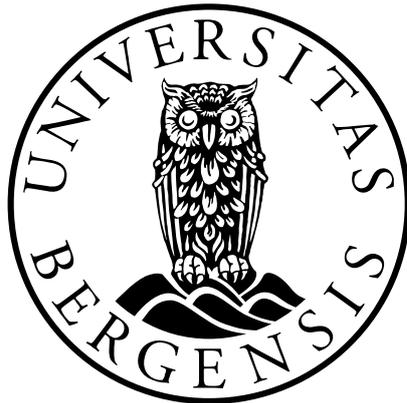


Shipowner's liability for unmanned ships

Can existing legislation handle the challenges of the future?

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1 Introduction to maritime transportation

Maritime transportation is the most efficient and cost-effective method of international transportation of goods.¹ In fact, 90% of world trade is transported by ships today² and there is no reason to believe that this number will decrease in the future.

In the past years, the industry has gone through a rough period. A great part of maritime industry was forced to handle an uncertain market under great pressure due to the fall in oil prices, which led to less demand of oil related shipping.³ On top of this, shipping companies experience a shortage of available crew⁴, pressure to reduce costs and increased demands to maintain an environmentally friendly business. This has led to additional focus on safety issues as well as finding ways to save costs by implementing new technology to make the ships more sustainable and reduce the need of a human crew onboard.⁵ A solution to these issues might prove to be unmanned ships.

Shipowners have experienced a lack of qualified people that are willing to commit to life at sea.⁶ Hiring a crew is the most expensive part of running a vessel⁷ and unmanned ships will therefore solve issues regarding both lack of crew and cost savings. The progress of modern technology has resulted in a rapid development of unmanned ships that regulators have not been able to keep up with. This may have made the existing legislation outdated.⁸ My thesis revolves around this issue and it will be thoroughly discussed from a liability perspective.

The challenges involving unmanned ships are highly current topics. For a long time, it was considered something belonging in the distant future; a futuristic, fantasy object. The interest in doing research to properly start the development, has grown the last couple of years. This

¹ IMO, "A concept of a sustainable maritime transportation system", *Sustainable development: IMO's contribution beyond Rio+20*, 2013 p. 1

² <https://www.rederi.no/om-oss/fagomrader/sikkerhet-miljo-og-innovasjon/innovasjon/strategi/skipsfarten-og-den-maritime-naringen/>, <http://www.fn.no/FN-informasjon/FN-organisasjoner/Den-internasjonale-sjoefartsorganisasjonen-IMO>

³ Christian Svane Mellby et al. "Maritim næring i det 21. århundret – prognoser, trender og drivkrefter" *Menon-publikasjon*, 2016 p. 4

⁴ Ørnulf Jan Rødseth and Hans-Christopher Burmeister, "Developments toward the unmanned ship", *MUNIN*, 2012 p. 8-9

⁵ http://www.forskningsradet.no/no/Nyheter/Enormt_potensial_for_ny_maritim_virksomhet/1254017466428

⁶ Rødseth and Burmeister, p. 8

⁷ <https://www.wilsonship.no/en/ship-management/running-costs>

⁸ <https://worldmaritimeneews.com/archives/220585/autonomous-ships-set-to-plough-the-baltic-by-2025/>

has made the progress rocket forward. Yara has started a project with Kongsberg Gruppen to develop an electric, self-driven ship to transport products between their different factories. They believe this will be under full remote control by 2019 and autonomous by 2020.⁹ It is now popular belief that remotely operated ships can be in use at open sea by 2025.¹⁰

Because the unmanned ships no longer will have a human crew onboard the ship, there are several incidents that previously could lead to accidents, that no longer will make a risk.¹¹ Human mistakes will be limited where advanced technology is running the ship. There will however be different kinds of threats and dangers to consider with computer-based technology. Therefore, there are many issues regarding safety that must be researched before the ships can come to use.

The technology needed to build and use unmanned ships has already existed for quite some time, but to get national governments on board with the projects, the ships must prove to be at least as safe as today's manned ships.¹²

All the maritime laws and conventions we have today, revolve around the fact that the ship is supposed to be properly manned. As will be discussed in the following, the regulations regarding whose actions the shipowner is liable for on a manned ship, are clear. This might have to be reconsidered when the ship does not have an actual crew onboard, but is dependent of an operator ashore or a computer to make decisions regarding maneuvering and navigation.

1.1 Actuality

The thesis focus on the shipowner's liability and how far this extends when technology replaces humans. But it is not only in the shipping industry the future suddenly caught up with the present. Several areas of society are exploring the possibility of replacing humans in several professions. In the last couple of years, plans for other autonomous vehicles, such as cars, buses¹³ and airplanes¹⁴, have developed quickly.

⁹ <http://sysla.no/maritim/vil-bygge-verdens-forste-selvkjorende-og-utslippsfrie-containerskip/>

¹⁰ <http://worldmaritimeneews.com/archives/218365/interview-smart-ships-are-coming/>

¹¹ Rødseth and Burmeister, p. 9

¹² AAWA, "Autonomous ships – The next step", *Rolls-Royce Marine*, 2016b p. 4

¹³ <https://www.tu.no/artikler/vi-kan-fa-selvkjorende-biler-pa-norske-veier-neste-ar/359569>

¹⁴ Volker Bertram, *Towards the Unmanned Ship*, DNV GL p. 4, <http://itavisen.no/2017/01/18/glem-de-autonome-bilene-snart-kan-drosjeflyene-komme/>

Tesla and Google believe that fully autonomous cars can be driving independently by respectively 2018¹⁵ and 2020¹⁶, whilst Uber have already started experimenting with self-driving cars in actual traffic¹⁷.

The progress of developing autonomous ships has been slower, but has finally come a long way. The European Commission and a cluster of European maritime stakeholders have made a collaborative research project concerning the future development of unmanned ships, Maritime Unmanned Navigation through Intelligence in Networks (MUNIN).¹⁸ They have drawn up a list¹⁹ of how the progress towards the autonomous ship can look and how it may best be developed.

Rolls-Royce Marine is one step ahead in the progress towards an autonomous ship. In association with the Advanced Autonomous Waterborne Applications Initiative (AAWA), they are developing designs for a remote ship that can be waterborne and fully functioning within a few years.²⁰

This shows that once someone takes a lead and commits to doing research towards future solutions, the interest and will to contribute increases and leads to a rapid progress. Considering this, it is sensible to be one step ahead in legal matters even if the actual development of autonomous ships is still not fully clarified or completed. The Norwegian Government has recognized this and has included the need of being aware of the development towards automated and autonomous ships in their National Transport Plan 2018-2029.²¹

1.2 Definitions

“Shipowner” is defined as the legally responsible person(s) or company who owns and is legally in charge and responsible of the ship. The shipowner equips and run the ship.²² To be

¹⁵ <https://www.tu.no/artikler/fremtidens-mercedes-skal-kjore-for-uber/375901>

¹⁶ <https://www.tu.no/artikler/slik-virker-selvkjorende-biler/358826>

¹⁷ <http://www.dinside.no/a/62948357>

¹⁸ MUNIN, “Research in maritime autonomous systems project results and technology potentials”, 2016 p. 1

¹⁹ <http://www.unmanned-ship.org/munin/about/the-autonomus-ship/>

²⁰ AAWA (2016b) p. 7

²¹ Meld.St. 33 (2016-2017), chapter 3.4.5

²² <https://snl.no/reder>

named shipowner, one should have the highest authority in combination with ownership interest.²³ The shipowner is liable for actions made by anyone in service for the ship.²⁴

A “ship” is defined as a large seagoing vessel.²⁵ My thesis focus on the manned, remote, automated and autonomous ship. Since the thesis is classified according to which ship is discussed, it will be specifically written if a different type of ship is involved in the specific chapter. If not specified, the term “ship” will indicate the type of ship the chapter regulates.

The thesis is based on the previously mentioned list by MUNIN showing the development from manned to autonomous ship via remote and automated ships.

Manned ships are the ships that exists today. They are based on the principle of being properly manned and are dependent of a human crew in charge of navigation and maneuvering.

A remote ship is an unmanned ship where the operation can be performed via a remote-control mechanism, for example by a shore based human operator.²⁶ This means that there will be a person in charge of navigating and maneuvering the ship, but there will not be anyone on board the actual ship.

The automated ship follows the remote ship. An advanced decision support system on board should make all the operational decisions independently without the intervention of a human operator.²⁷

In **the autonomous ship**, both the remote ship and the automated ship is combined into one concept. This means that the ship is supposed to manage on its own with the onboard decision system and rely on the predetermined restrictions.²⁸ The route will already have been set by an operator and the computer will have different sets of actions to choose from should

²³ Thor Falkanger and Hans Jacob Bull, *Innføring i Sjørett*, Oslo 2004 p. 118

²⁴ *Ibid.* p. 119

²⁵ <https://www.merriam-webster.com/dictionary/ship>

²⁶ <http://www.unmanned-ship.org/munin/about/the-autonomus-ship/>

²⁷ *Ibid.*

²⁸ <http://www.unmanned-ship.org/munin/about/the-autonomus-ship/>

something unexpected occur.²⁹ If the computer cannot decide on an action, it will reach out to an operator who will make the final call. If an alternative route is set up by the computer, an operator must approve it.³⁰

1.3 Structure of the thesis

The thesis concerns shipowner's liability for unmanned ships. More accurately it attempts to answer how well the existing liability rules for collisions involving manned ships fit the unmanned ships. I focus on the shipowner's liability since he has the supreme responsibility for the ship and crew and must upkeep a certain duty of care.

Through this I seek to assess how current national legislation and rules regarding the shipowner's liability for manned ships involved in a collision may apply to unmanned ships. Existing rules of liability governing the manned ships will form a basis of comparison for the further discussion.

It is unsure whether the existing rules will be applicable, because they are made for manned ships with a human crew. As the unmanned ships evolve and eventually are controlled by a computer, it is not certain that the legislation can handle this change. The discussions show whether the current legislation can be applied for unmanned ships or if it is unfitting due to the change in control.

The thesis starts with a brief summary of how the shipping industry has changed throughout modern history and how the maritime laws have changed accordingly. This can be helpful when the industry now face a whole new chapter and perhaps even a small revolution within shipping.

Next the current laws are presented and explained how they fit the manned ships. If they prove not to be applicable for the unmanned ships in the further discussion, I examine if and how they may be altered. I focus on three different liability rules for the shipowner. This includes employers' liability, objective liability and chapter 8 of the Norwegian Maritime Code regarding liability for collisions.

²⁹ AAWA (2016a) p. 10

³⁰ AAWA (2016a) p. 11

I am not discussing liability for goods where the shipowner and ship function as a carrier because damages to goods, passengers and in contract, are more specifically treated by legislation. Environmental damages caused by a ship is also founded in law. I am therefore focusing on incidents happening outside of contract, typically collisions or other unexpected events. This focus will also prevent the thesis becoming too extensive.

In my thesis, all three of the above-mentioned ships are discussed in separate chapters and compared to the legislation for manned ships. The rules of liability regarding manned ships are presented before considering if the rules will be appropriate for respectively the remote, the automated and at last the autonomous ship.

My theory is that the further down MUNIN's list of ships one reaches, the existing liability rules will become less suitable because they are made for ships manned by humans, not computers. This may be natural as the automated ship differ most from existing ships since it is built to function completely independently.

The thesis ends with a conclusion of whether my theory was correct or not. This includes a summary of how fitting the existing legislation proves to be for unmanned ships and how the liability should be organized.

2 Liability in general

2.1 Historical prelude

Transportation by sea is an international business and the need for uniform legislation and international harmonization has been important for centuries.³¹ This need grew as the shipping industry became bigger and interaction across borders more frequent.

During the beginning of the 20th century the ship industry grew fast and ships became increasingly efficient. Improvements in technology led to steam ships becoming faster, bigger and cheaper to operate. This made maritime transportation the preferred mean of transportation and cargo handling at the time and the industry experienced a boom.³²

As people with different nationalities, backgrounds and customs started doing business together, the need for common legal grounds increased. This became especially clear whenever accidents happened and ships collided. Amongst shipping nations there were conflicting systems regarding liability and fault.³³ This led to many disagreements.

The need for harmonization was recognized by the International Maritime Committee (CMI) and several conferences were hosted to find a solution.³⁴ In 1910 this led to the International Convention for the Unification of Certain Rules of Law with respect to Collisions between Vessels, commonly known as the Brussels Collision Convention.

Several conventions have been made to provide certain common guidelines in case of severe incidents happening at sea. This includes conventions regarding oil pollution damages³⁵, damages caused by spillages of hazardous and noxious substances during maritime transportation³⁶ as well as a convention regarding preventing of collisions at sea³⁷.

³¹ Hugo Tiberg and Johan Schelin, *On Maritime & Transport Law*, Stockholm 2016 p. 22

³² Dr Martin Stopford, "How shipping has changed the world & the social impact of shipping", *Global Maritime Environmental Congress*, 2010 p. 4

³³ The Travaux Préparatoires of the 1910 Brussels Collision Convention, p. 6

³⁴ *Ibid.*

³⁵ The International Convention on Civil Liability for Oil Pollution Damages, 1969

³⁶ The International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea Convention, 1996

³⁷ The Convention on the International Regulations for Preventing Collisions at Sea, 1972

Since the thesis focuses on collisions between ships, the Brussels Collision Convention, which the Norwegian Maritime Code is based upon, is relevant and will be referred to in the following.

2.2 The Brussels Collision Convention on liability

The Brussels Collision Convention is based on a principle of fault. This principle is applicable for the shipowner, as well as for anyone he is responsible for. If the shipowner himself or anyone he is responsible for, can be blamed for the collision, the owner will be liable for the damages of the crossing ship. Both colliding shipowners will have to prove the other was in breach of his duty of care.³⁸

The Brussels Collision Convention introduced the principle of liability proportional to the degree each ship was to blame.³⁹ This means the shipowner's liability for damages caused by the collision, should be in proportion to the degree each vessel was at fault.⁴⁰ To avoid liability, it must be proved that the collision was an accident. If this is proved, each ship covers his own loss and damages.

Like many other countries and important shipping nations, Norway ratified the 1910 Convention. The Norwegian Maritime Code is therefore based on the Collision Convention and both regulations are applicable in the upcoming discussion. I have however decided to only refer to the Norwegian Maritime Code whenever considering collisions according to chapter 8 of the Maritime Code. The Brussels Collision Convention is nonetheless a highly important framework to the regulations of chapter 8.

2.3 Liability according to the Norwegian Maritime Code

The Norwegian Maritime Code was updated and introduced as a new law in 1994. The previous Maritime Code was introduced in 1893, with an update in 1938. Considering the

³⁸ Simon Baughen, *Shipping Law*, Sixth edition, Oxon and New York 2015 p. 273

³⁹ Yvonne Baatz et al., *Maritime Law*, Oxon and New York 2014 p. 227

⁴⁰ Christopher Hill, *Maritime Law*, Sixth edition, London 2003 p. 311

changes the shipping industry experienced during the 20th century, an update was due.

The new Maritime Code was updated to keep up with the developments the industry had faced, but also to handle the progress the international legal environment had experienced through a set of new conventions.

As previously mentioned, chapter 8 of the Norwegian Maritime Code is based on the Brussels Collision Convention from 1910. This means both are founded on a principle of fault, where the owner is responsible for himself and any helper according to the Maritime Code § 151. Chapter 8 must therefore be considered in relation with § 151 to figure out who can be at fault and consequently covered by the shipowner's liability. This will be further discussed in the following.

Liability under the Maritime Code must also be interpreted in consideration of Norwegian tort legislation. The reason for this is that liability decides who is responsible for a collision or an accident, and therefore who must pay for damages and who should be compensated.

The basis of the general Norwegian tort legislation is that there must be a reason for liability.⁴¹ This is normally triggered by *culpa*, a negligent act. In addition to a requirement of negligence and causation, the loss of the third person must also have been foreseeable. The person responsible for the damage should therefore have understood that his behavior could lead to this loss.

The situations that are interesting throughout my thesis is where the person liable, the shipowner, is without fault. This could be where the shipowner is liable due to employers' responsibility where one of his employees has acted with fault. The same goes for cases where no one is to blame, but the shipowner still has an objective liability.

Objective liability might be the most relevant kind of liability when discussing autonomous ships. There might not be anyone obvious to blame when the ship is taking over control and is responsible of making decisions independently.

⁴¹ Falkanger and Bull, p. 140

2.4 Developments of liability in a global perspective

The international maritime society in shape of the International Maritime Committee (CMI), the International Maritime Organization (IMO) and the United Nations Commission for International Trade Law (UNCITRAL), try as best they can to keep up with the development and progress the ship industry continuously experiences. To a large extent it has been successful, even though the ratification of the different conventions has been varying.

The technology does however have a way of developing faster than conventions can keep up. This has led to conventions that are not prepared for a future where ships are unmanned. IMO have made efforts to develop and implement technology that can support and communicate information between ships and a shore control center and is thereby a part of the development towards remote ships.⁴²

Regarding completely autonomous ships, IMO has not started any regulatory work yet⁴³, but has shown to the work of the British government-sponsored Marine Autonomous Systems Regulatory Working Group (MASRWG).⁴⁴ The group was set to develop a framework to allow unmanned vessels to safely operate with manned vessels and engage and influence the national bodies in the development.⁴⁵ It has released a Code of Conduct for surface maritime autonomous systems and is working on a Code of Practice.⁴⁶

The Code consists of nine principles that should make sure that the maritime autonomous systems are operated safely and responsibly, at the same time it agrees with the applicable regulations as far as this is practically possible.⁴⁷ The aim for MASRWG is to create a forum for communication and form an agreement across relevant industries in the maritime community on different aspects of the maritime autonomous systems in advance of governmental regulations.⁴⁸

⁴² <http://maritime-executive.com/editorials/would-autonomous-ships-be-good-for-society>

⁴³ <http://www.ship-technology.com/features/featureis-2017-the-breakthrough-year-for-unmanned-vessels-5692723/>

⁴⁴ <https://www.bdpinternational.com/uncategorized/ship-operators-explore-autonomous-sailing/>

⁴⁵ <http://www.ukmarinealliance.co.uk/content/masrwg-faqs>

⁴⁶ <http://www.ship-technology.com/features/featureis-2017-the-breakthrough-year-for-unmanned-vessels-5692723/>

⁴⁷ <https://www.asvglobal.com/industry-code-of-conduct-for-maritime-autonomous-systems-launched/>

⁴⁸ <https://www.asvglobal.com/industry-code-of-conduct-for-maritime-autonomous-systems-launched/>

Because national regulations permit autonomous ships in domestic waters, the development can continue nationally. There is however still a strong need for IMO to engage in and promote the legal challenges following the advanced ships.⁴⁹ This is the only way to make sure the ships can be tested in international waters.⁵⁰

The question ahead is therefore whether the set of ground rules that exist for manned ships, such as the Brussels Collision Convention and in extension the Norwegian Maritime Code, can be brought forward as modernized and more advanced ships come into use. As most of the shipping nations in the world have ratified and use this regulation, it makes a good basis when looking at the liability of the shipowner.

In the following, liability for manned ships is presented to form a backdrop for the following discussion regarding liability for the remote, automated and autonomous ship. Depending on the ship, it might differ which types of liabilities are relevant. This is further elaborated under each ship.

⁴⁹ Mogens Blanke, Michael Henriques, Jakob Bang, “A pre-analysis on autonomous ships”, *Danish Maritime Authority and the Technical University of Denmark*, p. 12

⁵⁰ *Ibid.*

3 Liability for manned ships

In the following I present how the current liability for the owner of a manned ship is organized. This liability can be split into three types, including employers' liability, objective liability and liability for collisions according to chapter 8 of the Norwegian Maritime Code. The situations I focus on are collisions and accidents happening outside of contract.

As previously stated, the shipowner's liability according to § 151 of the Norwegian Maritime Code for those acting on behalf of the ship, harmonizes with the general employers' liability.⁵¹ This includes responsibility for the shipowner for damage caused by fault or neglect in the performance of duties by the master, any member of the crew or other people acting on behalf of the ship.⁵²

In addition to the principle of the shipowner's employers' liability, the shipowner has objective liability as well as liability for collisions according to chapter 8 of the Norwegian Maritime Code. In the following, I introduce all three types of liability concerning manned ships, starting with the employers' liability. This is the source of comparison for liability for the different types of unmanned ships.

3.1 Employers' liability

The Norwegian Maritime Code § 151 is the main regulation regarding the shipowner's liability for accidents occurring outside of contracts where someone can be blamed. The liability includes both nautical as well as general faults⁵³ that lead to collisions with other ships or fixed, land-based devices.⁵⁴ These kinds of incidents will be the basis of the following.

Liability according to § 151 is triggered by the same conditions as the general liability for damages regulated by Norwegian legislation.⁵⁵ This means that the liability arise in case of fault or neglect by anyone the shipowner is responsible for who performs services for the

⁵¹ Tiberg and Schelin, p. 95

⁵² Falkanger and Bull, p. 148

⁵³ Sjur Brækhus, *Rederens husbondansvar*, Göteborg 1954, p. 52

⁵⁴ Falkanger and Bull, p. 119

⁵⁵ *Ibid.* p. 140

ship. A wrongful act includes concrete actions as well as failure to do something. If this leads to a loss for a third party, the shipowner may become liable if the loss was foreseeable and adequate.⁵⁶

The shipowner is liable for fault or neglect from any of the persons involved in service of the ship, hereafter called a helper.⁵⁷

It is not necessary for the helper to be in a contractual or employment position with the shipowner for the liability to come into force.⁵⁸ It is the helper's actual connection to the ship that is relevant.⁵⁹ The helper can therefore be a hired crew member onboard as well as anyone assisting the ship independently, such as a pilot.⁶⁰ The shipowner will be equally liable in both cases.

There is one other condition that also must be fulfilled for the liability to occur. The fault or negligent action must have been done in service of the ship, while working.⁶¹ It must also have been somewhat in relation to the work the employee is supposed to do.⁶²

Consequently, the liability for the shipowner is dependent on the fulfilling of two conditions; fault or neglect and in relation to service of the ship that must be somewhat relevant to the work the helper was supposed to do.

3.1.1 “Fault or negligent behavior”

Employers' liability is dependent on fault or negligent behavior from the helper. The fault or negligent action must be of such a character that it would make the helper personally liable⁶³ had it not occurred in an employment situation.

In other words, the helper's behavior relies on a regular culpa assessment. Within this assessment lies a clear causation between the negligent action and the damage, as well as

⁵⁶ Falkanger and Bull, p. 140

⁵⁷ *Ibid.* p. 142

⁵⁸ *Ibid.* p. 149

⁵⁹ See note 237 to the Norwegian Maritime Code § 151 by Camilla Bråfelt at www.rettsdata.no

⁶⁰ *Ibid.*

⁶¹ Falkanger and Bull, p. 151

⁶² *Ibid.* p. 142

⁶³ Brækhus, p. 52

foreseeable damage.

When considering whether a helper has acted negligent, one should see whether there is any kind of branch standard the helper has failed to respect or if he has acted in a normal and diligent way. To prove negligence, the helper must have acted in a way that is not in accordance with ordinary, considerate behavior to be expected of that kind of work.

Typically, this faulty or negligent action must be proved by the one claiming compensation.⁶⁴ There is however no need to identify the individual who did it, but it must be concluded that one or several of the helpers have acted negligently.⁶⁵

For the shipowner to become liable for a helper's mistake, the fault or negligent action must be proved. If this negligence or fault then lead to an accident, two ships colliding for instance, the shipowner will be liable for the damages of the other ship.

3.1.2 “In service of and in relation to the ship”

The helper's fault or negligent action must be in service of the specific ship the helper is associated with.⁶⁶ The fault or negligence must also be in relation to the work the helper is supposed to do. A typical example is where the shipmaster navigates in a negligent way that leads to an accident.⁶⁷ This makes the shipowner liable.

Any action, or lack of it, made in relation to his work duties, will make the owner liable. The owner will however also bear the risk of any foreseeable consequences of using a helper. This includes a responsibility for negligent actions done off-duty, but still on board the ship.⁶⁸ He is not liable for extraordinary cases that may occur that he cannot protect himself from.⁶⁹ The same goes for travels to and from the ship in relation with work.

To make the shipowner liable for a helper's negligent act or fault, it is required that the act is done in service of the ship and in relation to the work duties. This limitation of what kind of

⁶⁴ Tiberg and Schelin, p. 96

⁶⁵ Brækhus, p. 52

⁶⁶ Falkanger and Bull, p. 151

⁶⁷ Brækhus, p. 55

⁶⁸ Falkanger and Bull, p. 151

⁶⁹ *Ibid.* p. 152

behavior and negligence the shipowner must accept as part of the risk of using helpers, makes the liability easier to accept. Because of these limitations, the fault or negligence has happened as the helper attempted to fulfill his duties and do his job. It is therefore natural that the shipowner holds liability for the helper's actions.

3.2 Objective liability

Objective liability for shipowners is partly regulated by chapter 10 of the Maritime Code. This legislation does however only make the shipowner liable for any pollution caused by the ship and is therefore not applicable in my discussion. I focus on whether an objective liability can be used in case of collisions.

A purely objective liability includes responsibility for damage regardless of blame. According to Norwegian legal theory this kind of liability for the shipowner might be considered too strict, because the demand for the crew to perform due care is set unrealistically high.⁷⁰

Scandinavian case law has developed a principle of whoever runs a business with any kind of risk of operating, should expect that these risks and dangers are fulfilled every once in a while.⁷¹ This has led to an opinion that the business owner should bear the loss rather than an innocent third party, because the owner has the possibility to sign an insurance and thus avoid personal responsibility.⁷²

Objective liability may also involve a burden of proof for the shipowner. It will be up to the owner to prove that the damage was not caused by negligent behavior from him or his crew. The essence of this liability is how strict the burden of proof is set. If it is set too high, it makes the shipowner liable where he is not to blame and consequently lead to an unfair result.⁷³

There is doubt whether the shipowner can be held liable for damages relating to operating the ship.⁷⁴ As previously mentioned, a ship crashing with another ship is regulated by the

⁷⁰ Falkanger and Bull, p. 142

⁷¹ *Ibid.* p. 143

⁷² Erling Selvig, "Rederansvaret. § 3. Objektivt rederansvar.", *MarIus* nr. 20, 1977a p. 1-32 (p. 5)

⁷³ Falkanger and Bull, p. 142

⁷⁴ *Ibid.* p. 143

Maritime Code. Because this kind of liability is dependent on fault or accident, as confirmed in case law⁷⁵, objective liability cannot be used in these cases. It is therefore uncertain how far the objective liability can be drawn in the maritime business and if it is needed altogether.

Objective liability is relevant where damage is caused by failure, weakness or imperfection in the ship's technical equipment or machinery.⁷⁶ In two of the judgements⁷⁷ from the Norwegian Supreme Court concerning objective liability, the shipowner became responsible for damage to quays and other land-based provisions due to a failure of the reverse engine.⁷⁸ In a different judgment⁷⁹ regarding collisions with other devices than bridges and quays, the shipowner was not liable, even if it was caused by a technical failure.

A shipowner is therefore liable for damage his ship causes to a connected arrangement due to failure, flaw or any inadequacy of the equipment or machinery on board. Within this I interpret a certain level of impossibility of preventing this failure, which is a requirement for no one to be blamed. This includes not recognizing that something was wrong with the equipment or running the appropriate tests to check this. If the damage is caused by failure of any instrument or equipment that could have been noticed and fixed by the shipmaster or any member of the crew, it is regulated by § 151 in the Maritime Code and the objective liability is not applicable.

According to existing case law there are three requirements that needs to be fulfilled for the shipowner to become objectively liable. First the damage must be done to a connected device or similar. Second, it must have been caused by a technical failure to equipment or machinery.⁸⁰ Third, the crew cannot have had any chance of preventing it by examination and repairs.

The objective liability is therefore discussed from this point of view. It is based on damage caused by a failure in the equipment or machinery of the ship. This is in accordance with the maritime judgments that have maintained the application scope of objective liability quite

⁷⁵ Rt. 1971.843 *Marna Hepsø*

⁷⁶ Selvig (1977a) p. 29

⁷⁷ Rt. 1921.519 *Neptun*, Rt. 1952.1170 *Sokrates*,

⁷⁸ <https://snl.no/rederansvar>

⁷⁹ Rt. 1973.1364 *Uthaug*

⁸⁰ Selvig (1977a) p. 9

narrow.⁸¹ The objective liability has been used in exceptional and rare cases.⁸² In the upcoming discussions, it is important to keep in mind that the objective liability is supposed to have a narrow scope of use.

3.3 Liability for collisions

Collisions between ships is regulated by chapter 8 of the Norwegian Maritime Code, which is based on the Brussels Collision Convention from 1910. Fault is an absolute prerequisite to make the shipowner liable for a collision.⁸³ The fault can however be caused by any member of the crew or by the owner himself.⁸⁴

A collision is defined as physical contact between ships, regardless of whether the ships are in motion, if one of the ships is moored or if it is caused by wind or stream.⁸⁵ The Convention, and therefore the Maritime Code, also applies where actual physical contact is absent. This includes sailing too close to moored ships with excessive speed and causing damage to another ship due to the swell that arises.⁸⁶

The main conditions that must be proven is consequently contact between ships causing damage. It must have happened due to negligence or fault of a helper. If this is proven, the shipowner is liable. Only a breach of duty of care that is causative to the damage can make the shipowner liable for the collision.⁸⁷

The burden of proof lies on the party seeking damages, the plaintiff. He must prove beyond reasonable doubt that the loss or damage has been caused by negligence of the other ship. To avoid liability the defendant must then prove that the negligence on his side did not cause any loss or damage.⁸⁸ For the shipowner to be relieved of the duty of care, he must demonstrate that the supposed negligent action complied with the required standard of care.⁸⁹

⁸¹ Selvig (1977a) p. 6

⁸² *Ibid.* p. 8

⁸³ Tiberg and Schelin, p. 107

⁸⁴ Falkanger and Bull, p. 190

⁸⁵ *Ibid.* p. 191

⁸⁶ Plinio Manca, *International Maritime Law*, 3rd Volume, Antwerp 1971 p. 72

⁸⁷ Baatz et al., p. 224

⁸⁸ Hill, p. 284

⁸⁹ Baatz et al., p. 224

The Norwegian Maritime Code § 161 establishes how compensation is split according to blame. Damage to ship, goods or person caused by a collision between ships where one party can be blamed, the ship at fault must solely compensate the damage. A negligent action done by a helper the owner is responsible for according to § 151, must be proved for the liability to take effect.⁹⁰

Furthermore, where both parties can be blamed, the damage shall be compensated according to the fault shown on either side. Where this is impossible, the total damage compensation should be apportioned equally to each party.⁹¹

Paragraph 162 regulates if the collision is caused by an accident, if it cannot be decided who is at fault or cannot be proved that one part acted negligent. Each ship must then cover its own damage.⁹²

3.4 Summary

The employers' liability leads to the shipowner being liable for any fault or neglect of his crew or helpers that lead to a collision or accident. The fault or neglect includes both an actual action as well as a failure to do something.

The objective liability has been used where no one can be blamed, but the ship collided with a fixed, land-based device due to technical failure. The shipowner is here liable, even though he or his crew is without fault.

Liability according to chapter 8 of the Norwegian Maritime Code is used where ships have collided. It is relevant for the compensation of damages whether someone is to blame for the collision or not. The Maritime Code regulates both cases where someone can be blamed as well as accidents.

Legislation regarding collisions between manned ships is quite straight forward, even though uncertain situations surely occur in these situations as well. The discussion relating to how

⁹⁰ Tiberger and Schelin, p. 110

⁹¹ *Ibid.* p. 111

⁹² Falkanger and Bull, p. 192

collisions between ships that rely less on interference from humans follow. In these cases, there are many interesting sides to the situations that might appear.

How will it be decided what makes an accident in these cases? Should everything be considered an accident because the ship is supposed to make its own decisions independently, or should nothing be considered an accident on the same grounds? The upcoming discussion attempts to answer this.

4 Liability for remote ships

The remote ship is an unmanned ship that will be controlled by a human operator in a control center ashore.⁹³ The ship itself is not advanced enough to make independent decisions regarding navigation or maneuvering. It does not contain the sufficient technology to sail self-reliantly and is therefore dependent of the human operating the ship from ashore. Because the ship is controlled by a human being, a fully functioning remote ship is likely to be waterborne within the next 3-4 years.⁹⁴

The remote ship will not have any crew members or a master onboard the actual ship, but a land-based operator will fill some of these positions. The shipowner will therefore still be liable for the operator's actions through different kinds of liability.

4.1 Employers' liability

The shore based operator has the same role as the shipmaster and fills many of his duties. The operator maintains an overlook of everything happening with the ship concerning navigation, maneuvering, sensors and general technology and machinery. The shipowner has the same kind of liability for the operator as for the master according to § 151.

It is however likely that the operator's functions exceeds the master's, because he is exclusively in charge. The operator is responsible for the whole journey and therefore fills the duties of any navigational crew on board a manned ship. Therefore, it might be more natural to compare the shipowner's liability for the operator with the liability for the crew and "others" in general, and not limit it by comparing it with the liability for the master. He is still covered by § 151 as he is performing his duties in service of the ship while deciding how the ship is operated.

The operator must be blamed for acting neglect or at fault for the owner to become liable for any loss or damage occurred due to this. For fault or neglect regarding the general navigation and plotting of the correct route, there is not much difference between a remote ship and a

⁹³ <http://www.unmanned-ship.org/munin/about/the-autonomus-ship/>

⁹⁴ <https://www.rolls-royce.com/products-and-services/marine/ship-intelligence.aspx#section-discover/smart-shipping>

manned ship. Because the operator has the full responsibility of the ship, his actions should always be “in service of the ship” and in relevance to his job and duties.

The operator ashore is fully dependent on technology to do a proper job. Accidents happening because of technical failures will therefore most definitely happen. Is the shipowner liable for these technical failures causing damages? He is the one responsible of keeping it up to standards and is also the one who decided to use that kind of products on his ship. It could therefore be tempting to make him liable for any failure or fault that happens due to technology.

The operator relies on visuals from radars, cameras and sensors to navigate and maneuver the ship. What happens when for example a camera or sensor fails? This can leave the operator with inadequate or wrongful information and lead to him making the wrong decision causing damage, without it really being his fault. Who is liable and must cover the damage of the innocent third party?

The question is whether this failure could have been avoided or not. It must have been impossible for the operator to prevent the technical failure for the shipowner to avoid liability. The third party must however be compensated for his loss. This is elaborated below under chapter 4.2 regarding product liability.

Since the operator maintains most of the responsibilities and duties needed on the ship, he is also responsible for making sure the ship itself is in up to standards. Machinery and equipment needed to navigate and control the ship is included in this. This is in accordance with § 131 of the Norwegian Maritime Code where the master is responsible for the ship's seaworthiness.

If a technical failure that could have been prevented, leads to a collision, the shipowner will be liable for damages to the third party due to normal employers' liability. It is classified as a helper acting negligent if the failure was noticeable and the collision therefore could have been avoided. This principle follows of the normal interpretation of § 151 regarding negligent or faulty actions.

The limit for being negligent must however be set quite low. If the operator had any chance of realizing there was a failure in the technology or machinery, the owner must be liable.

Where the failure originates from a defect in production and the operator had no way of preventing it, a product liability must be relevant. This is discussed below.

4.2 Product liability

The Norwegian law on product liability from 23 December 1988 number 104, initially would not allow damages caused by ships or other transportation vehicles to be treated by said law.⁹⁵ This exemption was however removed in the 1992 revision after Norway entered the EEA. The law then had to agree completely with the European Council Directive of 25 July 1985 (85/374/EEC) on liability for defective products. The Directive has no exceptions to damages caused by any means of transport.⁹⁶

Paragraph 1-1 (1) of the law on product liability makes a producer liable for damage caused by a product produced or sold as a part of his profession or other kind of business.

The devices in the ship that are relevant in this thesis must clearly be considered a product as they are loose goods implemented into another good, cf. § 1-2 (1).⁹⁷ In any case, the ship itself must be considered a product under the Directive as transport objects were no longer exempted after the law was revised to harmonize with the Directive. This shows that transport objects, even larger vessels, should be considered as a part of “all movables” under the Directive article 2.⁹⁸

The shipowner must be entitled to expect that the product functions without causing any damages or problems, under proper use and maintenance, for a certain number of years. The producer is liable for damages caused by a malfunction of his device where the shipowner or his crew could not avoid or prevent it, cf. § 2-1 (1). This is in accordance with the preparatory

⁹⁵ Ot.prp. nr. 48 (1987-1988), p. 48-49 and 138

⁹⁶ Ot.prp. nr. 72 (1991-1992), chapter 6.3

⁹⁷ See note 14 to The Product Liability Law § 1-2 by Magne Strandberg on www.rettsdata.no

⁹⁸ Vibe Ulfbeck, “Maritime Product Liability”, *Scandinavian Institute of Maritime Law Yearbook*, Oslo 2006 p.65-79 (p. 67-68)

work for the product liability law, where it is stated that so-called production errors lead to liability *unless* the damage is caused by unforeseeable use of the product.⁹⁹

Product liability can therefore be applied where a failure of the ship, its machinery or technical devices causes damages. Article 6 of the directive defines a product as defective “when it does not provide the safety which a person is entitled to expect”.

A wide stretched product liability will keep producers on edge and function preventively, making sure they do absolutely everything possible to keep their products at high standards. Because the operator is fully dependent of the correct information to make safe decisions, the producer should have strict responsibility regarding his own products.

The operator has little or no possibility at all to control the ship if the monitoring products fail, which would make it unfair towards the shipowner to be liable in these cases. This is supported by the preparatory work to the product liability law. It was here emphasized that a more advanced production created a greater risk of damage caused by products than earlier.¹⁰⁰ This was a risk the producers had to be responsible for.

On the other hand, it might be unfair for the producer to be responsible for damages he cannot control. It could be considered imbalanced and unjust to make the producer accountable for events that are out of his hands, such as a navigational error due to technology failure. He has no knowledge of how good the operator’s reactions and maneuvering skills are and whether a better reaction on that side could have prevented damage. Nonetheless it is his responsibility that the technology he supplies comes without defects.

The initial cause for damage in these cases is failure of technology. The producer must therefore be liable for any production error where the technical failure is the underlying cause of damage. It is however easier for the innocent third party to claim damage directly from the shipowner and not struggle to get through to the producer. It is a strong principle within tort that it must be considered how it is easiest for the innocent party to receive compensation. The shipowner can claim recourse from the producer for the damage he has compensated the third party for.

⁹⁹ Ot.prp. nr. 48 (1987-1988), p. 127

¹⁰⁰ NOU 1980: 29 Produktansvaret, p. 13

The producer is liable if a malfunction or defect originates from production. The shipowner can then claim recourse from the producer for damages to a third party in a collision, that he initially had to cover. The producer is responsible to make sure the product he supplies is without defects and works properly for its intended use. He is therefore the nearest to cover damages caused by a defect originating from production and must bear the risk of this.

The next question is if it is best to put a time limit for this, as can be seen in Norwegian trade law where the seller has full responsibility if the mistake shows within six months¹⁰¹, or a degree of seriousness of the malfunction. This will be discussed in the upcoming chapter.

If examinations of the failed device show that it could have been fixed or avoided by maintenance of the crew, liability will still fall on the shipowner. This also applies if the product has been used wrongfully. In this case, the shipowner must cover the damages of all parties involved. It is only natural that the shipowner bears the responsibility in these cases, when he, through the operator, still has the full responsibility of keeping the ship and its equipment seaworthy, reliable and up to date.

The shipowner's employers' liability will therefore be the same as for manned ships, unless it is clearly caused by a technical failure. The examination of the failed technical device will show if the shipowner or producer is the closest to cover the damages.

4.3 Objective liability

Objective liability due to a technical failure used to be considered an uncommon cause for liability for the shipowner.¹⁰² This will change when the unmanned ships are fully developed and in use since they are far more reliant of technical devices to navigate and maneuver the ship.

With remote ships the operator has diverse ways of navigating, but all depends on different types of technology, such as camera transfers via satellites. The operator is not able to "stick his head out the window" to get a clearer overlook if something appears blurry or insufficient.

¹⁰¹ Law 21 June 2002 number 34 on Consumer Rights, § 18

¹⁰² Erling Selvig, *Det såkalte husbondsansvar*, Oslo 1968 p. 14

He must rely on repositioning the cameras or possibly get a better view by sending up a drone or similar. This is a good back-up solution, but it might take some time to make the adjustments and an accident can happen in the meantime. The number of situations for the shipowner to be liable for due to technical failure, will therefore most likely increase.

Previously the shipowner could become objectively liable due to company responsibility for technical failures of the ship or machinery. This type of technical malfunction led to liability until 1969.¹⁰³ The *Baltic* case¹⁰⁴ then made sure the terms were altered and extended the scope for objective liability.

In *Baltic*, the Norwegian Supreme Court made the shipowner liable for the death of a crew member hired to unload the boat by the buyer of the transported goods. The buyer's crew used the ship's equipment and cranes. He was killed by a wrongfully rigged technical equipment used to unload the ship. The Supreme Court decided that the shipowner was liable regardless of whether anyone could be blamed because he had made the equipment available to the crew.

This specific case therefore led to a wider spread objective liability than had been normal. The objective liability now included liability for technical equipment, and not only technical failure of the machinery or ship. It was however somewhat overruled by the later *Uthaug* case¹⁰⁵.

In *Uthaug*, a submarine collided with a fishing trawler's trawl under water, but the Norwegian state avoided objective liability for the damages on the trawler. Because the collision happened with the trawl, it was considered beside the definition of "ship" in the Maritime Code. The reason behind this was to upkeep the objective liability as a narrow liability for exceptional cases, even though it had been extended with the *Baltic* case.¹⁰⁶ The *Uthaug* case was not considered extraordinary enough by the judges.

¹⁰³ Erling Selvig, "Mot objektivt rederansvar? Det objektive bedriftsansvars anvendelse i sjøfartsforhold.", *Tidsskrift for rettsvitenskap*, Oslo 1970 p. 225-253 (p. 231)

¹⁰⁴ Rt. 1969. 1308

¹⁰⁵ Rt. 1973. 1364

¹⁰⁶ Erling Selvig, "Bedriftsansvaret i sjøfartsforhold", *Tidsskrift for rettsvitenskap*, Oslo 1977 p.413-437 (p. 418-419)

In conclusion, it can therefore be said that the current objective liability for shipowners can be used where damage is caused by failure, weakness or imperfection in the ship's technical equipment.¹⁰⁷ In two out of three cases where objective liability was applied, the collision happened with a land-based device. It is therefore unsure how far the liability extends in other types of collisions. It is also uncertain how the courts will judge on new technology, as most of the case law regarding this originate from the 1970s and 1980s.

The conclusion is based on technical failure as an uncommon cause for damages. The ships become more reliant of technical solutions since they are unmanned and it is expected that the number of damage caused by technical failure also will increase. Even though the removal of humans on board most likely will lead to fewer accidents¹⁰⁸, there are other factors that will lead to accidents and damages. Technical failure is one of them.

The objective liability of today can be applied where the ship damages quays or other land-based devices due to a technical failure of the machinery.¹⁰⁹ When most of the accidents involving ships most likely will be caused by technical failures, should the objective liability be carried forward? Should it be extended to cover all kinds of collisions and not just with land-based fixtures? Or should it be disregarded?

The most set base of objective liability is collisions with land-based devices due to technical failures, seeing as it has been determined by case law. The reason behind creating an objective liability in these cases, was because it was damage without fault or negligent behavior from the shipowner, his crew or helpers and therefore ended up outside of the owner's responsibilities.

Because the operator's alternative actions are limited due to the reliance on technical equipment, it could be fair to relieve the shipowner of objective liability where damage to a third party is caused by technical failure. The operator has close to no chance of validating the information he receives from the navigational and maneuvering equipment and is therefore forced to base his decisions on the information he receives.

¹⁰⁷ Selvig (1977a) p. 30

¹⁰⁸ Rødseth and Burmeister p. 9

¹⁰⁹ <https://snl.no/rederansvar>

On the other hand, it can also be considered an argument for the shipowner to maintain the objective liability where accidents happen due to technical failure. It is after all his own decision to completely trust this kind of equipment. It is also easier for the damaged party to go straight to the shipowner to claim compensation. This must be weighted as the innocent third party should not have to go through a lot of trouble to be compensated for damages he could not avoid.

If the objective liability should be excluded as a liability option, it is possible to make the product liability take over. The product liability must not extend too far since it is the shipowner who is responsible for the running and general operation of the ship. What must be decided is the fine line between employers' liability and objective liability and between product liability and objective liability for the shipowner.

It can be argued that because the product liability is not very extensive today, it should not be for these ships either. It is important to keep in mind that the technology will have a bigger role on these ships. The operator will be reliant of the products and have little way of avoiding errors or faults that cannot be prevented through maintenance or repairs. This is a significant reason for placing a bigger part of the liability on the producer of the technical components.

Where a technical failure causes a collision between the ship and for example a quay, the question is if it should be considered what kind of failure led to the damage. Could it have been avoided by inspections and maintenance? Had the operator had any way of knowing or was it deemed to happen? Or did the defect originate from production and is therefore covered by warranty?

In case of a technical failure that neither the owner or anyone he is responsible for could fix or know of, the supplier of the specific device must be liable. It is only natural that as technology forms a bigger part of the industry, the suppliers of vital parts and devices of the ship must carry a bigger part of the liability. This is also in accordance with the warranty product suppliers offer today when the defect shows within a certain number of years. An innocent third party that has been damaged, must however have the right to claim compensation from the shipowner, whereas the shipowner receives recourse from the producer.

Where the damage is caused by a failure that does not originate from a production defect, but could have been avoided with the right inspections and controls, the shipowner must be liable. But this will be covered by negligent behavior by the employers' liability and is covered by § 151.

In other words, the need for objective liability will minimize. It will be more relevant to operate with employers' liability and an extended product liability, rather than employers' liability and objective liability. Because a technical failure will cause accidents more frequently than before, there should not be a specific liability for collisions with quays or other land-based devices. These kinds of accidents should be incorporated into other liability rules.

The shipowner must have the burden of proof for the failing technical device to avoid liability for negligent behavior from the operator or crew. There must be a strict policy for the operator to control, repair and report any dysfunction, error or unordinary conduct of the ship.

The bar for being considered negligent should be set relatively low to make sure the product liability is not extended unfairly far. Any lack of reports or controls should lead to the operator being considered negligent and hence trigger the employers' liability for the shipowner.

4.4 Liability for collisions

The regulations in chapter 8 of the Norwegian Maritime Code regarding ships colliding, is based on the 1910 Brussels Collision Convention. Paragraph 161 and 162 regulates culpable or accidental acts causing collisions. These regulations are relevant here as well, because there is a person ashore navigating the ship.

Where it can be decided that one party is to blame, due to fault or negligent behavior of the operator, the owner's liability is clear. This could include failure to supervise and maintain the ship's equipment, like sensors, satellites or cameras. As I have concluded earlier in the thesis, the operator will take over the shipmaster's responsibility of keeping the ship seaworthy both

before and under the voyage according to § 131. It is however the ship causing the damages that must prove that the crew is without fault.¹¹⁰

But what happens where this cannot be decided? How can it be determined what makes an accident where the operator is reliant on technology to do his job? Should it be considered an accident where the technology fails and hence let each party be liable for his own damages?

The Supreme Court has in several occasions considered a technical failure an accident, and let each ship cover its own damages. Therefore, it could be wise to let this practice continue and let technical errors where the operator is without blame, be considered accidents. On the other hand, these cases are from the 70s and 80s and the technical errors they experienced, is different from the kinds unmanned ships will experience. At least to a certain degree.

In the *Marna Hepsø* case the ship had collided with other boats while trying to moor at a quay. The assumed reason behind the collision was a malfunction of the reverse engine that none of the crew could be blamed for. The shipowner was therefore released of paying any compensation.

The same goes for a case from Bergen District Court¹¹¹ where a spring in the automated steering mechanism broke. This was considered an accident and even though the crew had made other blameworthy mistakes, they were released of responsibility.

This shows that it was mostly failures of the machinery that was considered an accident in relation to § 162. However, as the ships become more reliant of technical equipment, it will become increasingly important and should be considered equally important as the general machinery.

If the cameras or sensors fails and the ship's technology thereby is cut off from the operator, the ship should end up in a fail-to-safe mode.¹¹² This should include warning other ships of what has occurred so any contact can be avoided. If a collision happens even after these

¹¹⁰ This is applied in for example Rt. 1971 s. 843 *Marna Hepsø*, where the ship causing the damage had to prove that the collision happened due to a technical failure that the crew could not have prevented

¹¹¹ ND 1980. 277 (Bergen)

¹¹² MUNIN (2016) p. 11

precautions have been made and the other ship has not acted negligent, both shipowners should carry their own loss.

The same goes for where the blame cannot be put on one side, as is regulated in today's § 162 of the Maritime Code. The current legislation regarding collisions, seems very suitable to remote controlled ships as well as the present manned ships.

Where negligence or fault can be proved, the specific shipowner should be liable, cf. § 161. Where blame cannot be appointed, both owners should be responsible of their own loss, cf. § 162. As should be the case where the damage or loss clearly happened due to an accident where no one can be blamed.

5 Liability for automated ships

The automated ship is characterized by its automated computer-based decision-making system.¹¹³ The ship's advanced decision support system on board undertakes all operational decisions independently without any intervention of a human operator.¹¹⁴ There is not an operator ashore deciding the next action, but computers, sensors and navigation systems make sure the ship follows the planned route within its allowed deviations.¹¹⁵

The ship will follow a set plan of the route that has been plotted into the computer. There will also be alternative actions, should any unexpected events occur, for example a sudden change of weather or a traffic hazard.¹¹⁶ This makes the ship's computer in charge of making the final decision whether the ship should diverge from the original plan or not. There are high demands and requirements for the technology to solve things as quickly and satisfactory as a human operator.

5.1 Employers' liability

Whenever there is someone ashore responsible for plotting the route and coming up with different suitable alternatives, they are covered by the owner's employers' liability. As long as they are performing their duties in service to the ship and in relation to their job, the owner is liable for their actions. This is in full accordance with § 151 and the operator is a part of the "crew".

However, since it is a computer that makes the final decision of the appropriate act within the previously set limitations¹¹⁷ should an unforeseen situation occur, the employers' liability must be discussed in this relation. An unforeseen situation can include steering away from crossing ships, changing the route because of an upcoming storm or other unexpected perils.

Even though it might sound farfetched to consider a computer as a helper or part of the crew, it is important to remember that the computer is developed for the exact purpose of fulfilling

¹¹³ <http://www.unmanned-ship.org/munin/about/the-autonomus-ship/>

¹¹⁴ *Ibid.*

¹¹⁵ MUNIN (2016) p. 8

¹¹⁶ *Ibid.*

¹¹⁷ <http://www.unmanned-ship.org/munin/about/the-autonomus-ship/>

the role of a shipmaster. The initial instructions are also set by a human operator. There is a willpower behind the computer originating from a part of the actual human crew, which will naturally be in accordance with § 151 of the Maritime Code.

It is also highly relevant that everything the computer does is an expression of the shipowner's will, which is also the case for the rest of the crew and helpers. Its job is to perform the same duties as a shipmaster would on a manned ship and an operator on a remote ship. The computer therefore acts "in service of and in relation to the ship" and can be characterized as "others", cf. § 151.

The expression "others" has not been defined as a human. It has merely been said to include "others who have an association to a certain ship and performs duties in relation to the running of the ship"¹¹⁸. The computer will perform according to the shipowner's best interest and it is therefore natural that he is liable for the computer and its actions on equal terms as other crew members. With a broad interpretation of the word "others", it can therefore include a computer and § 151 is applicable.

If the computer makes a decision that leads to a collision and it can be defined as fault or negligent behavior, the shipowner is liable. The computer must have acted thinking it was the right decision to make, for it to be classified as a faulty or negligent action. The data prior to the collision is important for the examination of the decision-making process. The desired effect of the decision should show whether the computer should be considered negligent. If the unintended decision leads to a collision due to a weakness in the software or algorithms that originates from a defect in production, the producer is liable for the damages.

The shipowner has a strict responsibility of keeping the technology and systems of the ship under observation and preparing the computer of any alternative actions if anything unexpected happens either with the technical devices or at sea, which leads to dismissal or alteration of the original plan. This responsibility will of course be applicable through whichever hired operator is set to program the computer.

¹¹⁸ See note 243 to § 151 in the Norwegian Maritime Code by Camilla Bråfelt on www.rettsdata.no

Where the collision is caused by a defect in the computer or ship machinery that could or should have been noticed through surveillance and maintenance by the computer or operator, and in extension the owner, he must be liable. The same liability applies where the shipowner or his helpers has failed to keep the devices at the proper standard.

However, there must be an exception for accidents happening due to technical failures the operator or owner did not know of or could prevent. Where the technology simply fails and the shipowner had no way of preventing it through maintenance or repairs, a product liability should take effect. It will be applicable where the shipowner had no chance of expecting these failures of machinery or where it is caused by short circuit due to defect components originating from production.

The possibility is however only for the shipowner with the damaged products to claim recourse. Third parties experiencing damage indirectly caused by said owner, can demand compensation from the owner without having to reach out to the producer.

Because the automated ship is even more reliable of technology than the remote ship, the producer of the technology must be responsible for malfunctions of devices that are inevitable for the shipowner. In these cases, the producer must compensate the owner for any damages that arise. This will be further elaborated under chapter 5.3.

5.2 Objective liability

Much of the discussion regarding objective liability for automated ships will be the same as for remote ships. As previously mentioned, objective liability has mostly been used in the case of collisions between ships and land-based installations caused by a technical failure in the ship's machinery.

The objective liability was made to regulate a very narrow scope of liability for manned ships. An important difference between today's ships and the remote and automated ships is the extreme dependence on technology. This distinction must be discussed in relation to the objective liability.

Where the ship is reliant of technology and any human interference is reduced to a minimum, the previous limited use of objective liability might suddenly become common. Because everything is computer based, many of the human errors leading to accidents with manned ships today will be eliminated, but accidents can still be caused by a failure in the technical equipment. Accidents due to failure in technology or machinery will become the rule, rather than the exception.

If the objective liability should be used in the same cases as the Supreme Court decided in the 1970s and 1980s, it could lead to a far more extended objective liability than originally meant. Because the courts have applied this kind of liability in judgements in a very restricted manner, an excessive use does not seem appropriate.

It is therefore more relevant to minimize the objective liability and replace it with employers' liability where applicable, product liability where suitable and collision legislation according to chapter 8 of the Maritime Code where it is fitting. As explained above, the employers' liability can include the computer's actions without particular difficulties. After all, there is a person who has plotted all the information the computer bases its decisions on¹¹⁹ and the computer is executing the shipowner's commands and wishes.

The current objective liability for manned ships appears, in my opinion, complex and unpredictable. If it were to be continued with the remote and automated ships, it would become too widespread and would not lead to good solutions, neither for the owners of the land-based devices nor for the shipowners.

It will be especially difficult for the shipowner to predict his liability situation if a collision or incident happens due to technical failure. It is therefore best to disregard the objective liability and not differentiate if an accident happens due to technical failure, regardless of whether the collision is between a ship and a land-based installation or two ships. Considering that the objective liability has not got a very strong hold or agreed opinions in neither Norwegian case law or legal theory, it is not likely that it would leave an empty, legislative gap of any kind.

¹¹⁹ MUNIN (2016) p. 2

Objective liability for the shipowner has a marginal position in the international environment and other shipping nations as well.¹²⁰ This is also an argument for eliminating the objective liability. Uniform legislation in the maritime industry is in everyone's favor and it is highly beneficial for the international legal environment to be as harmonized as possible.

5.3 Liability for collisions

Liability for collisions is today regulated by chapter 8 of the Norwegian Maritime Code.

Where a computer is responsible for maneuvering and navigating, one of the questions is if everything should be considered an accident according to § 162 because the computer makes its own decisions. How can it be determined who is to blame if two automated ships collide?

The data from the computer concerning weather situations, navigations, challenges etc. must be carefully examined to be able to figure out the situation prior to the accident. Was the computer's maneuver within the preset scope of action?

As previously stated, someone will plot the route and alternative actions into the computer. This makes someone responsible if an accident should occur, which rules out that everything should be considered an accident.

Since someone is in charge of setting the route of the ship, the same person will be responsible if any miscalculations in the route or negligent alternative actions causes an accident. All this electronic information will therefore be very important to analyze to be able to place blame.

If an accident is caused by a miscalculation or negligent action from the operator in charge after facing an unexpected event, the shipowner must carry the liability for damages to both ships involved. This is in accordance with § 161 in the Norwegian Maritime Code. It is only fair that the ship without blame, which has not acted in a culpable or negligent manner, is free of damages.

The limit for what should be considered negligent behavior should be placed relatively low,

¹²⁰ Selvig (1970) p. 253

equal to the employers' liability for remote ships. Any absence of acting where the ship needs assistance or fails to make the desired or appropriate maneuver, should be considered negligent. It should also apply if the computer fails to recalculate the route if it encounters an unanticipated incident and therefore cause an accident. The shipowner should here be liable due to negligent behavior in accordance with § 151, cf. § 161, as would be the case for manned ships as well.

It will also be a question of what should be considered an accident where each party is responsible for its own damages where the automated ship is fully dependent on the technology to function. What is the limit for what should be considered an accident where the technology fails, making the shipowner liable for damages? What can be considered a failure of the product and therefore be included in the product liability?

In my opinion it will be a good solution to base this on a time limit for the products in this case as well. This is well within the existing norms regarding warranty and liability for the producer or shipbuilder.¹²¹ Because the products are more advanced and supposed to handle incidents by themselves within certain limitations, the time limit should be shorter than with the remote ships. I am basing this on the fact that this will leave a greater responsibility with the shipowner to go in and check on the vessel, its computers and technical devices regularly. This might work as an incentive and not make the shipowner dismiss the ship after it set sail, because it is basically supposed to function on its own.

The producer should be liable and offer a warranty for his products a limited number of years. The shipowner must then act as soon as possible following a technical failure within the set number of years to be able to claim recourse from the producer. The number of years can be dependent of the expected lifespan of the product or ship. It might not be relevant to set it too high because technical products have a way of becoming outdated fast and if the ship should be up to date, it might need to replace the products regularly anyway.

This will make it easier for the shipowner to predict his liability and legal stand in case of an accident or collision. It is also considered fair and in accordance with common sense as the shipowner will become dependent of these products to be able to compete with others on fair

¹²¹ <http://www.gard.no/web/updates/content/20822944/warranty-claims-in-shipbuilding-contracts>

grounds. The producer is liable for delivering a product that is fit for its purpose, which is in harmony with the reflections behind the product liability law. The producer is also the closest to bear the risk of a malfunctioning product originating from production. These are matters the shipowner shall not expect nor accept.

The technical failure of the ship, its devices or machinery, must therefore be examined and the assessment will depend on whether it could have been avoided by the shipowner or operator. If the failure had been noticed, but the operator did not have time to inspect it closer or repair it, the blame must of course lie with the shipowner.

The liability for collisions for automated ships is therefore quite similar to the liability for remote ships. Unless the accident is caused by negligence or fault by the operator overseeing the computer in charge of navigating and maneuvering, the important element will be whether the failure could have been avoided by the shipowner. If it could have been avoided, the shipowner will once again be liable due to negligent or faulty behavior and will be covered by the employers' liability.

If the technical failure and thereby the accident and damage, could have been avoided by stopping the ship, repairing the failure or any other appropriate and feasible measure, the shipowner must be liable. The shipmaster is responsible of keeping the ship up to all safety and technical standards and demands according to § 131, which in extension makes the shipowner responsible, cf. § 151. This can be fulfilled through an operator in charge of monitoring the ship as well as being available in case the ship needs human intervention.

If the shipowner or operator could not prevent or avoid technical failure, nor know of it, and this leads to a collision, the producer is once again liable, as long as the warranty is applicable. The owner should be able to trust that the product he has obtained is safe for use. A product on the market should rightfully be presumed to be reasonable fit for its intended purpose.¹²² The third party will also here be able to claim compensation from the damaging party who can demand recourse from the producer.

¹²² Francis O'Brien, "The history of products liability", *Tulane law review*, Volume 62, Numbers 2 & 3, February 1988, p. 313-324 (p. 320)

I do however want to emphasize that if the failure could have been avoided by any mean, the shipowner will be liable according to § 151 by failing to act with proper due diligence. This could for example include the available operator ashore stopping the ship and locking it down to avoid a collision. The owner would be forced to have crewmembers available to operate ashore. In the start phase of automated ships, this would nonetheless be a positive contribution until there is more knowledge of how the ship will function in different situations.

Should the failure of the technical device or machinery lead to an accident where responsibility cannot be placed with neither the owner, operator or producer, each party must cover his own damage, cf. § 162. In these cases, it must have been impossible for the shipowner or operator to know of or avoid the failure and producer must be without blame. This is in accordance with the previously mentioned precedence on accidents caused by technical failure.¹²³ Like the remote ship, the owner should not be liable for accidents and damages that are caused by technology he is absolutely reliant of and could not have prevented.

The automated ship alike the remote ship, functions well with the existing rules of collisions and accidents. It will however be a strong need to conclude with what the product liability should cover and what the shipowner should have liability for. I have proposed to draw the line in a way I consider fair and appropriate.

This does however include the elimination of an objective liability. But as previously stated, this should not lead to any severe issues or problems seeing as it is not a very strong, established part of Norwegian maritime liability and not commonly applied by the courts. In my opinion it could be replaced by the more relevant employers' liability and product liability as technical failures on ships will happen more frequently.

¹²³ Rt. 1971. 843 *Marna Hepsø* and ND 1980. 277 (Bergen)

6 Liability for autonomous ships

According to MUNIN's outline of the development of ships, the autonomous ship will be a combination of the remote and automated ship. This means that it contains qualities from both ships and the liability will therefore be a combination of the two. An autonomous ship is supposed to function as an automated ship, but has an operator ashore as backup in case something occurs that the ship's computers cannot handle. The appropriate liability depends on how the ship is run when the collision or accident happens, consequently collecting sufficient data is a major part of deciding the liability.

6.1 A combination of liabilities

Since the ship is a combination between a remote ship and an automated ship, the liability will differ slightly depending on how the ship is controlled. When the ship is controlled by a computer, the liability for accidents concerning automated ships must apply. If the computer in control cannot decide on an appropriate action, it reaches out to an operator, which makes liability of the remote ship applicable.

If an accident happens and it is uncertain which liability is applicable, it must be examined what happened in the minutes and seconds before the collisions. It will be of importance which driving mode was applied and whether an operator was in charge. This kind of data must be logged and saved. It must also include notices of any failure of the systems and how these failures were reacted to. Even though the shipowner owns the data, it is crucial that producers and insurers can access it on certain terms.¹²⁴ This will make sure there is no doubt regarding who is liable and must pay compensation for the caused damage.

Since the autonomous ship is highly reliant of technology, it increases the risk for the producer to become liable as there are more technical devices that could contain a defect. This is a benefit and leads to less responsibility for the general marine insurers, but increases the responsibility and obligations for the maritime product liability insurance market.¹²⁵ In my

¹²⁴ Alison Newstead, *The Autonomous Vehicle: A Product Liability Perspective*, Shook, Hardy and Bacon International LLP, p. 23

¹²⁵ <http://fairplay.ihs.com/safety-regulation/article/4284176/legal-risks-of-autonomous-shipping-highlighted>

opinion it is only fair as the ship's safety will rely on different kinds of software, devices and machinery and defective autonomous software could cause severe damage.¹²⁶

6.2 Regarding technical failures

If the ship experiences any sort of technical failure while it is controlled by an automated computer, it is supposed to reach out to the support center ashore where an operator is ready to take charge and maneuver the ship safe to shore. If this then leads to an accident of any kind, the shipowner will end up being liable according to the employers' liability for remote ships.

The same principle will apply if the operator is not available and the ship ends up in a "fail-to-safe"-mode. The shipowner will still be responsible for a collision due to the employers' liability, as discussed under chapter 5. The computer is after all fulfilling the owner's demands regarding navigation and maneuvering. An exemption to this is of course if the meeting ship is at fault and could have avoided the collision by alternative navigation.

Should the ship encounter a technical failure where the operator is not able to communicate with the ship and take control over the navigation and maneuvering, the liability will rely on whether this failure could have been prevented. If it could have been avoided, the shipowner will be liable for the total damage, as is regulated by chapter 8 of the Norwegian Maritime Code. If the shipowner cannot be blamed for the failure and the same applies for the meeting ship and the producer of the failed device, it must be considered an accident according to § 162 of the Maritime Code. Each party must then cover its own damage.

The product liability will depend on what is considered a normal lifespan for the technical devices and whether the defect is covered by warranty. The producer is liable for damage caused by a defect in his product within a certain number of years and if it originates from a production error.

Regardless of blame on the producer's side, a damaged third party can always seek compensation directly from the shipowner. This is merely to make his situation easier and to

¹²⁶ Njord Law, *The future of transport*, Njord News – Maritime and transport, p. 5

make sure it harmonizes with the general principles of tort legislation. It is fair that it is up to the shipowner to demand recourse from the producer if a technical failure of his ship is the cause of damage.

A relation can be drawn to autonomous cars. Volvo has stated that since they are the suppliers of the technology, they will also be liable for everything the car does in autonomous mode.¹²⁷ This is limited by only accepting liability if there is a flaw in the car's design or software. Liability will not be accepted if damage is caused by a customer using the technology wrongfully or if a third-party vehicle causes the crash.

This outlook on liability for autonomous vehicles is in accordance with the product liability I have drawn up. It is fair towards the parties involved and in harmony with the objectives and principles of the product liability law. An important side note to this is the evaluation of the Directive on liability for defective products that is currently arranged.

The EU started an evaluation in June 2016 to be completed in July 2017. It will be assessed how fitting the Directive on product liability is when it comes to new technology, software, apps and "smart products". Amongst this they will investigate whether an unintended, autonomous behavior of an advanced robot could be considered a "defect" according to the Directive.¹²⁸ The conclusion of this evaluation will naturally be a strong indicator of how far the product liability should extend for autonomous vehicles.

The objective liability is here excluded and covered by the product liability during a certain amount of years depending on the warranty or the collision legislation if the crew is without fault. Regardless of the ship colliding with either a land-based device or another ship, the shipowner is not liable if it was caused by an accident. For a collision to be considered an accident, all the involved parties must however be without fault, including the producer. The shipowner will have to prove that it was completely out of his hands and blame cannot be put on his side.

As with the other two types of ships, the limit for liability should be strict negligence or culpa.

¹²⁷ Newstead, p. 19

¹²⁸ European Commission, *Evaluation and Fitness Check Roadmap*, regarding the Directive concerning liability for defective products, p. 4

If the shipowner could prevent the loss, he is liable, regardless of whether the ship was maneuvered by a computer or operator.

The liability according to remote and automated ships will hence be applicable on the autonomous ship as well. The difference lies in the combination of the two types of liability. This depends on the situation in each case and whether the ship was under control by a remote operator or an automated computer. Where there is a shift of who is navigating the ship, there will be a shift in liability. The liability will therefore differ in each case and depends on the form of control.

7 In conclusion, the extent of liability for the shipowner

Through this thesis, I attempted to examine how well the current shipowner's liability for manned ships fit the different types of unmanned ships. My basis for comparison is the existing employers' liability, objective liability and the liability for accidents according to the Norwegian Maritime Code.

I had a hypothesis that the rules might become less fitting as the ships became increasingly automated and based on technology. This theory was for the most part proven wrong as liability to a certain extent is as suitable for the remote and automated ship as it is for the manned ship. This will however require a broader law interpretation than might be comfortable for some, so a revision of the laws is necessary.

7.1 Employers' liability

Employers' liability will have to be extended somewhat to cover the computer as an employee. This does not cause any significant problems because the definition of what should be considered "an employee" must be altered as society changes and challenges the existing definitions.

The operator responsible for navigating and maneuvering remote ships, is covered by employers' liability by being a human operator working directly for the shipowner. Even though he is localized ashore, he is in charge of the ship due to technology. Because technology is a big part of navigating and maneuvering, the product liability can also be applied in certain cases, as reviewed above.

The computer in automated ships should quite naturally be included in what the employer must be liable for. The computer only performs the operator's, and therefore in extension the shipowner's, demands and wishes. It is therefore a part of "*others who perform services in duty to the ship*" in § 151 of the Maritime Code.

7.2 Objective liability

When the remote and automated ship become a natural part of the shipping industry, the causation behind the need for objective liability, “technical failure”, will become more frequent and the scope will no longer be reserved for the exceptional cases.

Objective liability originates from case law and is meant for accidents and collisions between ships and land-based devices caused by technical failure. As the development of modern ships progresses, making the ships and operators more reliant of technology, the chance of an accident caused by a technical failure is more likely than before.

The modern ships do not have a crew onboard and it is most likely that an accident or collision is caused by a technical failure in either the surveillance equipment, sensors or general navigation devices. Therefore, it is more practical to have a more specific legislation to handle all kinds of technical failures leading to accidents and collisions, rather than separating the different cases according to what the ship collides with. A technical failure should be treated the same way regardless of whether the ship collides with a quay or another ship.

In my opinion, it is therefore more sensible to eliminate the objective liability due to technical failure and rather incorporate it into the other forms of liability. In the discussion above, I attempted to show how the employers’ liability and the liability in chapter 8 of the Norwegian Maritime Code and if suitable, the product liability, can absorb the objective liability.

This does not only make the shipowner’s liability more focused and precise, but will also make the liability situation more predictable for the shipowner as it has varied where the courts apply objective liability.

7.3 Liability for collisions

Chapter 8 of the Norwegian Maritime Code regulates collisions and accidents between manned ships. It can also regulate collisions between remote and automated ships without major complications.

Like employers' liability, the definition of what should be encountered into the liability of chapter 8, i.e. how extended it should be, must be reconsidered. It might not be part of the natural definition that a computer is "blameworthy" because it is a technical device. However, when considered in relation to § 151, it can be to "blame" and is therefore in accordance with the legislation in chapter 8.

If the computer in charge of the automated ship makes the wrong calculations and ends up in a collision or accident, it is clear that the computer is to blame. The shipowner is in extension at fault and therefore liable for the damages of the other party. It is however important to be aware of the possibility of a flaw in the software's algorithms originating from the production. In those cases, it might be relevant with product liability.

It can be difficult to define anything as an accident where each party must cover its own loss, when a computer makes the decisions. Where the accident is caused by a technical failure the computer and crew could not have prevented or avoided and the producer of the failed device is without blame, it is an accident and each ship must cover its own damages.

Collisions that are not caused by accidental technical failure can very well be covered by the regulation regarding accidents in § 162 as it is today.

7.4 Summarized

As the discussion above has shown, the existing legislation regarding shipowner's liability for manned ships is fitting for unmanned ships as well. A revision should be done to update the definitions and make it more suitable to fit the new, unmanned ships. The terminology will in any case need an update as technology evolves and becomes more advanced.

As society progresses and technology makes up a bigger part of both the working as well as everyday life, definitions of what should be considered an employee, must be broadened. It must also be decided what an employer should be liable for as computers become more autonomous and make independent decisions. Legislators must meet this development and keep the relevant laws updated to make sure the society continues onward.

References

Articles

AAWA, “Remote and Autonomous ships – The next steps”, *Rolls-Royce Marine*, 2016a

AAWA, “Autonomous ships – The next step”, *Rolls-Royce Marine*, 2016b

Blanke, Mogens, Michael Henriquez, Jacob Bang, “A pre-analysis on autonomous ships”, *Danish Maritime Authority and the Technical University of Denmark*

Dry Stopford, Martin, “How shipping has changed the world & the social impact of shipping”, *Global Maritime Environmental Congress*, 2010

IMO, “A concept of a sustainable maritime transportation system”, *Sustainable development: IMO’s contribution beyond Rio+20*, 2013

Mellby, Christian Svane, Agatha Rialland, Even Ambros Holthe, Erik W. Jakobsen, Atle Minsaas, “Maritim næring i det 21. århundret – prognoser, trender og drivkrefter”, *Menon-publikasjon nr. 11*, 2016

MUNIN, “Research in maritime autonomous systems project results and technology potentials”, 2016

O’Brien, Francis, “The history of products liability”, *Tulane law review*, Volume 62 numbers 2 & 3, February 1988 p. 313-324

Rødseth, Ørnulf Jan and Hans Christopher Burmeister, “Developments toward the unmanned ship”, *MUNIN*, 2012

Selvig, Erling, “Mot objektivt rederansvar? Det objektive bedriftsansvars anvendelse i sjøfartsforhold”, *Tidsskrift for rettsvitenskap* (Oslo 1970) p. 225-253

Selvig, Erling, “Rederansvaret. § 3. Objektivt rederansvar.”, *MarIus* nr. 20 (Oslo 1977a) p. 1-32

Selvig, Erling, “Bedriftsansvaret i sjøfartsforhold”, *Tidsskrift for rettsvitenskap* (Oslo 1977b) p. 413-437

Ulfbeck, Vibe, “Maritime Product Liability”, *Scandinavian Institute of Maritime Law Yearbook* (Oslo 2006) p. 65-79

Books

Baatz, Yvonne et al., *Maritime Law*, Third edition (Oxon and New York 2014)

Baughen, Simon, *Shipping Law*, Sixth edition (Oxon and New York 2015)

Brækhus, Sjur, *Rederens husbondansvar* (Göteborg 1954)

Falkanger, Thor and Hans Jacob Bull, *Innføring i Sjørett*, 6. utgave (Oslo 2004)

Hill, Christopher, *Maritime Law*, Sixth edition (London 2003)

Manca, Plinio, *International Maritime Law*, 3rd Volume (Antwerp 1971)

Selvig, Erling, *Det såkalte husbondsansvar* (Oslo 1968)

Tiberg, Hugo and Johan Schelin, *On Maritime & Transport Law*, Fifth Edition (Stockholm 2016)

Conventions

The Convention for the Unification of Certain Rules of Law with respect to Collisions between Vessels

The Convention on the International Regulations for Preventing Collisions at Sea

The International Convention on Civil Liability for Oil Pollution Damages

The International Convention of Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea Convention

Judgments

Rt. 1921. 519 - *Neptun*

Rt. 1952. 1170 - *Sokrates*

Rt. 1969. 1308 - *Baltic*

Rt. 1971. 843 – *Marna Hepsø*

Rt. 1973. 1364 - *Uthaug*

ND 1980. 277 (Bergen)

Laws and Directives

Law 21 June 2002 number 34 on Consumer Rights

Law 23 December 1988 number 104 on Product Liability

Law 24 June 1994 number 39 - the Norwegian Maritime Code

EU Directive 85/374/EEC concerning Liability for Defective Products

Preparatory work

Meld. St. 33 (2016-2017) Nasjonal transportplan 2018-2029

NOU 1980: 29 Produktansvaret

Ot.prp. nr. 48 (1987-1988)

Ot.prp. nr. 72 (1991-1992)

Travaux Préparatoires of the 1910 Brussels Collision Convention

Presentations

European Commission, *Evaluation and Fitness Check Roadmap*, regarding the Directive concerning liability for defective products:

http://ec.europa.eu/smart-regulation/roadmaps/docs/2016_grow_027_evaluation_defective_products_en.pdf

Bertram, Volker, *Towards the Unmanned Ship*, DNV GL:

<https://www.ntnu.edu/documents/20587845/1266707380/UnmannedShips.pdf/e60834b0-b0f7-4d61-b368-3ee38f829afc>

Newstead, Alison, *The Autonomous Vehicle: A Product Liability Perspective*, Shook, Hardy and Bacon International LLP:

[https://static1.squarespace.com/static/564c7074e4b0aeb501e3f749/t/582b15b0440243c12b32c76f/1479218616816/Shook+Hardy+Bacon+091116+\(002\).pdf](https://static1.squarespace.com/static/564c7074e4b0aeb501e3f749/t/582b15b0440243c12b32c76f/1479218616816/Shook+Hardy+Bacon+091116+(002).pdf)

Njord Law, *The future of transport*, Njord News – Maritime and transport:

http://njordlaw.com/wp-content/uploads/2016/11/fremtidens-transport_-uk.docx.pdf

Webpages and online articles

ASV Global, *Industry Code of Conduct for Maritime Autonomous System Launched*,

<https://www.asvglobal.com/industry-code-of-conduct-for-maritime-autonomous-systems-launched/>, accessed 03.05.17

BDP International, *Ship operators explore autonomous sailing*

<https://www.bdpinternational.com/uncategorized/ship-operators-explore-autonomous-sailing/>, accessed 03.05.17

Dinside, *Uber på veien med selvkjørende biler*

<http://www.dinside.no/a/62948357>, accessed 28.04.17

Fairplay, *Legal risks of autonomous shipping highlighted*

<http://fairplay.ihs.com/safety-regulation/article/4284176/legal-risks-of-autonomous-shipping-highlighted>, accessed 16.05.17

FN-sambandet, *Den internasjonale sjøfartsorganisasjonen (IMO)*

<http://www.fn.no/FN-informasjon/FN-organisasjoner/Den-internasjonale-sjoefartsorganisasjonen-IMO>, accessed 01.05.17

Forskningsrådet, *Enormt potensial for ny maritim virksomhet*

http://www.forskningsradet.no/no/Nyheter/Enormt_potensial_for_ny_maritim_virksomhet/1254017466428, accessed 28.04.17

Gard, *Warranty claims in shipbuilding contracts*

<http://www.gard.no/web/updates/content/20822944/warranty-claims-in-shipbuilding-contracts>, accessed 16.05.17

Gyldendal Rettsdata, *Sjøloven and Produktansvarsloven*

www.rettsdata.no, accessed 16.03.17 and 09.05.17

ITavisen, *Glem de autonome bilene – snart kan drosjeflyene komme*

<http://itavisen.no/2017/01/18/glem-de-autonome-bilene-snart-kan-drosjeflyene-komme/>, accessed 28.04.17

Merriam-Webster, *Ship*

<https://www.merriam-webster.com/dictionary/ship>, accessed 24.04.17

MUNIN, *The Autonomous Ship*

<http://www.unmanned-ship.org/munin/about/the-autonomus-ship>, accessed last 18.05.17

Norges Rederiforbund, *Skipsfarten og den maritime næringen*

<https://www.rederi.no/om-oss/fagomrader/sikkerhet-miljo-og-innovasjon/innovasjon/strategi/skipsfarten-og-den-maritime-naringen/>, accessed 27.04.17

Rolls-Royce, *Smart shipping*

<https://www.rolls-royce.com/products-and-services/marine/ship-intelligence.aspx#section-discover/smart-shipping>, accessed 03.04.17

Ship-technology, *Is 2017 the breakthrough year for unmanned vessels*

<http://www.ship-technology.com/features/featureis-2017-the-breakthrough-year-for-unmanned-vessels-5692723/>, accessed 03.05.17

Store Norske Leksikon, *Reder*

<https://snl.no/reder>, accessed 30.03.17

Sysla Maritim, *Vil bygge verdens første selvkjørende containerskip*

<http://sysla.no/maritim/vil-bygge-verdens-forste-selvkjorende-og-utslippsfrie-containerskip/>,
accessed 10.05.17

Teknisk Ukeblad, *Fremtidens Mercedes skal kjøre for Uber*

<https://www.tu.no/artikler/fremtidens-mercedes-skal-kjore-for-uber/375901>, accessed
28.04.17

Teknisk Ukeblad, *Selvkjørende biler: Vi har bare kommet til nivå 2 av*

<https://www.tu.no/artikler/slik-virker-selvkjorende-biler/358826>, accessed 28.04.17

Teknisk Ukeblad, *Vi kan få selvkjørende biler på norske veier neste år*

<https://www.tu.no/artikler/vi-kan-fa-selvkjorende-biler-pa-norske-veier-neste-ar/359569>,
accessed 28.04.17

The Maritime Executive, *Would Autonomous Ships Be Good for Society?*

<http://maritime-executive.com/editorials/would-autonomous-ships-be-good-for-society>,
accessed 03.05.17

UK Marine Industries Alliance, *MASRWG FAQs*

<http://www.ukmarinealliance.co.uk/content/masrwg-faqs>, accessed 03.05.17

Wilson, *Running Costs*

<https://www.wilsonship.no/en/ship-management/running-costs>, accessed 28.04.17

World Maritime News, *Autonomous Ships Set to Plough the Baltic by 2025*

<https://worldmaritimenews.com/archives/220585/autonomous-ships-set-to-plough-the-baltic-by-2025/>, accessed 22.05.17

World Maritime News, *In Depth: Interview: Smart Ships Are Coming!*

<http://worldmaritimenews.com/archives/218365/interview-smart-ships-are-coming>, accessed
10.05.17