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Review on policy instruments

Jenni Kuronen & Ulla Tapaninen

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Veistämönaukio 1–3
FI–20100 TURKU, FINLAND

Puh. / Tel. +358 (0)2 281 3300
Fax +358 (0)2 281 3311
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FOREWORD

The increasing shipping activity in the Gulf of Finland has raised concerns about the safety of maritime traffic, especially about the possibility of a large oil accident due to the increasing oil export activity of Russia in the area. Various international, supra-national, regional and national policy instruments aim at minimizing the risks of accidents and other harmful effects of shipping.

This report is concerned with maritime safety policy instruments: policy instruments in general; the central regulatory bodies of maritime safety; the maritime safety policy instruments and the future prospects of maritime policy; the effectiveness of policy instruments; and the critique of the current maritime safety policy system. The purpose of the report is to review the structure and state of the maritime safety policy system with focus on the Gulf of Finland.

This report has been written as a part of the research project "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" of Kotka Maritime Research Centre, and it is the result of Work Package 6 "Political and social instruments, guidelines and economic incentives". The research has been carried out by the Centre for Maritime Studies of the University of Turku. The research project is financed by the European Union – European Regional Development Fund – Regional Council of Kymenlaakso, the City of Kotka, Kotka-Hamina regional development company Cursor Ltd., Kotka Maritime Research Association Merikotka and Kotka Maritime Research Centre Corporate Group: SE Mäkinen Logistics, OSKE – Maritime Cluster Programme, Steveco, Port of Hamina, Port of Helsinki, Port of Kotka, Kristina Cruises, Finnlines, Aker Arctic, CCC and Finstaship.

The Centre for Maritime Studies of the University of Turku expresses its gratitude to all parties who have contributed to the making of this report.

Turku 19th October, 2009

Ulla Tapaninen
Professor
Centre for Maritime Studies

ABSTRACT

The increasing shipping activity in the Gulf of Finland has raised concerns about the safety of maritime traffic, especially about the possibility of a large oil accident due to the increasing oil export activity of Russia in the area. Various international, supra-national, regional and national policy instruments aim at minimizing the risks of accidents and other harmful effects of shipping.

This report is concerned with maritime safety policy instruments: policy instruments in general; the central regulatory bodies of maritime safety; the maritime safety policy instruments and the future prospects of maritime policy; the effectiveness of policy instruments; and the critique of the current maritime safety policy system. The purpose of the report is to review the structure and state of the maritime safety policy system with focus on the Gulf of Finland. The report is a part of the EU-funded research project "SAFGOF - Evaluation of the Traffic Increase in the Gulf of Finland During the years 2007-2015 and the Effect of the Increase on the Environment and Traffic Chain Activities" and the Work Package 6: "Political and social instruments, guidelines and economic incentives".

Policy instruments can be grouped to regulatory, economic and information guidance instruments. Maritime safety is enhanced with all these instrument types, although most prominently with regulatory instruments. Due to the international character of the shipping industry, the regulation of maritime safety is mostly done at international level, in the framework of the United Nations and the International Maritime Organization IMO. However, the European Union also has maritime safety regulations of its own, there are regional arrangements such as HELCOM, and some maritime safety related issues are regulated at the national level.

Regulatory maritime safety instruments include regulations on mariners, navigation, the surveillance of ship conditions and the construction and equipment of ships. Economic instruments include waterway and port dues, marine insurance, P&I clubs, liability and compensation questions and incentives. The use of economic instruments to promote public maritime safety goals is still in a minor position, but there are some examples that have potential for wider use. The problem with economic instruments is that, in many cases, they belong to the domain of national regulation, and their implementation at regional or international level can be difficult. Information guidance is based on voluntary actions and, in addition to the dissemination of information, it can include subjects like voluntary training, certification or awards.

It seems that the risks of maritime traffic in the Gulf of Finland and in the Baltic Sea are taken seriously, and new ways to decrease these risks are developed. New regulations are planned or are going to be implemented, especially in the areas of the environmental effects of shipping (emissions, anti-fouling substances, alien species etc.) and navigational issues (AIS-based systems, electronic charts etc.). It is also often noticed that the human factor in maritime safety risks needs more attention, but it seems to be

difficult to find policies effective in minimizing the effects of the human factor in maritime accidents and incidents. Training is most often offered as a solution.

According to literature, effective maritime policy instruments should fulfil at least the following criteria: 1) *effectiveness* – the policy instrument must be suitable for achieving a desired goal, 2) *economic efficiency* – the benefits versus the costs of implementing the policy instrument should be in balance, 3) *acceptability* – the policy instrument must be accepted by the stakeholders and the community, 4) *enforcement* – the policy instrument can be implemented effectively, 5) *lateral effects* – the positive spill-over effects of the policy instrument in other sectors, 6) *incentive and innovation* – a good policy instrument encourages experimentation and gives incentives for improvement.

Due to the increasing number of regulations on maritime safety, the number of maritime accidents has decreased during past decades. Most of the regulations have been effective in preventing accidents and incidents. Still, accidents and incidents happen at sea, and the current regulation system can be criticized on several points. The international regulation process is not easy; it tends to be slow and the result can become a compromise of compromises. Regulation is mostly reactive instead of proactive. The work of IMO is based on the participation of nation states and the implementation of regulation by flag states. Nation states are primarily promoting their own interests in IMO, and all flag states do not have the same implementation standards. The failure of IMO to provide fast responses and to take local circumstances into consideration in regulation has led to a situation where, for example, the European Union regulates maritime safety, and there are such arrangements as Particularly Sensitive Sea Areas.

Many kinds of companies operate in the shipping industry: companies that take safety matters seriously and act responsibly, and companies that aim to operate as cheaply as possible, not caring about safety measures. The latter often have very obscure owner arrangements and are thus difficult to bring to account if something happens. The operation of irresponsible shipping companies is enabled by shippers who take the cheapest transport at the expense of safety and by other actors who play ball with such companies. The careless attitude to safety can also partly be attributed to the old-fashioned safety culture of the shipping industry.

When comparing the current maritime safety policy system as a whole with the criteria for successful policies, it can be concluded that, in many respects, the current system is effective with the greatest problems being in implementation and in cost-effectiveness. The nation state based implementation system is not functioning properly, and the existence of flags of convenience is the clearest sign of that. The cost-effectiveness of policies is hard to calculate, both of single policies and of the policies in comparison with each other, which can result in a situation where a policy decreases little risk with high costs.

New approaches to shipping policy at the international level, such as multi-level governance or polycentric governance systems, have been proposed. Multi-level

governance means that central government authority is dispersed both vertically, to locate at other territorial levels, and horizontally, to non-state actors. Polycentric governance systems go one step further; they create a more complex policy-making framework, encompassing a variety of policy-generating origins across all types of institutions, both private and public (governments, interest groups, political parties, commercial companies etc.). International jurisdiction determines the levels, but the concrete measures can be decided locally in co-operation with different actors. These governance systems may offer a mechanism to reflect the actual activities within the maritime sector and the priorities of the stakeholders involved. However, such a change in international legislation seems remote.

TIIVISTELMÄ

Suomenlahden lisääntynyt meriliikenne on herättänyt huolta meriliikenteen turvallisuuden tasosta, ja erityisesti Venäjän öljyviennin kasvu on lisännyt öljyonnettomuuden todennäköisyyttä Suomenlahdella. Erilaiset kansainväliset, alueelliset ja kansalliset ohjauskeinot pyrkivät vähentämään merionnettomuuden riskiä ja meriliikenteen muita haittavaikutuksia.

Tämä raportti käsittelee meriturvallisuuden yhteiskunnallisia ohjauskeinoja: ohjauskeinoja yleisellä tasolla, meriturvallisuuden keskeisimpiä säätelijöitä, meriturvallisuuden ohjauskeinoja ja meriturvallisuuspolitiikan tulevaisuuden näkymiä, ohjauskeinojen tehokkuutta ja nykyisen meriturvallisuuden ohjausjärjestelmän heikkouksia. Raportti on kirjallisuuskatsaus meriturvallisuuden yhteiskunnalliseen sääntelyn rakenteeseen ja tilaan erityisesti Suomenlahden meriliikenteen näkökulmasta. Raportti on osa tutkimusprojektia ”SAFGOF - Suomenlahden meriliikenteen kasvunäkymät 2007 - 2015 ja kasvun vaikutukset ympäristölle ja kuljetusketjujen toimintaan” ja sen työpakettia 6 ”Keskeisimmät riskit ja yhteiskunnalliset vaikutuskeinot”.

Yhteiskunnalliset ohjauskeinot voidaan ryhmitellä hallinnollisiin, taloudellisiin ja tieto-ohjaukseen perustuviin ohjauskeinoihin. Meriturvallisuuden edistämisessä käytetään kaikkia näitä, mutta hallinnolliset ohjauskeinot ovat tärkeimmässä asemassa. Merenkulun kansainvälisen luonteen vuoksi meriturvallisuuden sääntely tapahtuu pääosin kansainvälisellä tasolla YK:n ja erityisesti Kansainvälisen merenkulkujärjestön (IMO) toimesta. Lisäksi myös Euroopan Unionilla on omaa meriturvallisuuteen liittyvää sääntelyä ja on myös olemassa muita alueellisia meriturvallisuuden edistämiseen liittyviä elimiä kuten HELCOM. Joitakin meriturvallisuuden osa-alueita säädellään myös kansallisella tasolla.

Hallinnolliset meriturvallisuuden ohjauskeinot sisältävät aluksen rakenteisiin ja varustukseen, alusten kunnon valvontaan, merimiehiin ja merityön tekemiseen sekä navigointiin liittyviä ohjauskeinoja. Taloudellisiin ohjauskeinoihin kuuluvat esimerkiksi väylä- ja satamamaksut, merivakuutukset, P&I klubit, vastuullisuus- ja korvauskysymykset sekä taloudelliset kannustimet. Taloudellisten ohjauskeinojen käyttö meriturvallisuuden edistämiseen on melko vähäistä verrattuna hallinnollisten ohjauskeinojen käyttöön, mutta niitä voitaisiin varmasti käyttää enemmänkin. Ongelmana taloudellisten ohjauskeinojen käytössä on se, että ne kuuluvat pitkälti kansallisen sääntelyn piiriin, joten alueellisten tai kansainvälisten intressien edistäminen taloudellisilla ohjauskeinoilla voi olla hankalaa. Tieto-ohjaus perustuu toimijoiden vapaaehtoisuuteen ja yleisen tiedotuksen lisäksi tieto-ohjaukseen sisältyy esimerkiksi vapaaehtoinen koulutus, sertifiointi tai meriturvallisuuden edistämiseen tähtäävät palkinnot.

Poliittisella tasolla meriliikenteen aiheuttamat turvallisuusriskit Suomenlahdella on otettu vakavasti ja paljon työtä tehdään eri tahoilla riskien minimoimiseksi. Uutta sääntelyä on odotettavissa etenkin liittyen meriliikenteen ympäristövaikutuksiin ja

meriliikenteen ohjaukseen kuten meriliikenteen sähköisiin seurantajärjestelmiin. Myös inhimilliseen tekijän merkitykseen meriturvallisuuden kehittämisessä on kiinnitetty lisääntyvissä määrin huomiota, mutta inhimilliseen tekijän osalta tehokkaiden ohjauskeinojen kehittäminen näyttää olevan haasteellista. Yleisimmin lääkkeeksi esitetään koulutuksen kehittämistä.

Kirjallisuudessa esitettyjen kriteereiden mukaan tehokkaiden ohjauskeinojen tulisi täyttää seuraavat vaatimukset: 1) *tarkoituksenmukaisuus* – ohjauskeinojen täytyy olla sopivia asetetun tavoitteen saavuttamiseen, 2) *taloudellinen tehokkuus* – ohjauskeinon hyödyt vs. kustannukset tulisi olla tasapainossa, 3) *hyväksyttävyys* – ohjauskeinon täytyy olla hyväksyttävä asianosaisten ja myös laajemman yhteiskunnan näkökulmasta katsottuna, 4) *toimeenpano* – ohjauskeinon toimeenpanon pitää olla mahdollista ja sen noudattamista täytyy pystyä valvomaan, 5) *lateraaliset vaikutukset* – hyvällä ohjauskeinolla on positiivisia seurannaisvaikutuksia muutoinkin kuin vain ohjauskeinon ensisijaisten tavoitteiden saavuttaminen, 6) *kannustin ja uuden luominen* – hyvä ohjauskeino kannustaa kokeilemaan uusia ratkaisuja ja kehittämään toimintaa.

Meriturvallisuutta koskevaa sääntelyä on paljon ja yleisesti ottaen merionnettomuuksien lukumäärä on ollut laskeva viime vuosikymmenien aikana. Suuri osa sääntelystä on ollut tehokasta ja parantanut turvallisuuden tasoa maailman merillä. Silti merionnettomuuksia ja muita vaarallisia tapahtumia sattuu edelleen. Nykyistä sääntelyjärjestelmää voidaan kritisoida monen asian suhteen. Kansainvälisen sääntelyn aikaansaaminen ei ole helppoa: prosessi on yleensä hidas ja tuloksena voi olla kompromissien kompromissi. Kansainvälinen sääntely on yleensä reaktiivista eli ongelmakohtiin puututaan vasta kun jokin onnettomuus tapahtuu sen sijaan että se olisi proaktiivista ja pyrkisi puuttumaan ongelmakohtiin jo ennen kuin jotain tapahtuu. IMO:n työskentely perustuu kansallisvaltioiden osallistumiseen ja sääntelyn toimeenpano tapahtuu lippuvaltioiden toimesta. Kansallisvaltiot ajavat IMO:ssa pääasiallisesti omia intressejään ja sääntelyn toimeenpanossa on suuria eroja lippuvaltioiden välillä. IMO:n kyvyttömyys puuttua havaittuihin ongelmiin nopeasti ja ottaa sääntelyssä huomioon paikallisia olosuhteita on johtanut siihen, että esimerkiksi Euroopan Unioni on alkanut itse säädellä meriturvallisuutta ja että on olemassa sellaisia alueellisia erityisjärjestelyjä kuin PSSA (particularly sensitive sea area – erityisen herkkä merialue).

Merenkulkualalla toimii monenlaisia yrityksiä: toisaalta yrityksiä, jotka pyrkivät toimimaan turvallisesti ja kehittämään turvallisuutta vielä korkeammalle tasolle, ja toisaalta yrityksiä, jotka toimivat niin halvalla kuin mahdollista, eivät välitä turvallisuusseikoista, ja joilla usein on monimutkaiset ja epämääräiset omistusolosuhteet ja joita vahingon sattuessa on vaikea saada vastuuseen. Ongelma on, että kansainvälisellä merenkulkualalla kaikkien yritysten on toimittava samoilla markkinoilla. Vastuuttomien yritysten toiminnan mahdollistavat laivaajat ja muut alan toimijat, jotka suostuvat tekemään yhteistyötä niiden kanssa. Välinpitämätön suhtautuminen turvallisuuteen johtuu osaksi myös merenkulun vanhoillisesta turvallisuuskulttuurista.

Verrattaessa meriturvallisuuden sääntelyjärjestelmää kokonaisuutena tehokkaiden ohjauskeinoihin kriteereihin, voidaan todeta, että monien kriteerien osalta nykyistä järjestelmää voidaan pitää tehokkaana ja onnistuneena. Suurimmat ongelmat lienevät sääntelyn toimeenpanossa ja ohjauskeinojen kustannustehokkuudessa. Lippuvaltioiden toimeenpanoon perustuva järjestelmä ei toimi toivotulla tavalla, josta mukavuuslippujen olemassa olo on selvin merkki. Ohjauskeinojen, sekä yksittäisten ohjauskeinojen että vertailtaessa eri ohjauskeinoja keskenään, kustannustehokkuutta on usein vaikea arvioida, minkä seurauksena ohjauskeinojen kustannustehokkuudesta ei ole saatavissa luotettavaa tietoa ja tuloksena voi olla, että ohjauskeino on käytännössä pienen riskin eliminoimista korkealla kustannuksella.

Kansainvälisen tason meriturvallisuus- (ja merenkulku-) politiikan menettelytavoiksi on ehdotettu myös muita vaihtoehtoja kuin nykyinen järjestelmä, esimerkiksi monitasoista tai polysentristä hallintojärjestelmää. Monitasoisella hallintojärjestelmällä tarkoitetaan järjestelmää, jossa keskushallinto on hajautettu sekä vertikaalisesti alueellisille tasoille että horisontaalisesti ei-valtiollisille toimijoille. Polysentrinen hallintojärjestelmä menee vielä askeleen pidemmälle. Polysentrinen hallintojärjestelmä on hallintotapa, jonka puitteissa kaikentyyppiset toimijat, sekä yksityiset että julkiset, voivat osallistua hallintoon, siis esimerkiksi hallitukset, edunvalvontajärjestöt, kaupalliset yritykset jne. Kansainvälinen lainsäädäntö määrittelee yleiset tasot, mutta konkreettiset toimenpiteet voidaan päättää paikallisella tasolla eri toimijoiden välisessä yhteistyössä. Tämän tyyppisissä hallintojärjestelmissä merenkulkualan todellinen, kansainvälinen mutta toisaalta paikallinen, toimintaympäristö tulisi otetuksi paremmin huomioon kuin järjestelmässä, joka perustuu kansallisvaltioiden keskenään yhteistyössä tekemään sääntelyyn. Tällainen muutos meriturvallisuuden hallinnassa vaatisi kuitenkin suurta periaatteellista suunnanmuutosta, jollaisen toteutumista ei voi pitää kovin todennäköisenä ainakaan lyhyellä tähtäimellä.

TABLE OF CONTENTS

ABBREVIATIONS

AIS	Automatic Identification System
APM	Additional Protective Measure
BIM	Baltic Icebreaking Management
CLC	International Convention on Oil Pollution Preparedness, Response and Co-Operation
CMS	Centre for Maritime Studies
COLREG	Convention on the International Regulations for the Prevention of Collisions at Sea
DW Route	Deep Water Route
DWT	Dead Weight Tonnage
ECDIS	Electronic Chart Display and Information System
EMS	Environmental Management System
EMSA	European Maritime Safety Agency
ENC	Electronic Navigational Charts
EU	European Union
FSA	Formal Safety Assessment
FUND	International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage
GOFREP	Mandatory Ship Reporting System in the Gulf of Finland
HELCOM	Helsinki Commission
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IHO	International Hydrographic Organization
ILO	International Labour Organization
IMO	International Maritime Organization

ISM Code	International Safety Management Code
KMRC	Kotka Maritime Research Centre
LL	International Convention on Load Lines
LLMC	Convention on Limitation of Liability for Maritime Claims
LRIT	Long Range Identification and Tracking System
MARPOL	International Convention for the Prevention of Pollution from Ships
MEPC	Marine Environment Protection Committee of the IMO
MOU	Memorandum of Understanding
OCIMF	Oil Companies International Marine Forum
P&I Clubs	Protection & Indemnity Clubs
PSSA	Particularly Sensitive Sea Area
RCO	Risk Control Option
SAFGOF	Research project "Evaluation of the traffic increase in the Gulf of Finland during the years 2007 – 2015 and the effect of the increase on the environment and traffic chain activities"
SAR	Search and Rescue
SECA	North Sea SO_x Emission Control Area
SIRE	Ship Inspection Report Programme
SOLAS	International Convention for the Safety of Life at Sea
STCW	International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers
TTE	Transport, Telecommunications and Energy Council of the European Council
UN	United Nations
UNCLOS	The United Nations Convention on the Law of the Sea
VTS	Vessel Traffic Services

1 INTRODUCTION

Maritime traffic in the Gulf of Finland has grown remarkably during the 2000's, which is mainly due to the strong economic growth and the increasing oil production and transportation activities of Russia. It is widely believed that the growth of maritime traffic will continue in the Gulf of Finland also in the future. In 2007, about 263 M tonnes of cargo with 53 600 ship calls were transported by sea in the Gulf of Finland. 56% of the cargo was oil. In addition, there is a dense passenger traffic line between Helsinki and Tallinn. (Kuronen et al. 2008)

The growth of maritime traffic, and especially of oil transportation, has raised concerns about the safety of maritime traffic in the Gulf of Finland, which is a narrow, shallow and ecologically vulnerable sea area. The Gulf of Finland is a part of the world's largest area of brackish water, the Baltic Sea. The Gulf of Finland is 400 km long and its width varies between 60 and 135 km. Three countries surround the Gulf of Finland: Finland, Russia and Estonia. The maximum depth is 60 metres and the average depth 37 metres (for comparison: the average depth of the Mediterranean Sea is 1 550 metres). The Gulf of Finland is partially ice-covered, approximately from December to April. The ice-cover is the heaviest on the Russian side of the gulf. (Nikula & Tynkkynen 2007)

The increasing shipping activity in the Gulf of Finland creates environmental and safety risks, such as the possibility of an oil tanker grounding or colliding – in the worst case with a passenger ship. Realization of the risks could have devastating effects on the environment and on the commercial and recreational activities at sea. Various international, supra-national, regional and national maritime safety policy instruments aim at minimizing these risks.

Maritime safety includes the safety of people both on board and ashore and the safety of cargo transportation. The environmental effects of shipping are either operational discharges (automatic or intentional discharges of oil and other harmful substances, ballast water, antifouling substances, garbage and sewage) or accidental discharges, which can have harmful effects on the environment (Roberts 2007). Factors affecting maritime safety can be grouped into internal and external factors. Internal factors include the condition of a ship and its equipment and the competence of the personnel on board. External factors consist of the conditions of waterways and maritime safety devices, the quality of vessel traffic services, piloting, ice-breaker assistance and available information on weather conditions, ice and water level. The supervision of compliance with the regulations and compensation and liability questions are also important aspects of maritime safety (Ministry of Transport and Communications 2009a). All these issues are regulated in order to enhance the level of maritime safety.

1.1 Contents and background of the study

In this report, maritime safety policy instruments are studied – how the safety and environmental safety of shipping is governed and can be governed by policy

instruments. The focus of the report is on preventive maritime safety policy instruments in the Gulf of Finland. The report presents policy instruments in general and the policy instruments, regulatory bodies and the future prospects of maritime safety from the point of view of the Gulf of Finland. The weak points of the current system are analyzed and evaluated in the light of the criteria for effective policies.

The report has been written as a part of the research project "SAFGOF - Evaluation of the traffic increase in the Gulf of Finland during the years 2007 - 2015 and the effect of the increase on the environment and traffic chain activities" of Kotka Maritime Research Centre (KMRC). This report is one result of the Work Package 6 "Summary: political and social instruments, guidelines and economic incentives". The purpose of the report is to review the maritime safety policy instruments in general and in the current situation of maritime safety policy in the Gulf of Finland. In connection with the theme, a report on oil accidents at sea and how they have affected the development of maritime safety legislation has been written in the project (Luoma 2009).

Work Package 6 of the SAFGOF project is conducted by the Centre for Maritime Studies of the University of Turku, which has previously conducted two Work Packages in the SAFGOF project: WP 1 "Baltic Sea traffic flows" (Kuronen et al. 2008) and WP 4 "Atmospheric emissions of the increasing maritime traffic" (Kalli & Tapaninen 2008). The SAFGOF project has begun on the 1st of January, 2008 and it ends on the 31st of December, 2010. The project is financed by the European Union – European Regional Development Fund – Regional Council of Kymenlaakso, the City of Kotka, Kotka-Hamina regional development company Cursor Ltd., Kotka Maritime Research Association Merikotka and Kotka Maritime Research Centre Corporate Group. This report has been written by researcher Jenni Kuronen with the support of Professor Ulla Tapaninen.

The Centre for Maritime Studies is a special unit of the University of Turku and it is one of the leading providers of education, research and expert services in the maritime field of Finland. In addition to its national activities, the CMS has taken part in numerous international projects, especially in the Baltic Sea area. The Kotka office of the Centre for Maritime Studies functions as a part of Kotka Maritime Research Centre. The KMRC has existed since 2005, and research units from four universities operate in its premises: the University of Helsinki, Helsinki University of Technology, the University of Turku and Kymenlaakso University of Applied Sciences.

1.2 The structure of the report

The report is structured as follows. First, the different policy instruments are presented generally (Chapter 2). Policy instruments are divided into three groups: regulatory instruments, economic instruments and information guidance instruments. Then, the most central regulators of maritime safety in the Gulf of Finland, the existing policy instruments of maritime safety and the future prospects of maritime policy are presented (Chapters 4 - 5). In the last part of the report some general views and criteria for effective policy instruments are studied and the weak points of the current governance

system are analyzed (Chapters 6 & 7). At the end, the findings of the report are summarized and discussed.

This report is based on written sources in literature and in the Internet. Part of the used literature has been literature on environmental policy instruments - partly due to the reason that much has been written about environmental policy instruments and, in most cases, it is applicable to other policy fields as well, and partly because in the SAFGOF research project, the primary focus is on the policy instruments that would reduce the accident probability and/or the environmental pollution caused by an oil spill.

2 POLICY INSTRUMENTS

In most cases, the self-regulation of companies or other private actors is not seen to be sufficient from the societal point of view, "the common good", and it has led to a wide spectrum of societal control of human activities (Klemmensen et al. 2007). Policy instruments aim to change the behaviour of actors towards patterns desired by the society. Policy instruments can be categorized into three groups: regulatory control (jurisdiction and law based decrees, restrictions, licences etc.), economic control (taxes, subsidies, fees etc.) and information guidance (information, voluntary education, certification, awards etc.). Policy instruments can also be considered from the viewpoint of which interests are to be protected – private goods (the competitiveness of companies) or public goods, which the market would otherwise neglect (the maintenance of safety in shipping, ensuring safety and security for people and goods and protection of the environment from the harmful effects of shipping). Policy instruments can be either preventive measures or sanctions and consequences. Both preventive measures and consequences can be either private (for example insurances) or administrative measures (for example prohibitions). (Figure 2.1)

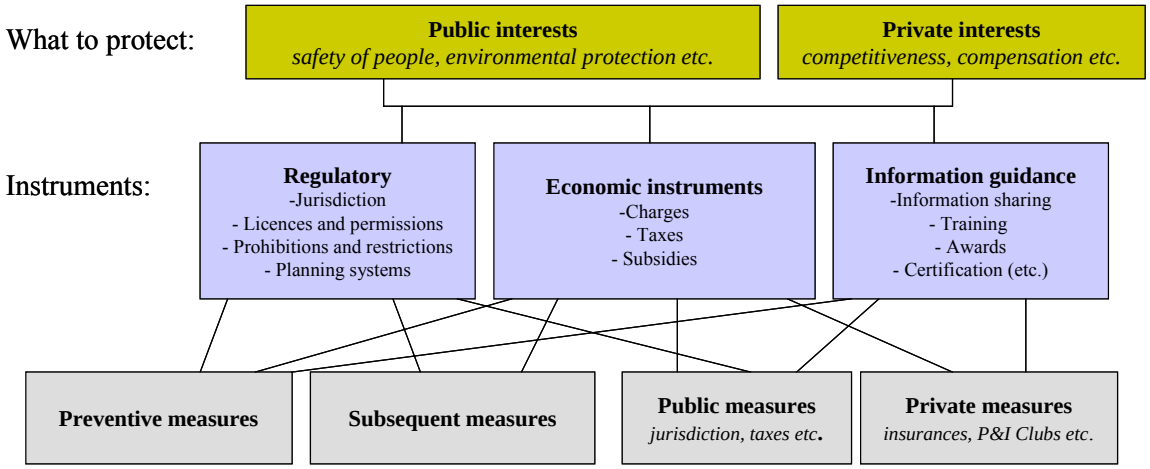

Figure 2.1 Policy instruments

In the following chapters 2.1 - 2.3, different kinds of policy instruments are presented in general.

2.1 Regulatory instruments

Regulatory instruments include actions that aim to modify an agent's behaviour by defining or changing the sets of rules. Regulatory instruments include jurisdiction, restrictions, licences, permissions and standards (Vieira et al. 2007). Planning systems can also be included in regulatory instruments (Ekroos et al. 2002). Regulatory instruments are the most widely used policy instruments, also in the maritime world.

2.1.1 Jurisdiction and law based decrees

Jurisdiction is actually behind all public regulatory instruments and economic instruments – to be legally conclusive, they must be based on jurisdiction. So, in fact, regulatory and economic instruments are practical means to carry out juridical goals and principles. But there is also a great amount of jurisdiction that solely sets out the rules for behaviour, and compliance is controlled by sanctions.

2.1.2 Licences and permissions

Licences and permissions represent anticipatory instruments, which require a permit to perform something before an action has begun. Authorities set requirements and restrictions, which actors have to fulfil before they can have a permit. A licence refers to the longer-lasting permit to do something; for example, a ship must have certificates on its structure and maintenance, which show that the ship fulfils certain requirements and is allowed to ship from one country to another. A permission is a more temporary permit to do something, e.g. a permit to ship radioactive cargo. A lighter version of licences and permissions is a requirement of notice; for example, a ship has to give a departure and arrival notice before it leaves or enters a port. (Ekroos et al. 2002)

2.1.3 Prohibitions and restrictions

A prohibition is a comprehensive act to prevent some unwanted action. A restriction is a milder version of a prohibition – it means that something is prohibited, for example, at a certain time or there are other temporary limitations to normal actions. For example, in winter time, the maritime administrations in the Gulf of Finland set winter navigation restrictions, which define the minimum ice-classes and DWT for ships entering the area.

2.1.4 Planning systems

In environmental policy, land use planning and other land use control systems are central regulatory instruments. In shipping, there are corresponding planning systems, such as waterway planning, traffic separation schemes and routing. They control the use of the sea area for shipping purposes and promote safe shipping. Transport supply instruments are also planning systems; they aim to modify and improve the behaviour of transport-system agents by changing the quantity and/or quality of the available transport infrastructure capacity, equipment or vehicles. In the maritime world this could mean the opening up of, for instance, new waterways and ports or new information systems to optimize the use of maritime infrastructure capacity and to replace traffic from congested sea areas. (Vieira et al. 2007)

2.2 Economic instruments

The rationale behind economic instruments is to make unwanted behaviour more expensive or wanted behaviour cheaper, so that companies will have economic incentive to change their activities in order to avoid extra costs. Economic instruments are also used in society to cover the costs of providing infrastructure, such as waterways, and to prevent the exploitation of common resources. In addition, there are market-based economic instruments, for example emission trading. (Klemmensen et al. 2007)

The basic problem in economics is that all costs of activity are not included in the prices of normal market transactions. These costs are so-called external costs, e.g. for pollution or health issues. By using economic instruments and by including external costs in the prices, the situation can be changed towards a more desirable way of action. The problem with the internalization of external costs into the prices is that often they are very difficult to measure in monetary terms. How much is it worth that a bird species is harmed by an oil spill or that people living near a port with dense sea and land traffic get respiratory organ diseases? Calculations of external costs are often full of uncertainties. In practice, deciding the level of taxation or other economic instruments has often been a "trial and error" exercise based on experience. (Klemmensen et al. 2007)

2.2.1 Charges

Charges are payments that are meant to cover the expenses of certain actions or maintenance of the infrastructure of some services, such as the handling of sewage. Charges can be demanded by both public and private actors. (Klemmensen et al. 2007)

2.2.2 Taxes

The society collects taxes in order to finance public expenditures. Finland, for example, collects a waterway due, which is a tax, and it is meant to cover the expenses of waterway maintenance. Taxes can also be used for pursuing other goals, for example goals related to social policy or to the competitiveness of private companies. Environmental taxes are directed to activities that have a harmful effect on nature. Many times, the tax liability is enacted to other than environmental purposes, but the tax can still have positive effects from the environmental or safety point of view. (Klemmensen et al. 2007)

2.2.3 Subsidies

If charges and taxes are "sticks", subsidies are "carrots". They are used for encouraging private actors to behave in a certain way, and they can be either direct or indirect. A direct subsidy means that, for example, the state finances a part of the investment or

gives a loan at a low interest rate. An indirect subsidy is a reduction of costs, for example the reduction of taxes. (Klemmensen et al. 2007)

2.3 Information guidance

Information guidance is premised on the idea that justified information makes people, communities or companies change their behaviour patterns. Information guidance includes, for example, information, training, standardization, certification and awards. What is characteristic of information guidance is that it is based on voluntary actions. While regulatory or economic instruments are, in most cases, based on legislation and there are consequences for non-conformity, the effect of information guidance is totally dependent on the voluntary interest of an actor.

3 THE REGULATORY BODIES OF MARITIME SAFETY

Because ships can sail around the world between different states, it is appropriate to have worldwide regulations on matters like maritime safety in order to avoid a situation where each coastal state has its own rules on issues like ship structure, manning etc. (Stopford 2009). Thus, maritime safety regulation starts from the international level (the UN), but it is done also at supra-national (the EU), national (Finland, Estonia, Russia), and regional (the Gulf of Finland) levels (Figure 3.1). In principle, these levels work in a so-called nested hierarchy, which means that the international level is the outmost circle and other levels are within each other in the circle, and inner circles should always be consistent with the outer levels of the circle. Otherwise, the implementation of regulation is likely to be ineffectual. (Roe 2008)

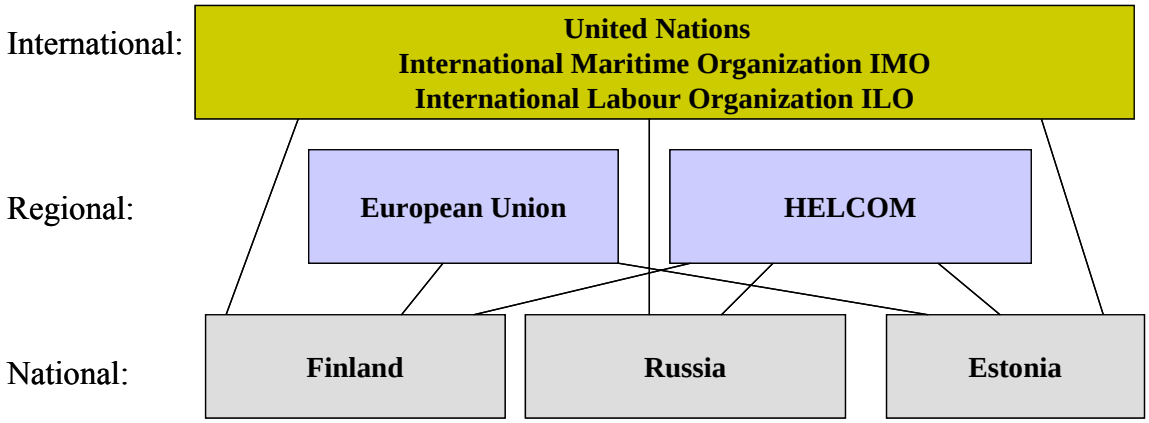

Figure 3.1 The main regulatory bodies of maritime safety in the Gulf of Finland

In this chapter, all central regulatory bodies of maritime safety in the Gulf of Finland are presented. In addition to these, there are bodies that do not have legislative power, but somehow affect maritime safety, for example, environmental organizations like WWF, classification societies and marine insurance companies. There are also cases where the United States have legislated maritime safety nationally, and it has had an effect on the entire shipping industry, for example, the Oil Pollution Act of 1990 (Luoma 2009).

3.1 The United Nations – The UNCLOS Convention

The United Nations Convention on the Law of the Sea (UNCLOS) establishes the most fundamental rules governing all uses of the oceans and their resources, including the movements of ships. The Convention has come into force in 1994. Some of the shipping related key points of the Convention are as follows:

- it defines the boundaries of sea zones
- coastal states exercise sovereignty over their territorial sea area and they have the right to determine its breadth up to a limit of 12 nautical miles
- foreign vessels are allowed innocent passage through territorial waters

- states are obliged to prevent and control marine pollution and are liable for damage caused by the violation of their international obligations to combat such pollution
- disputes can be submitted to the International Tribunal for the Law of the Sea, to the International Court of Justice or to arbitration.

The UNCLOS Convention lists the following areas in which coastal state legislation is permitted: the safety of navigation; the protection of navigational aids; the preservation of the environment; the prevention, reduction and control of pollution; and the prevention of infringement e.g. of customs laws. Coastal states cannot make legislation on the design, construction, manning or equipment of foreign ships. The rights of the port state are defined by dividing the sea into maritime zones:

- the territorial sea zone (water closest to the shore, where a coastal state has the most extensive rights)
- the contiguous zone (coastal states have limited powers to enforce customs, fiscal, sanitary and immigration laws)
- the exclusive economic zone (a belt of sea extending up to 200 miles from the shore, defines the ownership of resources, coastal states have rights to enforce pollution regulation in EEZ areas)
- high sea zones (sea areas that are not covered by the aforementioned zones). (Stopford 2009)

From the point of view of maritime safety in the Gulf of Finland, regulations on the territorial sea zones and economic zones have particular significance. The coastal state can, for example, demand that vessels in international traffic follow the traffic separation schemes and routeing that the coastal state has determined for its territorial waters. Particularly vessels with dangerous cargo can be asked to use certain routes. In the economic zone and in the high sea zone, vessels are under the jurisdiction of their flag state. Because of the narrowness of the Gulf of Finland, the territorial seas of Finland and Estonia would reach each other, but the countries have agreed to limit their territorial waters so that they do not reach closer than three nautical miles from the centre line of the Gulf of Finland. Thus, there is a sea area in the middle of the Gulf of Finland where high sea zone rules apply to the ships in international traffic. (Ministry of Transport and Communications 2009a)

All three countries surrounding the Gulf of Finland – Finland, Russian and Estonia – have ratified the UNCLOS Convention. (United Nations 2009)

The United Nations has delegated maritime issues to two UN agencies: International Maritime Organization (IMO) and International Labour Organization (ILO) (Chapter 4.3.3). IMO is the agency responsible for ship safety, pollution and security, and ILO for the laws governing maritime personnel. The main instrument of both agencies is conventions, which become laws when they are enacted by each member state. IMO and ILO also give codes, guidelines or recommended practices on important matters not considered suitable for regulation by formal treaty instruments.

3.2 IMO

IMO has 166 member states and its supreme governing body is the Assembly, which meets every two years. The Assembly selects the Council, which consists of 32 member states. The technical and legal work is carried out by five committees and by numerous sub-committees. (Stopford 2009)

The IMO Conventions include both preventive and sanction and consequence instruments. The implementation of IMO rules is based on the two different roles of a state: "flag state" and "coastal state". In the role of flag state, the state rules ships registered under its flag regardless of where the ship is in the world. The coastal state, also known as port state, enforces maritime laws on the ships that are in its territorial waters. (Stopford 2009)

Currently IMO has a total 29 conventions.

Table 3.1 IMO Conventions and their ratification in the Gulf of Finland [1] (IMO 2009a)

IMO convention		*Entry into force*	*Ratification % (of world fleet)*	*Ratification in the Gulf of Finland [2]*
LL	**International Convention on Load Lines**	1968	99	Finland, Russia, Estonia
COLREG	**Convention on the International Regulations for the Prevention of Collisions at Sea**	1977	98	Finland, Russia, Estonia
SOLAS	**International Convention for the Safety of Life at Sea**	1980	99	Finland, Russia, Estonia
MARPOL	**International Convention for the Prevention of Pollution from Ships**	1983 (Annex I/II)	98	Finland, Russia, Estonia
		1992 (Annex III)	95	"
		2003 (Annex IV)	81	"
		1988 (Annex V)	97	"
		2005 (Annex VI)	83	Finland, Estonia

[1] The list is not comprehensive but includes the conventions that are mentioned in this report.
[2] In July 2009.

STCW	**International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers**	1984	99	Finland, Russia, Estonia
	International Convention on Oil Pollution Preparedness, Response and Co-Operation	1995	67	Finland, Estonia
CLC	**International Convention on Civil Liability for Oil Pollution Damage**	1996	96	Finland, Russia, Estonia
LLMC	**Convention on Limitation of Liability for Maritime Claims**	1996	35	Finland, Russia
FUND	**International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage**	1996 [3]	94	Finland, Russia, Estonia

3.2.1 The Baltic Sea - Particularly Sensitive Sea Area PSSA

In the past decades, it was perceived in IMO that, besides international regulation, there was need for a system that would also take local circumstances into consideration. As a solution to this problem, IMO developed the concept of PSSA, "Particularly Sensitive Sea Area", in order to protect ecologically sensitive sea areas from the hazards of shipping *(Resolution A.982(24): Revised guidelines for the identification and designation of Particularly Sensitive Sea Areas)*. To be identified as PSSA, the following elements must be present in the sea area: 1) the area must meet at least one of the three criteria: a) ecological, b) social, cultural and economic, c) scientific and educational value, 2) it must be vulnerable to damage caused by shipping activity, 3) there must be measures that can be taken by IMO to provide protection to the area. PSSA status provides international recognition of the special significance of a sea area, and informs mariners of the importance of taking extra care when navigating in that sea area. It gives coastal states the opportunity to take additional protective measures to minimize the risks caused by shipping. The designation of a PSSA is not a regulation in its own right, but it serves as a basis for the proposal for additional protective measures (APMs). The PSSA concept is created by a non-binding IMO Assembly resolution, and it is not set forth in a convention. It sets out the problem that PSSA does not have the precise legal basis in existing international instruments, and the legal validity of measures given on the basis of PSSA status is rather unclear. (Roberts 2007)

APMs given on the basis of PSSA status can include routeing systems for ships (traffic separation schemes, areas to be avoided, no anchoring areas, inshore traffic zones, deep water routes, precautionary areas, recommended routes), ship reporting systems, and discharge and emission control restrictions. (Mäkinen 2008)

[3] The latest version, which has the ratification of over 90% of the world fleet.

At the moment, 12 sea areas have PSSA Status (IMO 2009c). The Baltic Sea has had PSSA status since 2005. So far, PSSA associated protective measures in the Baltic Sea have been mandatory reporting, a transit route, a deepwater route, fifteen traffic-separation schemes, localized compulsory pilotage, a deepwater route between existing TSS, and two areas to be avoided (recommendation) (Roberts 2007). In the application phase, more ambitious proposals were made on possible measures, such as 1) ship construction must meet certain standards, so that low quality ships can be excluded from the Baltic Sea, 2) crews must have adequate skills and training, 3) the shipping industry must assume financial responsibility for the impacts of its activities. Some of the participants in the application process held unrealistic expectations and misconceptions of the PSSA concept, thinking of it as a "magic cure". In reality, such APMs as a proposal for crew certification and a ban on single-hulled tankers are out of the question in the context of the PSSA status. (Uggla 2007) However, single-hulled tankers will be banned by 2010 on the basis of the MARPOL Convention and EU legislation (Luoma 2009).

The Baltic Sea is also a special area by definition of the MARPOL Convention, which means that the emitting of oil and oil-bearing mixtures into the sea is completely prohibited (Karvonen et al. 2006).

3.3 The European Union

In the past, the starting point in the European Union was that maritime safety matters should be negotiated at an international level, and the EU did not engage itself in this policy area. In the early 1990s, the maritime policy output of the EU was restricted to recommendations for the implementation of international rules. However, after some maritime accidents in European waters (e.g. the capsizing of Herald of Free Enterprise), maritime safety issues were added to the agenda of the EU. The publication of the maritime strategy in 1996 marked the transformation of maritime safety into one of the four pillars of maritime politics – the other three being the maintenance of the open market, the enhancement of the EU shipping sector competitiveness and the development of the EU rules regarding state aid to the sector. (Pallis 2006)

The shift in policy legitimacy from the international level to the EU was promoted by structural changes in both the supply and demand sides of the shipping market, e.g. the flagging-out of ships, the struggle of traditional maritime nations to maintain their market share through the relaxation of taxation and crew nationality requirements, the establishment of multi-national companies, and the increase of low cost labour from developing countries. These changes contributed to the depersonalization and reorganization of ship-owning, as well as the increase of asset players who speculate in the market. This led to the inflation of the safety problems and increased the opportunities for ship-owners to avoid specific regulatory frameworks. All of these factors contributed to the possibility for the EU institutions to put forward common policy responses. The EU policy making also benefited from the public attention on maritime incidents and their consequences on people and the environment. There were member states who opposed the development of the common EU maritime safety

policy, but the European Union and its institutions (most notably the Commission) succeeded in negotiating and modifying its draft proposals, so that they became acceptable and in bringing together under a common policy agenda a wide spectrum of sea-related industrial, regional and social interests. (Pallis 2006) For example, after the accident of oil tanker Erika, the European Union tightened the timetable for the abolition of single-hull tankers. The European Union also established the European Maritime Safety Agency (EMSA) in 2000 (Karvonen et al. 2006).

The European Union shipping policies are implemented through national legislation of the member states and applied through regional and local regulations (Roe 2008). At the moment, there are over 40 Community regulations on maritime safety. National authority has shifted to the European Union in maritime issues where Community legislation exists. In such matters, the EU member countries are obliged to follow the Community opinion in IMO, and also, in other maritime issues, there is an obligation to coordinate the opinions of the member states in regard to IMO (Ministry of Transport and Communications 2009a). The European Union has attempted to gain full membership in IMO and present all EU countries with one voice, which is thought to be more effective than individual state representations in IMO. This would mean a step where the hierarchy in the international jurisdiction of shipping based on state representation would be changed, and the influence of states would be reduced. (Roe 2009)

Maritime affairs are dealt with within the European Union as follows: the European council – Transport, Telecommunications and Energy Council (TTE), which is formed by the ministers of transportation; the European Parliament – the Standing committee of Transport and Tourism, the European Commission – the Directorate-General for Energy and Transport and the European Maritime Safety Agency (EMSA). EMSA's role is to assist the Commission and the member states in the implementation of maritime safety legislation and to act as a forum for co-operation between the European Union members and institutions. EMSA also maintains related data systems (e.g. SafeSeaNet). (Ministry of Transport and Communications 2009a)

In addition to legislative actions in shipping policy, the European Union attempts to create comprehensive policies on the use of seas. It has launched the Integrated Maritime Policy (*green paper COM (2006) 275*; *communication COM (2007) 575*), and the European Commission has given communication for the European Union's strategy for maritime transport policy until 2018 (*COM (2009) 8*).

3.4 HELCOM

The Helsinki Commission's (HELCOM) aim is to protect the marine environment in the Baltic Sea, and it also deals with pollution from maritime traffic. The work of HELCOM is founded on the Helsinki Convention of 1992, of which the coastal states of the Baltic Sea are the members. HELCOM's work is guided by declarations and strategies approved in ministerial meetings. HELCOM gives recommendations for member states to implement, although they are not legally obliged to do so. In practice,

member states usually follow the recommendations (Karvonen et al. 2006). In the Helsinki Convention, the following issues are defined to be the needed actions to prevent pollution from ships:

- co-operation with IMO
- realization of systematic hydrographical surveying in the main waterways
- the development of electric navigation charts (ENC)
- the approval of the Electronic Chart Display and Information System (ECDIS) to replace paper navigation charts
- the maintenance of a database for AIS information
- port state controls
- the harmonization of accident investigation procedures
- the planning of refuges for ships in emergency state. (Ministry of Transport and Communications 2009a)

In recent years, HELCOM has given several recommendations in relation to maritime safety and pollution from ships (Ministry of Transport and Communications 2009a).

3.5 The national level

The national policy level focuses on the implementation of the policies agreed at international and/or supra-national levels (Roe 2008). Whenever possible, states also use the chance to adapt regulations in relation to their own interests and circumstances or give national regulations as well (Karvonen et al. 2006). Piloting, vessel traffic services, the maintenance of waterways and safety devices, nautical charting and weather, water level and ice services are issues that are usually governed nationally (Ministry of Transport and Communications 2009a).

3.5.1 Finland

Maritime safety issues in Finland belong to the sphere of authority of the Ministry of Transportation and Communications, which is responsible for maritime policy in Finland, drafting maritime legislation and contributing to any legislative drafting at the EU level. The Transport Services Unit of the Ministry deals with matters concerning the safety of waterborne traffic, aids to maritime transport, legal issues concerning shipping and maritime environmental legislation. The Ministry's administrative sector in shipping comprises of the Finnish Maritime Administration, Shipping Enterprise Finstaship and State Pilotage Enterprise Finnpilot. The Finnish Maritime Administration carries out most of the duties concerning maritime safety. In environmental matters administration is dispersed: Environmental administration also has duties related to maritime environmental issues, such as oil combating.

From 2010 onwards, the government of the transport sector is going to be rearranged, so that all the modes of transport are combined into two agencies: the transport safety agency and the transport infrastructure agency. For maritime affairs, this means that most maritime safety issues will be dealt with in the transport safety agency and other

maritime issues (such as cartography and waterway maintenance) in the transport infrastructure agency. (Ministry of Transport and Communications 2009b)

3.5.2 Russia

In Russia, maritime safety issues are mainly dealt with in the Morskaya Kollegiya [Maritime Collegial Body], which works under the Government of Russian Federation and Ministry of Transport. Co-operation with Russia in the Baltic Sea area is a challenge, because Russia is the only country that is not a member of the EU, although it is a member of IMO and HELCOM.

3.5.3 Estonia

In Estonia, the main authorities are the Ministry of Economic Affairs and Communications and the Estonian Maritime Administration, which operates within the government of the Ministry of Economic Affairs and Communications. The duties of the Estonian Maritime Administration are to ensure safe navigation in the Estonian territorial and inland waters by, for example, performing flag state implementation and port state control activities, issuing the certificates of competency for seafarers, carrying out the maintenance of aids to navigation, performing hydrographical surveys and cartography, arranging icebreaker services, investigating marine casualties and keeping ship register (Estonian Maritime Administration 2009; Ministry of Economic Affairs and Communications 2009).

4 MARITIME SAFETY POLICY INSTRUMENTS

Factors affecting maritime safety can be grouped to internal and external factors. Internal factors include the condition of a ship and its equipment and the competence of personnel on board. External factors consist of the conditions of waterways and maritime safety devices, the quality of vessel traffic services, piloting, icebreaker assistance and available information on the conditions of weather, ice and water level. The supervision of compliance with regulations and compensation and liability questions are also important aspects in maritime safety (Ministry of Transport and Communications 2009a). All these issues are regulated in order to enhance the maritime safety level.

In this chapter, the current maritime safety policy instruments are presented. First, issues that are governed with regulatory instruments are looked through and summarized. Regulatory instruments in maritime safety have been categorized into four groups: ship construction and equipment, surveillance of ship conditions, mariners & management and navigation. After that, economic instruments and information guidance instruments are presented. Also, SAR and other "after accident" policies are viewed shortly at the end of the chapter. Here, the purpose is not to present all details of the regulations, but to look at how different kinds of policy instruments are used for enhancing maritime safety.

4.1 Regulations on the construction and equipment of ships

An unsound ship is undoubtedly a threat to maritime safety. In order to avoid the shipping of such ships, the structure of ships is regulated, most prominently by IMO and the SOLAS convention. Regulations on the structure of ships include the following aspects:

- construction and subdivision
- stability
- equipment
- stowage
- navigation
- handling and nature of the cargo carried.

The main objective of SOLAS is to specify minimum standards for the construction, equipment and operation of ships. The SOLAS convention covers a wide range of measures to improve the safety and security of shipping, such as construction, fire protection, life-saving appliances, radio communications, safety of navigation, carriage of cargo, management for the safe operation of ships (the ISM code) and maritime security (the ISPS code). Flag states are responsible for ensuring that ships under their flag comply with these requirements, which are proofed by a number of certificates (Roberts 2007). Also, the International Convention on Load Lines and the MARPOL Convention are central when looking at regulations on ship construction. (Ministry of Transport and Communications 2009a)

The ice-going features of a ship are outside the international regulations but central from the point of view of the Gulf of Finland. Finland has given national regulations on ice classes, which are based on the ice class rules. Ice class rules are made in co-operation with the Swedish maritime authorities. Also, international classification societies have participated in the drafting of ice class rules and have included them in their own rules. (Ministry of Transport and Communications 2009a)

4.2 The surveillance of ship conditions

In order to make sure that ships are complying with the regulations on ship structure and condition and that they can ship safely, there are several supervision systems in the shipping industry:

- flag state control
- port state control - PARIS MOU and equivalents
- classification societies
- vetting inspections.

If it is perceived that a ship does not comply with the regulations, it can lead to the following consequences:

- request to correct faults
- certifications of inspection, compliance and related documents can be rejected, cancelled or not be renewed
- intensified control
- detention of a ship
- prevention of a ship from entering a port
- setting a conditional imposition of a fine.

4.2.1 Flag state control

Flag State Control is one of the basic premises of the IMO conventions. It means that the state where a ship is registered is responsible for supervising that the ship fulfils the requirements of those IMO Conventions that the state has ratified. The UNCLOS Convention gives the right for any state to register ships, in so far as there is a link between the ship and the state. In practice, the state can define the nature of this link, and so it can register any vessel it chooses. (Stopford 2009) Countries without any maritime experience and expertise can also establish ship registers (Mitroussi 2004). Some flags are called flags of convenience or open registries. They usually have lighter taxation and less regulation on employment conditions and little supervision on the conditions of ships sailing under their flag. Ship-owners register their ships as flags of convenience in order to reduce their costs. Nevertheless, all ships sailing under flags of convenience are not sub-standard or operated badly.

Ship surveys are performed by national maritime authorities before a ship is put into traffic, and renewal, periodical, intermediate, annual and additional surveys are carried

out by virtue of the legislation on ship surveys, for example, a date of renewal and periodical survey is dependent on ship type and type of traffic. Surveys can also be performed by other actors, mainly by classification societies, if they are authorized by national authorities. (*Decree on Ship Surveys 1123/1999*)

4.2.2 Port state control

Port state control is a complementary instrument to flag state control, and it has been born due to the fact that flag states have different standards in flag state control, and some allow the operation of sub-standard ships (Karvonen et al. 2006). IMO has adopted a resolution on port state control inspections to identify deficiencies in a ship, its equipment or its crew. These procedures are not mandatory, but many countries have followed them, e.g. Paris MOU states. Ships with serious deficiencies are detained, and a ship can also be banned. The ships inspected are often selected using statistical methods to identify high-risk vessels, e.g. on the basis of ship age, flag and ship type. (Stopford 2009) Inspections are performed by national maritime authorities or other actors authorized by the national authority.

The port state control system has added to the transparency of the maritime safety system. Through flag states, it has been impossible to have information on the performance of the flag state control system. Port state control information is publicly available on the Internet, where anyone can see the safety levels of the flag states, for example via http://www.parismou.org. (Karvonen et al. 2006)

Ro-Ro-passenger ships and high speed crafts are also controlled by the host state control system, which means that these kinds of ships, which are in regular traffic between nations, are controlled by a host state. The host state control system is based on the EU Directive (*99/35/EY*).

4.2.3 The Paris MOU and equivalents

The port state control movement began from eight European states located around the North Sea, which agreed to inspect foreign ships visiting their ports and to share information on the deficiencies of those ships. In 1982, the co-operation was formalized in the Paris Memorandum of Understanding (MOU), in which 14 European states agreed to work together to ensure that ships visiting their ports comply with international conventions on safety and pollution. By 2007, the Paris MOU was undersigned by 27 countries, including Finland, Estonia and Russia (Paris MOU 2009). Each country inspects 25% of the foreign merchant ships visiting its ports. Additional port state control MOUs have been established around the Mediterranean (10 participators), The Tokyo MOU (18 participators), the Caribbean (11 participators), the Latin America (12 participators), and the Indian Ocean (11 participators). The United States has its own control programme. (Stopford 2009)

4.2.4 Classification societies

Classification societies are the shipping industry's own system for regulating the technical and operational standards of ships (in other words, they guarantee that a vessel is properly constructed and in good condition), and historically they have arisen from the need for insurers to make sure that vessels they were insuring were sound. Nowadays, the role of classification societies is more extensive than just acting for the needs of insurers. They also serve flag states under the terms of international conventions and national regulations. Classification societies work as technical advisers to the maritime regulators and assist the regulators in making and implementing maritime laws. They also develop technical standards and grant the classification certificate required by insurance underwriters. Classification societies class ships according to their rules, carry out certification connected with international conventions, codes and protocols, and offer a range of quality assurance, engineering and consultancy services. Still, classification societies have no legal power, although they might act as government representatives, the most common authorizations being tonnage measurement and load lines, or SOLAS, MARPOL and IMO setting standards on the transportation of dangerous goods. Most major maritime nations have a classification society and, altogether, there are more than 50 classification societies operating world-wide. The 10 largest societies (e.g. Lloyds Register, Det Norske Veritas, Nippon Kaiji Kyokai, American Bureau of Shipping, Germanischer Lloyd, and Russian Register) cover over 90% of the cargo and passenger fleet in the world. (Boisson 1994; Stopford 2009)

The problem with classification societies is that they are private companies and are thus financed by selling their services. This means that there is intense competition between classification societies to attract clients, which can lead to a situation where one society classes vessels that have been previously denied of class by another society. The process of class transfers has been criticized for being too lax in enabling unscrupulous ship-owners to engage in "class shopping" to obtain a particular advantage offered by a particular society, or to avoid a special survey made by some other society. To tackle this problem, there is the International Association of Classification Societies (since 1968) which has two aims: to introduce uniformity into the rules of the classification societies and to collaborate between class societies. IACS has consultative status in IMO. (Boisson 1994; Stopford 2009)

Boisson (1994) has concluded that, in order to tackle the problems of classification societies, the following changes are needed: 1) restoring the credibility of classification societies, which requires, for example, uniformity of the rules of different classification societies and prevention of the class-shopping phenomena, 2) integrating human factors by paying more attention to the compliance with the ISM Code or the STCW convention, and 3) returning to basics by supplying ship ratings – in other words giving insurers, charterers or bankers the class rating for each ship.

4.2.5 Vetting inspections

Among some charterers, there have been doubts about the performance of either flag or port state control or classification societies, and they have chosen to rely on their own surveyors to assess the quality of ships, especially in the oil industry. The mistrust began to appear in 1980's after some major accidents. Oil companies claimed that existing inspection systems were unable to detect serious deteriorations in the hull of a ship. In the initial vetting inspections, Shell found 20% of their oil fleet to be sub-standard, BP 30% and Mobil 35%. (Boisson 1994)

Besides oil tankers, vetting inspections are performed on chemical and bulk tankers. They are mostly performed on behalf of cargo owners, like oil majors, but (Knapp & Franses 2007) ship-owners may also ask for the inspection to prove that their vessel meets the required quality level (Knapp & Franses 2006). Ship-owners have a strong commercial incentive to comply with the requirements of the vetting inspection, because the outcome of the inspection determines whether the ship can get cargo. (Knapp & Franses 2007)

The Ship Inspection Report Program (SIRE) was introduced by the Oil Companies International Marine Forum (OCIMF). It was launched in 1993, and it is a tanker risk assessment tool originating from cargo owners (Knapp & Franses 2007; OCIMF 2009). Inspections are performed mainly on oil tankers and normally take 8 to 10 hours. OCIMF appoints the inspectors (Knapp & Franses 2006). Inspections are based on a standardized questionnaire of shipboard operations (Knapp & Franses 2009). After the inspection, ship-owners have time to comment on the report before it becomes available online. Parts of the inspection results can be seen by other OCIMF members for a fee (Knapp & Franses 2006). Different governmental bodies, like port state control authorities, have access to SIRE and to the inspection reports for free. The SIRE system is a very large database, and it has received altogether over 160,000 inspection reports. SIRE has helped the tanker industry to increase its awareness of the importance of meeting ship safety standards. OCIMF believes that "better informed vetting decisions are leading to improvements in the quality of ships". (OCIMF 2009) In addition to this, oil majors have their own additional requirements besides the basic SIRE requirements, and they do not publish the result of the additional requirements in the SIRE report (Knapp & Frances 2007).

Rightship is a ship vetting service that ranks vessels from 1 to 5 stars. It combines information received through vetting inspections, port state control, casualties, ship particular and ship-owner information to rank vessels (Knapp & Franses 2007). Rio Tinto Shipping and BHB-Billiton Freight Trading and Logistics founded Rightship in 2001. Rightship's aim is to make sure that vessels meet the given standards (Rio Tinto 2009). The Rightship system is mainly for dry bulk carriers but also for tankers (Knapp & Franses 2007). Physical inspections are performed when it seems that the vessel is in a higher risk class (Rightship 2009). Inspections can take up to 48 hours (Knapp & Franses 2007).

Green award inspections originate from the non-profit Green Award Foundation. Inspections are performed on oil tankers and bulk carriers and paid by ship-owners. The inspections cover all aspects of shipboard operations. If the vessel fulfils the requirements, it will get a certificate entitling the ship-owner to have discounts on port dues from ports participating in the program. Inspections have to be performed from time to time to keep the vessel certified. (Knapp & Franses 2007)

4.2.6 About inspection systems in the shipping industry

According to Knapp & Franses (2007), the inspection system, overall, is successful in eliminating sub-standard ships, despite some obvious problems in the system. There is a lack of trust in the industry that has led to numerous inspections performed by flag states, port states, classification societies, insurance companies, P&I Clubs and cargo owners in order to determine the real condition of the ships (Boisson 1994; Knapp & Franses 2007). In a survey made by Knapp and Franses (2007), total estimated yearly inspection costs per tanker are 47,166 dollars, and the estimated yearly frequency of inspections for tankers is 11 inspections. The problem with the current inspection system is that none of the vetting inspection regimes, or port state control, recognize inspections performed by another regime. Now, too many different inspections can increase the working hours of the crew and possibly offset the positive impact of the inspection. It adds to the costs of the industry, and there do not seem to be significant differences in the effects of all these inspections in preventing casualties, although there are some differences between different inspections. For example, some industry inspections, like Rightship and the Green award, spend more time interviewing crew members and pay more attention to ship operations than other inspections. (Knapp & Franses 2007)

One solution to the problem could be an information system that combined data on all inspections and casualties. This data could be used to improve risk profiling and to shift the inspection efforts to the ships and regions where they are needed most. (Knapp & Franses 2007) However, initiatives to establish such a system have faced several obstacles in IMO. There would have to be measures to ensure that surveyors have worked to common standards, and some provision would be needed to protect confidential information, for example, between classification societies and their customers, in order to avoid the risk of legal action if wrong information was issued to the system. (Boisson 1994)

From the point of view of minimizing the risks of an oil accident, it should also be noticed that other ship types, such as general cargo, bulk and container ships can carry great volumes of bunker fuel, large container ships even more than small tankers, and they often have lower safety standards than tankers. (Eide et al. 2007) Attention should not only be paid to tankers and ignore other ship types when trying to minimize oil accident risks. It can be discussed whether it is good that oil tankers need to bear higher safety costs because of higher safety standards, when other shipping sectors can cause oil accidents as well.

4.3 Mariners and management

From the point of view of maritime safety, it does not matter how good a ship is, if it is badly operated by people. Besides the national implementation of international regulations on the matter, flag states also play a crucial role in the sense that they can regulate many issues connected to the mariners, for example, employment conditions or working hours.

4.3.1 IMO regulations

The manning of a ship and the training of seafarers is regulated by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). Each ship belonging to the sphere of the Convention must have a Manning Certificate, which rules how much crew a ship must have and what kind of an education is required of them. The manning is decided on the basis of ship size, type and traffic area. Seafarers must also have a medical certificate to prove their health is good enough for seaman work. (Ministry of Transport and Communications 2009a)

IMO has also given several guidelines and resolutions connected to the human factor at sea. For example, *Resolution on Fatigue Factors in Manning and Safety A.772 (18)* aims at the recognition of factors causing fatigue, and its goal is to broaden the knowledge on fatigue factors and to encourage shipping companies to take fatigue factors into consideration when making related decisions. (Ministry of Transport and Communications 2009a)

4.3.2 The ISM Code

The ISM (International Safety Management) Code, which requires a ship to have a safety management system, was included in the SOLAS Convention in 1994. The foundation for ISM was laid in the late 1980's, when numerous fatal accidents happened at sea; for example, the capsizing of Herald of Free Enterprise awoke concerns about the maritime safety culture. The roots of human error were seen to stem from the lack of a comprehensive management system in relation to safety management in shipping. The ISM Code requires that a company provide safe practices in ship operation and a safe working environment and establish safeguards against all identified risks. The ISM Code also entails the idea that companies should continuously improve safety. (Lappalainen 2008)

National authorities issue a Document of Compliance to a company that has implemented a safety management system in compliance with the requirements of the ISM Code. The Safety Management Certificate is issued to ships compliant with the ISM Code. Before the issuance of the Document of Compliance and the Safety Management Certificate, audits are carried out in the company and on board ships in

order to control the conformity of the safety management system. Audits are performed by either national authorities or organizations authorized by authorities. (Lappalainen 2008)

4.3.3 ILO regulations

ILO (International Labour Organization) addresses issues related to the welfare of seafarers. By the end of 1900's, ILO had developed numerous maritime labour conventions and recommendations dealing with working and living conditions at sea, e.g. manning, hours of work, pensions, vacation, sick pay and minimum wages. It started to become apparent that this system of conventions was too complex. In 2006 ILO adopted a new comprehensive Maritime Labour Convention, which will come into force when it has been ratified by 30 ILO members with a total share of at least 33% of the world gross tonnage. (Stopford 2009)

4.4 Navigational instruments

Navigational instruments are developed to prevent accidents at sea, such as groundings or collisions. Navigational instruments are preventive in nature, and they include, for example, speed limits, sea-lanes, routeing of ships, ship reporting systems and Vessel Traffic Services (VTS). Internationally, navigational standards are embodied in the Convention on the International Regulations for the Prevention of Collisions at Sea (COLREG), SOLAS and related IMO guidelines. (Roberts 2007)

Chapter V of the SOLAS Convention (Safety of Navigation) identifies certain navigational safety services that should be provided by contracting governments and sets forth provisions of an operational nature applicable in general to all ships on all voyages. The subjects covered include the maintenance of meteorological services for ships, the ice patrol service and the routeing of ships. In the Convention, IMO is recognized as the only international body for establishing and adopting routeing measures on an international basis. However, the coastal states can establish environmentally targeted routeing measures in their own territorial seas in order to protect vulnerable areas, but they need to take into account the recommendations of IMO in respect to the design and adoption of routeing systems of ships (Roberts 2007). Coastal states can, in co-operation, also establish obligatory ship reporting and traffic separation schemes in international waters. (Ministry of Transport and Communications 2009a)

An important tool in navigational aids is the Automatic Identification System (AIS) which gives real-time data about the ships and their movements. AIS is obligatory for all ships with gross the tonnage of at least 300 (IMO regulation). The AIS system is based on VHF radio apparatus that automatically sends two kinds of information: static (e.g. the ships identity, destination and cargo) and dynamic (e.g. speed, position and heading). It also receives information from other ships. AIS data is used by national authorities (such as VTS centres or coast guards) to perform their duties and by

international authorities (e.g. HELCOM and EU) on the basis of international conventions. (Finnish Maritime Administration 2009a)

4.4.1 VTS - Vessel Traffic Services

The SOLAS Convention requires contracting states to maintain Vessel Traffic Services, if it is necessary on the basis of the amount of ship traffic and ship traffic related risks. Vessel Traffic Services aim to improve the safety and effectiveness of ship traffic. In the VTS centres, the sea traffic situation is followed in real time based on information transmitted by AIS, radars, cameras and VHF radios. The VTS centres inform ships of the traffic situation, the conditions of waterways and safety devices and other issues concerning the safety of navigation in the area. The VTS centres can also organize traffic with takeoff permissions and staggering methods and even temporarily command a traffic area to be closed, command ships to anchor, to return to a port or give speed limits, if there are exceptional circumstances, for example because of the weather, ice conditions, special transport or some other matter threatening maritime safety. (Finnish Maritime Administration 2009b; Ministry of Transport and Communications 2009a) VTS centres in Finland, Estonia and Russia have slightly different functions, especially concerning the organization of search and rescue services and pilotage services (Estonian Maritime Administration 2009b; Norfes 2009).

Studies indicate that the risk-reducing effect of a VTS centre is between 20% and 80%, depending on the geography, the traffic density and the resources available to the VTS (Eide et al. 2007). The effectiveness of VTS centres is also dependent on such matters as the co-operation with VTS and piloting, responsibility issues and the control of VTS operations. In Finland, there has been criticism that there is legislative unclarity in the jurisdiction relations of such matters (Karvonen et al. 2006; Kotiranta 2008).

In the Gulf of Finland, there is one VTS centre in Helsinki in Finland, in Estonia one in Tallinn and in Russia one in St. Petersburg. In Russia, VTS centres are organized into the following categories: ports (water areas of ports), river (internal waterways) and coastal VTS (Norfes 2009).

4.4.2 Ship reporting systems

In the international waters of the Gulf of Finland, Russia, Finland and Estonia have agreed on a Mandatory Ship Reporting System (GOFREP), which has IMO approval. GOFREP was introduced to the Gulf of Finland on the 1st of July, 2004. When arriving at the GOFREP area, ships heading to the east report to the Tallinn VTS centre and ships heading to the west to the Helsinki VTS centre. The GOFREP area is divided so that the southern part is supervised by Estonia, the northern part by Finland and the bottom of the Gulf of Finland by Russia. Ships are supervised with the help of the AIS system, and they are given information on safety related issues. If a ship is breaking the rules of the GOFREP system, the GOFREP authorities make an announcement to the flag state, which can put the master in charge. During 2005–2008, the amount of

misconducts in the GOFREP system diminished remarkably. In the first half of 2008, there were 13 misconducts, which were mostly misconducts in the routing system. (Ministry of Transport and Communications 2009a)

Ship traffic and the cargo the ships are carrying are also followed with electrical systems. The European Union has developed the SafeSeaNet system, where information on ship movements and on dangerous cargoes is gathered. The EU member states are responsible for sending information on all ships visiting their ports. In Finland, information sharing on the SafeSeaNet is carried out with the national maritime traffic data system Portnet, which is compatible with the SafeSeaNet system. (Ministry of Transport and Communications 2009a)

4.4.3 Traffic separation schemes and routing

Traffic separation schemes are purposed to guide ships to the lanes so that ships can anticipate the movements of other ships. According to the SOLAS Convention, IMO can ratify traffic separation schemes for international waters on the basis of applications of coastal states. In some sea areas, there are special lanes – the so-called DW routes – for ships with large depth. In such lanes, smaller ships are obliged to give way to large ships, usually tankers. In the Gulf of Finland, there are six traffic separation schemes and one DW route, on the southern side of Suursaari. (Ministry of Transport and Communications 2009a)

4.4.4 Traffic recommendations and restrictions

In order to secure safe shipping in the Gulf of Finland all year round, Finland, Russia and Estonia organize ice-breaking assistance services. Ice-breaking assistance is not covered by international regulations, except that SOLAS obliges to give information on ice conditions for ships. In wintertime, states also impose traffic restrictions based on DWT and ice class. During ice conditions, ships can also be routed to sea areas with easier ice conditions. The Baltic States have established an Internet service (www.baltice.org), where comprehensive information on ice conditions, ice-breaker assistance, traffic restrictions and ice-training can be obtained. (Ministry of Transport and Communications 2009a)

Traffic recommendations and restrictions can also be set in other situations, if the circumstances require it.

4.4.5 Piloting

Piloting is connected with the manoeuvring of a ship, where a pilot guides the ship master as an expert of a specific water area and shipping. Piloting is advisory in nature and the master of the ship decides whether a ship follows the recommendations of a

pilot. Piloting is regulated nationally and there are no international conventions or regulations on pilotage.

In Finland, piloting is regulated by the *Pilotage Act 940/2003*, and the state owned company Finnpilot offers the piloting services. In the territorial waters of Finland, the use of a pilot is obligatory for all ships with a length of over 60 m, a breadth of over 10 m, or which carry dangerous cargo, or when the summer draught is over 4.5 m. Upon application, the Finnish Maritime Administration can grant a Pilotage Exemption Certificate, for a specific waterway and vessel, to the master of a vessel, if he shows that he is familiar with the waterway used by the vessel. A Pilotage Exemption Certificate can also be granted to the navigating officer of a vessel meeting the same conditions. The Finnish Maritime Administration can also, on application, grant a vessel-specific exemption on compulsory pilotage to a vessel the master of which has long-term experience of navigating the vessel referred to in the application or a similar vessel in Finnish territorial waters. (Ministry of Transport and Communications 2009a; *Pilotage Act 940/2003*)

In Estonia, piloting has been arranged in a similar way as in Finland; the state-owned joint stock company AS EestiLots, the stockholder of which is the Ministry of Economic Affairs and Communications, offers the piloting services. Piloting is regulated in the Maritime Safety Act of Estonia and compulsory pilotage is conducted in the inland maritime waters and in the vicinity of ports, in the water areas of ports and between ports. (*Maritime Safety Act RT*^{2} *I 2002*; Matso 2006)

Also in Russia, piloting services are offered by a state-owned piloting company and the state defines the areas and rules for using a pilot. The use of a pilot is practically always compulsory in Russia. In the Gulf of Finland, ships to St. Petersburg sail to the port in convoy.

Baltic Sea piloting means piloting, where the Baltic Sea pilot acts as a pilot outside the territorial waters on the basis of a private contract. Baltic Sea piloting is based on IMO Recommendation (*IMO A.480.XII*). Finnish Baltic Sea pilots have made, in recent years, from four to ten pilotings per year, so it is very rare for ships in the Baltic Sea to use a Baltic Sea pilot. (Ministry of Transport and Communications 2009a)

4.4.6 Waterway safety

The condition of waterways is very crucial from the point of view of shipping safety; the depth and breadth of a waterway and its safety devices – channel alignment and buoyage – all are important aspects. The SOLAS Convention binds states to follow international recommendations on waterway marking, of which the most central is the IALA (International Association of Marine Aids to Navigation and Lighthouse Authorities) recommendation on waterway marking. (Ministry of Transport and Communications 2009a)

4.4.7 Nautical charts

Nautical charts of good quality are a precondition for safe shipping. The contracting states of the SOLAS Convention are committed to doing hydrographical surveying, to gathering other relevant information, to publishing and updating nautical charts in co-operation with other countries and to following the recommendations of IHO (International Hydrographic Organization). In the framework of HELCOM, Baltic states have agreed to make a hydrographic surveying plan for the Baltic Sea in order to produce comprehensive, official nautical charts of the sea areas defined in the plan. (Ministry of Transport and Communications 2009a)

Ships can use either paper or electric nautical charts. If electric charts are used, a ship must use electronic navigation systems (ECDIS = Electronic Chart Display and Information System) and official electronic charts (ENC), which have the type approval of IMO. ECDIS is obligatory for high speed crafts and, in 2010, it will be obligatory to other ship types as well. (Ministry of Transport and Communications 2009a)

4.4.8 Information supply

The contracting states of the SOLAS Convention are committed to informing the shippers of topical risks to shipping. Sea warnings are given on subjects such as the conditions of waterways and safety devices and of exceptional weather circumstances. The SOLAS Convention also obliges contracting states to organize sea weather services for shipping. (Ministry of Transport and Communications 2009a)

4.4.9 Towage services

Towage of ships in port areas and in entrance waterways enhances shipping safety, but there is no international regulation on the matter. Some ports have regulations on the use of tugs – in Finland, the ports of Sköldvik and Naantali require loaded tankers to be towed to/from the port all the way through the waterway leading to the port. Tugs are also needed in emergency situations at sea, for example, when a ship has machinery damage (Ministry of Transport and Communications 2009a). Guidelines on emergency towing are provided by the Bonn Agreement, which suggests the use of risk assessment to position and operate emergency towing vessels, factoring in prevailing meteorological conditions, traffic density etc. In emergency towing, tugs can be used as an escort or to hold in a given position. (Eide et al. 2007)

4.5 Regulatory instruments – a summary

Table 4.1 summarizes the regulatory instruments of maritime safety and the main actors in each regulated sector.

Table 4.1 Regulatory instruments in maritime safety

Regulated sector		*Main actors*
Ship construction and equipment	• construction and subdivision • stability • equipment • stowage • navigation • handling of the cargo	→ IMO
Surveillance of ship conditions	• flag state control • port state control • host state control • classification societies • vetting inspections	→ IMO → IMO, PARIS MOU → EU → private companies → private companies
Mariners & management	• working conditions • employment conditions • manning of ships • safety management	→ IMO, ILO
Navigation	• VTS • ship reporting systems • traffic separation schemes and routings • traffic recommendations and restrictions • piloting • waterway safety • nautical charts • information supply on weather, water level, ice situation etc. • towage services	→ IMO → IMO, regional co-operation → IMO, regional co-operation → IMO, regional co-operation and states → states → IMO, IALA → IMO, IHO → IMO → states, private companies

4.6 Economic instruments

In the shipping industry, economic instruments are mostly used for improving the competitiveness of the shipping sector, but they are also used for promoting maritime safety. Economic instruments are typically either private arrangements (such as insurances) or in the domain of national legislation. This makes it difficult to implement international, or even regional, economic instruments. For example, waterway maintenance or port dues have, in many countries, characteristics of a maritime safety policy instrument, but the systems vary from one country to another, as can be seen in the chapters below.

4.6.1 Dues related to the maintenance of waterways

In Finland, the state collects waterway dues from merchant ships in the territorial waters of Finland (*Act on fairway dues 1122/2005*). The waterway due is calculated on the basis of net weight and ice class, but there are certain exemptions in the system, such as the maximum amount of due per ship call and per year, or discount if a cargo ship is not fully loaded.

In Estonia, the state collects two dues, which are called "the lighthouse due" and "the navigation due". The dues are determined by the gross tonnage of a ship engaged in commercial activity and by the amount of days a ship is staying in Estonian ports or roadsteads. Also in Estonia, there are exemptions to the system, for example, ships with ice class IA or IA super and cruise ships get discounts. (*Maritime Safety Act of Estonia)*

In Russia, dues related to the maintenance of waterways are gathered together with port dues (Chapter 4.6.2).

4.6.2 Port dues

Port dues are primarily dues that a port charges for its services, but port dues can and do have characteristics of a policy instrument. For example, current legislation in Finland regulates that all ships have to pay a waste management fee, even if they are not disposing waste in the port (*Alusjäteasetus 635/1993*). This system aims at the prevention of dumping waste at sea by making it economically unattractive. Otherwise, in Finland, port legislation gives ports the right to gather port dues for their services (*Laki yksityisistä yleisistä satamista 1156/1994*).

In Russia, port administrations gather various port dues depending on the port, and the gathered dues are defined by the Federation of Russia. The gathered dues include dues on ship tonnage, waterway maintenance, pilotage, icebreaker assistance, waste disposal and other environment-related dues. (Portnews 2009) In Estonia, the Ports Act defines that port rules include port dues and fees for the receipt of bilge water, sewage, refuse and other pollutants. Port rules must be approved by the port authority in consultation with the Estonian Maritime Administration, and the requirements for port rules are approved by the Minister of Economic Affairs and Communications. (*Ports Act of Estonia)*

In Sweden, port dues have been used for decreasing air pollution from shipping. In Sweden in 1996, an agreement between the Swedish Maritime Administration, the interested Swedish ship-owners and Swedish port industries was made to aim towards a decrease of 75% in NO_x and SO_2 emissions from ships, within a period of five years, by establishing differentiated waterway and port dues. The differentiation takes the form of a discount on less polluting ships. Regarding sulphur, a discount was given for using low sulphur fuel, whereas the NO_x discount increased linearly with the decrease in emissions. For a limited time, subsidies were paid in the form of reimbursement of the fee for installing selected NO_x reduction technologies. By 1999, 28 ports had

differentiated their port fees according to SO_2 emissions and 15 according to NO_x emissions. In 2000, 23 ships had registered for the nitrogen and 1450 ships for sulphur discounts. About 350–450 ships are estimated to have switched to low-sulphur fuel; the rest had already been using it. The differentiation of the waterway and port dues gave a boost to carrying on the innovation process for technology already under development and made it easier to undertake pilot installations and acquire crucial customers. (Mickwitz et al. 2008)

4.6.3 Marine insurance

Marine insurance is meant to cover the loss or damage of ships, cargo and any transport mean or property by which cargo is transferred, acquired, or held between the point of origin and the final destination. A marine insurance is a contract of mutual rights and obligations between the insurer and the insured. The basic principle is that the insured should not profit from the loss or be in a worse position than before the loss occurred. Marine insurance is usually split between the ships and the cargoes. (Noussia 2007)

In law, marine insurance is often dealt with separate from other forms of insurance: in some countries, it is codified in a separate statute, while in others it is codified in the more general statutes of insurance. In some cases, insurance is obligatory: the International Convention on Civil Liability for Oil Pollution Damage enacts that a ship carrying oil must have an obligatory insurance. In Finland, for example, every ship visiting a Finnish port and carrying 200 tonnes or more of oil is obliged to have an insurance or other indemnity that covers the liabilities of oil damage as defined in regulation (*Merilaki 1994/674*).

Marine insurance systems aim at the balanced spread of risks between the insurer and the insured. Insurance terms require a ship to be in such a condition that it can operate safely, in other words, a ship must be accepted by a classification society. The problem with sub-standard ships is that they are usually not insured at all, because their value is so low that the risk of losing a ship can be borne by the ship-owner. A ship with no insurance can compete in the market with lower prices. In such cases, it becomes the shippers' responsibility to choose between cheap but unsafe transportation and more expensive but safe transportation. (Karvonen et al. 2006) Even though most ships are insured, many have much lower cover than required by the Convention on Limitation of Liability for Maritime Claims (LLMC 1996), which is, in 2009, ratified only by 35% of the world fleet (European Commission 2009b).

4.6.4 P&I clubs

P&I (Protection & Indemnity) insurance clubs are associations of ship-owners, formed for the purpose of protecting and indemnifying themselves against claims (such as those arising from pollution, death or injury to crew or passengers and loss of cargo) by others on a mutual basis. While marine insurance is categorized as market insurance, P&I Clubs are a system of mutual insurance. Market insurance consists of financial bargain,

where cover is purchased for a fixed premium from a profit-making entity, while mutual insurance consists of non-profit making organizations. (Noussia 2007) About 90% of the world's merchant fleet (by tonnage) is organized into P&I clubs. In the P&I club, each ship-owner is both an insurer and insured. The insurance premium paid by a member depends on the claims made by all the other members of the club. It is in the interest of members' claims for it to be as low as possible. Mutuality creates a common interest in high safety and environmental standards. (Bennett 2001)

An individual ship-owner might, however, be tempted to care less once insured, for knowing that the costs of an accident will be shared by all. The challenge for a Club is to create particular institutional arrangements to ensure that individual members behave according to the interests of the Club. Lack of homogeneity in the Club can also pose a risk to the interests of the Club when members are dispersed geographically or otherwise. Competition between Clubs can limit their influence on the safety and environmental performance of ship-owners, when members may jump from one club to another in order to obtain lower premiums. In his analysis on the role of P&I clubs in enhancing maritime safety and environmental performance, Bennett (2001) has concluded that the idea that P&I clubs would always act to promote quality shipping is unsustainable because of reasons mentioned above. P&I clubs primarily aim at minimizing financial risk, and improving safety is but one way to achieve it. (Bennett 2001)

4.6.5 Liability and compensation

Liability and compensation for damage are central questions, both from the viewpoint of private (e.g. cargo damage and breaking down of the ship) and public interests, such as the cleanness of seas. In case of oil spills, the need for liability and compensation systems for protecting public interests and the interests of third parties, such as the inhabitants of the polluted area, have been long recognized. IMO has regulations on the matter; the latest version of the International Convention on Civil Liability for Oil Pollution Damage is from the year 1992. It enacts that a ship must have an obligatory insurance and that an injured party is entitled to apply for compensation straight from an insurer. The liability of a ship-owner is limited and is determined by the net tonnage of the ship. However, for a ship-owner, there is a limitation of risk, which is not more than 89.7 million SDR (=special drawing right), or about 106 million euro (in 2008). If the costs of oil pollution are more, they are covered from the oil pollution fund based on the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage. Fees for the oil pollution compensation fund are based on the amount of transported oil and they are usually paid by the receiver of oil cargo. Maximum compensation from the fund per one damage case is 750 million SDR or about 780 million euro (in 2008). (HE 140/2008 vp)

It is interesting and also disputable that such a limitation of liability is in use, when it comes to the liability questions of an oil spill. The origin of a limitation in liability in maritime law has a long history and it has been employed in various areas related to shipping activity. Limitation right is also in use in other forms of transportation. The

historical reasons for the limitation of liability are that it was needed to encourage the development of the shipping activity, which was considered risky, and that it was used to promote the national merchant fleet under competitive pressures. The limitation of liability has also been considered equitable to make all those who benefit from the activity bear the risk instead of only the transporter bearing it. Limitation of liability has also been considered necessary to meet the needs of liability insurance, as the capacity of the insurance market is finite. It seems that, when making the current legislation, the rationale of the limitation of liability was not even discussed and, in fact, the newer provisions of CLC 1969 (International Convention on Civil Liability for Oil Pollution Damage) provide even better protection for ship-owners. (Faure & Hui 2008)

There are exceptions to the limitation of liability, and it can be lost if the incident occurred as a result of actual fault or carelessness, which makes the ship-owner fully liable for the damage. However, insurance cover is usually lost in such cases and also when it becomes impossible to acquire compensation from a ship-owner who has declared bankruptcy. Actual accidents (e.g. Erika and Prestige) have also showed that the level of the limitation of liability is far from sufficient and the European Union has tried to renew the system in its maritime safety legislation packages I, II, and III in order to give the victims of severe oil spills adequate compensation. (Faure & Hui 2008)

The limitation of liability has been criticized on the basis that it is actually a subsidy to the shipping industry at the cost of other interests. The tanker owner is not fully exposed to the costs of oil pollution damage, which can be regarded as a financial advantage. The previously mentioned problem with insurances could easily be resolved by the insurance providing cover only to a certain amount. The removal of the limitation of liability would provide incentives for prevention while currently the tanker owner can consider the accident as one where the limited amount of liability is the maximum damage that can be suffered and the victims will be compensated only partly. Liability rules can even have an eroding effect on the goals of the maritime safety policy. (Faure & Hui 2008; Gauci 1995) On the other hand, oil spill damage is definitely not in the interest of the ship-owner or operator when thinking about other than economic consequences: bad publicity, lost trust etc. The question is rather that the limitation of liability should be high enough to give a further incentive for a ship-owner to prevent oil damage.

Current liability systems can also be criticized for that they are more directed to ensure adequate compensation than to prevent sub-standard shipping. The strictest liabilities and claims are imposed on the likely causes of catastrophic accidents – oil and chemical tankers and passenger ships – when presumably these sectors of shipping have the most advanced safety culture. For other types of ships, there is no such economic pressure on liability questions, and it is, to some extent, an unfair situation or at least strange from the point of view of maritime safety that those who are already the most safety-oriented carry a relatively heavier burden in this matter than others who actually are more likely to cause unwanted incidents. The same argument goes with insurances and P&I Clubs, in their possible role as a promoter of maritime safety (Bennett 2000), and as has already been noticed, with inspection systems as well (Chapter 4.2.6).

The liability of firms could be ensured by using third party actors, for example insurers. Firms can be required to show the evidence of financial responsibility before they are allowed to engage in risky activity. This can be done by purchasing insurance or by making the firm's own assets legally accessible. If direct action against the insurer is allowed in legislation, the insurer becomes responsible for any liability when the likelihood that compensation is received increases. If insurers are put into this position, they will naturally require responsible operation of their clients and the amount of deductibles, future premiums and risk assessments become dependent on the behaviour of the insured in the present. (Bennett 2000)

4.6.6 Incentives

Incentives diminish costs for actors capable of proving that they operate in a safer way than is the normal practice, and thus also encourage other actors to improve their operations. In the shipping industry, several incentive systems have been developed to promote maritime safety, but none of them are in large scale use. Probably the most wide-ranging is the Green Award Certification System, which was developed in the 1990s by the Green Award Foundation in Rotterdam (Chapter 4.2.5). The benefit of this certification is that certified ships are granted a reduction in port dues in ports that have joined the system. These include ports in the Netherlands, Belgium, Lithuania, Spain, Portugal, South Africa and New Zealand. (Green Award 2009; Kaps 2004)

The problem with such systems is maintaining the necessary income for ports, when ships are getting reductions for port dues (Kaps 2004). One solution could be to collect higher port dues from other ships, but many times this is not possible for competitive reasons. Incentive systems are easier to carry out by nations that have more options for replacing the lost income. In the shipping industry, nations have used economic incentives mainly to maintain the competitiveness of the flag and to support industry economically, and not so much to reach maritime safety related targets.

4.7 Information guidance

Public information guidance means that authorities can share information on what they think is important and what might affect the behaviour of citizens or companies and hope to influence society this way. Maritime safety is also promoted with information guidance based instruments. For example, IMO gives codes, guidelines or recommended practices on important matters not considered suitable for regulations by formal treaty instruments. In the Baltic Sea area, the maritime authorities have an Internet service, Baltice.org, which contains information related to winter navigation in the Baltic Sea area, e.g. ice situation, traffic restrictions and information on ice navigation. (Baltic Icebreaking Management 2009).

Information guidance can also include other instruments besides pure information guidance. A typical voluntary action is education, either short-term courses or longer-lasting training. For example, in the Baltic Sea area, there are several service providers

who organize training on ice navigation. Also, different kinds of best practices cases, awards and, to some extent, certification can be seen as information guidance. The use of, for example, the Environmental Management System and audits set up processes that encourage self-critical thinking and learning and channel behaviour in a certain direction. Such systems also encourage actors to become active in their self-governance, and the evidence of EMS or other suchlike systems are increasingly required by investors, insurers, customers or suppliers. (Bennett 2000) These kinds of systems also bring fresh winds to the governance, because they enrol third parties into the promotion of public goods, instead of the state and command-and-control based policies.

Maritime safety related awards include, for example, the International Maritime Prize, the IMO Award for Exceptional Bravery at Sea and the Safety at Sea International Awards. The International Maritime Prize is annually awarded by the IMO Council to the individual or organization judged to have made the most significant contribution to the work and objectives of IMO (IMO 2009b). This prize is by nature more like an acknowledgement than an encouragement to the shipping industry to enhance maritime safety.

The IMO Award for Exceptional Bravery at Sea was launched in 2006, and the purpose of it is to provide international recognition for those who, at the risk of losing their own lives, perform acts of exceptional bravery, displaying outstanding courage in attempting to save a life at sea or in attempting to prevent or mitigate damage to the marine environment. (IMO 2009f)

Safety at Sea International Awards is organized by Safety at Sea Magazine. The awards have been established to recognize innovative and original developments in safety equipment, systems, training and operations/management. In 2007, the training award was given to Transas of Russia for its distance simulation-based training for oil spill and rescue operations, which formed a part of an EU-funded scheme involving Russia, Finland and Estonia, the goal of which was to improve safety and environmental protection in the Gulf of Finland (Lloyd's Register Fairplay 2009).

However, information guidance works only if actors really act on the information, because information guidance is based on the self and mutual governance of actors. For it to be effective, other actors should refuse to work with actors not complying with requests, for example, by refusing insurance or finance, refusing to charter the ship, send cargo with the company or to load and unload the ship. This can be the only penalty resulting from information guidance based policies and, otherwise, such information guidance based actions are merely window dressing. (Bennett 2000)

4.8 SAR and other "after accident" policies

Accidents and other unwanted incidents can hardly be totally prevented. One category of policy instruments is those to minimize the consequences of an accident. Here, this category of policy instruments is presented only in short.

In accident situations, the number one priority is to prevent the loss of human lives. The SOLAS Convention defines the compulsory life-saving appliances and the appliances needed to send emergency messages. Emergency situations must be rehearsed regularly on board. (Ministry of Transport and Communications 2009a)

Several Conventions (UN, IMO) oblige states to organize SAR (search and rescue) operations. SAR operations include the search and rescue of people in danger at sea, first aid and emergency communication. Finland, Russia and Estonia have made an agreement on defining responsibilities and on co-operation in emergency situations. National laws regulate concrete actions, when the accident has happened, for example, the duties and roles of different authorities, communication, and oil spill prevention and response activities. (Ministry of Transport and Communications 2009a)

It is also important in accident situations to prevent the spilling of dangerous substances into the sea. The MARPOL Convention includes regulations on the structure and equipment of a ship that are meant to prevent spills, for example, the maximum size for cargo tanks, double-hulls (from 2010 forward), and the denial to carry oil in the fore peak. Every tanker with gross tonnage of over 150, and other cargo ships with gross tonnage of over 400, must have a Shipboard Oil Pollution Emergency Plan that contains terms of reference in emergency situations. Also, all chemical tankers with gross tonnage of over 150 must have a Shipboard Marine Pollution Emergency Plan. (Ministry of Transport and Communications 2009a) In case of an oil spill, international co-operation is regulated by the IMO Convention on Oil Pollution Preparedness, Response and Co-Operation (Karvonen et al. 2006). Russia has not ratified the Convention, but the HELCOM Convention and the bilateral Convention between Finland and Russia agree on mutual assistance in case of an oil spill. (Ministry of Transport and Communications 2009a)

Ports (or areas) of refuge are another way to minimize the harmful consequences of an accident (*IMO Guidelines on Places of Refuge for Ships in Need of Assistance* (*Resolution A.949(23))).* When a ship has suffered an incident and danger to life is not involved, the best way to prevent further damage or pollution is to transfer the cargo and bunkers and to repair the damage. Such an operation is best to be carried out in a place of refuge, which is preferably located near a coast rather than in open sea, where a ship is at the mercy of the weather. However, to bring such a ship into a place of refuge near a coast may endanger the coastal state, both economically and environmentally, and local authorities and people may strongly object to the operation. Therefore, granting access to a place of refuge is a political decision, which can only be taken on a case-by-case basis with due consideration given to the balance between the advantage to the affected ship and the risk to the environment resulting from that ship being near the coast. (IMO 2009g) The European Union has directed its member states to name the places for areas of refuge. (YLE 2006)

Accident investigation is carried out after severe accidents in order to find out the causes, consequences and rescue measures of the accident. Accident investigation information is meant to improve safety and prevent future accidents. Accident

investigation does not interfere with liability or culpability questions. (Ministry of Transport and Communications 2009a)

4.9 Maritime safety policy instruments – a summary

The policy instruments presented in Chapter 4 are summarized in Figure 4.1. The focus of the report has been on preventive maritime safety policy instruments, which have been divided into regulatory, economic and information guidance instruments. With regard to the amount of legislation, regulatory instruments are the largest group. For economic instruments, it is typical that they are governed nationally or between the private actors. Information guidance is based on voluntary measures.

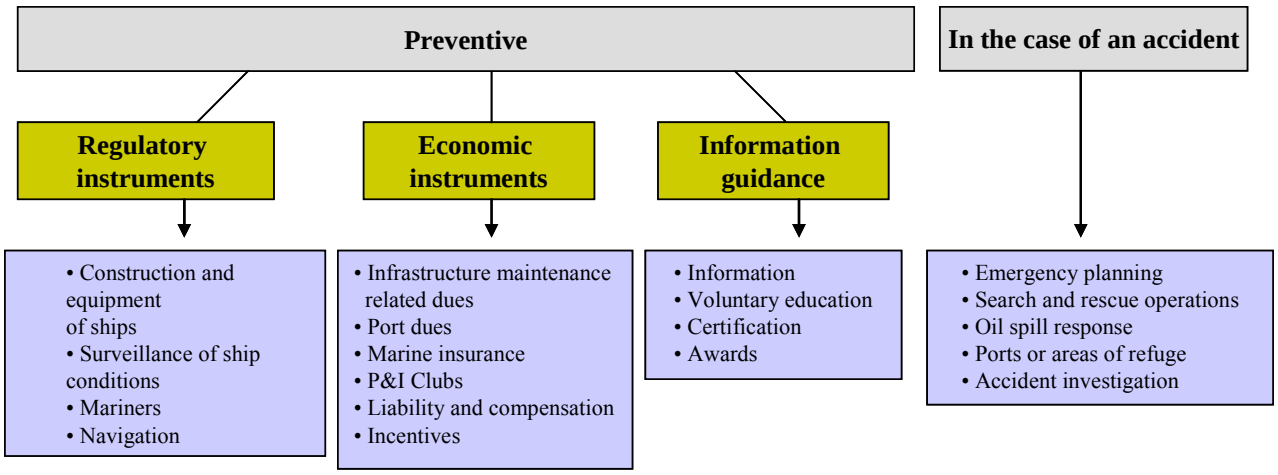

Figure 4.1 Maritime safety policy instruments

5 THE FUTURE PROSPECTS OF THE MARITIME SAFETY POLICY

Despite the vast number of maritime safety regulations, new policies are developed at international and other levels and in many issues to further improve safety. Especially the developing of navigational aids, decreasing the environmental effects of shipping and decreasing the effects of the human factor in accident causes are issues where changes can be expected. Also, the wider use of economic instruments to promote maritime safety, such as compensation or green port dues, seems to have caught the interest of legislators. At the same time, existing regulations are also developed and updated to be more effective. In regard to existing regulations and those under development, it can be concluded that maritime safety risks are, at least at the political level, taken seriously, and a great amount of work is done to ensure safe shipping in the world seas.

5.1 IMO

In IMO, maritime safety regulations are being developed in numerous issues and at numerous levels, ranging from technical details to the matters of principle. Here, only issues that are perceived to be relevant for this study are presented.

5.1.1 Ships

IMO is developing goal-based standards for the construction of ships. The premise behind the development of goal-based standards is that IMO should play a larger role in determining the fundamental standards for building new ships. The intention is not for IMO to take over the detailed work of the classification societies, but rather for IMO to state what has to be achieved, leaving classification societies, ship designers and naval architects, marine engineers and ship builders the freedom to decide how best to meet the required standards. (IMO 2009c) Drafts for the SOLAS amendments on making goal-based standards mandatory for new oil tankers and bulk carriers have been agreed on, as have the drafts for international goal-based ship construction standards for bulk carriers and oil tankers. The eventual adoption is planned to take place in 2010. (IMO News 1/2009)

In 2010, new regulations concerning ship structures are coming into force. The use of single-hull tankers will mainly come to an end. Rules to limit the size of oil fuel tanks on new ships and ensure they are safely located are included in the International Convention for the Prevention of Pollution from Ships (the MARPOL Convention) which applies to tankers built in 2010 or after. In addition, new tankers must have a tank for gathering waste oil. (Ministry of Transport and Communications 2009a; IMO News 1/2008)

5.1.2 The human factor

The STCW Convention (Chapter 4.3.1) is being revised in order to develop the qualifications of seafarers and to take into consideration the changes in the working environment. Among other things, the qualifications of personnel in oil, gas and chemical tankers and of personnel taking care of electronic devices on board are revised. Also, changes in the watch keeping regulations, such as regulations concerning the reduction of the fatigue of seafarers, working hours and prevention of alcohol abuse on board, are being discussed. Changes in the STCW Convention are planned to be approved in 2010. (Ministry of Transport and Communications 2009a)

Regulations on bridge watch alarm (the SOLAS Convention Chapter V) are meant to obligate ships to have a device that alarms other officers on board, if a responsible person for ship operations has not reacted to alarms in the navigation bridge, or if it otherwise seems that this person is not actively engaged in the operation of the ship. This helps prevent accidents caused by the watch keeper falling asleep. This regulation is entering into force in phases during 2011-2014. (Ministry of Transport and Communications 2009a)

5.1.3 Navigation

The carriage of ECDIS (Electronic Chart Display and Information System) is becoming mandatory for ships on international voyages, under the SOLAS chapter V Safety of Navigation. Implementation is going to take place in phases during 2012-2018. The availability of electronic charts is a prerequisite for the use of ECDIS, and contracting governments must produce the needed charts before the system is implemented. The ECDIS devices will give all information on the sea area and traffic on the same radar display. The system will also sound an alarm if a ship is heading to too shallow a waterway for the depth of the ship. (Ministry of Transport and Communications 2009a; IMO News 3/2008)

LRIT (Long Range Identification and Tracking System) collects and distributes to the authorities information on the identity and position of ships flying their flag, wherever they are in the world. LRIT is included in the SOLAS Conventions' chapter V, and its initial purpose has been to enhance security by providing ship identity and current location information for Contracting Governments to evaluate the security risk posed by a ship off its coast and to respond, if necessary, to reduce that risk. The system also has potential safety benefits, most notably for maritime search and rescue. Accurate information on the location of a ship in distress, as well as ships in the vicinity that could lend assistance, will save valuable response time. So, the purpose and scope of LRIT was extended in IMO to also include safety and environmental protection applications. (EMSA 2009) The European Union has decided to establish a European centre for managing LRIT data, which is run by EMSA. The system is planned to be operational from mid-2009. LRIT will also be able to follow ships flying non-EU flags that pass within 1 000 nautical miles of European coasts. (European Commission 2009c)

In e-navigation, the aim is to integrate existing and new navigational tools, particularly electronic tools, in an all-embracing system enhancing navigational safety while simultaneously reducing the burden on the navigator. As the basic technology for such a system is already available, the challenge lies in ensuring the availability of all the other components of the system, including electronic navigational charts, and in using it effectively in order to simplify the display of the occasional local navigational environment. E-navigation would thus incorporate new technologies in a structured way and ensure that their use is compliant with the various navigational communication technologies and services already available. (IMO 2009h)

5.1.4 The environmental effects of shipping

Air pollution and other environmental effects of shipping, such as ship waste, sewage, ballast waters, anti-fouling paints or the energy efficiency of ships have been high on IMO's agenda recently. Strict regulations on air pollution (greenhouse gases) are going to be implemented in the future. For example, the maximum allowed content of sulphur in fuel is defined in the IMO MARPOL Annex VI. The global limit at the moment is 4.5%-S and 3.5%-S in 2012, and by 2020 it will be further limited to 0.5%-S. However, the Baltic Sea and the North Sea belong to the IMO-defined SECA (=Emission Control Areas) which have tighter restrictions: 1.5%-S until 2010, 1%-S from 2010 and 0.1%-S from 2015. For NO_x emissions the three-tier program was agreed on in the IMO MEPC 57, which will reduce the emissions of new engines and, through adaptation, the emissions of old engines (the IMO MARPOL Annex VI). (Shortsea Promotion Centre Finland 2009) It also seems that the reduction of air pollution from shipping is going to be the first area where IMO is implementing economic instruments. Such instruments would have purposes such as: climate change mitigation and adaptation activities; research and development; offsetting of emissions; and serving as an incentive for the industry to invest in more fuel-efficient technologies. (IMO 2009e)

5.1.5 The Member State Audit Scheme

The Voluntary IMO Member State Audit Scheme is intended to assess how effectively a member state administers and implements the mandatory IMO instruments covered by the scheme. The scheme addresses issues such as conformance in enacting appropriate legislation for the IMO instruments, the administration and enforcement of the applicable laws and regulations by the Member State, the delegation of authority to recognized organizations, and the related control and monitoring mechanisms of the survey and certification processes by the Member States. With this system, IMO aims to make measurable improvements in the effectiveness of the international regulatory framework of shipping and to achieve harmonized and consistent global implementation of IMO standards. The scheme was approved by the IMO in 2003, but it works on a voluntary basis. (IMO 2009i) In the European Union, auditing of national maritime administration will be compulsory (Chapter 5.2.2).

5.2 The European Union

The European Union has been active in promoting an integrated maritime policy, which means that all the aspects of marine resources and their use should be viewed together in order to promote sustainable development and to avoid conflicting policies. (Ministry of Transport and Communications 2009a)

The European Union has defined the core issues of maritime safety policy to be:

- "the aim is to eliminate sub-standard shipping, increase the protection of crews and passengers, reduce the risk of environmental pollution and ensure that operators who follow good practices are not put at a commercial disadvantage"
- prevention of accidents and pollution: "improve the quality of European flags, review legislation on port state control, amend the directive on traffic monitoring (e.g. SafeSeaNet), improve rules relating to classification societies"
- accident response: improving accident investigation, fair compensation to passengers in the event of an accident, introducing a directive on ship-owners' civil liability coupled with a mandatory insurance scheme
- raising safety standards for ships and seafarers
- stiffer sanctions for ship-sourced pollution (European Commission 2006).

The European Union has promoted these goals most recently in June 2009, when the European Commission published the "European Union Strategy for the Baltic Sea Region" (*COM(2009) 248/3*) and with the Third Maritime Safety Package.

5.2.1 The European Union Strategy for the Baltic Sea Region

For maritime issues, the European Union Strategy for the Baltic Sea Region sets the goals for becoming a model region of clean shipping and for becoming a leading region in maritime safety and security. The first goal is pursued with air pollution control systems (SO_x emission control area in 2015) and with systems to collect ship generated waste, for example, by encouraging voluntary measures to reduce discharges and by supporting the HELCOM proposal for IMO asking for a prohibition of the discharge of waste from ships, especially from passenger ships. It is also suggested that differentiating port dues depending on the environmental impact (e.g. emissions, the managing of waste and ballast waters, the use of environmentally friendlier technologies, and having high safety standards) of ships would be introduced in the Baltic Sea area. (Commission of the European Communities 2009)

The second goal (to become a leading region in maritime safety and security) is pursued with the improvements of traffic organization measures, which involve the monitoring of ship movements. Also, more efficient surveillance, routing systems and addressing of the human factor are proposed as key means to enhancing maritime safety in the Baltic Sea. At a more concrete level, these would mean the creation of a common maritime management system and monitoring, information and intelligence sharing environment for the Baltic Sea and improvement of the coordination of systems relating to the

routing of ships, the monitoring of the vessel traffic and the consideration of the establishment of new systems. It is proposed that the Baltic Sea region would become a pilot region for e-navigation. It is also emphasized that ships, especially those carrying dangerous cargo, should be up to the highest maritime safety standards. The human factor is addressed by developing training, for example upgrading seafarers' competence (ICT, security and navigation in ice conditions). (Commission of the European Communities 2009)

5.2.2 The Third Maritime Safety Package

In 2005, The European Commission gave the Third Maritime Safety Package, which includes seven proposals for regulations. The objectives of the Package are preventing accidents and improving measures in case of an accident. The contents of the Package were approved in December 2008. (Ministry of Transport and Communications 2009a)

Table 5.1 Summary of the contents of the Third Maritime Safety Package (European Commission 2009a)

Topic	*Purposes*	*Examples of measures*
Flag State responsibilities	• the flags of all the EU countries have good standing (not blacklisted or on the grey list) • to incorporate the IMO's flag-state audit scheme into the EU law and introduce certification of national maritime authorities	• the EU countries must ensure that in a port state inspection detained ships flying their flag are brought into line with the regulations • set up a quality management system for the maritime authorities • auditing of maritime authorities
Classification societies	• make the inspection procedures of classification societies more rigorous and empower the Commission to carry out audits and impose penalties • make the current directive more readable and give stakeholders greater legal certainty	• the classification societies are to set up an independent joint body to certify their quality-management systems • reformed system of penalties – classification societies that do not do their work properly can be fined and in the most serious cases their recognition withdrawn
Port State control	• to make control mechanisms in port states more efficient and to prevent substandard ships visiting the EU ports • the target is to check all ships and perform more frequent inspections of	• improve the regime for banning substandard ships • high-risk ships will be inspected every 6 months, average-risk ships every 12 months, and low-risk ships every three years. The profile of ships is determined by ship type, age and flag, the

	high-risk ships	company's past performance and the number of times the ship has been detained.
Vessel traffic monitoring	• improve knowledge of maritime traffic by improving the collection of information and setting up a network for sharing information between the EU countries • Reduce the risks of merchant vessels colliding with fishing vessels • Improve the decision-making process for accommodating ships in need of assistance in places of refuge, to limit major coastal pollution	• SafeSeaNet becomes standard in the EU • establish a European LRIT centre to collect identification data and monitor shipping at long distance • deploy information and prevention measures when ice formation creates a serious risk for shipping
Accident investigation	• to provide clear EU guidelines for technical investigations and lessons learnt after accidents at sea	• investigation methods and procedures must be harmonized to achieve comparable quality in all EU countries • the bodies responsible for investigations must be independent of all parties involved in an accident, including the national maritime authorities • an EU database on accidents and incidents must be set up
Liability and compensation for damage for passengers	• to introduce a uniform set of rules on compensating passenger victims of accidents	• all carriers must be insured and victims could apply directly to the insurer for compensation
Insurance of shipowners for maritime claim	• to require all shipowners to be insured against damage to third parties caused by their ships	• the insurance cover must correspond to the limits in the LLMC 1996 • ships not carrying a commercial insurance certificate may be detained or expelled • the rules will take effect in 2012 by which the EU member states have committed to ratifying the LLMC 1996

5.2.3 Vessel traffic service systems

The European Union has been promoting the use of electronic vessel traffic service systems such as AIS, LRIT, SafeSeaNet, and there are also new systems under development: Galileo (satellite radio navigation programme) and GMES (Global Monitoring for the Environment and Security). The efficient use of these systems is one of the most important measures in enhancing maritime safety and they also lessen the administrative burden on maritime transportation. (Ministry of Transport and Communications 2009a)

SafeSeaNet

The main objective of SafeSeaNet is to provide a European platform for maritime data exchange between the maritime administrations of the Member States, by setting-up a telematic network between all the maritime EU Member States, Norway and Iceland for their co-operation in preventing maritime pollution and accidents at sea. SafeSeaNet is run by EMSA. The authorized users can request the information they need from the system, such as information on ship operations (accidents, pollution incidents etc.) and on the dangerous cargoes carried by ships. SafeSeaNet is still evolving. New features are added to the system, which aim at satisfying new user requirements in line with legal obligations imposed by applicable European legislation. (EMSA 2006; EMSA 2008)

5.3 The regional and national levels

HELCOM has launched The HELCOM Baltic Sea Action Plan in 2007, which is a programme to restore the good ecological status of the Baltic marine environment by 2021. To prevent accidental pollution from maritime traffic, the Action Plan focuses on winter navigation safety and efficiency (e.g. strengthening co-operation within the framework of BIM and encouraging ships to use trained crew and voluntary pilotage for winter navigation), on the development of vessel traffic control services (e.g. the modification of AIS information content) and on the support of IMO initiatives for the general requirement of ECDIS as early as possible. (HELCOM 2008)

The navigational safety of the Gulf of Finland and the whole Baltic Sea also seems to be high on the agenda at the national level. In Finland, for example, a system that automatically follows the movements of ships and gives automatic warnings in case of potential dangerous situations is being developed. (Finnish Maritime Administration 2009c) It has also been proposed that the vessel traffic operators should have access to the planned routes of vessels in real time. The system would be similar to that of air traffic control. Ships would thus have to follow certain routings, announced in advance, and the maritime traffic control operators would communicate with and monitor ships to ensure they are on their designated routes. The system would also follow the near future situations and provide warnings as well as commands to ships if they are about to run into danger. Similarly, the authorities could see in advance if the announced route is

suited to the tonnage and other features of the ship. (Nikula 2008) Such a system is currently under development in the Finnish Maritime Administration. Route planning is recommended by IMO but it is not obligatory to provide route planning information for authorities. (Meriväylä 3/2009)

Finland, Estonia and Russia have decided to submit a proposal to IMO on the improvement of traffic separation schemes in the Gulf of Finland. The proposal includes, for example, the widening of the traffic lanes and the establishing of a new security zone in the area. These changes would come into force earliest in July 2010. (Finnish Maritime Administration 2009c)

In Finland, implementation of the database "Insjö", that collects information about incidents and near miss situations, is being prepared. Insjö is already in use in Sweden. Information on near misses and dangerous situations come from the shipping companies' non-conformity reports. (Ministry of Transport and Communications 2009a)

6 THE EFFECTIVENESS OF POLICY INSTRUMENTS

Government, financial, administrative and community resources are limited and must be deployed where they are the most likely to have the greatest positive impact. It is important to assess the strengths and weaknesses of the range of instruments in terms of the stated objectives and to identify the circumstances in which they are the most likely to make a positive contribution to the outcome sought. (Greiner et al. 2000) Policy analysis must also include an analysis of the costs of regulations to private actors – in most cases, there is a constant contradiction between economic interests and public interests (Karvonen et al. 2006). In this chapter, views on the effectiveness of policy instruments and some methods to evaluate them are presented.

6.1 General views on the effectiveness of different policy instruments

In comparison with economic instruments, regulatory instruments are very effective and easy to enforce, because they are, by nature, compulsory. The weaknesses of regulatory instruments can be their economic efficiency and public acceptance, and their enactment and implementation can be expensive, difficult or practically impossible. (Vieira et al. 2007) Regulatory policy instruments may not promote changes or innovations because there is no economic incentive (Klemmensen et al. 2007).

Economic instruments can reach environmental targets with good economic efficiency from the point of view of a more social-efficient allocation of resources. However, economic instruments often face acceptance difficulties, because they tend to increase prices. If they have lateral effects or in combination with other policies, they can be more acceptable, if the price increase in the first is compensated by the price decrease in the other. Recently, the popularity of economic regulations has been decreasing, because they are seen to distort the market competition and to reduce overall economic efficiency. (Vieira et al. 2007)

For example, from economic instruments, environmental taxation has been most widely used in the energy and fuel sectors, although it was done often for other than environmental purposes, such as to reduce the dependence on the imported energy sources. Still, the use of fossil energy sources has grown worldwide and environmental taxation can be said to have had very little effect on this trend. How efficient environmental taxes are depends much on the price elasticity of the fields concerned. In the energy sector, price elasticity seems to be low – this means that the rise in prices has very little effect on the consumption. In these cases, it is mainly the state that benefits from taxation as an income source. It is in the prices of high elasticity, where environmental taxation can really contribute to behaviour, or in other words, where already a slight rise in prices can change consumption patterns. How low or high the price-elasticity is depends, for example, on the availability of alternatives and the indispensability of the object concerned. (Klemmensen et al. 2007)

Mickwitz et al. (2008) have analyzed the common claims connected with the effectiveness of policies in promoting environmentally friendlier technologies by using the Finnish pulp and paper industry and the marine engine industry as examples. These claims include that regulations do not provide any additional incentive to innovate, that economic instruments are superior, since they impose a cost and therefore provide a continuous incentive to innovate. In their study, Mickwitz et al. (2008) found both supporting and contradicting experiences for these claims, which caused them to conclude that the effectiveness of various policy instruments is dependent on the context of their use and often differs from theoretical assumptions presented in literature. For an effective economic instrument, the costs have to be sufficiently high in comparison with the alternatives. Combinations of policies simultaneously affecting supply and demand are more effective than just one type of policy on its own. (Mickwitz et al. 2008)

One aspect of the effectiveness of regulatory and economic instruments is what happens in case of non-compliance. Non-compliance should result in penalties or economic consequences severe enough to minimize the temptation of an actor to break the rules. (Greiner et al. 2000)

6.2 The criteria for effective maritime policy instruments

Vieira et al. (2007) have developed a system to assess transport policy instruments, where a set of policies is evaluated against certain criteria and in relation to each other. Also, Greiner et al. (2000) had very similar criteria for policy evaluation. These criteria are presented below.

- *Effectiveness* refers to the potential improvements in the object attempted to change. It relates to whether an instrument is technically and otherwise suitable for achieving a goal. Performance indicators are needed to monitor the effects of policies. (Greiner et al. 2000; Vieira et al. 2007)
- *Economic efficiency* relates the effectiveness to the implementation costs of an instrument and to the economic efficiency of an instrument in a collective sense, assessing the total benefits of the associated change in risk minimizing against its total costs. (Greiner et al. 2000; Vieira et al. 2007)
- *Acceptability* refers to the stakeholders' level of agreement on a new policy instrument and to the political and communal acceptability of an instrument. Acceptability is a necessary condition for the durability of the policy. (Greiner et al. 2000; Vieira et al. 2007))
- *Enforcement* indicates how effectively a policy instrument can be implemented. Some instruments can be difficult to implement, even though they would probably be effective. Vieira et al. (2007) present the following types of barriers for implementation: legal and institutional (legal or regulatory conflicts, legal powers are spread through various institutions or organizations), resource or financial (lack of financial or physical resources to implement an instrument), political and cultural (some groups oppose policy) and technological (lack of suitable technology). (Greiner et al. 2000; Vieira et al. 2007)

- *Lateral effects* refer to the possible spill-over effects of an instrument in other sectors, e.g. the reduction of air pollution can improve people's health, which decreases health care expenses. (Vieira et al. 2007)
- *Incentive and innovation effects* relate to the question whether an instrument encourages experimentation and change and provides an ongoing incentive for improvement. (Greiner et al. 2000)

Effective policy instruments should also be coherent with overall policy orientations. Policies should not be evaluated separately. Some set of policies can together be more effective than any single policy. In their study on transport policy instruments, Vieira et al. 2007 found that most of the studied policy instruments had positive synergy effects, i.e. the effectiveness of instruments implemented together is potentially bigger than the effectiveness of each instrument separately. It is also important to look at which current policies might provide conflicting incentives and which should be removed. Policy instruments should also be reviewed if the context of maritime shipping system changes. (Vieira et al. 2007; Greiner et al. 2000; Walker 2000)

Huppes & Simonis (2009) distinguish three groups of criteria for effective policy (Table 6.1). First-order criteria are related to the direct operational consequences of the application of the instrument. Second-order criteria relate to broader aspects of administration and economy. Strategic criteria, the most general of the categories, relate the instrument to the broader culture and institutions in the society.

Table 6.1 Criteria for evaluating policy instruments (adapted from Huppes & Simonis 2009)

First-order criteria	Second-order criteria	Strategic criteria
• Effectiveness	• Social and political acceptability	• Fitting in with the broader conceptual framework for public policy
• Social costs	• Within administrative capacities	• Fitting in with the broader institutional framework of society
• Distributive justice	• Limited changes in competitiveness	• Fitting in with general cultural developments
• Generative equality	• Incentive for sustainable technology development	• Fitting in with general economic developments

6.2.1 The system diagram for maritime safety

Walker (2000) suggests that the first step in policy analysis is to define the system of interest, which means: 1) defining the boundaries of the system, 2) defining the structure of the system and 3) defining the output of the system. In this study, the system is commercial shipping in the Gulf of Finland. The structure of the system can be described in the system diagram (Figure 6.1). The system diagram can be used as a

tool to systematically think of how the system can change in the future. It brings out the aspects that are likely to have an effect on the performance of policies. The primary outputs or interests in this study are the accidents – which policies are the most effective in preventing oil accidents and their environmental effects.

In the system diagram, there are four types of elements:

1) physical characteristics – weather, sea depths etc.
2) ship characteristics – the quality of the ships, the equipment on board, the capabilities of the crew
3) traffic flows – the number and type of ships and their cargo
4) policy instruments – the combination of instruments and subsystems that aim to ensure efficient and safe movement of sea traffic. (Walker 2000)

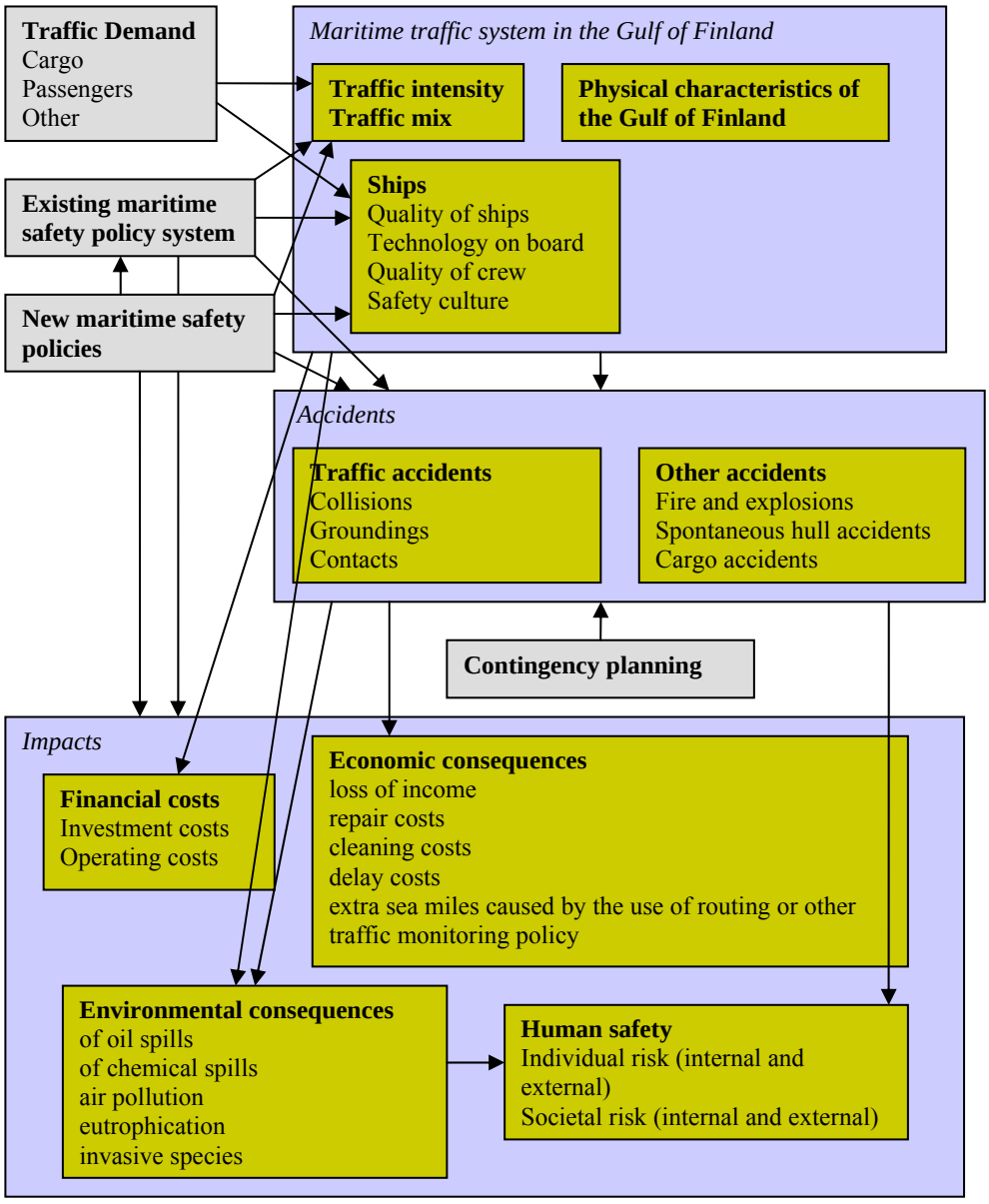

Figure 6.1 System diagram for the maritime safety (adapted from Walker 2000)

The extent to which these measures affect the desired goal depends on the characteristics of the future system – traffic flows, ship characteristics and maritime safety policy system (Walker 2000).

6.2.2 Formal safety assessment

IMO has developed the Formal Safety Assessment (FSA) method which can be used to enhance maritime safety and as a tool to evaluate new regulations for maritime safety and to make comparisons between existing and possibly improved regulations. FSA consists of five steps:

1. the identification of relevant accident scenarios with potential causes and outcomes
2. the evaluation of risk factors
3. the identification of risk control options (RCO)
4. determining the cost-effectiveness of previous RCOs
5. recommendations for decision-making (Ruud & Mikkelsen 2008).

The cost-effectiveness criterion is based on the calculation of the expected risk reduction and the costs of implementation and operation of the RCO – the latter should not exceed the previous (Ruud & Mikkelsen 2008). The problem with FSA studies has sometimes been the lack of adequate data for the proper analysis of risk factors and different applications of the guidelines (Knapp & Franses 2009).

The FSA method was used, for example, in the evaluation of navigational arrangements and in measures in the Sound between Denmark and Swede (Øresund). For the FSA steps 1 and 3, a workshop was organized. It resulted in a list of 66 identified hazards and a list of 44 risk reducing measures. The FSA step 2 calculations were made to estimate risks associated with collisions and groundings. Step 4 – cost-benefit analysis – was performed according to the Danish Ministry of Transport's guidelines for social-economical evaluation. Recommendations for decision making (step 5) resulted in a list of recommendations for cost-effective measures and a list of recommendable measures depending on the results of additional clarification. (Rambøll Danmark A/S 2006)

6.2.3 The effectiveness of IMO Conventions

Knapp & Franses (2009) have studied the effectiveness of major IMO Conventions with the econometric model. There are two types of measures: measures that take effect prior to coming into force (e.g. the single-hull tanker phase-out) and measures that become relevant after they come into force (e.g. the operational changes of the vessel). This aspect affects how fast measures will improve safety. In the long run, effectiveness can be calculated from the number and type of casualties. Knapp & Franses (2009) found out in their study that the introduction of conventions shows a decreasing effect on the number of casualties, some show a positive effect and others are insignificant. The SOLAS was perceived to show negative effects on the number of serious casualties.

Also, the adoption of the ISM Code had a negative effect on the number of casualties, especially for dry bulk carriers and general cargo ships. Also, MARPOL and especially the phase-out of single-hull tankers decreased the number of accidents with pollution. It was also discovered that, from ship types, tanker safety showed positive effects on almost all studied legal instruments. Disappointing was that human related conventions, with working and living conditions and certification, presented only a small amount of negative effects, or in other words, human related measures seem to be weak in impact.

7 CRITIQUE OF THE MARITIME SAFETY POLICY SYSTEM

The maritime safety policy system has been criticized on many points. Most of them are connected to each other, which reflects that ultimately the problem lies in the foundations of the system. In this chapter, the weak points of the maritime safety policy system are explored and what has been proposed as more effective alternatives for the current system are presented. At the end, the effectiveness of the current system is analyzed in the light of the criteria that were presented in Chapter 6.

7.1 The weak points of the maritime safety policy system

Although maritime safety regulations can be proven to have improved maritime safety, when looking at, for example, the number of casualties and their seriousness, there are still unwanted phenomena in the shipping industry from the point of view of maritime safety. Shipping still causes harmful effects, such as environmental pollution or accidental deaths. Sub-standard or otherwise obscurely managed ships are able to sail in the world seas. The inability of international regulations to take local circumstances and special needs into consideration has led to different kinds of regional arrangements, which erode the international legislation system.

According to Roe (2008), current policy-making fails in many ways on many fronts: it fails to have the desired effect, it is generated by inappropriate bodies (national governments rather than international authorities), it is diffuse and partial (Port State Control and the failure to eliminate sub-standard ships), and many times it is unclear where it emerges from, the motives behind it or the methodology for its application. Roe suggests that the problem in making effective policies on shipping lies in the failure to understand the relationships between jurisdictions operating at international, supra-national and national levels, which makes it possible for unconcerned ship-owners to take advantage of the failings of the current regulation systems and in the failure to incorporate the stakeholders' interests into the jurisdiction process. One sign of existing policy complexities is the number of both public and private networks within shipping that are somehow involved in regional and international jurisdictions. For example, policy discussions on shipping labour might involve, not just the EU member states, but also unions, regional representatives, port authorities, the EU Commission, the European Parliament and pressure groups. (Roe 2008: Roe 2009)

The international regulation process is often slow, and the result can become a compromise of compromises (Mitroussi 2004; Stopford 2009). At the regional level, there would often be preparedness to react more quickly to the deficiencies in the maritime safety system. IMO does not support regional decision-making and regional systems are problematic from the point of view of the global shipping industry. It affects the competitiveness issues and can lead to a situation where stricter rules, for example, for ship conditions make ships with poorer condition operate in areas where there are no such rules. The decrease of risk in one place leads to the increase of risk in another (Karvonen et al. 2006).

The IMO legislation can mostly be considered reactive - regulations are revised or tightened after major sea accidents and preventive actions are still uncommon. This kind of "post-accident" policy is often unsuccessful. The policy-making is not very comprehensive, and one particular risk gets too much attention (Goulielmos 2001; Karvonen et al. 2006; Knapp & Franses 2009).

At the international level, national representatives make up the IMO, constructing maritime policies for the globalized industry from a national perspective. Problems arise when national interests conflict with supra-national ideas. The failures of shipping policies derive from the development of internationalized ownership of industrial and capital operation resulting from national protectionist regulations. The tonnage tax regimes are the clearest evidence of this. The nested hierarchical governance model applied to shipping shows signs of failure, as it does not adequately reflect the activities, desires and ambitions of its constituents. An example of such an occasion, where national or supra-national legislation has conflicted with the international level, is the case of double-hull tankers, which were first required by the United States and the US Oil Pollution Act. Later in the EU, a number of member states introduced legislation to enforce the use of double-hull oil tankers before it was agreed on at the EU level and well before the date recommended by IMO. (Mitroussi 2004; Roe 2008; Roe 2009)

The contradiction in the current maritime legislation system is also manifested in the PSSA system, where the principle of freedom of the high seas and uniform international legislation is challenged. The designation of the PSSA area can be seen as an attempt to extend national and regional authority to the sea area (Uggla 2007). In fact, such regional arrangements can be regarded as a failure of the international system to make effective regulations in the shipping industry (Goss 2008; Kaps 2004).

The current governance system of the maritime industry has been criticized for being old-fashioned and ineffective. The makeshift repairs of the current system are not enough and the current regulatory framework does not protect the seas (Uggla 2007). For flag states to justify their juridical competence in respect to ships and seamen would require a demonstration of effectiveness and fairness in their individual and collective ability to govern and regulate ship safety issues in a uniform manner – the available evidence shows the opposite. It also seems that the opinion of the maritime industry shows that there are enough regulations but the problem is their inadequate implementation (Kovats 2006).

7.1.1 Third party involvement

The discussion on effective policies is often centred on the terms of public versus private, state versus civil society, command-and-control versus market-based incentives etc. This kind of debate is quite unhelpful, and it should be remembered that market-based policies also involve government co-ordination. In most cases, governance is not either public or private but both. Regulations also depend on the enrolment of third parties, both public and private (financial firms, insurers, government agencies,

auditors, consultants etc.). These third parties have the power to influence the behaviour of companies. They can implement incentives or sanctions on other parties, from the making or breaking of social and economic relationships to concrete financial penalties formalized in legally binding contracts. Still, third parties are rarely exploited in the promotion of public interests such as maritime safety. In maritime regulations, such third party actors as associations of ship-owners, cargo owners, insurers, classification societies and banks have the potential to exert their influence over ship safety and environmental standards. The third parties could be enrolled to assist the public policy, for instance, by holding them liable for environmental damage caused by their clients, making it a legal requirement that the targets of regulators use the machinery of third parties (such as auditors or insurers). (Bennett 2000)

Hänninen (2007) has observed that the marine system is lacking egalitarian stakeholder groups to monitor risks and risk taking behaviour in maritime transportation. In other industries, such as in the nuclear power production and in the forest industry, egalitarian watch and interest groups are common and they provide fresh and unconventional views on matters of safety, thus creating pressure on other groups to pay attention to and upgrade safety related risk classification and regulatory practices.

7.1.2 Grey economy in the shipping industry

All companies in the shipping industry are not the same. There are companies that buy cheap second-hand ships, operate them as cheaply as possible, do not care about safety measures, and when repairs become too expensive, they abandon the ships and their crews in some obscure port. There are also companies that are very active in promoting safe shipping; they are willing to test new technologies, act as good employers and achieve a good reputation among the public. The problem is that both the commendable and the non-commendable companies are competing in the same market. Competitive pressure has led, for example, to crew sizes being cut to levels that might be considered dangerous. However, competition should not be regarded as a negative matter in itself, as long as all the players have the same starting point. The current regulation system enables the situation to be far from that. The implementation of international jurisdiction is based on flag states, and flag states have very different standards on implementing regulations. (Goss 2008)

The shipper also plays a crucial role in maritime safety. For example, in the case of the Erika accident, it turned out that the ship was chartered because of the affordability of the offered transportation, and the shipper did not have much interest in the condition of the ship (Karvonen et al. 2006). It should be discussed what the liability of a cargo owner and a shipper is in case on an accident (Bennett 2000). If a shipper requires a high safety level from a transporter instead of looking solely at the price of transportation, obscure firms are not able to operate in the market and distort fair market competition.

It also seems that, in the shipping industry, complex corporate structures are used for minimizing the liability of the owner. This can lead to a situation where a victim of a

maritime incident is only one of a long list of substantial claimants against the ship and the victim is never able to get compensation for the harm suffered. (Gauci 1995)

7.2 Alternatives to the current maritime safety policy system

An industry-wide self-governing and democratic constitution composed of the maritime institutions and arrangements of full and equal representation from all operational sectors of the industry has been proposed as an alternative to the current system. However, the current foundation of international law-making is an obstacle to such a system, because the current foundation is based on sovereign states, treaties and international conventions. According to an alternative juridical concept, ships could be categorized as subjects of international law, so that legally binding rules could be made directly for them by the international community without the legislative involvement of sovereign states. The advantages of such a system are said to be numerous. Ships and seamen would be brought under the protection of regulations relating to marine technical and ship management standards. Seamen's social security and employment conditions would be improved. Sub-standard vessels (which are the main reasons for unfair competition for cargo and causes of environmental pollution and accidents at sea) would be eliminated and the exploitative employment practices for seamen would cease. The interpretation and implementation of rules would be uniform. (Kovats 2006) However, such a revision of the international law of the sea seems remote at the moment, and the inherent risk in the self-government of an industry is that regulatory goals are watered down in favour of private interests (Bennett 2000).

Roe (2008; 2009) proposes new approaches to shipping policy, which are called multi-level governance or polycentric governance systems. Multi-level governance means that central government authority is dispersed both vertically, to locate at other territorial levels, and horizontally, to non-state actors. Multi-level governance is thus characterized by overlapping and multiple jurisdictions, in contrast to the simple hierarchical approach, and it allows the integration of state and non-state actors and the dispersion of state activity to supra-national, regional and local authorities in a way that reflects the shipping industry itself. Polycentric governance systems go one step further; they create a more complex policy-making framework encompassing a variety of policy-generating origins across all types of institutions, both private and public (governments, interest groups, political parties, commercial companies etc.) There are no boundaries between different actors. International jurisdiction determines the levels, but concrete measures can be decided locally in co-operation with different actors. These governance systems may look complex, but according to Roe, they offer a mechanism to reflect the actual activities within the maritime sector and the priorities of the stakeholders involved (Roe 2008; Roe 2009).

7.3 The challenge of the human factor and safety culture

The human factor (Figure 7.1) has been identified as the most notable cause of maritime accidents (e.g. Karvonen et al. 2006; Hänninen 2008; Trucco et al. 2008), and, in all

shipping accidents, the human factor plays some role. The development of technology has led to the reduction of failures in technology, which in turn has revealed the underlying level of influence of human error in accident causation (Hetherington et al. 2006). Also, the influence of economic pressure in a strongly competitive industry may have added to the human factor causing shipping accidents (Trucco et al. 2008).[4]

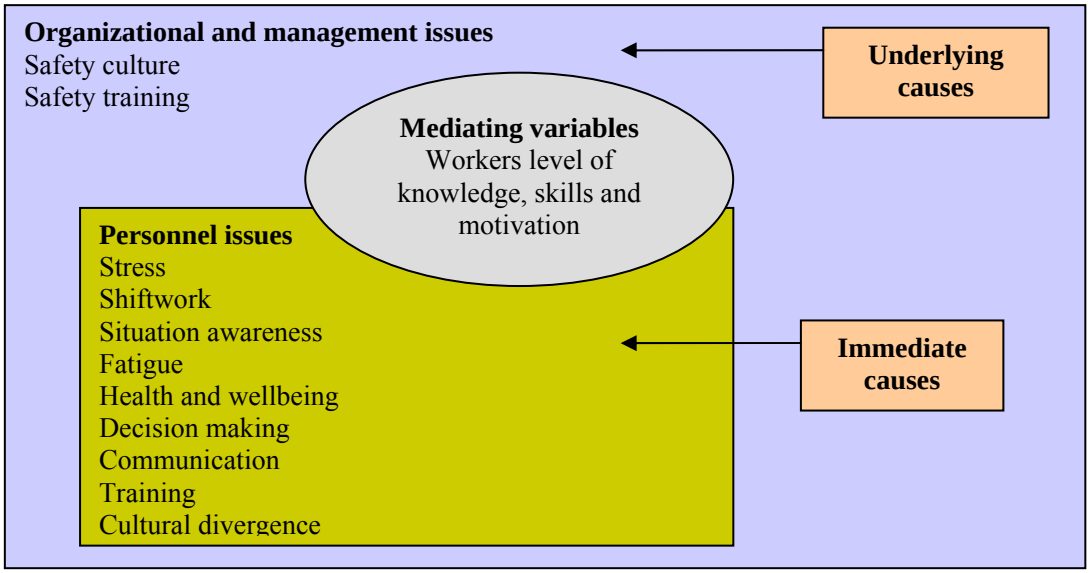

Figure 7.1 Framework forthe human factors contribution in shipping accidents (adapted from Hetherington et al. 2006)

If the human factor is seen as the major cause of accidents, effective policies should take into consideration how the effect of the human factor in accident causes could be diminished. It has already been long recognized in the shipping industry, including IMO, that effective maritime safety policy should make safety an integral part of the day-to-day activities, instead of just making technical regulations (Mitroussi 2004). However, it appears to be difficult to find good policies to tackle the human factor. Safety management, including inspection and training, is commonly thought to be the key means for tackling the human factor's contribution to the accidents (Trucco et al. 2008). Also, working conditions, safety culture on board and the proper use of technological and other tools have a role in preventing accidents caused by the human factor (Karvonen et al. 2006).

The human factor related errors can be of two kinds: active and latent errors. Active errors are the ones made by the pilot, the control room crew, the ship officers or other operators. However, the biggest threat to safety comes from latent errors, which are caused by poor design, incorrect installation, faulty maintenance, poor management decisions etc. The active error made by the operator is just a finishing touch in the human factor based errors leading to casualties (Hänninen 2008). In other words, the human factor based error can be said to be the final link of a long and complex chain of organizational and systemic errors. According to Hetherington et al. (2006), the

[4] Comprehensive review on the human factor in risk analysis of marine traffic can be found in Hänninen (2008).

fundamental error inducing character in shipping lies in the social organization, economic pressure and the structure of the industry.

It has been discovered, for example, that the predominant causes of accidents have been the misjudgements of ship masters and pilots, or the lack of comprehension between the pilot and the master or among crew members, or the inattention of the pilot and the officer of the watch. Flag states require that each ship have a working language that each employee must speak to a certain standard, but is this always the case? In emergency situations, the capability to speak the working language coherently and competently can have a crucial role. (Hetherington et al. 2006)

In the study on marine casualties at the Strait of Istanbul (Arslan & Turan 2009), several human-related factors affecting marine casualties were found. They were divided into four categories: 1) the fatigue of the navigation officers and the seafarers (both physical and psychological), 2) the inadequate knowledge and skills of the navigation officers on their tasks, the ship and the navigation area, 3) inadequate team and safety culture of the navigation officers and the seafarers of the ships, 4) the shortage of experienced seafarers on ships and pilots at the Strait of Istanbul.

Grabowski et al. (2007) have analyzed the leading indicators of tanker operations safety. The leading indicators are the conditions, events or measures that precede an undesirable event. As already stated, the causes of accidents are often the result of interactions among multiple, interdependent elements in complex and hazardous systems. The leading indicators can be categorized into individual, organizational or technical factors. The leading factors can be traced by analyzing whether a change in a certain factor could have prevented or significantly helped in preventing the undesirable event. Grabowski et al. (2007) have found that the leading indicators may differ by culture and different vessels may have different leading indicators of safety. Safety culture also exists on different levels: organizational safety culture, shipboard safety culture and the safety attitudes of individuals.

Grabowski et al. (2007) also discovered that the safety performance of a vessel could not be predicted with the vessel's characteristics, such as flag, classification society, trade, size, age, hull type or ownership. They concluded that most of the leading factors preceding an undesirable event focus on employee perceptions, satisfaction and assessments and the crew and supervisors worked with.

In several studies, it has been observed that there are problems in the flow of maritime safety related information in the shipping industry. For example, in the accident investigation of Estonia passenger ferry, it was found out that shipping companies had noticed structural weaknesses in visors (which caused the Estonia accident), but this information had never reached the authorities (Hänninen 2007; Karvonen et al. 2006). Also, Lappalainen (2008) has learnt, in his study on implementation of the ISM Code, that there are serious deficiencies in the reporting of near misses in the shipping industry. In this kind of a situation, lessons from mistakes and weak points cannot be learnt, which reflects partly on the old-fashioned safety culture of the maritime industry.

Hänninen (2007) has pointed out in his study that the safety culture of the maritime industry is, in many ways, old-fashioned:

- there is a high tolerance for accepting incidents and near misses in the maritime community
- shipping companies are profit-oriented and neglect safety issues
- mariners are not proactive on safety issues.

It is still the basis of maritime law that the ship master is in absolute charge of his vessel. The master's duties and responsibilities are numerous and extensive. He is, for example, the owner's personal representative, bears the ultimate responsibility for the safety in the navigation of the vessel and for the loading, stowage and discharge of cargo. (Branch 2007) Pilots and VTS centres cannot command ships, only give advice, and the ship master decides whether they are followed. In case of an accident, the master (and other officers as well) can even be made criminally liable, even if there had not been any criminal intention or conscious negligence, especially so in case of environmental pollution (Lawford 2002). This practice seems quite odd when compared to other industries, e.g. aviation, and when thinking about safety culture on the organizational or industry-wide levels, which are probably a greater cause of accidents than the actions of a single officer on board. The practice was understandable when there were no ways to follow a ship after it left a port and no means (at least fast means) to communicate between the cargo owner and a ship master. This is definitely not the situation anymore.

Maritime safety is, by nature, a very complex issue and it is as much related to culture as anything else. Such complex issues as language, authority and communication are all determined by individual and institutional relationships that may or may not be affected by jurisdiction and other policy instruments. Successful policies need to reflect the complexity of inter-relationships and the multiplicity of centres of authority that influence the safety and environmental standards and the implementation of penalties in the shipping industry. (Roe 2009)

7.4 The effectiveness of the maritime safety policy system

In Chapter 6, criteria for the effective maritime safety policy system were presented and, according to literature, effective maritime policy instruments should fulfil at least the following criteria: 1) *effectiveness* – the policy instrument must be suitable for achieving a desired goal, 2) *economic efficiency* – the benefits versus the costs of implementing the policy instrument should be in balance, 3) *acceptability* – the policy instrument must be accepted by the stakeholders and the community, 4) *enforcement* – the policy instrument can be implemented effectively, 5) *lateral effects* – the positive spill-over effects of the policy instrument in other sectors, 6) *incentive and innovation* – a good policy instrument encourages experimentation and gives incentives for improvement. In this chapter, each criterion is looked at in the light of the current maritime safety policy system in general – does it, as a whole, fulfil these criteria? Naturally, there are differences between single policies, but here the purpose is to look solely at the system as a whole, based on the previous chapters of this report.

Effectiveness – the policy instrument must be suitable for achieving a desired goal

Most of the maritime safety policy instruments can be considered suitable for their purposes. They address the matters directly connected to the operational circumstances of a ship and their improvement is likely to have an impact on the safety of shipping. One of the problems is that international legislation seems to lack the capability to take local circumstances into consideration and to make fast responses when needed. The PSSA status system and the activity of the European Union to legislate maritime safety are signs of this problem. Another problem is that it seems difficult to find effective policies to tackle the human factor, when it is seen to be the main cause of most of the accidents at sea.

Economic efficiency – the benefits versus the costs of implementing the policy instrument should be in balance

Economic efficiency varies between different policies and it is difficult to estimate as a whole. For sure, some people say that safety regulations cost too much for the industry, because they are so extensive. In principle, the costs of implementing international regulations should not be the problem of the industry, because all actors bear the same costs. However, we know that this is not the case in the real world. The implementation level varies, and regional regulations and arrangements like the PSSA can alter the costs. Still, economic efficiency is a very important criterion. Resources should be allocated so that the maximum benefit is obtained. There is no point in making regulations that cost a great deal to the industry and have little impact. The problem is that costs and benefits are, in many cases, hard to calculate, as has been perceived, for example, in the studies on the FSA method (Chapter 6.2.2). It would also be important to evaluate the cost-effectiveness of the system, not just single policies. The evaluation of cost-effectiveness is an area that needs further development.

Acceptability – the policy instrument must be accepted by the stakeholders and the community

In a way, the slowness of the international regulation process reflects that policy instruments not accepted by the stakeholders cannot be legislated; the slow process is a sign that the stakeholders have differing opinions on the matter and it takes long to negotiate a result that can be accepted by a sufficient number of stakeholders. When looking at the broader community, it seems that it would be willing and ready to make tighter policies on maritime safety, but they are not accepted by the industry, or they are against the principles of the maritime law. For example, in many instances, it has been proposed that the VTS system should be extended to the whole Baltic Sea area, but at the moment, it is not possible, due to the international legislation not allowing coastal states to employ the VTS system in high sea zones. (E.g. Karvonen et al. 2006)

Enforcement – the policy instrument can be implemented effectively

This seems to be the core problem of the current system. International regulations based on the nation-state implementation are not functioning properly. On the global scale, there are too large differences in the ways of implementing maritime safety regulations. The existence of flags of convenience is the most visible sign of it. Differences in implementation lead to the other problems of the shipping industry.

Lateral effects – the positive spill-over effects of the policy instrument in other sectors

At its best, the maritime safety policy has many positive spill-over effects. Safer shipping means less human misery and less polluted seas. These achievements further affect the society positively in many ways. People are healthier, live longer and work longer. Ecosystems in seas are protected, which improves the possibilities to use the sea both for commercial and recreational activities, although these matters depend on many other issues, as well. Safe transportation also decreases transport damages and cargo loss.

Incentive and innovation – a good policy instrument encourages experimentation and gives incentives for improvement

The maritime safety policy is, in many aspects, very detailed, for example with regard to ship construction and equipment. The more detailed the legislation is, the less there is room for experimentation and innovations. Economic instruments are often thought to be better in promoting innovations, but they are not much used in the maritime safety policy. However, as it has been noticed (Chapter 6.1), it is not that straightforward. Regulatory instruments can encourage innovation as well, and economic instruments do not necessarily do that. Goal-based standards (Chapter 5.1.1) of ships can be regarded as an attempt to leave more room for innovations in ship construction, as long as certain requirements are met. Another example, the ISM Code, includes the requirements for continuous improvement, but as it has been perceived in the study of Lappalainen (2008), the shipping industry often lacks the kind of culture that aims at the continuous improvement of safety culture. In sum, how well maritime safety policy instruments encourage experimentation and innovation varies from policy to policy, but it looks like more attention has recently been paid to making policies that are more innovative and encouraging for continuous improvement.

The current maritime safety policy system is effective in many respects, but its greatest weaknesses are the implementation and cost-effectiveness of policies and the failure of the system to diminish the role of the human factor as a cause of accidents. Implementation based on the nation state authorities has not succeeded on a global scale, and the problem with cost-effectiveness is that there is no reliable and comprehensive data on the costs of policies – both of single policies and of policies in comparison with each other. The system allows sub-standard shipping in many respects: the implementation of international legislation has not succeeded, other companies and actors agree to co-operate with obscure shipping companies and the consequences of sub-standard shipping are not severe enough. The savings resulting from sub-standard

operation of ships have been perceived to outweigh the penalties, if owners and operators are caught (Mitroussi 2004).

8 CONCLUSIONS

The increasing shipping activity in the Gulf of Finland has raised concerns about the safety of maritime traffic in the Gulf of Finland, especially about the possibility of a large oil accident due to the increasing oil export activity of Russia in the area. Various international, supra-national, regional and national policy instruments aim at minimizing the risks of accidents and other harmful effects of shipping. This report has dealt with maritime safety policy instruments: policy instruments in general; the central regulatory bodies of maritime safety; maritime safety policy instruments and the future prospects of maritime policy; the effectiveness of policy instruments; and the critique of the current maritime safety policy system. The purpose of the report has been to review the structure and state of the maritime safety policy system with focus on the Gulf of Finland.

Policy instruments can be grouped to regulatory, economic and information guidance instruments. Maritime safety is enhanced with all these instrument types, although most prominently with regulatory instruments. Due to the international character of shipping industry, the regulation of maritime safety is mostly done at international level in the framework of the United Nations and the International Maritime Organization IMO. However, the European Union also has maritime safety regulations of its own, there are regional arrangements such as HELCOM, and some maritime safety related issues are regulated at the national level.

Regulatory maritime safety instruments include regulations on mariners, navigational instruments, the surveillance of ship conditions and the construction and equipment of ships. Economic instruments include waterway and port dues, marine insurance, P&I clubs, liability and compensation questions and incentives. The use of economic instruments to promote public maritime safety goals is still in a minor position, but there are some examples that have potential for wider use. Information guidance is based on voluntary actions, and besides the dissemination of information, it can include subjects like voluntary training and education, certification or awards.

It seems that the risks of maritime traffic in the Gulf of Finland and in the Baltic Sea are taken seriously, and a lot of work is done to find new ways to decrease these risks: the International Maritime Organization is developing its regulations; in the European Union level, a comprehensive III Maritime Safety Package has been approved, and the Strategy for the Baltic Sea Region, where maritime safety issues are high on the agenda, was published recently; HELCOM is promoting environmental issues of the Baltic Sea; and national authorities and politicians are also addressing maritime safety issues. Also, other sectors, such as research or, for example, environmental organizations, are organizing seminars and gathering and sharing information in order to promote maritime safety in the Baltic Sea. It will remain to be seen to what extend and in what timetable the planned actions and instruments will be implemented and what kinds of effects they will have. Still, from the political point of view, it cannot be said that the risks of maritime traffic in the Gulf of Finland and in the Baltic Sea are not noticed.

New regulations are planned or are going to be implemented, especially ones related to the environmental effects of shipping (emissions, anti-fouling substances, alien species etc.) and to the navigation (AIS-based systems, electronic charts etc.). It is also often noticed that the human factor in maritime safety risks needs more attention. However, it seems to be difficult to find policies effective in minimizing the effect of the human factor in maritime accidents and incidents. Training is most often offered as a solution, but as human errors mostly emerge from the organizational safety culture, the training of mariners cannot solely be expected to be very efficient.

According to literature, effective maritime policy instruments should fulfil at least the following criteria: 1) *effectiveness* – the policy instrument must be suitable for achieving a desired goal, 2) *economic efficiency* – the benefits versus the costs of implementing the policy instrument should be in balance, 3) *acceptability* – the policy instrument must be accepted by the stakeholders and the community, 4) *enforcement* – the policy instrument can be implemented effectively, 5) *lateral effects* – the positive spill-over effects of the policy instrument in other sectors, 6) *incentive and innovation* – a good policy instrument encourages experimentation and gives incentives for improvement.

Policy instruments should be evaluated together, because a set of policies is likely to be more effective than just one policy alone. The evaluation of policy instruments together is also important in order to avoid the use of conflicting policy instruments simultaneously. Maritime safety policy instruments can be evaluated by using, for example, the formal safety assessment (FSA) method developed by IMO.

There are a vast number of maritime safety regulations, and the overall number of maritime accidents has decreased during past decades. Most of the regulations have been effective in preventing accidents and incidents. Still, accidents and incidents happen at sea and the current regulation system can be criticized on several points. The international regulation process is not easy; it tends to be slow and the result can become a compromise of compromises. Regulations are mostly reactive instead of preventive, and they are only revised after accidents. The work of IMO is based on the participation of nation states primarily promoting their own interests instead of looking at the entity. The implementation of regulations is carried out by flag states, and all flag states do not have the same implementation standards. To ensure the seaworthiness of ships, several inspection systems aim at eliminating the operation of sub-standard ships, but they are still able to sail in the world seas. The failure of IMO to provide fast responses and take into consideration the local circumstances in regulations has lead to a situation, where, for example, the European Union gives its own maritime safety legislation and there are such arrangements as Particularly Sensitive Sea Areas.

Many kinds of companies operate in the shipping industry: companies that take safety matters seriously and act responsibly, and companies that aim to operate as cheaply as possible, do not care about safety measures, often have very obscure owner arrangements and are difficult to bring to account if something happens. All these companies compete in the same market and should follow the same regulations, but in practice they do not, which is enabled by the failure of the flag state system to

implement regulations similarly all over the world. The operation of irresponsible shipping companies is also enabled by shippers who take the cheapest transport at the expense of safety and by other actors who play ball with such companies. The careless attitude to safety can also partly be attributed to the old-fashioned culture of the shipping industry, for example, there is a high tolerance to accept incidents and near misses in the maritime community.

When comparing the current maritime safety policy system as a whole with the criteria of effective policies, it can be concluded that, in many respects, the current system is effective with the greatest problems being in implementation and cost-effectiveness. The nation state based implementation system is not functioning properly, and the existence of flags of convenience is the clearest sign of that. The cost-effectiveness of policies is hard to calculate, both of single policies and of the policies in comparison with each other. This is an area where further research and better methods are needed.

New approaches to shipping policy, such as multi-level governance or polycentric governance systems, have been proposed. Multi-level governance means that central government authority is dispersed both vertically, to locate at other territorial levels, and horizontally, to non-state actors. Multi-level governance is thus characterized by overlapping and multiple jurisdictions, in contrast to the simple hierarchical approach, and it allows the integration of state and non-state actors and the dispersion of state activity to supra-national, regional and local authorities in a way that reflects the shipping industry itself. Polycentric governance systems go one step further; they create a more complex policy-making framework encompassing a variety of policy-generating origins across all types of institutions, both private and public (governments, interest groups, political parties, commercial companies etc.). International jurisdiction determines the levels, but the concrete measures can be decided locally in co-operation with different actors. These governance systems may offer a mechanism to reflect the actual activities within the maritime sector and the priorities of the stakeholders involved. However, such a change in international legislation seems remote.

Third parties could also have more power to influence the behaviour of firms in regard to public interests. They can implement incentives or sanctions on other parties, from the making or breaking of social and economic relationships to concrete financial penalties formalized in legally binding contracts. In the shipping industry, such third party actors as associations of ship-owners, cargo owners, insurers, classification societies and banks have the potential to exert an influence over ship safety and environmental standards.

The third parties could be enrolled to assist the public policy, for instance, by holding them liable for environmental damage caused by their clients, making it a legal requirement for the targets of regulations to use the machinery of third parties (such as auditors or insurers). It should also be discussed what the liability of a cargo owner and a shipper is in case of accidents. It has also been observed that the marine system lacks egalitarian stakeholder groups to monitor risks and risk taking behaviour in maritime transportation.

In conclusion, maritime safety is enhanced by a great number of regulations on many levels, and the system has been partly effective in promoting maritime safety. Instruments used are mostly regulatory, and economic instruments could probably be used more to promote maritime safety. Still, there are some inherent problems in the system: flag state based implementation; the difficulty of making truly global and effective regulations that can react quickly to the need for change; and the problems of safety culture in the shipping industry. Before these problems are solved, the major improvements in maritime safety cannot be expected to happen, and, ultimately, single policies will only be band-aid solutions to the problem, not interfering in the actual causes of bleeding. It would be important to think thoroughly of how the shipping industry could best be motivated to improve maritime safety – is it through technical systems or perhaps by some other means?

8.1 Further research

Research on the maritime safety policy instruments will continue in the SAFGOF research project for which this report forms a basis. The focus will be on the policies reducing the probability of an oil accident and its environmental effects in the Gulf of Finland. Work is continued with expert questionnaires and interviews, and the aim is to evaluate the effectiveness of the current system and its need for improvement on the empirical level. A few new policies will be selected whose effectiveness will be tested in the SAFGOF meta-model, in other words, the tests will explore how the implementation of the selected policies affects the accident probabilities or environmental effects of an oil accident in the Gulf of Finland. The SAFGOF meta-model is going to be a Bayesian belief network based probability model, which combines social, technical and environmental information. The SAFGOF meta-model is being built together with the Centre for Maritime Studies of the University of Turku, the Helsinki University of Technology and the University of Helsinki, who are the co-partners in the SAFGOF project. The results of this study are also used in the SAFGOF project to spread the new knowledge to the field through different teaching and training packages produced in the WP 7 of the SAFGOF project. More information on the project can be found via the Internet-page: http://www.merikotka.fi/uk/SAFGOF.php.

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University of Turku
CENTRE FOR MARITIME STUDIES
Veistämönaukio 1-3
FI-20100 TURKU, Finland

http://mkk.utu.fi

TURUN YLIOPISTO
UNIVERSITY OF TURKU