

Reconceptualising the Nautical Fault Exception in the Fog of Emerging Technologies

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ABSTRACT

It is expected that the maritime world will be significantly different by 2050, from smart ports through to blockchain-based shipping documents and autonomous vessels. As the maritime trade witnesses further developments in this field, there will be an inevitable struggle to harmonise the new technology vessels with the traditional rules of law. This article seeks to further the discussion of one of the main legal rules that will have a significant role in shaping sea carriers' liability for goods carried by autonomous vessels: the nautical fault exception, which operates to remove, to some extent, sea carriers' liability for losses arising from the acts or omissions of their employees. The main tenet of this article is that an adapted version of the exception should be available to govern the carriage of goods by new technology vessels. In this context, it advocates the use of legal personhood for the purposes of the nautical fault exception. In so doing, this article contributes to the important debate in employment law on the distribution of the risk of losses arising from autonomous systems when, in future, they take over tasks traditionally carried out by employees. In the absence of employment contracts to perform certain commercial activities, the law will need to decide whether legal personhood should be assigned to autonomous systems for efficient and fair risk allocation. This article illustrates why this may be the solution particularly where there is a 'fine-tuned' balance of liability already struck in the current legal landscape.

1. INTRODUCTION

With the expanding commercial potential of emerging maritime technologies, the race to build 'new technology vessels'¹ has already taken off. A number of projects are currently under way in various parts of the world

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¹In this article, the phrase 'new technology vessels' is used to refer to both remote-controlled and autonomous vessels. The phrase 'unmanned vessels' was intentionally not used as an umbrella term mainly because the law may still require on-board support irrespective of a vessel's level of autonomy.

to develop the systems and technology for the commercial operation of such vessels in international waters.² Undoubtedly, these technological advances and explorations have given us a tangible grasp of how our understanding of maritime operations and management will gradually change in the years to come. The question that we as legal academics and lawyers now face is how the law can best provide certainty for the commercial use of new technology vessels without putting a brake on further progress in the field. A corollary question is: Can these vessels be incorporated into the existing legal landscape with some adaptation or do we need an entirely new legal framework?

The purpose of this article is not to suggest an ‘ideal’ liability regime for the carriage of goods by new technology vessels. The lessons from the past have shown that a widely accepted liability regime usually manifests itself as a compromise, leaving little room for considerations of ideal frameworks in purely legal terms. In our quest for solutions to the questions above, the role of legal academics and lawyers is nonetheless an important one since the traditional concepts of maritime law will have to be revisited together with our understanding of maritime operations and navigation. From a legal perspective, the major issue therefore appears to be conceptual.

This article seeks to further the discussion of one of the main legal rules that will play an important role in shaping the sea carrier’s liability for goods carried by new technology vessels: the nautical fault exception. From the perspective of an employment lawyer, this immunity can appear somewhat unusual, as it allows the sea carrier to avoid liability for cargo loss or damage by proving *the fault* of their employees. As the shipping industry prepares for a sea change, from labour-intensive to autonomous shipping, this article illustrates the extent to which algorithmic decision-making can replace the acts and omissions of the sea carrier’s employees for the application of the nautical fault exception.

The article begins by discussing how it contributes to the important debate in employment law on the distribution of the risk of losses arising from autonomous systems when, in future, they assume tasks that are traditionally carried out by employees. For the purposes of setting the scene, it also discusses algorithmic liability in the context of shipping law, as well as the key features of new technology vessels with reference to the different degrees

²See, for instance, the Yara and Kongsberg partnership to build autonomous vessels. <https://www.kongsberg.com/maritime/about-us/news-and-media/news-archive/2017/yara-and-kongsberg-enter-into-partnership-to-build-worlds-first-autonomous-and/?OpenDocument> (last date accessed 22 September 2021).

of autonomy envisaged. Thereafter, it discusses the major aspects of the nautical fault exception, urging us to rethink its role in shaping the carrier's liability. Following these discussions, this article argues that in order to capitalise on the benefits offered by these emerging technologies, an adapted version of the exception should be available to govern the carriage of goods by new technology vessels: the nautical fault exception should, in principle, apply to the algorithmic decisions taken for the navigation and/or management of autonomous vessels. With this approach, the paper also stresses the importance of keeping the nautical fault exception in order to maintain the 'fine-tuned'³ balance of liability achieved in the Hague-Visby Rules.

2. THE RELEVANCE OF THE TOPIC TO EMPLOYMENT LAW

When engaged in a commercial activity,⁴ entities can be subject to vicarious liability due to the wrongful acts or omissions of their employees.⁵ In this context, employment contracts facilitate the imposition of vicarious liability onto entities in the interests of fair and efficient risk allocation,⁶ which is based on a 'combination of policy considerations'.⁷

While employment contracts, in general, form the basis of the assignment of liability to employers through the doctrine of vicarious liability, they can serve a different purpose in the context of maritime law. Under the nautical fault exception, sea carriers can, to some extent, avoid liability for losses arising from the acts or omissions of their employees. Nonetheless, similar to the justifications underpinning the doctrine of vicarious liability, the nautical fault exception also draws support from policy

³See B. D. Daniel, 'Potential Liability of Marine Classification Societies to Non-Contracting Parties' (2006) 19 *USF Mar LJ* 183, 289.

⁴For vicarious liability, the defendant's activities need not necessarily be commercial, see *Cox v Ministry of Justice* [2016] UKSC 10, at para 30 per Lord Reed.

⁵Vicarious liability can also be imposed even in cases where a relationship is not one of employment: *The Catholic Child Welfare Society and others v Various Claimants (FC)*, *The Institute of the Brothers of the Christian School and others* [2012] UKSC 56, at para 47 per Lord Phillips. See also *JGE v Portsmouth Roman Catholic Diocesan Trust* [2012] EWCA Civ 938 at para 60.

⁶*Viasystems (Tyneside) Ltd v Thermal Transfer (Northern) Ltd and others* [2005] EWCA Civ 1151, at para 55 per Rix LJ.

⁷J. G. Fleming, *The Law of Torts*, 10th edn (Sydney: Thomson Reuters Australia, 2011) at p. 438, cited in *JGE v Portsmouth Roman Catholic Diocesan Trust* [2012] EWCA Civ 938, at para 53. See also *Lister and Others v Hesley Hall Ltd* [2001] UKHL 22; [2002] 1 AC 215, 217.

considerations that are, in the maritime context, built around the established structure of maritime trade.⁸

With their introduction to commercial use, autonomous systems will no doubt assume some important functions that are traditionally performed by employees. Unlike a machine that is used by humans, these systems will make and execute decisions independent of humans.⁹ Relatedly, they will make decisions in exceptional situations that may not be foreseen by their creators. In the absence of employment contracts, how should the law address the issue of risk allocation when autonomous systems assume the role of employees?

Because the liability rules, as they currently stand, may not effectively address this issue, this paper provides an illustration of how the rules could be reconceptualised by assigning legal personhood to algorithms. Before building upon this argument through discussions from various angles, it is acknowledged that other solutions, such as granting immunity to sea carriers, may seem more straightforward than the personification of autonomous systems. In the space of a single article, no attempt is made to map out and analyse all possible legal solutions. Instead, the use of legal personhood is discussed with an eye to showing that the personification can allow us to deal more effectively with cases where autonomous systems, although properly designed and maintained, act unpredictably.

3. ALGORITHMIC LIABILITY IN CARRIAGE OF GOODS BY SEA

Before delving into the main discussion, our attention should first be directed towards the form in which algorithmic liability can be shaped in the context of carriage of goods by sea. The crucial question here is: should we think about ‘machine-learning’ (hereinafter ‘ML’) algorithms to be used for autonomous vessels as a ‘thing’ or ‘person’?¹⁰ Given that autonomous vessels are expected to have multiple sensors with ‘decision support

⁸See discussions in s VIII(a) below.

⁹R. Abbott, ‘The Reasonable Computer: Disrupting the Paradigm of Tort Liability’ (2018) 86 *Geo Wash L Rev* 1, at p. 5.

¹⁰The law traditionally distinguishes between the thing and the person, see J. R. Trahan, ‘The Distinction Between Persons & Things: A Historical Perspective’ (2008) 1 *J Civ L Stud*, available at <https://digitalcommons.law.lsu.edu/jcls/vol1/iss1/3> (last date accessed 22 September 2021).

systems', all of which are to be integrated into the construction of such vessels,¹¹ it may be difficult to disentangle the algorithm from the vessel and deem it a legal person.

This is also compounded by the fact that ML algorithms are human-made artefacts that cannot fully replicate essential human abilities and intelligence.¹² ML algorithms display an ability to choose the best action to achieve a particular task with the operation of complex multilayered networks of artificial neurons.¹³ These algorithms are given sets of data to process, analyse and make inferences, thereby gaining predictive powers to arrive at outcomes when they are given 'live data'.¹⁴ With such ability, ML algorithms are expected to carry out tasks that are traditionally performed by humans, such as the navigation and management of vessels, both of which involve professional skill and judgement.¹⁵

If ML algorithms to be used for autonomous vessels are not granted some form of legal personhood, it becomes important to decide whether they should be considered as a product, service or information. Should we think about such ML algorithms in the same way as we think about the algorithms used for websites or should they be considered as a piece of computer program¹⁶ embedded in a tangible medium? If contained in 'non-embedded applications',¹⁷ ML algorithms may be considered as a

¹¹See also the AAWA whitepaper (The Rolls-Royce-led Advanced Autonomous Waterborne Applications Initiative), <https://www.rolls-royce.com/~media/Files/R/Rolls-Royce/documents/customers/marine/ship-intel/aawa-whitepaper-210616.pdf> at p. 16 (last date accessed 22 September 2021).

¹²On this issue, see C. Markou and S. Deakin, 'Ex Machina Lex: The Limits of Legal Computability', https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3407856 (last date accessed 22 September 2021); M. U. Scherer, 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies and Strategies' (2016) 29 *Harv J L & Tech* 353, at 360.

¹³Y. Bathaee, 'The Artificial Intelligence Black Box and the Failure of Intent and Causation' (2018) 31 *Harv J L & Tech* 889, at 903.

¹⁴*Ibid.* at 900. On the backpropagation algorithm, see Markou and Deakin, n.12.

¹⁵*Standard Oil Company of New York v The Clan Line Steamers, Ltd* [1923] 17 Ll L Rep 120.

¹⁶See the definition of 'artificial intelligence system' in Art 3(1) of the Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts, SEC(2021) 167 final – SWD(2021) 84 final – SWD(2021) 85 final. There the system is defined as software. The proposal can be found online at <https://digital-strategy.ec.europa.eu/en/library/proposal-regulation-laying-down-harmonised-rules-artificial-intelligence-artificial-intelligence> (last date accessed 22 September 2021).

¹⁷See A. Bertolini, 'Artificial Intelligence and Civil Liability', European Parliament Legal Affairs, Policy Department for Citizens' Rights and Constitutional Affairs Directorate-General for Internal Policies, PE 621.926 – July 2020, at para 3.4.1, [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/621926/IPOL_STU\(2020\)621926_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/621926/IPOL_STU(2020)621926_EN.pdf) (last date accessed 22 September 2021).

service¹⁸ or information,¹⁹ and a mistaken decision taken by them may therefore give rise to a liability in contract and/or tort.²⁰ Where they are embedded in a tangible system, such as a vessel, they may be viewed as a ‘product’.²¹ When viewed from this perspective, liability for algorithmic decisions causing loss of or damage to cargo can seem analogous to the liability of the carrier in respect of defects in the vessel.²² The law as it currently stands resolves such a liability issue mainly on two grounds: the rules on seaworthiness²³ and the ‘latent defect exception’.²⁴

¹⁸The question of whether software should be treated as a product or service has attracted much debate, see A. Bertolini, n.17, at para 3.4.1. This is an important distinction to make mainly because different rules govern the provision of services. Under EU law, service providers’ liability is not in principle regulated by the Product Liability Directive 85/374/EEC, see Commission Staff Working Document, Evaluation of Council Directive 85/374/EEC of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products, para 2.1.1, citing Judgment of 21 December 2011, Case C-495/11, Dtrueux and Caisse primaire d’assurance maladie du Jura. See <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62010CJ0495&qid=1632267805347> (last date accessed 22 September 2021).

¹⁹Under English law, a non-embedded digital content, such as software, may not be a product for the purposes of product liability, but it can be considered as ‘information’, see M. Jones, *Clerk & Lindsell on Torts*, 23rd edn (London: Sweet & Maxwell, 2020), at para 10.52.

²⁰On the supply of digital content and services, some innovative regulatory steps have been taken within the EU. See the EU Directives 2019/770/EU on contracts for the supply of digital content and digital services and 2019/771/EU on contracts for the sale of goods. Both of these directives came into force on 11 June 2019, and they will be implemented by Member States by 1 July 2021. The UK Consumer Rights Act 2015 also contains provisions on digital content and services.

²¹Once a software is embedded in a tangible system, it may become a ‘product’ for product liability purposes, see Jones, n.19, at para 10.52, citing *St Albans City Council v ICL Ltd* [1995] F.S.R. 686, where it was held, obiter, that software constituted goods for the purposes of the Sale of Goods Act 1979, s 61(1). However, the opinion of the Advocate General in *Computer Associates v Software Incubator* suggests that the treatment of software may change. There, the Advocate General took the view that software need not be embodied in a tangible structure for the purposes of the Commercial Agents Directive (Directive 86/653/EEC). See also the AAWA whitepaper, n.11, at p. 50, where it is stated that ML algorithms fitted in autonomous vessels can give rise to product liability.

²²On this view, see F. Stevens, ‘Carrier Liability for Unmanned Ships: Goodbye Crew, Hello Liability?’ in B. Soyer and A. Tettenborn (eds), *New Technologies, Artificial Intelligence and Shipping Law in the 21st Century* (London: Informa, 2019), Ch 11.

²³See Art III, Rule 1 of the Hague and the Hague–Visby Rules.

²⁴See Art IV, Rule 2(p) of the Hague and the Hague–Visby Rules, where reference is made to latent defects not discoverable by due diligence.

Although the law on seaworthiness has always been an evolving field,²⁵ it is fairly settled that a vessel's defective part can render her unseaworthy.²⁶ In this context, a vessel's defective part may well be a particular ML device that is fitted into the vessel. When this is the case, the carrier may not necessarily be held liable for the loss of or damage to the cargo caused by the vessel's unseaworthiness. The current rules on seaworthiness can protect a carrier from such an ML device going wrong where they establish that the carrier exercised due diligence in choosing, fitting and maintaining the device for the vessel to be seaworthy before and at the beginning of the voyage.²⁷

Another layer of protection for carriers can potentially be the 'latent defect' exception contained in Article III, Rule 2(p) of the Hague and the Hague-Visby Rules.²⁸ This exception allows the carrier to be exempt from liability where the loss of or damage to the cargo is caused by a defect which could not have been discovered by exercising due diligence.²⁹ The applicability of the exception has recently been considered, but not applied, in an Australian case where the cargo damage was caused by incompatible software fitted in the refrigerated container supplied by the carrier.³⁰

If the current rules on seaworthiness and the latent defect exception can potentially provide a safe harbour for the sea carriers in the case of an algorithmic decision causing loss of or damage to cargo, why should the nautical fault exception be extended to cover such cases? In other words, why should the ML devices to be fitted in autonomous vessels be personified and treated as though they are the master and crew for the application of the nautical fault exception?

²⁵On the recent debate as to whether a vessel's defective passage plan can render her unseaworthy, see the recent Court of Appeal decision in *Alize 1954 and Another v Allianz Elementar Versicherungs AG and Others* ('*The CMA CGM Libra*') [2020] 2 Lloyd's Rep 565. The decision is currently before the Supreme Court.

²⁶See, for instance, the decision in *Cranfield Bros Ltd v Tatem Steam Navigation Company Ltd* [1939] 64 Ll L. Rep 264, where the vessel's leaky rivet rendered her unseaworthy. See also *The Fjord Wind* [2000] 2 Lloyd's Rep 191 and *The Cape Bonny* [2018] 1 Lloyd's Rep 356.

²⁷On this view, see Stevens, n.22, p. 155. Regarding the rules of seaworthiness, see Art III, Rule 1 of the Hague and the Hague-Visby Rules.

²⁸In the case of a latent defect, the carrier can in principle be protected by Art IV, Rule 1 of the Hague and the Hague-Visby Rules. For this reason, the exception is not usually considered to have much significance in shaping the immunities of the carrier, see G. Treitel and F. Reynolds, *Carver on Bills of Lading*, 4th edn (London: Sweet & Maxwell, 2017), para 9-235.

²⁹*The Dimitrios N Rallias* (1922) 13 Ll L. Rep 363, at p. 366. See also *The Antigoni* [1991] 1 Lloyd's Rep 209.

³⁰*Seafood Imports Pty Ltd v ANL Singapore Pte Ltd* (2010) FCA 702.

It is tempting to think of ML algorithms as defective where their decisions have caused loss of or damage to cargo. As such, the rules on seaworthiness and the latent defect exception may appear to be a more natural solution to the liability problem. However, to reduce the analysis to this point misses an important fact. While an ML device that has been not created and/or maintained properly can be defined as defective, it is not convincing to treat every ML device as defective just because it has acted in way that was not foreseeable by its designer and by those in charge of maintaining it.³¹ When this distinction is recognised, the question arises as to how carriers can be protected against ML devices that, although properly designed and maintained, act unpredictably. This article suggests that ML algorithms can be granted legal personhood for the nautical fault exception to apply in cases where they are not defective, despite the loss of or damage to the cargo being caused by them.

Without the nautical fault exception, the carrier's liability would be somewhat unpredictable, while getting close to strict liability. This would have a knock-down effect on the long-established fine-tuned balance struck on the allocation of inherent risks in sea carriage. Under the Hague and the Hague-Visby Rules, the carrier is in principle tasked to shoulder the responsibility for loss or damage arising from matters that are within his/her control. Those risks arising from matters outside of his/her direct control, such as acts or omissions of the master and crew, are excluded³² from the sphere of the carrier's responsibility.³³ Consequently, it becomes possible for sea carriers to know where they stand, in terms of the risks they assume, and make the necessary insurance arrangements accordingly.³⁴ As suggested in this article, the scrapping of the nautical fault exception would disturb the sophisticated arrangements for limiting, sharing and insuring the risks to the carrier's detriment. All this would consequently stifle innovation, thereby hindering further progress in these technologies.

4. AN OVERVIEW OF THE NEW TECHNOLOGY VESSELS

The current projects on the technological aspects of new technology vessels suggest that the progress will probably be gradual, starting first with

³¹In this context see Bathaee, n.13.

³²See Art IV, Rule 2 of the Hague and the Hague-Visby Rules.

³³See *The Tasman Pioneer* [2010] NZSC 37 (SC), per Wilson at para 8.

³⁴*Ibid.*

the introduction of remote-controlled vessels that will primarily be controlled by shore-based remote operators.³⁵ At the initial stage, it is expected that there will also be ‘on-board decision support’.³⁶ At the other end of the spectrum is a fully autonomous vessel with complete deterministic control features to sail the ship.³⁷ With increased levels of autonomy, the need for human control will probably wane over time.

Some major maritime institutions have already taken steps to identify the degrees of autonomy expected of such vessels. While the International Maritime Organisation has identified four different levels of autonomy,³⁸ Lloyd’s Register has recognised six.³⁹ These classifications may be helpful in our quest to understand these technologies but they may not necessarily reflect what we might see in reality. Experts, such as Rolls-Royce, predict that new technology vessels will come in a hybrid form with both autonomous and remote-controlled functions.⁴⁰ With the ‘adjustable’ autonomy feature, it will be possible for such vessels to have different levels of autonomy in various stages of a voyage.⁴¹ This fragmentation of the expected level of autonomy also raises considerable legal challenges for the regulators. Should there be different sets of rules applicable to certain categories of new technology vessels? If so, how should the vessels with the adjustable autonomy feature be classified for regulatory purposes?

With these new technologies, the question of carriers’ liability will be far less straightforward. The developers see a future in which human involvement in the direct control of ships will no longer be the main culprit of accidents at sea.⁴² It is anticipated that the main cause will instead be defective products and systems.⁴³ However, this does not detract from the fact that a number of other factors will still have the potential to cause

³⁵See S. T. Pribyl and A. M. Weigel, ‘Autonomous Vessels: How an Emerging Disruptive Technology Is Poised to Impact the Maritime Industry Much Sooner Than Anticipated’ (2018) 1 *RAIL* 17, 19.

³⁶See also the AAWA whitepaper, n.11, at p. 7.

³⁷*Ibid.*

³⁸<http://www.imo.org/en/MediaCentre/HotTopics/Pages/Autonomous-shipping.aspx> (last date accessed 22 September 2021).

³⁹See Lloyd’s Register’s development of rules for classifying autonomous ships, <https://www.cdinfo.lr.org/information/documents/ShipRight/Design%20and%20Construction/Additional%20Design%20Procedures/Design%20Code%20for%20Unmanned%20Marine%20Systems/Design%20Code%20for%20Unmanned%20Marine%20Systems,%20February%202017.pdf> (last date accessed 22 September 2021).

⁴⁰See the AAWA whitepaper, n.11, at p. 13.

⁴¹*Ibid.* at p. 7.

⁴²*Ibid.*

⁴³*Ibid.* at p. 49.

accidents, such as a cyberattack.⁴⁴ On the whole, there will be more legal challenges ahead where fully autonomous vessels are put into commercial operation.

5. FULLY AUTONOMOUS VESSELS

When fully autonomous, a vessel will be able to operate without human intervention, taking its own decisions with the help of an algorithmic system, mathematical algorithms based on large amounts of data. At the heart of this technology is ML,⁴⁵ with computer algorithms designed to facilitate learning from data through the process of extracting and encoding patterns from a statistical perspective.⁴⁶

From programming through to emulation of principles, all these processes involve a human element. Humans are, and will remain, key to designing and maintaining these systems.⁴⁷ On the collection of data, humans are also tasked with making decisions on who and how to sample.⁴⁸ An important point here is the role that humans play as they bring ‘subjectivity’ to ML.⁴⁹ Consequently, no absolute perfection can, or should, be expected of these technologies as there will be bumps along their evolutionary path. Just as a properly trained and competent master can still negligently cause an accident, some algorithmic decisions will simply turn out to be wrong: not all accidents will be down to a defective system or product or cyber security, as technology evolves over time through mistakes. In some instances, there will be insurmountable difficulties in perfecting algorithmic decision-making to completely avoid mistakes. With this in mind, the following sections expand on one of the main concepts, the nautical fault exception, that requires re-thinking for the purposes of governing the sea carrier’s liability for cargoes carried by new technology vessels.

⁴⁴Ibid. at p. 60.

⁴⁵See s III above.

⁴⁶M. Veale, ‘Governing Machine Learning that Matters’ (2019) PhD thesis, at p. 33.

⁴⁷Ibid. at p. 35.

⁴⁸Ibid.

⁴⁹B. W. Jackson, ‘Artificial Intelligence and the Fog of Innovation: A Deep-Dive on Governance and the Liability of Autonomous Systems’ (2019) 35 *Santa Clara High Tech L J* 35, 42.

6. THE NAUTICAL FAULT EXCEPTION: SOME PRELIMINARY POINTS

English law of contract is usually described as a strict liability system because liability for breach is not based on the contract breaker's fault.⁵⁰ Whether there is inadvertence, negligence or wilful misconduct on the part of the contract breaker is, in principle, irrelevant to the question of breach. This aspect of English contract law might appear compatible with algorithmic decision-making, which does not communicate its reasons for the decisions made.⁵¹

On this matter, contracts of carriage governed by the Hague–Visby Rules ('the Rules') deserve a separate treatment, as the nautical fault exception contained under Article IV, Rule 2(a) refers to some fault-based concepts. It provides that the carrier shall not be responsible for loss or damage arising or resulting from 'act, neglect, or default of the master, Mariner, Pilot, or the servants of the carrier in the navigation or in the management of the ship'. Despite the reference to these different levels of culpability, the nautical fault exception does not in fact require consideration of the mindset of the decision-maker for the purposes of deciding whether a wrongdoing qualifies as 'act, neglect or default'.⁵² This does not, however, mean that the state of mind of the decision-maker is irrelevant to the question of applicability of the nautical fault exception. As the discussions below will reveal,⁵³ the motive of the decision-maker is an important component of the court's consideration when deciding whether the operational mistake was committed in the interests of the cargo or the ship.

The so-called nautical fault exception has its roots in the Harter Act 1893,⁵⁴ and it found its way into both the Hague Rules (1924)⁵⁵ and the

⁵⁰See generally, C. Bridgeman, 'Reconciling Strict Liability with Corrective Justice in Contract Law' (2007) 75 *Fordham L Rev* 3013.

⁵¹Bathae, n.13, at 893.

⁵²Although there is no English case law directly on this point, some guidance can be drawn from the *travaux préparatoires* of the Hague Rules, which suggest that the nautical fault exception covers all levels of culpability, from negligence through to intentional acts and omissions, except for barratry. See M. F. Sturley (ed), *The Legislative History of the Carriage of Goods by Sea Act and the Travaux Préparatoires of the Hague Rules* (Littleton, CO: Fred B Rothman & Co, 1990), at pp. 248 and 249, cited in *The Tasman Pioneer* [2010] NZSC 37 (SC), per Wilson at p. 17. Prior to the Hague–Visby Rules, this was also the position at English common law, see *Bulgaris v Bunge* (1933) 45 Ll. L. Rep 74, at 81. See also *Marriott v Yeoward Brothers* [1909] 2 KB 987.

⁵³See Section 7 below.

⁵⁴See s 3 of the Harter Act 1893.

⁵⁵The rules were implemented into English law through the Carriage of Goods by Sea Act 1924.

Hague–Visby Rules (1968)⁵⁶ as compensation for the carrier’s duty to care for the cargo carried.⁵⁷ Following its recognition under the Hague Rules, the scope of the exception was even extended to the negligence of the carrier’s servants.⁵⁸ With human error long having been regarded as a major cause of sea accidents,⁵⁹ the exception was viewed as ‘a reasonable negligence’ provision.⁶⁰ This was based on the premise that the rules were not intended to impose on carriers an ‘absolute responsibility’ for cargo loss and/or damage.⁶¹

When considered outside the shipping context, such an exception would nevertheless appear unfair, if not strange: it allows the carrier to avoid liability by *proving the fault* (emphasis added) of his/her employees and agents. Troubling as this may be from the perspective of cargo interests, the exception has come under mounting criticism particularly with carriers’ increasing ability to control their vessels at sea. Consequently, this exception does not appear in the most recent sets of rules governing sea carriage, namely the Hamburg Rules and the Rotterdam Rules. Yet, because these sets of rules have not been a widely accepted replacement for the Hague and the Hague–Visby Rules, the nautical fault still, to this day, plays an important part in determining carriers’ liability.

7. SUBJECTIVE ELEMENTS OF THE NAUTICAL FAULT EXCEPTION AS APPLIED TO CONVENTIONAL VESSELS

On the scope of the exception, the first question that comes to mind is what should be understood by ‘navigation’? The concept of navigation has been considered in various types of contract and factual setting. Nevertheless, some valuable guidance can be drawn from the decision in *Carmichael & Co. v The Liverpool Sailing Ship Owners’ Mutual Indemnity Association*,⁶²

⁵⁶See the Carriage of Goods by Sea Act 1971, which implemented the rules into domestic law.

⁵⁷*The Travaux Préparatoires of the Hague Rules and of the Hague–Visby Rules* (Antwerp: Comité Maritime International), <https://comitemaritime.org/wp-content/uploads/2018/05/Travaux-Preparatoires-of-the-Hague-Rules-and-of-the-Hague-Visby-Rules.pdf> (last date accessed 22 September 2021), p. 389.

⁵⁸Amendments to the Hague Rules were approved at the XXVI Plenary Conference of the Comité Maritime International (CMI), held at Stockholm in June 1963.

⁵⁹Human error accounts for 75–96% of marine accidents, see <https://www.maritimejournal.com/news101/insurance.-legal-and-finance/human-error-accounts-for-75-of-marine-liability-losses> (last date accessed 22 September 2021).

⁶⁰*Travaux Préparatoires*, n.57, at p. 34.

⁶¹*Ibid.*

⁶²(1889) 23 QBD 342.

where Lord Justice Bowen said: ‘Navigation must mean something having to do with the sailing of the ship: that is, of course, the sailing of the ship having regard to the fact that she is a cargo-carrying ship’.⁶³

This concept includes matters reserved to the master’s professional judgement, involving the safety of the vessel, her crew and cargo.⁶⁴ Technical issues related to the operation of the vessel, such as the prevailing conditions of wind, tide and weather are matters of navigation. In setting the boundaries of this concept, regard must also be had to the ‘planning and intent’ of the master.⁶⁵ Consequently, errors occurring before the commencement of a voyage can also qualify for the exception.⁶⁶ Excluded from this concept are matters not related to the vessel’s safety, regardless of how they could be perceived by an overzealous master.⁶⁷

Another important question is the definition of ‘management’. What constitutes a decision on management of the ship depends on the factual circumstances of each case. The delimitations of the terrain of the concept can be observed in cases decided prior to the enactment of the Carriage of Goods by Sea Act 1924.⁶⁸ Reliance on early common law cases in this context is not misplaced: by forbearing to define ‘management’, the legislature of the Carriage of Goods by Sea Act 1924 showed a clear intention to keep the meaning of the concept adopted by the courts prior to the Act.⁶⁹ On the meaning of ‘management’, the decision in *The Glenochill*⁷⁰ is worthy of note. There, Sir Francis Jeune said:

It seems to me clear that the word “management” goes somewhat beyond – perhaps not much beyond – navigation, but far enough to take in this very class of acts which do not affect the sailing or movement of the vessel, but do affect the vessel herself.⁷¹

⁶³ *Ibid.*, at 344.

⁶⁴ *The Hill Harmony* [2001] 1 Lloyd’s Rep 147 (HL), per Lord Bingham at 152.

⁶⁵ See *The Lady M* [2019] EWCA Civ 388 (CA) and P. Myburgh, ‘Charting the Limits of the Nautical Fault Exemption’ [2009] *Lloyd’s Maritime and Commercial Law Quarterly* 291, 294.

⁶⁶ *The Lady M*, n.65.

⁶⁷ See *The Hill Harmony*, n.64. See also S. Baughen, ‘Navigation or Employment? The Hill Harmony’ [2001] *LMCLQ* 177, 179.

⁶⁸ See n.55.

⁶⁹ *Gosse Millerd Ltd v Canadian Government Merchant Marine Ltd* [1928] LI L Rep 91, 97 (HL).

⁷⁰ [1986] p. 10.

⁷¹ *Ibid.*, at pp. 15–6.

A. Management of the Ship

After the enactment of the Carriage of Goods by Sea Act 1924, the phrase ‘management of the ship’ came under judicial scrutiny, with the courts emphasising the distinction between acts having for their purpose the management of the ship and those pursued to care for the cargo. In particular, Lord Atkin in *Hourani v T & J Harrison*⁷² said:

there is a clear distinction drawn between goods and ship, and when they talk of the word “ship,” they mean the management of the ship, and they do not mean the general carrying on of the business of transporting goods by sea.⁷³

Consequently, the House of Lords in *Gosse Millerd Ltd. v Canadian Government Merchant Marine Ltd.*⁷⁴ held that failure to replace tarpaulins to protect the cargo from rainwater was not management of the ship. Although the distinction might at first sight appear straightforward, its application to particular facts may not always be so. This is particularly the case when the relevant part of the ship, such as hatches and lashings, can be regarded as related to both care of the cargo and management of the vessel. Further complications arise in cases where a loss is the result of two concurrent causes, an error related to the care of cargo and an error related to management of the vessel. Can the carrier rely on the exception in such circumstances? There is not much guidance from case law since each case usually turns on its own facts. As Lord Sumner in *Gosse Millerd* put it: ‘It is never wise to try to decide case B because part of the ship mishandled is “like” the part mishandled in case A.’⁷⁵

Where an act done for the proper handling of the vessel causes indirect damage to the cargo, will this still be considered as related to the management of the ship? In other words, should there be a distinction between ‘lack of care of the cargo’ and ‘lack of care of the vessel indirectly causing loss of or damage to the cargo’?⁷⁶ In *The Priveocean*,⁷⁷ Mrs Justice Cockerill was asked to decide whether the master’s negligence in failing to identify a

⁷²(1927) 28 Ll L Rep 120 (CA).

⁷³*Ibid.*, at p. 125.

⁷⁴(1928) 32 Ll L Rep 91, 98 (HL); See also *The Acongagua* [2010] EWCA Civ 1403 (CA), *The Priveocean* [2018] 2 Lloyd’s Rep 551 and *The Iron Gippstand (NSWSC)* [1994] 1 Lloyd’s Rep 335.

⁷⁵(1928) 32 Ll L Rep 91 (HL) at p. 97.

⁷⁶*The Glenochill*, n.70, per Sir Francis Jeune at p. 16.

⁷⁷[2018] 2 Lloyd’s Rep 551.

stowage plan that did not involve strapping was a care of ship issue. Holding that it was, she said:

It was clear from the tribunal's findings that what drove the master to act as he did was a consideration of the stability of the vessel and was therefore a care of the ship issue. The primary nature and object of the acts which caused the loss were ones which related to ship management in the sense of stability. What was in question was not a want of care of cargo, but a want of care of the vessel which had an effect on the cargo.⁷⁸

It follows that the test as to which class a particular act, neglect or default belongs is based on the 'primary object' of the act, which requires consideration of the context and motive of the person concerned.

B. The Required Level of Culpability

As mentioned above, the exception would appear to encompass all levels of culpability, with the possible exception of 'barratry'.⁷⁹ Although there is no English case law directly on this point, the *travaux préparatoires* of the Hague Rules suggest that the broad wording 'act, neglect, or default' found in the exception was adopted to warrant a wide application, ranging from negligence through to wilful misconduct. This can be contrasted with the phrase 'faults or errors' found in the Harter Act 1983,⁸⁰ in which the nautical fault exception originated.

On this issue the New Zealand decision in *The Tasman Pioneer* is also illustrative. There the vessel was grounded due to the master's decision to take the vessel through a narrow passage to save time. Despite this incident, the master did not notify the owners or the coastguard, and instead ordered the crew to lie about the reason for the grounding. Given that the direct cause of the cargo damage was the master's post-grounding conduct, the main issue was whether the conduct was within the navigation or management of the ship. William J in the High Court sought to decide this issue with reference to the concept of good faith, taking the view that only conducts that were *bona fide* would qualify for the exception.⁸¹ Consequently,

⁷⁸Ibid., at paras 61–76.

⁷⁹On the definition of barratry, see *The Lady M* [2019] 2 Lloyd's Rep 109, 117 (CA).

⁸⁰See s 3 of the Harter Act 1893.

⁸¹HC [234]; Myburgh, n.65, at 291, 294.

he held that the shipowner was not entitled to the protection under Article IV, Rule 2(a).

The majority view of the New Zealand Court of Appeal also rejected the idea of allowing the shipowner to rely on the protection, but they adopted a different line of reasoning: the rules could not have been intended to cover cases involving such an 'outrageous' conduct by the master.⁸² In his dissenting judgment, Fogarty J in the Court of Appeal preferred to lay emphasis on the words 'act, neglect or default' as they were left unqualified in Article IV, Rule 2(a).⁸³ By way of literal interpretation, he went on to say that the words were apt to cover all levels of culpability, from negligence through to wilful misconduct. Overturning the Court of Appeal's decision, the New Zealand Supreme Court also found that the wording of the protection was apt to cover the 'reprehensible' conduct of the master as it did not amount to 'barratry'.⁸⁴

On the whole, the nautical fault exception would appear to cover all levels of culpability. This makes it unnecessary to consider the mindset of the decision-maker for the purposes of deciding whether a wrongdoing qualifies as 'act, neglect or default'. Nevertheless, the nautical fault exception would appear to contain subjective elements, particularly when deciding to which class a particular act, neglect or default belongs. Unlike a decision-maker that is a human being, whose mindset can be deduced from a wide range of evidence, including letters, emails and cross-examination, the same cannot be said when a decision is given by way of an algorithmic system. Given our inability to map out the reasons behind such a decision, an important question must at this point be addressed. Can there still be a nautical fault exception applicable to the carriage of goods by new technology vessels?

8. THE NAUTICAL FAULT EXCEPTION IN THE NEW AREA OF TECHNOLOGY

On the applicability of the exception, the human element comes to mind first. This makes it necessary to make a distinction between remote-controlled vessels and those with fully deterministic functions, ie autonomous vessels.

⁸²CA [59–60]. See also Myburgh, n.65, at 292.

⁸³CA [63]. See also Myburgh, n.65, at 293.

⁸⁴SC [31]. See also P. Myburgh, 'Carriers 2 – Common Sense 0' [2010] *Lloyd's Maritime and Commercial Law Quarterly* 569.

Although there will not be crew physically on both types of vessel whilst in transit, human monitoring and control will continue to play an important part in the operation of remote-controlled vessels. The only difference will be that the duty of the crew will be transferred to a team of on-shore operators. In essence, the main duty to control and monitor the vessel will remain with a team of humans. The fact that the duty is carried out remotely does not give a ground for abandoning the nautical fault exception since the human element will still exist in the operation of remote-controlled vessels.

Nonetheless, one major factor that can militate against application of the exception will be shipowners' increased ability to control and monitor the status of the ship and the operators when all operations are carried out on shore. This cannot, however, rule out the application of the exception altogether since the shipowner may not be in a position to have control over all the decisions made by every single operator around the clock. It may therefore be hard to establish any fault or negligence on the part of the shipowner. In some instances, the shipowner's increased control may also be irrelevant to the application of the exception, such as where a person other than the shipowner, for example a time charterer, is a contractual carrier responsible for the cargo carried.

Different considerations arise with a vessel that can be both remote controlled and autonomous. Think, for instance, of a vessel that operates autonomously in high seas but asks remote operators to take manual control in the middle of a congested and narrow passage in bad weather. Can the nautical fault exception apply to such a vessel that has varying functions? There seems to be no difficulty in applying the nautical fault exception as long as a loss or damage is caused by a human's negligent management or navigation, irrespective of the type of the relevant vessel. Where, however, a loss has occurred due to an algorithmic decision, can we still talk of the nautical fault exception?

An easy answer to this question is 'No'. When there is no human element in the decision-making, the nautical fault exception should not apply. This is also bolstered by the fact that the exception requires assessment of a number of subjective elements, such as motive and intent, none of which can be ascertained in the case of an algorithmic decision. Another ground is the absence of negligence in algorithmic decision-making: the concept of negligence is inherently human, requiring assessment of humanistic behaviours. Furthermore, to apply the nautical fault exception to algorithmic decisions

would appear to be at odds with the nature of this exception, which in essence is adopted to excuse a human act or omission.⁸⁵

Regardless of all these seemingly convincing points, there are overwhelming reasons for the application of the nautical fault exception even in the case of carriage of goods by autonomous vessels.

A. Policy Considerations Around the Nautical Fault Exception

Embedded in common law, the nautical fault exception predates the Hague and the Hague–Visby Rules. Its recognition under both sets of rules, under Article 4(2)(a), was based on the consensus that nautical faults, rather than commercial faults, should not give rise to liability.⁸⁶ Lord Diplock also looked favourably upon the inclusion of this exception, stating *inter alia* that:

There had been no criticism of the immunity of the carrier from liability for loss due to the negligence of his servants in the navigation or management of the vessel... Judged by the relevant criteria, this was sensible enough. Since negligence in navigation and management would be likely to endanger the vessel as well as the cargo, this in itself is sufficient inducement to the carrier to take precautions to prevent it, and it is more practical and economical from the point of view of insurance to spread the risk to the cargo among a number of cargo insurers than to concentrate it in the carrier's P & I insurer.⁸⁷

The main foundation of Lord Diplock's comment is the economic aim of the laws governing contracts of carriage: to encourage carriers to undertake precautions that are economically productive, thereby creating a self-interest to induce them to care for the cargo.⁸⁸ Because the exception is designed to relieve carriers of liability for cargo only in the case of neglect, an act or default in the navigation or management of the vessel, it does not diminish the carriers' self-interest to care for the cargo.⁸⁹ Nor does it, of itself, create

⁸⁵See generally *Travaux Préparatoires*, n.57.

⁸⁶See Sturley, n.52.

⁸⁷Lord Diplock, 'Conventions and Morals – Limitation Clauses in Maritime Conventions' (1970) *J Mar L & Com* 525, 528–9. Another reason for keeping the nautical fault exception is the 'pay-to-be-paid' provisions found in P & I Club Rules. To ensure that carriers remain solvent to pay cargo claims in the first place before being able to claim from the insurers under the 'pay-to-be-paid' provisions required cargo interests insure themselves against nautical faults, see pp. 34–5 per Sir Norman Hill in *Travaux Préparatoires*, n.57.

⁸⁸Lord Diplock, n.87, at 526. See also L. T. Weitzm, 'The Nautical Fault Debate (the Hamburg Rules, the US COGSA 95, the STCW 95 and the ISM Code)' (1998) 22 *Tul Mar L J* 581.

⁸⁹Weitzm, n.88, 585.

a disincentive for carriers to take precautions for the cargo. Instead, it urges carriers to take all reasonable measures for the safety of their vessel, which are also likely to increase the safety of the cargo.

On the question of what practical differences would arise from the retention or abolition of the nautical fault exception, regard must also be had to the allocation of financial risks between the shipowners' insurers, ie P & I Clubs, and cargo insurers. With the removal of the exception, the nautical fault risk will be transferred from cargo insurers to P & I Clubs, resulting in an increase in P & I premiums. While freight rates will be adjusted upwards, parallel to the increased premiums, different considerations arise in relation to the rate for cargo insurance.⁹⁰ There may not necessarily be a matching reduction in cargo premiums since any reduction will depend on the cargo insurers' rate of recovery,⁹¹ which requires assessment of a number of factors, including recovery costs and the percentage of cargo claims that were previously defended on the basis of the nautical fault exception.⁹²

If accepted, the scrapping of the nautical fault exception would be a significant step towards a strict liability regime for cargo claims, with the effect of substantially increasing the cost of liability insurance for shipowners. Strict liability may work well in some commercial settings,⁹³ particularly where the use of an algorithmic system poses a significant risk of personal injury.⁹⁴ However, because the risks inherent in carriage of goods by sea are mainly economic, strict liability can be a poor fit for governing this commercial activity.

Furthermore, carriage of goods by sea involves sophisticated arrangements for limiting, sharing and insuring the inherent risks,⁹⁵ thereby providing a base for broad public policy considerations that are closely connected with the structure of maritime trade.⁹⁶ These considerations will make it difficult to adopt the solutions that may be reached in other commercial contexts. Consequently, whether or not strict liability becomes the norm for the use

⁹⁰Ibid.

⁹¹Ibid.

⁹²Ibid. See also B. Makins, 'The Hambury Rules: A Casualty' (1994) 96 *Il Diritto Marittimo* 637, 652, 665–6.

⁹³Bathae, n.13.

⁹⁴Ibid., at 896.

⁹⁵As stated by Lord Philips in *Watson v British Boxing Board of Control Ltd & Anor* [2000] EWCA Civ 2116 (CA) at para 61.

⁹⁶*Perret v Collins and Others* [1998] 2 Lloyd's Rep 255 (CA).

B. Reconceptualising the Nautical Fault Exception

One of the key objections to the application of the exception is the lack of a human element in the navigation and management of autonomous vessels. Since the nautical fault exception was in essence introduced to excuse human error, how can it be applicable to algorithmic decision-making? Furthermore, why should an algorithmic system be treated differently to a vessel's hull? Such an extended application of the exception thus seems to blur the dichotomy between human and machine.

This dichotomy would at first appear clear under the Hague–Visby Rules. Human errors can form the basis for the application of the nautical fault exception unless such errors amount to incompetence on the part of the master and/or crew.¹⁰¹ In the case of such incompetence, the shipowner's obligation to keep the vessel seaworthy kicks in.¹⁰² Where there is cargo loss or damage caused by a vessel part, the seaworthiness obligation may also have a role to play: the concept of seaworthiness also comprises the fitness of the vessel for the intended voyage¹⁰³ as well as the vessel's cargoworthiness.¹⁰⁴ However, unlike human acts or omissions, a vessel part does not of itself justify the application of the nautical fault exception.

Recently, the English Court of Appeal in *The CMA CGM Libra*¹⁰⁵ has followed this line of thinking. In so doing, they affirmed the decision of the Admiralty Court, holding that a defective passage plan was not an error of navigation for the purposes of the nautical fault exception.¹⁰⁶ Considering that seaworthiness extends to having on board all necessary documentation to carry cargo safely to its destination, the Court of Appeal found that the defective passage plan rendered the vessel unseaworthy. Therefore, the emphasis was placed on the document produced as a result of the passage planning, and not on the process of planning itself.

¹⁰¹ *The Eurasian Dream* [2002] 1 Lloyd's Rep 719; *The Adamastos Shipping v Anglo Saxon Petroleum* [1959] AC 133; *The Isla Fernandina* [2000] 2 Lloyd's Rep 15.

¹⁰² See Art III, Rule 1 of the Hague and the Hague–Visby Rules. See also *Kopitoff v Wilson* [1876] 1 QBD 377; *FC Bradley & Sons v Federal Steam Navigation Co* (1926) 24 Ll L Rep 446.

¹⁰³ See *Hong Kong Fir Shipping Co v Kawasaki* [1962] QB 26 and *The Hellenic Dolphin* [1978] 2 Lloyd's Rep 336.

¹⁰⁴ See *Kopitoff v Wilson* (1876) 1 QBD 377; *Northern Shipping v DSR (Kapitan Sakharov)* [2000] 2 Lloyd's Rep 255; *Smith, Hogg v Black Sea & Baltic Insurance* [1940] AC 997; *Owners of Cargo on Maori King v Hughes* [1895] 2 QB 550; and *The Good Friend* [1984] 2 Lloyd's Rep 586.

¹⁰⁵ [2020] EWCA (Civ) 293.

¹⁰⁶ *Ibid.*

Consequently, the application of the nautical fault exception to an algorithmic decision would not be without problems, particularly in the current legal landscape. However, with the wholesale shift to autonomous vessels, the legal system will have to decide what to do when an erroneous algorithmic decision is not caused by a defective system or product. One solution would be to reconceptualise the nautical fault exception, by ‘personifying’ the algorithmic systems on autonomous vessels, in other words by treating them as though they are the master and crew for the purposes of the exception.¹⁰⁷ In order to achieve this goal, it would be essential to abandon the subjective elements of the exception,¹⁰⁸ thereby revoking the need to ascertain the actual motive behind a decision taken by an algorithmic system.

In most cases, the application of the exception can be maintained without having to ascertain the real intention behind a relevant decision taken. To illustrate, where a decision has been taken to activate or deactivate a system that is mainly used for the management of the cargo carried, the nautical fault exception should not be applicable whether or not the decision is that of a human. However, where there is an error with regard to the use of a system, the primary purpose of which is to protect the vessel, the nautical fault exception should apply whether or not the error was committed by a human. Consequently, for the purposes of the nautical fault exception, the focus on ‘the primary object of the relevant act or omission’¹⁰⁹ should be shifted to ‘the primary object of the relevant system’ managed.¹¹⁰

Undoubtedly, there will be borderline cases, such as where the management of a system is related to both the cargo and the vessel or where handling of the vessel causes indirect damage to the cargo. For instance, a ballasting operation may not always be carried out for the management of the ship. In some cases, this may be required for taking care of the cargo

¹⁰⁷The personification of algorithmic systems in general commercial context has been discussed in M. Scherer, ‘Digital Analogues (Intro): Artificial Intelligence Systems Should Be Treated Like ...’, *Future of Life Institute* (9 June 2016), <https://futureoflife.org/2016/06/09/digital-analogues-intro-artificial-intelligence-systems-treated-like/> (last date accessed 22 September 2021). See also Jackson, n.49, at 57. See also M. Hatfield, ‘Professionally Responsible Artificial Intelligence’ (2019) 51 *Ariz St L J* 1057.

¹⁰⁸See the discussions under Section 6.

¹⁰⁹By and large, this was the test applied in *The Privocean* [2018] 2 Lloyd’s Rep 551. For further discussions on this issue, see Section 6, above.

¹¹⁰A similar view was taken in *The Iron Gippsland (NSWSC)* [1994] 1 Lloyd’s Rep 335.

aboard the vessel.¹¹¹ The same can also be said in relation to hatch covers and tarpaulins.¹¹² Consequently, some superficial decisions will need to be taken due to the impossibility of ascertaining the true intention behind an algorithmic decision.¹¹³ For instance, a presumption in favour of cargo interests may be upheld in the case of doubt: the relevant loss or damage may be presumed not to have arisen from the navigation and management of the vessel.¹¹⁴

The personification of the algorithmic systems on autonomous vessels may at first sight seem too fictitious, while blaming humans in autonomous vessel accidents may appear more straightforward. However, the latter approach has two main shortcomings. Firstly, it may not always be possible to identify a human liable for the loss of or damage to cargo. This will be the case where there is no human error in maintaining an algorithmic system and where the system provided by a manufacturer is not of itself defective. Secondly, the law is already full of legal fictions, which have been created as a balancing act between the conflicting interests of parties. This is particularly true in the context of maritime law: vessels have long been personified as the real defendants in common law jurisdictions.¹¹⁵

To further personify a vessel's part paves the way for a nuanced approach when applying the nautical fault exception to the carriage of goods by autonomous vessels. The personification will allow us to recognise the 'ML' technology underpinning the systems to be used for autonomous vessels. Consequently, the level of training of an algorithmic system can play a vital role when deciding whether it should be treated just like a competent master or crew with the requisite experience. Where the training of an algorithmic system is not at the appropriate level, this will give a cargo interest

¹¹¹See the US Supreme Court decision in *The Germanic* 196 US 589, at 597, per Holmes J, cited in *Gosse Millerd Ltd and Another v Canadian Government Merchant Martine Ltd.* [1927] 29 Ll L Rep 190, at 195.

¹¹²See *The Hector* (1883) 8 PD 218. A different outcome was reached in *Gosse Millerd Ltd and Another v Canadian Government Merchant Martine Ltd.*, above, at 190.

¹¹³In the current legal landscape, it may also be difficult to determine whether a decision is related to the management of the vessel or the cargo carried. See N. Gaskell et al, *Bills of Lading: Law and Contracts* (London: LLP, 2000), at 279. See also the discussions in V. Rochester, 'Nautical Fault' (2008) PhD thesis, University of Cape Town, Ch 4.2.

¹¹⁴This solution is already accepted in some jurisdictions, see the discussions in Rochester, n.113, p. 74.

¹¹⁵However, the personification theory has not been without controversy, and utility of this theory has been questioned. See *The Indian Grace* (No 2) [1998] 1 Lloyd's Rep 1, per Lord Steyn, at 10. For views in support of this theory, see M. Davies, 'In Defense of Unpopular Virtues: Personification and Ratification' (2000) 75 *Tul L Rev* 337.

the right to recover even though the system cannot of itself be defined as defective. The contrary will be the case where the algorithmic system has an appropriate level of training having passed a series of tests for safety and quality control.

9. CONCLUSION

As the maritime trade witnesses further developments in this field, there will be an inevitable struggle to harmonise the new technology vessels with the traditional rules of law. The question of whether the nautical fault exception should be maintained with the wholesale shift to autonomous vessels is a mixed question of policy and law. This paper has sought to highlight the benefits of keeping the exception in the new era of new technology vessels, while also illustrating that it is possible to apply the exception with some adaptation even in the case of an autonomous vessel with no human in control. In view of the long-established structure of maritime trade, as well as the underpinning complex arrangements already in place for the allocation of risks in sea carriage, the paper has argued that the retention of the exception will produce outcomes desirable for the development of new technology vessels without unduly increasing the level of liability that carriers already assume in the current legal landscape.