ø No clear definition of what to report and what not to report.
- Ø The perception of 'exposing one's skills'. Reporting is thought to be showing personal capabilities of carrying out the job. It is a bit connected to natural human behavior of being ashamed.
- Ø Matter of age. Some think that it is hard to make older seafarers to report some happenings.
- Ø Time restriction. It is the opinion of rating side. Officer side think that it is not a workload to write down reports.
- Ø Pure laziness and nature of seafarers who are used to take actions immediately but not put it as a report officially.
- Ø Ignorance by the people to whom the near-miss is told. If the officer or master doesn't show attention to what an AB reports, that person stops reporting after some time.
- Ø Rules are interpreted differently by different countries and cultures. It makes hard to create a common approach to safety issues.
- Ø Time restriction for officers, especially for the master and chief officer, due to having unrelated duties which prevent them to spend time with the ratings. If they have more time, they will increase ratings' awareness of safety by communicating more.

The effect of near-miss reporting in creating safety culture and enhancing it continuously has in principle been seen as important by most of the participants. Many, especially the officer side, have agreed that they should be better at reporting. However, they believe that the reporting will further improve by the time and they are now on the right way.

Although the system is recognized by both shore and vessel organizations, there are no clear results which show that reporting near-misses has brought significant benefits to the safety culture and the performance of the companies investigated in this study, even though these companies are believed to be amongst the best in implementing good safety culture.

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Appendix I

Interview questions to shore organizations and shipboard personnel:

- Ø How is the system they use to report near-misses inside the company? Who does the reporting? What kind of incidents and near-misses are reported? What is the content of reports? How the personnel are advised what kind of incidents and near-misses should be reported and how to do that? How many reports are received approximately per month/per year? How long have they been using that reporting system? Have they previously tried other systems? How have the number of reports evolved during the time they have used the system?

- Ø Do they use any external system? Which system? Insjö / ForeSea? What is the general idea about these systems and their purpose? How can these systems be used as an advantage?

- Ø Comparison of internal and external systems? Are they happy with both or do they see the external system as a 'workload'? Are there any other reasons that inhibit reporting to external system? Are they happy with their internal system. What are the good things in it? What kind of development needs they see in both external and internal system? If they think that external system is not needed, why? Do they think that they can learn from other companies' experiences? What kind of incentives are needed that reports are entered to the external system?

- Ø How does the feedback from company to ship work? How reports are processed after DPA gets them? Is there some kind of analyzing system in use? How are "the lessons learnt" shared inside the company? Practical examples e.g. how reporting has changed procedures onboard? Is there some kind of follow-up how reporting has affected the actual operations?

- Ø How much the effect of near-miss reporting in creating a safety culture? How important is near miss reporting when developing safety culture and enhancing safety level? What kind of barriers are there for reporting and for the development of safety culture? Which factors strengthen the safety culture and the usefulness of near miss reporting? Do they think the number of reports is some kind of indicator of safety level?

Interview questions to Insjö Administrator:

- Ø Are all the shipping companies, which are the members of Insjö, reporting actively to Insjö system? Are certain types of companies more active than others? (e.g. the size of company or business sector)
- Ø Since the introduction of Insjö, how the number of reports has evolved?
- Ø How the system was introduced to the shipping companies at the beginning? Did several companies start to report at the same time? How are they persuaded to start reporting to Insjö? If Insjö was introduced now, would something be done differently?