VTT Technical Research Centre of Finland

Safety assessment of the international sea area of the Gulf of Finland

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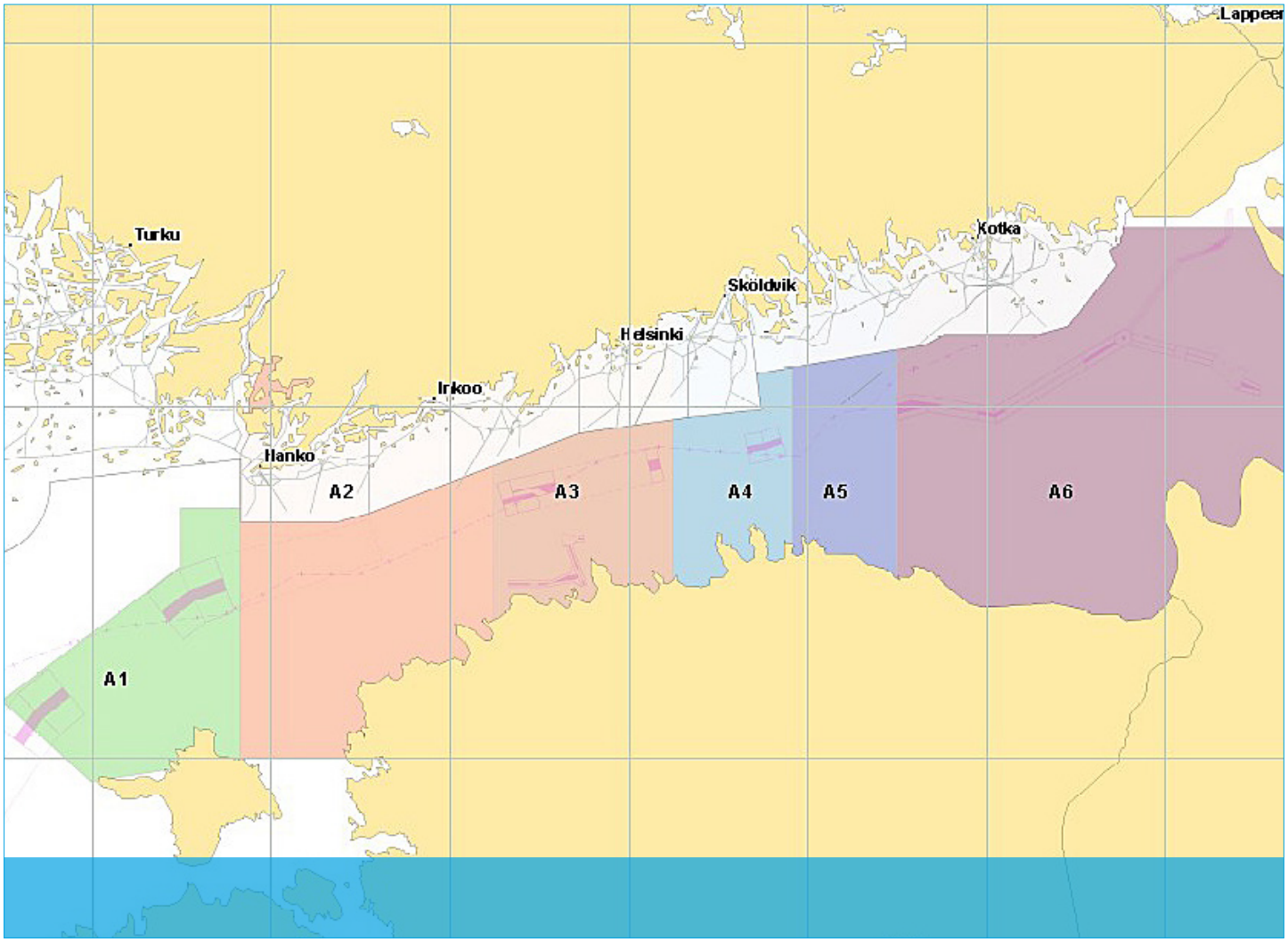

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Summary

This report describes a post-evaluation of GOFREP, the Mandatory Ship Reporting System in the Gulf of Finland, initiated by the Finnish Transport Agency in 2016. The objective of the evaluation was to show how the safety and fluency of maritime transport in the GOFREP area have developed since 2004 when the traffic separation scheme (TSS) was complemented by a mandatory ship reporting system and a radar-based monitoring system (SRS). This GOFREP traffic centre operation was assessed using a Formal Safety Assessment (FSA) approach in 2000–2002. The risk assessment results of that study (FSA2002) provide reference points to the current study.

This evaluation utilized a safety case approach to collect evidence concerning safety and fluency of maritime transport and apply safety argumentation based on these. Four different lines of safety argumentation were applied:

i) comparison of the predicted traffic densities (as of 2002) to observed ones in 2015 in order to check the validity of the FSA2002 results of collision probabilities which were based on predicted densities - are these results over- / underestimating the collision probabilities given the recent observations of the traffic?
ii) analysis of AIS-trajectories in order to see if close encounters or near misses have increased or decreased during the period 2010–2015;
iii) comparison of accident and incident data in order to compare the GOFREP traffic centre operations effectiveness in the GOFREP area with the situation in the non-GOFREP area of the Baltic Sea north of N 59°;
iv) assessment of expert opinions in a one-day session about GOFREP area's safety level development and traffic fluency over the past 10 years.

The following claims can be stated based on the safety arguments:

- The collision probabilities with one vessel being a passenger vessel were over-estimated in the FSA2002 study;
- The collision probabilities between two oil tankers remain approximately the same as assessed in the FSA2002 study;
- Average distances (in nautical miles) between crossing vessels during the ice free period (months 4–10) have grown during 2010–2015;
- The ratio of accidents (collision and grounding) and incidents in the GOFREP area vs. non-GOFREP area are approximately 0.5% and 10%, respectively, suggesting that the GOFREP area is very effective in controlling incidents;

- The general opinion of mariners/officers and GOFREP-operators is that the collision probabilities in the GOFREP area have decreased over the past 10 years, both during the ice free and the ice period;

The overall conclusion of the study is that the annual collision probabilities are decreasing for all vessel types, except oil tankers, and hence the GOFREP study area is considered safer now than 10 years ago. According to the study, the four most important factors shaping the safety in the GOFREP area are GOFREP-operations, TSS, communication between ships and competence of staff. The TSS effectively separates the east- and westbound traffic from each other. The benefit from the active monitoring and surveillance performed by the GOFREP traffic centres is twofold: The presence of the surveillance motivates the seafarers to keep better traffic discipline and the GOFREP operators may prevent accidents by active intervention in potentially non-safe situations.

The mariners and GOFREP-operators participating in the one-day expert session presented further development ideas to improve the safety and fluency of the maritime traffic in the GOFREP area. The main improvement suggestions were:

- More uniform procedures for intervention across operators and areas. All parties should intervene in same kind of navigational situations at same distances / time frames and in same way.
- The surveillance could be stricter with a lower threshold to intervene.
- Electronic route plan exchange service both between vessels and between vessels and GOFREP centres.
- Improved e-navigation services in general.
- A specific amendment suggestion to the TSS off Hanko: “Traffic to Hanko leaves and enters the TSS with such a course that makes give-way vessels manoeuvre with big course changes. That could be avoided by making TSS a bit longer (eastbound) so the traffic to/from Hanko would meet other traffic with 90 deg angle.”

Foreword

The project group consisted of researchers from the Finnish Transport Agency and VTT Oy. From Finnish Transport Agency the following experts were involved: Samu Koski, Sami Dahl, Tuomas Martikainen, Sari Talja, Mikko Turunen, Thomas Erlund, Jenni Luomala and Hanna Linjos-Maunula. From VTT Oy the following researchers were involved: Tony Rosqvist, Robin Berglund and Saara Hänninen with Markus Porthin providing valuable comments. Hanna Kojo from VTT Oy provided technical assistance in running the MeetingSphere system that was used during the expert meeting. The following external experts took part in the project:

Jouni Partanen	Bore/Auto Bank
Are Piel	VTS Tallinn
Tõnis Pärsim	VTS Tallinn
Sergei Rostopshin	VTS St. Petersburg
Pekka Poutanen	Navy
Mattias Udd	Finnlines
Kimmo Kuusisto	M/S Silja Serenade
Ulf Nyström	Bore/Auto Bank
Stefan Karell	Viking Line
Kimmo Lehto	Alfons Håkans
Olli Saarinen	Alfons Håkans

Valtteri Laine from the Finnish Transport Safety Agency provided statistical data on accidents and incidents.

Helsinki, March 2017

Finnish Transport Agency
Vessel Traffic Services

Table of Content

1 Introduction

The GOFREP traffic centre operation was assessed using a Formal Safety Assessment (FSA) approach in 2000–2002 (Hänninen et al., 2002). The risk assessment results of that study (FSA2002) provide reference points to the current study. In the FSA2002 study, two blueprints of traffic control systems for the Gulf of Finland – labelled VTMIS1 and VTMIS2, were subject to a FSA in order to compare their risk reduction potential and cost effectiveness. The study divided the traffic into oil tankers, passenger ships and others (mainly containers). Each of these vessel types was further divided into two size groups, i.e. large and small. Collision probabilities between the vessel types were computed using the GRACAT (Grounding and Collision Analysis Toolbox) software. According to the FSA2002 study, the option VTMIS2; a change of the existing traffic separation scheme (TSS) together with mandatory ship reporting system and a radar-based monitoring system (SRS), would most effectively reduce the collision probability between different vessel types during the ice free period. The results of the FSA2002 study were part of the application sent to the International Maritime Organization (IMO) in 2002. The application was approved by IMO by resolution MSC.139(76) in 5th December, 2002. The first version of the GOFREP system was commenced in 1st July, 2004 with changes as of MSC.231(96) in 5th December, 2006 - implemented in 1st July, 2007.

In 2015, IMO requested a post-evaluation of the GOFREP system given the evidence and experience gained since 2004. This report describes the post-evaluation project which started in 2016.

2 Objectives

The research objective of the project was to show how the safety and fluency of maritime transport in the GOFREP study area have developed since 2004 when the TSS was complemented by a SRS.

The following objectives were defined:

1. A review of the traffic density in the Gulf of Finland in year 2015 in order to make a comparison with the estimates calculated in the FSA2002 study;
2. An analysis based on AIS in order to assess the number and trend of close encounters in the GOFREP area;
3. An analysis of incident and accident data in order to assess safety performance of the GOFREP area;
4. An elicitation of expert judgements on the safety level and development needs of the GOFREP area, as well as, specific risk factors related to near miss events experienced.

The map in Fig. 1 shows the GOFREP study area divided into subareas A1–A6. These subareas were referred to in the one-day expert session that was organized for eliciting the experts' judgments (objective 4).

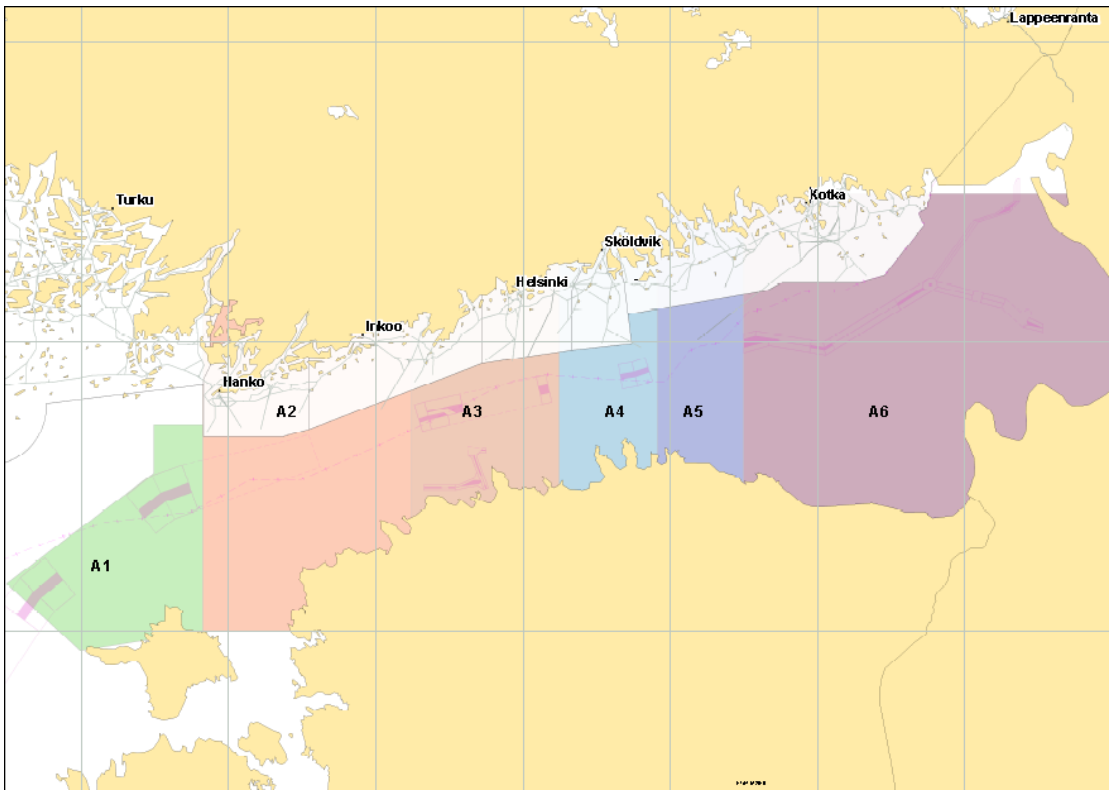

Figure 1. *Subareas of the GOFREP study area: A1. Western border -Hanko separation East. A2. Off Hanko. A3. Off Helsinki. A4. Off Sköldvik. A5. Off Orregrund. A6. Eastern part (Russia).*

3 Safety case methodology

The research was conducted using a safety case approach (ONR Guide, 2016; Kelly and Weaver, 2004). A *safety case* should communicate a clear, comprehensive and defensible argument that a system is acceptably safe to operate in a particular context. A safety case consists of three principal elements: Requirements, Argument and Evidence. The relationship between these three elements is depicted in Fig. 2.

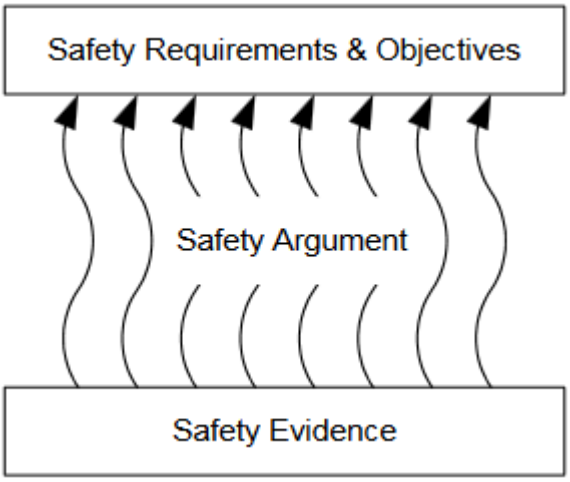

Figure 2. The safety argument communicates the relationship between the evidence and objectives.

In the project, safety evidence comprised of traffic data compiled from the numbers of port calls in the Gulf of Finland, AIS data recorded since 2010, incident and accident reports collected by the Finnish Transport Safety Agency (Trafi), as well as, mariners' and GOFREP-operators' judgments elicited in a one-day expert session organized 25th October, 2016. Each of these sources provided the starting point for a safety argument, and the safety arguments together formed the basis for the final conclusions about the safety development of the GOFREP area during the period 2004–2015.

The four safety arguments, to be detailed in the subsequent sections, are:

i) comparison of the predicted traffic volumes (as of 2002) to observed ones in 2015 in order to check the validity of the FSA2002 results of collision probabilities - are these results over- / underestimating the collision probabilities given the recent observations of the traffic?

ii) analysis of AIS-trajectories in order to see if close encounters or near misses have increased or decreased during the period 2010–2015;

iii) comparison of accident and incident data in order to compare GOFREP Traffic Centre Operation effectiveness in the GOFREP area with the situation in the non-GOFREP area of the Baltic Sea north of N 59°;

iv) assessment of expert opinions about GOFREP safety level development and traffic fluency over the past 10 years.

4 Safety arguments

4.1 Maritime traffic densities of the Gulf of Finland in 2000 and 2015 vs. predicted traffic densities for 2010-2015

For the FSA2002 study, the port call data was collected from the ports for all ship types. Locations of these ports are presented in Fig 3.

Figure 3. Locations of the ports in the study.

In 2000, there were 36 818 port calls in the Gulf of Finland for the ports under study. This was the reference situation for making the prediction of traffic densities in 2015 under different assumptions of annual growth rates, ranging between 2 and 7% depending on the country or the port under survey (Rosqvist et al., 2002). In Table 1 the actual port calls in 2015 are presented together with the realised port calls in 2000 and estimated port calls for 2010–2015.

Table 1. *The annual number of port calls (all ship types) in 2000 (Hänninen et al., 2002), 2015 (references are listed under Port calls data, 2016) and predicted port calls for the period 2010–2015 (Hänninen et al., 2002).*

	2000 realised	2010–2015 estimate	2015 realised
Hanko	980	2100	1748
Helsinki	11398	15300	8405
Sköldvik	916	1150	1117
Kotka+Hamina	3429	4620	2548
Vysotsk			884
Primorsk	0	400	939
St.Petersburg	9016	13500	5697
Batareynaja	0	200	0
Ust-Luga	96	470	2706
Aseri	0	300	0
Kunda	600	700	401
Tallinn	10383	14000	7081
ALL	36818	52740	31526

Regarding oil tankers, the corresponding figures are as show in Table 2.

Table 2. *The annual number of port calls (tankers) in 2000 (Hänninen et al., 2002), 2015 (references are listed under Port calls data, 2016) and predicted port calls for the period 2010–2015 (Hänninen et al., 2002).*

	2000 realised	2010–2015 estimate	2015 realised
Helsinki	108	0	39
Sköldvik	916	1150	1117
Kotka+Hamina	564	730	362
Vysotsk			216
Primorsk	0	400	925
St.Petersburg	492	740	519
Batareynaja	0	200	0
Ust-Luga	0	120	949
Aseri	0	100	0
Kunda			7
Tallinn	679	960	542
ALL	2759	4400	4676

The number of port calls in 2015 in the harbours was 31 526, see Table 1. Hence, the traffic density in the Gulf of Finland has decreased from the top level in year 2000 by 14% in year 2015. The only exception is the oil transport with an increase of almost 70% as shown in Table 2.

The growth predictions for 2015 made in year 2000 were +43% and +60%, respectively. Hence, the prediction regarding oil tanker transport density was quite accurate. The increased tanker traffic is due to establishment of new oil ports in Primorsk (transportation began 2002), Vysotsk (2004) and Ust-Luga (2011). The number of tankers in traffic in the Gulf of Finland has increased (as expected), but in addition also the cargo capacity has increased, see Fig. 4, for the oil transportation in the Gulf of Finland between 1995 and 2015. The data has been gathered during the years by VTT and SYKE together from several sources, mainly directly from the ports (references are listed under Oil transportation data, 2016).

On the other hand, based on data regarding Helsinki port, the cargo tonnage has increased by 11% and the passenger amount by 32% (Port of Helsinki, 2016). This is explained by the increased carrying capacity of different vessel types, both cargo and cruise vessels have grown in size. Also the popular passenger traffic between Helsinki and Tallinn is nowadays operated using larger vessels.

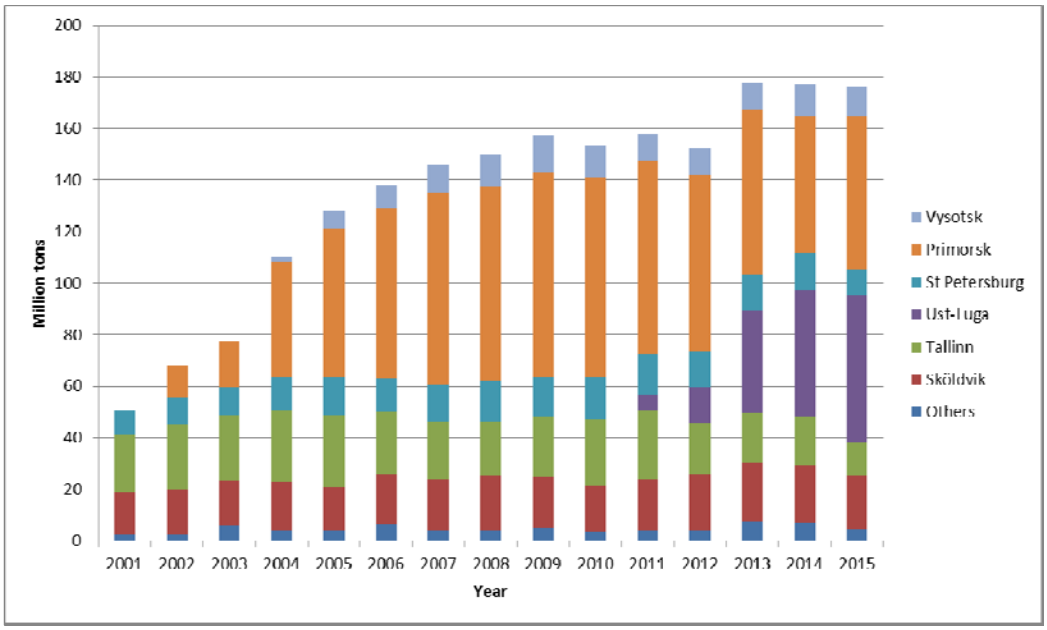

Figure 4. *Oil transportation in the Gulf of Finland between 1995 and 2015 (references are listed under Oil transportation data, 2016).*

Certain subareas of GOFREP show a clear deviation upwards compared to the predictions: Vysotsk, Ust-Luga and Primorsk, as shown by Fig. 5. The main source of the unforeseen traffic stems from tankers, see Fig. 6.

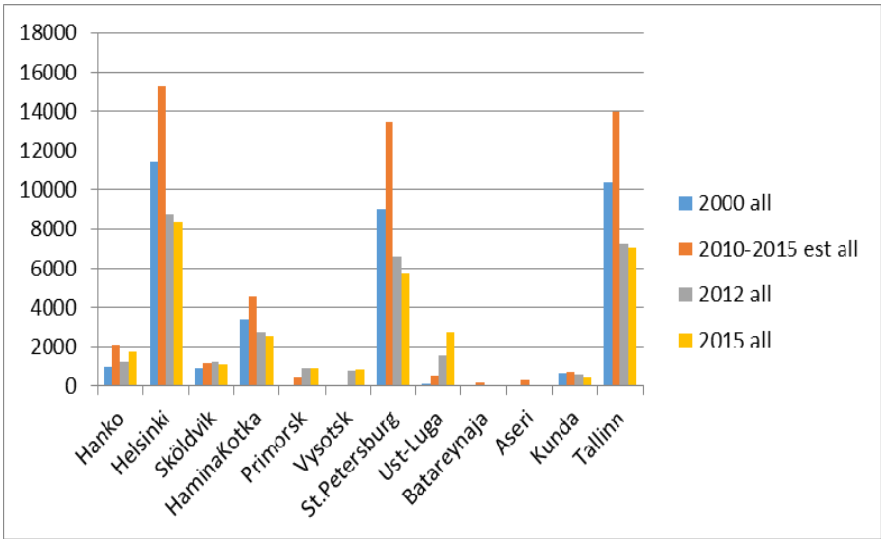

Figure 5. *Comparison of predicted and observed traffic densities in the main ports of the Gulf of Finland (all vessels).*

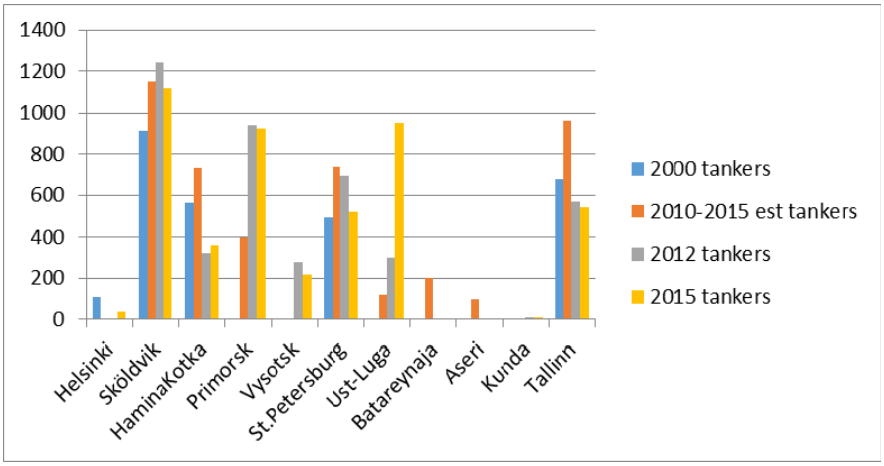

Figure 6. *Comparison of predicted and observed traffic densities in the main ports of the Gulf of Finland (tankers).*

Based on the difference between the predicted and the observed net traffic density alone, the following biases in the FSA2002 collision probabilities can be concluded: i) the collision probabilities with one vessel being a passenger vessel are clearly over-estimated ii) the collision probabilities between two oil tankers remain approximately the same. This holds for all cases 'Baseline', 'System1' and 'System2' in the FSA2002-study[1].

Despite the new tanker traffic from the above-mentioned new ports, the general decrease in traffic drives the annual collision probabilities downwards, compared to the predictions for 2010–2015 made in the FSA2002 study. It cannot, however, be stated whether the collision probability reduction of System2 (which corresponds substantially to the current GOFREP system) is lower or greater than originally

[1] Baseline: No additional investments to vessel traffic control in the Gulf of Finland beyond the situation in 2002
System1: New routeing system and mandatory reporting system
System2: New routeing system, mandatory reporting system and a radar-based monitoring system.

estimated because the approach does not support the assessment of the probability changes.

Hence, it can be argued, that the risk of maritime transport in the GOFREP study area, as a whole, is lower than what was predicted in the FSA2002 study, although passenger and oil volumes per transport have grown.

4.2 Close encounters and near miss analysis based on AIS data

Close encounters refer to situations where the mariners need to constantly follow the behaviour of vessels in its vicinity in order to follow if any deviation from what the mariner expects occurs. AIS data is here analysed to detect the number of ship encounters in open sea areas where the shortest distance between the vessels during the encounters were significantly below the recommended crossing distances for encountering ships. Particular focus was put on possible trends in these numbers during the years that were the target of the study. Also certain special cases are picked for further scrutiny regarding the behaviour in these cases: are they near miss situations or normal close encounters?

4.2.1 Trends of close encounters

The AIS-analysis was based on AIS data collected with 2-minute sampling resolution in the time period 2010–2015, and with full resolution in 2011 where maximum resolution of 2 seconds was applied to vessels with highest speeds.

The initial sample size covers the 7 month period from April to October, i.e. the open sea period in general. The area covered is shown in Fig. 7. The sample size after cleaning of incomplete observations, observations where the vessel speed is under 1 knot, and special vessels (such as fishing boats), the data consisted of 159 000 observation points (vessel position, velocity and time).

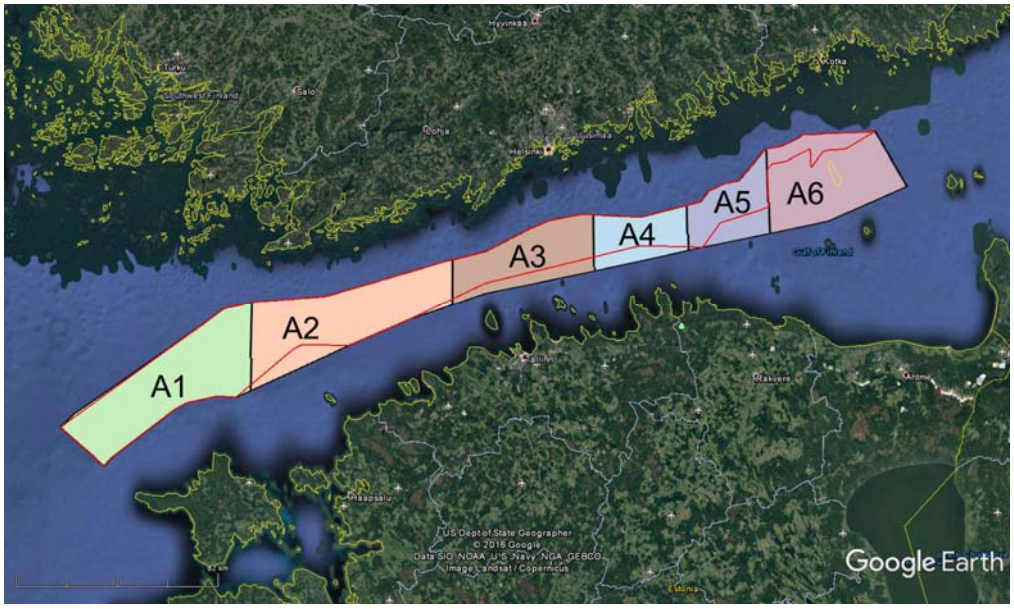

Figure 7. *The areas - numbered A1 to A6 - were used as a spatial filter in the AIS-analysis of close encounters. Together they formed a superset of the GOFREP area. The GOFREP area is indicated in red in the figure above. (Exact coordinates for the subareas are listed in Appendix 1)*

The analysis of these 159 000 observations focused on the metric nautical mile such that encounters under 0.3 nm, 0.2 nm, and 0.1 nm where statistically computed (Berglund and Pesonen, 2011). Encounter rates are shown in Figs 8–10 where the rate has been normalized per the daily average number of vessels moving in the (sub)area in order for the encounter rates to be comparable between the areas A1–A6 (see Fig 7). It should be noted that the type of close encounter: crossing, head-on and overtaking is not separately analysed as the aim was to identify the general trend of number of short passing distances in the open sea areas.

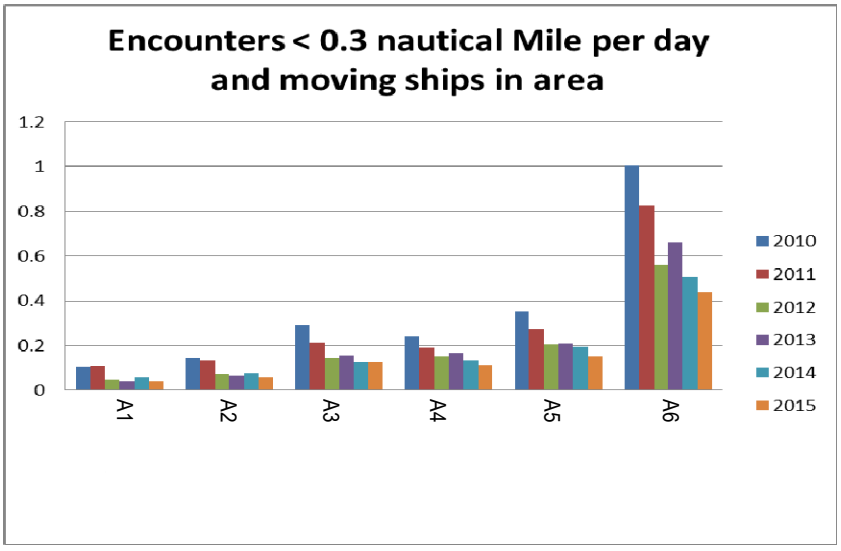

Figure 8. *The trend of close encounters under 0.3 nm during the period 2010–2015.*

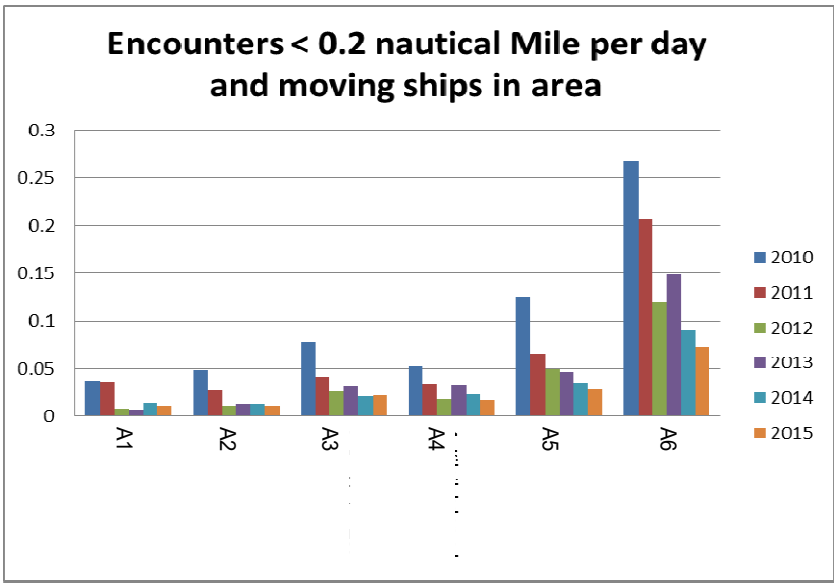

Figure 9. *The trend of close encounters under 0.2 nm during the period 2010–2015.*

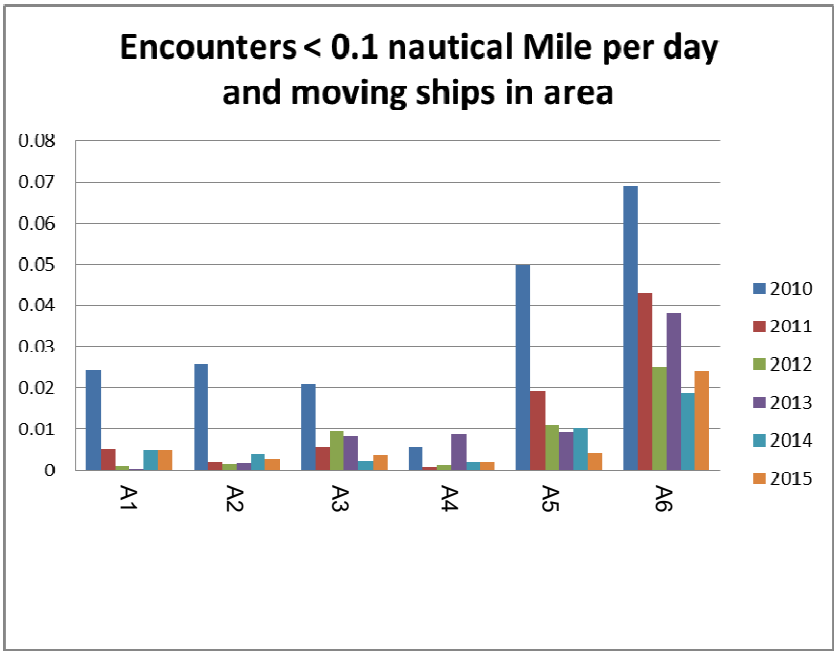

Figure 10. *The trend of close encounters under 0.1 nm during the period 2010–2015.*

The results of Figs. 8 and 9 show a clearly decreasing trend in the number of ships passing each other at all distance categories less than 0.3 nm and less than 0.2 nm. Fig. 10 shows for areas A5 and A6 a clearly decreasing trend in the number of ships passing each other in category less than 0.1 nm. However, for the areas A1–A4 there is no discernible trend. The main reason for this is probably the temporal filtering of the AIS data in the analysis: close encounters are quickly passing events, which leads to bigger errors when the distances are calculated at discrete time intervals. The statistical confidence limits of such low numbers of occurrences are also higher. The effect of sampling errors in close encounter situations has not been studied enough in order to validate the size of this error type. In the case of year 2010, lower AIS data accuracy may explain the relatively high rate.

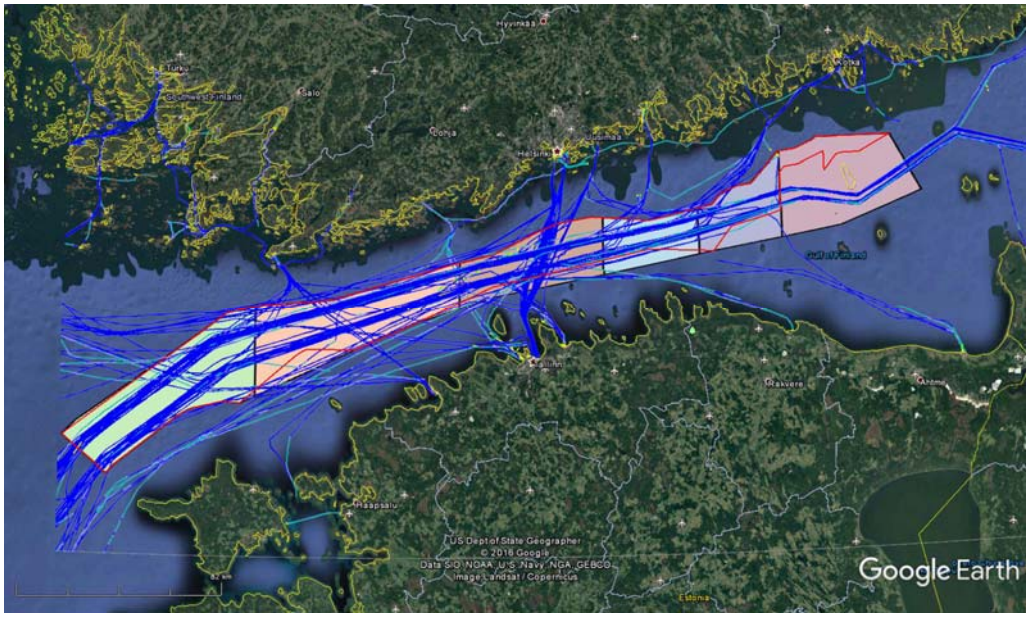

Figure 11. The areas with a typical traffic pattern showing the normal routes of the vessels in the Gulf of Finland.

When comparing the number of encounters in different subareas, area A6 has significantly higher values than the other areas. One explanation to this is in the traffic pattern (Figure 11) showing high local traffic density compared to the other areas. The probability of two ships being close to each other is thus higher here than in areas where the ship traffic is more evenly distributed over larger areas. This probability should, however, be compensated by active distance-keeping measures by the ships (like cars keeping a safe distance in spite of slowdowns because of heavy traffic). An additional analysis could reveal to what extent the ships have taken active measures to keep a safe distance in the different areas, but this has not been possible to do within the scope of this study. Another interesting point is that the traffic in area A6 is actually outside of the proper GOFREP area (see Figure 11), which could be taken as an indicator of the positive effects of the GOFREP system. It is, however, important to note the strong decreasing trend also in this area regarding the number of ships passing each other at a close distance.

The trend effects cannot be explained as a result of decreasing traffic density as the numbers are normalized with the daily average number of vessels moving during that time interval (24 h). Although it is not possible to quantify the decrease in risk level based on these results alone, there is a clear indication of a positive safety trend as fewer ships seem to be involved in close encounters. A more detailed analysis of the close encounters less than 0.1 nm was conducted regarding some interesting cases detailed below.

4.2.2 Some interesting cases of less than 0.2 nm distance

The following cases were presented in the expert session in order to gain a better understanding of when a close encounter could be categorized as a risky one, labelled a near miss.

Case 1 (Head-on): Two cargo ships, crossing near the border of the areas A5 and A6. DWT 8700 and 5500 tons, length 132 and 128 m. Speed 12 and 10 knots. Minimum passing distance: 118m (between ship AIS transponder positions). The vessels did not alter their courses during the encounter situation, which can be taken as an indicator of the ships not perceiving this to be a situation requiring evasive manoeuvre (COG 258 and 76 degrees)

Case 2 (Head-on): RoRo/passenger ship length 183 m, beam 30 m and oil tanker length 170 m, beam 28 m. Speed 17 and 14 knots. Encounter east of Hogland, area A6. Minimum passing distance: 178 m. The vessels did not alter their courses during the encounter situation (COG 231 and 63 degrees).

Case 3 (Head-on): Vehicles carrier and River barge. DWT 7750 t and 2800 t. Length 148 and 82 m. Speed 18 and 8 knots. Encounter east of Hogland, area A6. Minimum passing distance: 134 m. COG: 239 and 57 degrees.

Case 4 (Head-on): General cargo vessels. Lengths 95 and 99m. DWT 2554 and 5871 t. Speed 9 and 14.6 knots. Encounter east of Hogland, area A6. Minimum passing distance: 111 m. COG: 79.9 and 260.2 degrees.

Case 5 (Crossing): High speed craft and crude oil tanker. Lengths 92 and 252 m. DWT 62 and 106000 t. Speed 22 and 8 knots. Encounter between Helsinki and Tallinn, area A3. Minimum passing distance: 340 m. COG: 358 and 262 degrees. The high speed craft passed aft of the tanker which is ok.

Case 6 (Crossing): General cargo vessel and sailing yacht. Lengths 90 and 34 m. Speed 9.4 and 7.7 knots. Encounter between Helsinki and Tallinn, area A3. Minimum passing distance: 306 m. COG: 259 and 10 degrees. The sailing yacht passes aft of the cargo ship.

Case 7 (Overtaking): Two river barges. Lengths 114 and 119 m. DWT 4235 t and 3804 t. Speed 6 knots. Encounter west of Hogland, area A6. Minimum overtaking distance: 350 m. COG: 271 and 270 degrees.

The general opinion was that the cases above were not considered exceptionally risky, because the encounter geometries indicated controlled encounters. Another explanation by the experts was that in case 7 the vessels were river barges that are used to pass each other at a close distance.

A conclusion of the discussion about the cases was that Euclidian distance metrics (= straight line) based on AIS data are not alone adequate for identifying near miss situations in historical AIS data. Doubts were raised that more complicated metrics, like the Vessel Conflict Ranking Operator (Zang 2015), would perform any better.

Instead, it was raised as an opportunity to utilize AIS in real time for monitoring and predicting possible emerging close encounter situations which require immediate monitoring and interference in order to avoid a near miss or collision/grounding.

4.3 Comparison of accident and incident data between GOFREP and non-GOFREP areas

The Finnish Transport Safety Agency (Trafi) has compiled and developed an interactive web tool for filtering and exploring accident and incident data (Trafi merchant shipping risk areas webviewer, 2016). The underlying data sheets were provided for this study with the purpose of analysing the performance of GOFREP traffic centre operations.

The following formula provides an indication of VTS- or GOFREP-operator performance:

$Y = a*X$

where Y denotes accidents, X denotes operator reactions, and parameter a the rate of failure to intervene. In practice, all the variables are uncertain, partly due to variations in reporting triggers and incident classifications. It should be noted that the indicator is not dependent on traffic densities in the area.

Perfect GOFREP traffic centre -operation would mean that the parameter $a \rightarrow 0$, i.e. all incidents that GOFREP traffic centre operation are expected to interfere with actually lead to successful interference and accident avoidance.

The number of accident in the Baltic Sea north of N 59° under the period 2003–2013 was studied (includes Finnish territorial sea areas, which are equipped with VTS services). Based on data provided by the Finnish Traffic Safety Agency, there were 3 collisions and 0 groundings in the GOFREP area and 25 collisions and 113 groundings outside the GOFREP area during that time period.

Based on data provided by the Finnish Traffic Safety Agency, the number of reported incidents for the period 2012–2015 regarding navigational error, TSS violation and fail to report, are 235 in the GOFREP area and 469 for the non-GOFREP area. These incidents may lead to near miss situations or accidents if not reacted upon. Typically, such incidents are controlled by VTS or GOFREP traffic centre interference.

The ratio of accidents (collision and grounding) and incidents in the GOFREP area vs. non-GOFREP area (i.e. the rate of failure to intervene; parameter 'a'' in the above formula) are approximately 0.5% and 10% (assuming that the annual incident average is applied over the period 2003–2013). The difference is approximately one order of magnitude. Because of the scarcity of observations the result is only indicative and not conclusive that the GOFREP area is more effective in controlling incidents compared to other areas considered here. Also other contributing factors, such as differences in operating environment or incident reporting practices, are not taken into account here. These introduce uncertainties that cannot be easily estimated.

The underlying data sheets are in Appendix 3 (accident data) and Appendix 4 (incident data).

4.4 One-day expert session

A one-day expert session was organized 25th October, 2016 in order to collect the tacit knowledge of both mariners and GOFREP-operators regarding the performance of the GOFREP traffic control system. 21 experts took part of the session where the number of mariners and GOFREP-operators where almost the same. Also experts from Tallinn and St. Petersburg GOFREP traffic centres took part in the session. Appendix 2 shows the agenda of the one-day expert session.

The Group Decision Support System (GDSS) called MeetingSphere was utilized for collecting the opinions which were then reviewed for further commenting. In order to get the opinions statistically easier to analyse several multiple choice questions were asked. The structure of the meeting was as follows:

Phase 1: Evaluating the collision risks and the traffic flow
Phase 2: Risky situations (GOFREP study areas and circumstances)
Phase 3: Improving the risk management and the traffic fluency
Phase 4: Feedback on the GDSS process

Expert opinions were collected to a meeting raw report summarising the voting results and comments. In the following the main results are presented and comments that received high support highlighted. The reader is referred to Appendix 5 for further details.

4.4.1 Phase 1: Evaluating collision probabilities and traffic fluency

The experts gave their opinions regarding the change in collision probabilities, as well as, traffic fluency, in the six subareas of GOFREP. In addition to multiple choice questions, also free commenting was encouraged. Below key results are presented.

The general opinion was that GOFREP has decreased the collision probability over the past 10 years, both during the ice free and the ice periods. Regarding Sköldvik frontal zone the change of the collision probability (ice free period) raised opposing opinions – positive judgements were dominating, however. Regarding the Eastern part (Russia) the change of collision probability as well as traffic fluency during the ice period raised opposing opinions - positive judgements were dominating, however.

The comparison between the TSS Åland and the GOFREP regarding the collision probability was inconclusive. But comments reveal that GOFREP is judged as less risky than TSS Åland, despite of the denser traffic. The main reason for this is the fact that the surveillance in the GOFREP area is stricter. The numerical ambiguity in the responses may be explained by some experts' probably wrong interpretation of the direction of comparison.

The grounding probability was judged clearly higher for the TSS Åland area due to narrowness of fairway and rocks lying in the vicinity of the fairway.

Regarding the importance of traffic control function, the experts where asked to rank between the following functions:

1) Traffic separation scheme
2) GOFREP-operations
3) Vessel technology, maintenance practices
4) Communication between ships
5) Competence of vessel staff
6) Other navigational aids
7) Other, specify

The following four functions were found the most important in shaping GOFREP area's safety: GOFREP-operations (14/14 votes), TSS (9/14 votes), Communication between ships (7/14 votes) and Competence of vessel staff (7/14). Hence, any changes in these lead to notable changes in the safety performance. In other words, GOFREP area's safety is judged to be most sensitive to these functions.

4.4.2 Phase 2: Risky situations (GOFREP study areas and circumstances)

In the FSA2002 study, eleven risk factors were identified and used as parameters in Fault Tree-models explaining an escalation of an encounter to a close encounter and further to a near miss (or an accident). The factors are:

NAVE: Navigation error
= navigation error due to human error, equipment failure, ignorance, etc.

ROPIN: Route planning wrong
= Route planning is wrong due to negligence, misunderstanding, etc.

INKNOW: Insufficient knowledge
= The give-way does not understand how to comply with the colreg-rules

RADAR/GV: Radar observation error under good visibility
= Error in reading the radar due to equipment failure, poor know-how, etc. under good visibility

RADAR/PV: Radar observation error under poor visibility
= Error in reading the radar due to equipment failure, poor know-how, etc. under poor visibility

VISUAL: Visual observation failure
= Visual observation of the traffic pattern has failed under good visibility due e.g. fatigue, no-one performing look-out, etc.

REACGA/REACSO: Restricted manoeuvre options
= Restricted manoeuvring due to vessel properties, traffic pattern, fairway properties, etc.

COE: Communication error
= Communication efforts fail due to technical, cultural, linguistic etc. problems. Also starting the communication effort too late is a problem factor.

SOFO: Stand-on fails to observe
= Stand-on vessel does not observe the threat of the give-way due to observational error

GWNEG: Neglect by give-way
= Give-way vessel behaves like a cowboy and forces stand-on vessel to react.

SONEG: Neglect by stand-on
= Stand-on wants to show he has the right not to take other vessels into account, and does not cooperate for the benefit of all.

In the expert session, all these factors where subject to ranking by importance in shaping a close encounter/near miss event. The following four were judged as the most important:

1. NAVE - equally relevant in all circumstances;
2. INKNOW - specifically off Helsinki under traffic peaks;
3. COE- specifically, in the Eastern part (subarea 6 in Russia);
4. GWNEG - specifically off Helsinki and under traffic peaks.

The above four causes (factors) were deemed similarly significant in other sea areas than GOFREP. Also these factors are better controlled in areas under surveillance, one reason being that officers are keen on keeping a good reputation and therefore are more focused to the task. The results presented in this section are found in more detail in Appendix 5, p. 11–25.

4.4.3 Phase 3: Improving the risk management and the traffic fluency

The experts ranked the same seven functions as in chapter 4.4.1 with regard to their potential in controlling the above collision risk factors (causes). The ranking yielded the same four functions which were judged the most sensitive ones for the GOFREP system performance: GOFREP-operations (11/14 votes), TSS (8/14 votes), Communication between ships (6/14 votes) and Competence of staff (5/14). The similarity of the results confirms consistency of the experts' judgments.

About thirty specific comments were submitted, see p. 27–28 in Appendix 5. According to the participants, the main strengths of the current GOFREP system are the TSS separating the east- and westbound traffic from each other and the active monitoring and surveillance performed by the GOFREP traffic centres. The benefit from the surveillance is twofold: The presence of the surveillance motivates the seafarers to keep better traffic discipline and the GOFREP operators may prevent accidents by active intervention in potentially non-safe situations.

The main improvement suggestions were:

- More uniform procedures for intervention across operators and areas. All parties should intervene in same kind of navigational situations at same distances / time frames and in same way.
- The surveillance could be stricter with a lower threshold to intervene.
- Electronic route plan exchange service both between vessels and between vessels and GOFREP centres.
- Improved e-navigation services in general.
- A specific amendment suggestion to the TSS off Hanko: "Traffic to Hanko leaves and enters the TSS with such a course that makes give-way vessels

> manoeuvre with big course changes. That could be avoided by making TSS a bit longer (eastbound) so the traffic to/from Hanko would meet other traffic with 90 deg angle."

Regarding non-regular cruise ships and high speed passenger crafts the general opinion was that they can better adjust to the traffic pattern and do not increase collision risk. An exception could be peak hours in dense traffic areas where a high speed craft may disturb the observations regarding other vessels. In addition, the plans for introduction of traffic by wing in ground (WIG) craft between Helsinki and Tallinn, operating at very high speed, was seen as a potential risk factor.

Regarding functions that would increase the fluency of transport many ideas where raised similar to those for controlling the risk factors above. This leads to a conjecture that the GOFREP risk control is not seen as a regulatory issue decreasing the traffic fluency, but rather the opposite: transport safety implies transport fluency.

4.4.4 Phase 4: feedback on the GDSS process

The experts considered the GDSS approach a good method for addressing GOFREP safety issues. The available expertise was considered adequate by the majority of the participants. The approach could be used for studying some cases with the aim of learning from close encounter or near miss events. Further comments are found in Appendix 5, p. 29–30.

5 Conclusions

The project utilized a safety case approach to collect evidence and apply safety argumentation based on these. Four different lines of safety argumentation were applied:

i) comparison of the predicted traffic densities (as of 2002) to observed ones in 2015 in order to check the validity of the FSA2002 results of collision probabilities which were based on predicted densities - are these results over- / underestimating the collision probabilities given the recent observations of the traffic?
ii) analysis of AIS-trajectories in order to see if close encounters or near misses have increased or decreased during the period 2010-2015;
iii) comparison of accident and incident data in order to compare the GOFREP traffic centre operations effectiveness in the GOFREP area with the situation in the non-GOFREP area of the Baltic Sea north of N 59°;
iv) assessment of expert opinions in a one-day session about GOFREP area's safety level development and traffic fluency over the past 10 years.

The following claims can be stated based on the safety arguments:

- The collision probabilities with one vessel being a passenger vessel were over-estimated in the FSA2002 study;
- The collision probabilities between two oil tankers remain approximately the same as assessed in the FSA2002 study;
- Average distances (in nautical miles) between crossing vessels during the ice free period (months 4–10) have grown during 2010–2015;
- The ratio of accidents (collision and grounding) and incidents in the GOFREP area vs. non-GOFREP area are approximately 0,5% and 10%, respectively, suggesting that the GOFREP area is very effective in controlling incidents;
- The general opinion of mariners/officers and GOFREP-operators is that the collision probabilities in the GOFREP area have decreased over the past 10 years, both during the ice free and the ice period;

The overall conclusion of the study is that the annual collision probabilities are decreasing for all vessel types, except oil tankers, and hence the GOFREP area is safer than 10 years ago. According to the study, the four most important factors shaping the safety in the GOFREP area are GOFREP-operations, TSS, communication between ships and competence of staff. The TSS effectively separates the east- and westbound traffic from each other. The benefit from the active monitoring and surveillance performed by the GOFREP traffic centres is twofold: The presence of the surveillance motivates the seafarers to keep better traffic discipline and the GOFREP operators may prevent accidents by active intervention in potentially non-safe situations.

The mariners and GOFREP-operators participating in the one-day expert session presented further development ideas to improve the safety and fluency of the maritime traffic in the GOFREP area. The main improvement suggestions were:

- More uniform procedures for intervention across operators and areas. All parties should intervene in same kind of navigational situations at same distances / time frames and in same way.
- The surveillance could be stricter with a lower threshold to intervene.
- Electronic route plan exchange service both between vessels and between vessels and GOFREP centres.
- Improved e-navigation services in general.
- A specific amendment suggestion to the TSS off Hanko: "Traffic to Hanko leaves and enters the TSS with such a course that makes give-way vessels manoeuvre with big course changes. That could be avoided by making TSS a bit longer (eastbound) so the traffic to/from Hanko would meet other traffic with 90 deg angle."

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Coordinates of the subareas used in the AIS Analysis

A1		
1	59 33.3	22 30.0
2	59 36.5	22 38.1
3	59 37.9	22 50.0
4	59 19.0	22 50.0
5	59 17.5	22 43.9
6	59 17.7	22 36.1
7	59 16.2	22 23.8
8	59 14.7	22 18.4
9	59 03.4	21 50.9
10	59 02.1	21 49.0
11	59 10.0	21 30.0

A2		
1	59 37.9	22 50.0
2	59 38.1	22 51.4
3	59 39.4	23 21.1
4	59 47.0	24 12.4
5	59 47.3	24 15.0
6	59 37.6	24 15.0
7	59 34.6	23 57.1
8	59 28.9	23 31.2
9	59 19.0	22 50.0

A3		
1	59 47.3	24 15.0
2	59 47.8	24 19.9
3	59 49.0	24 29.3
4	59 53.5	24 47.1
5	59 55.3	24 55.8
6	59 56.6	25 10.2
7	59 56.4	25 15.0
8	59 44.5	25 15.0
9	59 40.0	24 28.8
10	59 37.6	24 15.0

A4		
1	59 56.4	25 15.0
2	59 55.9	25 28.3
3	59 55.7	25 35.0
4	59 55.9	25 37.2
5	59 57.9	25 55.0
6	59 48.3	25 55.0
7	59 44.5	25 15.0

A5		
1	59 57.9	25 55.0
2	59 58.6	26 01.0
3	60 00.8	26 04.5
4	60 02.3	26 11.3
5	60 02.8	26 17.7
6	60 09.2	26 29.5
7	60 09.2	26 30.0
8	59 51.3	26 30.0
9	59 48.9	26 01.2
10	59 48.3	25 55.0

A6		
1	60 09.2	26 30.0
2	60 09.7	26 36.7
3	60 11.4	26 44.5
4	60 12.0	26 45.9
5	60 12.0	27 13.4
6	60 12.0	27 17.6
7	60 00.0	27 30.0
8	59 53.4	26 55.2
9	59 51.3	26 30.0

Invitation to expert workshop - GOFREP

Safety development in the international waters of the Gulf of Finland: GOFREP workshop

Time: 25 October 2016 at 9:00 – 15:30

Place: Finnish Transport Agency, Opastinsilta 12, Helsinki, Senate meeting room Merkurius

Programme of the day

8:30 Coffee and registration

9:00 Opening of the workshop
- GOFREP workshop assessment for the IMO (Thomas Erlund, FTA)
- The objective and phases of the computer-aided workshop (Tony Rosqvist, VTT)

9:30 Workshop phase 1: General assessment of GOFREPs impact on collision risks and vessel traffic flow

Questions presented by Tony Rosqvist:
- *Development of GOFREP area in terms of collision risks and vessel traffic flow: what factors have affected development the most? Open water season/winter season.*

11:00 Workshop phase 2: Incidents in the GOFREP area

Introduction: Incidents based on an AIS analysis (Robin Berglund, VTT)

Questions presented by Tony Rosqvist:
- *What factors causing incidents have been most critical in light of previous experience?*
- *In what areas and under what conditions are the factors causing incidents most likely to occur?*

12:30 Lunch

13:30 Workshop phase 3: Development of risk management and smooth traffic flow in the GOFREP area

Questions presented by Tony Rosqvist
- *What have we learnt/should we learn from incidents*?

15:00 Coffee break

15:15 – 16:00 Workshop feedback questionnaire and conclusion

ACCIDENT STATISTICS 2003-2014

	ALL ACCIDENT TYPES		
	In GOFREP	Outside GOFREP	Grand Total
2003	1	19	20
capsize		2	2
Grounding		10	10
Collision to navigation mark/quay		2	2
collision	1	5	6
2004		13	13
Grounding		6	6
Collision to navigation mark/quay		5	5
collision		2	2
2005		18	18
Grounding		11	11
Collision to navigation mark/quay		4	4
collision		3	3
2006		23	23
Grounding		17	17
Collision to navigation mark/quay		3	3
collision		3	3
2007	1	12	13
Grounding		9	9
Collision to navigation mark/quay	1	1	2
collision		2	2
2008		16	16
capsize		1	1
Grounding		12	12
Collision to navigation mark/quay		2	2
collision		1	1
2009		8	8
Grounding		4	4
Collision to navigation mark/quay		2	2
collision		2	2
2010		7	7
Grounding		5	5
Collision to navigation mark/quay		1	1
collision		1	1
2011	1	12	13
capsize		1	1
Grounding		6	6
Collision to navigation mark/quay		2	2
collision	1	3	4
2012		14	14
Grounding		11	11
Collision to navigation mark/quay		3	3
2013	59	137	196
Could not contact the vessel		1	1
Anchor dragging		2	2
Anchor lost		1	1

Colreg/reporting violation	47	70	117
Towing problem		1	1
capsize		1	1
Grounding		14	14
Technical failure	1	1	2
Near miss	3	7	10
Near miss with sailing boat		1	1
Grounding prevention		9	9
Other	1	1	2
Navigational Assistance Service		3	3
Navigating outside of fairway area		3	3
Rudder failure		1	1
Collision to navigation mark/quay		3	3
Causing danger to other traffic	6	8	14
Collision	1	3	4
fairway		7	7
2014	57	170	227
Black Out		5	5
Colreg/reporting violation	49	94	143
No charts		1	1
Towing problem		1	1
Deck cargo shifting/loss		1	1
Grounding		8	8
Technical failure	2	9	11
Towing problem		7	7
Near miss	2	8	10
Near miss with sailing boat		3	3
Grounding prevention		9	9
Navigating outside of fairway area		6	6
Fire		1	1
Collision to navigation mark/quay		6	6
Causing danger to other traffic	4	7	11
Leakage		1	1
Exceeding maximum draught for		3	3
Grand Total	119	449	568

Collision total	3	25
Grounding total	0	113

INCIDENT STATISTICS 2012-2015

		ALL INCIDENT TYPES					INCIDENT TYPES: '200' + '210' + '250'	
		In GOFREP	Not in GOFREP	No position	Grand Total		In GOFREP	Not in GOFREP
Incident categories	2012	73	234	74	381	-->	60	135
grounding	20		4	1	5			
collision	30		1		1			
fire, explosion	40			3	3			
machine failure	60		10	3	13			
vessel damage	70		1		1			
equipment failure including design faults	110	3	39	33	75			
other vessel error	130	4	7	6	17			
environmental hazard	140			1	1			
other external failures	160		1	3	4			
reporting obligation	200	11	15		26			
traffic separation scheme	210	47	112	1	160			
port manoeuvre	220			3	3			
environmental damage	230			1	1			
piloting boarding/disembarking	240			1	1			
navigational error	250	2	8	7	17			
Unknown causes	270			2	2			
non-categorized	(blank)	6	36	9	51			
	2013	99	242	47	388	-->	70	132
grounding	20		8		8			
collision	30		5	1	6			
fire, explosion	40	1	2		3			
Failure in hull or water tight doors	50		1		1			
equipment failure including design faults	110	27	70	27	124			
other vessel error	130	1	3	4	8			
environmental hazard	140		8		8			
Error in navigational infrastructure	150		2	2	4			
other external failures	160		4	2	6			

reporting obligation	200	17	15	3	35			
traffic separation scheme	210	50	94	1	145			
port manoeuvre	220		3	3	6			
piloting boarding/disembarking	240		4	1	5			
navigational error	250	3	23	3	29			
	2014	117	272	27	416	-->	70	136
0	0	1			1			
grounding	20		4		4			
collision	30		3	2	5			
fire, explosion	40		1		1			
Failure in hull or water tight doors	50		1		1			
capsizing	80		1		1			
equipment failure including design faults	110	43	83	14	140			
cargo	120		2		2			
other vessel error	130	3	6	1	10			
environmental hazard	140		4	2	6			
Error in navigational infrastructure	150		2		2			
other external failures	160		14	3	17			
reporting obligation	200	23	19	3	45			
traffic separation scheme	210	46	97	1	144			
port manoeuvre	220		4		4			
environmental hazard	230		1	1	2			
pilot boarding /disembarking	240		8		8			
navigational error	250	1	20		21			
Unknown causes	270		1		1			
	2015	75	179	32	286	-->	35	66
grounding	20		3		3			
collision	30		2	2	4			
fire, explosion	40		1		1			
capsizing	80		1		1			
equipment failure including design faults	110	37	71	22	130			
cargo	120	1			1			
other vessel error	130	2	2	2	6			

environmental hazard	140		3		3			
other external failures	160		21	3	24			
reporting obligation	200	10	6		16			
traffic separation scheme	210	25	51		76			
port manoeuvre	220		1		1			
pilot boarding /disembarking	240		5		5			
navigational error	250		9	1	10			
Unknown causes	270		3	2	5			
	Grand Total	364	927	180	1471	-->	175	334
	Yearly average						43,75	83,5

Report GOFREP workshop

Date	August 31, 2016
Location	Helsinki, Turku, Web
Hosts	Thomas Erlund, Jenni Luomala (FTA), Tony Rosqv ist (VTT)
Facilitator	Tony Rosqvist (VTT)

1 Phase1: evaluating the collision risks and the traffic flow

1.1 Multi-criteria Rating: Rate area 1, Rate area 2, Rate area 3, Rate area 4, Rate area 5, Rate area 6

1.1.1.T0 Phase 1, Area 1 Western border - Hanko separation area east (rating by numeric scale) sorted by Source order

14 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 1.1.1
Area 1 Western border - Hanko separation area east Consider a time period of the last 10 years!

Label for scale value

1 = to noticeably worse	2 = to slightly worse	3 = no change	4 = to slightly better	5 = to noticeably better

Phase 1, Area 1 Western border - Hanko separation area east (rating by numeric scale) sorted by Source order
Criterion "Rate area 1". 5 items.
Scale: 1-5. Abstentions not permitted. Item list not randomized.

Nr	Item	1	2	3	4	5	Mean	SD		n
1	Has the collision probability changed? (ice free period)	0	1	3	7	3	3.86	0.21		14
2	Has the grounding probability changed? (ice free period)	0	0	4	6	4	4.00	0.19		14
3	Has the traffic fluency changed in this area? (ice free period)	0	1	1	8	4	4.07	0.20		14
4	Has the collision probability changed? (ice period)	0	2	4	5	3	3.64	0.24		14
5	Has the traffic fluency changed in this area? (ice period)	0	2	1	9	2	3.79	0.22		14

1.1.2.T0 Phase 1, Area 2 Hanko frontal zone (rating by numeric scale) sorted by Source order

14 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 1.1.2
Area 2, Off Hanko Consider a time period of the last 10 years!

Label for scale value

1 = to noticeably worse	2 = to slightly worse	3 = no change	4 = to slightly better	5 = to noticeably better

Phase 1, Area 2 Hanko frontal zone (rating by numeric scale) sorted by Source order Criterion "Rate area 2". 5 items. Scale: 1-5. Abstentions not permitted. Item list not randomized.										
Nr	Item	1	2	3	4	5	Mean	SD		n
1	Has the collision probability changed? (ice free period)	0	1	4	6	3	3.79	0.22		14
2	Has the grounding probability changed? (ice free period)	0	0	4	8	2	3.86	0.16		14
3	Has the traffic fluency changed in this area? (ice free period)	0	1	3	7	3	3.86	0.21		14
4	Has the collision probability changed? (ice period)	0	0	5	7	2	3.79	0.17		14
5	Has the traffic fluency changed in this area? (ice period)	0	1	3	8	2	3.79	0.19		14

1.1.3.T0 Phase 1, Area 3 Helsinki frontal zone (rating by numeric scale) sorted by Mean

13 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 1.1.3
Area 3 Off Helsinki Consider a time period of the last 10 years!

Label for scale value

1 = to noticeably worse	2 = to slightly worse	3 = no change	4 = to slightly better	5 = to noticeably better

Phase 1, Area 3 Helsinki frontal zone (rating by numeric scale) sorted by Mean Criterion "Rate area 3". 5 items. Scale: 1-5. Abstentions not permitted. Item list not randomized.										
Nr	Item	1	2	3	4	5	Mean	SD		n
2	Has the grounding probability changed? (ice free period)	0	0	5	4	4	3.92	0.21		13
1	Has the collision probability changed? (ice free period)	0	2	2	4	5	3.92	0.27		13
3	Has the traffic fluency changed in this area? (ice free period)	0	3	0	7	3	3.77	0.26		13
4	Has the collision probability changed? (ice period)	0	2	4	4	3	3.62	0.25		13
5	Has the traffic fluency changed in this area? (ice period)	0	2	4	5	2	3.54	0.23		13

1.1.4.T0 Phase 1, Area 4 Kilpilahti frontal zone (rating by numeric scale) sorted by Source order

14 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 1.1.4
Area 4 Off Kilpilahti Consider a time period of the last 10 years!

Label for scale value
1 = to noticeably worse | 2 = to slightly worse | 3 = no change | 4 = to slightly better | 5 = to noticeably better

Phase 1, Area 4 Kilpilahti frontal zone (rating by numeric scale) sorted by Source order Criterion "Rate area 4". 5 items. Scale: 1-5. Abstentions not permitted. Item list not randomized.										
Nr	Item	1	2	3	4	5	Mean	SD		n
1	Has the collision probability changed? (ice free period)	0	4	2	4	4	3.57	0.29		14
2	Has the grounding probability changed? (ice free period)	0	1	5	5	3	3.71	0.22		14
3	Has the traffic fluency changed in this area? (ice free period)	0	2	3	8	1	3.57	0.21		14
4	Has the collision probability changed? (ice period)	0	1	4	7	2	3.71	0.20		14
5	Has the traffic fluency changed in this area? (ice period)	0	1	4	7	2	3.71	0.20		14

1.1.5.T0 Phase 1, Area 5 Orregrund frontal zone (rating by numeric scale) sorted by Source order

14 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 1.1.5
Off Orregrund Consider a time period of the last 10 years!

Label for scale value
1 = to noticeably worse | 2 = to slightly worse | 3 = no change | 4 = to slightly better | 5 = to noticeably better

Phase 1, Area 5 Orregrund frontal zone (rating by numeric scale) sorted by Source order Criterion "Rate area 5". 5 items. Scale: 1-5. Abstentions not permitted. Item list not randomized.										
Nr	Item	1	2	3	4	5	Mean	SD		n
1	Has the collision probability changed? (ice free period)	0	2	3	6	3	3.71	0.24		14
2	Has the grounding probability changed? (ice free period)	0	0	3	9	2	3.93	0.15		14
3	Has the traffic fluency changed in this area? (ice free period)	0	2	4	6	2	3.57	0.23		14

Phase 1, Area 5 Orregrund frontal zone (rating by numeric scale) sorted by Source order Criterion "Rate area 5". 5 items. Scale: 1-5. Abstentions not permitted. Item list not randomized.										
Nr	Item	1	2	3	4	5	Mean	SD		n
4	Has the collision probability changed? (ice period)	0	1	5	6	2	3.64	0.20		14
5	Has the traffic fluency changed in this area? (ice period)	0	2	3	8	1	3.57	0.21		14

1.1.6.T0 Phase 1, Area 6 Eastern part (Russia) (rating by numeric scale) sorted by Mean

12 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 1.1.6
Area 6 Eastern part (Russia) Consider a time period of the last 10 years!

Label for scale value

1 = to noticeably worse	2 = to slightly worse	3 = no change	4 = to slightly better	5 = to noticeably better

Phase 1, Area 6 Eastern part (Russia) (rating by numeric scale) sorted by Mean Criterion "Rate area 6". 5 items. Scale: 1-5. Abstentions not permitted. Item list not randomized.										
Nr	Item	1	2	3	4	5	Mean	SD		n
1	Has the collision probability changed? (ice free period)	0	1	4	3	4	3.83	0.25		12
2	Has the grounding probability changed? (ice free period)	0	1	5	2	4	3.75	0.25		12
3	Has the traffic fluency changed in this area? (ice free period)	0	2	3	5	2	3.58	0.24		12
4	Has the collision probability changed? (ice period)	1	0	5	3	3	3.58	0.28		12
5	Has the traffic fluency changed in this area? (ice period)	1	1	3	5	2	3.50	0.28		12

1 Phase1: evaluating the collision risks and the traffic flow

1.1.M0 Rate area 1, Rate area 2, Rate area 3, Rate area 4, Rate area 5, Rate area 6 (Criteria: Rate area 1 / Rate area 2 / Rate area 3 / Rate area 4 / Rate area 5 / Rate area 6)

1.1.M0 Rate area 1, Rate area 2, Rate area 3, Rate area 4, Rate area 5, Rate area 6 (Criteria: Rate area 1 / Rate area 2 / Rate area 3 / Rate area 4 / Rate area 5 / Rate area 6)

Specification of the Ratings
Criterion: "Rate area 1". Rating 1.1.1 "Area 1 Western border - Hanko separation area east" Scale: 1-5. 5 Rating items. Abstentions not permitted. Item list not randomized.

Criterion: "Rate area 2". Rating 1.1.2 "Area 2, Off Hanko" Scale: 1-5. 5 Rating items. Abstentions not permitted. Item list not randomized.

Criterion: "Rate area 3". Rating 1.1.3 "Area 3 Off Helsinki" Scale: 1-5. 5 Rating items. Abstentions not permitted. Item list not randomized.

Criterion: "Rate area 4". Rating 1.1.4 "Area 4 Off Kilpilahti" Scale: 1-5. 5 Rating items. Abstentions not permitted. Item list not randomized.

Criterion: "Rate area 5". Rating 1.1.5 "Off Orregrund" Scale: 1-5. 5 Rating items. Abstentions not permitted. Item list not randomized.

Criterion: "Rate area 6". Rating 1.1.6 "Area 6 Eastern part (Russia)" Scale: 1-5. 5 Rating items. Abstentions not permitted. Item list not randomized.

1 Phase1: evaluating the collision risks and the traffic flow

1.1.M0 Rate area 1, Rate area 2, Rate area 3, Rate area 4, Rate area 5, Rate area 6 (Criteria: Rate area 1 / Rate area 2 / Rate area 3 / Rate area 4 / Rate area 5 / Rate area 6)

Rate area 1, Rate area 2, Rate area 3, Rate area 4, Rate area 5, Rate area 6 (Multi-criteria table) sorted by Mean							
		Rate area 1		Rate area 2		Rate area 3	
Nr	Item	Mean	SD	Mean	SD	Mean	SD
3	Has the traffic fluency changed in this area? (ice free period)	4.07	0.20	3.86	0.21	3.77	0.26
2	Has the grounding probability changed? (ice free period)	4.00	0.19	3.86	0.16	3.92	0.21
1	Has the collision probability changed? (ice free period)	3.86	0.21	3.79	0.22	3.92	0.27
5	Has the traffic fluency changed in this area? (ice period)	3.79	0.22	3.79	0.19	3.54	0.23
4	Has the collision probability changed? (ice period)	3.64	0.24	3.79	0.17	3.62	0.25

Rate area 1, Rate area 2, Rate area 3, Rate area 4, Rate area 5, Rate area 6 (Multi-criteria table) sorted by Mean							
		Rate area 4		Rate area 5		Rate area 6	
Nr	Item	Mean	SD	Mean	SD	Mean	SD
3	Has the traffic fluency changed in this area? (ice free period)	3.57	0.21	3.57	0.23	3.58	0.24
2	Has the grounding probability changed? (ice free period)	3.71	0.22	3.93	0.15	3.75	0.25
1	Has the collision probability changed? (ice free period)	3.57	0.29	3.71	0.24	3.83	0.25
5	Has the traffic fluency changed in this area? (ice period)	3.71	0.20	3.57	0.21	3.50	0.28
4	Has the collision probability changed? (ice period)	3.71	0.20	3.64	0.20	3.58	0.28

1.2 Rating: Phase 1, comparing to TSS Åland

1.2.1.T0 Phase 1, comparing to TSS Åland (rating by numeric scale) sorted by Source order

13 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 1.2.1
Compare risk levels in GOFREP area and in Åland

Label for scale value

1 = significantly higher	2 = slightly higher	3 = no difference	4 = slightly lower	5 = significantly lower

Phase 1, comparing to TSS Åland (rating by numeric scale) sorted by Source order
Criterion "rate". 2 items.
Scale: 1-5. Abstentions not permitted. List of items randomized.

Nr	Item	1	2	3	4	5	Mean	SD		n
1	What is the collision probability in the GOFREP area compared to TSS Åland? Consider the open sea period.	1	6	0	5	1	2.92	0.30	⚠	13
2	What is the grounding probability in the GOFREP area compared to TSS Åland? Consider the open sea period.	0	1	2	7	3	3.92	0.21		13

- What is the collision probability in the GOFREP area compared to TSS Åland? Consider the open sea period.
  - Scale value 2 "rate"
    - Traffic density is higher in certain GOFREP areas (#1)
    - Plese see the comment on question. (#5)
    - Crossing traffic Helsinki - Tallinn more frecvent than in Åland. (#6)
    - PSuurempi liikeentiheys verrattuna A.maan alueen liikenteeseen (#9)
  - Scale value 1 "rate"
    - Much more traffic in the GOFREP area (#2)
  - Scale value 5 "rate"
    - The risk is much smaller because TSS Åland has not any mandatory ship reporting. There is not a similar surveillance as in the Gofrep. For example Sweden has a "watch dog" system watching over the COLREG`s in the Åland Sea when the Finnish side has a person watching over the situation. The automated system can not interviene with the arising collision situation. Ofcourse more traffic in the Gulf of Finland... (#7)
- What is the grounding probability in the GOFREP area compared to TSS Åland? Consider the open sea period.
  - Scale value 5 "rate"
    - Not many grounds in the GOFREP area. (#1)
  - Scale value 2 "rate"

- Åland sea trafic is very active and making this fairway area safer to navigate. GOFREP is less active in this field. (#4)

Scale value 4 "rate"
- In TSS Åland area is more narrow and islands & rocks are closer. (#5)
- The risk is much bigger. More shallows in the Aland Sea area. (#6)
- A;maan alueella huomattavasti enemmän kareja tms verrattuna GOFREP-alueen vesiin (#8)

1.3 Rating: Phase 1 Evaluating the factors concerning the risk

1.3.1.T0 Phase 1 Evaluating the factors concerning the risk (multiple selection) sorted by Source order

16 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 1.3.1
Which of these factors explain the changes in risk levels? Please, choose the THREE (3) most important factors!

Phase 1 Evaluating the factors concerning the risk (multiple selection) sorted by Source order Criterion "The most important factors". 3 selections of 7 items. Ratings submitted: 16. Total selections 43. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
1	Traffic separation scheme	9
2	GOFREP-operations	14
3	Vessel technology, maintenance practices	2
4	Communication between ships	7
5	Competence of vessel staff	7
6	Other navigational aids	3
7	other, specify	1

Traffic separation scheme

Not selected "The most important factors"
- N/A (#2)
- It contribiutes to the whole gofrep area and mainly to the are GOFREP3. It separates opposite vessel traffic, reduces vessels dispersion, separates vessels joining to th TSS in Porkkala West TSS. So it lowers the risk of collision. The most dangerous are traffic crossing areas when bunches of vessels are crossing each other routes.. (#20)

Selected "The most important factors"
- Lower the risk cause it keeps vessels on contratory course clearly away from each other. (#7)
- Area 3, collisinón risk is higher. Rising the risk. (#10)
- TSS make vessels navigate in safe courses and makes the rules of the road clearer. (#13)
- area 3. separation scheme between Helsinki and Tallinn lower the risk to collision due the crossing traffic. (#17)
- Separation of the traffic flow reduses probability of collisions (#19)
- Areas 2, 3, 6 (#21)

GOFREP-operations

Not selected "The most important factors"
- N/A (#2)

Selected "The most important factors"

- All areas. In common the "liikennekuri" is better because vessels know that someone is watching. GOFREP operators remind vessels of the colregs and their duties as give way vessels. (#7)
- Lower the risk. Navigators know that they are under surveilance and they also get the info about other traffic from VHF ch.60. Gofrep operators also notifies vessels with collision course, navigating in TSZ or manouvering oddly. (#9)
- GOFREP-operations are veryimportant to reduce the risk of grounding and collission. (#11)
- Area 3, the collission risk, rising. (#14)
- Gofrep operations can make safety better if the operator is active. (#17)
- Area 3, see previous. (#21)
- The monitoring by the GOFREP or VTS operators is the second step of control to prevent negative effect of human factor (navigation mistake). If the first step of control fails we have reserve: influence of the GOFREP or VTS operator. (#23)
- GOFREP 3. Information exchange between TLL and HEL GOFREP operators. Situations forms in one area of responsibility but finalize in other area. There have to be kind of route or "intention" exchange procedures between gofrep centres enabling operators to predict situations earlier than entering into their area of responsibility. (#24)
- Surveillance is important tool for cotrolling that TSS regulations are followed by all ships. GOFREP is good system for preventing collisions. (#27)
- Gofrep operations lower the grounding risks in all areas (#28)

Vessel technology, maintenance practices

Not selected "The most important factors"

- N/A (#2)
- No effect (#6)

Selected "The most important factors"

- Lower the risk. AIS and eletronic charts raise the awareness of traffic situation around you. (#4)
- High tech level makes safety marginals smaller. So it might make safety worse. (#7)

Communication between ships

Not selected "The most important factors"

- N/A (#2)
- This is fifty-fifty. Cause sometimes communication between vessels is good and sometimes it just confuses more. Too much talk can affect others listening and using the same channel. (#7)
- Communication is better. (#11)

Selected "The most important factors"

- It is better to be quiet than have bad communications. Communtications between ships usually leads to misunderstandings. GOFREP-operations important. (#8)
- Language skils onboard ships are nowdays poor. (#10)
- Easier to communicate with other vessels, to avoid close situtation. (#13)
- In areas 2 and 3 the communication between the vessels is improtant because of the crossing traffic (#15)

Competence of vessel staff

Selected "The most important factors"

- N/A (#2)
- All areas. Vessels are taking knowingly risks with close overtaking distances, and navigating close to shallow waters. Seems that they are blindly following route plans on ecdis. Rises risks because there are not extra margins for errors or tecnical failure. (#5)
- The sailors are navigating the ships. Not GOFREP operators or other shore staff (#9)
- competence of vessel staff nowdayswery poor. (#12)

- Improved. (#14)

Not selected "The most important factors"
- Rise the risk. Nowadays have noticed that the trend that competence is going down. Dont know if its the economics that pushes the companies to hire staff were they can get it cheapest? (#7)
- Sometimes have to be better.E.G. language skills, specially when the crew is from Far East: (#17)

Other navigational aids

Selected "The most important factors"
- All areas. Ecdis, AIS and evolved navigational systems lower risk of collision and grounding when used wisely. (#5)
- Use of electronic charts have significantly lowered the risk for maritime accidents (#10)

Not selected "The most important factors"
- N/A (#3)
- Improved. (#7)

other, specify

Not selected "The most important factors"
- N/A (#2)
- N/A (#3)

Selected "The most important factors"
- Working time onboard the vessel. How the working time devided among the officers. If there are only 2 officers (captain and C/O) the probability of navigation mistake is higher. Also there is dependence on collision risk. (#6)

2 Phase 2: Risky situations

2.1 Multi-criteria Rating: (1) NAVE, (2) ROPIN, (3) INKNOW, (4) RADAR/GV, (5) RADAR/PV, 6 VISUAL, 7 REACGA/REACSO, 8 COE, 9 SOFO, 10 GWNEG, 11 SONEG

2.1.1.T0 Phase 2, option 1 NAVE (multiple selection) sorted by Source order

15 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 2.1.1
NAVE NAVE: Navigation error (equipment failure / reading error) = navigation error due to human error, equipment failure, ignorance, etc.

Phase 2, option 1 NAVE (multiple selection) sorted by Source order Criterion "(1) NAVE". 4 selections of 18 items. Ratings submitted: 15. Total selections 50. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	2
2	2. Quite important	6
3	3. Very important	8
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur?	3

Phase 2, option 1 NAVE (multiple selection) sorted by Source order Criterion "(1) NAVE". 4 selections of 18 items. Ratings submitted: 15. Total selections 50. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
	1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	3
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	3
7	4. Rarely	1
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	0
9	B. 2. Hanko frontal zone	1
10	C. 3. Helsinki frontal zone	9
11	D. 4 Kilpilahti frontal zone	0
12	E. 5 Orregrund frontal zone	0
13	F. 6 Eastern part (Russia)	2
14	4. In which circumstances does this most probably happen? A. In any circumstances	5
15	B. Mostly in rough seas	3
16	C. Mostly in fog	0
17	D. Mostly during the night	2
18	E. Mostly while traffic peaks	2

2.1.2.T0 Phase 2, option 2 ROPIN (multiple selection) sorted by Source order

15 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 2.1.2
ROPIN ROPIN: Route planning wrong = Route planning is wrong due to negligence, misunderstanding, etc.

Phase 2, option 2 ROPIN (multiple selection) sorted by Source order Criterion "(2) ROPIN". 4 selections of 18 items. Ratings submitted: 15. Total selections 37. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	2
2	2. Quite important	10
3	3. Very important	3
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	1
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	2
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	1
7	4. Rarely	4
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	0
9	B. 2. Hanko frontal zone	1

Phase 2, option 2 ROPIN (multiple selection) sorted by Source order Criterion "(2) ROPIN". 4 selections of 18 items. Ratings submitted: 15. Total selections 37. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
10	C. 3. Helsinki frontal zone	2
11	D. 4 Kilpilahti frontal zone	1
12	E. 5 Orregrund frontal zone	0
13	F. 6 Eastern part (Russia)	3
14	4. In which circumstances does this most probably happen? A. In any circumstances	4
15	B. Mostly in rough seas	0
16	C. Mostly in fog	0
17	D. Mostly during the night	2
18	E. Mostly while traffic peaks	1

2.1.3.T0 Phase 2, option 3 INKNOW (multiple selection) sorted by Source order

15 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 2.1.3
INKNOW: Insufficient knowledge = The give-way does not understand how to comply with the colreg-rules

Phase 2, option 3 INKNOW (multiple selection) sorted by Source order Criterion "(3) INKNOW". 4 selections of 18 items. Ratings submitted: 15. Total selections 48. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	0
2	2. Quite important	5
3	3. Very important	10
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	1
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	7
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	2
7	4. Rarely	2
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	1
9	B. 2. Hanko frontal zone	0
10	C. 3. Helsinki frontal zone	7
11	D. 4 Kilpilahti frontal zone	0
12	E. 5 Orregrund frontal zone	0
13	F. 6 Eastern part (Russia)	2
14	4. In which circumstances does this most probably happen? A. In any circumstances	4
15	B. Mostly in rough seas	0

Phase 2, option 3 INKNOW (multiple selection) sorted by Source order Criterion "(3) INKNOW". 4 selections of 18 items. Ratings submitted: 15. Total selections 48. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
16	C. Mostly in fog	0
17	D. Mostly during the night	1
18	E. Mostly while traffic peaks	6

2.1.4.T0 Phase 2, option 4 RADAR/GV (multiple selection) sorted by Source order

15 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 2.1.4
RADAR/GV Radar observation error under good visibility = Error in reading the radar due to equipment failure, poor know-how, etc under good visibility

Phase 2, option 4 RADAR/GV (multiple selection) sorted by Source order Criterion "(4) RADAR/GV". 4 selections of 18 items. Ratings submitted: 15. Total selections 32. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	2
2	2. Quite important	13
3	3. Very important	0
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	0
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	1
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	1
7	4. Rarely	3
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	0
9	B. 2. Hanko frontal zone	0
10	C. 3. Helsinki frontal zone	3
11	D. 4 Kilpilahti frontal zone	1
12	E. 5 Orregrund frontal zone	0
13	F. 6 Eastern part (Russia)	1
14	4. In which circumstances does this most probably happen? A. In any circumstances	2
15	B. Mostly in rough seas	1
16	C. Mostly in fog	1
17	D. Mostly during the night	2
18	E. Mostly while traffic peaks	1

2.1.5.T0 Phase 2, option 5 RADAR/PV (multiple selection) sorted by Source order

14 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 2.1.5
RADAR/PV: Radar observation error under poor visibility = Error in reading the radar due to equipment failure, poor know-how, etc under poor visibility

Phase 2, option 5 RADAR/PV (multiple selection) sorted by Source order Criterion "(5) RADAR/PV". 4 selections of 18 items. Ratings submitted: 14. Total selections 42. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	1
2	2. Quite important	7
3	3. Very important	6
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	0
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	4
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	2
7	4. Rarely	3
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	1
9	B. 2. Hanko frontal zone	1
10	C. 3. Helsinki frontal zone	4
11	D. 4 Kilpilahti frontal zone	0
12	E. 5 Orregrund frontal zone	0
13	F. 6 Eastern part (Russia)	2
14	4. In which circumstances does this most probably happen? A. In any circumstances	1
15	B. Mostly in rough seas	2
16	C. Mostly in fog	4
17	D. Mostly during the night	3
18	E. Mostly while traffic peaks	1

2.1.6.T0 Phase 2, option 6 VISUAL (multiple selection) sorted by Source order

6 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 2.1.6
VISUAL: Visual observation failure = Visual observation of the traffic pattern has failed under good visibility due e.g. fatigue, no-one performing look-out, etc.

Phase 2, option 6 VISUAL (multiple selection) sorted by Source order Criterion "6 VISUAL". 4 selections of 18 items. Ratings submitted: 6. Total selections 24. Abstentions not permitted. Item list not randomized.

Nr	Item	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	0
2	2. Quite important	4
3	3. Very important	2
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	0
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	2
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	1
7	4. Rarely	3
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	2
9	B. 2. Hanko frontal zone	0
10	C. 3. Helsinki frontal zone	3
11	D. 4 Kilpilahti frontal zone	0
12	E. 5 Orregrund frontal zone	0
13	F. 6 Eastern part (Russia)	1
14	4. In which circumstances does this most probably happen? A. In any circumstances	3
15	B. Mostly in rough seas	0
16	C. Mostly in fog	0
17	D. Mostly during the night	2
18	E. Mostly while traffic peaks	1

2.1.7.T0 Phase 2, option 7 REACGA/REACSO (multiple selection) sorted by Source order

13 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 2.1.7
REACCA/REACSO REACGA/REACSO: Restricted manoeuvre options = Restricted manoeuvring due to vessel properties, traffic pattern, fairway properties, etc.

Phase 2, option 7 REACGA/REACSO (multiple selection) sorted by Source order Criterion "7 REACGA/REACSO". 4 selections of 18 items. Ratings submitted: 13. Total selections 27. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	3
2	2. Quite important	8
3	3. Very important	1
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	0

Phase 2, option 7 REACGA/REACSO (multiple selection) sorted by Source order Criterion "7 REACGA/REACSO". 4 selections of 18 items. Ratings submitted: 13. Total selections 27. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	1
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	0
7	4. Rarely	4
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	1
9	B. 2. Hanko frontal zone	0
10	C. 3. Helsinki frontal zone	0
11	D. 4 Kilpilahti frontal zone	0
12	E. 5 Orregrund frontal zone	1
13	F. 6 Eastern part (Russia)	2
14	4. In which circumstances does this most probably happen? A. In any circumstances	1
15	B. Mostly in rough seas	1
16	C. Mostly in fog	0
17	D. Mostly during the night	2
18	E. Mostly while traffic peaks	2

2.1.8.T0 Phase 2, option 8 COE (multiple selection) sorted by Source order

14 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 2.1.8
COE: Communication error = Communication efforts fail due to technical, cultural, linguistic etc problems. Also starting the communication effort too late is a problem factor.

Phase 2, option 8 COE (multiple selection) sorted by Source order Criterion "8 COE". 4 selections of 18 items. Ratings submitted: 14. Total selections 43. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	0
2	2. Quite important	5
3	3. Very important	9
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	1
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	4
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	2
7	4. Rarely	3
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	1
9	B. 2. Hanko frontal zone	0
10	C. 3. Helsinki frontal zone	2
11	D. 4 Kilpilahti frontal zone	0

Phase 2, option 8 COE (multiple selection) sorted by Source order Criterion "8 COE". 4 selections of 18 items. Ratings submitted: 14. Total selections 43. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
12	E. 5 Orregrund frontal zone	2
13	F. 6 Eastern part (Russia)	5
14	4. In which circumstances does this most probably happen? A. In any circumstances	4
15	B. Mostly in rough seas	0
16	C. Mostly in fog	0
17	D. Mostly during the night	1
18	E. Mostly while traffic peaks	4

2.1.9.T0 Phase 2, option 9 SOFO (multiple selection) sorted by Source order

14 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 2.1.9
SOFO: Stand-on fails to observe = Stand-on vessel does not observe the threat of the give-way due to observational error

Phase 2, option 9 SOFO (multiple selection) sorted by Source order Criterion "9 SOFO". 4 selections of 18 items. Ratings submitted: 14. Total selections 42. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	3
2	2. Quite important	6
3	3. Very important	5
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	1
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	0
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	3
7	4. Rarely	5
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	0
9	B. 2. Hanko frontal zone	0
10	C. 3. Helsinki frontal zone	7
11	D. 4 Kilpilahti frontal zone	1
12	E. 5 Orregrund frontal zone	0
13	F. 6 Eastern part (Russia)	2
14	4. In which circumstances does this most probably happen? A. In any circumstances	5
15	B. Mostly in rough seas	0
16	C. Mostly in fog	1
17	D. Mostly during the night	0

Phase 2, option 9 SOFO (multiple selection) sorted by Source order Criterion "9 SOFO". 4 selections of 18 items. Ratings submitted: 14. Total selections 42. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
18	E. Mostly while traffic peaks	3

2.1.10.T0 Phase 2, option 10 GWNEG (multiple selection) sorted by Source order

14 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 2.1.10
GWNEG: Neglect by give-way = Give-way vessel behaves like a cowboy and forces stand-on vessel to react.

Phase 2, option 10 GWNEG (multiple selection) sorted by Source order Criterion "10 GWNEG". 4 selections of 18 items. Ratings submitted: 14. Total selections 46. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	0
2	2. Quite important	6
3	3. Very important	8
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	0
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	3
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	3
7	4. Rarely	5
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	2
9	B. 2. Hanko frontal zone	0
10	C. 3. Helsinki frontal zone	6
11	D. 4 Kilpilahti frontal zone	0
12	E. 5 Orregrund frontal zone	0
13	F. 6 Eastern part (Russia)	2
14	4. In which circumstances does this most probably happen? A. In any circumstances	5
15	B. Mostly in rough seas	1
16	C. Mostly in fog	1
17	D. Mostly during the night	1
18	E. Mostly while traffic peaks	3

2.1.11.T0 Phase 2, option 11 SONEG (multiple selection) sorted by Source order

14 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 2.1.11
SONEG: Neglect by stand-on = Stand-on wants to show he has the right not to take other vessels into account, and does not cooperate for the benefit of all.

Phase 2, option 11 SONEG (multiple selection) sorted by Source order Criterion "11 SONEG". 4 selections of 18 items. Ratings submitted: 14. Total selections 42. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	2
2	2. Quite important	8
3	3. Very important	4
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	0
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	1
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	1
7	4. Rarely	7
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	1
9	B. 2. Hanko frontal zone	2
10	C. 3. Helsinki frontal zone	4
11	D. 4 Kilpilahti frontal zone	0
12	E. 5 Orregrund frontal zone	0
13	F. 6 Eastern part (Russia)	2
14	4. In which circumstances does this most probably happen? A. In any circumstances	6
15	B. Mostly in rough seas	0
16	C. Mostly in fog	0
17	D. Mostly during the night	1
18	E. Mostly while traffic peaks	3

2.1.M0 (1) NAVE, (2) ROPIN, (3) INKNOW, (4) RADAR/GV, (5) RADAR/PV, 6 VISUAL, 7 REACGA/REACSO, 8 COE, 9 SOFO, 10 GWNEG, 11 SONEG (Criteria: (1) NAVE / (2) ROPIN / (3) INKNOW / (4) RADAR/GV / (5) RADAR/PV / 6 VISUAL / 7 REACGA/REACSO / 8 COE / 9 SOFO / 10 GWNEG / 11 SONEG)

Specification of the Ratings
Criterion: "(1) NAVE". Rating 2.1.1 "NAVE" Select 4 of 18. Ratings submitted: 15. Total selections: 50. Abstentions permitted. Item list not randomized.

Criterion: "(2) ROPIN". Rating 2.1.2 "ROPIN" Select 4 of 18. Ratings submitted: 15. Total selections: 37. Abstentions permitted. Item list not randomized.

Criterion: "(3) INKNOW". Rating 2.1.3 "INKNOW: Insufficient knowledge" Select 4 of 18. Ratings submitted: 15. Total selections: 48. Abstentions permitted. Item list not randomized.

Criterion: "(4) RADAR/GV". Rating 2.1.4 "RADAR/GV Radar observation error under good visibility" Select 4 of 18. Ratings submitted: 15. Total selections: 32. Abstentions permitted. Item list not randomized.

Criterion: "(5) RADAR/PV". Rating 2.1.5 "RADAR/PV: Radar observation error under poor visibility" Select 4 of 18. Ratings submitted: 14. Total selections: 42. Abstentions permitted. Item list not randomized.

Criterion: "6 VISUAL". Rating 2.1.6 "VISUAL: Visual observation failure" Select 4 of 18. Ratings submitted: 6. Total selections: 24. Abstentions not permitted. Item list not randomized.

Criterion: "7 REACGA/REACSO". Rating 2.1.7 "REACCA/REACSO" Select 4 of 18. Ratings submitted: 13. Total selections: 27. Abstentions permitted. Item list not randomized.

Criterion: "8 COE". Rating 2.1.8 "COE: Communication error" Select 4 of 18. Ratings submitted: 14. Total selections: 43. Abstentions permitted. Item list not randomized.

Criterion: "9 SOFO". Rating 2.1.9 "SOFO: Stand-on fails to observe" Select 4 of 18. Ratings submitted: 14. Total selections: 42. Abstentions permitted. Item list not randomized.

Criterion: "10 GWNEG". Rating 2.1.10 "GWNEG: Neglect by give-way" Select 4 of 18. Ratings submitted: 14. Total selections: 46. Abstentions permitted. Item list not randomized.

Criterion: "11 SONEG". Rating 2.1.11 "SONEG: Neglect by stand-on" Select 4 of 18. Ratings submitted: 14. Total selections: 42. Abstentions permitted. Item list not randomized.

2 Phase 2: Risky situations

2.1.M0 (1) NAVE, (2) ROPIN, (3) INKNOW, (4) RADAR/GV, (5) RADAR/PV, 6 VISUAL, 7 REACGA/REACSO, 8 COE, 9 SOFO, 10 GWNEG, 11 SONEG (Criteria: (1) NAVE / (2) ROPIN / (3) INKNOW / (4) RADAR/GV / (5) RADAR/PV / 6 VISUAL / 7 REACGA/REACSO / 8 COE / 9 SOFO / 10 G

(1) NAVE, (2) ROPIN, (3) INKNOW, (4) RADAR/GV, (5) RADAR/PV, 6 VISUAL, 7 REACGA/REACSO, 8 COE, 9 SOFO, 10 GWNEG, 11 SONEG (Multi-criteria table) sorted by Source order						
		(1) NAVE	(2) ROPIN	(3) INKNOW	(4) RADAR/GV	(5) RADAR/PV
Nr	Item	Selections	Selections	Selections	Selections	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	2	2	0	2	1
2	2. Quite important	6	10	5	13	7
3	3. Very important	8	3	10	0	6
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	3	1	1	0	0
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	3	2	7	1	4
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	3	1	2	1	2
7	4. Rarely	1	4	2	3	3
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	0	0	1	0	1
9	B. 2. Hanko frontal zone	1	1	0	0	1
10	C. 3. Helsinki frontal zone	9	2	7	3	4
11	D. 4 Kilpilahti frontal zone	0	1	0	1	0
12	E. 5 Orregrund frontal zone	0	0	0	0	0
13	F. 6 Eastern part (Russia)	2	3	2	1	2
14	4. In which circumstances does this most probably happen? A. In any circumstances	5	4	4	2	1
15	B. Mostly in rough seas	3	0	0	1	2
16	C. Mostly in fog	0	0	0	1	4

2 Phase 2: Risky situations

2.1.M0 (1) NAVE, (2) ROPIN, (3) INKNOW, (4) RADAR/GV, (5) RADAR/PV, 6 VISUAL, 7 REACGA/REACSO, 8 COE, 9 SOFO, 10 GWNEG, 11 SONEG (Criteria: (1) NAVE / (2) ROPIN / (3) INKNOW / (4) RADAR/GV / (5) RADAR/PV / 6 VISUAL / 7 REACGA/REACSO / 8 COE / 9 SOFO / 10 G

(1) NAVE, (2) ROPIN, (3) INKNOW, (4) RADAR/GV, (5) RADAR/PV, 6 VISUAL, 7 REACGA/REACSO, 8 COE, 9 SOFO, 10 GWNEG, 11 SONEG (Multi-criteria table) sorted by Source order						
		(1) NAVE	(2) ROPIN	(3) INKNOW	(4) RADAR/GV	(5) RADAR/PV
Nr	Item	Selections	Selections	Selections	Selections	Selections
17	D. Mostly during the night	2	2	1	2	3
18	E. Mostly while traffic peaks	2	1	6	1	1

(1) NAVE, (2) ROPIN, (3) INKNOW, (4) RADAR/GV, (5) RADAR/PV, 6 VISUAL, 7 REACGA/REACSO, 8 COE, 9 SOFO, 10 GWNEG, 11 SONEG (Multi-criteria table) sorted by Source order						
		6 VISUAL	7 REACGA/REACSO	8 COE	9 SOFO	10 GWNEG
Nr	Item	Selections	Selections	Selections	Selections	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	0	3	0	3	0
2	2. Quite important	4	8	5	6	6
3	3. Very important	2	1	9	5	8
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	0	0	1	1	0
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	2	1	4	0	3
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	1	0	2	3	3
7	4. Rarely	3	4	3	5	5
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	2	1	1	0	2

2 Phase 2: Risky situations

2.1.M0 (1) NAVE, (2) ROPIN, (3) INKNOW, (4) RADAR/GV, (5) RADAR/PV, 6 VISUAL, 7 REACGA/REACSO, 8 COE, 9 SOFO, 10 GWNEG, 11 SONEG (Criteria: (1) NAVE / (2) ROPIN / (3) INKNOW / (4) RADAR/GV / (5) RADAR/PV / 6 VISUAL / 7 REACGA/REACSO / 8 COE / 9 SOFO / 10 G

(1) NAVE, (2) ROPIN, (3) INKNOW, (4) RADAR/GV, (5) RADAR/PV, 6 VISUAL, 7 REACGA/REACSO, 8 COE, 9 SOFO, 10 GWNEG, 11 SONEG (Multi-criteria table) sorted by Source order						
		6 VISUAL	7 REACGA/REACSO	8 COE	9 SOFO	10 GWNEG
Nr	Item	Selections	Selections	Selections	Selections	Selections
9	B. 2. Hanko frontal zone	0	0	0	0	0
10	C. 3. Helsinki frontal zone	3	0	2	7	6
11	D. 4 Kilpilahti frontal zone	0	0	0	1	0
12	E. 5 Orregrund frontal zone	0	1	2	0	0
13	F. 6 Eastern part (Russia)	1	2	5	2	2
14	4. In which circumstances does this most probably happen? A. In any circumstances	3	1	4	5	5
15	B. Mostly in rough seas	0	1	0	0	1
16	C. Mostly in fog	0	0	0	1	1
17	D. Mostly during the night	2	2	1	0	1
18	E. Mostly while traffic peaks	1	2	4	3	3

(1) NAVE, (2) ROPIN, (3) INKNOW, (4) RADAR/GV, (5) RADAR/PV, 6 VISUAL, 7 REACGA/REACSO, 8 COE, 9 SOFO, 10 GWNEG, 11 SONEG (Multi-criteria table) sorted by Source order		
		11 SONEG
Nr	Item	Selections
1	How important is this factor in creating a risky situation in the GOFREP area? 1. Not very important	2
2	2. Quite important	8
3	3. Very important	4
4	IF YOU EVALUATED THIS FACTOR AS A VERY IMPORTANT, answer the following questions? How often does this factor occur? 1. Once during 10 voyages (ship master) or work shifts (VTS-operator)	0
5	2. Once during 100 voyages (ship master) or work shifts (VTS-operator)	1
6	3. Once during 1000 voyages (ship master) or work shifts (VTS-operator)	1

(1) NAVE, (2) ROPIN, (3) INKNOW, (4) RADAR/GV, (5) RADAR/PV, 6 VISUAL, 7 REACGA/REACSO, 8 COE, 9 SOFO, 10 GWNEG, 11 SONEG (Multi-criteria table) sorted by Source order		
		11 SONEG
Nr	Item	Selections
7	4. Rarely	7
8	In which area does this factor most probably occur? A. 1. Western border - Hanko separation area east	1
9	B. 2. Hanko frontal zone	2
10	C. 3. Helsinki frontal zone	4
11	D. 4 Kilpilahti frontal zone	0
12	E. 5 Orregrund frontal zone	0
13	F. 6 Eastern part (Russia)	2
14	4. In which circumstances does this most probably happen? A. In any circumstances	6
15	B. Mostly in rough seas	0
16	C. Mostly in fog	0
17	D. Mostly during the night	1
18	E. Mostly while traffic peaks	3

2.2 Phase 2. Comparing GOFREP and other areas

Number of participants: 13

Participant instructions:
Compare the GOFREP risks to risks in other areas
All contributions are anonymous.

Not categorized (2)

1. Do the risk factors (1-11) you chose as the most important apply only in the GOFREP area, or also in other traffic areas?
   - Yes, in all areas (#3)
   - Yes (#4)
   - Yes, also relevant in VTS area (#5)
   - yes! (#6)
   - Yes (#7)
   - Everywhere (#8)
   - May be applyed in VTS areas providing INS (coastal VTS) (#10)
   - Yes in all areas (#15)
2. Do the GOFREP operations increase traffic discipline compared to other unsurveilled traffic areas? How significantly? Please comment?
   - yes. (#9)
     - yes (#17)
   - Yes of course it does. (#11)
     - Ofcourse it does change your behaviour when you know that you are under surveilance. (#13)
   - Yes Gofrep operations increase dicipline from 60 violations per year to 9 from 2004 to 2016. (#12)
   - It is very difficult to say how significantly! (#14)
   - Yes. GOFREP seems like coastal VTS (#16)
   - Yes (#18)
   - Yes, (#19)
   - Very significantfly. Surveillance and possible sanctions keep all the sailors on track. Bad behaviour can also affect company's reputation as a reliable partner. (#20)

3 Phase 3: Improving the risk management and the traffic fluency

3.1 Rating: Phase 3, Lowering the most significant risks

3.1.1.T0 Phase 3, Lowering the most significant risks (multiple selection) sorted by Source order

14 persons have submitted their ratings.
The Host does not participate in the Rating.

Participant instructions of Rating 3.1.1
Which of the following means are the best in controlling the most important risk factors? How should these be developed? In phase 2, following risk factors were rated as the most important ones: NAVE, INKNOW, COE, GWNEG

Phase 3, Lowering the most significant risks (multiple selection) sorted by Source order Criterion "The most effective means". 3 selections of 7 items. Ratings submitted: 14. Total selections 37. Abstentions permitted. Item list not randomized.		
Nr	Item	Selections
1	Traffic separation scheme	8
2	GOFREP-operations	11
3	Vessel technology, maintenance practices	2
4	Communication between ships	6
5	Competence of vessel staff	5
6	Other navigational aids	3
7	Other, specify?	2

- Traffic separation scheme
  - Selected "The most effective means"
    - Vessels stay in traffic lines. (#2)
    - Keeping TSS-s updated in accordance with the real traffic patterns (#4)
    - More TSS areas (#5)
    - TSS keeps vessels apart from each other relatively good and they dont cross each others courses. Clear and easy to navigate. (#6)
    - At the moment ok (#7)
- GOFREP-operations
  - Selected "The most effective means"
    - More communication, closer follow up on ships movements (#2)
    - Different level of intervention on different areas is maybe one of the problem. Keeping same standards on all of the areas/operators. (#3)
    - Uniformed practises among all operators and VTS centres, so that all parties should intervene same kind of navigational situations at same distances / time frames. Less talk on traffic channels to avoid fatigue to radio noise -> collect of voyage info shouldbe more reliable electronically. (#4)
    - There is always something to improve. There should not be operative differences between centres. (#5)
    - NAVE, INKNOWN, COE, GWNEG: GOFREP operators should quide and assist vessel in clear cases. (#6)
    - - Cooperation between the different GOFREP operations. eg. Tallin traffic, Helsinki traffic... (#8)
    - More interference and coordination between GOFREP operators to influence fluency of traffic patterns (e.g. traffic organisation service), specially during high traffic dencity periods in GOFREP 3 area. (#11)
    - Commonicatoin between ships and Gofrep operators could be more active. Instead on just following gofrep operators cuold give more information and also "orders". (#12)
- Vessel technology, maintenance practices
  - Selected "The most effective means"
    - AIS information helps to navigate, because you can see the destination of the target. (#2)
    - Route exchange system between the VTS and Vessel would be a good solution to develope further (#4)
- Communication between ships
  - Selected "The most effective means"

- development of E-navigation sistems (mona-lisa, ENCI) (#1)
- AIS, because you can see the vessels names. (#2)
- This is most essential issue. Important to encourage the offisers on watch always to make VHF contact when needed. Case simulation in training center. (#5)
- Inform the others about your intensions before it is too late (#8)

Competence of vessel staff

Selected "The most effective means"

- Control methods for the training and certification of seafares in different countries to ensure that the STCW standards are met (#2)
- Cheapest is not always the best. (#3)
- Better language education, better navigational andequipment related education. (#4)
- Better crews make better decisions (#9)

Other navigational aids

Selected "The most effective means"

- AIS that shows the passage plan on the electronic chart displays of other vessels (#1)
- Route plan exchange between all parties.-> Routeplans to be seen on vessels ecdis systems as well as on VTS systems. (#2)
- Virtual waypoint system woud help to provide navigational assistance if needed or operator deems it necessary (e.g. setting the optimal/safe route...) (#4)

Other, specify?

Selected "The most effective means"

- - Learn from "Near miss situations" How can we handle it better.The ENSI (Enhanced Navigation Support Information)? (#1)
- Common understanding about VTS and Ship Reporting Systems. What mariners can expect from VTS and SRS operators. Topic should be applied to mariners basic education. (#2)

3.2 Phase 3. improving the risk management and traffic fluency (Brainstorm)

Number of participants: 14

Not categorized (3)

1. Do cruise ships and fast passenger vessels affect the collision risk?

A. The collision risk increases

B. No effect

- B (#4)
  - Areas 2 and 3 are the high risk areas (#13)
    - Trafic to Hanko leaves and enters the TSS with such a course that makes give-way vessels manouvre with big course changes. That could be avoided by making TSS a bit longer (eastbound) so the trafic to/from Hanko would meet other trafic with 90 deg angle. (#29)
- B (#5)
- no effect (#6)
- B (#7)
- A Area 3 (#8)
  - High speed crafts mainly keep away from other traffic but if we are talking about passenger ferries then it is a bit different. Cause of schedules and fuel economy they tend to play in a risky area of leaving little or very little leeway for any error in traffic situations or leaving/approaching ports. (#21)
  - Large and fast vessels navigate in this area quite a same time usually, creating an extra traffic peak on top of the other, year round traffic. This affects directly to situations

between vessels, and also indirectly when many vessels need to do manouvers -> domino effect. (#23)
- B No Effect (#11)
- B (#15)
- B (#17)
- There is Finnish/Estonian company who plans to operate with WIG (wing in ground) crafts between HEL and TLL. The WIG craft speed is ~ 200 km/h. This influences significantly risk of collision and specially with small ships which cant be monitored by AIS. (#30)

2. Are the previously considered risk management means (Traffic separation scheme, GOFREP-operations, Vessel technology, maintenance practices, Communication between ships, Skills of vessel staff, Other navigational aids or the Other means you specified yourself) effective enough for dealing with these risks also?
- yes (#9)
- Yes, they are enough! (#10)
- Yes + Fatigue (#12)
- Enough (#16)
- yes (#18)
- +working time onboard, number of mates (#19)
- Yes (#20)
- Yes (#31)

3. Which functions should be developed to improve the traffic fluency in the GOFREP-area without increasing the risk levels?
- stricter follow up on ships movements by vys operator (#14)
- More automatic monitoring on vessels (#22)
- Routeplanning must sen to the traffic centres. (#24)
  - Good idea (#28)
- development of e-navigation segment (#25)
- Sanctions for those not following GOFREP's instructions. Public Web site that shows the companies / vessels not complying with the TSS and other regulations. (#26)
  - Good idea (#27)
  - very good idea! (#35)
- Traffic organisation services (IALA) (#32)
- Routeplans exchange between all parties, vessels routeplans could be seen on all ecdis and vts equipment in the area. (#33)
  - Good idea. (#34)
- excellent idea (#36)

4 Phase 4: feedback

4.1 Phase 4, Feedback from the workshop (Brainstorm)

Number of participants: 18

Participant instructions:
Give feedback about this workshop
All contributions are anonymous.

A. Did the expert group in this workshop have enough experience and knowledge for this evaluation?
- Yes (#4)
  - Yes (#9)
- Yes (#5)
- Yes (#6)

- We all are expert on our working areas. (#8)
- yes (#10)
  - yes (#28)
- It seems so (#11)
- Yes, but should have more masters and officers navigating in the area (#12)
  - Well said. (#24)
  - more master and officers could have given valuable feedback (#47)
- Well i sincerely hope that there would be more seafarers participating that are navigating in these areas frequently. (#14)
- Yes (#16)
- Yes. Would have been nice to hear from officers trading Helsinki-Tallin eg. Tallink, Viking. (#23)
- SAR / MRCC -authorities (Border Guard) did not participate to the workshop (#25)
- Only when there are some issues or problems to solve or something to discuss (#26)
- Yes, enought experience but the questions were a little bit hard to understand. (#27)

B. Is there some topic that should have been covered in this workshop, but was missing?

- coverage sufficient (#35)
- Ice breaking assistance?? (#37)
- Future of the GOFREP and ongoing projects. (#38)
- underwater surveys, construction works (cables, pipelines) (#42)
- Annual accident rate before GOFREP and statistics how the situation has developed in the GOFREP area. (#44)
- Concrete likes and dislikes of gogrep operations. May be some real case analyses (#45)

C. Should this kind of workshops be arranged regularly? Not at all? Every other year? Once in every 5 years?

- once in every 5 years. (#36)
- Yes, once in every three years (#39)
- every two years (#40)
- in 3 years period. Case study in advance. (#41)
- every second year but abit lighter (#43)
- Every second year. Questionnaires to be answered (except feedback) well before the meeting. (#46)

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