Maritime Product Liability at the Dawn of Unmanned Ships – the Finnish Perspective*

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Contents

Abstract

The development of unmanned ships has raised the question of whether product liability could end up having a more central role in shipping in the future. This article aims to conceptualise the Finnish product liability framework in shipping and explore its impacts on unmanned shipping. On the one hand, the article argues that product liability rules could already be applied today to many shipping accidents, but the absence of case law indicates that there has usually been no need to make use of them. On the other hand, the article argues that unmanned ships will lead to an increasing number of cases where aggrieved parties can invoke the product liability rules, but it remains unlikely that unmanned ships could drastically affect the position of the Finnish Maritime Code as being the most common approach to seeking compensation, unless the liability rules are significantly changed. However, recourse actions may become significantly more common, which highlights the importance of contractually defining how liability between shipowners, shipyards, and component manufacturers is ultimately allocated.

1 Introduction

'This is happening. It's not if, it's when. The technologies needed to make remote and autonomous ships a reality exists.' So said Rolls-Royce Vice President of Marine Innovation Oskar Levander at the Autonomous Ship Technology Symposium 2016.[1] Indeed, sophisticated technologies seem to be proliferating both on land, at sea, and in the air. Technological development has been most visible in road traffic, where several companies have already tested their self-driving car prototypes.[2] However, the same transformation is also underway in seafaring. Several companies are developing technologies that will make ships less crew dependent and—eventually—allow shipowners to operate vessels without having a crew on board at all.[3] Furthermore, this transition may happen sooner than many expect: several countries have already opened test areas where new technologies can be tested,[4] and the International Maritime Organization (IMO) has began to explore how unmanned ships could be addressed in IMO instruments.[5] The most optimistic technology suppliers expect that the commercial use of unmanned ships will begin during the 2020s.[6]

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1 See American Shipper, 'AAWA lays out vision for autonomous shipping' (27 June 2016) <http://www.americanshipper.com/main/news/aawa-lays-out-vision-for-autonomous-shipping-64477.aspx> accessed 12 March 2018.

2 See e.g. Financial Times, 'Waymo builds big lead in self-driving car testing' (14 February 2019) <https://www.ft.com/content/7c8e1d02-2ff2-11e9-8744-e7016697f225> accessed 1 March 2019.

3 See 'Global Marine Technology Trends 2030: Autonomous Systems' (Lloyd's Register; QinetiQ; University of Southampton 2017), p. 6.

4 At least Finland, Norway, and China have already created areas where unmanned ships can be tested. See SAFETY4SEA 'China builds Asia's first autonomous ship test area' (12 February 2018) <https://safety4sea.com/china-builds-asias-first-autonomous-ship-test-area/> accessed 7 April 2018.

5 See 'IMO takes first steps to address autonomous ships' (25 May 2018) <http://www.imo.org/en/mediacentre/pressbriefings/pages/08-msc-99-mass-scoping.aspx> accessed 28 February 2019.

6 See Oskar Levander, 'Autonomous ships on the high seas' (2017) 54 IEEE Spectrum 2, p. 31.

Because unmanned ships will have no crew on board, they will rely heavily on technical equipment, such as communication systems, sensors, and software.[7] Consequently, it is often wondered to what extent the parties who develop unmanned ships could—or should—be liable if an unmanned ship causes an accident, due to a technical failure. The question has, however, no easy answer. At least in the Nordic countries, product liability has played a very limited role in shipping, and legal scholars have most often bypassed product liability questions entirely. The main exception that can be cited is *Ulfbeck's* article from 2006.[8] Thus, before it is even reasonable to discuss whether product liability rules *should* be somehow changed due to unmanned ships, it is first necessary to explore the rules that already exist.

In manned shipping, liability for shipping accidents is usually determined according to the rules of shipowner's liability.[9] This situation arises from obvious reasons: shipping accidents are often caused by errors made by the master and crew, and even if the cause of an accident is a technical failure, the question is usually whether the shipowner has e.g. failed to maintain the vessel properly. In Nordic case law, courts have sometimes imposed very strict requirements on the standard of care that shipowners must follow,[10] and sometimes shipowners have even been held strictly liable if the root cause of an accident has been a technical failure.[11] Consequently, aggrieved parties usually have no need to invoke product liability rules if a manned ship causes an accident.

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7 See 'Global Marine Technology Trends 2030: Autonomous Systems', pp. 6–22.

8 See Vibe Ulfbeck, 'Maritime Product Liability' in *SIMPLY 2006 — Scandinavian Institute of Maritime Law Yearbook* (Sjørettsfondet 2007), pp. 65–79.

9 The definition of 'shipowner' slightly differs depending on the jurisdiction discussed. Under the Nordic maritime codes, the shipowner is most often the person who runs the vessel on his own account (in Finnish: 'laivanisäntä'; in Swedish: 'redare'; in Norwegian: 'reder' or 'rederi'). Most typically this person is the owner of the ship, but it may also be e.g. a bareboat charterer. See Thor Falkanger, Hans Jacob Bull, and Lasse Brautaset, *Scandinavian Maritime Law: The Norwegian Perspective* (4th edn, Universitetsforlaget 2017), pp. 164–169. For the sake of simplicity, it is assumed in this study that the same person both owns and operates the vessel, and this person is called 'the shipowner'.

10 See e.g. ND 1995.163 DSC BRAVUR.

11 See ND 1921.401 NEPTUN and ND 1952.320 SOKRATES. However, it is important to note that both cases concerned Norwegian law. In Norway, courts have been

Nevertheless, the introduction of unmanned ships may change the status quo. Because an unmanned ship has no crew on board, the shipowner must rely on technical equipment more than ever before. Of course, human errors may still occur: humans may commit navigational errors if the vessel is meant to be remotely controlled, and even if the vessel is meant to act autonomously, the shipowner may still fail to maintain the vessel properly.[12] However, it is far from clear to what extent the current shipowner's liability rules would hold shipowners liable if the cause of accident is e.g. an algorithmic failure. In practice, the shipowner's possibilities for ensuring that algorithms function as they should are very limited, and in many cases the shipowner may just have to trust that an unmanned ship is as safe to use as its technology suppliers claim.[13] More importantly, this problem concerns all kinds of unmanned ships, no matter how they are meant to be operated. Basically, remote control is only possible as far as remote connection exists *and* the ship is following the orders that the human is giving. In other words, even a ship that is meant to be under remote control will have to survive on her own if the

significantly more willing to develop strict liability rules via case law than courts in the other Nordic countries have been. See Viggo Hagstrøm and Are Stenvik, *Erstatningsrett* (Universitetsforlaget 2015), pp. 146–147. Moreover, the exact scope of strict liability in maritime law seems to be unclear even in Norway. See e.g. Trond Solvang, 'Rederiorganisering og ansvar — rettslige utviklingstrekk' (2017) 484 MarIus, pp. 53–66 and Falkanger, Bull, and Brautaset, p. 193 and pp. 283–284.

12 As Wróbel, Montewka, and Kujala conclude, the possibility for human errors will exist 'as long as people are involved in either design or the operations themselves, in other words: forever'. See Krzysztof Wróbel, Jakub Montewka, and Pentti Kujala, 'Towards the assessment of potential impact of unmanned vessels on maritime transportation safety' (2017) 165 Reliability Engineering & System Safety, p. 164.

13 Shipowner's possibilities for detecting software bugs are limited due to several reasons. Besides the fact that software programming usually goes beyond the shipowner's own expertise, shipowners do not necessarily have access to the software's source code. In addition, revealing all existing software bugs is practically impossible even to software developers themselves, at least when sophisticated systems are being considered. As computing pioneer *Edsger W. Dijkstra* wrote already back in 1974, 'testing can be used very convincingly to show the presence of bugs, but never to demonstrate their absence, because the number of cases one can actually try is absolutely negligible compared with the possible number of cases'. See Edsger W. Dijkstra, 'Programming as a Discipline of Mathematical Nature', (1974) 81 The American Mathematical Monthly 6, p. 609.

possibility for remote control is suddenly lost.[14] This fact, in turn, gives more space for thought as to whether aggrieved parties could invoke product liability rules instead—or in addition to—shipowner's liability rules, if a ship is operated without having a crew on board.[15]

The main objective of this study is to conceptualise the product liability framework in shipping and to discuss its implications in the context of unmanned ships. On the one hand, the idea is to show that even if aggrieved parties have usually had no need to invoke the product liability rules in manned shipping, these rules could already see use in many shipping accidents today. On the other hand, the study will analyse whether it is realistic to suppose that unmanned ships will make product liability litigation more common in shipping, even if no legislative changes are made. The question of whether either the shipowner's liability rules or the product liability rules *should* be changed is left outside the scope of this study. Moreover, the study is limited to third party losses only; liability for damage caused to a ship itself will not be discussed. The study will focus on Finnish law in particular, but the results may obviously be valuable in the other jurisdictions as well, especially where the national rules are based on EU law.

In Finland, the product liability framework is relatively fragmented. The most important source of law is the Finnish Product Liability Act (694/1990) which is based on the EU Product Liability Directive.[16]

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[14] Of course, it can be argued that a problem in remote control should cause no major problems if the ship is able to maintain her current position and wait until a human reaches the vessel. In reality, however, the situation is more complicated. Imagine an unmanned ship sailing in bad weather in the middle of a congested and narrow fairway, when remote control possibility is suddenly lost. If the only action that the ship is then capable to perform is just to maintain her position, a hazardous situation may occur. See Esa Jokioinen, 'Introduction' in Esa Jokioinen and others, *Remote and Autonomous Ships — The next steps* (Rolls-Royce plc 2016), p. 8.

[15] Remote control has of course other limitations as well. For example, humans need data of adequate quality to make the right decisions. However, if a ship provides incorrect data, it may be extremely difficult to blame the person who remotely controls the vessel, especially if the data *seems* to be correct.

[16] Council Directive 85/374/EEC on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products.

However, these rules only apply to personal injuries and damage caused to property that the aggrieved party has used in non-commercial activities.[17] Consequently, damage to or destruction of property used in commercial activities must be evaluated based on other rules. Because no special legislation exists on this matter, the existence of product liability in these cases depends on the Finnish Tort Liability Act (412/1974)—which provides the general tort liability rules in Finland—and the general principles of tort law.[18] In addition, product liability may actualise after a third party has received his compensation. For example, a shipowner—or his liability insurer—may have compensated for the loss because he has been strictly liable under the Finnish Maritime Code (674/1994), and the question is then whether the shipowner has the right of recourse against the party whose fault the accident had been. In such cases, contractual rules and practices must also be explored, as they may affect how liability is allocated.

The study is structured as follows. In Section 2, I will discuss whether the Finnish Product Liability Act can be applied in the maritime context and analyse when—and to what extent—the parties who have contributed to damage or injury can be liable under the Act. In Section 3, I will discuss in turn how the basis of liability changes if an aggrieved party must instead base his claim on the Finnish Tort Liability Act, and on the general principles of tort law. In Section 4, I will focus on recourse actions and explore how liability is ultimately allocated between shipowners, shipyards, and component manufacturers. Since this study presumes that the product liability rules are the same no matter whether a ship is manned or unmanned, the study is written with both ship types in mind. However, Section 5—which provides the conclusions—will focus on unmanned ships in particular and analyse whether unmanned ships may change how liability for shipping accidents is allocated, even if no legislative changes are made.

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17 See the Product Liability Directive's Article 9 and the Finnish Product Liability Act's Section 1.

18 See Marko Mononen, *Yritysten välinen tuotevastuu* (Talentum 2004), pp. 153–196.

2 Finnish Product Liability Act

In the following, the analysis of the Finnish Product Liability Act is divided into four subsections. The first subsection will determine the range of objects that can be considered as 'products' in the shipping context. The second subsection, in turn, will discuss the basis of liability, while the third subsection will determine the range of persons that may be liable. Finally, the fourth subsection will discuss the level of compensation that an aggrieved party is entitled to obtain under the Finnish Product Liability Act.

2.1 What is a product?

According to Section 1 of the Finnish Product Liability Act, the Act only applies if there is 'a product' that causes personal injury or damage to or destruction of property used in non-commercial activities. The notion of product clearly includes ordinary consumer goods, such as bicycles and kitchen machines, but the position of ships may seem less clear. Commercial vessels are exceptional by their scale, and they are used by enterprises. This section aims to determine whether ships and their components are products under the Finnish Product Liability Act. The position of software will be discussed as well.

In the Act, the concept of product receives a very wide definition. Section 1 of the Act, which closely follows Article 2 of the Product Liability Directive, states that the concept of product extends to 'all movables with the exception of buildings on land owned by others'. Furthermore, the Act applies to losses caused by a product 'even if the product has been incorporated into another movable or real property'. A component of a product is, therefore, also a product. According to the same section, a component means 'raw materials and parts of a product as well as

materials used in the manufacture or production of a product'. Electricity is also deemed a product.[19]

The wide-reaching definition of the concept of product means that all kinds of movable objects can be products, no matter how they are produced or who uses them.[20] According to Section 7 of the Act, however, they must be 'put into circulation' in the course of producer's business. With the exception of electricity, the object must also be tangible.[21] This restriction excludes e.g. services outside the scope of the Act. However, if a product causes damage in the course of providing a service, the Act may still apply; a product cannot be disguised as a service to avoid product liability.[22]

In the shipping context, it seems clear that the ship itself must be regarded as a product. It is a movable and tangible object that is put into circulation in the course of the producer's, i.e. shipyard's, business.[23] It is also obvious that ships consist of an enormous number of components which are products as well, even if they are incorporated into a ship. The position of software is, however, less clear and must be discussed in more detail.

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19 In this study, I quote Finnish legislation several times. Unless otherwise stated, the quotations are always from unofficial translations made by the Finnish Ministry of Justice.

20 See Thomas Wilhelmsson and Matti Rudanko, *Tuotevastuu* (2nd edn, Talentum 2004), pp. 67–68.

21 See Duncan Fairgrieve and others, 'Product Liability Directive' in Piotr Machnikowski (ed), *European Product Liability: An Analysis of the State of the Art in the Era of New Technologies* (Intersentia 2016), pp. 41–42.

22 See *Case C-203/99, Veedfald v Århus Amtskommune*, para. 12. See also Fairgrieve and others, pp. 43–44.

23 Support for this conclusion can also be found from the preparatory works of the Finnish Product Liability Act. In its proposal, the government considered whether there was a need to exclude losses caused by defective transportation vehicles outside the scope of the Act. With the exception of road traffic, however, the goverment saw no such need. See 'Finnish Government Proposal 119/1989: Hallituksen esitys Eduskunnalle tuotevastuulaiksi', pp. 21–22. See also Ulfbeck, pp. 67–68. She refers to the history of the Norwegian Product Liability Act, which originally excluded i.a. damage caused by a ship outside the scope of the Act. This exclusion was, however, abolished when Norway joined the European Economic Area. According to *Ulfbeck*, the exclusion was seen to be inconsistent with the Product Liability Directive.

Generally, legal scholars have presented varying opinions on the question of whether software can be classified as a product. This discussion originates from the observation that the Product Liability Directive only extends to tangible objects. Because of this fact, some scholars have argued that software cannot be a product, unless it is delivered in a tangible object such as a DVD or a USB stick. According to this viewpoint, software downloaded from the Internet cannot be regarded as a product under the Directive.[24] The treatment of *embedded software* may, however, be different. Embedded software is incorporated into tangible goods, and it may be difficult to distinguish it from the object itself. As *Fairgrieve and others* state, e.g. '[t]he flight operation software of an aeroplane (...) must be treated as a product within the meaning of the Directive, given its inextricable link with the product itself'.[25] Defective software may, therefore, result in manufacturer's liability. Nevertheless, it remains somewhat unclear as to whether embedded software can in itself be regarded as a product, or whether it is just *a part* of a product. This question is, however, only relevant if the manufacturers of the tangible object and the embedded software are different persons.[26]

As a result, there may clearly be at least two types of products in the shipping context: first, the vessels themselves, and second, the tangible components of a vessel, such as engines, propellers, and bolts. In addition, if e.g. an auto-pilot system is supplied as a package that contains not only software but tangible objects as well, that package is clearly a product. Defective software may then cause the system—and the ship herself—to be defective, as the software is necessary for the functioning of the system. Nevertheless, it still seems questionable as to whether the software itself can be regarded as a product, since algorithms themselves are intangible. This question does not, however, only affect ships; it affects all kinds of

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24 See Fairgrieve and others, pp. 46–47.

25 See Fairgrieve and others, p. 47.

26 *Wilhelmsson and Rudanko*, for example, seem to argue that e.g. a defective operating system of a computer may cause *the computer* to be defective, but the software in itself still cannot be regarded as a product. See Wilhelmsson and Rudanko, pp. 79–80.

machines that utilise software. Thus, it is quite likely that this issue will sooner or later be clarified, either via case law or legislative means.[27]

2.2 Basis of liability

The previous section explored the range of items that may be considered as 'products' in the shipping context. However, merely the fact that a product has caused damage does not result in liability under the Finnish Product Liability Act; instead, Section 3 of the Act requires that the product must have been 'defective'. This section discusses what this requirement means in general and explores the interpretation problems that may occur in the context of shipping.

According to Article 6 of the Product Liability Directive, a product is defective when it does not provide 'the safety which a person is entitled to expect, taking all circumstances into account'. In the Finnish Product Liability Act, the formulation of this rule differs slightly, but is for practical purposes the same: according to the Act's Section 3, compensation shall be paid if 'the product has not been as safe as could have been expected'. Consequently, a product is not automatically defective even if it is dangerous. Take a sharp chef's knife as an example: a person may cut his or her finger with a knife when cooking, but the knife is still working as intended. But if the grip of a knife suddenly detaches, so leading to a personal injury, the knife may, of course, be defective. A person must be aware that a knife may be sharp and may, therefore, cause damage, but he also has a right to expect that the knife does not abruptly break down.[28]

The evaluation of the defectiveness of a product is meant to be objective: a product is defective if it does not meet the safety expectations that a normal person is entitled to have of it. In addition, the criterion

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[27] On the need for such clarification, see e.g. Piotr Machnikowski, 'Conclusions' in Piotr Machnikowski (ed), *European Product Liability: An Analysis of the State of the Art in the Era of New Technologies* (Intersentia 2016), pp. 700–701. See also 'Evaluation of Council Directive 85/374/EEC on the approximation of laws, regulations and administrative provisions of the Member States concerning liability for defective products' (European Commission 2018), pp. 74–76.

[28] See Wilhelmsson and Rudanko, p. 146.

for establishing defectiveness is also normative: a court must establish the level of safety the public is entitled to expect, regardless of whether its actual safety expectations are higher or lower.[29] In practice, the safety rules and standards imposed by regulatory bodies and other organisations often provide certain guidelines for this evaluation, but it is highly important to note that courts cannot automatically base their assessments on these. For example, if the rules and standards are outdated, the level of required safety may exceed the level of safety that the rules and standards would indicate.[30] At the same time, the normative nature of the concept of defectiveness also prevents the public from having unrealistic expectations of product safety. The concept of defectiveness aims, therefore, to determine *the legitimate safety expectations that a normal person is entitled to have.*[31]

In addition, the evaluation of a product's defectiveness is sometimes difficult because Section 3 of the Finnish Product Liability Act ties the required level of safety to the time when the product was put into circulation. Products are obviously constantly developed further, and new technical innovations may even lead to the prohibition of older technologies. Think e.g. of car manufacturing: nowadays every new car must have an anti-lock braking system (ABS). Such cars are undoubtedly much safer than cars that are not equipped with such a system. This fact alone does not, however, automatically mean that an older car without an ABS system would be defective, especially if such systems did not even exist when the car was put into circulation.[32] Consequently, technical development may affect the level of safety that the public is entitled to

[29] See Fairgrieve and others, pp. 51–52.

[30] See Wilhelmsson and Rudanko, pp. 165–169.

[31] See Fairgrieve and others, pp. 51–53. It is worth noting that sometimes the legitimate safety expectations may arguably be even higher than it is possible to achieve in the real world. In the English case *A and others v. National Blood Authority and another [2001] 3 All ER 289,* for example, the court concluded that a patient receiving transfused blood has the right to expect that the blood contains no harmful viruses, even if there is always a small statistical chance of infection. Of course, it is a completely different question as to how widely this approach can be utilised in other contexts than injuries caused by medical products.

[32] See Fairgrieve and others, pp. 60–61.

expect, but the defectiveness of a particular product is still evaluated based on the legitimate safety expectations that existed when the product was put into circulation.

Furthermore, Article 7(e) of the Directive includes a provision that allows the liable party to avoid liability if he can prove that 'the state of scientific and technical knowledge at the time when he put the product into circulation was not such as to enable the existence of the defect to be discovered'. At first sight, this defence could be a major limiting factor for liability in the case of new technical innovations such as unmanned ships. It is evident that our knowledge e.g. of artificial intelligence is still limited and will increase during the coming years. The practical relevance of this 'development risks defence' may, however, be more limited, due to two reasons.

First, Article 15 of the Directive allows a Member State to decide whether it incorporates the development risks defence into national law at all. Although the vast majority of the Member States have incorporated the provision, Finland is one of the countries that implemented the Directive without it. The development risks defence is not, therefore, available under Finnish law.[33]

Second, even if the defence were available, its practical relevance could still be more limited than it might at first appear. As *Taschner* emphasises, the defence should be understood as only protecting the liable party 'in respect of the unknown' and nothing more. As he puts it, we are then dealing with 'an objectively harmful product, which would have been considered as defective at the time of manufacturing, if only the damaging properties had been known, but where there are no means available in science and technology for discovering them'.[34] However, the problem with new technologies is that we often *know* that there are

[33] As a comparison on the way in which the Directive is implemented in relation to the development risks defence, see Mark Mildred, 'The Development Risks Defence' in Duncan Fairgrieve (ed), *Product Liability in Comparative Perspective* (Cambridge University Press 2005), pp. 168–169.

[34] See Hans Claudius Taschner, 'Product Liability: Basic Problems in a Comparative Law Perspective' in Duncan Fairgrieve (ed), *Product Liability in Comparative Perspective* (Cambridge University Press 2005), pp. 163–164. As an example, he refers to a German case where a company had imported blood from the United States to be used as raw material for a medicine. Unfortunately, the blood was contaminated with HIV, but

problems that have just not been discovered yet. Sophisticated software, for example, almost always has bugs, no matter how thoroughly it has been tested.[35] Sometimes e.g. security issues are discovered only years—or even decades—after the software release.[36] Our current knowledge may very well be theoretically sufficient to discover these issues, but due to economic reasons it may in practice be impossible. Consequently, it may be questionable whether the development risks defence is available in such cases.[37]

Furthermore, the evaluation of a product's defectiveness may be difficult if a product uses embedded software that may receive updates during the product's life cycle. Two problems, in particular, arise. The first of these concerns the question of whether the public is entitled to expect that software is updated when e.g. a security issue is discovered. In such a case, the software appeared to be safe to use when it was released, but, due to the development of external threats, it has later become vulnerable to criminal attacks. Although these threats have only materialised afterwards, it may seem reasonable to consider the product to be defective, since the product itself has not changed since it was first released.[38] The second question, in turn, relates to this observation. Basically, a software update may also create *new* problems. Even if a product was safe to use when it was put into circulation, a software update may thereafter turn the product into being defective. If the updated software then causes an accident, it is a difficult

at the time the virus was unknown and was only discovered years later. As a result, numerous people got sick and died.

35 About the limitations of software and testing, see Gerald M. Weinberg, *Perfect Software: And Other Illusions About Testing* (Dorset House Pub 2008), pp. 3–12, 22–28.

36 For example, it was revealed in January 2018 that Intel's processor chips manufactured during the past decade have a severe design error that makes security breaches possible using normal user programs. This design flaw forced the operating system manufacturers to disable certain features from their systems, which in practical terms slowed down Intel-powered computers. See The Register, 'Kernel-Memory-Leaking Intel Processor Design Flaw Forces Linux, Windows Redesign' (2 January 2018) <https://www.theregister.co.uk/2018/01/02/intel_cpu_design_flaw/> accessed 23 February 2018. Although this particular design error concerned hardware instead of software, it is a good example of how difficult discovering even severe bugs may sometimes be.

37 Similarly, see Machnikowski, pp. 701–702.

38 See Machnikowski, pp. 700–702.

question as to who should be liable to pay compensation, since only the intangible part of the product has changed. The current product liability rules seem to provide no clear-cut answer to this question.

The above discussed rules—and problems—are of course also present in shipping. The question of whether a ship is defective depends on the legitimate safety expectations that a normal person is entitled to have. However, it is very difficult to provide more clear-cut guidelines for the evaluation of ship's defectiveness, because the legitimate safety expectations are always linked to case particulars. In the end, it is always a court who decides what these legitimate expectations are in the particular case. The maritime safety regulations usually provide the minimum level of safety that must be followed, but as I have noted above, it is possible that a ship may still be defective, even if these requirements are fulfilled.

In addition, it seems that interpretation problems become even more complicated when ships become more sophisticated. For example, let us imagine an unmanned ship being allowed to operate autonomously without any active human supervision at all. It is obvious that regulators would set strict safety requirements for such vessels, and they would not be allowed at all unless they are at least as safe as manned ships.[39] However, the problem is that unmanned ships would most probably cause *different kinds of accidents* than those caused by manned ships, and it is also unrealistic to suppose that autonomous systems would *never* fail.[40] Furthermore, it is not clear that accidents could only occur due to design or manufacturing errors. Because ships have to operate in an open world, there are always uncertainties that cannot be fully predicted. This fact, in turn, means that the decisions that autonomous systems make are nearly always based on *probabilities;* they are just best guesses that will hopefully turn out to be the correct ones.[41] Thus, it is

[39] See Robert Veal and Henrik Ringbom, 'Unmanned ships and the international regulatory framework' (2017) 23 The Journal of International Maritime Law 1, p. 115.

[40] See Wróbel, Montewka, and Kujala, pp. 163–165.

[41] Generally on the problem of uncertainty when using artificial intelligence, see e.g. Stuart J. Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach* (3rd edn, Prentice Hall 2010), pp. 480–483. On the question how the scope of challenge depends on the type of environment, see Russell and Norvig, pp. 40–46.

very likely that severe design errors cause ships to be defective, but if an autonomous system has just made a wrong decision in a complex and uncertain environment, the concept of defect suddenly becomes significantly more open to interpretation.

2.3 Liable party

This study has now explored the range of objects that are considered 'products' in the shipping context and discussed the general principles of the evaluation of a product's 'defectiveness'. The next question is who is liable if a defective ship causes damage. Generally, there are numerous persons involved in shipbuilding, including ship designers, shipyards, component manufacturers, software houses, and classification societies. Under the Finnish Product Liability Act, however, there are only four types of persons who may be liable: first, the producer of the product; second, the person who presents himself as a producer; third, the importer of the product; and fourth, the supplier of the product.[42] The objective in the following is to determine what these different types of persons may be in the context of shipping.

a) The producer

According to the Finnish Product Liability Act's Section 5, the producers of products are the first group of persons that may be liable. The Act provides no explicit definition of the concept of producer, but according to Article 3 of the Product Liability Directive it means 'the manufacturer of a finished product, the producer of any raw material or the manufacturer of a component part'. The question is, therefore, who these parties are in the context of shipping.

In shipbuilding, the producer of a finished product—i.e. a ship—is most often a shipyard. Although the shipyard's role is often only to assemble the ship, the shipyard is the party who produces the finished product and puts it into circulation. From a risk allocation perspective,

[42] See the Finnish Product Liability Act's Section 5 and Section 6.

this approach may obviously sometimes seem questionable. Ships are usually designed by enterprises other than shipyards, and a shipyard may have little to no influence on what components will be used in a particular ship. Under the Finnish Product Liability Act, however, this observation seems to have no relevance. Even if the party does nothing more than assemble the finished product from components manufactured by other producers, it is still considered as the producer of the finished product.[43]

Nevertheless, it is important to note that the producer of a defective component or raw material may also be liable. According to the Finnish Product Liability Act's Section 4, '[i]f an injury or damage is attributable to a defect in a component, the injury or damage shall be considered to have been caused by both the component and the product'. More importantly, if there are two or more persons liable for the same damage, they shall be 'liable jointly and severally'.[44] Thus, if a ship causes an accident due to a defective steering system, the aggrieved party may have the right to choose whether to claim damages from the shipyard or from the producer of the system, or from both of them. This rule contains, however, two important exceptions: according to the Act's Section 7, the producer of a component shall be exempted from liability if 'the defect which caused the injury or damage is attributable to the design of the product into which the component has been incorporated or to the instructions given by the product manufacturer'.

The concept of producer requires, however, that the person has been involved in the actual manufacturing or producing process of the product. Persons that are involved only in the product's design phase are, therefore, left outside the scope of the Act.[45] Thus, even if the defectiveness of a ship can be traced back to the decisions made by a ship designer, the designer cannot be held liable unless it has been involved in the actual manufacturing process of the ship.[46] Similarly, it is obvious the producer

43 Generally, see Wilhelmsson and Rudanko, pp. 109–116.

44 See the Product Liability Directive's Article 5. The Finnish Product Liability Act contains no such rule, but it is incorporated to the Finnish Tort Liability Act's Chapter 6 Section 2.

45 See Wilhelmsson and Rudanko, p. 114.

46 The designer may, of course, still be liable under some other liability system such as the general tort liability rules. However, the basis of liability is then most likely to be

must have produced something that can be categorised as 'a product'. Thus, if software is not seen as a product, a software house cannot be liable under the Finnish Product Liability Act either.[47]

b) The person who presents himself as a producer

According to the Finnish Product Liability Act's Section 5, the second group of persons includes every person who has 'marketed the product which has caused the injury or damage as his/her own if the product is labelled with his/her name, trade mark or other distinguishing feature'. The purpose of this rule is to offer protection for the aggrieved party if he experiences difficulties in discovering the identity of the actual producer.[48] In the shipping context, however, this rule has limited significance, since the identity of the producer is most often known.

c) The importer

According to the Finnish Product Liability Act's Section 5, the group of persons that may be liable also includes 'the party which has imported the product into the European Economic Area with the intention of putting it into circulation there'. This rule is extremely important because products are often manufactured by foreign producers. Ships, for example, are often built in Asian countries,[49] and it is usually very difficult for an aggrieved party to achieve compensation from an Asian shipyard. Although an aggrieved party may be able obtain a judgment in Finland even against a foreign producer,[50] it is often impossible to enforce it in the country where the manufacturer is located. Instead, the only real possibility for an aggrieved party to achieve compensation from a foreign producer will

based on the concept of fault. Generally on the role of the general liability rules in shipbuilding, see Section 3 of this study.

47 On the question whether software can be deemed a product, see Section 2.1 of this study.

48 See Fairgrieve and others, p. 64.

49 See The Shipbuilders' Association of Japan, 'Shipbuilding Statistics — March 2018'.

50 The Finnish Product Liability Act can usually be applied if the aggrieved party domiciles in Finland *and* the loss has incurred there. However, the latter requirement may sometimes cause difficult interpretation problems. See Juha Lappalainen, 'Tuomioistuinten toimivalta siviiliasioissa' in Dan Frände and others, *Prosessioikeus* (4th edn, Sanoma Pro 2012), pp. 315–317.

often be to sue him in his home country under the rules that apply in that jurisdiction.[51] Thus, the purpose of importer's liability is to protect consumers in such cases.[52]

A challenge in the shipping context is that there are very few companies—if any—whose main business is the importing of vessels, with the exception of small vessels such as private yachts, into the EU. Instead, the shipowner usually buys the vessel directly from a foreign shipyard or foreign shipowner and then imports it into the EU. Consequently, the key question here is whether shipowners may be considered as being importers. Answering this question requires an in-depth analysis of the concept of 'importer'.

The Act and the Directive define the concept of importer in slightly different ways. According to the Act's Section 5, a person is only deemed to be an importer if he has imported the product into the European Economic Area 'with the intention of putting it into circulation there'. According to Article 3 of the Directive, in turn, the concept extends to 'any person who imports into the Community a product for sale, hire, leasing or any form of distribution in the course of his business'. It is somewhat unclear as to whether there is any practical difference between these two definitions, but it seems reasonable to suppose that they should be interpreted in the same way, since the Act is based on the Directive.

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51 For an overview on the choice of law and forum in product liability matters, see e.g. Wilhelmsson and Rudanko, pp. 100–108. As an illustrative example of complexity that may be present in transnational product liability litigation, the Überlingen mid-air collision can mentioned. 71 people died when two airplanes collided with each other in Germany. Many lawsuits were filed, including one claim based on product liability rules. In that case, the relatives of Russian victims claimed damages from two manufacturers of the aircraft's collision avoidance system. Although the accident had occurred in Germany, and the victims were Russian citizens, the case was brought into a court in Spain which had been the destination of the flight. However, the Spanish court applied the laws of Arizona and New Jersey which where the principal places of manufacturers' businesses. See Hanna Schebesta, 'Risk Regulation Through Liability Allocation: Transnational Product Liability and the Role of Certification' (2017) 42 Air & Space Law 107.

52 See 'Finnish Government Proposal 119/1989: Hallituksen esitys Eduskunnalle tuotevastuulaiksi', p. 48.

In principle, it seems relatively clear that the shipowner must be considered to be the importer of the product if he imports a vessel from a foreign country and then immediately leases it out. The action is clearly taken 'in the course of his business' with an intention to distribute—in this case by leasing—the vessel onwards.[53]

If the shipowner imports a ship and intends to use it himself, the question seems more difficult. On its face, the concept of importer does not extend to persons who import products for their personal use. The intention that the person had when the product was imported is decisive: even if he later decides to sell or lease the product, the person is not considered to be an importer if he has first used the product for his personal use.[54] However, it is sometimes difficult to distinguish 'personal use' from 'any form of distribution'. As *Fairgrieve and others* state, "the mere fact of placing a product at one's disposal—even for a very limited period in time—is sufficient to qualify the product as being imported for 'any form of distribution'". According to the authors, a hotel that imports hairdryers for its guests is considered to be the importer of the products. They even argue that an airline company that imports an aeroplane into the EU should be deemed the importer, since the plane is intended to carry passengers.[55] *Ulfbeck,* in turn, argues that a shipowner who imports a vessel into the EU and puts it on time or voyage charter could be considered to be the importer of the vessel, since the ECJ has interpreted the concept of 'put into circulation' very broadly.[56]

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53 Similarly, see Ulfbeck, pp. 76–77.

54 See 'Finnish Government Proposal 119/1989: Hallituksen esitys Eduskunnalle tuotevastuulaiksi', p. 48.

55 See Fairgrieve and others, p. 66.

56 See Ulfbeck, pp. 76–77. She refers to *Case C-203/99, Veedfald v Århus Amtskommune* which concerned the manufacturer's liability for damage caused to a kidney that was meant to be used in transplantation. A hospital had manufactured a perfusion fluid to flush the kidney, but due to the defectiveness of the fluid, the kidney was damaged and became unusable for transplantation. Although the fluid never left the medical 'sphere of control', the ECJ argued that the fluid was still put into circulation as the person for whom the product was intended was required to 'bring himself within that sphere of control'. Although the case did not specifically concern importer's liability, *Ulfbeck* argues that it shows how broadly the concept of 'put into circulation' has been interpreted.

As a result, it seems that a shipowner may indeed be considered to be the importer of a vessel. The exact boundaries of the concept of importer are nonetheless unclear.

d) The supplier

Finally, the Finnish Product Liability Act's Section 6 states that the party which has put the product into circulation shall be liable '[i]f the product does not indicate its manufacturer or producer'. This person—the supplier—may nonetheless avoid liability by notifying within a reasonable time 'the injured party of the identity of the party liable for the injury or damage'. In addition, the Act's Section 6 continues by stating that the same rule applies when the importer of the product is unknown. Supplier's liability is, therefore, a secondary alternative that is only triggered if the manufacturer—or the importer—of the product cannot be identified. Since these persons are usually known in shipping, this provision has a rather limited importance here.

2.4 Amount of damages

The previous section explored the range of persons who may be liable to pay compensation if a defective ship causes an accident. The result was somewhat surprising: a number of persons—under certain circumstances even the shipowner—could be liable under the Finnish Product Liability Act. However, the question arises of why an aggrieved party would want to raise a claim under the product liability rules. In the following, it is argued that the rules on the amount of damages may be such an incentive.

There is a long tradition in maritime law that shipowners and certain other persons have the right to limit their liability when the loss exceeds a specified limit.[57] However, the approach under the product liability rules is different. The Finnish Product Liability Act is based on the principle of full compensation, which means that an aggrieved party is usually

[57] For the history of the concept of limitation of liability, see Peter Wetterstein, *Globalbegränsning av sjörättsligt skadeståndsansvar: en skadeståndsrättslig studie* (Åbo Akademi 1980), pp. 18–48.

entitled to get his losses fully compensated, no matter the size of the loss.[58] This approach is further strengthened by the Act's Section 10, that states that any 'contractual term, agreed upon before the injury or the damage occurred, which limits the right of the injured party to compensation laid down in this Act shall be null and void'. Consequently, the key question here is whether the rules on limitation of liability may be relevant within the product liability framework, or whether it may, in fact, be beneficial for an aggrieved party to base his claim on the Finnish Product Liability Act instead of on the Finnish Maritime Code.

It is natural to begin this discussion by exploring how the right to limit liability is currently regulated. In the Finnish Maritime Code, these rules are divided into several chapters: one of them providing the general rules and the others only applying to certain specified types of damage.[59] However, it is important to note that these rules are based on several international conventions enacted within the IMO.[60] Consequently, it seems reasonable to begin the analysis with these conventions. For the sake of simplicity, the following discussion only focuses on the general rules on limitation of liability, which are established by the Convention on Limitation of Liability for Maritime Claims (hereafter 'the LLMC Convention').[61]

Article 2(1) of the LLMC Convention includes a list of losses to which the Convention is meant to be applied. Among other things, the list includes 'claims in respect of loss of life or personal injury or loss of or damage to property (including damage to harbour works, basins

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58 See Wilhelmsson and Rudanko, pp. 236–237.

59 As an overview on the rules on limitation of liability in the Nordic maritime codes, see Falkanger, Bull, and Brautaset, pp. 212–230.

60 For the full list of conventions that Finland has ratified, see 'Chronological List of Imo Instruments and Entry into Force Dates' <http://www.imo.org/en/About/Conventions/StatusOfConventions/Documents/status-x.xlsx> accessed 20 June 2018.

61 The reader should note that the LLMC Convention has been updated by the Protocol of 1996 to amend the Convention on Limitation of Liability for Maritime Claims. Nonetheless, the 1996 Protocol is not discussed in this study as it did not change any relevant rules in this context. Generally on the international conventions regarding limitation of liability, see e.g. Norman A. Martínez Gutiérrez, *Limitation of Liability in International Maritime Conventions* (Routledge 2011).

and waterways and aids to navigation), occurring on board or in direct connexion with the operation of the ship or with salvage operations, and consequential loss resulting therefrom'. The important thing here, however, is that according to Article 2(1), the LLMC Convention is meant to apply to such losses 'whatever the basis of liability may be'. Even if the claim is brought as a recourse action in a contractual relation, Article 2(2) states that the right to limit liability is still available. Consequently, it seems relatively obvious that the LLMC Convention is also meant to apply to product liability claims, if the incurred loss otherwise falls within its scope. This outcome gives rise to a potential conflict between the rules: on the one hand, the LLMC Convention allows a shipowner to limit his liability, but on the other hand, the product liability rules require the loss to be compensated to its full extent if the shipowner is also the importer of the ship.[62]

Nevertheless, the position is different for vessel manufacturers, such as shipyards and component manufacturers. According to Article 1 of the LLMC Convention, the right of limitation of liability is only available to four types of persons: first, the shipowner, meaning the owner, charterer, manager, and operator of a seagoing ship; second, the salvor, meaning any person rendering services in direct connection with salvage operations; third, any person for whose act, neglect, or default the shipowner or salvor is responsible; and fourth, the liability insurer to the same extent as the assured himself. Consequently, because the LLMC Convention does not specifically mention vessel manufacturers, their position depends on whether they can be categorised as 'any person for whose act, neglect or default the shipowner or salvor is responsible'. Unfortunately, the LLMC Convention provides no definition for this expression. As *Martínez Gutierrez* notes, 'with the exception of the salvor and the liability insurer, it seems that all other categories of persons listed in Article 1 can be interpreted in several ways'. The interpretations also vary between jurisdictions.[63] In Finland, the government has read the term 'responsible'

[62] Similarly, see Ulfbeck, pp. 77–79.

[63] See Martínez Gutiérrez, pp. 202–203.

as referring to the rules of shipowner's vicarious liability. These rules, in turn, depend on national law.[64]

According to the Finnish Maritime Code's Chapter 7 Section 1, the extent of the shipowner's vicarious liability is defined as follows (translated by the author):

> 'The shipowner shall, unless otherwise stated in this or other law, be liable for damage caused by the fault or neglect in the service by the master, crew, pilot, or by any other person who, without belonging to the crew, performs work on behalf of the shipowner or the master in the service of the ship.'

The scope of shipowner's vicarious liability is broad as it extends even to independent contractors.[65] However, it is still unlikely that a vessel manufacturer could usually be included to the scope of the rule. As *Falkanger and others* state on Norwegian law—which quite closely corresponds to Finnish law on this matter[66]—only work that can be categorised as 'a typical shipowner's activity' may fall into the scope of shipowner's vicarious liability. Consequently, if a person employed by a shipyard causes damage while performing ordinary maintenance activities onboard the ship, the shipowner may be vicariously liable for the damage caused by that person. As the authors state, however, '[m]ajor works carried out at a shipyard are a good example of work' which do not result in shipowner's liability under the vicarious liability rules.[67] Thus, it is obvious that a shipowner cannot be vicariously liable for errors that e.g. a shipyard has made when the ship was built. It is mainly the

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64 See 'Finnish Government Proposal 10/1984: Hallituksen esitys Eduskunnalle laiksi merilain muuttamisesta ja eräiksi siihen liittyviksi laeiksi', pp. 14–15.

65 See Falkanger, Bull, and Brautaset, p. 200.

66 The maritime codes of Finland, Sweden, Norway, and Denmark were drafted in co-operation, and they are very similar—albeit not identical—to each other. See Falkanger, Bull, and Brautaset, pp. 28–29. According to Section 151 of the Norwegian Maritime Code, the shipowner 'shall be liable to compensate damage caused in the service by the fault or neglect of the master, crew, pilot, tug or others performing work in the service of the ship'. The quotation is from the Code's unofficial translation published in MarIus no. 435.

67 See Falkanger, Bull, and Brautaset, p. 207.

ordinary repair and maintenance activities that may fall into the scope of shipowner's vicarious liability.

As a result, the rules on the amount of damages seem to differ significantly between the Finnish Maritime Code and the Finnish Product Liability Act. Although the LLMC Convention applies in theory to product liability claims, its practical relevance seems limited. It is mainly shipowners who may be subjected to two sets of rules; for the producers of a vessel the right to limit liability is very seldom available. Thus, it seems evident that it may, under certain circumstances, be beneficial for an aggrieved party to base his claim on the Finnish Product Liability Act, instead of the Finnish Maritime Code.

Of course, it could be argued that attempts to circumvent the rules on limitation of liability would be rare. However, the existing case law shows that such attempts are not purely imaginary, and, more importantly, they may even succeed. In *Case C-188/07, Commune de Mesquer v Total France SA and Total International Ltd,* the oil tanker MV *Erika* had sunk and caused one of the worst oil disasters in the history of Europe. Since the amount of damage exceeded the limits that were established in the applicable IMO conventions, a French municipality attempted to circumvent these limits by basing its claim on the French waste legislation which, in turn, was based on the EU Waste Framework Directive.[68] The claimant argued that heavy fuel oil had become waste when it had spilled into the sea and that the oil company Total should reimburse the costs to their full extent. Interestingly, the ECJ reached the conclusion that the EU was not bound to the IMO conventions, as neither the EU nor all of its Member States had ratified them. Consequently, the right to limit liability did not extend to the area of the EU Waste Framework Directive.[69]

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[68] Council Directive 75/442/EEC of 15 July 1975 on waste.

[69] For an analysis of ECJ's judgement, see Christina Eckes, 'Case C-188/07, Commune de Mesquer v. Total France and Total International Ltd., Judgment of the Court (Grand Chamber) of 24 June 2008 [2008] ECR I-4501; Case C-301/08, Irène Bogiatzi v. Deutscher Luftpool, Société Luxair, European Communities, Luxembourg, Foyer Assurances SA, Judgment of the Court (Fourth Chamber) of 22 October 2009, not yet Reported' (2010) 47 Common Market Law Review 899.

In conclusion, it is possible that aggrieved parties may receive a more comprehensive compensation under the Finnish Product Liability Act than under the Finnish Maritime Code, and this possibility should be taken seriously. Even if this possibility is utilised very rarely, in an isolated case it may cause severe financial problems to the liable party if he has not taken this possibility into account in his risk management, e.g. by having liability insurance.[70] In addition, in the future this possibility will most likely become available more often as the usage of sophisticated technologies becomes more and more common. Especially in the case of unmanned shipping where there is no crew on board to ensure that technical equipment functions as it should, the root cause of accident may be a technical failure more frequently than before.

3 General tort liability rules

In the previous section it was discovered that the Finnish Product Liability Act may apply to damage caused by a ship. However, it was also noted that the Act has one important limitation: it does not apply to damage to property that the aggrieved party has used in commercial activities. In shipping, this limitation is significant. For example, if a defective ship collides with a commercial vessel, the shipowner who has suffered the loss cannot claim damages under the Finnish Product Liability Act, since he has used the vessel in a commercial activity. The objective in this section is to explore which rules may apply in such cases.

[70] It is worth noting that the amount of damages may still be adjusted under the Finnish Tort Liability Act's Chapter 2 Section 1 (2) if 'the liability is deemed unreasonably onerous in view of the financial status of the person causing the injury or damage and the person suffering the same, and the other circumstances'. However, when a loss is caused while seeking financial gain, this possibility is rarely available, and it is completely excluded if the liable party has liability insurance that covers the loss. See Pauli Ståhlberg and Juha Karhu, *Suomen vahingonkorvausoikeus*, (6th edn, Talentum 2013), pp. 478–479 and Wilhelmsson and Rudanko, pp. 236–238.

In *Case C-285/08, Moteurs Leroy Somer v Dalkia France and Ace Europe,* the ECJ stated that the Product Liability Directive does not affect the way a Member State is allowed to regulate product liability for damage to property used in commercial activities.[71] Consequently, a national legislator may extend the national product liability regime to apply to such losses—as has been done in France[72]—or regulate them in some other way. In Finland, there is no special legislation on this matter. This means that manufacturer's liability in these cases must be evaluated based on the Finnish Tort Liability Act, which contains the general rules of liability, and on the general principles of tort law.[73]

According to the Finnish Tort Liability Act's Chapter 2 Section 1, '[a] person who deliberately or negligently causes injury or damage to another shall be liable for damages, unless otherwise follows from the provisions of this Act'. In other words, liability is based on the concept of fault. This observation is important since it highlights the fact that a manufacturer may be able to avoid liability even if the product is defective. The claimant must prove that the manufacturer had acted negligently. Especially in the case of sophisticated technology, this requirement may constitute a major obstacle to recovery. In order to prove that a manufacturer was negligent, an aggrieved party may need access to the manufacturer's internal data, which is most often unavailable to third parties.[74] In fact, the challenges related to fault liability were one of the reasons why the Product Liability Directive was conceived in the first place.[75]

Furthermore, proving the existence of negligence may be difficult even if the aggrieved party has access to the manufacturer's internal data. Consider e.g. software defects: as was stated in Section 2.2, sophisticated software will almost inevitably contain bugs, and these bugs may sometimes have serious consequences. Nevertheless, it is a difficult question as to whether they exist because someone has acted *negligently*.

71 See Case C-285/08, Moteurs Leroy Somer v Dalkia France and Ace Europe, paras. 14–32.

72 See Article 1245 of the French Civil Code.

73 See Mononen, pp. 153–196.

74 Generally, see Wilhelmsson and Rudanko, p. 145.

75 See Recital 2 of the Product Liability Directive.

The software may have passed the ordinary tests, but, under some very rare circumstances, an undiscovered bug may still be triggered and cause an accident. Since fault liability focuses on what 'a reasonable person' would have done[76], it may be extremely difficult to show that the bug has been caused by someone's negligent conduct.

Nevertheless, it is somewhat uncertain whether the difference between these two forms of liability is as significant as it seems at first. As was explained in Section 2.2, the Finnish Product Liability Act sets the defectiveness of the product as the basis of liability; it is not, therefore, strict liability in its purest form. In certain jurisdictions the evaluation of the defectiveness of a product may even include elements that resemble the evaluation of fault.[77] Even in Finland, some legal scholars have argued that the defectiveness of a product often indicates that the manufacturer of the product had acted negligently.[78] In addition, it is important to note that a court may—at least in Finland—reverse the burden of proof if the defendant is in a better position to provide evidence.[79] Although it is unclear how often this possibility is utilised in product liability litigation, it is clear that a need to reverse the burden of proof may exist if the aggrieved party has e.g. no access to the manufacturer's internal data. It is also worth noting that some of the EU Member States had, in fact, reversed the burden of proof in their national product liability legislation before they implemented the Directive.[80]

In addition, it is important to note that the general principles of tort law may also affect the basis of manufacturer's liability. Although the Finnish Tort Liability Act requires negligence to be triggered, the preparatory works of the Act explicitly state that the courts are allowed

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76 See Mika Hemmo, *Vahingonkorvausoikeus* (WSOYPro 2005), p. 27.

77 See e.g. discussion in Geraint Howells, 'Defect in English Law — Lessons for the Harmonisation of European Product Liability' in Duncan Fairgrieve (ed), *Product Liability in Comparative Perspective* (Cambridge University Press 2005).

78 Mononen, pp. 157–160.

79 See Antti Jokela, *Pääkäsittely, todistelu ja tuomio. Oikeudenkäynti III* (2nd edn, Talentum 2015), p. 349. See also Wilhelmsson and Rudanko, p. 22.

80 See e.g. Magdalena Sengayen, 'Product Liability Law in Central Europe and the True Impact of the Product Liability Directive' in Duncan Fairgrieve (ed), *Product Liability in Comparative Perspective* (Cambridge University Press 2005), p. 282.

to develop strict liability rules via case law. Product liability was even mentioned as being an example of an area where such a development could occur.[81] However, in the existing case law there are no signs that strict liability would—with the exception of the Finnish Product Liability Act—apply to product liability.[82] Even in general, the Finnish Supreme Court has been cautious to extend the area of strict liability via case law.[83] Consequently, it is evident that under the general tort liability rules of Finland, the basis of manufacturer's liability is currently based on the concept of fault.

In conclusion, an aggrieved party may face significant challenges when seeking compensation from a vessel manufacturer for damage that a ship has caused to property used in commercial activities. The aggrieved party may need to prove the existence of manufacturer's negligence, which may often be too difficult. More importantly, the product liability framework for these losses is significantly more fragmented between the EU Member States than in the area where the Product Liability Directive applies. In shipping, this observation provides a major uncertainty factor, as shipping activities, by their very nature, are remarkably international.

4 Recourse actions

The study has now explored the product liability rules from a third party's perspective. However, it is a completely different question to consider how liability is allocated between shipowners, shipyards, and component manufacturers after one of them has compensated the aggrieved party. This section aims to provide an overview of this question. The discussion will be divided into two subsections. The first subsection will canvass

81 See 'Finnish Government Proposal 187/1973: Hallituksen esitys Eduskunnalle vahingonkorvausta koskevaksi lainsäädännöksi', p. 12.

82 See Wilhelmsson and Rudanko, pp. 12–17.

83 See Ståhlberg and Karhu, p. 176.

the legal basis of recourse claims. The second subsection, in turn, will explore how contractual arrangements may affect the eventual liability allocation between shipowners, shipyards, and component manufacturers.

4.1 Legal basis of recourse actions

In shipping, aggrieved parties usually bring their claims against shipowners, because it is most often the easiest way to obtain compensation. However, the question of whether an aggrieved party *could* have had the right to claim compensation from other persons may still be important. Consider the following example: a ship runs aground, and numerous passengers get injured or lose their lives. The shipowner—i.e. the carrier—is held strictly liable according to the Finnish Maritime Code's Chapter 15 Section 1 and compensates the aggrieved parties. However, the root cause of the accident was a severe design error in the ship's steering gear. Let us also assume that the ship and its steering gear are considered defective under the Finnish Product Liability Act. The question is whether the shipowner has the right of recourse against the shipyard and the manufacturer of the steering gear, and, if he has, on what rules can a recourse action then be based.

Under Finnish law, it is a clear starting point that if two or more persons have caused the same loss, they are s*olidarily liable* to compensate the aggrieved party. For example, the Finnish Tort Liability Act's Chapter 6 Section 2 states that '[w]here the injury or damage has been caused by two or more persons, or they otherwise are liable in the same damages, the liability shall be joint and several' and adds that 'a person who has not been rendered liable in full damages shall be liable only to the amount of the award'.[84] Consequently, it is irrelevant whether they have caused the damage together or whether the basis of their liabilities is different.

[84] The Finnish Ministry of Justice uses the term 'joint and several liability' in its unofficial translation, but it means the same as 'solidary liability'. The difference between these is that the first mentioned term usually refers to common law, whereas the latter is typically used in civil law systems. See e.g. Bjarte Askeland, 'Plurality of Liable Persons and Prescription of Recourse Actions' in Helmut Koziol and Barbara C. Steininger (eds.), *European Tort Law 2007* (Springer 2008), p. 95.

For example, the Finnish Supreme Court's case 2008:62 considered an accident where the roof of a building had collapsed because of bad construction. Two persons had contributed to the construction error: first, the contractor, and second, the city whose building inspector had not ensured that the roof fulfilled the safety requirements. Both tortfeasors were deemed liable: the contractor under the contractual liability rules and the city under the Finnish Tort Liability Act. Although the Supreme Court did not consider the existence of solidary liability in particular but instead only considered the existence of city's liability, e.g. *Norros* has seen the case as a prime example of what solidary liability means. Since an aggrieved party cannot get the same loss compensated twice, tortfeasors' liability is 'automatically' solidary.[85]

In our example, an aggrieved party had three alternative routes to seek compensation. He could claim damages from either: 1) the shipowner, 2) the manufacturer(s) of the product, or 3) the shipowner *and* the manufacturer(s) of the product. All three tortfeasors had contributed to the same loss, even if they had not acted together and their basis of liability was different. Consequently, if the aggrieved party had claimed damages from all of them, it seems clear that they would have been considered solidarily liable. In that case, the eventual liability allocation between the tortfeasors would have been made after the aggrieved party had been compensated. Although there is no clear rule on how liability allocation is made when tortfeasors' liabilities are based on different liability regimes, it is probable that the court would follow the Finnish Tort Liability Act's Chapter 6 Section 3 which expresses the general principle on this matter. According to the Act, '[t]he damages payable shall be allocated to those liable as is deemed reasonable in view of the guilt apparent in each person liable, the possible benefit accruing from the event and other circumstances'. Of course, it is a very difficult question as to what would be deemed 'reasonable' in our example if none of the parties have acted negligently. The general starting point seems nevertheless relatively clear. For example, if the defectiveness of the steering gear has resulted from component manufacturer's gross negligence and there is no

[85] See Olli Norros, *Velvoiteoikeus* (2nd edn, Alma Talent 2018), pp. 302–303.

negligence on the shipowner's part, the shipowner could probably have a wide or even full right of recourse against the manufacturer.

However, the problem in our example is that the aggrieved party had only claimed damages from the shipowner. It remains a question whether the aggrieved party's decision to only claim damages from one of the tortfeasors affects how liability is allocated between them. Although there is no precedent under Finnish law on this matter, there are strong arguments that support the existence of the right of recourse. As *Askeland* notes, solidary liability is 'a wonderful institution in the eyes of the victim', but it cannot function 'without granting the tortfeasor who has paid a right of recourse'. If no right of recourse existed, the eventual liability allocation would be completely coincidental, as it would then fully depend on the decisions made by the aggrieved party. In other words, the idea of the solidary liability institution is to protect the aggrieved party, not to affect the eventual liability allocation between the tortfeasors.[86] Thus, in our example the shipowner would most probably have the right of recourse against the shipyard and the component manufacturer to the extent that is deemed 'reasonable', even if the aggrieved party made no claim against them.[87]

4.2 Effects of contractual arrangements

Nevertheless, the eventual liability allocation between shipowners, shipyards, and component manufacturers does not necessarily depend on the above discussed rules. Although e.g. the Finnish Product Liability Act's Section 10 states that '[a] contractual term, agreed upon before the injury or the damage occurred, which limits the right of the injured party

[86] See Askeland, pp. 98–99.

[87] Of course, the right of recourse may also be available because of the contractual liability rules. For example, if a defective vessel causes damage, it may indicate that the shipyard has breached the shipbuilding contract, and the eventual liability allocation is then determined according to the contract. However, it is important to note that at least under Finnish law, liability for loss caused by a product is usually not dealt under the contractual liability rules. See 'Finnish Government Proposal 93/1986: Hallituksen esitys Eduskunnalle kauppalaiksi', p. 128. In addition, two tortfeasors may obviously be held solidarily liable, even if there is no contractual relationship between them.

to compensation laid down in this Act shall be null and void', nothing prevents the tortfeasors from agreeing how liability is allocated between them after the aggrieved party has been compensated.[88] Such agreements are also commonly used between industrial partners. However, it is very difficult to provide a comprehensive view on arrangements that are used in shipbuilding. At least three problems exist: first, there are many alternative standard contracts that are commonly used; second, the interpretation of terms depends on the applicable law; and third, the contracting parties may agree on terms that differ from the standard terms. Thus, the following discussion is limited to certain commonly used terms that may potentially affect the eventual liability allocation between shipowners, shipyards, and component manufacturers.

In principle, it is possible to imagine at least three types of terms that may potentially affect the eventual liability allocation: first, the contracting parties may expressly agree on who compensates losses caused by a product; second, the contracting parties may agree on a guarantee and exclude liability for any other loss that may occur; and third, the contracting parties may exclude liability for consequential and indirect losses. However, the impacts of these three alternatives may differ from each other.

The first alternative—the contracting parties expressly agree on who compensates losses caused by a product—may often be present in component supply contracts. Section 40 of the Orgalime General Conditions S 2012, for example, states that '[t]he Supplier shall not be liable for any damage to property caused by the Product after it has been delivered and whilst it is in the possession of the Purchaser'. Section 40 even adds that '[i]f the Supplier incurs liability towards any third party for such damage to property as described in the preceding paragraph, the Purchaser shall indemnify, defend and hold the Supplier harmless'. According to the official Orgalime commentary, the purpose of this term is to agree on liability allocation in cases where an aggrieved party may directly claim

[88] See Wilhelmsson and Rudanko, pp. 282–283.

damages from the supplier, e.g. under the product liability rules.[89] Thus, if we assume that a component manufacturer has directly sold his product to a shipowner and the Orgalime General Conditions S 2012 are applied, it is clear that the shipowner's right of recourse is excluded if the component causes damage to property while it is in the possession of the shipowner.

The second alternative—the contracting parties agree on a guarantee and exclude liability for any other loss that may occur—is often present in shipbuilding contracts. According to Article X of the Standard Form Shipbuilding Contract 2000, for example, the shipbuilder issues the buyer with a guarantee, whose length is typically 12 months. During the guarantee period, the builder has a duty to 'repair and rectify at its own cost and expense and free of charge to the Buyer, any defects—including latent defects or deficiencies—concerning the Vessel or parts thereof, which are caused by faulty design, defective material and/or poor workmanship on the part of the Builder, its servants, employees or Subcontractors'. Furthermore, if the builder has rectified the deficiencies within a reasonable time, the builder shall have 'no other liability for any damage or loss caused as a consequence of the defect, except for repair or renewal of the Vessel's part/parts that have been damaged as a direct and immediate consequence of the defect without any intermediate cause, and provided such part or parts can be considered to form a part of the same equipment or same system'. However, it may sometimes be unclear whether such clauses affect how non-contractual liability is divided between the contracting parties. In Finland, *Saarnilehto* has argued that liability exclusions do not necessarily apply to liability that is not based on a contract, but instead on the Finnish Product Liability Act. According to his view, liability exclusions only concern liability that has resulted from a breach of contract, unless something indicates that the exclusion is meant to apply to product liability as well. He also notes that liability exclusions are not the most typical way to agree on the allocation of product liability, as specific indemnity clauses are often used

[89] See Mats Bergström and others, *Orgalime General Conditions S 2012: Guide on their use and interpretation* (The European Engineering Industries Association 2014), p. 111.

in this purpose.[90] Thus, if *Saarnilehto's* view was accepted, the intention of the parties would be decisive here if Finnish law were to be applied. The very comprehensive wording: 'no other liability for any damage or loss caused as a consequence of the defect', could nonetheless suggest that the right of recourse would also be excluded when it is based on the non-contractual liability rules.[91]

The third alternative—that the contracting parties exclude liability for consequential and indirect losses—is arguably the most controversial way to agree on the allocation of product liability. For example, the official Orgalime commentary notes that even if Section 40 of the Conditions does not for some reason apply, the seller of a product may still be able to avoid product liability claims if the type of loss falls into the scope of Section 45, which states that '[s]ave as otherwise stated in the General Conditions there shall be no liability for either party towards the other party for loss of production, loss of profit, loss of use, loss of contracts or for any other consequential or indirect loss whatsoever'.[92] However, the problem is that the interpretation of the term 'consequential or indirect loss' depends heavily on the applicable law. In some jurisdictions a loss caused by a product may be considered as a consequential and indirect loss, whereas in others it may be a direct loss.[93] Sometimes it may even be

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90 See Ari Saarnilehto, 'Sopimuskumppanit, vastuunrajoitus ja tuotevastuu' 2011 Lakimies 7–8, p. 1404.

91 Compare to Ulfbeck, p. 74. According to her, under Danish law Article X of the Standard Form Shipbuilding Contract 2000 clearly covers 'actions brought by the shipowner against the shipyard' but she seems uncertain as to whether the liability exclusion is valid if the recourse action is based on the fact that the shipowner has become liable for personal injury. As she notes, under the product liability rules it is not allowable to limit liability in relation to the aggrieved party. However, the existence of this problem seems unlikely at least under Finnish law. Basically, under Finnish law, a contractual term in a shipbuilding contract does not limit liability against a third party but only determines how liability is allocated *after* the aggrieved party has been compensated.

92 See Bergström and others, p.115.

93 See e.g. Simon Curtis, *The Law of Shipbuilding Contracts* (4th edn, Routledge 2012), p. 185. He discusses the scope of Article IX.4 of SAJ Form and notes that 'the buyer's liability for damage to the vessel or injury to a passenger or crew member consequent upon the failure of a defective item of machinery is likely to be direct rather than consequential and therefore not excluded by the terms of Article IX.4'.

unclear which one it is.[94] Consequently, the exclusion of 'consequential and indirect losses' may be a very uncertain way of agreeing upon the eventual liability allocation in product liability, unless it is clear that the contracting parties have meant the exclusion to apply in such claims.

In addition, it is important to note that contracts are usually only binding between the contracting parties.[95] If e.g. a shipowner who has bought a vessel from a shipyard then sells the vessel onwards, it is a question whether the shipbuilding contract may affect the eventual liability allocation between the shipyard and the new owner of the vessel, if they are held solidarily liable under the non-contractual liability rules. In principle, it could be argued that the new owner should not be in a better position against the shipyard than the old owner could have been.[96] However, the problem is that if the new owner undertakes a recourse action against the shipyard, it is not based on the contractual liability rules, but instead on the non-contractual liability rules. At least under Finnish law, it seems somewhat unclear whether the shipbuilding contract may then affect the eventual liability allocation between the tortfeasors, unless the new owner has somehow agreed to respect its terms.

For example, the Finnish Supreme Court's case 2009:92 considered a situation where a manufacturer had sold a yacht to a person who had later sold the vessel to a third person. Thirteen years after the manufacturer had put the yacht into circulation, the yacht sank due to her defective design. Under the contractual liability rules, the manufacturer was

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94 In Finland, for example, Section 67(2) of the Sale of Goods Act (355/1987) states that 'loss due to damage to property other than the goods sold' is deemed an indirect loss. However, the problem is that the Act does not apply to personal injuries, and even damage caused to property is only compensable if the damaged property has had a close connection to the use of the product. See 'Finnish Government Proposal 93/1986: Hallituksen esitys Eduskunnalle kauppalaiksi', p. 128. Thus, it may sometimes be unclear exactly what losses are excluded if a contract only states that 'consequential and indirect losses' are not compensable.

95 See e.g. Ari Saarnilehto and Vesa Annola, *Sopimusoikeuden perusteet* (8th edn, Alma Talent 2018), pp. 37–40.

96 This principle can be deduced e.g. from the Finnish Promissory Notes Act (622/1947). According to Section 27 of the Act, '[w]hen a non-negotiable promissory note is transferred or assigned, the transferee shall not have a better right against the debtor than the transferor had unless expressly otherwise stipulated.'

only liable for defects occurring during the first ten years after the yacht was put into circulation. However, the Supreme Court noted that the defectiveness of the yacht had resulted from manufacturer's negligence, as it had not followed safety regulations that were in force at the time of manufacture, regardless of the contract. Consequently, the new owner of the yacht was entitled to compensation under the Finnish Tort Liability Act, even if claiming damages under the contractual liability rules was no longer possible. Although this conclusion has been criticised because liability was extended to damage caused to the yacht itself,[97] the case shows that a contract between a manufacturer and the original owner does not necessarily affect the rights that the new owner may acquire, regardless of contract. Consequently, at least under Finnish law it can be argued that if a vessel has been sold to a third party and the new owner and the manufacturer become solidarily liable to compensate a loss that the vessel has caused, the terms of the shipbuilding contract do not *necessarily* affect the eventual liability allocation between the tortfeasors, unless the new owner has somehow agreed to respect those terms.

In conclusion, it is evident that contracts affect how liability is eventually allocated between shipowners, shipyards, and component manufacturers. On the one hand, the above discussed examples indicate that shipyards and component manufacturers are probably at least partially protected against shipowner's recourse claims, even if the right of recourse is based on the non-contractual liability rules. On the other hand, there are many uncertainties, and the freedom of contract provides wide possibilities for agreeing on a liability allocation that the contracting parties perceive as being appropriate. In any case, it is worth highlighting that under Finnish law, liability exclusions are only valid against losses caused by ordinary negligence; in the case of gross negligence, liability exclusions do not apply.[98]

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97 See Olli Norros, 'KKO 2009:92 — Valmistajan vastuu veneen vahingoittumisesta' 2010 Lakimies 3, pp. 439–442.

98 Generally on the effects of gross negligence on liability exclusions, see Mika Hemmo, *Sopimusoikeus III* (Talentum 2005), p. 254.

In unmanned shipping, a key question will obviously be how the contractual relationship between shipowners, shipyards, and component manufacturers will be arranged. As the role of technical equipment increases, shipowners—or their liability insurers—may have incentives to seek as extensive a right of recourse as possible against vessel manufacturers.[99] Manufacturers, in turn, will probably try to avoid liability as far as possible.[100] Shipyards, for example, may find it unacceptable to bear the consequences caused by software defects, if the role of a shipyard is just to assemble the parts together. Consequently, it is a very central question in the development of unmanned ships of how to contractually strike a balance between the interests of shipowners, shipyards, component manufacturers, and any other party who will be somehow involved in the development of unmanned ships.

5 Conclusion

The previous sections of this study showed that the product liability rules could be applied even today in relation to many shipping accidents. The absence of case law, however, indicates that there has usually been no need to utilise them. Many reasons may exist for why this is the case, but, in my view, it most likely results from the way the shipowner's liability

[99] Liability insurers may sometimes even find it difficult to insure technology risks. See e.g. Mika Viljanen, 'Robotteja vakuuttamassa — autonomiset alukset esimerkkinä', 2018 Lakimies 7–8, pp. 962–973.

[100] Of course, it is theoretically possible that manufacturers would voluntarily take liability as it is one way to convince the public that new technologies are safe to use. In the context of self-driving cars, Volvo already announced back in 2015 that they will hold themselves 'liable for everything the car is doing in autonomous mode' and even added that 'if you are not ready to make such a statement, you shouldn't try to develop autonomous system'. See Autoblog, 'Can't Accept Autonomous Liability? Get Out of the Game, Says Volvo' (9 October 2015) <https://www.autoblog.com/2015/10/09/volvo-accept-autonomous-car-liability/> accessed 18 April 2018. However, it is a completely different question whether such an approach could work in the maritime context.

framework is arranged. Basically, the Finnish Maritime Code includes many advantages that make the Code attractive to an aggrieved party. For example, the shipowner often has a duty to obtain liability insurance,[101] and in some cases an aggrieved party may even have a right to make direct claims against the insurer.[102] In product liability, in turn, the producer of a product has no duty to obtain liability insurance,[103] and even if an insurance policy exists, it is a completely different question as to what kind of losses it covers. In addition, Section 9 of the Finnish Product Liability Act requires that the claim must be made 'within ten years from the date on which the liable party (...) put the product which caused the injury or damage in circulation'. Although the general tort liability rules do not have this kind of limitation, the requirement of fault makes claiming damages difficult under those rules as well. When one takes into account that the area of strict liability has also grown within the Finnish Maritime Code,[104] it is unsurprising that the aggrieved parties have most often based their claims on the Finnish Maritime Code, rather than on the product liability rules.

In theory, unmanned ships could change the status quo. Because the role of technical equipment will become more central than ever before, it is clear that there will also be more situations where aggrieved parties could invoke the product liability rules. In reality, however, I find it unlikely that the introduction of unmanned ships could drastically affect the position of the Finnish Maritime Code as being the main way to seek compensation, *unless* the Finnish Maritime Code or the product liability rules are signifi-

[101] According to the Finnish Maritime Code's Chapter 7 Section 2, liability insurance must be obtained if the gross tonnage of the vessel is at least 300.

[102] Direct claims against the insurer are possible at least in the cases of oil pollution and passenger injuries. See Article VII(8) of the International Convention on Civil Liability for Pollution Damage and Article 4bis(10) of the Athens Convention Relating to the Carriage of Passengers and their Luggage by Sea.

[103] The question of whether manufacturers should have a duty to obtain liability insurance was considered when the Finnish Product Liability Act was enacted. Nevertheless, the government saw no need for such an approach. See 'Finnish Government Proposal 119/1989: Hallituksen esitys Eduskunnalle tuotevastuulaiksi', p. 17.

[104] On the position of strict liability in the Nordic maritime codes, see Falkanger, Bull, and Brautaset, pp. 192–193.

cantly changed. Even in unmanned shipping, the root cause of an accident may often still—at least partially—be the shipowner's negligent behaviour, and in such cases the Finnish Maritime Code will usually be a significantly easier way for an aggrieved party to seek compensation. If the basis of shipowner's liability is strict, there are even less incentives for aggrieved parties to invoke the product liability rules. Consequently, I believe the current product liability rules seem attractive to an aggrieved party mainly in two situations: first, if the shipowner is not liable to compensate the loss at all, and second, if the scale of the loss is exceptionally large, and the shipowner is not liable to compensate the loss to its full its extent, due to the right of limitation of liability.

The first situation—the shipowner is not liable at all—mainly concerns cases where shipowner's liability requires negligence.[105] As I have discussed in this study, unmanned ships may cause situations where finding negligence, at least on the shipowner's part, may be extremely difficult.[106] However, it is not clear that product liability should be the instrument to use for filling the potential gaps in shipowner's liability. If a decision to use an unmanned ship creates liability gaps, the solution may also be a wider adoption of strict liability within the shipowner's liability framework.[107]

The second situation—the shipowner is not liable to compensate the loss to its full extent—may be a more difficult challenge. It seems that an aggrieved party may be able to secure a more comprehensive recovery by basing his claim on the product liability rules instead of, or in addition, on the Finnish Maritime Code. In theory, this problem could be solved in two ways: first, the right to limit liability could be extended to vessel manufacturers, and second, the right to limit liability could be abolished completely. However, it may be difficult to get enough support for either approach. On the one hand, regulators have been reluctant to extend

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105 Of course, certain force majeure situations may release a shipowner from liability even under the strict liability rules. See e.g. the Finnish Maritime Code's Chapter 10 Section 3. However, the force majeure defence can also be invoked under the product liability rules. See Wilhelmsson and Rudanko, p. 244.

106 See Section 1 of this study.

107 See e.g. Peter Wetterstein, 'Redaransvaret och autonom sjöfart – några synpunkter', 2019 Tidskrift utgiven av Juridiska Föreningen i Finland 1, pp. 32–35.

the range of persons that have the right to limit liability,[108] and this approach could also be difficult to accept under EU law, as the product liability rules are meant to protect consumers.[109] On the other hand, the complete abolition of limitation of liability also seems unlikely. Although the existence of this right has been criticised many times, the majority of the international maritime community has only been willing to increase the limits, rather than abolish the right entirely.[110]

In any case, unmanned ships may affect the eventual liability allocation between the liable parties. An increasing number of cases where aggrieved parties can invoke the product liability rules also means that shipowners—or their liability insurers—may more often have the right of recourse against shipyards and component manufacturers. To some extent manufacturers are most probably already protected against such claims under the current contractual practices, but it is likely that these practices will also be contested more frequently if the role of technical failures significantly increases as the root cause of accidents. Consequently, the introduction of unmanned ships will make it more important than ever before to clearly define in contracts how liability for losses caused by defective products is allocated between the contracting parties. In addition, the liability allocation that the parties agree will have to be compatible with the terms of their insurance policies. Without sufficient insurance coverage, many contractual arrangements may be difficult or even impossible to adopt.

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[108] On the position of shipyards, see e.g. Wetterstein, *Globalbegränsning av sjörättsligt skadeståndsansvar: en skadeståndsrättslig studie*, pp. 99–102.

[109] See Recital 4 of the Product Liability Directive. The importance of the principle of full compensation has been noted by the ECJ as well. In *Case C-203/99, Veedfald v Århus Amtskommune*, the ECJ stated that although it is left to national legislatures to determine the precise content of compensable damage, 'full and proper compensation for persons injured by a defective product must be available' for 'damage resulting from death or from personal injuries and damage to, or destruction of, an item of property'. See paras. 25–27 of the judgment.

[110] See Martínez Gutiérrez, p. 201.