https://doi.org/10.12697/JI.2025.34.06

PhD Olavi-Jüri Luik
Attorney-at-Law, Law Firm WIDEN

Rauno Kinkar
Attorney-at-Law, Law Firm WIDEN

Artificial Intelligence and Non-Contractual Liability: Will the Insurance System Replace the Tort System in the Future?[*1]

An example of autonomous vehicles

Abstract. The rapid advancement of artificial intelligence (AI) technologies, particularly in the development of autonomous vehicles, presents a fundamental shift in the distribution of liability for traffic accidents. This article examines the future of non-contractual liability in the context of fully autonomous vehicles and explores whether the insurance system could eventually replace traditional tort-based liability frameworks. It analyses the classification of vehicle autonomy levels, the specific risks posed by autonomous systems (software failures, hacking, etc.), and discusses who may be held liable under existing and proposed EU regulations. Particular attention is given to the applicability of the Motor Insurance Directive (MID), the limits of civil liability in different Member States, and the feasibility of introducing compulsory cyber or producer liability insurance. The authors argue against the fragmentation of liability systems and propose that existing motor third-party liability insurance frameworks be adapted to encompass the new risks presented by autonomous technologies. Such an approach would avoid the creation of parallel compensation systems and ensure consistent victim protection throughout the EU.

Keywords: autonomous vehicles, artificial intelligence, civil liability, insurance law, Motor Insurance Directive, EU law

1. Introduction

Klaus Schwab coined the term 'fourth industrial revolution' back in 2016, referring to the ongoing technological revolution that is blurring the boundaries between the physical, digital, and biological spheres.[*2] In 2025, the authors believe, there is no doubt that we have truly entered the fourth industrial

1 The article is based on the thesis of the author (OJ Luik) submitted after completing the postgraduate course 'AI in Legal Practice and its Regulation' (University of Lisbon). The authors have also published an article on the same subject: Olavi-Jüri Luik and Rauno Kinkar, 'Tehisaru ja lepinguväline vastutus: kas kindlustussüsteem asendab tulevikus deliktisüsteemi? Autonoomsete sõidukite näide [AI and Non-Contractual Liability: Will the Insurance System Replace the Tort System in the Future? The Example of Autonomous Vehicles]' (2024) (7) Juridica 496–508.

2 'The Fourth Industrial Revolution: What It Means and How to Respond | World Economic Forum' <https://www.weforum.org/stories/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/> accessed on 9 May 2025.

revolution, driven by the rapid development and mass adoption of the artificial intelligence technology, and accompanied by a range of new and emerging risks.[*3] The first, nineteenth-century industrial revolution was centred on the rapid development of production methods, which led to mass industrialisation. At the heart of the industrial revolution occurring today is the mass adoption of artificial intelligence. Just like 200 years ago, the current industrial revolution is changing the social and legal order at a fundamental level.

An important element in this revolution is the gradual transfer of the driving function of land vehicles from humans to artificial intelligence (autonomous vehicle[*4]).[*5] Partially autonomous vehicles are already on the roads of Estonia today. This means that vehicles that are capable of autonomously driving[*6] themselves in certain traffic situations or on a limited route are already available to the average consumer. At the time of writing the article, these vehicles still require a driver (operator) to steer them manually by using control levers when necessary. However, fully autonomous buses have been tested on various public routes in Estonia since 2020.[*7] A fully autonomous taxi fleet has been in operation in Beijing, China, for several years, and consumers can use it for transportation.[*8] It seems like it is only a matter of time before a larger number of fully autonomous vehicles become part of traffic.

It is obvious that fully autonomous vehicles have many advantages over conventional vehicles. The introduction of fully autonomous vehicles is expected to reduce traffic density and the need for parking (due to the reduction in the number of vehicles in use), thus potentially reducing CO_2 emissions, and enable the use of vehicles even for those who cannot use them today due to health conditions, age, etc. Fully autonomous vehicles will also help people be more efficient with their time because, in the future, drivers could engage in other necessary activities (working, studying, reading, etc.) instead of driving over long distances.

At the same time, it is also clear that, in addition to the above, the primary advantage that fully autonomous vehicles could and should bring to road traffic is a dramatic increase in road safety. Simon Chesterman points out that '[m]any observers believe that autonomous vehicles will eventually be far safer than human drivers and ultimately replace them.'[*9] Autonomous vehicles are expected to be able to significantly reduce human errors in vehicle operation. This requirement and assumption for increasing road safety is also written into the guidelines on the exemption procedure for the EU approval of automated vehicles (12.02.2019).[*10] We are already seeing this trend in existing vehicles. New vehicles often come with adaptive cruise control, lane keeping assist, automatic emergency braking, smart parking assist, automatic

3 Christiane Wendehorst believes that 'risks associated with AI are typically divided into two categories: (a) "safety risks" (e.g. death, personal injury, damage to property, etc.) caused by unsafe products and activities related to AI, and (b) "fundamental rights risks" (e.g. discrimination, surveillance, manipulation, exploitation, etc.), including risks to society at large caused by inappropriate decisions made by AI or inappropriate use of AI.'

Christiane Wendehorst, 'Liability for Artificial Intelligence: The Need to Address Both Safety Risks and Fundamental Rights Risks' in Silja Voeneky, Philipp Kellmeyer, Oliver Mueller, and Wolfram Burgard (eds), *The Cambridge Handbook of Responsible Artificial Intelligence: Interdisciplinary Perspectives* (Cambridge University Press 2022) 209.

4 Autonomous vehicle or automated vehicle: Pursuant to Article 3 of Regulation (EU) 2019/2144 of the European Parliament and of the Council of 27 November 2019 (OJ L 325/40), an automated vehicle is 'a motor vehicle designed and constructed to move autonomously for certain periods of time without continuous driver supervision but in respect of which driver intervention is still expected or required', and a fully automated vehicle is 'a motor vehicle that has been designed and constructed to move autonomously without any driver supervision'.

5 'Autonomous vehicle' is a general term, and 'fully autonomous vehicle' is a sub-term (see section 2.1 for further details).

6 An autonomous vehicle is actually a robot – essentially an independent, computer-controlled machine designed to perform a certain function autonomously, see Ziya Altunyaldiz, 'Legal aspects of "autonomous" vehicles' (Council of Europe, Committee on Legal Affairs and Human Rights 2020) < https://assembly.coe.int/LifeRay/JUR/Pdf/DocsAndDecs/2020/AS-JUR-2020-20-EN.pdf> accessed on 12 October 2024.

7 'Our Story – Auve Tech' <https://auve.tech/company/our-story/> accessed on 9 May 2025.

8 'Driverless Taxis to Start Paid Service in Capital - Chinadaily.Com.Cn' <https://www.chinadaily.com.cn/a/202307/10/WS64aad722a310bf8a75d6e165.html> accessed on 9 May 2025.

9 Simon Chesterman, 'Artificial Intelligence and the Problem of Autonomy' (2020) (1)2 Notre Dame Journal on Emerging Technologies 217.

10 '1. When in the automated driving mode ("Operational Domain" – OD), the automated vehicle drives and shall replace the driver for all the driving tasks under the situations which can be reasonably expected in the OD. 2. When in the automated driving mode, the vehicle shall not cause any traffic accidents that are rationally foreseeable and preventable. 3. When in the automated driving mode, the vehicle shall have a predictable and careful behaviour and shall allow an appropriate interaction with other road users (e.g. obey to orders by authorities or communication with other road users when needed). 4. When in the automated driving mode ("Operational Domain"-OD), the automated vehicle shall drive in accordance with the traffic rules.' European Commission, 'Guidelines on the Exemption Procedure for the EU Approval Vehicles' (2019) <https://ec.europa.eu/docsroom/documents/34802/attachments/1/translations/en/renditions/native> accessed on 9 May 2025.

lane keeping assist, etc.*[11] All of these functions are at least partially aimed at improving road safety. In this regard, artificial intelligence is already taking over the functions of a human driver, either partially or completely, and either for a short or long term.

Legally (including from the perspective of the distribution of liability), this tendency is important. Various analyses*[12] point out that up to 95% of traffic accidents are caused by the human factor. Meanwhile, approximately 20,400 people lose their lives in traffic accidents in the European Union each year.*[13] From a humane point of view, this is a tragedy, but legally, it is damage – property and non-patrimonial damage. The transfer of liability from humans to artificial intelligence raises a number of questions from the perspective of civil liability, including who and on what basis is liable for the damage caused by autonomous vehicles (including fully autonomous vehicles), which may still occur despite technological advances.*[14] At the same time, attributing liability to AI is controversial, and the authors argue below that, in the context of autonomous vehicles, this issue can be addressed by other means.

The issue of non-contractual liability under civil law has been previously addressed by Estonian legal scholars, and the authors generally agree with their conclusions.*[15] The insurance law aspect of the Estonian system of compensation for damage needs to be investigated. Namely, compulsory motor third-party liability insurance is in force in the Member States of the European Union, which has been harmonised between the Member States by Directive 2009/103/EC of 16 September 2009*[16], as amended by the Directive of 24 November 2021 2021/2118*[17] (hereinafter together referred to as the MID). Applying the principles of the MID to compensation for the damage caused by autonomous and fully autonomous vehicles raises a number of new questions, which the authors analyse here.

- Does using the insurance system to alleviate the liability arising particularly from the use of fully autonomous vehicles differ from using it to alleviate the liability arising from the use of non-autonomous vehicles in the context of the MID, and if it does, then how?
- If there is a difference (i.e. the liability arising from the use of autonomous or fully autonomous vehicles is different or broader), could the corresponding broader liability be mitigated through some other insurance system?
- If the scope of liability cannot be mitigated through another insurance system or if it is not practical, would the pan-European compulsory motor third-party liability insurance system need to be changed (and if so, how)?

The authors analyse below the different approaches that legal scholars have proposed in this context.

The authors believe that this is an important topic because it is difficult for vehicle owners as well as for countries to distinguish between autonomous vehicles, fully autonomous vehicles, and non-autonomous

11 'The Pathway to Driverless Cars: A detailed review of regulations for automated vehicle technologies' (Department for Transport 2015) <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/401565/pathway-driverless-cars-main.pdf> accessed on 9 May 2025.

12 'Safer Roads: New EU Measures to Reduce Car Accidents' <https://www.europarl.europa.eu/topics/en/article/20190307STO30715/safer-roads-new-eu-measures-to-reduce-car-accidents)> accessed on 9 May 2025.

13 '2023 Figures Show Stalling Progress in Reducing Road Fatalities in Too Many Countries - European Commission' <https://transport.ec.europa.eu/news-events/news/2023-figures-show-stalling-progress-reducing-road-fatalities-too-many-countries-2024-03-08_en> accessed on 9 May 2025.

14 Béatrice Schütte and others, 'Damages Liability for Harm Caused by Artificial Intelligence – EU Law in Flux' (2021) Legal Studies Research Paper Series Paper No 69, University of Helsinki; Yaniv Benhamou and Justine Ferland, 'Artificial Intelligence and Damages: Assessing Liability and Calculating Damages' in Giuseppina D'Agostino, Aviv Gaon, and Carole J. Piovesan (eds), *Leading Legal Disruption: Artificial Intelligence and a Toolkit for Lawyers and the Law* (Thomson Reuters – Yvon Blais, Montreal 2021) 165–197.

15 Rauno Kinkar, *Tootjavastutus ja juhi deliktiõiguslik vastutus autonoomsete sõidukite tehnoloogia puudusest tingitud kahju tekkimise korral* [Tort liability of producer and driver of vehicle in cases where damage is caused by a defect in autonomous vehicle technology] (Master's thesis, University of Tartu 2015) <https://dspace.ut.ee/items/c07230a3-e0b2-418e-b793-5cf50d9e7747> accessed on 9 May 2025.

Taivo Liivak, *Tort Liability for Damage Caused by Self-driving Vehicles under Estonian Law* (Doctoral thesis, University of Tartu 2020) <https://dspace.ut.ee/server/api/core/bitstreams/8c3588d6-397c-4161-9048-81bbb65e6089/content> accessed on 9 May 2025.

16 Directive 2009/103/EC of the European Parliament and of the Council of 16 September 2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability [2009] OJ L263/11.

17 Directive (EU) 2021/2118 of the European Parliament and of the Council of 24 November 2021 amending Directive 2009/103/EC relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability [2021] OJ L430/1.

vehicles (the line is blurred). Particularly in the case of fully autonomous vehicles, a situation may arise in practice where the driver is not liable for the damage caused. This would create a situation where some vehicles would be completely outside the scope of protection of the classic motor third-party liability insurance. This cannot be the purpose of a compulsory insurance system.

We have limited this study to land vehicles only. We recognise that the issues arising from the regulation of insurance for other vehicles also need to be examined in the context of autonomous and fully autonomous vehicles.

2. Autonomous vehicles and liability

2.1. Definition of an autonomous vehicle

The first issue of definition is what is considered an autonomous vehicle and what is considered a fully autonomous vehicle. The Society of Automotive Engineers (SAE) highlights[*18] that vehicles can be essentially divided into six categories in terms of their autonomy.[*19]

Level	Description	The role of the driver
Level 0	The automatic system does not control the vehicle but can issue warnings to the driver.	The driver has full control of the vehicle.
Level 1	The automatic system may include driver assistance systems such as stability control, lane keeping, and parking assistance with automatic steering.	The driver must be ready to drive the vehicle at any time.
Level 2	The automatic system can control acceleration, braking, and steering.	The driver is required to identify objects and events and respond if the automated system cannot respond adequately.
Level 3	In secure, familiar conditions, the driver can safely turn their attention away from driving the vehicle.	The driver must be ready to intervene if the system requires this.
Level 4	The automatic system is able to control the vehicle in most circumstances, except for exceptional weather events.	The attention of the driver is not required when the automatic system controls the vehicle.
Level 5	The vehicle can operate anywhere where autonomous vehicles are legally permitted.	Human intervention is only required when turning on the system and setting the destination.

The table shows that the higher the level of vehicle autonomy, the smaller the role of the driver in operating the vehicle: level 0 are non-autonomous vehicles, levels 1–3 are autonomous vehicles, and levels 4–5 are fully autonomous vehicles. When implementing the aforementioned MID system, no problems arise from the specific characteristics of an autonomous vehicle as long as it is an autonomous vehicle that meets autonomy levels 1–3. At levels 1–3, the role of the driver is decisive, meaning that it is not a fully autonomous vehicle: it is a conventional vehicle that is currently widely used, even if it has elements of an autonomous vehicle.

18 SAE International, 'Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles J3016_202104' (2021) <https://www.sae.org/standards/content/j3016_202104/> accessed on 9 May 2025.

19 The referenced table is based on the following source: SAE International, 'SAE Standards News: J3016 automated-driving graphic update' (2019) <https://www.sae.org/news/2019/01/sae-updates-j3016-automated-driving-graphic> accessed on 9 May 2025.

We will therefore limit further analysis to SAE levels 4 and 5 (whereas in the case of level 5 the driver may no longer exist at all), because it is precisely these levels that may lead to problems related to civil liability (and also problems related to motor third-party liability insurance) and the need to amend regulations or introduce new regulations.

2.2. Risks arising from the use of an autonomous vehicle

Legal literature has cited six main risks arising from the specific nature of autonomous vehicles:[*20]

a) sensor failure – for example, a situation where the sensor cannot correctly identify the location of the vehicle and therefore a dangerous situation arises;
b) software failure – for example, a situation where faulty software is installed on an autonomous vehicle, causing a dangerous situation;
c) wireless network failure – for example, a situation where a wireless network disruption/failure occurs and an autonomous vehicle, following the initial route, creates a hazardous situation;
d) neglect of instructions – for example, a situation where the instructions of the manufacturer of the vehicle are ignored and a dangerous situation arises as a result;
e) hacking – for example, a situation where the operating system installed on a vehicle is hacked and therefore creates a dangerous situation;
f) programming failure – for example, a situation where a programming error has occurred (e.g. a vehicle chooses to hit pedestrians in order to avoid a collision with a tree).

In the opinion of the authors, as a result of the foregoing, in the context of this article, the risks arising from autonomous vehicles can be divided into three groups:

a) risks arising from the driver or operator – for example, ignoring the instructions of the autonomous vehicle manufacturer;
b) risks arising from the manufacturer, programming, or service provision – for example, a programming error or a faulty device/sensor;
c) risks arising from third parties – for example, hacking by an unlawful party or failures in the operation of the data communication network.

The first two of these are more manageable/controllable risks from a liability perspective[*21], while risks arising from the actions of third parties may be outside the sphere of influence of the driver or operator.

2.3. Who is responsible for the risks arising from an autonomous vehicle?[*22]

In the proposal of the European Commission of 21 April 2021 (the AIR proposal)[*23], it was pointed out that artificial intelligence systems offer enormous development opportunities, but also great risks, and therefore artificial intelligence systems must first and foremost be safe. On 28 September 2022, the Commission proposed a package of measures to support the wider adoption of AI. The package included a proposal that would make it easier for individuals harmed by AI systems to file non-contractual claims (injured individuals can request access to evidence through courts) and to prove a causal link between the fault of the party concerned and the product of the AI system through the establishment of rebuttable

20 Florin Costinel Dima, *Fully Autonomous Vehicles in the EU: Opportunity or Threat?* (Essay (Master), University of Twente 2019) 30–37 <https://purl.utwente.nl/essays/72945> accessed on 9 May 2025.

21 Legal literature points to the risk that '[i]n order to limit manufacturer liability, automotive manufacturers may wish to develop technology that incorporates override options (e.g. manual driving) even in level 4 or 5 autonomous cars, because in situations where drivers interact and are able to control the vehicle, it will be easier to argue contributory negligence in the event of a collision.' Katie Atkinson, 'Autonomous Cars: A driving force for change in motor liability and insurance' (2020) 1(1) SCRIPTed 145 <https://script-ed.org/?p=3804> accessed on 9 May 2025.

22 The authors also point to a problem with the 1968 Vienna Convention on Road Traffic art 8(1), of which every moving vehicle or combination of vehicles shall have a driver <https://treaties.un.org/pages/ViewDetailsIII.aspx?src=TREATY&mtdsg_no=XI-B-19&chapter=11> accessed on 12 December 2025.

23 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 COM (2021) 206 final <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021PC0206> accessed on 9 May 2025.

presumptions (the AILD proposal).[*24] The package of measures also included a proposal to bring AI systems under the scope of the Producer Liability Directive (PLD) as a product for which producers are liable (the PLD proposal[*25], substantially amended Producer Liability Directive[*26]). These two draft directives, together with the regulation on artificial intelligence adopted in 2024[*27] (the AI Act), must form a comprehensive framework. Unfortunately, the AIR, AILD, and PLD proposals do not provide for the creation of an insurance system to protect injured parties: the first of them concerns only the liability insurance of notified bodies (Article 33(8)), the second the analysis regarding the need for insurance coverage (Article 5(2)) to be carried out after five years, and the third does not concern the establishment of compulsory liability insurance at all. The AI Act also does not concern liability for the damage caused by AI systems or the compensation systems.[*28]

Although the AILD proposal has been withdrawn, it offers useful insight into the challenges of harmonising private law across EU Member States. The proposal aimed to introduce rebuttable presumptions and facilitate access to evidence in AI-related damage claims but ultimately foundered due to legal fragmentation. This experience supports the case for advancing insurance-based solutions, such as adapting the MID, which can provide more immediate harmonisation and victim protection across jurisdictions.

In 2020, the European Parliament adopted a resolution with recommendations to the Commission on a civil liability regime for artificial intelligence (2020/2014(INL)).[*29] The proposal dealt with the question of who is liable for the damage caused by the operation of artificial intelligence systems. While this proposal has not been transformed into a directly applicable European Union regulation, it did contain some ideas of merit.

For instance, article 3 of the proposal identified three categories of new operators that control artificial intelligence systems:

> ‘(d) “operator” means both the frontend and the backend operator as long as the latter’s liability is not already covered by Directive 85/374/EEC;
> (e) “frontend operator” means any natural or legal person who exercises a degree of control over a risk connected with the operation and functioning of the AI-system and benefits from its operation;
> f) “backend operator” means any natural or legal person who, on a continuous basis, defines the features of the technology and provides data and an essential backend support service and therefore also exercises a degree of control over the risk connected with the operation and functioning of the AI-system.’

Furthermore, articles 23 and 24 of the proposal emphasise the importance of a compulsory third-party liability insurance system to compensate for damages resulting from AI systems.

Since the aforementioned proposal has not been formalised as a European Union regulation, the authors must proceed from the currently valid system. Therefore, the authors will not discuss the liability of operators and the mitigation of liability through the insurance system suggested in the proposal further.

The authors also leave aside the question of whether, in addition to the two entities currently in use across the European Union – a natural person and a legal person – a third entity, AI[*30], should be created,

---

24 Proposal for a Directive of the European Parliament and of the Council on adapting non-contractual civil liability rules to artificial intelligence (AI Liability Directive) COM(2022) 496 final <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022PC0496> accessed on 9 May 2025.

25 Proposal for a Directive of the European Parliament and of the Council on liability for defective products. COM(2022) 495 final <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022PC0495> accessed on 9 May 2025.

26 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 [1985] OJ L 210/29.

27 Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act) [2024] OJ L, 12.7.2024.

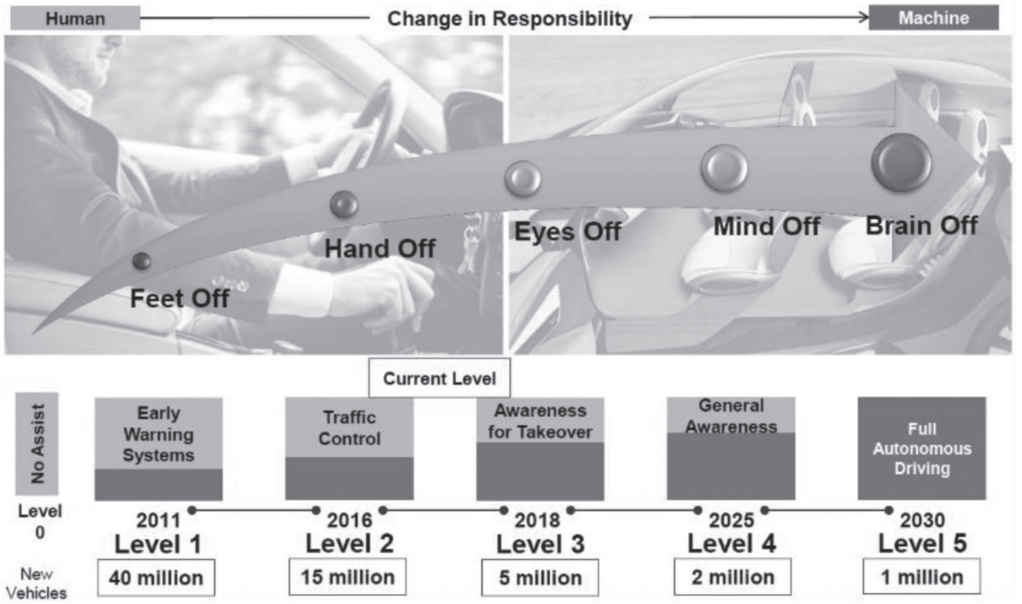
28 Autonomous vehicles are also only slightly affected by the AI Act, for example, according to Annex III thereof, autonomous vehicles are high-risk systems.

29 [2021] OJ C404/107.

30 Victor Schollaert, ‘AI and Legal Personality in Private Law: An Option Worth Considering (?)’ (2023) 31(2/3) European Review of Private Law 387–410. Also see Claudio Novelli, *AI and Legal Personhood: A theoretical survey* (Doctoral dissertation,

since due to one of the stages of AI development, where AI develops itself further, the errors arising from AI are no longer attributable to its creator (producer, programmer, etc.) and a situation may also arise where AI is no longer directly controllable by anyone or in the possession of anyone. The emergence of such a third legal entity status cannot be completely ruled out in the future. At the same time, it would be a major change in the legal dogma, which would require a major revision of the legal environment of the European Union.

Professional literature*[31] illustrates the change in liability due to changes in the level of vehicle automation.*[32]



The authors do not address here those risks arising from the use of an autonomous vehicle that overlap with the risks arising from the use of a non-autonomous vehicle (e.g. driver failure). However, the question can be asked whether the driver or operator is liable (a) for the damage caused to a third party if risks arising from the manufacturer, programming, or service provision materialise or (b) for the damage caused to another person if risks arising from an unlawfully behaving third party materialise (e.g. damage resulting from hacking). It cannot be denied that, in the case of the first category (risks arising from the driver or operator) presented in the previous subsection, the driver or operator of an autonomous vehicle remains liable to a third party for the damages caused by a traffic accident in the same way as in the case of a non-autonomous vehicle.

When risks arising from the manufacturer, programming, or service provision materialise, we can additionally talk about the liability of the person involved in causing the damage – essentially, the question boils down to whether the driver or operator can rely on the claim that they are exempt from liability due to a lack of fault. In the opinion of the authors, this again boils down to the question of whether a particular country recognises the concept of strict liability (risk liability)*[33] or the concept of fault liability as the basis for the liability of the vehicle owner. Namely, in some European countries, the system of third-party liability is not recognised as the basis for driver liability, or the system of third-party liability is only

University of Bologna 2022) <https://ec.europa.eu/docsroom/documents/24402/attachments/1/translations/en/renditions/native> accessed on 9 May 2025.

31 European Commission, 'Public support measures for connected and automated driving: Final report' (2017) 96 <https://op.europa.eu/en/publication-detail/-/publication/0f3e5c98-66ad-11e7-b2f2-01aa75ed71a1/language-en> accessed on 9 May 2025.

32 The table is copied from: 2017 Final raport "Public support measures for connected and automated driving" <https://op.europa.eu/en/publication-detail/-/publication/0f3e5c98-66ad-11e7-b2f2-01aa75ed71a1/language-en>, p 96 accessed on 12 October 2024.

33 On risk liability in relation to autonomous vehicles, see e.g. Janno Lahe and Taivo Liivak 'Strict Liability for Damage Caused by Self-Driving Vehicles: The Estonian perspective' (2020) 12(2) Baltic Journal of Law & Politics 1–18.

partially recognised.*[34] In addition, the question arises whether the manufacturer can rely on the concept of development risk. Third-party liability essentially also arises in the case of a non-autonomous vehicle – for example, an error of the manufacturer in the production of tires or rims can lead to a negative consequence even if there is no error in the behaviour of the driver. Currently, this is not generally considered a basis for releasing the compulsory motor third-party liability insurer from their obligation to perform in the European Union, but it may give the motor third-party liability insurer a recourse claim against the manufacturer.

However, when a risk arising from an unlawfully acting third party materialises, in addition to the concept of risk liability or fault liability, the question arises as to whether the vehicle owner can rely on the concept of force majeure.

Furthermore, the question may arise as to whether the driver or operator is liable or whether there is joint and several liability – these questions are more related to the issue of possession and serving possession. In the case of a fleet of vehicles consisting only of fully autonomous vehicles, only the liability of the operator or owner can presumably be considered, because all persons in the vehicle are inherently considered passengers (similarly to bus passengers, for example). In the opinion of the authors, the above example does not affect the mitigation of civil liability through the insurance system from the point of view of the injured party (the only question is who should be the policyholder). While traditional tort law frameworks focus on driver fault or mechanical failure, the technological architecture of autonomous vehicles introduces a new spectrum of non-traditional risks. These include cyber vulnerabilities (e.g. hacking), sensor or software malfunction, and remote system failure. Such risks often transcend the direct control of both the driver and the vehicle owner. As automation increases and human involvement diminishes, the attribution of liability becomes more complex and diffuse. This shift necessitates not only a reconsideration of civil liability doctrines but also a more robust role for the insurance system in risk allocation and compensation. The following section will examine whether and how insurance mechanisms—such as compulsory motor liability insurance, cyber insurance, and product liability insurance—can respond to these emergent risk profiles in a coherent and consumer-friendly way.

3. Compensation for damage related to an autonomous vehicle through the insurance system

3.1. Do we need compulsory cyber insurance?

Cyber insurance is an insurance service that helps reduce the risk of cybercrime, such as cyberattacks.*[35] It protects insured persons from the costs of internet-based threats affecting IT infrastructure, information management, and information policy, which are often not covered by liability insurance and traditional insurance services. Cyber insurance can protect the insured against cyber incidents, including acts of cyberterrorism, and assist in the resolution of security incidents. Cyber insurance covers losses that a person may incur as a result of a cyberattack. Cybersecurity has become increasingly important in recent years as the risk of cyberattacks against applications, devices, networks, and users increases. Professor Helmuth Heiss points out that cyber insurance 'covers both first-party and third-party losses resulting from information security breaches.'*[36]

[34] Directorate General for Internal Policies, 'Cross-border traffic accidents in the EU – the potential impact of driverless cars' (2016) <http://www.europarl.europa.eu/RegData/etudes/STUD/2016/571362/IPOL_STU(2016)571362_EN.pdf> accessed on 9 May 2025.

[35] For more information on the cybersecurity of autonomous vehicles, see Calvin Nobles and others, 'Driving into Cybersecurity Trouble with Autonomous Vehicles' in Festus Fatai Adedoyin and Bryan Christiansen (eds), *Handbook of Research on Cybersecurity Risk in Contemporary Business Systems* (IGI Global 2023) 255–273 <https://www.researchgate.net/publication/369973063_Driving_Into_Cybersecurity_Trouble_With_Autonomous_Vehicles> accessed on 9 May 2025.

Anastasios Giannaros and others, 'Autonomous Vehicles: Sophisticated Attacks, Safety Issues, Challenges, Open Topics, Blockchain, and Future Directions' (2023) 3(3) Journal of Cybersecurity and Privacy 493–543 <https://doi.org/10.3390/jcp3030025> accessed on 9 May 2025.

[36] Helmut Heiss, 'Liability for Artificial Intelligence (AI): Solutions Provided by Insurance Law' in Sebastian Lohsse, Reiner Schulze, and Dirk Staudenmayer (eds), *Liability for AI: Münster Colloquia on EU Law and the Digital Economy VII* (Nomos 2023) 250.

Thus, cyber insurance could be a solution to the problem of the risk arising from an unlawfully behaving third party (e.g. a situation where the operating system installed on a vehicle is hacked and a dangerous situation arises as a result). Since hacking is an intentional unlawful act by a third party, in most legal systems, the driver of an autonomous vehicle could rely on the concept of force majeure[*37] in the event of a traffic accident caused by hacking. Force majeure exempts the driver of an autonomous vehicle from liability in most legal systems, both under the concepts of risk liability and fault liability. This is also predicated on the impractical assumption that hacking is evident to the parties and not concealed (which would usually be the case).

However, a disadvantage of cyber insurance is that it would not be able to cover other risks arising from the use of an autonomous vehicle (e.g. risks arising from the driver or operator or risks arising from the manufacturer, programming, or service provision) from an insurance perspective. Consequently, theoretical cyber insurance would only help in limited cases of damage. The authors believe that it would be (legally) disadvantageous to consumers and incomprehensible to policyholders if owners of autonomous vehicles were to have to sign several different insurance contracts for their vehicle (it is currently impossible to avoid a compulsory motor third party liability insurance contract). Additionally, in connection with possible compulsory cyber insurance, the issue of direct claims arising from the so-called *actio directa* principle would arise. Namely, throughout the European Union, the full right of direct claim of the injured party against the liability insurance provider of the person causing the damage is only affirmed in the case of compulsory motor third-party liability insurance (as a result of the MID). Thus, there are countries in the European Union where the *actio directa* principle is recognised only in compulsory motor third-party liability insurance (e.g. Latvia). However, there are countries where the *actio directa* principle is recognised in both voluntary and compulsory liability insurance in its entirety (e.g. Lithuania[*38]). Consequently, the creation of a separate compulsory cyber insurance system would also entail problems with the right of direct claim and therefore, in the opinion of the authors, would not be justified. Based on the above, the authors do not support mitigating the risks arising from autonomous vehicles through possible compulsory cyber insurance regulation.

3.2. Do we need compulsory producer liability insurance?

When risks arising from the manufacturer, programming, or service provision materialise, we can additionally talk about the liability of the person involved in causing the damage. This also raises the question of whether additional compulsory liability insurance should be introduced in relation to autonomous vehicles concerning the risks arising from producer liability that are not covered by compulsory motor third-party liability insurance.

Legal literature points to a paradox: 'Autonomous vehicles will increase the safety of vehicle travel by reducing vehicle collisions. Ironically, autonomous vehicles are likely to increase the liability exposure of vehicle manufacturers. Autonomous vehicles will shift the responsibility for avoiding accidents from the driver to the vehicle manufacturer. Although the autonomous vehicle is expected to result in a net decrease in the number of accidents, it will create new modes of failure that will be attributed to the vehicle. These failures are likely to generate lawsuits against the vehicle manufacturer and possibly manufacturers of components of the autonomous system.'[*39] Determining the SAE level of autonomous vehicles, and thus their impact on road safety, will be complicated in the future by the possibility that a vehicle may be at SAE level 3, 4, and possibly even 5 at the same time. Today, we are increasingly seeing vehicles that have some applications (Android Auto, seat heating, etc.) with a subscription-based payment model. The user can enable additional vehicle functions for an additional fee – if the fee is not paid, this function is deactivated.

37 Võlaõigusseadus [Law of Obligation Act]: RT I 2001, 81, 487; RT I, 08.01.2020, 10. § 103 (2) - force majeure is a circumstance that the debtor could not influence and, based on the principle of reasonableness, could not be expected to have taken into account or avoided at the time when the non-contractual obligation arose, or to overcome the impeding circumstance or the consequence thereof.

38 Olavi-Jüri Luik and Janno Lahe, 'Granting Direct Claim Rights in Voluntary Liability Insurance to the Aggrieved Person in Estonian Insurance Practice: Via Insurance Contract vs. Claim Assignment' in *Revisiting the Limits of Freedom While Living Under Threat II* (University of Latvia Press 2024) 196–206.

39 Garry E. Marchant and Rachel A. Lindor, 'The Coming Collision between Autonomous Vehicles and the Liability System' (2012) 52 Santa Clara Law Review 1339.

It is possible that (partly to cover insurance costs) higher SAE levels will be made available under additional payment so that the same car may be SAE level 3 one month, and SAE level 5 the following month.

Section 1.1 of the PLD proposal highlights that in the case of PLD it is legally unclear how to apply the outdated definitions and concepts of the Producer Liability Directive to modern digital and circular economy products (e.g. software and products that require software or digital services to function, such as smart devices and autonomous vehicles). Therefore, one solution could be to amend the producer liability regulation of the European Union or to consider whether compulsory liability insurance should be introduced for manufacturers of autonomous vehicles.

However, in the case of producer liability, it must be borne in mind that in the case of autonomous vehicles, the principle of development protection, among other things, may very likely apply, which may exempt the manufacturer from liability: the manufacturer is not liable for damage resulting from the product if they prove that the state of scientific and technical knowledge at the time of placing the product on the market did not allow the existence of a defect to be discovered. The exact scope and basis for the implementation of development risk protection are still a subject of debate among legal scholars.[*40] In essence, development risk expresses the addition of fault liability to the producer liability regime. This is also confirmed by the fact that some European Union member states (Finland, Luxembourg and, specifically in the case of pharmaceuticals, Germany) initially decided not to adopt development risk protection.[*41] Pressure from pharmaceutical manufacturers on governments has been seen as one of the reasons for adding development risk to the Product Liability Directive, as it is necessary in order to increase public welfare. Proponents of development risk have also pointed out that it protects incentives for innovation, encourages companies to use the latest knowledge, and ensures the stability of product liability insurance costs in Europe. Thus, the very basis of the concept of development risk is to give producers the opportunity and confidence to innovate.[*42] When determining the level of knowledge, it must be taken into account that the knowledge that we expect the manufacturer to implement must have been available to the manufacturer prior to production. This gives rise to the problem of how to determine the most advanced level of science and the availability of information.[*43] In practice, very strict standards of conduct have been applied to manufacturers in exploring and applying the most advanced level of science.[*44] It is obvious that the exclusion of development risk arises in the case of AI-powered autonomous vehicles. However, this would lead to a situation where theoretical compulsory producer liability insurance would not work in real practice, because the insurer would be released from liability in many cases (the liability of the insurer of compulsory liability insurance cannot be broader than the liability of the insured person). Theoretically, the possibility of applying the principle of development protection to autonomous vehicles could be ruled out. However, this raises the question of why one product is preferred over another in terms of legal policy. Furthermore, compulsory producer liability insurance would also raise the problem of implementing the above-described *actio directa* principle in European Union Member States. Another problem would be simultaneous implementation of parallel compulsory liability insurance systems – a compulsory motor third-party liability insurance system already exists, and thus two parallel compulsory liability insurance systems would emerge for vehicles participating in street traffic.[*45] Another issue would be how to distinguish autonomous vehicles from other products in the system of compulsory liability insurance of the manufacturer – in certain situations, drawing a line between a vehicle and a non-vehicle may be difficult. The problem of cybercrime and the exclusion of force majeure described above would certainly remain in the case of the system of compulsory liability insurance of the manufacturer – compulsory liability insurance of the manufacturer would not be able

40 Stephen Weatherill and Jacques Delors, *EU Consumer Law and Policy* (2nd edn, Elgar European Law 2014) 139.

41 Christopher Hodges, 'Development Risks: Unanswered Questions' (1998) 61(4) The Modern Law Review 560–570.

42 Kadri Alekõrs, 'Tootja vastutus puudusega poote põhjustatud kahju eest [Producer's liability for damage caused by defective products]' (Master's thesis, University of Tartu 2012) <http://hdl.handle.net/10062/26229> accessed on 9 May 2025.

43 Ibid.

44 Duncan Fairgrieve, 'Product Liability in Comparative Perspective' (Cambridge University Press 2005) 1 <https://www.cambridge.org/core/books/product-liability-in-comparative-perspective/D51EDAAD27C8326D2977196E0B41E115> accessed on 9 May 2025.

45 Legal literature also affirms the possibility of simultaneous existence of two insurance systems.
Victória Ilková and Adrian Ilka, 'Legal Aspects of Autonomous Vehicles – an Overview' (2017) Proceedings of the 2017 21st International Conference on Process Control (PC), Štrbské Pleso, Slovakia 428.

to essentially cover the risks arising from cybercrime. Based on the above, the authors do not support mitigating the risks arising from autonomous vehicles through possible compulsory manufacturer liability insurance regulation.

3.3. Would the solution be changing/improving the current European Union compulsory motor third-party liability insurance system?

Motor third-party liability insurance[*46] in modern terms is essentially compulsory liability insurance for the owner of a motor vehicle. The most important goal of compulsory motor third party liability insurance is the protection of victims of traffic accidents – the victim must be guaranteed prompt and fair compensation for damages, regardless of the financial situation of the person causing the damage. Almost equally important in the compulsory motor third-party liability insurance system is the protection of the person who caused the traffic accident – the obligation to compensate for the damage has been transferred to the insurer by the insurance contract, which is why the person who caused the damage is protected from financial difficulties or insolvency associated with compensation.

Essentially, three motor insurance systems exist in parallel in Europe:

a) domestic third-party motor insurance system;
b) so-called 'green motor insurance system';
c) European Union motor insurance system.

Consequently, in the case of the additional risks arising from autonomous vehicles, it is necessary to consider the need to modify all three systems (if such a need exists). In the case of the first one, the domestic third-party liability insurance system, the rules for compensation for damage depend on domestic tort law and the limitations of the local third-party liability insurance system. In the context of the European Union, domestic third-party liability insurance systems have also been harmonised through the MID (see below).

After the Second World War, when the borders of European countries opened up, the broader problem of how to protect victims from the harm caused by foreign citizens returning to their home countries after a traffic accident arose in connection with travelling. In such a situation, compensation for victims of a traffic accident often depended solely on whether mutual agreements existed between the victim and the country of the party that caused the damage.[*47] In 1949, an international conference of motor insurers was held in London, which approved the proposal of the United Nations Economic Commission for Europe's Inland Transport Committee and established the Council of Bureaux. In 1952, the United Nations Economic Commission for Europe's Inland Transport Committee approved the Green Card system and the form of an international motor insurance policy (Green Card). As a result, the so-called Green Card motor insurance system was introduced on January 1, 1953. The Green Card system covers most European countries, while several Asian and African countries are also part of the system.

The Green Card system has 48 members.[*48] The Green Card system does not regulate issues related to civil liability, including the determination of compensation, which is decided by the countries themselves, or general insurance coverage for driver injuries or vehicle damage. It does establish the principles of compensation for damage caused by a foreign vehicle (by whom, how, and within what period will the damage

46 The term *motor third-party liability (MTPL) insurance* derives from the fact that it is an insurance contract purchased by the first party (policyholder) from the insurer (second party), which covers the damage caused to a third party (injured party). The first party is liable for their own damage, regardless of how it was caused. In particular, in the Anglo-American insurance system (e.g. in the USA), there is also *first-party liability insurance*, where the first party (the policyholder) is compensated by their own insurer (the other party) for the damage caused by a third party (e.g. cases where the policyholder is not liable for causing the damage; no one is liable for causing the damage; the person who caused the traffic accident flees the scene and cannot be found).

47 In the case of a motor insurance contract, the principle of *lex loci damni* is applied (the law of the country where the damage occurred applies), which is why it is difficult to know the scope of insurance coverage if one is involved in a traffic accident in another country.

48 Albania, Andorra, Azerbaijan, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Estonia, Spain, the Netherlands, Croatia, Ireland, Israel, Iran, Iceland, Italy, Greece, Cyprus, Lithuania, Liechtenstein, Luxembourg, Latvia, Macedonia, Malta, Morocco, Moldova, Montenegro, Norway, Poland, Portugal, France, Sweden, Romania, Germany, Serbia, Slovakia, Slovenia, Finland, the United Kingdom, Switzerland, Denmark, Czech Republic, Tunisia, Turkey, Ukraine, Hungary, Belarus, and Russia <http://www.cobx.org/> accessed on 9 May 2025.

be compensated). While the principles of the motor third-party liability insurance system in the European Union have been harmonised through the MID (although not tort law), there is no harmonisation in the Green Card system. In essence, it is just a system that makes it easier for victims to receive compensation. Since the Green Card system has no substantive impact on the scope of insurance coverage even for non-autonomous vehicles, the authors believe that the introduction of autonomous vehicles does not require significant changes to the Green Card system.

In addition to the rules of the Green Card motor insurance system, the motor insurance system is regulated by the consolidated MID. In summary, the MID:

- calls for all motor vehicles in the European Union to be covered by compulsory motor third-party liability insurance;
- abolishes insurance checks at the border to facilitate international travel within the European Union;
- sets the minimum limits for motor third-party liability insurance benefits in European Union countries;
- specifies the persons exempt from the insurance obligation and the institutions responsible for compensation;
- creates a mechanism for compensating victims of accidents that were caused by vehicles from another European Union country;
- calls for swift resolution of the claims based on an accident that occurred in a European Union country other than the place of residence of the victim (so-called visiting victim);
- gives policyholders the right to request a notification of claims or lack thereof related to the vehicle (at least for five years preceding the contract).

The MID does not regulate issues related to civil liability, including determination of compensation, which is decided by the European Union countries themselves, nor general insurance coverage for driver injuries or vehicle damage. Combined with the fact that the problems arising from the use of autonomous vehicles have not been harmonised by a directly applicable regulation in the European Union, a situation arises where the protection arising from motor third-party liability insurance for autonomous vehicles in some European Union Member States may be different from that in other Member States. One of the most important effects of harmonising the motor third party liability insurance systems of the European Union Member States through the MID is to ensure the right of direct claim for injured parties (as the authors explained above, there are member states in the European Union where the right of direct claim in liability insurance is limited to motor third-party liability insurance). The introduction of compulsory cyber insurance and product liability insurance will create a situation where some vehicle owners will have to have multiple compulsory liability insurance policies at the same time – which is presumably not in the interests of any consumer. This would make it difficult to receive compensation and would create several parallel compensation rules (in other words, some victims would presumably be treated unequally compared to others). Therefore, the authors believe that one solution would be to amend the MID, which would impose an obligation on European Union Member States according to which national motor third-party liability insurance systems must cover compensation for damage arising from the additional risks of autonomous vehicles (and also fully autonomous vehicles) equally to the risks arising from the use of non-autonomous vehicles.[*49] This would essentially also require guidelines (through the MID) for the (partial) harmonisation of civil liability systems: in the future, the owner of an autonomous or fully autonomous vehicle should not be able to rely on the lack of fault in certain cases (e.g. countries where liability related to vehicles is not based on risk liability, but on fault liability), force majeure (e.g. hacking), or development risk protection

[49] Legal literature also indicates that '[p]erhaps the most important issue in liability for AV is clarity both with respect to third-party compensation and redress actions. First of all, we need clarity of who the primary liable person is. It would be very useful to channel liability to a single person or entity, i.e. the driver or the manufacturer, who could then take redress against other potentially liable parties. We consider it more appropriate to establish strict liability of the driver, whose insurer would pay settle the claims of third parties. There will be vehicles of various levels of automation on the roads for many years to come, while road traffic insurers have already extended know-how in such claims. Therefore, it would be much simpler for third parties to turn against these insurers than having to determine the appropriate liable person by examining whether the vehicle was being driven in automated mode and whether the human or the ADS was responsible for the accident.'

Michael P. Chatzipanagiotis and George Leloudas, 'Automated Vehicles and Third-Party Liability: A European Perspective' (2020) SSRN Electronic Journal <https://papers.ssrn.com/abstract=3519381> accessed on 9 May 2025.

(in the case of producer liability). In these cases, the motor third-party liability insurance insurer must be guaranteed the right of recourse only against the person ultimately liable (e.g. in the event of a traffic accident resulting from hacking, the motor third-party liability insurance insurer of the relevant vehicle compensates the damage caused to the injured party and then files a claim against the hacker). In fact, even today, the Estonian motor third-party liability insurance system, for example, deviates from the classic civil liability-based liability insurance system. For example, the medical expenses of a driver who caused a traffic accident are compensated (§ 44 (1) of the Motor Insurance Act[*50]), although the compensation of the accident-causing driver's own medical expenses does not constitute liability insurance, as liability towards oneself cannot arise, etc.

One important shortcoming of the current MID framework is its limited coverage of damages suffered by passengers inside autonomous vehicles. Given that AVs may have no human driver and all occupants are effectively passengers, an accident may leave them without an evident liable party under fault-based regimes. This creates a strong argument for explicitly extending motor insurance coverage to include first-party losses, as is common in personal accident insurance models. Therefore, the inclusion of autonomous vehicles in the MID regime will require clarifying the notion of the liable party to avoid fragmenting the motor insurance system into separate regimes for autonomous and non-autonomous vehicles.

Our policy suggestion is that the role of "operator" be explicitly incorporated into the MID as a recognised category of liable party alongside the owner and driver. The operator, defined as the person or legal entity exercising effective control over the autonomous system (e.g. person in control of a vehicle via an app), would bear responsibility for incidents arising from such control. This approach would prevent legal gaps in liability allocation while preserving the integrity of a single-tier insurance regime.

Such clarification need not lead to a dual insurance system for autonomous and non-autonomous vehicles. Rather, the MID could be amended to treat the operator as functionally equivalent to the driver in traditional vehicles for liability purposes. The insurance policy would continue to be vehicle-based, but with flexibility regarding the identification of the liable person, depending on the technological level of autonomy. This would allow for a unified framework where risk attribution evolves with vehicle capability, without fragmenting the market or distorting consumer expectations.

Also, such policy shift would not necessarily undermine the foundational principle of motor third-party liability insurance, namely that it compensates the civil liability of the driver. In the context of autonomous vehicles, the concept of a "driver" becomes increasingly obsolete. This raises the necessity of reconceptualising the liable party under the MID.

Although the MID was amended by Directive 2021/2118 of 24 November 2021, unfortunately, regarding autonomous vehicles, the relevant directive only acknowledges in Article 28c that, by 24 December 2030 at the latest, the Commission shall submit a report to the European Parliament, the Council and the European Economic and Social Committee analysing matters related to autonomous vehicles.[*51] In the opinion of the authors, technology is unfortunately developing faster and, based on the above, it can be expected that fully autonomous vehicles at SAE Level 5 (fully autonomous driving) will be on the roads by 2030.

3.4. Would an alternative solution be a new, European Union-wide no-fault insurance system for autonomous vehicles?

Motor insurance is essentially compulsory liability insurance, meaning that the civil liability of the vehicle owner is considered a prerequisite for compensation. At the same time, there are also forms of compensation for damage in the insurance system that are not correlated with the civil liability of the insured person. For example, vaccine insurance often operates as a so-called no-fault insurance system. Liability arising from vaccines, like in the case of autonomous vehicles, is closely linked to producer liability. Various scientific

50 Liikluskindlustuse seadus: RT I, 11.04.2014, 1; 29.06.2024, 12.

51 'The European Commission also has a duty to monitor the application of the MID Directive in light of technological developments (including the increasing use of fully and semi-autonomous vehicles) and to review it to ensure that the directive continues to serve its purpose, which is to protect potential victims of road accidents.' Liikluskindlustuse seaduse muutmise ning sellega seonduvalt teiste seaduste muutmise seaduse eelnõu seletuskiri [Explanatory memorandum to the draft law on amendments to the Motor Insurance Act and related amendments to other acts] 92–93 <https://www.riigikogu.ee/download/b554ae63-9db6-479b-be88-19130edf032a> accessed on 9 May 2025.

articles[*52] and websites[*53] point out that at least 27 countries[*54] around the world use a no-fault program (Vaccine Injury Compensation Program) to compensate for vaccine injuries.

No-fault insurance systems for land vehicles can be found, for example, in Canadian provinces such as British Columbia, Saskatchewan, Manitoba, and Québec.[*55] Essentially, no-fault insurance means that the loss incurred as a result of the realisation of the insured risk is compensated by the own insurer of the insured person (not the insurer of another person). This does not necessarily mean that the driver bears no liability. It is an approach similar to accident insurance. This replacement of the tort-based insurance system with a no-fault system avoids disputes over liability and exemption from liability that are inherent in tort law.

A European Union study[*56] points out that 'Engelhard and Bruin argue that a no-fault insurance model would be the best regulatory response at the EU level to allocate the risk of damage caused by AVs. This policy solution would help to address the current gaps and constraints, contribute to legal certainty and effectiveness, ensure consumer protection, and provide certainty for producers.'[*57] Legal literature also includes, for example, Punev's position, that 'for AVs the right solution might be compulsory no-fault insurance, supplemented by a shift of liability to the manufacturer. A fault-based system, which relies on the care exercised by drivers, is obviously impractical for AVs, not only because these vehicles are designed to learn from mistakes, but also because it would be burdensome for the victim to prove the negligence of the driver.'[*58]

The authors admit that creating a no-fault system for autonomous vehicles[*59] may be easier from a legal technical point of view than amending the MID and attempting to partially harmonise the tort law systems of the European Union Member States. However, in such a case, the realisation of risks arising from the use of motor vehicles would create two parallel damage compensation systems: the first, the currently valid compulsory motor third party liability insurance system for non-autonomous vehicles, and the second, the new no-fault system for autonomous vehicles. Yet, different compensation systems would lead to a situation where the base, scope, deadlines, etc. of compensation for damage would depend on the system through which the compensation for damage is made. The authors believe that it would not be acceptable from a legal policy perspective for compensation for damage to the victim to depend on whether the motor accident was caused by an autonomous vehicle or a non-autonomous vehicle. Therefore, the authors would prefer to change the motor insurance system. The authors also believe that a no-fault insurance system would sharply increase the moral hazard problem known in insurance theory:[*60] people tend to change

52 Sam Halabi, Andrew Heinrich, and Saad B. Omer, 'No-Fault Compensation for Vaccine Injury — The Other Side of Equitable Access to Covid-19 Vaccines' (2020) 383 New England Journal of Medicine <https://www.nejm.org/doi/pdf/10.1056/NEJMp2030600> accessed on 9 May 2025.

Randy G. Mungwira and others, 'Global Landscape Analysis of No-Fault Compensation Programmes for Vaccine Injuries: A Review and Survey of Implementing Countries' (2020) 15 PLOS ONE e0233334 <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0233334> accessed on 9 May 2025.

53 State insurers offer minimum motor insurance based on a no-fault system. Public Health Agency of Canada, 'Vaccine Injury Compensation Programs in Quebec' (2020) <https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2020-46/issue-9-september-3-2020/vaccine-injury-compensation-programs-quebec.html> accessed on 9 May 2025.

54 Tommie Crum, Birendra R. Tiwari, and Kirsten Mooney, 'Current Situation of Vaccine Injury Compensation Program and a Future Perspective in Light of COVID-19 and Emerging Viral Diseases' (2021) 10 F1000Research 652 <https://f1000research.com/articles/10-652/pdf> accessed on 9 May 2025.

55 Insurance Bureau of Canada, 'Mandatory Auto Insurance Requirements' <https://www.ibc.ca/insurance-basics/auto/types-of-auto-coverage/mandatory-auto-insurance-requirements> accessed on 9 May 2025.

Stephanie Wallcraft, 'Public vs private car insurance: How car insurance differs across Canada' (*Driving.ca*, 6 January 2024) <https://driving.ca/features/shopping-advice/public-private-car-insurance-across-canada> accessed on 9 May 2025.

56 European Parliamentary Research Service, 'A common EU approach to liability rules and insurance for connected and autonomous vehicles. European Added Value Assessment. Accompanying the European Parliament's legislative own-initiative report (Rapporteur: Mady Delvaux)' (2018) EPRS <https://www.europarl.europa.eu/RegData/etudes/STUD/2018/615635/EPRS_STU(2018)615635_EN.pdf> accessed on 9 May 2025.

57 Ibid, 35.

58 Anastas Punev, 'Autonomous Vehicles: The Need for a Separate European Legal Framework' (2020) 19(1) European View 95 <https://doi.org/10.1177/1781685820912043> accessed on 9 May 2025.

59 For more information on the no-fault insurance system for autonomous vehicles, see Maurice Schellekens, 'No-fault Compensation Schemes for Self-Driving Vehicles' (2018) 10(2) Law, Innovation and Technology 314–333.

60 This is a situation in insurance theory (also in economic theory) where one party is willing to take greater risks due to the actions of the other party. For example, insurers fear that due to the existence of an insurance contract, policyholders may

their behaviour when some of the risks of their behaviour are borne by others, not themselves, and also when the risks are insured.*[61] In the case of a no-fault system, the moral hazard is clearly higher and this makes the insurance system more expensive from the economic perspective*[62].

The problems associated with the no-fault insurance system receive considerable attention in legal literature.*[63] For example, it is indicated that '[f]or instance, the damage covered by the no-fault compensation scheme may be limited to personal injury or death, which excludes property damage. In addition, it remains controversial when it comes to the issue of who should provide the coverage (state fund, private insurance company, or AV producer) under the no-fault compensation scheme and in which manner (voluntary or compulsory participation). On that point, further nuanced rules should be developed to regulate these issues either at the Member State level or, in the absence thereof, at the EU level.'*[64]

4. Conclusions

Legal literature and EU policy documents highlight various options for regulating the potential damage arising from risks caused by autonomous vehicles. It is precisely the development of technology (due to the unpredictability or unawareness of risks) that leads to the need to mitigate the risks more through the insurance system (e.g. the proposed creation of no-fault insurance systems) and this creates a situation where insurance systems essentially replace the tort system. In the opinion of the authors, the biggest problem in the European Union today is the fact that the tort law systems of the Member States are not harmonised. This prevents the creation of a simple and effective liability-based insurance system to mitigate the risks arising from autonomous vehicles (including fully autonomous vehicles) (an exception would be a no-fault insurance system, which is not based on liability). However, the authors believe that in a situation where motor third-party liability insurance has already been harmonised in the European Union through the MID (although not in relation to civil liability), the creation of two or three parallel insurance systems for liability for the vehicles participating in road traffic would be problematic (different compensation rules, etc.). Therefore, the most effective option would be to supplement the MID in a way that would oblige European Union Member States to ensure that national motor insurance systems ensure compensation for the damage arising from the additional risks of autonomous vehicles on an equal basis with the risks arising from the use of non-autonomous vehicles. In essence, this would be partial harmonisation of civil liability systems in relation to the risks arising from the operation of vehicles (which would be a major legal change in the European Union). True, this does not solve the problem of compensating for the damages arising from the additional risks of autonomous vehicles to the persons who were in those autonomous vehicles themselves. At the same time, it can be argued that even for most non-autonomous vehicles today, there is no European-wide compulsory producer liability insurance system. The authors believe that until statistical data confirm that the risks posed by autonomous vehicles are greater than those posed by non-autonomous vehicles, there is no logical justification for creating a compulsory producer liability insurance system or a compulsory cyber insurance system for the latter. Social perception of a risk must also be taken into account: it is expected that in the social debate, autonomous vehicles will not be considered less risky than conventional vehicles as soon as the risk rate of an autonomous vehicle is statistically lower than that of the average driver, but rather a stricter standard will be set for autonomous vehicles. The authors believe that, taking into account the specific risks arising from autonomous vehicles (hacking, etc.), the risks arising from them are lower than those arising from non-autonomous vehicles.

behave more carelessly than they would without an insurance contract. See, for example, Karl Borch, 'Moral Hazard in Insurance' (1984) 19(3) The Financial Review.

61 Lloyd R. Cohen and Michelle E. Boardman, 'Methodology: Applying economics to insurance law – an introduction' in Julian Burling and Kevin Lazarus (eds), *Research Handbook on International Insurance Law and Regulation* (Edward Elgar 2011).

62 Please see about broader systemic consequences: Guido Calabresi, *The Costs of Accidents: A Legal and Economic Analysis* (Yale University Press 1970).

63 See, for example, the article by ME Diamantis, in which he outlines six main arguments against the no-fault approach. Mihailis Diamantis, 'Vicarious Liability for AI' (2023) 99 (1) Indiana Law Journal 331 <https://www.repository.law.indiana.edu/ilj/vol99/iss1/7> accessed on 9 May 2025.

64 Shu Li and Michael Faure, 'Motor Liability Insurance in a World with Autonomous Vehicles' in Slobodan Jovanovic and Pierpaolo Marano (eds), *Insurance and Legal-Economic Environment – Wider and Narrower Framework: Proceedings* (AIDA Serbia 2022) 108 <https://doi.org/10.18485/aida.2022.23.ch9> accessed on 9 May 2025.

In light of the issues discussed, we propose the following:

1. Amend the MID to explicitly include specific risks of autonomous and fully autonomous vehicles.
2. Introduce partial harmonisation of tort law by setting a common presumption of liability for AV owners/operators.
3. Provide interim soft law guidance (e.g. Commission Recommendations or Communications) pending formal legislative changes.
4. Avoid parallel insurance regimes by maintaining a unified liability framework under the MID and refraining from creating separate mandatory cyber or product liability insurance systems.

References

Bibliography

Adedoyin, F.F., Christiansen, B. (eds), *Handbook of Research on Cybersecurity Risk in Contemporary Business Systems* (IGI Global 2023) <https://www.researchgate.net/publication/369973063_Driving_Into_Cybersecurity_Trouble_With_Autonomous_Vehicles> accessed on 9 May 2025.

Alekõrs, K., 'Tootja vastutus puudusega poote põhjustatud kahju eest [Producer's liability for damage caused by defective products]' (Master's thesis, University of Tartu 2012) <http://hdl.handle.net/10062/26229> accessed on 9 May 2025.

Altunyaldiz, Z., 'Legal aspects of "autonomous" vehicles' (Council of Europe, Committee on Legal Affairs and Human Rights 2020) <https://assembly.coe.int/LifeRay/JUR/Pdf/DocsAndDecs/2020/AS-JUR-2020-20-EN.pdf> accessed on 12 October 2024.

Atkinson, K., 'Autonomous Cars: A driving force for change in motor liability and insurance' (2020) 1(1) SCRIPTed <https://script-ed.org/?p=3804> accessed on 9 May 2025.

Borch, K., 'Moral Hazard in Insurance' (1984) 19(3) The Financial Review.

Burling, J., Lazarus, K. (eds), *Research Handbook on International Insurance Law and Regulation* (Edward Elgar 2011).

Calabresi, G., *The Costs of Accidents: A Legal and Economic Analysis* (Yale University Press 1970).

Chatzipanagiotis, M.P., Leloudas, G., 'Automated Vehicles and Third-Party Liability: A European Perspective' (2020) SSRN Electronic Journal <https://papers.ssrn.com/abstract=3519381> accessed on 9 May 2025.

Crum, T., Tiwari, B.R., Mooney, K., 'Current Situation of Vaccine Injury Compensation Program and a Future Perspective in Light of COVID-19 and Emerging Viral Diseases' (2021) 10 F1000Research <https://f1000research.com/articles/10-652/pdf> accessed on 9 May 2025.

Chesterman, S., 'Artificial Intelligence and the Problem of Autonomy' (2020) (1)2 Notre Dame Journal on Emerging Technologies 217.

D'Agostino, G., Gaon A., Piovesan, C.J. (eds), *Leading Legal Disruption: Artificial Intelligence and a Toolkit for Lawyers and the Law* (Thomson Reuters – Yvon Blais, Montreal 2021).

Diamantis, M., 'Vicarious Liability for AI' (2023) 99(1) Indiana Law Journal <https://www.repository.law.indiana.edu/ilj/vol99/iss1/7> accessed on 9 May 2025.

Dima, F.C., *Fully Autonomous Vehicles in the EU: Opportunity or Threat?* (Essay (Master), University of Twente 2019) <https://purl.utwente.nl/essays/72945> accessed on 9 May 2025.

Fairgrieve, D., 'Product Liability in Comparative Perspective' (Cambridge University Press 2005) <https://www.cambridge.org/core/books/product-liability-in-comparative-perspective/D51EDAAD27C8326D2977196E0B41E115> accessed on 9 May 2025.

Giannaros, A., and others, 'Autonomous Vehicles: Sophisticated Attacks, Safety Issues, Challenges, Open Topics, Blockchain, and Future Directions' (2023) 3(3) Journal of Cybersecurity and Privacy <https://doi.org/10.3390/jcp3030025> accessed on 9 May 2025.

Halabi, S., Heinrich, A., and Omer, S.B., 'No-Fault Compensation for Vaccine Injury — The Other Side of Equitable Access to Covid-19 Vaccines' (2020) 383 New England Journal of Medicine <https://www.nejm.org/doi/pdf/10.1056/NEJMp2030600> accessed on 9 May 2025.

Hodges, C., 'Development Risks: Unanswered Questions' (1998) 61(4) The Modern Law Review.

Ilková, V., Ilka, A., 'Legal Aspects of Autonomous Vehicles – an Overview' (2017) Proceedings of the 2017 21st International Conference on Process Control (PC), Štrbské Pleso, Slovakia.

Jovanovic, S., Marano, P. (eds), *Insurance and Legal-Economic Environment – Wider and Narrower Framework: Proceedings* (AIDA Serbia 2022) <https://doi.org/10.18485/aida.2022.23.ch9> accessed on 9 May 2025.

Kinkar, R., *Tootjavastutus ja juhi deliktiõiguslik vastutus autonoomsete sõidukite tehnoloogia puudusest tingitud kahju tekkimise korral* [Tort liability of producer and driver of vehicle in cases where damage is caused by a defect in autonomous vehicle technology] (Master's thesis, University of Tartu 2015) <https://dspace.ut.ee/items/c07230a3-e0b2-418e-b793-5cf50d9e7747> accessed on 9 May 2025.

Lahe, J., Liivak, T. 'Strict Liability for Damage Caused by Self-Driving Vehicles: The Estonian perspective' (2020) 12(2) Baltic Journal of Law & Politics.

Liivak, T., *Tort Liability for Damage Caused by Self-driving Vehicles under Estonian Law* (Doctoral thesis, University of Tartu 2020) <https://dspace.ut.ee/server/api/core/bitstreams/8c3588d6-397c-4161-9048-81bbb65e6089/content> accessed on 9 May 2025.

Lohsse, S., Schulze, R., Staudenmayer, D. (eds), *Liability for AI: Münster Colloquia on EU Law and the Digital Economy VII* (Nomos 2023).

Luik O.-J., Lahe, J., 'Granting Direct Claim Rights in Voluntary Liability Insurance to the Aggrieved Person in Estonian Insurance Practice: Via Insurance Contract vs. Claim Assignment' in *Revisiting the Limits of Freedom While Living Under Threat II* (University of Latvia Press 2024).

Marchant, G.E., Lindor, R.A., 'The Coming Collision between Autonomous Vehicles and the Liability System' (2012) 52 Santa Clara Law Review.

Mungwira, R.G., and others, 'Global Landscape Analysis of No-Fault Compensation Programmes for Vaccine Injuries: A Review and Survey of Implementing Countries' (2020) 15 PLOS ONE <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0233334> accessed on 9 May 2025.

Novelli, C., *AI and Legal Personhood: A theoretical survey* (Doctoral dissertation, University of Bologna 2022) <https://ec.europa.eu/docsroom/documents/24402/attachments/1/translations/en/renditions/native> accessed on 9 May 2025.

Punev, A., 'Autonomous Vehicles: The Need for a Separate European Legal Framework' (2020) 19(1) European View <https://doi.org/10.1177/1781685820912043> accessed on 9 May 2025.

Schellekens, M., 'No-fault Compensation Schemes for Self-Driving Vehicles' (2018) 10(2) Law, Innovation and Technology.

Schollaert, V., 'AI and Legal Personality in Private Law: An Option Worth Considering (?)' (2023) 31(2/3) European Review of Private Law.

Schütte, B., and others, 'Damages Liability for Harm Caused by Artificial Intelligence - EU Law in Flux' (2021) Legal Studies Research Paper Series Paper No 69, University of Helsinki.

Voeneky, S., Kellmeyer, P., Mueller, O., Burgard W. (eds), *The Cambridge Handbook of Responsible Artificial Intelligence: Interdisciplinary Perspectives* (Cambridge University Press 2022).

Wallcraft, S., 'Public vs private car insurance: How car insurance differs across Canada' (*Driving.ca*, 6 January 2024) <https://driving.ca/features/shopping-advice/public-private-car-insurance-across-canada> accessed on 9 May 2025.

Weatherill, S., Delors, J., *EU Consumer Law and Policy* (2nd edn, Elgar European Law 2014).

Legal acts

Directive 85/374/EEC of the Council of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products [1985] OJ L 210/29.

Directive 2009/103/EC of the European Parliament and of the Council of 16 September 2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability [2009] OJ L263/11.

Directive (EU) 2021/2118 of the European Parliament and of the Council of 24 November 2021 amending Directive 2009/103/EC relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability [2021] OJ L430/1.

Liikluskindlustuse seadus: RT I, 11.04.2014, 1; 29.06.2024, 12.

Regulation (EU) 2019/2144 of the European Parliament and of the Council of 27 November 2019 [2019] OJ L 325/1.

Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act) [2024] OJ L, 12.7.2024.

Vienna Convention on Road Traffic (UN treaty, 8 November 1968).

Other sources

'Driverless Taxis to Start Paid Service in Capital - Chinadaily.Com.Cn' <https://www.chinadaily.com.cn/a/202307/10/WS64aad722a310bf8a75d6e165.html> accessed on 9 May 2025.

European Commission, 'Guidelines on the Exemption Procedure for the EU Approval Vehicles' (2019) <https://ec.europa.eu/docsroom/documents/34802/attachments/1/translations/en/renditions/native> accessed on 9 May 2025.

European Commission, 'Public support measures for connected and automated driving: Final report' (2017) 96 <https://op.europa.eu/en/publication-detail/-/publication/0f3e5c98-66ad-11e7-b2f2-01aa75ed71a1/language-en> accessed on 9 May 2025.

European Parliamentary Research Service, 'A common EU approach to liability rules and insurance for connected and autonomous vehicles. European Added Value Assessment. Accompanying the European Parliament's legislative own-initiative report (Rapporteur: Mady Delvaux)' (2018) EPRS <https://www.europarl.europa.eu/RegData/etudes/STUD/2018/615635/EPRS_STU(2018)615635_EN.pdf> accessed on 9 May 2025.

European Parliament resolution of 20 October 2020 with recommendations to the Commission on a civil liability regime for artificial intelligence (2020/2014(INL)) [2021] OJ C404/107.

Directorate General for Internal Policies, 'Cross-border traffic accidents in the EU – the potential impact of driverless cars' (2016) <http://www.europarl.europa.eu/RegData/etudes/STUD/2016/571362/IPOL_STU(2016)571362_EN.pdf> accessed on 9 May 2025.

Insurance Bureau of Canada, 'Mandatory Auto Insurance Requirements' <https://www.ibc.ca/insurance-basics/auto/types-of-auto-coverage/mandatory-auto-insurance-requirements> accessed on 9 May 2025.

Liikluskindlustuse seaduse muutmise ning sellega seonduvalt teiste seaduste muutmise seaduse eelnõu seletuskiri [Explanatory memorandum to the draft law on amendments to the Motor Insurance Act and related amendments to other acts] <https://www.riigikogu.ee/download/b554ae63-9db6-479b-be88-19130edf032a> accessed on 9 May 2025.

'Our Story - Auve Tech' <https://auve.tech/company/our-story/> accessed on 9 May 2025.

Public Health Agency of Canada, 'Vaccine Injury Compensation Programs in Quebec' (2020) <https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2020-46/issue-9-september-3-2020/vaccine-injury-compensation-programs-quebec.html> accessed on 9 May 2025.

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 COM (2021) 206 final <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021PC0206> accessed on 9 May 2025.

Proposal for a Directive of the European Parliament and of the Council on liability for defective products. COM(2022) 495 final <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022PC0495> accessed on 9 May 2025.

Proposal for a Directive of the European Parliament and of the Council on adapting non-contractual civil liability rules to artificial intelligence (AI Liability Directive) COM(2022) 496 final <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022PC0496> accessed on 9 May 2025.

SAE International, 'Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles J3016_202104' (2021) <https://www.sae.org/standards/content/j3016_202104/> accessed on 9 May 2025.

SAE International, 'SAE Standards News: J3016 automated-driving graphic update' (2019) <https://www.sae.org/news/2019/01/sae-updates-j3016-automated-driving-graphic> accessed on 9 May 2025.

'Safer Roads: New EU Measures to Reduce Car Accidents' <https://www.europarl.europa.eu/topics/en/article/20190307STO30715/safer-roads-new-eu-measures-to-reduce-car-accidents)> accessed on 9 May 2025.

'The Fourth Industrial Revolution: What It Means and How to Respond | World Economic Forum' <https://www.weforum.org/stories/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/> accessed on 9 May 2025.

'The Pathway to Driverless Cars: A detailed review of regulations for automated vehicle technologies' (Department for Transport 2015) <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/401565/pathway-driverless-cars-main.pdf> accessed on 9 May 2025.

'2023 Figures Show Stalling Progress in Reducing Road Fatalities in Too Many Countries - European Commission' <https://transport.ec.europa.eu/news-events/news/2023-figures-show-stalling-progress-reducing-road-fatalities-too-many-countries-2024-03-08_en> accessed on 9 May 2025.