



## **Autonomous Driving - Overview of the Current Legal Framework**

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### Abstract:

The topic of driving a car has typically focused on a person driving. The driver of a vehicle was and – to a large extent still is – required to possess the power to control all of the car’s functions. Recent technological and legal developments in the field of autonomous driving, however, demonstrate that the driver-centered principle in road traffic is beginning to lose relevance and in the future may become the exception or eventually disappear entirely. About the author: Dr. Hannah Dittmers studied law in Freiburg, Germany and Fribourg, Switzerland with a focus on private international law and European law. She obtained her LL.M. from the University of Michigan Law School in 2017 and her Ph.D. (Dr. jur.) from the University of Freiburg in 2019. She is currently a legal trainee (Rechtsreferendarin) at the Regional Court Freiburg.

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## Autonomous Driving

Overview of the Current Legal Framework

Hannah Dittmers



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Autonomous Driving

Overview of the Current Legal Framework

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## A. Introduction: A dynamic and radiating topic

### I. General

The topic of driving a car has typically focused on a *person* driving. The driver of a vehicle was and – to a large extent still is – required to possess the power to control all of the car’s functions. Recent technological and legal developments in the field of autonomous driving, however, demonstrate that the driver-centered principle in road traffic is beginning to lose relevance and in the future may become the exception or eventually disappear entirely<sup>1</sup>. Cars with automated driving functions currently offered on the market may still require the driver’s attention at any time<sup>2</sup>. However, some commentators have predicted that, in the future, the emphasis in driving will shift more and more towards mere observation of a car’s movements by the human “driver” rather than on the active steering<sup>3</sup>. As such, autonomous driving is an issue of considerable future significance<sup>4</sup>. Furthermore, the topic has a wide range of implications for different disciplines. Economic interests, for example, will inevitably play an important role in the development and use of autonomous vehicles. However, these issues are also particularly relevant from the point of view of law and ethics.

Two of the principal motivations for the development of self-driving systems are security and convenience<sup>5</sup>. With regard to the former, the development of autonomous driving devices aims to realize the “Vision Zero” that is characterized by a reduction of traffic injuries and deaths as well as lesser traffic accidents<sup>6</sup>. The European Commission, for example, has discussed the “use of modern technology to increase road safety” in a communication paper from 2010<sup>7</sup>. On the other hand, from the standpoint of convenience, advances in autonomous driving aim to reduce traffic jams and enhance the ability to react to demographic change<sup>8</sup>.

There are several obstacles that will need to be addressed as autonomous driving technologies progress. The fact that autonomous driving is such a quickly developing technology will further complicate these obstacles, making progress especially difficult. Specifically, the fast-developing nature of these technologies could make it difficult to establish legal certainty. The legal questions that arise may be challenging as they concern important legal goods and require differentiating analyses of potential conflicts of interest. Even a preliminary discourse seems to be in need of adopting an interdisciplinary perspective in

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1 Cf. on the history of autonomous vehicles *Brodsky*, Berkeley Technology Law Journal 2016, 851, 853 ff.

2 *Wollers*, Recht Automobil Wirtschaft (RAW) 2017, 2.

3 *Jänich/Schrader/Reck*, Neue Zeitschrift für Verkehrsrecht (NZV) 2015, 313.

4 *Crane/Logue/Pilz*, A Survey of Legal Issues Arising From the Deployment of Autonomous and Connected Vehicles, Michigan Telecommunications and Technology Law Review, Vol. 23 Issue 2 (2017), 191, 193.

5 Cf. *Brodsky*, Berkeley Technology Law Journal 2016, 851, 852; *König*, NVZ 2017, 249; *Lari/Douma/Onyiah*, Minnesota Journal of Law, Science & Technology 2015, 735, 750; *Lutz*, Neue Juristische Wochenschrift (NJW) 2015, 119; cf. also the data on traffic accidents in Germany referred to by *Stender-Vorwachs/Steeger*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 253 f.

6 *Jänich/Schrader/Reck*, NZV 2015, 313; *König*, NZV 2017, 123; *Scheurs/Steuer*, in: *Maurer/Gerdes/Lenz/Wimmer* (eds.), *Autonomes Fahren* (2015), *Autonomous Driving – Political, Legal, Social, and Sustainability Dimensions*, 151, 157; cf. the European Commission’s reference to expert opinions, according to which about 95 % of road accidents involve some level of human error, COM (2016) 787 final, p. 4.

7 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM (2010) 389 final, p. 9.

8 *Jänich/Schrader/Reck*, NZV 2015, 313.

light of the multiple actors and disparate interests that are involved.<sup>9</sup> In addition, the current legal landscape of automated and autonomous driving gives a rather scattered impression. It includes sub-national, national, supranational and international rules whose interplay needs to be considered when dealing with automated or autonomous cars from any perspective<sup>10</sup>. Although many different legal areas are concerned as well, areas such as Public Regulatory Law can have decisive (and possibly unifying) influences on civil law or criminal law.<sup>11</sup>

The practical field poses equally daunting challenges. Principally, the infrastructure of a country must be made suitable for the use of autonomous cars. Problems also emerge with regard to interactions between autonomously driving cars and those primarily driven by persons, which, at least for a period of transition, would need to coexist. The international character of the issue adds an additional layer of complexity as manufacturers of self-driving cars (and, indeed, their consumers) act globally<sup>12</sup>.

The progress made in research and development of autonomous cars reveals ever-new legal issues. Lawmakers on the international, the supranational European and the national level have adopted first steps in order to ensure that the development of autonomous driving is accompanied by a parallel development in the legal area. The existing rules have thus far proven to be useful. The Vienna Convention on Road Traffic of 1968 is a principal source of international law making when it comes to the (automated) driving of vehicles. In Germany, the legal framework for the regulation of road traffic has been modified as recently as 2017. A prominent example for a complex legal and ethical question in the realm of autonomous driving poses itself in the so-called dilemma situation. In this case, the question of balancing two legal goods of equal weight comes into discussion.

This article aims to give an overview over the current legal framework relevant for autonomous driving and takes a closer look at the ethical implications that accompany that framework. First, the article will examine the international sphere for rules applicable to the topic (B). The article will then summarize relevant supranational European law (C) as well as German national law (D). The article also intends to identify the legal challenges of the topic and discusses the primary solutions offered as well as some of the gaps that can be currently identified. Finally, the ethical implications of autonomous driving will be outlined especially with regard to the German Ethics Commission's work on automated driving (E).

## II. Terminology

The definition of autonomous driving poses problems<sup>13</sup>. Even if a common ground has evolved regarding the levels of automation that can occur in a vehicle, a clear and uniform terminology seems to be lacking as of yet. To help organize these discussions, commentators have used a scale composed of five distinct levels of automation<sup>14</sup>. In level 1, certain systems embedded in the vehicle assist a human driver when using specific functions of the car. Level 2 concerns a partial automation where routine actions (i.e. parking) are carried out by the vehicle's internal systems. In level 3, the act of driving is highly automated and the human driver is not required to supervise the system constantly. Level 4 concerns a full automa-

9 Cf. insofar the composition of the German Ethics Commission on Automated Driving, below V.

10 On the situation in the United States concerning regulatory fragmentation between different states *Brodsky*, Berkeley Technology Law Journal 2016, 851, 873 ff.; *Geistfeld*, California Law Review 2017, 1611, 1675.

11 *Wolfers*, at a presentation held at the University of Freiburg, Germany on 29 November 2018.

12 *Wolfers*, RAW 2017, 2, 3.

13 Cf. *Wolfers*, RAW 2017, 2, 3 who gives an overview over the different – German – terms used.

14 Cf. regarding the following definitions *v. Kaler/Wieser*, NVwZ 2018, 369.

tion of the vehicle in which the system can order the driver to take over if necessary. Level 5, by contrast, represents full automation with no human input. In this article, the term “autonomous driving” will be used to refer to fully automated driving by a vehicle without the assistance of a human driver, turning the driver into a mere passenger in the vehicle. In contrast, “automated driving” will be used referring to a vehicle that has automatic functions but which requires a human driver to overlook its operation or relies on a person to take over the steering.

## B. International Law

Current regulation of automated and autonomous driving in the international sphere can be divided into a regulatory and a behavior-related set of rules<sup>15</sup>. On the regulatory side, there are the rules made by a working party under the umbrella of the United Nations Economic Commission for Europe (UN/ECE). Concerning the regulation of behavior in road traffic, the Vienna Convention on Road Traffic of 3 November 1968 is the central instrument.

### I. UNECE-Regulations

The Economic Commission for Europe (ECE) is responsible for setting standards in the area of road traffic<sup>16</sup>. The leading groups in developing standards are the specialized Group 1 (Working Party on Road Safety) and the Group 29 (Working Party on the Harmonisation of Vehicle Regulation)<sup>17</sup>. The groups’ work is based on the so called “1958 Agreement” (formerly: Agreement concerning the adoption of uniform technical prescriptions for wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions (E/ECE/TRANS/505/Rev.2, amended on 16 October 1995)). There are 61 countries that are party to the Agreement. The European Union is also a party. In the following, the various ECE rules that are particularly relevant for autonomous and automated driving will be analyzed as to the extent of their coverage.

#### 1. UNECE Regulation No. 13-H (Brakes)

Regulation 13-H<sup>18</sup> refers to the requirements for the admissibility of brakes. Its paragraph 2.20. gives a definition of automatically commanded braking. The definition includes the possibility of slowing or stopping a vehicle “with or without a direct action of the driver, resulting from the automatic evaluation of on-board initiated information”. This rule therefore does not pose obstacles to the introduction of autonomous or automated driving systems<sup>19</sup>. Similarly, paragraph 2.21. of the Regulation addresses “selective breaking” and refers to systems where the “actuation of individual brakes is made by automatic means”. Paragraph 2.25.5 refers to an assistance of the driver “in maintaining control of the vehicle” through algorithms concerning the functioning of the propulsion torque. These provisions demonstrate an openness to the introduction of automatic functions in cars with regard to brakes.

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15 Wolfers, RAW 2017, 2, 4.

16 von Ungern-Sternberg, in: Oppermann/Stender-Vorwachs (eds.), *Autonomes Fahren*, 293, 296.

17 von Ungern-Sternberg, in: Oppermann/Stender-Vorwachs (eds.), *Autonomes Fahren*, 293, 308.

18 Regulation No 13-H of the Economic Commission for Europe of the United Nations (UN/ECE) – Uniform provisions concerning the approval of passenger cars with regard to braking.

19 Wolfers, RAW 2017, 2, 5.

## 2. UNECE Regulation No. 79 (Steering Equipment)

### a. General

The UNECE Regulation No. 79<sup>20</sup> aims to establish uniform provisions for the layout and performance of steering systems fitted to vehicles used on the road<sup>21</sup>. In its introductory section, the Regulation takes the advancements of technology into account. It acknowledges that “it will now be possible to have steering systems in which there is not any positive mechanical connection between the steering control and the road wheels”<sup>22</sup>. The Regulation further carries out a distinction between systems in which the driver remains in primary control of the vehicle, such as “Advanced Driver Assistance Steering Systems” and “Corrective Steering Functions” on the one hand, and systems that incorporate functions by which the steering can be controlled by external signals on the other (called “Autonomous Steering Systems”). In the case of Advanced Driver Assistance Steering Systems, the driver can override the assistance function at all times. Advanced Driver Assistance Steering Systems are permissible under the Regulation. The Regulation does not, however, allow Autonomous Steering Systems, which do not require the presence of a driver<sup>23</sup>.

### b. The Rules in No. 2.2.3, 2.2.4. and 5.1.6. of the Regulation

In No. 2.3.3. and 2.3.4. the Regulation defines “Autonomous Steering Systems” and “Advanced Driver Assistance Steering Systems”. The former type of system according to No. 1.2.2. does not fall under the Regulation’s scope of application. “Autonomous Steering Systems” are defined by the Regulation as follows (No. 2.3.3.):

*“Autonomous Steering System’ means a system that incorporates a function within a complex electronic control system that causes the vehicle to follow a defined path or to alter its path in response to signals initiated and transmitted from off-board the vehicle. The driver will not necessarily be in primary control of the vehicle.”*

This definition of the area not covered by the set of rules reflects the traditional principle in driving: A human driver must remain the primary actor when it comes to controlling the steering wheel. However, the wording of this definition does not extend to many designs for highly, or even fully, automated vehicles which receive signals from cameras and laser scanners located *within* the vehicle<sup>24</sup>. What nevertheless excludes the autonomously driving vehicles from the Regulation’s scope of application is the fact that the automated steering function must terminate if the vehicle reaches a specific speed (12 kilometers per hour, cf. No. 5.1.6.1.)<sup>25</sup>. The latter system (“Advanced Driver Assistance Steering Systems”), which is included by the Regulation’s scope of application, is defined as follows (2.3.4.):

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20 Regulation No 79 of the Economic Commission for Europe of the United Nations (UN/ECE) – Uniform provisions concerning the approval of vehicles with regard to steering equipment.

21 Regulation’s Introduction.

22 Regulation’s Introduction.

23 Regulation’s Introduction; cf. *Lutz/Tang/Lienkamp*, NZV 2013, 57, 59.

24 *Wolfers*, RAW 2017, 2, 6.

25 *von Ungern-Sternberg*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 292, 299; *Wolfers*, RAW 2017, 2, 6.

“Advanced Driver Assistance Steering System’ means a system, additional to the main steering system, that provides assistance to the driver in steering the vehicle but in which the driver remains at all times in primary control of the vehicle. (...)”

These Advanced Driver Assistance Steering Systems are characterized by the fact that they have an “automatically commanded steering function” (2.3.4.1.) and/or a “corrective steering function” (2.3.4.2.). “Corrective steering” also extends to features that do not “positively actuate the steering system”. In both these cases, the actuation of the steering system occurs due to an “automatic evaluation of signals on-board the vehicle”. The driver’s readiness to take over the relevant function seems to be the assumed background for the use of these features. In fact, the rules declare assistance and warning of the driver as the aim of such devices (2.3.4.1. and 2.3.4.2.).

The norm of 5.1.6. pertaining to construction provisions is relevant as well. In sentence two it is stated that advanced driver assistance steering systems “shall be designed such that the driver may, at any time and by deliberate action, override the function”. This norm also confirms the principle that the driver is the primary actor controlling the driving process.

### c. The Revision of the Regulation No. 79

A revision of the Regulation No. 79<sup>26</sup> is currently being discussed with regard to the speed limit of 12 kilometers per hour in No. 5.1.6.1. of the Regulation. It is planned to either increase the limit or to abolish it entirely. Moreover, systems will be required to recognize the presence of a person and he or she will be required to take over the steering within four seconds after the system orders them to do so<sup>27</sup>.

## II. The Vienna Convention on Road Traffic (1968)

The Vienna Convention of 8 November 1968 shapes the international law landscape in the field of autonomous and automated driving when it comes to norms governing the behavior of participants in road traffic. According to the prevailing opinion, however, the Convention’s requirements are to be taken into account when it comes to the *admission* of vehicles into public traffic as well<sup>28</sup>.

The treaty was concluded to unify the rules applying to road traffic in order to enhance safety on roads and to facilitate traffic<sup>29</sup>. It requires the 50 parties to the treaty (including the European Union) to adopt certain rules pertaining to the regulation of traffic and the authorization of vehicles as well as to recognize national drivers’ licenses. It is noteworthy that some states that play a vital role in the development of autonomous and automated driving techniques are not party to the Convention, such as China and the United States<sup>30</sup>.

26 Cf. the UNECE press release: <https://www.unece.org/info/media/presscurrent-press-h/transport/2016/unece-paves-the-way-for-automated-driving-by-updating-un-international-convention/doc.html>.

27 Wolfers, RAW 2017, 2, 6.

28 von Ungern-Sternberg, in: Oppermann/Stender-Vorwachs (eds.), *Autonomes Fahren*, 293, 301; Wolfers, RAW 2017, 2, 9.

29 Bewersdorf, NZV 2003, 266, 267.

30 A fairly recent article in the newspaper *The Economist* (“AI, EU, go”) calls China and the United States even “[t]he two superpowers of artificial intelligence”, September 22nd – 28th 2018 edition (Europe), p.12.

Until 23 March 2016, the treaty stipulated that legislation adopted by a party had to require a human driver to be able to control the vehicle constantly<sup>31</sup>. The norms relevant to this article can be found mainly in Articles 8 and 13 of the Convention. Pursuant to Article 8 para. 1 of the Convention, every vehicle must have a driver who – according to para. 5 of this rule – is able to control his or her vehicle at all times. Confirming this driver-centered principle, Article 13 para. 1 states that “every driver of a vehicle shall in all circumstances have his vehicle under control so as to be able [...] to be at all times in a position to perform all manoeuvres required of him”. Some think that the “Operator” in a remote-controlled car falls under the term “driver” in Article 8 of the Vienna Convention<sup>32</sup>. Others said that Articles 5 and 8 of the Vienna Convention solely regulate the behavior of the person driving and do not apply to the question of how to design assisted driving systems<sup>33</sup>. However, as the German government has stated that the admission of autonomous vehicles to German roads would require a modification of the Vienna Convention, the question loses much of its practical relevance<sup>34</sup>.

A revision of Article 8 led to the implementation of Article 8 para. 5bis that came into force in March 2016<sup>35</sup>. This alteration enhanced legal certainty. According to the new rule, the use of automated vehicles is in accordance with Article 8 para. 5 and Article 13 para. 1 of the Convention as long as the cars comply with the UNECE-Regulations<sup>36</sup> or if their mechanism can be overridden or deactivated by the driver. The first possibility aims at introducing a unanimous standard for the assessment of behavior-related rules and those concerning the admission of vehicles<sup>37</sup>. The second alternative seems to introduce a rather low standard for the introduction of autonomous vehicles. Some consider it a political compromise that with regard to practical matters is of smaller relevance than the first alternative<sup>38</sup>.

The modification in Article 5 of the Convention had the effect of linking the development of autonomous driving to the current state of the UNECE Regulations, thereby ensuring openness for technical novelties<sup>39</sup>. The dynamic referral to the UNECE Regulations thus also corresponds with the dynamic nature of autonomous driving. The modification in Article 5 has therefore introduced the possibility of highly automated driving, provided that there still is a driver within the sense of Article 8 of the Vienna Convention<sup>40</sup>. This means that the behavior-related side of international rules allows the use of admitted automated driving systems<sup>41</sup>.

The procedure for (further) modifications on the Regulation is laid down in Article 49 of the Vienna Convention. According to this rule, states can propose alterations to the Convention that can come into effect, for example, when the other member states do not object within a period of twelve months (Arti-

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31 *Ilková/Ilka*, „Legal Aspects of Autonomous Vehicles – an Overview“, Proceedings of the 2017 21st International Conference on Process Control (PC), Pleso, Slovakia, June 6–9, pp. 428–433, III B (<http://publications.lib.chalmers.se/publication/249781>).

32 *Lutz/Lienkamp*, NZV 2013, 57, 58.

33 *Bewersdorf*, NZV 2003, 266, 271.

34 *v. Kaler/Wieser*, NVwZ 2018, 369, 372.

35 *Wolfers*, RAW 2017, 2, 9.

36 Cf. above II 1.

37 *Wolfers*, RAW 2017, 2, 10.

38 *Wolfers*, RAW 2017, 2, 10.

39 *von Ungern-Sternberg*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 293, 308.

40 *von Ungern-Sternberg*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 293, 308.

41 *Wolfers*, RAW 2017, 2, 10.

cle 49 para. 2 of the Vienna Convention). The modification of Article 8 of the Convention has been effected through this procedure as well.

## C. European Law

### I. The Framework Directive

The European Union with the Member States has a shared competence to legislate in the field of road traffic<sup>42</sup>. The norms governing the area can be found in the Articles 90 ff. of the Treaty on the Functioning of the European Union (TFEU). The most important set of rules regarding road traffic is laid down in the Directive 2007/46/EC that aims to establish a framework for the approval of motor vehicles and other related units (“Framework Directive”)<sup>43</sup>. It is based on the above mentioned competence concerning road traffic and is particularly relevant for the authorization procedure, the sale and the operation of new cars.

According to German law, a car may only be used in public space if it accords with an authorized model, § 3 of the German Regulation on the Admission of Vehicles (*Fahrzeug-Zulassungsverordnung*, FZV). The EU-authorization pursuant to Article 20 of the Framework Directive is the most important mechanism for authorization thus far. The Framework Directive in turn refers to the UNECE Regulations with regard to the admission of a vehicle or the procedure of accepting an authorization as equivalent<sup>44</sup>. A change in the UNECE Regulations would thus have an effect on the admissibility of cars in the European Member States. Should the UNECE regulations allow autonomous driving and should these changes be adopted by the EU, the Member States would be obliged to modify or delete contradicting law, Article 35 para. 2 of the Framework Directive<sup>45</sup>. The Directive moreover states that the European Union has to make concrete suggestions for modifications should a UNECE-Regulation be considered to be revised (Article 21 para. 1, 29 para. 3)<sup>46</sup>.

This demonstrates that the UNECE-Regulations are, practically, the guiding force when it comes to the admission of cars to public traffic in the EU Member States. The standards laid down in these Regulations, however, do not have directly binding legal force in the European Union, but must be incorporated into the Framework Directive<sup>47</sup>.

Another notable provision is Article 20 of the Framework Directive (“Exemptions for new technologies or new concepts”). The norm allows admitting certain technologies that are incompatible with a regulatory act in Part I of Annex IV of the Regulation. In order to be granted such an approval, the manufacturer must apply to a Member State and the Commission must grant an authorization as well. The provision furthermore allows the Member State to issue a provisional approval that is valid only in its territory for the time the Commission’s decision is pending (Article 20 para. 2). It is also interesting that

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42 Streinz/Schäfer, EUV/AEUV, Article 90 para 1.

43 Directive 2007/46/EC of the European Parliament and of the Council of 5 September 2007 establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles (Framework Directive).

44 von Ungern-Sternberg, in: Oppermann/Stender-Vorwachs (eds.), *Autonomes Fahren*, 293, 300.

45 Lutz, *Neue Juristische Wochenschrift* (NJW) 2015, 119, 125.

46 Cf. von Ungern-Sternberg, in: Oppermann/Stender-Vorwachs (eds.), *Autonomes Fahren*, 293, 300.

47 von Ungern-Sternberg, in: Oppermann/Stender-Vorwachs (eds.), *Autonomes Fahren*, 293, 300 f.

other Member States can accept such a provisional approval on their territory (Article 20 para. 3). Article 20 of the Framework Directive therefore demonstrates an openness to technological changes and – through the possibility of granting a provisional approval – accommodates for the needs of the often quick character of technological development. As long as the Regulation No. 79 on Steering Equipment has not been modified, states can use Article 20 of the Framework Direction in order to obtain provisional approval for highly or fully automated driving systems<sup>48</sup>.

## II. The General Data Protection Regulation (GDPR)

On 25 May 2018, the European General Data Protection Regulation (GDPR)<sup>49</sup> came into force. It is a Regulation within the meaning of Article 288 para. 2 TFEU and therefore directly applicable in the Member States of the European Union. In Germany, the GDPR almost entirely supersedes the German Law on Data Protection (*Bundesdatenschutzgesetz*, BDSG) which used to regulate data use and protection in Germany as one of the main legal instruments. The GDPR's objective is to unify the rules on the protection of personal data in the European Union with regard to private corporations and public authorities. Though the GDPR does not contain regulations specifically tailored to automated or autonomous vehicles<sup>50</sup>, its rules nonetheless extend to the topic. The data that are collected by a car can be linked to the owner or even the driver if they are connected with different data that identify the car<sup>51</sup>. Therefore, the data are relatable to a person and thus are governed by data protection laws<sup>52</sup>. The person responsible for data in the context of automated and autonomous driving is the manufacturer who generally determines how and to what end data are being collected<sup>53</sup>. Inevitably, manufacturers are not the only actors which have an interest in the data generated by the car, as the data can, for example, also be useful in entertainment, provision of services, insurance and advertising<sup>54</sup>.

Article 25 para. 1 of the GDPR states that the controller must implement appropriate measures such as pseudonymization and integrate necessary safeguards in order to protect the rights of the data subject. This rule reflects the necessity that adequate protection of privacy nowadays requires that even at the early stages of programming and technical setup, data protection must be considered<sup>55</sup>. This necessarily plays a role in the process of developing autonomous systems. The developers of automated or autonomous driving systems must ensure that the interests of affected persons are being given attention even in the stadium of development<sup>56</sup>.

Another rule that is relevant in the context of autonomous systems is Article 25 para. 2 of the GDPR, stating that the controller must ensure that only data necessary for each specific purpose of the processing are processed. The norm furthermore stresses the aspect of the individual controlling the acces-

48 *Wolffers*, RAW 2017, 2, 6.

49 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

50 *Forgó*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 157, 168.

51 *Wendt*, ZD-Aktuell 2018, 06034, II.

52 *Forgó*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 157, 160; cf. in greater detail *Weichert*, NZV 2017, 507 ff.

53 *Wendt*, ZD-Aktuell 2018, 06034, II.

54 *Weichert*, NZV 2017, 507 f.

55 *Paal/Pauly/Martini*, DS-GVO, BDSG, Art 25 para. 10.

56 *Forgó*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 157, 169.

sibility of their data. The autonomous vehicle therefore cannot simply collect data without an examination of the proportionality of the process<sup>57</sup>. This accords with the principle of data economy, according to which data generated must serve a particular purpose<sup>58</sup>.

Another interesting norm in this context is Article 40 GDPR. This rule sets out the importance of codes of conduct that contribute to the concretization of the Regulation's rules<sup>59</sup>. These rules of conduct constitute a measure of self-regulation that can also serve to fill gaps in the Regulation and increase legal certainty<sup>60</sup>. "Best practice" guides drafted by the automobile industry, for example, therefore can gain relevance for the Regulation's application with regard to autonomous and automated driving systems.

## D. German Law

### I. Constitutional Law Implications

The German Basic Law (*Grundgesetz*, GG) does not explicitly refer to terms such as "technology". The *Grundgesetz*, however, is deemed open for progress in technology: The technical development and research fall within the scope of application of Article 5 para. 3 GG that states the freedom of research<sup>61</sup>. The use of autonomous vehicles by the individual falls in the scope of application of Article 2 para. 1 GG that protects the general freedom to act<sup>62</sup>.

With regard to implications on constitutional questions, it is being discussed whether permitting autonomous driving concerns the state's responsibility to protect<sup>63</sup>. The *Grundgesetz* acknowledges the state's responsibility to offer protection to people in particular areas that are covered by the fundamental rights laid down in the *Grundgesetz*. This particular function of the fundamental rights can be derived from their objective dimension<sup>64</sup>.

It is considered, for example, whether the state's responsibility to protect is being affected with regard to Article 1 para. 1 GG<sup>65</sup>. The norm establishes the protection of human dignity. The fact that, in the case of autonomous driving, humans essentially hand over their wellbeing to a machine, so the thought goes, may trigger the state's duty to intervene between private actors<sup>66</sup>. Some explicitly reject this consideration, arguing that the principle of human dignity is designed for violations of more intense impact, serving as a last resort to protect the core of what is human<sup>67</sup>. It is moreover reasoned that the person

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57 Cf. also *Forgó*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 157, 169.

58 Paal/Pauly/Martiny, DS-GVO, BDSG, Art 25 para 12; *Stender-Vorwachs/Steeger*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 253, 281.

59 *Forgó*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 157, 170.

60 Paal/Pauly/Paal, DS-GVO, BDSG, Art 40 para. 3.

61 *Hilgendorf*, in: *idem/Hötitzsch/Lutz* (eds.), *Rechtliche Aspekte automatisierter Fahrzeuge* (2015), 15, 17 f.; *Stender-Vorwachs/Steeger*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 253, 257.

62 *Hilgendorf*, in: *idem/Hötitzsch/Lutz* (eds.), *Rechtliche Aspekte automatisierter Fahrzeuge* (2015), 15, 18.

63 *Stender-Vorwachs*, Die grundrechtlichen Aspekte Autonomen Fahrens, *Informatik Aktuell*, 20.3.2018 (<https://www.informatik-aktuell.de/management-und-recht/it-recht/die-grundrechtlichen-aspekte-autonomen-fahrens.html>).

64 *Hilgendorf*, in: *id./Hötitzsch/Lutz* (eds.), *Rechtliche Aspekte automatisierter Fahrzeuge* (2015), 15, 18.

65 *Stender-Vorwachs/Steeger*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 253, 258.

66 *Stender-Vorwachs*, Die grundrechtlichen Aspekte Autonomen Fahrens, *Informatik Aktuell*, 20.3.2018 (fn. 62)

67 *Hilgendorf*, in: *id./Hötitzsch/Lutz* (eds.), *Rechtliche Aspekte automatisierter Fahrzeuge* (2015), 15, 21.

using an autonomous car in that case makes a conscious choice and thereby also uses a possibility of digital developments in society that the constitution cannot evade<sup>68</sup>. Human dignity comes into play with regard to dilemma situations as well. In dilemma situations, norms that order a balancing of lives by the autonomous driving system would have to be considered unconstitutional<sup>69</sup>.

The fundamental rights of the *Grundgesetz* in some areas affect citizens' rights to participation. If the government engages in building and development of autonomous driving systems in order to help disabled or elderly people to take part in society's mobility, for example, there could evolve a right to participate pursuant to Article 3 para. 1 GG<sup>70</sup>. This right could be claimed by individuals and would be directed at inducing the government to take action. Another question is whether the legislator could obligate manufacturers to only build autonomous cars and citizens to only use those, should it be determined that autonomous vehicles significantly enhance security<sup>71</sup>. Such developments are to be considered problematic with regard to the fundamental rights of Article 12 GG (Freedom of choosing and exercising a profession) and Article 11 GG (Freedom to mobility), among others<sup>72</sup>. Limiting these and other fundamental laws would require that the legal obligation pursues a legitimate goal, is suitable to reach that goal, necessary and in itself proportional<sup>73</sup>.

Finally, fundamental rights also come into play with regard to data protection. The right to self-determination in the realm of information technology, which is derived from Article 2 para. 1 GG in connection with Article 1 para. 1 GG, requires that vehicle occupants have to maintain the control over their data<sup>74</sup>. A similar aspect is regulated by Article 10 para. 1 GG, which protects the distance communication through immaterial signals. The rule covers the submission of traffic data such as time and place of the connection, the means of communication used, the duration of the communication as well as the numbers or email addresses of the persons affected<sup>75</sup>. But also third persons' fundamental rights to data protection can be concerned. Cameras in autonomous vehicles constantly film their environment. This can raise problems in terms of personality rights of other traffic participants<sup>76</sup>. In the European Union, the General Data Protection Regulation is one of the main sets of rules that cover the relevant questions on a data protection in a detailed manner<sup>77</sup>.

## II. Modifications in the German Law on Road Traffic (StVG)

### 1. Introduction

In general, the German Law on Road Traffic (*Straßenverkehrsgesetz*, StVG) regulates traffic signs and the behavior of drivers in road traffic. It was recently modified to adjust to technological advancements in

68 *Stender-Vorwachs/Steeger*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 253, 259.

69 *Stender-Vorwachs*, *Die grundrechtlichen Aspekte Autonomen Fahrens*, *Informatik Aktuell*, 20.3.2018; *id./Steeger*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 253, 264 f.

70 *Stender-Vorwachs*, *Die grundrechtlichen Aspekte Autonomen Fahrens*, *Informatik Aktuell*, 20.3.2018; *id./Steeger*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 253, 261.

71 *Stender-Vorwachs/Steeger*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 253, 266 ff.

72 *Stender-Vorwachs/Steeger*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 253, 268 f.

73 Assuming that the formal requirements of constitutionality are met as well.

74 *Stender-Vorwachs*, *Die grundrechtlichen Aspekte Autonomen Fahrens*, *Informatik Aktuell*, 20.3.2018 (fn. 62).

75 *Stender-Vorwachs/Steeger*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 253, 282.

76 *Stender-Vorwachs/Steeger*, in: *Oppermann/Stender-Vorwachs* (eds.), *Autonomes Fahren*, 253, 286.

77 Cf. above.

the field of autonomous driving. The modifications, effective from 30 March 2017, have clarified that automated driving functions are permissible in the sense that drivers may temporarily turn away from traffic and driving (§ 1b StVG). This means that the driver may remove his or her hands from the steering wheel<sup>78</sup>. The alterations concern three main areas: registration of vehicles, driver liability and data storage<sup>79</sup>. German lawmakers did not lose much time in implementing the new rules. The German government declared the issue as particularly urgent and, pursuant to Article 76 para. 2 sentence 4 GG, did not have to wait for the statement of the German Federal Council (*Bundesrat*) in order to proceed with the implementation<sup>80</sup>. The opinion later issued by the *Bundesrat* criticized several aspects of the draft produced by the German Parliament (*Bundestag*), but ultimately, albeit reluctantly, gave effect to its final version<sup>81</sup>.

## 2. The rule in § 1a StVG

In order for a driver to be allowed to turn their attention away from driving (§ 1b StVG), one has to take into consideration the new rule of § 1a StVG. By allowing “vehicles with high or full automation” and listing several technical requirements, it defines the type of system that triggers the effect of § 1b StVG allowing the driver to carry out other actions while the car is moving<sup>82</sup>. However, this rule only concerns automated driving for a certain span of time that also can be overridden or deactivated by the driver at any time<sup>83</sup>.

It is also important to note that the use of highly or fully automated functions is only admissible if used in accordance with their purpose, § 1a para. 1 StVG. The admissible use depends on the level of automation and the field of implementation<sup>84</sup>. To this end, the requirements produced by the manufacturer play a central role. The official considerations given for the new rule stress the importance of the manufacturer’s instructions in order to ensure the vehicle’s use in accordance with its purpose<sup>85</sup>. The manufacturer has to clarify the prerequisites and limits of the automated system, whereas drivers are required to inform themselves of these limits and keep them in mind when driving<sup>86</sup>.

## 3. The rule in § 63a StVG

Another interesting new rule is § 63a StVG. This norm requires every vehicle with autonomous driving functions to have a data-recording device – similar to a “black box” as used in airplanes. The rule intends to prevent the driver from generally referring to the automated system as a whole when an accident occurs, which would effectively lead to the driver’s blanket exemption from liability<sup>87</sup>.

The device saves information on the vehicle’s position and time in three cases: First, given a change in the steering from the device to the human driver or vice versa; secondly, if the driver is being ordered by

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78 Cf. *Wolfers*, RAW 2017, 86.

79 *Schirmer*, NVZ 2017, 253, 254.

80 *König*, NVZ 2017, 249; *Schirmer*, NVZ 2017, 253, 254.

81 *König*, NVZ 2017, 249.

82 Cf. *Wolfers*, RAW 2017, 86, 87.

83 *Schirmer*, NVZ 2017, 253, 254.

84 Justification of the StVG ÄndEntw, BR-Drs. 69/17, 13.

85 Justification of the StVG ÄndEntw, BR-Drs. 69/17, 14.

86 *Wolfers*, RAW 2017, 86, 88.

87 v. *Kaler/Wieser*, NVwZ 2018, 369, 371.

the system to take over control and thirdly, in case a technical problem occurs, § 63a para. 1 StVG. The data collected may be submitted to public authorities in the federal states. The owner of the vehicle is required to submit the data collected by the device to third parties if necessary for the assessment of liability in case of traffic accidents<sup>88</sup>. The rule furthermore opens the possibility of eliminating parts of the liability accusation in favor of the driver<sup>89</sup>.

#### 4. Summary

The analysis demonstrates that autonomous driving including a driver who gives up the entire control over the vehicle is not covered by the (modified) norms in the StVG. The statute nevertheless hints to autonomous systems when it determines in § 6 para. 1 No. 14a StVG that driverless parking systems may be allowed by ordinance as long as the use occurs in a private space and stays within the realm of a low speed. With regard to level 3 systems, it is difficult to draw the line between the driver's and the car's responsibility in a way that is not only comprehensible, but suitable for practical needs<sup>90</sup>.

### E. Ethical Dimension: The German Ethics Commission on Autonomous Driving

The Federal Ministry for Traffic and Digital Infrastructure in Germany has appointed a commission with the task of assessing the ethical dimension of autonomous driving and to formulate a set of guidelines to ensure the ethical treatment of drivers when developing and using autonomous driving technologies. The Commission's members are experts in disciplines such as philosophy, law, social sciences, technology, consumer protection, automobile industry and software development<sup>91</sup>. There were five different working groups addressing different areas of the overall topic: "Inevitable damage situations", "Data availability, security and economy", "Requirements of interaction between humans and machines", "Ethical considerations beyond road traffic" as well as "Scope of responsibility for software and infrastructure".

The Ethics Commission came together on 30 September 2016 under the chairman Udo Di Fabio, a former judge at the German Federal Constitutional Court. The independent Commission met on five occasions and produced 20 ethical rules touching various aspects of automated and autonomous driving systems. The work included a test drive with automated vehicles of different manufacturers and interrogation of external experts on questions such as the government's goals and activities in the field of autonomous driving, ethical aspects (especially dilemma situations), data protection and IT-security.

It is noteworthy that the Commission considers the introduction of autonomous driving systems as potentially necessary from an ethical standpoint if such systems would potentially minimize damages (Rule No. 6). As a general principle, the Commission's Report stressed the importance of using autonomous driving technologies in order to make traffic safer and enhance mobility (Rule No. 1). Moreover, the protection of people was declared the primary objective, superseding considerations on utility (Rule No. 2).

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88 Cf. *König*, NVZ 2017, 249, 252.

89 *Hoeren*, NVZ 2018, 153, 154.

90 *Wolfers*, at a presentation held at the University of Freiburg, Germany on 29 November 2018.

91 Cf. regarding the individual members Report Ethics Commission, p.8-9 ([https://www.bmvi.de/SharedDocs/DE/Publikationen/DG/bericht-der-ethik-kommission.pdf?\\_\\_blob=publicationFile](https://www.bmvi.de/SharedDocs/DE/Publikationen/DG/bericht-der-ethik-kommission.pdf?__blob=publicationFile)).

The so-called dilemma situation has had an important place in the ethical discussion related to autonomous driving. If the autonomous system in a vehicle has to solve every traffic situation on its own, there can occur intricate questions of responsibility. A vehicle that steers towards a group of people can find itself in the situation to make a decision as to which one of two legal goods of equal weight should be violated. As the Ethics Commission noted, such decisions must be made on a case by case basis<sup>92</sup>. As a general guideline, the Commission approached the conflict in Rule No. 7. There it is stated that the protection of human life is of the highest priority in the process of balancing legal goods. The report specifically declares inadmissible any differentiation on the basis of age, gender, or physical or mental constitution (Rule No. 9). An algorithm that aims to minimize the number of victims, however, is deemed potentially acceptable. This is stated under the requirement that the risk of every person involved is minimized to the same extent<sup>93</sup>. A possible scenario is considered to be that several persons are already immediately threatened to be injured; in this case it could be accepted that an algorithm intends to reduce the number of persons that would be harmed. However, there was no consensus among the members of the Commission concerning such an algorithm<sup>94</sup>.

According to the Commission, when programming autonomous systems, damage to animals and things are to be accepted if that means that damage to persons can be avoided. Moreover, Rule No. 5 states that such critical situations are to be prevented from evolving in the first place. Rule No. 8, however, explicitly pronounces that decisions regarding a balancing of one human life with another cannot be made by a rule as those decisions depend on the concrete situation and the behavior of the persons involved. The rule stresses that a legal judgment that assesses such concrete situations cannot easily be translated into an abstract and general ex-ante-consideration. Similarly, it is being stated in scientific literature that the legislator could, for example, not allow a software that states a one-sided weighing of goods and prefers the saving of certain lives over others<sup>95</sup>.

The Commission's report hints to an experience-based approach to the problem. With regard to the issue that legal judgments assessing specific circumstances cannot easily be transferred in abstract rules and algorithms, it is recommended to establish an independent public institution that is in charge of analyzing experiences with dilemma situations systematically (Rule No. 8)<sup>96</sup>. It does not become entirely clear if and how the Commission intends to utilize the data gained through that procedure with regard to avoiding or solving dilemma situations going forward. The data on the behavior of traffic participants could, for example, be used to develop an algorithm that comes close to a "human decision". However, it seems problematic to justify the use of an algorithm under the influence of the fact that other persons have reacted in a certain way when faced with a dilemma situation.

Regarding the dangers of autonomous driving systems, the Commission stressed that a possible complete interconnection of all vehicles in the context of digital infrastructure is concerning in view of ethical considerations on surveillance of traffic participants and manipulation of vehicles (Rule No. 13). The concern of data protection with regard to self-learning systems is being addressed as well; the condition

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92 Report Ethics Commission, p. 17.

93 Report Ethics Commission, p. 18.

94 Cf. the Commission's statement insofar, Report Ethics Commission, p. 18.

95 *v. Kaler/Wieser*, NVwZ 2018, 369, 373.

96 "It would therefore be desirable to process experiences systematically through an independent public institution (e.g. a Federal agency for investigations of automated traffic systems or for security in automated and interconnected traffic)", cf. Rule No. 8 (free translation by the author of this paper).

given for an establishment of such systems is the enhancement of safety (Rule No. 18). Moreover, the guidelines also assess the international dimension of autonomous driving vehicles. Rule No. 16 favors an international harmonization of procedures that concern the transmission from autonomous driving by the vehicle to manual driving by the person in the car. This is due to the international dimension of automated driving techniques that cause the need for a compatibility of documentation obligations.

## F. Summary and Outlook

The legislative analysis has demonstrated that important steps towards the inclusion of autonomous driving systems into the legal landscape are already underway. The UNECE Regulations play an important role in the application of the Vienna Convention of Road Traffic and the European Framework Directive. Both the European Directive and the Vienna Convention contain referrals to the UNECE Regulations, making them a guiding principle. The German Law on Road Traffic has adapted to changes in technology as well. As of yet, all legislative acts assume the availability of a driver to take over the steering of the car to some extent. Dilemma situations pose ethical problems that need to be discussed further.

There seems to be common ground that can be utilized in drafting further regulations or principles in order to ensure the safety of those affected by the automated and autonomous systems. It seems to be of specific importance that public international law takes the lead in the development of new rules, not least because the topic is strongly international in nature, with many relevant parties acting in various jurisdictions, or within infrastructure that spans jurisdictions. The currently existing norms on the international and European levels show an openness to technological change. Moreover, they address several levels of automation, e.g. in the case of the UNECE Regulations on brakes and steering equipment. The norms at the European level even offer the possibility of a provisional approval of new techniques under specific circumstances. Therefore, international and European rules show flexibility with regard to technological advances in the field of automated and autonomous driving.

With regard to dilemma situations, the decisions of responsibility so far have to be solved at the national level. It could be considered whether there is a need for developing universal (ethical) principles on the international level, as such delicate questions of responsibility in the context of dilemma situations are materially the same everywhere. These principles could then serve as a supplement to the rules on technical standards, where the need for a uniform treatment has already been expressed and partly been realized (e.g. in the European Union). However, depending on the form in which such principles are stated, the question of their effect on national (tort) law would have to be addressed. If there were international (ethical) guidelines on dilemma situations, they would have to be coordinated with and distinguished from (tort) principles and rules on responsibility in the respective countries. It is nonetheless desirable to work on a common solution also with regard to ethical principles in dilemma situations. The scientific literature could serve as starting point from which to launch an exchange between different approaches. It also seems desirable to include opinions from different disciplines, as was for example the case in the German Ethics Commission on automated driving.

Ultimately, it is difficult to predict how the legal landscape of autonomous driving will develop in the coming years. With regard to Article 8 para. 5bis of the Vienna Convention, there have already been

suggestions to introduce a distinction between different levels of automation<sup>97</sup>. Moreover, the UNECE Regulation No. 79 is being revised with the aim of extending the autonomous functions. Manufacturers and scientists seem to be optimistic that much development is possible within a short period of time. However, next to the possibilities of technology, dangers are present in people's minds as well. People suffering injury as seen during a test ride in Arizona or the crash of a car on autopilot in Florida are extreme examples of how things can go terribly wrong. As these technological possibilities progress, what humans can make of their power to create as well as what limits to autonomous driving systems our legal systems can create to foster ingenuity while preserving and protecting human life and dignity remains to be seen.

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97 *Ilková/Ilka*, „Legal Aspects of Autonomous Vehicles - an Overview“, Proceedings of the 2017 21st International Conference on Process Control (PC), Pleso, Slovakia, June 6-9, pp. 428-433, III B, fn. 7 (<http://publications.lib.chalmers.se/publication/249781>).

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