THE CENTRE FOR MARITIME STUDIES
UNIVERSITY OF TURKU

SCENARIOS FOR THE DEVELOPMENT OF MARITIME SAFETY AND SECURITY IN THE BALTIC SEA REGION

EUSBSR
EU STRATEGY
FOR THE BALTIC
SEA REGION

CENTRE FOR MARITIME STUDIES

DISCLAIMER

This report contains a number of scenarios for the development of maritime safety and security in the Baltic Sea Region. The Scenarios have been prepared by a team of experts from the Centre for Maritime Studies, University of Turku on the basis of input provided by the participants in a scenario workshop, organised by the Ministry of Transport and Communications of Finland and the Danish Maritime Authority, in their joint capacity as Coordinators for the Priority Area on Maritime Safety and Security of the EU Strategy for the Baltic Sea Region. The scenarios and the conclusions made are meant to serve as inspiration for further policy discussions, but do not represent the official opinion of the said authorities or the Priority Area´s international Steering Committee.

The report is compiled by the following team of researchers on maritime issues from the Centre for Maritime Studies of the University of Turku. The team included: Jenni Storgård, M.Soc.Sc; Jouni Lappalainen, M.Sc.; Irina Wahlström M.Sc., MBA and Sakari Kajander M.Sc (Tech.).

FOREWORD

The Baltic Sea is one of the most heavily trafficked seas in the world with nearly 2000 ships operating at any given moment. Moreover, the Baltic Sea is shallow; the fairways in some places - in particular through the Danish straits - are quite narrow, and the marine environment most sensitive to pollution. In the northernmost parts of the Baltic, ice is frequently a challenge to navigation. At the same time, the amount of and also the size of vessels are growing, and shipping is most important to the economy of the countries of the Baltic Sea Region.

This scenario report has been prepared on request from the international Steering Committee for the Priority Area on Maritime Safety and Security in the EU Strategy for the Baltic Sea Region. The Priority Area is jointly coordinated by the Danish Maritime Authority and the Ministry of Transport and Communications of Finland. An international Steering Committee, comprised of representatives from the maritime authorities and relevant international organisations from the Baltic Sea Region has been established to ensure that actions are anchored all over the region. The Steering Committee has an ongoing policy dialogue and monitors a series of Flagship Projects aimed at enhancing maritime safety and security in the Baltic Sea Region. The vision of the Priority Area is for the Baltic Sea Region to become a leading region in maritime safety and security.

This report has been prepared by a team of experts from the Centre for Maritime Studies of the University of Turku, which was contracted by the Danish Maritime Authority and the Ministry of Transport and Communications of Finland thanks to a grant from the European Commission. In order to provide input for the report, a seminar focusing on the future challenges to maritime safety and security in the region was held in Helsinki in May 2012, gathering experts from most countries of the region, and in addition, an electronic survey was conducted among a wide variety of stakeholders from the maritime community. The ambition has been to obtain a common vision about the upcoming challenges and demands, relevant to maritime safety and security in a regional perspective. A joint understanding of the future tasks is surely a precondition for discussing how to better meet the upcoming challenges, and whether improved regional cooperation, or – in a long time perspective – perhaps even joint operations or investments – could be a part of the answer.

We hope that this study will help to raise awareness on some of the expected challenges in the field of maritime safety and security and not least stimulate a discussion on the role of regional cooperation in how to meet these challenges.

ABSTRACT

The aim of this report is to analyse the future challenges and development needs in the area of maritime safety and security in the Baltic Sea. Central issues and key concerns related to maritime safety and security in year 2025 have been identified mainly based on three modelled future scenarios and of a survey directed to maritime safety and security experts in the Baltic Sea Region.

Three future scenarios were introduced and defined at an expert workshop. Key issues were grouped to a) the human factor, b) regulation and administration, c) safety of ships and cargoes, d) security and e) traffic control systems.

Development of crew competence and increase of manning levels fall under the category human factor issues potentially reducing fatigue on board as well as the number and scale of human errors. Improvement of safety culture and management also play an important role. Administrative and regulative actions entail strengthening of co-operation in the Baltic Sea Region, promoting harmonisation and implementation of maritime safety and security regulations and active participation in maritime safety and security work involving all Baltic Sea states and other stakeholders at all levels. In addition, support to shipping self-regulation could solve certain problems associated with traditional command-and-control policies.

Vessel traffic surveillance related measures include effective deployment of advanced technology development within the maritime safety and security sector, such as the use of satellite technology, implementation of e-Navigation and single-window system and co-operation in traffic surveillance in the Baltic Sea Region. In terms of security issues there is a need for comprehensive security risk assessment in the Baltic Sea Region. Factors affecting ship safety such as climate change, environmental regulations and goal-based standards induce a need to generate and produce new future solutions.

When the identified key issues of this report are compared to the maritime safety and security related projects over the last years, it can be noted that many of them have been addressed by other projects too. In the future more attention should be given to the practical implementation of project results and recommendations. Some of the issues such as co-operation between the Baltic Sea states are to a large extent of inter-governmental nature and require therefore high-profile commitment from decision makers.

Today shipping is a global business characterised by fierce economic competition. The best way to support maritime safety and security is to provide and offer shipping companies an operative framework which enables profitable and prosperous business in the Baltic Sea. Only then adequate resources and attention towards maritime safety and security can be ensured.

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1 INTRODUCTION

1.1 Background of the study

The Priority Area on Maritime Safety and Security in the EU Strategy for the Baltic Sea Region (EUSBSR), led by the Danish Maritime Authority together with the Finnish Ministry of Transport and Communications contracted the Centre for Maritime Studies of the University of Turku to produce a report on future maritime safety and security scenarios in the Baltic Sea Region. The aim of the study is to identify future development needs and challenges and propose measures and actions to be pursued and taken in order to assist the international Steering Committee of the Priority Area in its future work as well as to inspire maritime authorities and policymakers in the Baltic Sea Region to deal with maritime safety and security issues.

1.2 Definitions and scope of study

This study focuses on safety and security aspects of merchant shipping. Maritime safety entails the safety of people both on board and ashore and the safety of cargo transportation. Maritime safety furthermore embodies the potential environmental harmful effects shipping may cause due to either operational or accidental discharges. This study focuses on vessel safety and prevention of ship accidents and their harmful consequences.

Factors affecting maritime safety can be grouped into internal and external factors. Internal factors include on board equipment, ship condition and on board crew competence. External factors include amongst others waterway conditions, hydrographic services, maritime safety devices, quality of vessel traffic services, pilotage, ice-breaker assistance and information availability on such issues as weather conditions, ice and water levels.

Maritime security embraces the intentional damage to ships, crew or cargo as a result of theft, violence, piracy or terrorism, for instance. Maritime security started to gain worldwide attention especially after the terrorist attacks in New York on 11.9.2001.

1.3 Report structure

Chapter 2 contains general background information about maritime traffic and accidents, regulative framework of maritime safety and security and maritime safety and security development projects in the Baltic Sea in recent years. Chapter 3 presents three alternative scenarios for the development of maritime safety and security in the Baltic Sea Region in 2025. Chapter 4 presents future key issues of maritime safety and security in the Baltic Sea Region and makes suggestions about future actions and R&D needs. The conclusions are presented in the end of the report.

2 MARITIME TRANSPORTATION AND MARITIME SAFETY AND SECURITY IN THE BALTIC SEA IN 2000'S

2.1 Maritime transportation in the Baltic Sea

The amount of cargo handled in the Baltic Sea ports in 2010 was 808.8 million tonnes (Baltic Port List 2011). In 2010 the volumes recovered close to the peak levels of 2007 and 2008 after a 10 per cent fall in 2009. Since part of the cargo handled (in ports) is internal Baltic cargo the actual amount of cargo transported in the Baltic Sea is estimated to be roughly ¾ of the amount handled in ports. Maritime transport volumes in the Baltic Sea Region have doubled after 1992. In 2010, most of the Baltic Sea cargo was handled by Swedish ports, followed by Russian, Finnish and Danish ports (Fig. 1).

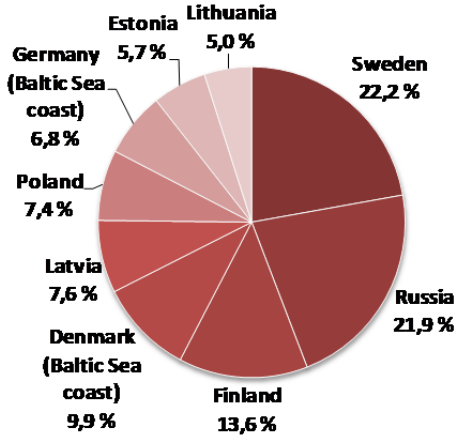

Figure 1. The amount of cargo handled in Baltic Sea ports in 2010 divided by country (Baltic Port List 2011)

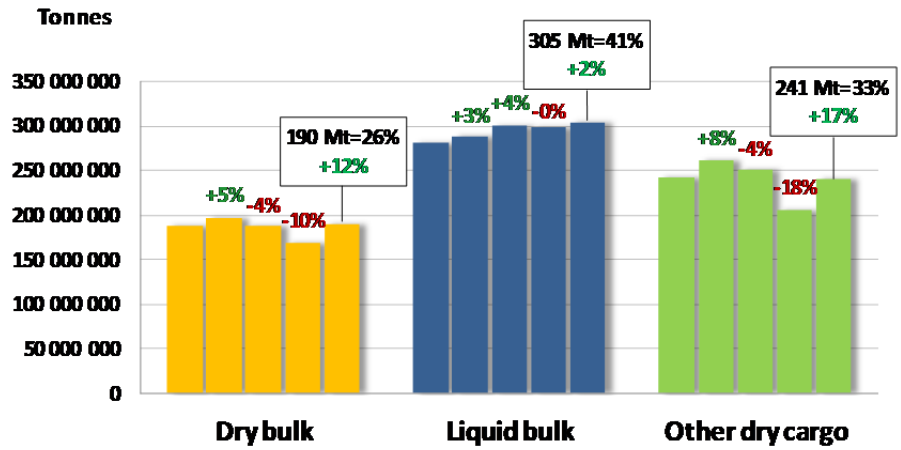

Figure 2. Cargoes by type in international maritime transport in the Baltic Sea ports, 2006-2010 (Baltic Port List 2011)

Two thirds of the cargo handled in the Baltic Sea ports is bulk; liquid bulk dominating with 41% out of the total international maritime traffic volume in 2010 (Fig. 2).

Two Russian ports, Primorsk (oil exports) and St. Petersburg, followed by Gothenburg in Sweden are the top three ports in the Baltic Sea in terms of tonnes handled (Baltic Port List 2011). The amount of cargo reflects also the vessel traffic intensity described in Fig. 3. At any given moment, there are about 2,000 ships in the Baltic marine area. Approximately 3,500–5,000 ships ply the Baltic Sea each month (HELCOM 2012).

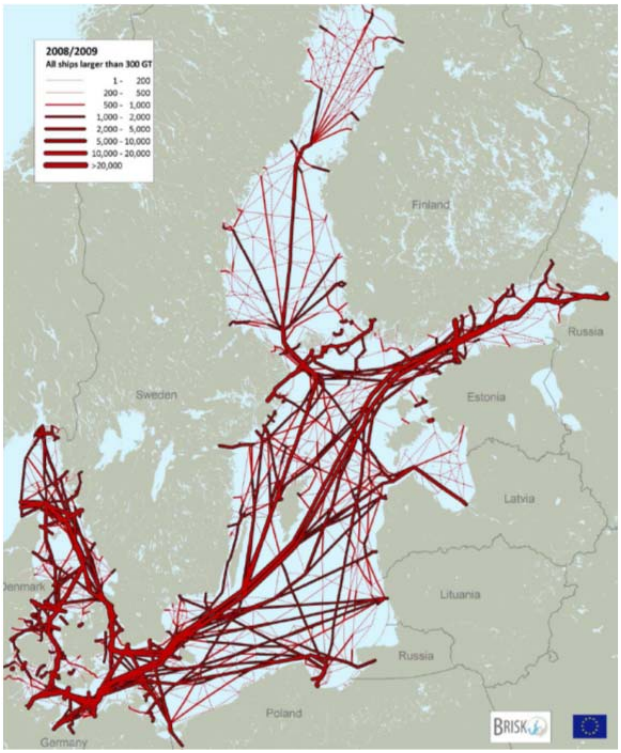

Figure 3. Traffic intensity on route segments of all ships bigger than 300Gt during1 July 2008 to 30 June 2009 (BRISK Model Report 2012)

2.2 Maritime accidents in the Baltic Sea

Approximately 125 annual maritime accidents were reported during 2004 and 2011. In 2011, there were 121 ship accidents equalling 2.94 accidents per 10,000 vessels in the HELCOM area (Fig. 4 and 5). The accidents in 2010 and 2009 comprised 124 and 105 ship accidents equalling 3.41 and 2.66 incidents per 10,000 vessels respectively (HELCOM 2012).

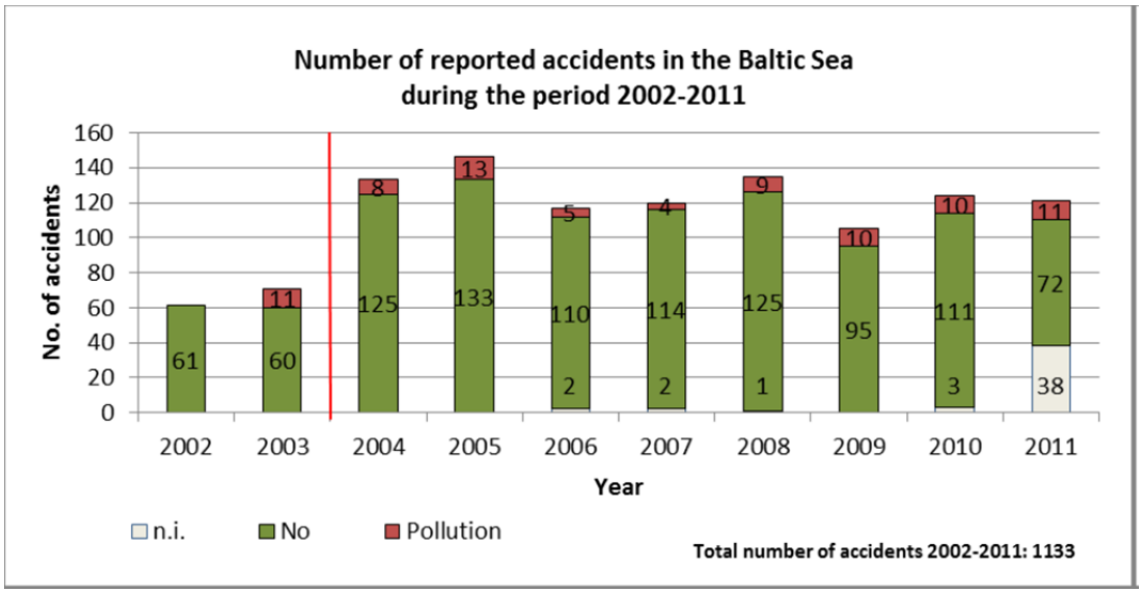

Figure 4. Number of reported accidents in the Baltic Sea, 2001-2011 (HELCOM 2012)

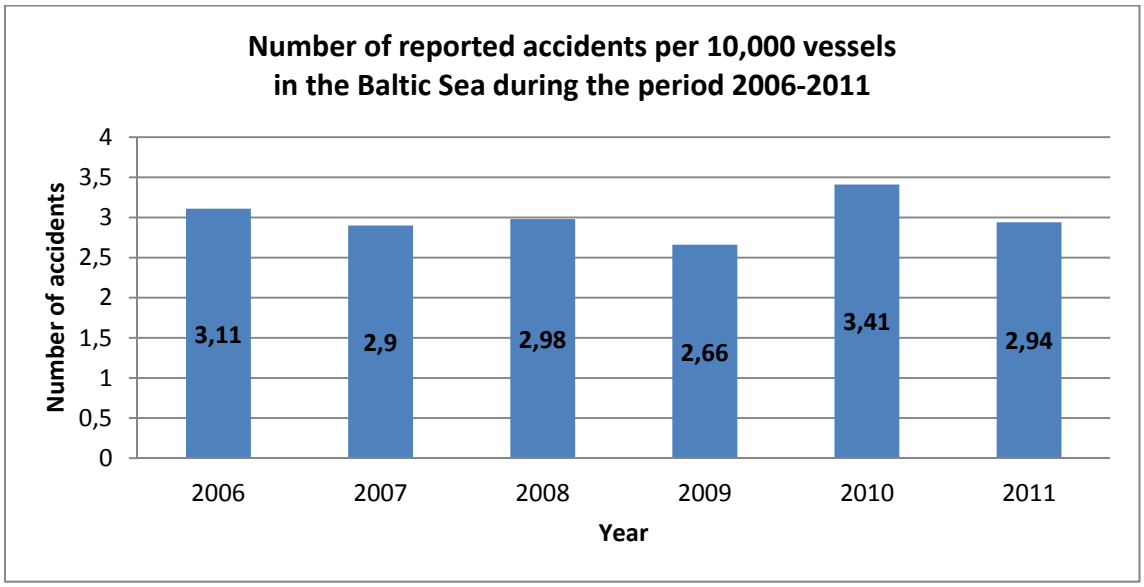

Figure 5. Number of reported accidents per 10,000 vessels in the Baltic Sea, 2006-2011 (HELCOM 2012)

Collisions and groundings are the most frequent types of accidents in the Baltic Sea. In 2011 35% of accidents were collisions and 25% were groundings. The share of fires was 7%, and machinery damages 12%. The human factor has been the main known cause for accidents in many years, in 2011 it accounted for 50 % of accidents. The share of technical factors was 22% and external factors caused 17 % of the accidents in 2011. The cause of 6% of all reported accidents was, however, unknown (HELCOM 2012).

2.3 Maritime safety and security regulation

Maritime safety can be governed through regulatory, economic or informative guidance based policy instruments. Maritime safety is enhanced by all these types of instrument, although most prominently through regulatory instruments. Due to the international character of the shipping industry, the regulation of maritime safety mostly takes place at an international level, within the framework of the United Nations and its International Maritime Organization (IMO). Additionally, the European Union also has maritime safety regulations of its own (for example so called Erika I-III legislation packages), and there are regional arrangements such as HELCOM, and certain maritime safety related issues are regulated at national levels (such as pilotage) (Fig. 5). In addition, such international organisations as the International Hydrographic Organization (IHO) and the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) address issues related to maritime safety.

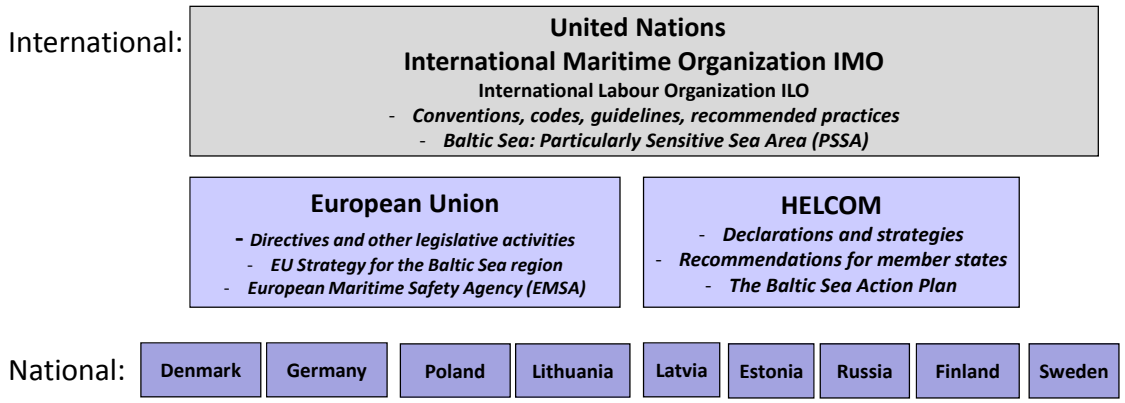

Figure 6. The main regulatory bodies and instruments of maritime safety in the Baltic Sea

The main instrument of maritime security regulation is the ISPS Code (International Ship and Port Facilities Security Code) which is a part of the IMO SOLAS Convention. The ISPS Code sets requirements and establishes a co-operational framework with the objective to identify and control security risks in maritime traffic and ports. In addition, the security of maritime transportation is monitored and controlled by security authorities such as the coast or border guard and by certain limited customs procedures.

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2.4 Maritime safety and security projects in the Baltic Sea

During the 2000's, the European Union has co-funded or is co-funding at least 22 maritime safety and/or security (with vessel safety perspective) related projects in the Baltic Sea Region[1]. Nine projects have addressed the risks of maritime oil transports and/or oil spill combat (Baltic Master II, BRISK, EnSaCo, MIMIC, OILECO, OILRISK, SAFGOF, REFUGE, SÖKÖ). Three projects have addressed issues relating to human factors, such as training, safety management or safety culture (CAFE, EfficienSea, METKU). Four projects have encompassed issues related to e-Navigation or situational awareness (BSMF, EfficienSea, MARSUNO, MonaLisa). Three projects have covered risks of dangerous substances other than oil (mainly chemicals) (BRISK, CHEMBALTIC, DaGob). Future traffic scenarios have been (or are) formulated in three projects (Baltic Transport Outlook 2030, SAFGOF, MIMIC). Two projects deal with security issues (BSMF, MIMIC). One project has created future visions for maritime safety issues in the Baltic Sea (Baltic Master II). One project has a focus on ice navigation (SAFEWIN) and one on LNG (MARTECH-LNG). SAFGOF and MIMIC aim at modelling effects of preventative maritime safety policy instruments on oil accident risks and oil spill induced environmental effects. Furthermore, many projects consider improved co-operation in the Baltic Sea Region as one of the main goals.

[1] The list of projects is found in Appendix 1. Only those projects which have a Lead Partner from the Baltic Sea Region are included.

Table 1. EU co-funded maritime safety & security projects in the Baltic Sea Region in 2000's[2]

Theme	*Number of projects*
Risks of maritime oil transports, oils spill combat	9
e-Navigation, situational awareness	4
Maritime safety culture, maritime safety management, human factor	3
Risks of maritime chemical transports	3
Future traffic scenarios	3
Security	2
Maritime safety policy	2
Maritime safety administration	2
Hydrographic re-surveying	1
Search and Rescue operations	1
Ice navigation	1
LNG	1

In addition to EU funded maritime safety and/or security scenarios, there are also other forms and means of promoting maritime safety in the Baltic Sea. The Mandatory Ship Reporting System (GOFREP) was jointly introduced by Finland, Estonia and Russia in the Gulf of Finland in 2004.

The John Nurminen Foundation has initiated a Tanker Safety project which aims at developing a system, in which tankers send their route plans in advance to VTS centres and in return navigational information is received. The system is planned to be implemented also on other ship types in the future. The system enables a route plan check by VTS in advance and intervention in hazardous situations if needed[3].

The Baltic Sea Action Group (BSAG) is a foundation, whose official name is the Foundation for a Living Baltic Sea. Its' main focus is to revive the ecological conditions of the Baltic Sea. The BSAG has initiated the Clean and Safe Maritime Activities program which aims at reducing shipping caused eutrophication, improving maritime safety, building up oil spill response capacity, combatting the spread of invasive species and detecting illegal discharges and ships non-compliant with regulations. The BSAG collaborates with maritime and environment protection authorities, NGOs, research institutes and private companies[4].

[2] Same projects can be included in several categories depending on their scope.
[3] http://www.puhdasitameri.fi/en/tanker-safety
[4] http://www.bsag.fi/en/

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3 SCENARIOS: MARITIME SAFETY AND SECURITY IN THE BALTIC SEA IN 2025

This section presents three alternative scenarios for the development of maritime safety and security in the Baltic Sea in 2025[5]. The three scenarios respectively represent preferred, possible and undesired future options. Each scenario consists of a general description, a list of general issues affecting maritime safety and security settings and a list of maritime safety and security issues. In the end of the chapter is a short summary and comparison of the three scenarios.

3.1 Scenario 1: The Baltic Sea – model region for safe shipping

"The Baltic Sea – model region for safe shipping" in 2025 pictures a positive development within the Baltic Sea Region from today to 2025. The region has developed favourably both politically and economically. A lot of efforts have been paid to reduction and hindrance of environmental degradation whereby the Baltic Sea and surrounding areas are in better environmental state compared to the present situation. The regulative framework offers good prospects for companies, organisations and citizens to operate. The consequent positive development has been a result of active co-operation between the Baltic Sea states including politicians, authorities, researchers, NGO's, other stakeholders and citizens. The positive development in the Baltic Sea Region has also been supported by global stability in politics and economics.

[5] Information about scenario creation is found in Appendix 2.

The well-being of the region reflects on maritime safety and security as well. No major security threats prevail and the number of accidents is low. This has been achieved by active and close co-operation in safety and security issues and through improved information sharing, further development of e-Navigation and other new navigational aids. Furthermore the augmentation of safety culture and safety management in shipping has had an important role. The competency of crews is therefore of high level and it is attractive for young people to have a maritime career. The ships operating in the Baltic Sea are generally high standard ships.

General development in the Baltic Sea Region:

- Stable political conditions
- Prosperous area with diversified economic structure
- New industries and technologies add to the welfare of the region
- Harmful environmental effects of shipping are minimised
- NGO's have an active role in society
- "All on board" - Good co-operation among all the Baltic Sea states, maritime stakeholders and citizens
- Resources are effectively utilised on a Baltic Sea scale
- There are no major security threats in the Baltic Sea area
- Vivid passenger traffic at sea e.g. due to increasing share of wealthy ageing population in the Baltic Sea Region

Maritime safety and security issues:

- The number of accidents is low despite of increased traffic and larger ships
- Safety and security related resources are utilised effectively in good understanding and co-operation in the Baltic Sea Region
- All ships operating in the Baltic Sea are high standard ships
- Effective information sharing, vessel traffic management and e-Navigation in the Baltic Sea Region, e.g. sharing route planning information, traffic separation schemes, VTS etc.
- Crew competence is of high level due to the good quality training, safety management and safety culture in shipping
- Near miss and incident data is shared and lessons are learnt in proactive way
- "Zero or low emission" ships are replacing the old vessels
- LNG is increasingly carried/used as a fuel, as well as other types of zero or low emission fuels

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3.2 Scenario 2: Business growing as it is in the Baltic Sea

"Business growing as it is" describes a situation in 2025 where the development witnessed over the past decades continues. The trade in the Baltic Sea area and that in particular of oil transports is increasing. Welfare is however not equally distributed or spread. Unequal living standards lead to political instability which in turn causes increasing criminality and other unwanted phenomena in the society. Climate change raises concerns which are manifested in the activities of NGO's leading to a growing number of environmental regulations and restrictions.

Fierce economic competition in shipping continues. Shipping companies strive to find savings by minimising the size of crews and employing low-cost workforce on board. This increases the risk of fatigue and incompetence on board which in turn adds to the likelihood of accidents. The number of human errors is reduced through increased use of technology, which may partly succeed yet easily leading to over-reliance on technology. Maritime safety and security issues are over-regulated causing frustration among companies which in turn results in an augmented level of ignorance or non-compliance among seafarers and shipowners. In addition, more resources are required from public administration to implement and control all the regulations. A maritime career is no more attractive than today.

General development in the Baltic Sea Region:

- Increasing trade
- Inequality in economic development leads to political instability
- Criminality, especially organised crime is increasing
- Concerns about climate change lead to increasing amount of environmental regulations, potentially to over-regulation
- Environmental over-regulation leads to illegal pollution

Maritime safety and security issues:

- The amount of maritime transportation increases
- The amount of oil tanker traffic increases
- Larger ships induce an increased need for dredging and towage
- Crew fatigue is a major issue due to lower manning levels
- Crew competence is also a major issue, larger ships and new technologies induce new crew skill and competence requirements and challenges
- Reliance on technology causes weakening of traditional navigation skills
- Human errors cause numerous accidents
- Safety culture is of poor level
- The growth in commercial shipping causes safety risks for other users of the sea such as pleasure boating and fishery. Undeclared dangerous cargoes pose a risk to maritime safety and security
- Over-regulation of maritime safety and security

3.3 Scenario 3: Major disasters in the Baltic Sea

In “Major disasters in the Baltic Sea 2025” the future development in the Baltic Sea area is mainly negative due to the enduring economic and political crisis at global level. The economic downturn leads to political instability, bringing about growing criminality, illegal immigration, human trafficking and other large scale security threats. Instable states are not able to regulate and control risks effectively. The threats of climate change materialise and extreme weather conditions become more frequent. Other environmental degradation furthermore adds to the misery of the Baltic Sea Region, which e.g. is no longer attractive for tourism.

In these circumstances shipping becomes a risky business and shipping companies avoid large-scale investments and expenses. Unstable states are not able to control maritime traffic properly and maritime safety and security are not actively developed. This leads to a high accident probability even if the amount of traffic decreases. Shipping cannot be considered an attractive career choice which reflects in poor motivation and seafaring competence among staff.

General development in the Baltic Sea Region:

- Global economic crisis spreads to the Baltic Sea Region
- Economic crises causes major political instability
- The amount of passenger and cargo traffic decreases
- Organised crime and other criminality increase because unstable states cannot effectively manage their controlling authorities and systems (coast and border guards, customs, police etc.)
- Human trafficking and illegal immigration are major problems in the region
- The likelihood and amount of cyber threats affecting maritime safety increases
- Climate change increases extreme weather conditions and phenomena

Maritime safety and security issues:

- Probability of accidents at sea is high
- Security risks are high and ships can be targets for terrorist attacks or hijacking
- Undeclared dangerous cargoes, such as illegal weapons, increase the risks of maritime traffic
- Shipping companies use old and sub-standard ships to reduce costs and potential losses
- Surveillance systems are not working properly or are not interconnected between countries
- Shipping becomes more dangerous and does not attract competent and motivated seafarers

3.4 Summary of future maritime safety and security scenarios in the Baltic Sea

In “The Baltic Sea – model region for safe shipping” scenario the starting point is a dense Baltic Sea maritime traffic and an advanced maritime safety and security level. In the “Business growing as it is” scenario there is likewise dense traffic but the level of maritime safety and security is not equally good compared with the first scenario. The scenario “Major disasters in the Baltic Sea” describes a situation where there may be less maritime traffic while the level of maritime safety and security level is poor. It is generally believed that the level of maritime safety level is linked to the amount of maritime traffic: more traffic means more risks. The connection between traffic density and the level of safety and security is, however, not that straightforward in the future as is seen in the scenarios (Fig. 7).

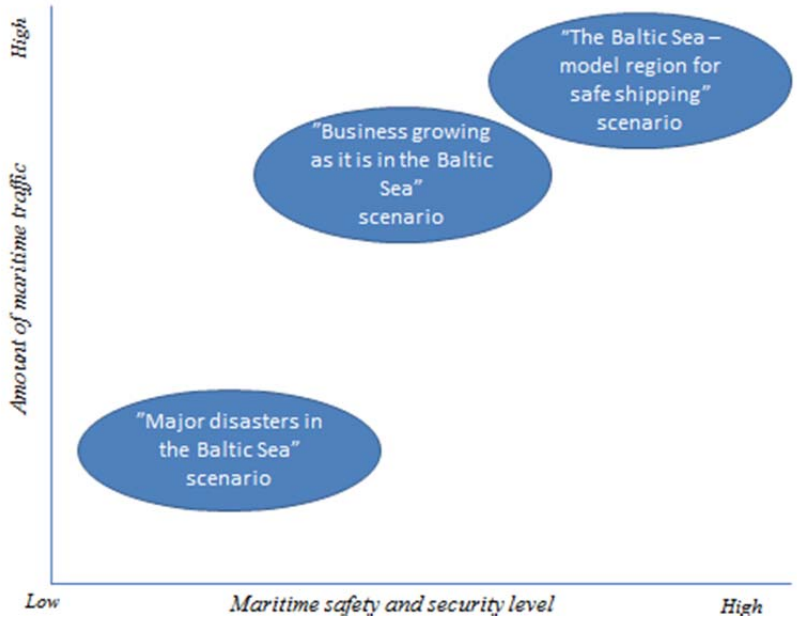

Figure 7. Comparison of three maritime safety and security in 2025 scenarios with regard to maritime safety and security level and the amount of maritime traffic

Because the future is always uncertain, and it is logically impossible to know it beforehand, scenarios should not be taken as forecasting the future as such. In most cases there are numerous complex and intertwined factors and trends which affect the future development. A scenario is thus always a simplification of a complex reality. It is very unlikely that any of the alternative scenarios is going to realise fully, but rather as a partial combination of each future scenario drawn up. In addition, it is likely that there will also appear other factors ahead that are totally unpredictable today.

The ”Business growing as it is” scenario pictures the most likely development if the settings remain and the existing trend continues more or less unchanged compared to the past ten years. If major improvements are made in the Baltic Sea Region co-operation and new approaches for the governance of maritime safety and security are developed, the Baltic Sea would be able to reach “The Baltic Sea – model region for safe shipping” scenario. “Major disasters in the Baltic Sea” could realise if the development on the global level is negative when considering economy, politics and climate change, and adequate measures to counteract the situation are not taken by the coastal states.

4 KEY ISSUES: MARITIME SAFETY AND SECURITY IN THE BALTIC SEA IN THE FUTURE

This section presents future key issues of maritime safety and security. The key issues have mainly been identified on the basis of the conducted scenario workshop (see Appendix 2) and survey study (see Appendix 3). Key issues have been grouped as follows (in alphabetic order):

- The human factor
- Regulation and administration
- Safety of ships and cargoes
- Security
- Traffic control systems and e-Navigation

The maritime safety and security situation in the Baltic Sea Region is to a certain extent dependent on the amount of maritime traffic in particular when considering the large share of oil transports in the area. The economic pressure shipping industry is facing and the limited resources of public administrations furthermore set certain limitations to potential safety and security actions. In comparison with some other sea areas in the world, the Baltic Sea already has a relatively high maritime safety and security level and thus the question is not how to change the poor safety and/or security level into a good one, but rather how to maintain the current level and to ensure a continuous positive development.

4.1 The human factor

Traditionally technical factors have dominated in the maritime safety work. Although the importance of technical factors should not be underrated, a greater potential is found in human element factors. It is commonly repeated that the human factor causes the majority of accidents. The human factor is a more complex issue compared to technical questions, and consequently it is difficult to find good measures to tackle the related risks. The human factor is often tried to be harnessed and controlled with technical solutions instead of focusing on issues which actually cause human errors.

Crew competence Seafarers are employed from international crew markets and the quality of maritime education can vary considerably from one country to another. Issues such as language skills, nationality, social structures or culture differences may influence competence issues. In the Baltic Sea Region and especially in its northern parts, winter conditions increase the navigational challenges in the area. The worldwide shortage of competent and motivated seafarers is a problem that concerns also the Baltic Sea Region. Education and training of seafarers should be critically looked at to establish how the system could be improved and how the seafaring profession could become more attractive career choice among young people. To ensure suitable competence of seafarers in ice navigation is an issue which deserves particular attention not only from the Baltic Sea coastal states but the entire worldwide maritime education system as long as a large share of seafarers working in the Baltic Sea area come from

countries with no winter and ice condition experience. In general, better training of seafarers in hydrography could be facilitated to ensure proper utilisation of hydrographical information in the printed seacharts as well as in the Electronic Navigational Charts (ENCs).

Manning of vessels In many cases the number of crew members on board is restricted by the shipping companies to minimum manning levels. Manning costs can account up to 40 % of vessels' operating costs and economic pressures force shipping companies to reduce costs whenever possible. Minimum manning can be considered a risk to maritime safety, as it potentially adds to excessive workloads and human fatigue.

Safety culture Safety culture means a system of shared and individual, interpretation, values, attitudes, and behaviour related to work safety. It has individual, social and organisational layers which intertwine. Safety culture has a crucial role in comprehension of safety risks and how they are perceived. New approaches are needed in the adaptation and comprehension of safety culture in the maritime industry. Studies on maritime safety culture using cultural or social theories and methods would be a welcomed addition to maritime safety and security research.

Safety management A safety management system is in a crucial role when managing safety associated risks and promoting positive safety culture on the organisational level. The key feature of safety management is to strive for continuous improvement in safety and to proactively extract knowledge from safety risks in in order to prevent serious accidents from happening. In shipping, safety management bases itself on the ISM Code which is part of the IMO´s SOLAS Convention. Some of the preconditions for safety management include senior management commitment to safety, no-blame culture and sufficient resource allocation. Studies on ISM Code implementation have demonstrated that the basic requirements of the ISM Code are generally fulfilled but the philosophy of continuous improvement has not been properly and full-heartedly implemented in the maritime industry. One means of proactive safety is extracting knowledge and learning from incidents and near miss cases. It is known however that incident and near miss reporting in shipping is not at an adequate level.

Working conditions and working environment Working on a vessel means working in a very special working environment. Seafarers can spend many months on board, working in shifts accompanied by the same fellow workers 24 hours a day. Seafarers´ wellbeing can be improved by paying attention to ergonomics and/or to bridge and crew resource management, for instance. Upgrading and diversification of training in questions related to psychological issues (stress, homesickness, recovery from emergencies or accidents etc.) or social aspects of the job (working in multicultural settings, social relationships etc.) could enhance the mastering of the human factor in shipping.

Examples of future R&D needs:

- Education and training of seafarers
- Psychological and social aspects of seafaring occupations
- Maritime safety culture from cultural/social perspectives

- Promotion of incident and near miss reporting
- Emergency preparedness on board

4.2 Regulation and administration

Commitment of high level decision makers To ensure a good future maritime safety and security level in the Baltic Sea Region, a more active and tighter commitment from high level decision makers is required and called for. It would promote the visibility and transparency of maritime safety and security issues and emphasise the importance of these issues in the Baltic Sea Region. The European Union has launched its Strategy for the Baltic Sea Region which is one important tool to promote regional co-operation. Russia should also be persuaded to commit itself to the common strategy of the Baltic Sea. Furthermore it could be assessed if there is a need for a common "flag state approach or strategy" supporting a harmonised implementation of international maritime safety and security regulations.

Cross-border co-operation, division of tasks At the moment, maritime safety administration and related functions and tasks are mainly arranged and maintained by individual states on national level. Resources could be used more effectively if there would be more cross-border co-operation in knowledge, experiences and best practice sharing e.g. in ice-breaker or oil spill response capacity sharing. It should also be considered if there could be co-operation in the division of maritime safety or security related tasks. In practice this could entail joint appointing of coordinators or leaders for some particular issues or problems on the Baltic Sea level. For example in hydrographical surveys and charts, traffic control systems, Search and Rescue (SAR) operations, ice-breaking and border control management the potential for increased cross-border co-operation is apparent. The technological development in e.g. e-Navigation enables safer navigation, but will require new infrastructure on land. If the Baltic Sea states could cooperate on and jointly invest in this, it would most likely reduce costs and enable faster implementation.

One important aspect of co-operation is furthermore to ensure equal participation and involvement of all Baltic Sea states. Maritime safety and security risks concern all areas in the Baltic Sea and therefor free loaders should be avoided since a partial commitment, participation and co-operation in maritime safety and security work could result in unfair competition in shipping.

Cross-sectoral policies, maritime spatial planning Reconciliation of different uses of the maritime environment is an issue that is gaining more attention in the EU amongst others. Various marine sectors, for example fishery or pleasure boating, need to be taken into consideration in the maritime safety or security policy making.

Making shipping a profitable and prosperous business The most serious threat to maritime safety and security is that regulations and economic competition force shipping companies to operate on the verge of profitability. The likely outcome is that shipping companies cannot or are unwilling to dedicate or direct too much resources to

safety and security issues or to manning and/or well-being of seafarers. The precondition of a high safety and security level is that the shipping business is relatively profitable and that the regulative and administrative framework supports it. In such a setting, the prospects of the maritime safety and security issues are also much brighter and shipping companies have better chances to recruit competent and motivated seafarers. Governments can in various ways support shipping business to prosper, for example via tonnage taxation and other related tax systems, via flag state policy and by supporting the whole maritime cluster (education, ship building, classification societies, R & D sector, administration, etc.).

On board compliance of safety codes, standards and regulations Implementation of international maritime safety regulations and standards vary a lot between states and even between regions. If all regulations were implemented the way they originally were intended, maritime safety would be on a good level worldwide. More attention needs to be paid to harmonised interpretation and implementation of safety codes, standards and regulations which are reflected as increased co-operation between maritime administrations, more stringent sanctioning and increased awareness and responsibility of maritime safety and security issues in the maritime industry, for instance.

Port State Control (PSC) Port State Control is a proven way to ensure that vessels visiting ports of a certain country fulfil the requirements set by regulations and conventions. The new inspection regime of the Paris Memorandum of Understanding (Paris MoU) ensures a risk based selection of the inspected vessels and ensures that all vessels are covered by Port State Control. The main goal is the harmonisation of the control methods and a sound professionalism of the Port State Control Officers throughout the organisation. The Paris MoU and the EU are working to increase the level of harmonisation to gain a similar level of competence in order to continuously develop Port State Control.

Self-regulation The amount of maritime safety regulations is extensive. Instead of augmenting the amount of regulations and rules, new approaches to maritime safety should be encouraged and developed. Self-regulation means that private actors voluntarily engage themselves in actions and measures that improve safety of their operations. Self-regulatory approach can be linked to such concepts as Corporate Social Responsibility or eco labelling. Self-regulation has some advantages compared to conventional regulation: it is more flexible, it addresses safety deficiencies faster, it does not require so much public resources and it helps to develop solutions which are practical for individual companies. In many instances it is stressed that shipping companies should take more responsibility for their actions. More attention should be given to augmenting the responsibility of private actors i.e. what could maritime authorities do to support shipping in self-regulation? Attention needs to be paid especially to smaller companies because many larger companies have already recognised the importance of responsible actions and awareness.

Examples of future R&D needs:

- Proactive, self-regulative maritime safety governance

- Analysis of policy/decision making processes in shipping and identification of development needs
- Co-operation between public and private stakeholders, co-operation between states
- Development of a flag state policy and Port State Controls

4.3 Vessel and cargo safety

Dynamic risk assessment of vessels entering the Baltic Sea area Some projects have developed dynamic risk assessment systems which can in advance identify higher risk level vessels in order to intensify the follow-up and control of such vessels. However, there is still work to be done before these systems are deployed and utilised in practice.

LNG (liquefied natural gas) Environmental requirements have caused maritime industry to look for alternative energy sources. The use of LNG as ship fuel has got great attention so far and in many Baltic Sea countries LNG terminals are planned to be built. The safe delivery, storage, bunkering and use of LNG need to be assured. In addition to LNG, there are also other potential alternative fuels e.g. different biofuels. The safe handling of alternative biofuels can also be an issue that needs special attention in the future.

Structural vessel design, goal-based standards During the past decades there has been a marked development and improvement in vessel structural design. This however does not imply that there would not be room or call for further improvement with regard to shipping induced environmental impact and durability of ship structures for example in accident situations or harsh weather conditions. ***Maintenance of vessels and equipment*** is an issue which requires constant attention. On the regulation side there is a trend towards ***goal-based standards*** which in short means that regulations set certain goals which shipbuilders, classification societies and other stakeholders can decide themselves how to achieve. Because goal-based standards in shipping form a relatively new issue, there are still issues that need further research and development.

Examples of future R&D needs:

- Ship safety in accident situations
- Implementation of goal-based standards
- Risks assessment for the whole Baltic Sea Region
- Dynamic risk assessment systems
- Risk management of new fuels
- Effects of climate change on shipping

Finnish Border Guard/ West Finland Coast Guard

4.4 Security

The security risks in the Baltic Sea Region are generally not considered massive. Apart from terrorism other security issues, such as (organised) crime should also be recognised and taken into consideration. Crimes targeted at supply chains cause delays and disturbances in the logistics and economic losses representing altogether unwanted phenomena in the society. The Baltic Sea Region lacks a realistic security risk assessment and hence the compliance of the ISPS Code should be critically analysed in the Baltic Sea Region.

CISE The European Commission is developing a *Common Information Sharing Environment* (CISE) which will help to facilitate the exchange of information and data. The aim is to provide relevant authorities with all possible information on maritime surveillance through one system.

Marine pollution and illegal activity in protected areas Intentional or unintentional oil spills, dumping of waste, bilge or sewage in the sea (where it is not allowed) are all unwanted phenomena. The problem is connected to safety culture and social responsibility of shipping actors as well as to reception facilities and waste handling costs in ports.

Maritime terrorism The threat of using ships as a target or a medium for terrorist attack is a risk that should be taken into consideration also in the Baltic Sea Region. Oil is transported in large amounts in the Baltic Sea and therefore tankers could also be potential and attractive targets for terrorism.

Smuggling Smuggling of goods or people is a phenomenon which is closely associated with maritime traffic and smuggled goods can pose a maritime safety risk in themselves as in the case of munition smuggling.

Examples of future R&D needs:

- Security risk assessment on the Baltic Sea level
- Security risk preparedness
- Co-operation between authorities and other stakeholders

4.5 Traffic control systems

AIS Automatic Identification System (AIS) provides real-time data about ships and their movements. AIS is obligatory for all ships with a gross tonnage of at least 300. The AIS system is based on VHF radio apparatus that automatically sends two kinds of information: static (e.g. the ship identity, destination and cargo) and dynamic (e.g. speed, position and heading). The AIS system enables vessels to see each other´s course etc., and is also frequently used by national and international authorities to monitor and analyse vessel traffic. AIS data is an important tool for dynamic risk assessment and control. The European Union has been active in this area by developing SafeSeaNet and National Single Window (NSW) systems. AIS is also one of the corner stones for e-Navigation.

Fairways (maintenance, buoyage, lighthouses, ice-breaking) The condition of fairways has a crucial role in navigational safety. While traditional buoyage and lighthouses are still important in the shallow parts of the Baltic Sea modern technologies such as AIS and satellite technology could provide new solutions for dynamic fairway maintenance. Ice-breaking is an important contributor to the safety of winter navigation. In the coming decades the ice-breaker fleets of many countries is in need of renewal offering possibilities to develop and promote new technological solutions in ice-breaking. Risk reducing measures in fairways maybe considered in densely trafficked areas, such as in the hot spots near Gotland.

Nautical charts and ENCs Official printed and ENC charts form an essential precondition for safe navigation. The Hydrographic Offices in the countries around the Baltic Sea are working to improve the information and quality of ENCs and the associated updating services. The Baltic Sea Hydrographic Commission (BSHC) is a regional Commission of the International Hydrographic Organization (IHO). Several collaborative actions and projects are implemented in the framework of this Commission e.g. to foster hydrographical re-surveys, to extend the chart contents and ENCs to include new high accuracy information obtained from resurveying the seabed, to harmonise the Baltic Sea charts and ENCs and to develop user-friendly ENC distribution methods. One option could be to develop a harmonised information base for ENCs.

Pilotage Pilotage is nowadays mainly nationally regulated and countries have different ways of organising this service. Pilots have a major role in ensuring safe navigation in

coastal fairways. The question whether there is a need to develop common standards for piloting and if piloting obligations should be extended in the Baltic Sea area should be analysed and established.

VTS (Vessel traffic services), Marine traffic is monitored by national VTS centres in real time. The VTS centres inform ships about the traffic situation and other navigational safety matters in the area. Criticism has been raised over VTS centres´ lack of authority to control vessel traffic and that VTS centres should operate in a similar way as air traffic control in aviation. However, there are some principle and legislative issues (e.g. the UNCLOS Convention and IMO Conventions) which currently do not support such development, and it can be questioned if increasing the authority of VTS is a desirable development trend in shipping. Cross-border co-operation and training between the staff of VTS centres and co-operation on issues such as piloting and ice-breaking may be considered. It has been proposed that there should be a shared system for the whole Baltic Sea which would complement national VTS centres and increase information exchange. VTS issues have already been addressed in several development projects, but there are still many issues to be solved before new systems are in everyday use in the Baltic Sea area.

Examples of future R&D needs:

- Development of VTS operations in the Baltic Sea
- Information exchange technologies, systems
- Man-machine interface
- Pilotage practices

4.5.1 e-Navigation

The e-Navigation concept is believed to have a major role to play in the future development of navigational safety by means of harmonised collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means. The goal is to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine environment. In practice, it is an ongoing process led by IMO aimed at developing dynamic integration of existing and new electronic navigational aids in order to present the relevant information to the helmsman and authorities on shore when required, while simultaneously reducing the burden on the navigator. Several projects (e.g. MonaLisa, EfficienSea) in the Baltic Sea Region has contributed to developing a prototype for the infrastructure required and have tested a number of e-Navigation services, and the results have been conveyed to the IMO, thus constituting a regional contribution to a global development process.

5 CONCLUSIONS

In recent decades, there has been a growing concern about maritime safety in the Baltic Sea. The amount of marine traffic and especially the amount of oil transports has increased. There is a general concern about the environmental state of the Baltic Sea which has increased the scope of maritime safety concerns.

The aim of this report is to analyse the future challenges and development needs of maritime safety and security in the Baltic Sea supported by a survey study and by formulation of three future scenarios for the year 2025. These future scenarios describe the preferred, possible and undesired future development in the Baltic Sea Region.

Based on the three future scenarios and survey results a number of key issues have been identified within the future development of maritime safety and security regulation and other actions. Key issues have been grouped to a) the human factor, b) regulation and administration, c) safety of ships and cargoes, d) security and e) traffic control systems and e-Navigation.

Development of crew competence and increase of manning levels fall under the category human factor issues potentially reducing fatigue on board as well as the number and scale of human errors. Improvement of safety culture and management also play important roles. Administrative and regulative actions entail strengthening of co-operation in the Baltic Sea Region, promoting harmonisation and implementation of maritime safety and security regulations and active participation in maritime safety and security work involving all Baltic Sea states and stakeholders at all levels. In addition, support in shipping self-regulation could solve some problems associated with traditional command-and-control policies.

Vessel traffic surveillance related measures include effective deployment of advanced technology development within the maritime safety and security sector, such as the use of satellite technology, implementation of e-Navigation and single-window system and co-operation in traffic surveillance in the Baltic Sea Region. In terms of security issues there is a need for comprehensive security risk assessment in the Baltic Sea Region. In ship safety issues environmental regulations, goal-based standards and changing climate require new future solutions.

When the key issues of this report are compared to the maritime safety and security related projects over the last years, it can be noted that many of them have been addressed in other projects too. More attention should be given to the practical implementation of project results. Some of the issues are to large extent political in nature, for example the co-operation between the Baltic Sea states requiring high-profile commitment from decision makers.

Today shipping is a global business characterised by fierce economic competition. The best way to support maritime safety and security is to provide shipping companies with framework conditions which support profitable and prosperous business in the Baltic

Sea. Only then are adequate resources and interest towards maritime safety and security ensured.

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APPENDIX 1: LIST OF EU FUNDED MARITIME SAFETY AND SECURITY PROJECTS IN THE BALTIC SEA REGION IN RECENT YEARS[6]

Project name	*Main category of the contents*	*Lead partner*	*EU funding programme*	*Duration*	*Internet*	*Other information*
Baltic Master II – Maritime Safety Across Borders	Prevention of pollution from maritime transport, enhancing oil spill response capacity in the Baltic Sea	Region Blekinge, Sweden	EU Baltic Sea Region Programme	2009-2012	http://www.balticmaster.org/	Results include e.g. "Baltic Master II Political Vision", "The need for relevant Associated Protected Measures (APM´s) in the BSR"
BRISK - Sub-regional risk of spill of oil and hazardous substances in the Baltic Sea	Risks of transportation of dangerous goods in the Baltic Sea	Admiral Danish Fleet, Denmark	EU Baltic Sea Region Programme	2009-2012	http://www.brisk.helcom.fi/home/en_GB/home/	EUSBSR Flagship Project
Baltic Transport Outlook 2030	Development of transport infrastructure in the Baltic Sea Region. Scenarios until 2030.	EU (Contractor Tetraplan)	TEN-T	2010-2011	http://www.baltictransportoutlook.eu/	The BTO 2030 was a strategic priority in the EUSBSR
BSMF - The Baltic Sea Maritime Functionalities	Exchange of safety, security and defence information, co-operation between Baltic states	Finnish Border Guard, Finland	Swedish International Development Cooperation Agency´s Baltic Sea Unit	2011	http://www.cbss.org/Civil-Security-and-the-Human-Dimension/baltic-sea-maritime-functionalities	EUSBSR Flagship Project

[6] The list may not be exhaustive.

CAFE – Competitive Advantage by Safety	Maritime safety management, maritime safety culture in the Baltic Sea	Kotka Maritime Research Association, Finland	European Regional Development Fund (ERDF)	2011-2013	http://www.merikotka.fi/cafe/	
CHEMBALTIC – Risks of Maritime Transportation of Chemicals in the Baltic Sea	Risks of maritime chemical transports in the Baltic Sea	Univ. of Turku Centre for Maritime Studies and Aalto University, Finland	ERDF	2011-2013	http://www.merikotka.fi/chembaltic/	
Create a network of centres of excellence for maritime training	Development of maritime training in the Baltic Sea	Maritime University of Szczecin, Poland	No financing	2011	http://www.c4mt.eu/index.php	In 2011, financing application was not successful and new options for financing are being searched for EUSBSR. Flagship project.
DaGoB –Safe and Reliable Transport Chains of Dangerous Goods in the Baltic Sea Region	Risks of transportation of dangerous goods and co-operation between stakeholders to mitigate the risks	Turku School of Economic, Finland	BSR Interreg III	2006-2007	http://info.tse.fi/dagob/default.asp	
EfficienSea - Efficient, Safe and Sustainable Traffic at Sea	Competence and recruitment challenges, e-Navigation, vessel traffic data and maritime planning, dynamic risk assessment, the Baltic Sea	Danish Maritime Authority, Denmark	Baltic Sea Region Programme	2009-2012	http://www.efficiensea.org/	Strategic and EUSBSR Flagship Project
EnSaCo - Environment and Safety Management Cooperation on Shoreline Oil Spill	Oil spill response in the Baltic Sea	Haaga-Helia University of Applied Sciences, Finland	Central Baltic Interreg IVA	2011-2012	http://www.ensaco.fi/	

Response						
MARSUNO - Maritime Surveillance in the Northern Sea Basins	Improvement of maritime surveillance in the Baltic Sea and the North Sea area.	Swedish Coast Guard, Sweden	Co-financed under European Integrated Maritime Policy	2010-2011	http://www.marsuno.eu/	EUSBSR Flagship Project
MARTECH_LNG - Marine Competence, Technology and Knowledge Transfer for LNG (Liquid Natural Gas) in the South Baltic Sea Region	Providing local/regional maritime-related businesses with the knowledge and competence on LNG (liquefied natural gas) technologies.	Klaipeda Science and Technology Park, Latvia	ERDF, South Baltic Programme	2012-2014		
METKU – Development of Maritime Safety Culture	Maritime safety management, maritime safety culture in the Finnish shipping industry	Kotka Maritime Research Association, Finland	ERDF	2008-2010	http://www.merikotka.fi/metku/	
MIMIC – Minimizing the risks of maritime oil transport by holistic safety strategies	Risks of maritime oil transports in the Baltic Sea	Kotka Maritime Research Association, Finland	ERDF, Interreg IVA	2011-2013	http://www.merikotka.fi/mimic/	EUSBSR Flagship Project
MonaLisa - Motorways of the Sea	Improvement of e-Navigational services for shipping	Swedish Maritime Administration, Sweden	EU Trans-European Transport Network (TEN-T)	2010-2013	http://www.sjofartsverket.se/en/MonaLisa/	Contributes to the EUSBSR. Potential Flagship Project.
OILECO - Integrating ecological values in the decision making process on oil spill combating in the	Integration of ecological values in oil spill combating, modelling	University of Helsinki, Finland	ERDF	2005-2007	-	

Gulf of Finland						
OILRISK - Applications of Ecological Knowledge in Managing Oil Spill Risk	Management of oil spill risks in the Gulf of Finland and the Finnish Archipelago	Kotka Maritime Research Association, Finland	ERDF, Interreg IVA	2009-2012	http://www.merikotka.fi/oilrisk/	
REFUGE – Itäisen Suomenlahden suojasatamien luontoselvitykset	Nature value inventories for the Eastern Gulf of Finland and for ports of refugee	University of Helsinki, Finland	ERDF	2008-2010	-	
RescOp – Development of Rescue Operations in the Gulf of Finland	Development of Search and Rescue services in the GoF, Finnish-Russian co-operation	Kotka Maritime Research Association, Finland	ERDF, ENPI	2011-2014	http://www.merikotka.fi/rescop/	
SAFEWIN - Safety of Winter Navigation in Dynamic Ice	Development of an efficient ice compression and ice dynamics forecasting system and ice service products, analysis of the effect of ship structures onto risk of compressive ice damages.,	Aalto University, Finland	FP7	2009-2013		http://www.safewin.org/
SAFGOF - Evaluation of traffic increase in the Gulf of Finland 2007-2015 and the effect of the increase on the environment and traffic chain activities	Risks of maritime oil transports in the Gulf of Finland	Kotka Maritime Research Association, Finland	ERDF	2008-2010	http://www.merikotka.fi/uk/SAFGOF.php	
Speed up re-surveying of major	Speeding up hydrographic re-surveys of the Baltic Sea,	The Baltic Marine	Trans-European Transport Network	2010-2015	http://www.dma.dk/Policy/EUStrategy	Flagship project

shipping routes and ports	and thus to contribute to improving the safety of navigation	Environment Protection Commission (HELCOM) and the Baltic Sea Hydrographic Commission (BSHC)	(TEN-T)		BalticSeaRegion/Sider/FlagshipProjects.aspx	
Strengthening of administrative capacity of the Lithuanian Maritime Safety Administration in Application of European Union Maritime Safety Legislation	Development of maritime safety administration in Lithuania	Lithuanian Maritime Safety Administration, Swedish Maritime Administration	EU Phare Twinning	2007		Besides this project, there has been other similar development projects in Lithuania during 2000's.
Strengthening Enforcement of Maritime Safety in Estonia	Development of maritime safety administration in Estonia	University of Turku Centre for Maritime Studies, Finland	EU Phare Twinning	2003-2005	-	
SÖKÖ and SÖKÖ II	Management of on-shore oil spill combating in the Eastern Finland, compiling action plans and manuals for the response commander as well as for training both authorities and volunteers.	Kymenlaakso University of Applied Sciences, Finland	ERDF	2004-2007 (SÖKÖ) 2007-2011 (SÖKÖ II)	http://www.kyamk.fi/Projektit/SÖKÖ II 2007-2011/	

APPENDIX 2: INFORMATION ABOUT THE SCENARIOS

Three alternative maritime safety and security scenarios were formulated capitalising on expert views and judgments. The aim was to create alternative future scenarios for Baltic Sea maritime safety and security settings in 2025, which could be utilised to identify future development needs and challenges in the field of maritime safety and security. To elicit expert judgments, a workshop was organised as part of the 6th meeting of the international Steering Committee for the Priority Area on maritime safety and security of the EU Strategy for the Baltic Sea Region, held in Helsinki on 15May 2012. The workshop was attended by approximately 25 experts from Finland, Sweden, Denmark, Poland, Lithuania, Latvia and Estonia, the European Commission and certain regional organisations.

The workshop consisted of three steps:

- Identification of maritime safety, security and societal factors which affect the future maritime safety and security in the Baltic Sea region
- Grouping of the factors in three different scenarios and formulating the name and meta-story of the scenarios.
- Brainstorming of actions to support the positive development in each scenario and/or to mitigate the associated risks.

The two last steps were completed in three groups, each group handling one scenario.

APPENDIX 3: INFORMATION ABOUT THE SURVEY

The Centre for Maritime Studies of Turku University in Finland conducted in the period from 25th April to 8th May 2012, an electronic survey on behalf of the Priority Area on Maritime Safety and Security of the EU Strategy for the Baltic Sea Region.

The survey was sent to 260 recipients including members of the International Steering Committee of the Priority Area on Maritime Safety and Security, experts, officials, scholars and other stakeholders whose views were considered to be of significance and value to the subject. The number of respondents rose to 74 equalling a response percentage of 28%.

The main themes of the questionnaire were as follows:

- Improvement needs in maritime safety in the Baltic Sea region;
- Drivers affecting maritime safety development until 2025;
- Improvement needs in maritime security;
- Cross border co-operation improvement needs in the Baltic Sea Region;
- Most urgent needs for increased resources in the next 5-10 years;
- Needs for new development projects.

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Further information about the Priority Area on Maritime Safety and Security
http://pa13.dma.dk

Further information about the EU Strategy for the Baltic Sea Region:
http://www.balticsea-region-strategy.eu/

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