European Integration Studies, Volume 14, Number 1 (2018), pp. 47–57.

TOWARDS A EUROPEAN REGULATION OF AUTONOMOUS VEHICLES — EU PERSPECTIVES AND THE GERMAN MODEL*

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1. Introductory thoughts

Until recent years, it seemed so futuristic that the time would come when no drivers would be needed and cars would drive themselves. Today, the existence of so-called self-driving cars (in other words, autonomous or automated cars) and their participation in road transport is reality, and that raises countless legal and ethical questions. Nowadays, more and more essays and publications analyse the regulatory issues and various aspects of self-driving cars in a comprehensive manner.[1] In order to create a regulation on self-driving cars, the mapping of the legal questions raised by the appearance of these vehicles is essential. Among these questions, liability issues relating to self-driving cars are undoubtedly the most important questions, but other legal aspects shall also be examined. The use of intellectual properties (e.g. software) in the course of the operation of self-driving cars raises questions in the field of copyright law. Furthermore, the installation of so-called 'black box' into self-driving cars, specifically the data recording possibilities of this equipment and the prescription of the data retention duty in order to allow for the reconstruction of an incidental accident caused by the self-driving car, raises further questions. These issues fall within the field of data protection law.

The above-mentioned legal issues are regulated by the various national legislators in different ways. Nevertheless, it is a common feature of these legal regulations that they are always behind the technical reality since the process and rhythm of creating an appropriate legal background is incapable of competing with the

* This research was supported by the project nr. EFOP-3.6.2-16-2017-00007, titled Aspects on the development of intelligent, sustainable and inclusive society: social, technological, innovation networks in employment and digital economy. The project has been supported by the European Union, co-financed by the European Social Fund and the budget of Hungary.

1 See: HILGENDORF, Eric–HÖTITZSCH, Sven–LUTZ, Lennart: *Rechtliche Aspekte automatisierter Fahrzeuge*. Nomos, Baden-Baden, 2015; LOHMANN, Melinda Florina: *Automatisierte Fahrzeuge im Lichte des Schweizer Zulassungs- und Haftungsrechts*. Nomos, Baden-Baden, 2016; MAURER, Markus–GERDES, J. Christian–LENZ, Barbara–WINNER, Hermann (eds.): *Autonomes Fahren Technische, rechtliche und gesellschaftliche Aspekte*. Springer, 2015; OPPERMANN, Bernd–STENDER-VORWACH, Jutta (eds.): *Autonomes Fahren. Rechtsfolgen, Rechtsprobleme, technische Grundlagen*. C. H. Becks, München, 2017.

explosive technological progress that has taken place in the automotive industry in the last few years.

On a world scale, the United States leads the way in regulating self-driving cars. This prominent role has both technological and legal reasons.[2] Nevertheless, in the last few years, the USA has had to face several rivals in the development of self-driving vehicle technology. In the Far East, namely in China and Japan, a large amount of money is spent on motor vehicle improvement; the creation of the appropriate legal environment is coming forth in the near future. Though technological developments also take place in Europe, the future regulation of self-driving vehicles shall be examined from several viewpoints and levels in this region.

On the next few pages, the main tendencies of current and future European regulation are reviewed. It is important to mention that in the legal practise of European states there is a lack of legal provisions specifically concerning the legal issues of self-driving cars. Nevertheless, from a legislative point of view, Germany can be regarded as a pioneer at the European level because it was the first state on the continent to adjust the legal environment to technological developments. Therefore, the German regulation amended in 2017 will be examined in detail, since the German legislature created not only a framework for the participation of self-driving cars on the road but also attempted to resolve liability issues in connection with possible damage caused by such vehicles with the amendment of the existing German Federal Road Traffic Act. Nevertheless, the recent regulatory tendencies of other countries will be reviewed as well.

2. European tendencies in the regulation of self-driving cars

As it was mentioned above, the future European regulation of self-driving vehicles shall be examined from several viewpoints and levels. This is caused by the fact that distances in Europe are relatively small, i.e. travelling is necessarily coupled with the crossing of borders. Therefore, the appearance of self-driving motor vehicles on European roads brings up the demand for relatively unified, or at least harmonised, legal regulation. It would be the best solution if technical and legal questions related to self-driving vehicles would be regulated not at the national (or Member State) level but at the supranational level. However, a future regulation to be adopted by the European Union would cover the European continent only in part. Thus, the creation of such a legal framework would not be a satisfactory solution since the crossing of the external borders of the EU with a self-driving car raises further questions that can be arranged only by means of bilateral agreements.

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[2] About the US regulation see: BEIKER, Sven: History and Status of Automated Driving in the United States. In: MEYER, Gereon–BEIKER, Sven (eds.): *Road Vehicle Automation*. Springer, Cham, 2014, pp. 61–70; SMITH, Bryant Walker: Automated Vehicles Are Probably Legal in the United States. *Texas A&M Law Review*, 1/2014, pp. 411–521; PEARL, Tracy Hresko: Fast & Furious: The Misregulation of Driverless Cars. *Annual Survey of American Law*, 1/2017, pp. 19–72; JUHÁSZ, Ágnes: The Regulatory Frames and Models of Self-Driving Cars. *Zbornik Radova: Pravni Fakultet u Novom Sadu*, 3/2018 (forthcoming).

Since transport policy forms part of the common policies of the European Union, the designation of the main directions of regulation of the various sectors (e.g. road transport, railway transport, aerial transport and navigation) falls within the competence of the EU. Therefore, the minimum rules on self-driving cars will presumably be worked out at the EU level. However, road transport is regulated at the national level by all Member States, in line with the previously mentioned international road traffic conventions.[3]

In the middle of the 2000s, a European Technology Platform (ETP) was set up with the recognition and support of the European Commission. As main tasks, the *European Road Transport Research Advisory Council* (hereinafter referred to as ERTRAC) cooperates with the actors of the road transport sector to create a common approach and to shape the image of the future of European road transport. At the same time, it drafts the possible strategies and the main directions of research and development in the field of road transport.[4] National road transport strategies are worked out along these lines.

However, during the last few years, the Commission has expressed that it intends to create an intelligent transport system that is in step with technological developments and utilises recent achievements in the field of the motor vehicles as an industry having strategic importance. Moreover, the system to be worked out within the European Union should comply with the various aims (e.g. sustainability) of the EU.[5] Towards the realisation of this goal, the Commission launched several projects (e.g. HAVEit, Interactive, AdaptIVe, i-GAME, AutoNOMOS, etc.), which concern the development and testing of self-driving vehicles.[6]

In October 2015, the Commission set up the *High Level Group on the Competitiveness and Sustainable Growth of the Automotive Industry in the European Union* (hereinafter referred to as *GEAR 2030*), consisting of 25 members who are experts from different sectors. Moreover, certain members of the Commission, certain Member States' ministers of economy, industry or transport, representatives of consumers, trade unions, environmental protection and road safety organisations (e.g. the European Association of Automotive Suppliers, the European Federation for Transport and Environment, the European Consumer Organisation, etc.) and observers of other organisations (e.g. the European Investment Bank, the Commit-

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3 In Hungary, Act No. I. of 1988 contains provisions on road transport.

4 About the tasks and activities of the ERTRAC, see the organisation's homepage (www.ertrac.org).

5 See White Paper — Roadmap to a Single European Transport Area — Towards a competitive and resource efficient transport system, COM(2011) 144 final, Brussels, 28. 03. 2011; CARS 2020: Action Plan for a competitive and sustainable automotive industry in Europe, COM(2012) 636 final, Brussels, 08. 11. 2012. About the white paper see IVÁN Gábor: Közlekedési politika. In: KENDE Tamás (szerk.): *Bevezetés az Európai Unió politikáiba.* Wolters Kluwer, Budapest, 2015, pp. 657–660.

6 See MEYER, Gereon–DEIX, Stefan: Research and Innovation for Automated Driving in Germany and Europe. In: MEYER, Gereon–BEIKER, Sven (eds.): *Road Vehicle Automation*. Springer, Cham, 2014, pp. 71–81 and pp. 73–74.

tee of the Regions, the European Economic and Social Committee) also participated in the work of GEAR 2030.

In 2016, GEAR 2030 prepared a discussion paper for the Commission *(Roadmap on Highly Automated Vehicles)*[7], in which the working group defined the need for the revision and amendment of the legal and political framework of highly automated motor vehicles. According to GEAR 2030's paper, the abovementioned need is especially strong in the field of traffic rules, while provisions on the acquisition of driving license, road conformance, road signs, liability and insurance, as well as cyber security and data protection, shall also be revised or amended. As GEAR 2030 formulated, the final goal is the creation of a common legal foundation that is based on the international standards laid down by the UNECE and harmonised to the highest degree. In autumn 2017, GEAR 2030 published its final report[8], in which it made recommendations for the Commission and the Member States relating to the future direction of the regulation of automated and connected motor vehicles.

In May 2018, considering the recommendations of the report by GEAR 2030, the Commission published a communication[9], in which it envisaged the comprehensive revision of vehicle safety regulations[10] and the adoption of further legislative acts regarding the questions of self-driving cars. Furthermore, EU provisions on driving licenses[11] should also be amended in the near future due to the appearance of self-driving vehicles in open road traffic. Nevertheless, the direction of these amendments is uncertain at present since it has not been decided yet if the operation of these vehicles, provided that possession of special knowledge is needed, requires a new kind of driving license or not.

It is also important to note that both national legislators and the legislative bodies of the EU should take into consideration the amended and newly inserted provisions of the Vienna Convention[12] in the course of the adoption of their regulations on self-driving vehicles.

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7 https://circabc.europa.eu/sd/a/a68ddba0-996e-4795-b207-8da58b4ca83e/Discussion%20Paper%C2%A0-%20Roadmap%20on%20 Highly%20Automated%20Vehicles%2008-01-2016.pdf, (Date of download: 6th April 2018).

8 https://ec.europa.eu/growth/content/high-level-group-gear-2030-report-on-automotive-competitive ness-and-sustainability_en, (Date of download: 18th June 2018).

9 Communication from the Commission — On the road to automated mobility: An EU strategy for mobility of the future, COM(2018) 283 final, Brussels, 17. 05. 2018.

10 Regulation (EC) No. 661/2009 of the European Parliament and of the Council of 13 July 2009 concerning type-approval requirements for the general safety of motor vehicles, their trailers and systems, components and separate technical units intended therefore, OJ L 200, 31. 7. 2009, pp. 1–24.

11 Directive 2006/126/EC of the European Parliament and of the Council of 20 December 2006 on driving licences, OJ L 403, 30. 12. 2006, pp. 18–60.

12 The Convention on Road Traffic was signed in Vienna, on 8th November 1968. Although the Vienna Convention was regarded as a modern document at the time of its adoption, the jump in technological evolution in parallel with the appearance of new tendencies in the field of motor vehicle improvements make it clear that the revision of the Vienna Convention is indispensable since road traffic regulation, in the lack of an appropriate amendment, could not adapt itself to the regulation demands caused by technological evolution. With awareness of these factors, the Vi-

It is obvious that the revision of the EU regulations on road traffic is necessary because of the appearance and the future use of self-driving cars. Beyond this need, the potential directions of the revision became even more concrete in the last few years, therefore it should be taken into account that various legal regulations will be adopted in the EU, even if there has not been any explicit legal initiative up to now. EU legislation has its own time.

3. Legalisation of testing and operating self-driving cars on European roads

While the creation of a single EU regulation on self-driving cars will be a long, gradual and very slow process, several political declarations have been published at the national level in which the introduction of self-driving vehicles and the adoption of the regulatory framework have been scheduled. The activity of national legislators is also due to the pressure from leading motor vehicle producers since the existence of a clear, safe and predictable legal environment is particularly important to them. These manufacturers expect for good reason to see how and under which conditions the testing and the open-road use of automated vehicles or vehicles equipped with driving assistance technologies will occur.

Nowadays, there are more states that are interested in the introduction of self-driving vehicles, and that manifests this intention at the political level. However, there are also some states where the adoption of the related provisions or the modification of previously existing regulations is in process or has already occurred. For the present, the application of the latter solution, i.e. the amendment of the existing rules, is more common since the testing of self-driving vehicles (limited to a certain section of road and only in possession of a special permit) typically requires the appropriate amendment to road traffic rules.

In the *Netherlands*, for instance, road traffic rules were amended; since summer 2015, the wide open-road testing of self-driving vehicles (both cars and buses) is possible in possession of a permit from the competent authority.

In April 2016, a new legislative proposal was submitted, which suggested that the Swedish Transport Agency should be responsible for authorising permits to carry out trials at all levels of automation on *Swedish* roads. From 2017, the above mentioned authority is competent for authorizing permits and supervising trials in accordance with the law. The party that has been granted such permission is legally responsible for the operation of autonomous cars and for the damages caused by such vehicles operating in autonomous mode. However, in those cases, when vehicles operate at lower levels of automation, drivers will bear criminal and civil law liabilities. It is also important to mention that the Swedish government started a project in collaboration with the Volvo. The project titled *'Drive me — self-driving cars for sustainable mobility'* aims at testing highly autonomous vehicles on a larger scale with citizens.

enna Convention was amended in March 2016 on the initiative of several European countries, including Germany. As a result of this amendment, the previously mentioned Article 8 of the Vienna Convention was also completed with a further paragraph (5bis). At the same time, Article 39 of the convention was also amended.

In 2017, *Estonia* also has taken a step to introduce autonomous vehicles to the public, since it allowed the test driving of autonomous cars on the streets and roads of the country. However, the car must have a driver who sit within the vehicle and is able to take control of the car any time needed.

In *Hungary*, some steps have also been taken recently towards the future introduction of self-driving cars. In 2017, amendments to two ministerial decrees (Ministerial Decree KöHÉM No. 5/1990 of 12 April 1990 on the technical inspection of road vehicles and Ministerial Decree KöHÉM No. 6/1990 of 12 April 1990 on the technical conditions for placing and keeping road vehicles in circulation) were adopted[13] in relation to the testing of *vehicles for experimental purposes.* Thereafter the open-road testing of these vehicles became legal in Hungary.

It should be noted that Hungarian regulations use neither the expression 'self-driving vehicle' nor the term 'automated vehicle'. As an alternative, Hungarian legislators introduced a broader expression. An 'autonomous vehicle for experimental purposes' is such a vehicle for experimental purposes that (a) is aimed at the development of partially or fully automated operation and (b) has a qualified test driver who, depending on the level of automatisation of the vehicle, can exercise manual control when it is needed in cases that jeopardise traffic safety.[14]

Annex 18 of Decree No. 6/1990 contains the classing of the above-mentioned vehicles in line with internationally defined and recognised taxonomy.[15] Annex 17 of the same decree contains the detailed operational and technical conditions relating to autonomous vehicles with the aim of development.[16]

Although several European countries has already taken steps towards the introduction of self-driving cars, regarding the regulation of such vehicles at the European level, Germany is clearly a pioneer. The German legislation has already established the legal framework in which the participation of self-driving cars on the road is possible, despite the fact that until now there has been no adopted legislation at the EU level. Since the adopted legislation in Germany is unique at the European level and can be an example for other national and EU legislators, the main provisions will be described in more detail below.

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13 Ministerial Decree NFM 11/2017 of 12 April 2017 amending the Ministerial Decree KöHÉM No. 5/1990 of 12 April 1990 on the technical inspection of road vehicles and Ministerial Decree KöHÉM No. 6/1990 of 12 April 1990 on the technical conditions for placing and keeping road vehicles in circulation in relation to the testing of vehicles for experimental purposes.

14 See Decree No. 5/1990, Article §2 (3b), point b).

15 In 2014, the Society of Automotive Engineers (SAE) International published a standard by which the definition of autonomous motor vehicles and the five levels of automatisation were determined. See *Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles*, https://www.sae.org/standards/content/j3016_201806/.

16 Annex 17 of the Decree No. 6/1990 contains provisions on the expected status of the autonomous vehicle for experimental purposes and prescribes the requirement of prior notification of testing in autonomous mode to the Minister of Transport. It also prescribes that the vehicle developer shall provide a data recorder in autonomous vehicles with the aim of development that can record the digital signals from the movement of the vehicle and can reconstruct events in the case of a road accident. The Annex settles the requirements of the switching system between manual control and automatic control.

4. The German model of the regulation of self-driving cars

In the last few years, the demand for national regulation of self-driving vehicles has been growing even stronger in Germany in parallel with the great leap forward in the technology of automated and self-driving motor vehicles. The leading German motor vehicle producers (e.g. Mercedes [Daimler], BMW, Audi, Volkswagen, etc.) presented their innovative solutions and the prototypes of self-driving cars, as well as the testing on the open road and the use in road traffic of such vehicles that have been built to serve future generations, required for clear and precisely defined frames. In recent times, the attention of lawyers also turned toward the direction of self-driving vehicles and problems generated by their appearance. They tried to draft a solution for all of those questions that arose due to the appearance of self-driving vehicles and to the lack of their appropriate regulation.[17]

In November 2015, the Federal Government of Germany published a strategy[18] which defined the need for the modification of road traffic regulations in order to make the use of self-driving cars on the road possible. Afterwards, the government proposed a draft[19] to the Bundestag, according to which the German Road Traffic Act (*Straßenverkehrsgesetz,* hereinafter referred to as *StVG*) was amended in 2017.[20] With the adoption of this amendment, the German legislature paved the way for the safe introduction of vehicles equipped with automated functions to the open road traffic.

The new Article §1a of the StVG contains the basic provisions on automated motor vehicles, distinguishing between motor vehicles with highly or fully automated driving functions. As a starting point, Article §1a establishes that the operation of a motor vehicle with highly or fully automated driving function is permissible provided *the function is used for its intended purpose*. In addition, the referenced article of the StVG defines the conceptual framework of the above-mentioned motor vehicles. In the application of the StVG, those motor vehicles shall be deemed as motor vehicles with highly or fully automated driving functions, which are equipped with technical equipment that is able to perform, after activation, driving tasks in compliance with traffic laws. The definition set by the act also specifies that the automated system can be manually overridden or deac-

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17 FRANKE, Ulrich: Rechtsprobleme beim automatisierten Fahren — ein Überblick. *Deutsches Autorecht*, 2/2016, pp. 61–66; JÄNICH, Michael Volker–SCHRADER, Paul–RECK, Vivien: Rechtsprobleme des autonomen Fahrens. *Neue Zeitschrift fuer Verkehrsrecht*, 7/2015, pp. 313–318.

18 See *Strategie automatisiertes und vernetztes Fahren*, https://www.bmvi.de/SharedDocs/DE/ Publikationen/DG/broschuere-strategie-automatisiertes-vernetztes-fahren.html (Date of download: 17th June 2018), p. 17.

19 About the draft of the amendment of the StVG, see in detail BERNDT, Stephan: Der Gesetzentwurf zur änderung des Strassenverkehrsgesetzes. Ein Überblick. *Strassenverkehrsrecht*, 4/2017, pp. 121–127.

20 About the new provisions of the StVG, see HILGENDORF, Eric: Auf dem Weg zu einer Regulierung des automatisierten Fahrens: Anmerkungen zur jüngsten Reform des StVG. *Kriminalpolitische Zeitschrift*, 4/2017, pp. 225–228 and KÖNIG, Carsten: Die gesetzlichen Neuregelungen zum automatisierten Fahren. *Neue Zeitschrift für Verkehrsrecht*, 3/2017, pp. 124–128.

tivated by the driver at any time. It is laid down as a further requirement that the necessity of manual vehicle control can be recognised by the driver, who is to be alerted visually, acoustically, tactilely or otherwise perceivably by the automated system. In case of alert, the automated system shall ensure enough time for the driver to take control over the motor vehicle.[21]

It is also important to note that the definition of motor vehicles with highly or fully automated driving functions diverge from the notion used by the US state regulations. The definition of the StVG is more complex since it requires not only the existence of automated driving function and the possibility of taking over control of the car but also the fulfilment of other conditions. Moreover, the StVG determines who shall be deemed a driver. According to Article §1a (4), a driver can be anyone who activates a highly or fully automated driving function and uses such a function for vehicle control, even if he does not control the vehicle manually by himself during the time of the intended use of the automated function. Due to the application of a fiction, the notion of driver also covers those persons who actually do not exercise control over the motor vehicle. This is the reason why the general road traffic requirements for drivers shall be applied to the driver of motor vehicles with highly or fully automated driving functions.[22]

The amended text of the StVG also defines the basic rules for the relationship existing between the driver and the highly or fully automated motor vehicle. These provisions determine those rights and duties (responsibilities) that can be exercised or shall be fulfilled by the driver during the use of the motor vehicle in automated mode. Nevertheless, these rights and duties have an additional aspect since they, because of the normative extension of the notion of driver, complement those rights and duties which are generally prescribed for drivers of traditional motor vehicles.

Article §1b (1) of the StVG provides for the driver to divert his attention from the road traffic occurrences and vehicle control when the vehicle is controlled by means of highly or fully automated driving functions. However, the driver shall remain alert at any time to fulfil his duty prescribed by law, i.e. to take over control of the car.

According to the paragraph (2) of Article §1b, the driver is obliged to take control of the motor vehicle without delay if he is expressly asked to by the automated system or he himself recognises or on the basis of obvious circumstances should recognise that the prerequisites for the intended use of automated driving functions no longer exist.[23]

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21 StVG, Art. 1a (2).

22 HILGENDORF, p. 226.

23 The above-mentioned paragraph of the StVG was strongly criticised by specialists. See WAGNER, Bernd–GOEBLE, Thilo: Freie Fahrt für das Auto der Zukunft? Kritische Analyse des Gesetzentwurfs zum hoch- und vollautomatisierten Fahren. *Zeitschrift für Datenschutz*, 6/2017, p. 265; SCHIRMER, Jan-Erik: Augen auf beim automatisierten Fahren! Die StVG-Novelle ist ein Montagsstück. *Neue Zeitschrift für Verkehrsrecht*, 6/2017, p. 255.

Beyond the general rules of motor vehicles with highly or fully automated driving functions, the StVG also contains special provisions regarding data management (§63a). These rules have been strongly criticised in the literature.[24]

During the use of highly or fully automated driving functions, some data is stored by means of the satellite navigation system. Among others, motor vehicles store information on the exact time and place (i.e. coordinates) when a change of vehicle control between the (human) driver and the highly or fully automated system takes place. Moreover, the system records the time when the driver is asked to take over or take back control of the vehicle, or when a technical failure or malfunction occurs. According to Article §63a (4), the owner of the vehicle shall delete the data stored after six months. Nevertheless, in certain cases (e.g. in case of a traffic accident), this data can be transmitted to the authorities. In those cases, the owner of the vehicle is obliged to delete the data stored (and transmitted) after three years.

Though the German legislature amended several provisions of the StVG regarding motor vehicles with highly or fully automated driving functions, the modification did not concern issues of liability. The liability of the driver is essentially based on Article §823 of the German Civil Code (BGB) and §18 of the StVG. However, beyond such general delictual (fault-based) liability, the rule of strict liability can also be applied as it is prescribed by Article §7 of the StVG. The application of strict liability in the case of damage caused by a motor vehicle is widespread in European liability systems. Nevertheless, the use of motor vehicles with highly or fully automated driving functions raises the question of whether the application of such a form of liability shall be rethought. As *Hilgendorf* noted in his already mentioned work, the German legislature should have redefined the existing liability structure with regard to highly or fully automated motor vehicles. Since such modification was not adopted, the keeper of a highly or fully automated vehicle is still liable for the damage caused by his vehicle under strict liability rules according to the related provisions of the StVG. However, while the driver can be exonerated from liability if the automated driving function was used and the damage was caused by the malfunction of the automated driving system, this exoneration cannot be applied to the keeper. Hilgendorf also added that other legal acts like the German Product Liability Act[25] and the related provisions of the German Criminal Code[26] have not been amended.[27] Accordingly, in the case of a defect of a product, the producer or the operator of the technological system can be liable for the damage. Such liability is also based on fault. In his recent work, *König* agrees

[24] SCHMIED, Alexander–WESSELS, Ferdinand: Event Data Recording für das hoch- und vollautomatisierte Kfz. Eine kritische Betrachtung der neuen Regelungen im StVG. *Neue Zeitschrift fuer Verkehrsrecht*, 8/2017, pp. 357–364.

[25] *Gesetz über die Haftung für fehlerhafte Produkte (ProdHaftG).*

[26] *Strafgesetzbuch (StGB)*, Art. 222 and Art. 229.

[27] HILGENDORF, p. 227.

with the opinion of Hilgendorf and emphasizes that rules about the liability of the keeper, driver and producer should have been created.[28]

As it was mentioned, the amendments and the newly inserted provisions of the StVG have been strongly criticised by both theoreticians and practitioners. At the same time, it should be noted that the introduction of the new provisions has an experimental nature, as it is shown by Article §1c of the StVG. According to this Article, after 2019, the competent ministry (i.e. the Federal Ministry of Transport and Digital Infrastructure)[29] is obliged to revise the application of the amended provisions of the StVG and evaluate the application on the grounds of economic considerations. Afterwards, the ministry is obliged to report the results to the Bundestag.

Nonetheless, it should also be noted that the amended provisions of the StVG, aimed at creating the legal framework for the use of self-driving cars in open road traffic, are unique and exemplary in Europe. Therefore, these new German regulations can serve as a model for other European states in the course of working out their own national regulations on self-driving cars.[30]

5. Closing remarks

The automatisation of motor vehicles is a long development process. In the course of such a process, modern technologies like lane-keeping assistance, blind spot detection systems, adaptive cruise control (ACC), autonomous emergency braking system (AEB) or collision avoidance systems have been the first steps. However, these assistance systems were superseded by new science and technology, and such systems that are able to take over full operation (control) of the vehicle for shorter or longer periods have been tested.

With regard to the distribution of driving tasks between the (human) driver and the assistance system, vehicles can be ranked into levels on the basis of the measure of their automatisation. The first level encompasses those motor vehicles that are fully and exclusively controlled by a human driver, i.e. operating tasks like steering, braking, accelerating or slowing down and so forth are performed by the driver. Contrary to this, those vehicles that are at the highest level of automatisation *("fully automated vehicles")* are able to drive themselves, i.e. these vehicles do not require human attention (and human presence) since the autonomous vehicle system controls all critical tasks, such as the monitoring of the environment and identification of unique driving conditions like traffic jams, and is capable of allowing safe participation in public road traffic. Although the development of self-driving vehicles is quite fast, their appearance on public roads is only predicted to

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[28] KÖNIG, Cartsten: Gesetzgeber ebnet den Weg fuer automatisiertes Fahren — weitgehend gelungen. *Neue Zeitschrift für Verkehrsrecht*, 6/2017, p. 251.

[29] *Bundesministerium für Verkehr unf digitale Infrastruktur, BMVI.*

[30] By way of example, the German provisions are examined by *Konrad Lachmayer* in respect to their practicability for the creation of future Austrian regulation on self-driving cars. See LACHMAYER, Konrad: Von Testfahrten zum regulären Einsatz automatisierter Fahrzeuge. *Zeitschrift für Verkehrsrecht*, 12a/2017 (Sonderheft), p. 519.

happen in the 2020s or 2030s at the earliest; currently the testing of highly automated vehicle prototypes on public roads is in progress.

At present, national legislators are expected to create regulations on self-driving cars. The law should keep abreast of technological development, even if it is obvious that the legal environment cannot change as fast as the improvement of automated vehicles and other modern technologies. Not only the producers of motor vehicles but also the members of society as a whole need a safe and predictable legal background that designates the legal parameters of automatised systems and defines the ethical and legal requirements to be fulfilled.

Resolving liability questions is indisputably a cornerstone of the regulation to be created in the future.[31] There is a basic need for designating the borders of the liability of the (vehicle) keeper and driver, the producer of the vehicle or the built-in automated driving system and the operator of the technological system. Furthermore, defining the relationship among these liability forms is also essential. The clear designation and delimitation of civil (law) liability cases is undoubtedly the most urgent task. Nevertheless, questions also emerge in other fields of liability (e.g. criminal law and administrative law) to be answered in the near future.[32]

The existence of self-driving cars is not futurity but reality, therefore the creation of the appropriate regulatory environment is necessary, both at the national and supranational level. National legislators should start from already existing (e.g. German, American) regulation and, learning from their noticed deficiencies, should aim to create such a legal framework that satisfies the needs that arise and arranges more broadly the questions relating to the use of self-driving vehicles in open road traffic.

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[31] DE BRUYNE, Jan–TANGHE, Jochen: Liability for damage caused by autonomous vehicles: a Belgian perspective. *Journal of European Tort Law*, 3/2017, pp. 324–371; GOMILLE, Christian: Herstellerhaftung für automatisierte Fahrzeuge. *Juristen Zeitung*, 2/2016, pp. 76–82; HARNONCOURT, Maximilian: Haftungsrechtliche Aspekte des autonomen Fahrens. *Zeitschrift für Verkehrsrecht*, 12a/2016, pp. 546–552; SCHRADER, Paul: Haftungsfragen für Schäden beim Einsatz automatisierter Fahrzeuge im Straßenverkehr. *Deutsches Autorecht*, 5/2016, pp. 242–246; TEMPL, Heinz: Über die Haftungsfrage von selbsttätig am Straßenverkehr teilnehmenden KFZ. *Zeitschrift für Verkehrsrecht*, 1/2016, pp. 10–14; JUHÁSZ, Ágnes–PUSZTAHELYI Réka: Legal Questions on the Appearance of Self-Driving Cars in the Road Traffic with Special Regard on the Civil Law Liability. *European Integration Studies*, 1/2016, pp. 10–28; LIIVAK, Taivo–LAHE, Janno: Delictual Liability for Damage Caused by Fully Autonomous Vehicles: The Estonian Perspective. *Masaryk University Journal of Law and Technology*, 1/2018, pp. 49–73

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