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Motor liability insurance in a world with autonomous vehicles

Abstract

There will be accidents as long as we have vehicles running on the road. This proposition remains unchanged even if we are embracing a world with an increasing number of AVs. From a legal perspective, the emergence of AVs challenges not only our liability rules and safety regulations but also the framework of insurance. This latter aspect has created less discussion despite its importance in risk-shifting and compensation. In EU, the owner of a vehicle is obliged to obtain liability insurance for its registered vehicle. In this article, we argue that AVs will pose significant hurdles for victims when relying on liability insurance for sake of compensation. We critically analyse the direction of adapting the current legal framework and identify the competence of no-fault compensation in the context of AVs. We conclude this article by pointing out some important issues, which fall outside insurance scheme but will have significant implications for the future design of the insurance paradigm for AVs in the EU.

*Keywords:*Autonomous vehicles (AVs), artificial intelligence (AI), liability insurance, no-fault compensation scheme, Motor Insurance Directive, traffic law

1. Introduction

Statistics have shown that about 95% of road traffic accidents in EU are related to human errors.[1] How to reduce human errors becomes therefore a key issue to promote traffic safety. One potential way is to reduce the reliance on human beings when driving a vehicle. This prospect is no longer a fantasy, as artificial intelligence (AI) is being used in vehicles. By installing multiple sensors and adopting advanced algorithmic structures, a vehicle is able to receive and analyse data from the surroundings, which

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[1] European Parliament, Road fatality statistics in the EU, available at: https://www.europarl.europa.eu/news/en/headlines/society/20190410STO36615/road-fatality-statistics-in-the-eu-infographic, 15.1.2022.

can ultimately enable vehicles to make precise predictions and suitable decisions in different conditions. The vehicle that holds self-learning ability and can replace human beings to make decisions on the road is a so-called autonomous vehicle (AV).

While we may imagine a world without human driven vehicles on the road, the fact in the foreseeable future is that we may have a hybrid pattern of road traffic, containing both human driven vehicles and AVs. This hybrid traffic will generate many challenges regarding risk regulation. For example, since the essence of AI is making predictions (Agrawal, Gans, Goldfarb, 2018) and a prediction can be wrong, AVs cannot completely avoid all accidents. In fact, as literature has argued, regulating the risk posed by AI can be even more difficult, because the decision-making within the AI system can be opaque and unexplainable (Pasquale, 2015). In addition, questions are raised when it comes to human-AV interaction. It remains controversial for issues such as when human drivers shall override the vehicle and whether such a handover option is necessary for the AVs with an exceedingly high level of automation. As a result, the majority of the current debate is focusing on the issue of how to determine the liability of relevant parties for the sake of proper deterrence (Marchant, Lindor, 2012; Webb, 2016; Collingwood, 2017; Taeihagh, Lim, 2019; Patti, 2019) as well as how to set up regulatory measures to ensure that only safe AI systems can be placed in circulation (Veale, Borgesius, 2021). In comparison, there is only little research that pinpoints the influence of AVs on the insurance sector (Borges, 2019).

One important scheme to secure compensation in traffic accidents in the EU is obliging the owner of vehicles to obtain liability insurance for their vehicle (Motor Insurance Directive, 2009. The main objective of this article is to unveil the impact of AVs on the current liability insurance legal framework and to further assess the potential direction for policymaking. Section 2 will first showcase the disruption created by AVs. Then we will introduce the legal framework to deal with traffic accidents prior to AVs (Section 3) and analyse how AVs challenge the incumbent mandatory motor liability insurance (Section 4). Section 5 discusses the current liability insurance framework in the context of AVs and suggests a no-fault compensation scheme for damage caused by AVs. In Section 6 we critically discuss the potential directions adopted by Member States to alleviate the problems within the liability insurance scheme. Furthermore, we shed light on why a no-fault compensation scheme might become popular to compensate victims in the era of AVs. Section 7 concludes the article.

2. The disruption and challenges raised by AVs

Prior to AVs, an active engagement of the driver was required when driving a vehicle on the road. The emergence of AVs, in contrast, can free the control of human drivers to some extent. The difference regarding the control exercised by a human driver can be used as a variable to further distinguish various AVs.

As SAE International has refined, all vehicles could be categorised from Level 0 to Level 5 in a spectrum, with an increasing level of automation.[2] In general, AVs at Levels 0-2 still require a human driver to actively control the vehicle. In other words, as SAE

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[2] See SAE, Levels of Driving Automation, available at: https://www.sae.org/blog/sae-j3016-update, 15.1.2022.

International has stressed, the human driver is still *driving* the car. In comparison, AVs at Level 3-5 shows a substantially incremental level of automation, in which circumstances drivers, despite sitting in the driver's seat, are no longer regarded as *driving* the car. When a vehicle is armed with a higher automation ability, we reasonably assume that it can perform the vehicle in a way that is statistically safer than an average human driver does. Otherwise it would not be allowed to run on the road. Therefore, a human driver should not override driving, unless there is a clear requirement or signal to require them to do so (for AVs at Level 3). As literature indicates, an additional human intervention may even give rise to additional risk when vehicles are highly autonomous, because a machine in this situation can do better than human beings in light of analysing the conditions on the road and making a decision accordingly (Hevelke, Nida-Rumelin, 2015, 624). As a result, for AVs at Level 4-5, there is no requirement for human override. The role of a driver, as some scholars indicated, seems to be no different from a passenger in the vehicle (Schroll, 2014, 815–816).

The transformation incurred by AVs not only substantially alters the way of driving but also has significant implications for the risk posed on the road. From a risk perspective, an initial observation is that we can no longer expect the frontend driver to be responsible for the risk for all levels of Avs (Wendehorst, 2020). For the driver of an AV at Level 4-5, since they can no longer control the car, backend parties (e.g. manufacturers or service providers) will play a more determinant role in reducing the accident risk (Wendehorst, 2020). This shift of the control paradigm will also have impact on the sphere of insurance. Before we have a closer look at its challenges for the current insurance framework, we will first review in Section 3 of how the current legal framework is dealing with traffic accidents in a world without AVs.

3. The legal framework for traffic accidents in EU

From an institutional perspective, two goals are imperative to deal with accidents. One is to set up proper rules to incentivise relevant parties to behave appropriately; the other one is to ensure that victims can be compensated by offering plausible instruments (Calabresi, 1970). In this section, our purpose is to introduce how these two goals are materialised to deal with traffic accidents in the EU ahead of the emergence of AVs.

3. 1. Liability framework: who is liable for traffic accidents?

Traffic accidents are basically tackled with reference to two legal regimes: the product liability regime and the traffic law regime.

On the one hand, the producer of a vehicle might pose risks via their manufacturing activities. At the EU level, the Product Liability Directive (1985) has been established to harmonise the liability of producers: if an accident was caused by their defective product, the producer shall be strictly liable for the damage. A vehicle is not an exception; it is also a product, so that the vehicle manufacturer can be subject to strict liability.[3]

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[3] Article 1, PLD, 1985.

On the other hand, the driver and owner of a vehicle may contribute to accidents via their misbehaviour in operating the vehicle. A specific traffic liability regime is also established to deter these parties from behaving improperly. However, unlike strict product liability, this traffic liability regime is not harmonised at the EU level but respectively determined by domestic traffic liability laws. As a consequence, we can witness a large divergence regarding the liability for drivers and owners at the Member States level. The bottom line is that drivers are normally subject to fault-based rules (despite the presumption of fault of the driver in some jurisdiction) (Patti, 2019). In some countries, the owner of the vehicle is subject to strict liability, even though the damage was actually caused by a technical failure related to the manufacturing[4] or the (mis)behaviour of drivers (Slimmen, Van Boom, 2017, 19, para 55).

3. 2. Insurance framework: how to compensate victims on the road?

The insurance framework is indispensable in light of risk-shifting and compensation. The current liability regime implies that producers as well as frontend drivers/owners are at the risk of bearing liability and compensating victims for traffic accidents. These parties, therefore, may have an incentive to shift the risk in advance to avoid an unbearable compensation duty after an accident occurred. The insurance that these parties purchase to cover their liability for compensating other affected third parties is a so-called third-party liability insurance.

If an accident was caused by the defects of a vehicle, its producer shall ultimately take the liability, if they are not firstly targeted by victims. In this case, given risk aversion, producers have the incentive to purchase liability insurance to shift in advance any damages caused to third parties (Geistfeld, 2017, 1616).

If an accident occurred due to human operational errors, the owner of the vehicle (either subject to fault-based rules or strict liability according to domestic traffic laws) is often the first target of the victim, even if the accident were caused by other parties (e.g. drivers or producers). They would therefore also have an incentive to purchase liability insurance. As these parties are normally natural persons, who may have limited assets to sufficiently compensate the victim, a specific Motor Insurance Directive (MID, 2009) has been issued to oblige all *owners* of vehicles that are registered in the EU to obtain a liability insurance to cover the potential damages to a third-party victim before the vehicle runs on the road.[5]

Once an accident occurrs, the victim can bring a direct claim against the liability insurer of the vehicle owner.[6] In other words, liability insurers will bear the responsibility of compensating the victim for the damages that were caused and should have been covered by the insured party. However, in practice there are chances that victims fail to get compensation for a variety of reasons. First, in countries where liability is exclusively based on fault (i.e. only drivers are subject to fault-based liability), the proof of fault

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[4] Such as Germany, France and the Netherlands. See Engelhard, De Bruin, 2017, 72–75.

[5] See remark (8) and article 3, MID, 2009.

[6] This direct right of action has been provided for in article 18, MID, 2009.

may serve as a hurdle for victims seeking compensation. Recall that MID 2009 imposes an obligation to cover civil liability by insurance, but it does not provide a guarantee of compensation to the victim. Second, in Member States where owners are subject to strict liability, the existence of various *defences* provided to owners (e.g. contributory negligence, force majeure, etc.) may prevent protected victims from being compensated. Even tough article 18 MID 2009 provides a direct right of action to the victim, this does not exclude the possibility for insurers to call on defences to reject the claim of the victim. In addition, it is noteworthy that, as a type of third-party insurance, motor liability insurance usually does not cover the liability for the injury or damage to the *driver* of the vehicle that caused the accident (Slimmen, Van Boom, 2017:19, para 56). The injury and damage to innocent passengers, however, might be covered according to domestic laws.

To summarise, while a mandatory liability insurance has been set up in the EU, the right to compensation can be largely limited by several factors at the domestic level. The occurrence of an accident does not necessarily trigger a compensation to third-party victims via third-party insurance. As a result, other approaches might be provided to or referred by victims for sake of compensation. For example, ordinary people can choose a first party insurance product to shift risk in advance. What is more, as we will discuss in Section 5, some countries have been developing a no-fault compensation scheme (Faure, Hartlief, 2003, 150-51; Faure, 2004), under which compensation would be triggered merely by the fact of damage instead of liability(Schroll, 2015, 822). In the next section, we will explain how the new features brought about by AVs will challenge the current insurance framework.

4. How AVs challenges the current liability insurance framework

According to the MID, the vehicle refers to "any motor vehicle intended for travel on land and propelled by mechanical power, but not running on rails, and any trailer, whether or not coupled".[7] Therefore, AVs are covered by the MID without any difference from traditional human driven vehicles. The owner of a registered AV is thereby obliged to obtain a liability insurance before their AV can run on the road. What is more, whenever an accident occurs, victims are expected to get compensated via the motor liability insurance. In this section, we will identify some challenges for victims to claim their compensation via liability insurance according to the current framework.

First, Member States, which exclusively apply fault-based rules, are the most challenged with the emergence of AVs. Whenever an AV is involved in an accident, victims in these Member States would be at a vulnerable position to prove the existence of a fault. This is especially for the cases where AVs at Level 3-5 are involved. Since drivers can exercise little control over the AVs, their activity can pose little external risk and it would be difficult, if not impossible, for victims to prove that the accident is linked with the fault of driver or owner (Engelhard, De Bruin, 2017, 83, 110). Hence, from

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[7] MID, 2009, Article 1(1).

a legal perspective, it seems that Member States that expose owners to strict liability would promise a better protection of victims in the era of AVs. Victims that undergo an accident in these Member States can expect an easier process for compensation. However, it must be noted that the challenge posed to compensation does not necessarily constitute a solid postulation in support of making owners strictly liable for traffic accidents. As we will discuss in Section 5, whether or not owners of AVs are subject to strict liability should be determined by many other (more crucial) considerations (e.g. the deterrence effect).

Second, Member States adopting a strict liability for owners are not immune from challenges posed by AVs. The AVs may lead to new problems in the course of subrogation. Under the current insurance framework, owners are obliged to purchase mandatory liability insurance. Nevertheless, if it turns out that the accident is linked with the technical defects of backend manufacturers or the fault of drivers, after compensating victims, liability insurers will have to recover their loss from these parties on the basis of subrogation (Schellekens, 2015). This approach, however, would not be easy. On the one hand, it would be difficult for insurers to identify the fault of frontend drivers for AVs at Level 3-5. On the other hand, due to the opaque decision-making within the AI system, it would be difficult as well for insurers to prove that the accident was "caused" by relevant backend manufacturers.

Thirdly, there is controversy over the scope of protected victims in the era of AVs. As aforementioned, motor liability insurance principally does not cover the personal injury or property damage of the driver of the vehicle, because it will otherwise provide them with a wrong incentive to behave recklessly. In the context of AVs, the role of drivers is however transformed. Especially, when it comes to AVs at Level 3-5, they are no longer perceived as the "drivers" according to SAE International. The deprivation of their override for vehicles at Level 4-5 also indicates that they are loosely linked with accidents. In this sense, drivers are prescribed a role without much difference as other passengers in the AVs. This observation then raises a controversy about whether "drivers", who exercise little (if not none) control over the AVs and are innocent in an accident, can be the protected victims when they suffer personal injury or damage (Engelhard, De Bruin, 2017, 118). The answer to this question is not yet clear under the current legal framework.

5. Discussion

So far our analysis has sequentially described the transformation of AVs and its implication for the current liability insurance mechanism. The purpose of Section 5 is twofold. First, it will explore the potential approaches to adapt the current liability insurance framework in response to the challenges of AVs and discuss the potential forthcoming problems. Second, it will take a closer look at the potential alternative schemes in light of risk-shifting and compensation.

5. 1. Adapting the current liability
insurance framework to the context of AVs

Taking the challenges posed by AVs into consideration, we may attempt to adapt the current liability insurance framework in a way that is better able to protect victims in the era of AVs. This section will conduct a critical analysis of the potential directions.

First, policymakers from the Member States that exclusively adopt a fault-based rules toward drivers may shift to the paradigm of applying strict liability to owners (Engelhard, De Bruin, 2017).We argue that while this paradigm shift may promise a smoother process of claiming compensation, it receives critiques in other aspects. To start with, from a law and economics perspective, the primary goal of tort liability lies in deterrence but not in compensation. In this vein, if one day the owners of AVs are required to bear strict liability, it should be for the purpose of deterring owners to reduce accident costs. However, we lack evidence on this track and even worse, from a deterrence perspective, we may even reach an opposite conclusion according to our analysis. To explain it, the increase of the automation level indicates that the liability for frontend parties (e.g. owners) should be less strict rather than more. Apart from the deterrence consideration, applying strict liability to owners may pose some side effects regarding the social acceptance of AVs. People would like to utilise an innovative product provided that it elicits lower cost, which also includes the accident cost that may pose to them. Given strict liability, owners are expected to undertake more liability despite their decreasing ability to reduce the accident cost(Engelhard, De Bruin, 2017, 123). In this regard, consumers may stay back from purchasing AVs. Therefore, while extending strict liability to the owners of AVs may provide a better consumer protection, it can contradict other more important policy goals.

Second, we may expect that some Member States may give up the current owner-based mandatory liability insurance, and shift to another mechanism by requiring backend manufacturers to obtain mandatory liability insurance, especially for the AVs at Level 3-5. By doing so, the protected victims can bypass the problems when proving the fault of drivers or encountering the defense from owners (in the countries where strict liability applies). Alternatively, victims in the new model can claim compensation from the liability insurer of backend producers, which are based on strict product liability. This approach, however, is not perfect. For example, the current strict liability regime for backend producers is built upon a key concept, namely the "defect". In this regard, proving causation and identifying a defect would serve as hurdles for compensating protected victims. In addition, if we oblige all producers of AVs without difference to obtain liability insurance, it will incur the opposition from producers who are not involved in manufacturing vehicles with a lower level of automation (namely Level 0-2). Also, considering the fact the producers would have a better capacity than owners regarding risk bearing, it might be not wise to maintain a mandatory liability insurance scheme forcing producers of AVs to purchase a liability insurance. Actually, even without further reform, due to being exposed to strict product liability, producers of AVs (at Level 3-5) will remain an incentive to purchase liability insurance to shift the

risk. This also questions the added value of requiring manufacturers to obtain liability insurance.

The analysis in this section indicates that adapting the current liability insurance framework will be subject to some hurdles and oppositions, which are largely located at the liability sphere. Hence, policymakers may be further motivated to employ a new approach to deliver the protection of the vulnerable victims on the road. This approach can better be separated from the liability of owners or producer and simply be triggered by the existence of damage. The no-fault compensation scheme thereby becomes appealing in addition to liability insurance. In the next section, we will pay a closer attention to the potential function of no-fault compensation scheme in the context of AVs and identify its potential restrictions as well.

5. 2. No-fault compensation scheme toward AVs

In practice, direct insurance is a concrete materialisation of a no-fault compensation scheme. Direct insurance is noticeably different from liability insurance, because the insured party is the victim rather than the injurer and it is triggered by damage instead of relying on liability (Faure, Hartlief, 2003, 150–151). Direct insurance is also different from first-party insurance, since in direct insurance it is the potential injurer rather than the victim that serves as the policyholder that enters a contract with insurers, even if the victim serves as the insured party under both regimes (Faure, Hartlief, 2003, 150–151). Therefore, when direct insurance applies, the protected victim can directly claim their damage to insurers without referring to the liability of injured parties, making the compensation fair and quick (Pearl, 2018, 1833). There are several (European) legal systems where such a direct insurance mechanism applies. It is for example the case in Sweden where the Traffic Damage Act 1975 offers compensation to victims on a no-fault basis (Nyqist & Parsson 2006, 227). The system allows for an easy dispute resolution via traffic injury boards and for a high degree of victim satisfaction (Strömbäck 2000, 89). The lack of reference to liability within the no-fault compensation scheme also helps to reduce legal uncertainties, which would be preferred by various parties.[8] On the one hand, for backend parties (e.g. digital designers and service providers) whose liability in the era of AI remains undecided yet, the introduction of a no-fault compensation mechanism can make them endeavour to place innovative technologies on the market without serious delay (Colonna, 2012). On the other hand, for insurers, they will seemingly not suffer from the uncertain liability landscape, which may lead them to predict the risk and calculate the premium more precisely. In addition, compared with liability insurance, using direct insurance to cover the damages related to AVs is favoured by insurers, since they may rely on relatively visible and objective variables (e.g. the annual mileage and the annual amount of produced AVs) to differentiate the risk and determine the premium.

Direct insurance traditionally exists to deal with damages relating to occupational health and environment (Faure, Hartlief, 2003, 150–151). Now it has been observed in recent legal reform with respect to AVs. For example, in the UK, the new Automated

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[8] See further on the advantages of a direct insurance model, Faure 2002.

and Electric Vehicles Act (2018) has made it clear that where an accident is caused by an automated vehicle, the insurer shall be liable for the damage suffered by an insured person or any other person as a result of the accident.[9] In this regard, the fault of drivers or other hurdles adhered to the identification of liability plays no role in the course of compensation (Atkinson, 2020, 148–149). More remarkably, in the UK model, the injured driver will in principle be no different than any other victim in the light of obtaining compensation.

Developing direct insurance as well as other no-fault compensation schemes, however, would raise other concerns. For instance, the damage covered by the no-fault compensation scheme may be limited to personal injury or death, which excludes property damage (Schellekens, 2015). In addition, it remains controversial when it come to the issue such who should provide the coverage (state fund, private insurance company or AVs producer) under the no-fault compensation scheme and in which manner (voluntary or mandatory participation)(Schroll, 2015; Pearl, 2018). 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.

6. Other issues beyond the insurance framework

The discussion so far has echoed two important issues: how AVs are challenging the liability insurance system for car accidents, and what policymakers can do to adapt the incumbent insurance framework to introduce a new direct insurance scheme. When addressing these questions, we may have a perception that the performance of the liability insurance framework also relies on other systems, which are at the crossroad in the era of AI as well. In this section, we would like to point at specific issues, which fall outside the liability insurance mechanism but deserve a further elucidation by policymakers.

First, liability matters. A comprehensible interaction between liability and insurance is that if a risk-averse party will take some liability, they may have a motive to purchase liability insurance in advance. Therefore, the potential of bearing liability is the prerequisite of obtaining liability insurance. In the context of AVs, the scope of the potentially liable parties can fall beyond the conventionally recognised frontend drivers/owners and traditional manufacturers. Additional parties who design and develop the intelligent system in digital format and various essential backend service providers can also have substantial impact on the safety of Avs (Wendehorst, 2020). The extent to which these parties are subject to which kind of liability is a heated topic that has already raised a lot of discussion. The result of such a debate will have an impact on liability insurance, since any legal uncertainty will be part of cost that would ultimately be shifted to insurers (Geistfeld, 2011). An immediate observation is that when insurers are preparing to offer liability insurance to these parties, considering the opacity of AI decision-making, concrete measures shall be developed by or provided to insurers for a precise prediction of the risk.

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[9] Part I, Section 2. Available at: https://www.legislation.gov.uk/ukpga/2018/18/contents/enacted,15.1.2022.

Second, protection by design matters. This means that we may endeavour to intentionally pre-design the AI system in a way to protect consumers, secure ethical values and facilitate investigation when an accident occurs (Etzioni, Etzioni, 2017; Firlej, Taeihagh, 2021). AI is a double-edged sword in the light of risk-shifting. On the one hand, as just mentioned, it generates a mass of uncertainties for insurers when calculating the premium, which may give rise to an uninsurability problem. On the other hand, in the long run as multiple sensors have been installed and abundant data is recorded amid driving, insurers have the potential to learn the cause of risks and improve their prediction models (Eling, Nuessle, Staubli, 2021). In the era of AVs, the AI system should thereby be designed in a manner to gather and record the relevant data. It is noteworthy that institutions will serve as a channel to bridge insurers and data controllers. In that respect it is especially important that regulation clarifies that AI systems must keep a recording system for sake of tracing risks and more importantly, these rules should secure data protection and avoid any other unethical behaviour (e.g. discrimination).

Third, standardisation matters. In the age of digitalisation, while regulation and liability rules have significant influence on the behaviour of stakeholders by setting up a framework of safety requirements and apportioning risks, many minor but equally important works are complemented by soft laws. Standardisation bodies usually incorporate experts in specific fields, and they can deliver some nuanced rules in a fast and flexible manner. For example, as mentioned, SAE has taken much work in categorising different AVs. Such work has great implications when we are studying the control exercised by a party, which would crystalise the apportion of liability among multiple parties.

7. Conclusion

That machines are becoming intelligent will make the legal framework hysteretic. In this article, we discuss how AVs can disrupt the traditional mandatory liability insurance for vehicles.

Our analysis shows that, depending upon the domestic regulation, victims could be confronted with unsurmountable hurdles to get compensation when they are involved in an accident with an AV at high level of automation (i.e. Level 3-5). This is especially the case, when the accident occurs in the Member States that exclusively adopt fault-based rules for drivers. Although there is literature advocating strict liability for drivers of AVs, a counterargument from our analysis is that it may overly deter drivers, who actually exercise a decreasing control of the AVs. In addition, our analysis indicates that, while obliging drivers to purchase liability insurance might be less preferable in the context of AVs, a paradigm shift requiring manufacturers to obtain liability insurance will set up extra institutional obstacles as well for a smooth procedure of being compensated. Beyond the liability insurance mechanism, this article indicates the potential of a no-fault compensation scheme, considering its reliance on damage rather than liability to trigger compensation. However, the implementation of such a no-fault compensation scheme, based on a direct insurance for the benefit of victims

still requires many additional steps specifying for example the conditions of coverage as well as other crucial features.

We further point out that a liability insurance regime is dependent upon many other instruments. A crystal-clear liability regime, advancing safety control by design as well as international cooperation on standardisation will promote a clear vision of the future insurance legal framework.

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