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# Automated driving and its challenges to international traffic law: which way to go?

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## ABSTRACT

As more and more automated vehicles are being tested on public roads, it becomes necessary to address the challenges that this technological development poses to law. One of those challenges is the central concept of *driver* in international traffic laws, notably the Geneva Convention on road traffic of 1949 and the Vienna Convention on road traffic of 1968, these Conventions forming the base of many national traffic laws. In this article, it will be argued that an automated vehicle does not have a *driver* within the meaning of the Conventions. Four different approaches on how to revise the Conventions will be discussed. A comparison of the approaches will bring out the (dis)advantages of each approach and will lead to the recommendation of one of the approaches.

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**KEYWORDS** Automated driving; traffic law; Geneva Convention; Vienna Convention; driver

## 1. Introduction

Slowly, but gradually, more and more automated vehicles are being tested on public roads. Given the progress made by several companies during the testing of their vehicles, it will only be a matter of time before these vehicles become available to the general public.<sup>1</sup> Until then, legislators face legal challenges, posed by the absence of a human driver behind the wheel. The dynamic driving task – the longitudinal and lateral vehicle motion control, the monitoring of the environment via the detection of objects and events and responding to those objects and events, the manoeuvre planning and the enhancing of conspicuity (signalling, gesturing, etc.)<sup>2</sup> – is performed by a human when

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<sup>1</sup>For instance, Google claims to have driven over 8 million miles with their test vehicles on public roads: [waymo.com/ontheroad/](http://waymo.com/ontheroad/) (accessed 15 August 2018).

<sup>2</sup>SAE International, J3016, June 2018, 6–7. See also: ECE Inland Transport Committee, Global Forum for Road Traffic Safety, seventy-fifth session, informal doc. No. 8, 'Automated Vehicles: Policy and Principles

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driving a conventional vehicle. In an automated vehicle, however, the dynamic driving task is performed by the self-driving system of that vehicle.<sup>3</sup>

This shift in performance of the dynamic driving task from the human driver to the self-driving system gives rise to legal questions regarding traffic laws. The Geneva Convention on road traffic of 1949 and the Vienna Convention on road traffic 1968, which lie at the base of many national traffic law, are built around the notion of *driver*: in the 35 articles of the Geneva Convention, the word *driver* is used 30 times, whereas in the Vienna Convention (56 articles) the word *driver* is used over 140 times (all excluding annexes). Both Conventions are of great global importance as their Contracting Parties need to base their national traffic laws on the Conventions (art. 3 Vienna Convention, art. 6 Geneva Convention), thereby leading to uniform traffic rules across borders. At the moment of writing, the Geneva Conventions has 97 Contracting States<sup>4</sup>, whereas the younger Vienna Convention has 77 Contracting Parties (several of which are also party to the Geneva Convention).<sup>5</sup>

The legal questions regarding traffic law discussed in this paper, are primarily questions of public law. The outcomes of these questions are, however, also important for tort law as the violation of a statutory rule, e.g. a traffic rule, can give rise to liability.<sup>6</sup> In regimes with a no-fault compensation scheme, as discussed recently in this journal<sup>7</sup>, this is of lesser importance. A no-fault compensation scheme would provide compensation without needing to find a liable person (or driver), proof of negligence and causality, making the question whether or not a statutory rule has been violated less relevant to obtain compensation.<sup>8</sup>

In this article, reference will be made to the SAE international which describes six levels of automation, ranging from level 0 (no driving automation) to level 5 (full driving automaton).<sup>9</sup> For present purposes, 'automated vehicle' means an SAE level 4 or an SAE level 5 vehicle.<sup>10</sup> These vehicles are able to drive themselves either for an entire trip (Level 5) or part of a trip (Level 4).<sup>11</sup>

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Discussion Document', submitted by Germany, Japan, Spain, the Netherlands and United Kingdom, 4 September 2017, 9–10; and, JA Michon, 'A Critical View Of Driver Behavior Models: What Do We Know, What Should We Do?' (1985), [jamichon.nl/jam\\_writings/1985\\_critical\\_view.pdf](http://jamichon.nl/jam_writings/1985_critical_view.pdf) (accessed 9 August 2018).

<sup>3</sup>The strategic functions involved in driving, such as the scheduling of the trip and determining a destination, are always performed by a human. SAE International, J3016 (n 2) 5–7, ECE Inland Transport Committee (n 2) 10.

<sup>4</sup><http://www.unece.org/trans/maps/un-transport-agreements-and-conventions-07.html> (accessed 28 June 2018).

<sup>5</sup><http://www.unece.org/trans/maps/un-transport-agreements-and-conventions-08.html> (accessed 28 June 2018).

<sup>6</sup>C van Dam, *European Tort Law* (Oxford University Press, 2013) 279ff, 408ff.

<sup>7</sup>M Schellekens, 'No-fault compensation schemes for self-driving vehicles' (2018) 10 *Law, Innovation and Technology* 314.

<sup>8</sup>M Schellekens (n 7).

<sup>9</sup>SAE International (n 2).

<sup>10</sup>*Ibid.*, 19ff.

<sup>11</sup>*Ibid.*

What are the consequences of the absence of a human behind the wheel, and the resulting shift in performance of the dynamic driving task, for the Geneva Convention and the Vienna Convention? Do these Conventions require revision in order to accommodate automated driving? In this article, it will be argued that, given the current interpretation of the Conventions, an automated vehicle does not have a *driver* within the meaning of the Conventions.

Four different approaches on how to revise the Conventions in order to accommodate automated driving will be discussed. First, it will be explored how traffic laws governing other modes of transport that are familiar with a degree of automation accommodate this automation and whether this approach would be suitable to apply to a revision of the Conventions [option 1]. Novel interpretations, viewing the Conventions as ‘living instruments’, might also accommodate automated driving. In this light, we will discuss how the interpretation of the notion of *driver* can depend on the function of the notion [option 2] and whether or not the user can be regarded to be the *driver* within the meaning of the Conventions when interpreting the Conventions differently [option 3]. Finally, drawing on Dutch law, we explore the *functioneel ouderschap* approach [option 4]. Having evaluated each of these options, it will be argued that *functioneel ouderschap* is the preferred approach.

## 2. The notion of *driver* in the Conventions

### 2.1. The functions of the notion of *driver* in the Conventions

Although the term *driver* is used in the Conventions in relation to more than one function<sup>12</sup>, for present purposes, it is the use of the term in the context of the rules of conduct (the rules of the road, Chapter II of both Conventions) that is focal. These rules impose duties on drivers. For instance, the driver should not drive whilst being distracted (art. 8 paragraph 6 Vienna Convention) and a driver has to, before making a turn, make sure that he can do so without danger to other road users (art. 12 paragraph 4(a) Geneva Convention). These provisions and other provisions are based on art. 8 paragraph 1 Geneva Convention and art. 8 paragraph 1 Vienna Convention.<sup>13</sup>

Art. 8 paragraph 1 Vienna Convention: ‘Every moving vehicle or combination of vehicles shall have a driver.’

The driver can perform these duties as he is able to control his vehicle:

<sup>12</sup>See for instance art. 8 paragraph 4 Vienna Convention, where the notion of *driver* is used in capacity requirements.

<sup>13</sup>For matters of readability, the Geneva Convention will only be quoted in case it significantly deviates from the Vienna Convention.

Art. 8 paragraph 5 Vienna Convention: ‘Every driver shall at all times be able to control his vehicle or to guide his animals.’<sup>14</sup>

## 2.2. The notion of driver and control

What consequences do these provisions have for automated driving? The requirement of control seems to leave a bit of room for a driver to let the car handle (parts of) the dynamic driving task, especially art. 8 paragraph 5 Geneva Convention and art. 8 paragraph 5 Vienna Convention. Although these provisions require that the driver should at all times be able to control his vehicle, they might be taken to imply that the driver does not have to actually exercise that control at all times – in other words, it suffices that the driver is able to exercise that control at any given time. However, even if this is the case, there would still need to be a driver that can exercise the control at any given time. Because an automated vehicle does not have a human performing the dynamic driving task, this raises the question if an automated vehicle even has a *driver* within the meaning of the Conventions.

## 2.3. The definition of the notion of driver

The Conventions provide the following definition for *driver*:

Art. 1(v) Vienna Convention: “Driver” means any person who drives a motor vehicle or other vehicle (including a cycle), or who guides cattle, singly or in herds, or flocks, or draught, pack or saddle animals on a road (...).<sup>15</sup>

This does not provide much clarity. Is the person who falls asleep behind the wheel still the driver of the vehicle? Or the person who pulls the hand brake from the passenger’s seat? And regarding automated driving: is the person who only decides on the destination of an automated vehicle the driver of that vehicle?

## 2.4. The interpretation of the notion of driver

There has not been much discussion about the definition of driver in the Conventions.<sup>16</sup> During the drafting process of the Geneva Convention, the matter was raised briefly. The French representative stated ‘that to define driver, (...), was not to define the word at all.’<sup>17</sup> The French definition of driver in the official translation of the Geneva Convention therefore reads:

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<sup>14</sup>See also art. 13 paragraph 1 Vienna Convention.

<sup>15</sup>See also art. 4 paragraph 1 Geneva Convention.

<sup>16</sup>Bryant Walker Smith, ‘Automated Vehicles Are Probably Legal in the United States’ (2014) 1 *Texas A&M Law Review* 411, 428. Available at SSRN: [www.ssrn.com/abstract=2303904](http://www.ssrn.com/abstract=2303904) (accessed 15 August 2018).

<sup>17</sup>United Nations Conference on Road and Motor Transport, Committee III on Road Traffic, Summary Record of the Seventeenth Meeting, Held at the Palais des Nations, Geneva, on Tuesday, 6 September 1949 at 3 pm, E/CONF.8/C.III/SR.17/Rev.1, 21 November 1949, p. 2.

Le terme “conducteur” désigne toutes personnes qui assument la direction de véhicules, y compris les cycles, guident des animaux de trait, de charge, de selle, des troupeaux sur une route, ou qui en ont la maîtrise effective;<sup>18</sup>

Since the rise of driver assistance systems, the notion of *driver* has been subject of discussion in WP.1, the United Nations ECE organ responsible for keeping the Conventions up to date, more often. The debate has, so far, not led to a clear position on the definition of *driver*.<sup>19</sup> A complete picture of a more precise interpretation of the notion of *driver* is therefore not yet provided for. However, a closer look into the definition of *driver* given by Contracting Parties in their national laws can provide more insight.

In German<sup>20</sup> law reference to the *driver* (in German: *Fahrzeugführer*) is made in, amongst others, the *Straßenverkehrsordnung* (StVO), *Straßenverkehrsgesetz* (StVG) and the *Strafgesetzbuch* (StGB). The German constitutional court (BGH) has described *driver* and *driving* as follows:

Führer eines Kraftfahrzeuges im Sinne dieser Bestimmung ist, wer das Fahrzeug in Bewegung zu setzen beginnt, es in Bewegung hält oder allgemein mit dem Betrieb des Fahrzeugs oder mit der Bewältigung von Verkehrsvorgängen beschäftigt ist. Bringt ein Kraftfahrer sein Fahrzeug nicht verkehrsbedingt zum Stehen, bleibt er solange Führer des Kraftfahrzeuges, wie er sich noch im Fahrzeug aufhält und mit dessen Betrieb oder mit der Bewältigung von Verkehrsvorgängen beschäftigt ist. Dies ist regelmäßig erst dann nicht mehr der Fall, wenn er sein Fahrzeug zum Halten gebracht und den Motor ausgestellt hat.<sup>21</sup>

The Dutch interpretation of *driver* (*bestuurder*) deviates from the German definition, even though both countries are parties to the Vienna Convention<sup>22</sup>: if a person influences the direction and/or speed in which the vehicle is moving by operating the controls, he is driving the vehicle and therefore he is regarded as being the driver of that vehicle, regardless of his

<sup>18</sup>Translated: ‘The term “driver” refers to all persons who assume the direction of vehicles, including cycles, guide draft animals, pack animals, saddle animals, herd animals on a road, or who have effective control.’

<sup>19</sup>See for instance Informal Document no. 2, ‘Automated Driving’, submitted by the Chair of WP.1 Informal Working Group of Experts on Automated Driving (IWG-AD), 74th session 21–24 March 2017, 14 March 2017, Informal document no. 4, ‘Automated driving’, submitted by the Chair of WP.1 Informal Group of Experts on Automated Driving, 73rd session 19–22 September 2015, 14 September 2016.

<sup>20</sup>Germany is party to the Vienna Convention, but not to the Geneva Convention.

<sup>21</sup>Translated:

Driver of a motor vehicle within the meaning of this provision is who starts to set the vehicle in motion, who keeps the vehicle moving or who is generally occupied with the operation of the vehicle or with the handling of traffic operations. If a driver does not bring his vehicle to a halt due to traffic conditions, he remains the driver of the motor vehicle so long as he is still in the vehicle and occupied with the operation of the vehicle or with the handling of traffic operations. This is usually no longer the case if he has stopped the vehicle and turned off the engine.

BGH 4 StR 592/16, 27 April 2017, ECLI:DE:BGH:2017:270417U4STR592.16.0. See with regards to the Vienna Convention: Franke, ‘Rechtsprobleme beim automatisierten Fahren - ein Überblick’, DAR 2/2016.

<sup>22</sup>See also Advies Raad van State, *kamerstukken II 2017/18, 34838 nr. 4*. See more extensively on the Dutch *bestuurdersbegrip*: JBHM Simmelink, *Algemeenheden in het wegenverkeersrecht* (Quint 1995), paragraph 2.3.3.1.

position in the vehicle.<sup>23</sup> The passenger that pulls the hand brake is at that moment the driver of that vehicle.<sup>24</sup> Even a vehicle that is being towed can have a driver, as long as the person can influence the direction the vehicle is travelling in.<sup>25</sup> A driver does not necessarily have to be inside the vehicle<sup>26</sup>: a person walking next to the car, while the motor is running and the person is determining the direction of the vehicle by using the steering wheel, leaning through the open window, is the driver of that vehicle.<sup>27</sup>

From these descriptions of the notion of *driver* it follows that the driver can decide on the direction and speed (lateral and longitudinal control) by operating at least some of the controls of the vehicle.<sup>28</sup> His actions have an immediate effect on the speed and direction of the vehicle, the decisions are made on the spot. This gives rise to the question whether or not an automated vehicle has a *driver* within the meaning of the Conventions.

### 3. The driver of an automated vehicle

#### 3.1. The possible drivers of an automated vehicle

Given these features of the notion of *driver*, who or what can possibly be regarded as being the driver of an automated vehicle? Perhaps the manufacturer of the vehicle, the company that programmed the software, the system of the automated vehicle (the self-driving system), or the person that uses the vehicle to get to work? These parties all have in common that in one way or another they influence the direction and/or speed of the vehicle.

##### 3.1.1. The manufacturer as driver of the automated vehicle?

For instance, the manufacturer of the vehicle and the company that programmed the software do so before the automated vehicle drives down public roads by equipping the vehicle with certain radars, cameras, and by programming the software in a certain way. Can either of these legal persons be treated as the driver of the automated vehicle? The definition of *driver* from art. 4 paragraph 1 Geneva Convention and art. 1(v) Vienna Convention requires that the driver is a person. Although this does not seem to exclude a legal person, given the current state of the discussion, the time of writing of the Conventions and the overall structure of the Conventions – namely, a legal person with a driving permit (art. 41 Vienna Convention,

<sup>23</sup>HR 13 August 2005, ECLI:NL:HR:2005:AT7292, NJ 2005, 542.

<sup>24</sup>Ibid.

<sup>25</sup>HR 2 February 1965; ECLI:NL:HR:1965:AB3467, NJ 1965, 281; HR 26 January 1971, ECLI:NL:HR:AB5997, NJ 1971, 208; HR 1 December 1987, ECLI:NL:HR:1987:AB7814, NJ 1988, 689; HR 2 October 1990, ECLI:NL:HR:1990:ZC8593, NJ 1991, 380.

<sup>26</sup>See regarding stepping out of the vehicle: HR 21 October 2003, ECLI:NL:HR:2003:AL3411, VR 2004, 36.

<sup>27</sup>HR 12 June 1990, ECLI:NL:HR:1990:ZC8550, NJ 1991, 29, VR 1990, 158. See also HR 23 February 1999, ECLI:NL:HR:1999:ZD348, VR 2000, 81.

<sup>28</sup>See also JBHM Simmelink, *Algemeenheden in het wegenverkeersrecht* (Quint 1995), p. 77.

art. 24 Geneva Convention), a fit physical and mental condition of a legal person (art. 8 paragraph 3 Vienna Convention) – by *person* in this context a human is meant. Therefore, neither the manufacturer of the automated vehicle nor the company that programmed the software can be classified as the driver of the automated vehicle within the meaning of the Conventions.

### 3.1.2. *The self-driving system as the driver of the automated vehicle?*

As the *driver* within the meaning of the Conventions is a human, the self-driving system (SDS) of the vehicle, that makes all the decisions regarding the dynamic driving task, is not the *driver*. In a different context however – that of technical regulations – the notion of *driver* is sometimes interpreted in such a way that it does entail the self-driving system. An example is the interpretation the United States National Highway Traffic Safety Administration (or NHTSA) gave of several US Federal Motor Vehicle Safety Standards (FMVSS):

If no human occupant of the vehicle can actually drive the vehicle, it is more reasonable to identify the “driver” as whatever (as opposed to whomever) is doing the driving. In this instance, an item of motor vehicle equipment, the SDS, is actually driving the vehicle.<sup>29</sup>

Even if the definition of *driver* would be different, applying this reasoning to the notion of *driver* in the Conventions would still prove challenging. The driver in the Conventions has rights and obligations, whereas the driver in technical regulations (often) has not. In technical regulations, the notion of *driver* is used to describe a passive object.<sup>30</sup>

### 3.1.3. *The user as the driver of the automated vehicle?*

In the future, someone might summon an automated vehicle to pick him up after, for instance, doing the groceries. This user – the person using the automated vehicle for a trip, although he is not necessarily inside or in the vicinity of the vehicle – decides on the direction of the vehicle by providing its destination and he dispatches the vehicle. Is deciding on the destination and dispatching the automated vehicle enough to regard the user as the driver of the vehicle within the meaning of the Conventions? The user meets the requirement that the driver has to be human. But does the user ‘drive’? As discussed, the *driver* within the meaning of the Conventions will have to decide on the direction and speed by operating at least some of the controls of the vehicle. His actions have an immediate effect on the speed and direction of the vehicle.

<sup>29</sup>Letter of interpretation of the NHTSA to Chris Urmson, Director of the Self-Driving Car Project of Google, Inc. (4 February 2016) <https://isearch.nhtsa.gov/files/Google%20-%20compiled%20response%20to%2012%20Nov%20%2015%20interp%20request%20-%202016%20Feb%2016%20final.htm> (accessed 9 August 2018).

<sup>30</sup>See for instance UNECE Regulation No. 79, 5.4.1.1: ‘Any fault which impairs the steering function and is not mechanical in nature must be signaled clearly to the driver of the vehicle.(...)’.



Although the user does decide on the destination of the vehicle, he does not decide on the direction and speed at any given point in time during the trip. The user does not decide to make a left turn, to swerve, to brake. The actions of the user do not have immediate effect – he might change the destination but that does not have the same direct effect as swerving, braking, etc. The user cannot exercise any lateral or longitudinal control. In other words: the user does not perform the dynamic driving task. Taking all this into account, the user cannot be regarded as being the *driver* within the meaning of the Conventions.<sup>31</sup>

### **3.2. An automated vehicle is driverless within the meaning of the Conventions**

As all the parties discussed cannot be regarded as being the *driver* within the meaning of the Conventions, these instruments will need to be revised or a new Convention on road traffic law will need to be drafted in order to accommodate automated driving. Below, some possible ways to revise the Conventions so that they do accommodate automated driving are discussed.

## **4. Laws of other modes of transport as source of inspiration [Option 1]**

### **4.1. Maritime and aviation traffic law**

Aviation and maritime transport are two modes of transport that have already been confronted with (a degree of) automation. Although the level of automation of an autopilot of a vessel or aircraft might not be as high as the expected level of automation of an automated vehicle – the autopilot on board an aircraft or ship needs a certain level of supervision and might not respond to objects and events (see for instance paragraph 10 of the IMO Recommendation on navigational watchkeeping) – maritime and aviation traffic law could provide inspiration for revising the Conventions.

International rules on air traffic can be found in Annex 2 to the Convention on International Civil Aviation (Chicago Convention). See for example the provision on how to handle a head-on situation:

3.2.2.2 Annex 2 Chicago Convention: ‘(...) When two aircraft are approaching head-on or approximately so and there is danger of collision, each shall alter its heading to the right.’

This traffic rule is not directed at the pilot (as the traffic rules from the Geneva Convention and the Vienna Convention are directed at the driver of the

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<sup>31</sup>It can be argued that if the user pulls the emergency brake of the automated vehicle (if the vehicle is equipped with one) for that short moment he is the driver of that vehicle.

vehicle), but at the aircraft itself. The responsibility for complying with these and other air traffic rules lies with the pilot-in-command.<sup>32</sup> It is not relevant if this pilot-in-command actually operates the controls:

2.3.1 Annex 2 Chicago Convention: ‘The pilot-in-command of an aircraft shall, whether manipulating the controls or not, be responsible for the operation of the aircraft in accordance with the rules of the air, except that the pilot-in-command may depart from these rules in circumstances that render such departure absolutely necessary in the interests of safety.’

So even though the pilot-in-command might not be operating the controls, perhaps he is not even anywhere near the controls, he is responsible for the operation of the aircraft. It is not relevant if the operation of the aircraft is performed by a pilot, the autopilot or someone else; the pilot-in-command is responsible.

A similar situation can be found in maritime traffic law, in the United Nations International Regulations for Preventing Collisions at Sea of 1972 (COLREGS 1972). Here, the master of the ship is one of the persons responsible for the operation of the ship in accordance with the traffic rules:

Rule 2 a COLREGS 1972: ‘Nothing in these Rules shall exonerate any vessel, or the owner, master or crew thereof, from the consequences of any neglect to comply with these Rules or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.’

The master of the ship can be, besides the owner or the crew, held responsible for the operation of the ship although he might not have been operating the controls.<sup>33</sup> The traffic rules from the COLREGS are also, similar to the Chicago Convention, not directed at a person but at the vessel:

Rule 14 COLREGS 1972: ‘(...) When two power-driven vessels are meeting on reciprocal or nearly reciprocal courses so as to involve risk of collision, each shall alter her course to starboard so that each shall pass on the port side of the other.(...)’

#### **4.2. A distinction between operation and responsibility**

As follows from the above, the structure of the traffic rules of Annex 2 to the Chicago Convention and the COLREGS 1972 differ from the structure of the rules of conduct of the Geneva Convention and the Vienna Convention:

- The traffic rules are directed at the vessel or aircraft, not at the person that might operate the controls;

<sup>32</sup>See on the “see-and-avoid” requirement’: Douglas Marshall, ‘Unmanned Aerial Systems and International Civil Aviation Organization Regulations’ (2009) 85 *North Dakota Law Review* 693.

<sup>33</sup>AN Cockcroft and LNF Lameijer, *A Guide to the Collision Avoidance Rules: International Regulations for Preventing Collisions at Sea* (Elsevier, 2012).

- The responsibility for the compliance with the traffic rules lies with a person that does not necessarily operate the controls.

As a result, it is not important if the autopilot or a crew member performs the tasks involved in flying or sailing; the aircraft or vessel has to 'behave' in accordance with the traffic rules and someone bears responsibility for this. A distinction is made between who or what performs the dynamic driving task and who is responsible for the performance of the dynamic driving task: the dynamic driving task is performed by a pilot of an aircraft by operating the yoke or by the autopilot that keeps the aircraft on a certain height and course, whilst the pilot-in-command is responsible for the performance of the dynamic driving/flying task (2.3.1 Annex 2 Chicago Convention). Responsibility in this context does not equal liability. Under national law more factors can play a role in establishing (civil or criminal) liability.

This approach can be used in revising the road traffic law.<sup>34</sup> When applying the same structure as in maritime and aviation traffic law, the self-driving system of the automated vehicle performs the dynamic driving task, for which perhaps a person can be held responsible. This opens up the possibility to assign responsibility to a legal person, like the manufacturer. This approach would accommodate traffic of mixed levels of automation without the need for a different law or other instrument for each level of automation. If the conventional driver performs the dynamic driving task, he can be held responsible for the performance of that task; if the self-driving system performs the dynamic driving task the responsibility for the performance of that dynamic driving task can be assigned to a (legal) person.

### **4.3. The vehicle and the Conventions**

To revise the Conventions using the same approach as the approach in the discussed aviation and maritime traffic law, three steps need to be taken:

- A vehicle should no longer need to have a driver;
- The rules of conduct need to be directed at the vehicle instead of the driver;
- A person or persons (not necessarily a human) should be made responsible for the operation of the vehicle in accordance with the traffic rules.

As a result, a distinction is made between who or what performs the dynamic driving task and who is responsible for the performance of the dynamic driving task. There is still someone responsible for the operation of the vehicle like the conventional driver is under the current Conventions,

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<sup>34</sup>See also NE Vellinga, 'Self-driving Vehicles: Preparing Road Traffic Law for a Driverless Future', discussed at the World ITS Congress in Copenhagen, 17–21 September 2018.

even though there is no longer a *driver* within the current meaning of the Geneva Convention and Vienna Convention, and vehicles of all levels of automation need to obey the same traffic rules.

To reach this result, art. 8 paragraph 1 of the Geneva Convention and art. 8 paragraph 1 of the Vienna Convention, that both state that every vehicle should have a driver, need to be revised. As discussed above, an automated vehicle does not have a *driver* within the meaning of the Conventions. So in order to accommodate automated driving, these provisions will either need to be revised or deleted. For example, the provisions could state that a vehicle should have a driver or a self-driving system. Either way, it can no longer be required for a vehicle to have a driver.

The next step is to revise the rules of conduct in such a way that they are no longer directed at the driver but at the vehicle, just like the rules on avoiding a head-on collision of Annex 2 of the Chicago Convention and the COLREGS 1972. Take for example art. 11 paragraph 1(a) of the Vienna Convention on overtaking (see also art. 11 paragraph 1 Geneva Convention) which states:

Drivers overtaking shall do so on the side opposite to that appropriate to the direction of traffic.

A revised provision, that is directed at the vehicle instead of the driver, could state:

Vehicles overtaking shall do so on the side opposite to that appropriate to the direction of traffic.

Other rules of conduct do not need revision to accommodate automated driving because they are only suitable for a situation where there is a conventional driver behind the wheel. A revision would not benefit road safety or it is simply not possible for a vehicle to perform the obligation. See for instance art. 7 paragraph 5 on the wearing of safety belts:

The wearing of safety belts is compulsory for drivers and passengers of motor vehicles, occupying seats equipped with such belts, save where exceptions are granted by domestic legislation.

It would not benefit road safety to also make it compulsory for vehicles to wear safety belts (aside from the question how a vehicle can actually wear such a belt). This provision can therefore be left as it is; this way it remains compulsory for passengers (of conventional vehicles and of automated vehicles) and conventional drivers to wear safety belts, which contributes to safety.<sup>35</sup>

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<sup>35</sup>World Health Organization, *World Report on Road Traffic Injury Prevention* (WHO 2004).

#### 4.4. Responsibility

To come to a separation between who or what performs the dynamic driving task and who or what is responsible, it will be necessary, just like in Annex 2 of the Chicago Convention and the COLREGS 1972, to assign a person as the person who bears responsibility for the operation of the automated vehicle in accordance with the traffic rules. This person could be a human, or perhaps a legal person. After all, the responsible (legal) person does not have to be able to perform the dynamic driving task, he only bears responsibility for the performance of the dynamic driving task. With whom the responsibility rests is of importance as it can play a role in establishing liability, although this role would be limited if a no-fault compensation scheme is in place.<sup>36</sup>

Regarding conventional vehicles, there does not seem to be a reason why the conventional driver cannot remain responsible. But who should bear the responsibility for the performance of the dynamic driving task of an automated vehicle?

It can be argued that the manufacturer of the vehicle or the company that programmed the software should be responsible as they can influence the operation of the vehicle by the choices they make in hardware (radars, cameras, processing power, etc.) and software (for instance by programming the distance between the automated vehicle and the vehicle driving in front of it). However, the user and the owner of the vehicle can also influence the operation of the vehicle somewhat (by (lack of) maintenance, by choosing (not) to use the vehicle, by ignoring a software update, etc.). Perhaps they should bear responsibility, or perhaps multiple persons should bear responsibility. An example of the latter is Rule 2 a of the COLREGS 1972: the owner of the vessel, the master of the vessel or the crew can be held responsible for the operation of the vehicle.<sup>37</sup> Further discussion is needed to come to the assignment of a responsible person.<sup>38</sup>

#### 4.5. Arguments for and against the approach

The approach discussed above has several advantages. It provides for mixed traffic, where vehicles of different levels of automation share the public roads. The newest model of a fully automated vehicle, a car with adaptive

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<sup>36</sup>M Schellekens (n 7).

<sup>37</sup>Cockcroft and Lameijer (n 33).

<sup>38</sup>This also raises the question of whether perhaps robots should be assigned legal personhood and be responsible for their own actions, see for instance: Directorate-general for internal policies, policy department C: 'Citizens' rights and constitutional affairs, legal affairs, European civil law rules in robotics study', 2016, p. 14ff; European Parliament Report with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)), paragraph 59; Commission, 'Artificial Intelligence for Europe' COM (2018) 237 final, 25; <http://www.robotics-openletter.eu/> (accessed 9 August 2018); T Hartlief 'Van knappe koppen en hun uitvindingen' NJB 2018/878.

cruise control or an old-timer: all vehicles have to ‘behave’ in accordance with the same traffic rules.<sup>39</sup> Once there is agreement on who should be responsible for the operation of the vehicle in accordance with the traffic rules, all parties involved will have more certainty on their legal position. For the legal position of conventional drivers driving conventional vehicles, these changes would not have any negative consequences: in the end their position remains as it is. Besides, the Vienna Convention is familiar with the discussed approach, as it already has a provision formulated according to this approach:

A vehicle shall not overtake another vehicle which is approaching a pedestrian crossing marked on the carriageway or sign-posted as such, or which is stopped immediately before the crossing, otherwise than at a speed low enough to enable it to stop immediately if a pedestrian is on the crossing. (...). (art. 11 paragraph 9 Vienna Convention)

The approach does, nevertheless, require an extensive overhaul of the Conventions. Multiple provisions of both Conventions will have to be amended. The amending processes of both Conventions – especially of the Geneva Convention – are time-consuming (art. 31 Geneva Convention, art. 49 Vienna Convention). Coordinating the amendment processes to avoid divergence between the two Conventions will be challenging, as well as reaching the required majorities. This has already proven to be difficult<sup>40</sup> and might not be politically feasible. Instead of choosing to take the route of amending the Conventions, drafting a new Convention using the approach discussed above can also provide the desired result. This way, the difficult amending process can be avoided. However, less drastic options should also be explored.

## 5. A different driver per function of the notion of *driver* [Option 2]

### 5.1. The interpretation of the notion of *driver* depending on its function

On the assumption that the Conventions might be interpreted relatively flexibly as *living instruments*<sup>41</sup>, it might be possible to accommodate the notion of a *driver* to automated vehicles. As touched upon above, the function of the notion of *driver* can differ depending on the context. For reasons of brevity, only a novel interpretation of the notion of *driver* in rules of conduct will be discussed below.

<sup>39</sup>See in a different context on the importance of this: Benjamin von Bodungen and Martin Hoffmann, ‘Belgien und Schweden schlagen vor: Das Fahrsystem soll Fahrer werden!’ NZV 2015, 521.

<sup>40</sup>See ECE/TRANS/WP.1/20141, ECE/TRANS/WP.1/2014/4/Rev.1, ECE/TRANS/WP.1/145.

<sup>41</sup>See for instance *Tyrer v. United Kingdom* App no 5856/72 (ECHR, 25 April 1978) with regard to the Convention for the Protection of Human Rights and Fundamental Freedoms.

## 5.2. The notion of driver in rules of conduct

The notion of *driver* is omnipresent in the traffic rules of both Conventions (Chapter II Geneva Convention, Chapter II Vienna Convention). Duties are imposed upon the driver: the driver has to overtake in a certain manner (art. 11 Geneva Convention, art. 11 Vienna Convention), the driver should show extra care around vulnerable road users (art. 7 paragraph 3 Vienna Convention), the driver should not brake abruptly unless it is necessary to do so for safety reasons (art. 17 paragraph 1 Vienna Convention), and so on. A *living instrument* approach would open up the possibility of broadening the interpretation of the notion of *driver* from ‘the human who drives’, to ‘who or what drives the vehicle’. The traffic rules would no longer be directed only at the human driver, but also at the self-driving system or the vehicle itself. This way, the Conventions would accommodate automated driving.

The requirement that every vehicle should have a driver (art. 8 paragraph 1 Geneva Convention, art. 8 paragraph 1 Vienna Convention), is met by this approach. In this context, the notion of *driver* should be interpreted as who or what drives the vehicle. So, this can be a human driver when the vehicle is a conventional vehicle, or the self-driving system of an automated vehicle. However, before it is possible to use the *living instrument* approach to interpret the Conventions, the definitions of the notion of *driver* given by the Conventions need changing. Currently, the Conventions state that the *driver* is the *person* who drives the vehicle (art. 4 paragraph 1 Geneva Convention, art. 1 (v) Vienna Convention). This definition prevents interpreting the *driver* as being the self-driving system. Therefore, the definition needs either to be changed into stating that the *driver* is *anything* or *any person* driving the vehicle, or to be completely removed from the Conventions. This last option provides optimal flexibility for the years to come, for unforeseen developments.

## 5.3. Arguments for and against this approach

The *living instrument* approach shines a new light on the interpretation of the notion of *driver*. One way to interpret the notion of *driver* is, as discussed, to interpret the notion per function instead of having one and the same interpretation of the notion throughout the Conventions. An advantage of this approach is that, besides the deletion of the definition of *driver* (art. 4 paragraph 1 Geneva Convention, art. 1 (v) Vienna Convention), it does not require amendments to be made to the Conventions. This avoids a complex and lengthy amendment process. However, the approach comes with a degree of uncertainty as the interpretation of the notion of *driver*, and therefore where the responsibility for the traffic behaviour lies, can differ depending on the function of the notion in that specific context. This can be overcome by

capturing the interpretation of the notion of *driver* in its different functions in an agreement between the Contracting Parties to the Conventions (ex. Art. 31 (3)(a) Vienna Convention on the law of treaties). Although this requires consensus between the parties, it could well be an easier process than amending the Conventions as it does not require following a fixed process. This also provides flexibility; if unforeseen circumstances arise, the agreement can be adjusted if needed without having to go through the amendment procedure. It may, however, still leave the national legislator with uncertainty concerning the compatibility of national traffic laws with the interpretation of the notion of *driver* in the Conventions. Besides, if the driver is the self-driving system, it leaves unanswered the question of who is responsible for the acts of the driver.

## 6. The user operating the controls? [Option 3]

### 6.1. The start button as a control of the automated vehicle

Perhaps there is a less complicated solution than the approach discussed in the previous section, where the focus was on who or what operated the vehicle, who or what performed the dynamic driving task. Instead, the emphasis might be more on the operation of the controls of the vehicle. After all, the traditional controls of the vehicle will disappear: a fully automated vehicle will probably not have pedals or a steering wheel. It will, however, have a new element: a start button<sup>42</sup> with which to dispatch the vehicle. Given the starting point that the Conventions are *living instruments*, can this start button be regarded as a *control* of the vehicle and if so, does that mean that the user of the vehicle – the human using the start button to dispatch the vehicle and who determines its destination – can be regarded as the driver of the automated vehicle?

### 6.2. The controls and the driver of an automated vehicle

It can be argued that, although the automated vehicle does not have the traditional controls, the start button is the control of a fully automated vehicle. The start button almost forms a sort of overlapping control which allows the self-driving system to use the controls that are needed for steering, braking, accelerating, etc. Though this interpretation of *control* might not fit with the current interpretation of the notion of *control*, the *living instrument* approach opens up the possibility for this novel interpretation.

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<sup>42</sup>See for instance Darrell Etherington, 'Waymo's First Product will be Its Own On-demand Ride Hailing Service' (*TechCrunch*, 7 November 2017) <https://techcrunch.com/2017/11/07/waymos-first-commercial-product-will-be-its-own-on-demand-ride-hailing-service/?guccounter=1> (accessed 16 August 2018).



If the start button can be regarded as a control of the automated vehicle, it can be argued that the user is the driver of the automated vehicle: the user operates the control (the start button), thereby in a sense deciding on the direction and speed of the vehicle, and the user is human. This would mean that the user fills the void the conventional driver left behind. The Conventions do not need to be amended to provide for this new interpretation. However, for some provisions it is not necessary to change but desirable nevertheless. For instance art. 8 paragraph 3 Vienna Convention:

‘Every driver shall possess the necessary physical and mental ability and be in a fit physical and mental condition to drive.’

What is the purpose of requiring the user – the driver – to be in a fit mental and physical condition while he is not the one performing the dynamic driving task like a conventional driver does. The self-driving system is performing the dynamic driving task. For the same reason, one could wonder if it serves any purpose to require the user/driver to hold a driving permit, like a conventional driver (art. 24 Geneva Convention, art. 41 paragraph 1 Vienna Convention).

### **6.3. Arguments for and against this approach**

As discussed above, the approach that a start button is also a control of a vehicle does not require amendments to the Conventions, other than the approach from maritime and aviation traffic law and the approach of a different interpretation of the notion of *driver* per function. It is also provides a clearer approach as interpreting the notion of *driver* differently per function of the notion.

Nevertheless, there is a complication. The *start button is a control* approach puts the responsibility for the operation of the vehicle with the new driver: the user of the vehicle. The responsibility for the operation of a conventional vehicle lies with the conventional driver. The responsibility lies with the conventional driver as he performs the dynamic driving task: he decides to stop for a red traffic light, to slow down when driving past a playground, to swerve for someone stepping out onto the road, etc. The user would, however, under this approach bear responsibility for the operation of the vehicle – which can subsequently play a role in (civil and criminal) liability matters (also depending on the insurance scheme)<sup>43</sup> – but he would not perform the dynamic driving task, he would not decide specifically on any manoeuvre the self-driving system makes. One could argue that the user has accepted how the self-driving system performs the dynamic driving task by pressing the start button: by pressing the start button the user makes the conscious decision to let the self-driving system

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<sup>43</sup>M Schellekens (n 7).

perform the dynamic driving task, thereby agreeing on the lateral and longitudinal movements of the vehicle. But is that enough justification for holding the user responsible for the actions of the self-driving system? At the end of the day, the Parties to the Conventions will have to answer that question.

## **7. Functioneel ouderschap [Option 4]**

### ***7.1. The dynamic driving task and the notion of driver***

If we take the performance of the dynamic driving task as our point of departure, it can be argued that, in essence, the driver is who or what has deciding influence on the performance of the dynamic driving task. Does this provide possibilities for automated driving without the need for an extensive overhaul of the Conventions?

By focusing on the performance of the dynamic driving task, the self-driving system comes back into the frame as a possible driver. The self-driving system decides, through its combination of hardware and software, if the vehicle brakes, swerves, accelerates, etc. If the self-driving system 'sees' via its sensors a pedestrian suddenly stepping onto the road, its software will calculate to swerve, or brake. If for instance a sensor breaks, the system will decide: continuing as normal, warn the user of the automated vehicle, or make an emergency stop. All those decisions are made on the spot, in specific conditions. Therefore, the dynamic driving task of an automated vehicle is performed by the self-driving system of the vehicle. So, it can be argued that, when only taking the performance of the dynamic driving task into account, the self-driving system of the automated vehicle is the driver of that vehicle.

The (legal) person having the most influence on the performance of the dynamic driving task by the self-driving system is the manufacturer of (the self-driving system of) the automated vehicle. The manufacturer can, through the hardware and software, determine in advance and to some extent how the automated vehicle will respond to a certain situation or event. The manufacturer can decide how much distance the automated vehicle will keep from a vehicle travelling in front of it, that the automated vehicle will stop for a red traffic light, and that automated vehicle will slow down when approaching a pedestrian crossing. The manufacturer equips the vehicle with certain hardware and has the software programmed in a certain way. So why not attribute the acts of the vehicle or the self-driving system to the manufacturer, why not hold the manufacturer responsible for the performance of the dynamic driving task?

### ***7.2. Inspiration from Dutch law***

Dutch law is familiar with the attribution of acts to a legal person. In 1979 a case regarding the statements of an alderman concerning who was liable for

the collapse of a roof of a primary school was brought before the Dutch Supreme Court (Hoge Raad).<sup>44</sup> The Hoge Raad decided that the statements by the alderman could be attributed to its municipality, meaning that a legal person (in this case the municipality) can not only commit a tort through one of its administrative organs but also through someone like the alderman, if his acts in society are seen as acts of the legal person.<sup>45</sup> The act of the alderman is seen as the conduct of the municipality itself.<sup>46</sup>

Under Dutch criminal law, the acts of an individual can be attributed to the legal person that in effect had control over the conduct, meaning that the legal person can commit a crime through another person. The Dutch criminal code (Wetboek van Strafrecht or Sr) already stated that a legal person can commit a criminal offence (art. 51 Sr)<sup>47</sup>, when in 2003, a case reached the Hoge Raad raising questions regarding the attribution of a criminal offence to a legal person.<sup>48</sup> This case concerned a manager of farmlands, a company, who was convicted by the Court of Appeal for the wrongful use of animal manure on those farmlands (an economic offence).<sup>49</sup> The manager pleaded that the criminal charges should be dismissed as, among other reasons, she was not the owner of the farmlands and she had not given anyone permission to use the manure on the farmlands.<sup>50</sup> This case gave the Hoge Raad reason to explain under what circumstances a criminal offence can be attributed to the legal person and is to be regarded as an offence committed by the legal person itself, further developing the theory of *functioneel daderschap*.<sup>51</sup> The legal person is to be regarded as the offender when the conduct can reasonably be imputed to him.<sup>52</sup> What is a reasonable imputation depends on the specific circumstances of the case. The Hoge Raad did not give a general rule. An important guideline, however, is that if the act took place within the sphere of the legal person, this act can, in principle, be regarded as being committed by the legal person.<sup>53</sup> According to the Hoge Raad, such an act could exist in one or more of the following circumstances:

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<sup>44</sup>HR 6 April 1979, NJ 1980, 34, m. nt. CJH Brunner.

<sup>45</sup>HR 6 April 1979, NJ 1980, 34, m. nt. CJH Brunner, r.o. 1. See also HR 11 November 2005, ECLI:NL:HR:2005:AT6018, NJ 2007/231 m.nt. Vranken, r.o. 3.6; HR 7 October 2016, ECLI:NL:HR:2016:2285, JOR 2016/325 m. nt. BM Katan.

<sup>46</sup>HR 6 April 1979, NJ 1980, 34, m. nt. CJH Brunner.

<sup>47</sup>Art. 51 lid 1 Sr: 'Strafbare feiten kunnen worden begaan door natuurlijke personen en rechtspersonen.'

<sup>48</sup>HR 21 October 2003, ECLI:NL:HR:2003:AF7938 (drijfmarrest); Markus J Hornman, 'De strafrechtelijke aansprakelijkheid van leidinggevenden van ondernemingen. Een beschouwing vanuit multidimensionaal perspectief/Criminal Liability of Corporate Executives. A Multidimensional Approach' (2016) dissertation University of Utrecht, paragraph 2.5.2, 3.3ff.

<sup>49</sup>Conclusie A-G Wortel, ECLI:NL:PHR:2003:AF7938, 5.

<sup>50</sup>Conclusie A-G Wortel, ECLI:NL:PHR:2003:AF7938, 11.

<sup>51</sup>HR 21 October 2003, ECLI:NL:HR:2003:AF7938 (drijfmarrest). See also Simone N de Valk 'Aansprakelijkheid voor leidinggevenden naar privaatrechtelijke, strafrechtelijke en bestuursrechtelijke maatstaven' (dissertation, University of Groningen 2009), paragraph 5.4.3.

<sup>52</sup>HR 21 October 2003, ECLI:NL:HR:2003:AF7938 (drijfmarrest), r.o. 3.3.

<sup>53</sup>HR 21 October 2003, ECLI:NL:HR:2003:AF7938 (drijfmarrest), r.o. 3.4.

- If it concerns an act or an omission from someone under an employment or on another basis employed for the benefit of the legal person;
- If the conduct fits into the normal business operations of the legal person;
- If the conduct has been useful to the legal person in its business operations;
- If the legal person had the power to dispose whether the conduct would or would not take place, and this or similar conduct was, given the actual course of events, accepted or would be accepted by the legal person. ‘Accepting’ also includes not exercising the care that can reasonably be required of the legal person to prevent the conduct.<sup>54</sup>

This shows that under certain conditions an act can be attributed to a legal person and is to be regarded as the act of the legal person.<sup>55</sup> An offence can not only be committed by the person that commits the conduct, but also by the legal person that has the power to dispose over the conduct. Although the legal person did not ‘get its hands dirty’, it is the *functioneel dader* (freely translated: *vicarious perpetrator*). So, the emphasis lies on who has the power to dispose over the conduct, not so much on who actually commits the conduct. This approach from Dutch case law can be used as an example to treat the acts of the self-driving system of an automated vehicle as the acts of the manufacturer of that vehicle.

### 7.3. Functioneel daderschap and the Conventions

If the *functioneel daderschap* approach is applied to automated driving, the acts of the self-driving system, that performs the dynamic driving task, can be regarded as being the acts of the manufacturer of the automated vehicle. For instance, if the automated vehicle overtakes another vehicle on the wrong side of that vehicle (art. 11 (1)(a) Vienna Convention, see also art. 11 (1) Geneva Convention), this act can be seen as an act of the manufacturer of this vehicle.

It can be argued that the manufacturer of the automated vehicle, including the self-driving system, had the power to dispose whether the conduct would or would not take place, via the hard- and software with which the manufacturer equipped the automated vehicle. It has influence over the response of the vehicle/system to a traffic light, what distance the vehicle will keep from a vehicle travelling in front of it, if the full capacity of the brakes is used when stopping for someone who suddenly crosses the road, etc. The manufacturer’s acceptance of the behaviour of the vehicle can be derived from the

<sup>54</sup>HR 21 October 2003, ECLI:NL:HR:2003:AF7938 (drijfmasterarrest), r.o. 3.4. See also HR 23 February 1954, NJ 1954, 378 (ijzerdraad-arrest); HR 14 January 1992, NJ 1992,413.

<sup>55</sup>Simone N de Valk, ‘Aansprakelijkheid voor leidinggevendenden naar privaatrechtelijke, strafrechtelijke en bestuursrechtelijke maatstaven’ (2009) dissertation University of Groningen, paragraph 5.4.3, Markus J Hornman (n 48), paragraph 3.4.

decision of the manufacturer to put the vehicle, with all its flaws, into circulation. It can be argued that this reasoning also applies to an act of an automated vehicle equipped with self-learning software. After all, it was the manufacturer who decided to equip the vehicle with self-learning software, and it consciously put it into circulation. Looking at it from this perspective, the conduct of the self-driving system falls within the sphere of the manufacturer. Therefore, it can be reasonable to impute the acts of the self-driving system to the manufacturer and consider them to be acts of the manufacturer. So, along the lines of the discussed Dutch case law, the manufacturer can be held responsible for the conduct of the automated vehicle, which can subsequently lead to criminal or civil liability of the manufacturer. The manufacturer becomes, as it were, the ‘vicarious driver’ of the automated vehicle.

This *functioneel daderschap* approach provides an incentive for the manufacturer to put only automated vehicles into circulation that have been tried and tested. If, nevertheless, the manufacturer commits a traffic offence through the automated vehicle that ignored a traffic rule, the manufacturer could be fined for the misconduct of the automated vehicle or perhaps the (type-) approval of the vehicle could get withdrawn. If the vehicle not only ignores traffic law but also causes damage, the manufacturer could be exposed to a civil liability claim.<sup>56</sup>

This approach could fit within the terms of the Conventions if the definition of *driver* is deleted from them (art. 4 (1) Geneva Convention, art. 1 (v) Vienna Convention). The current definition does not leave room to treat the system as driver because the system is not a person. This definition needs to change in order to facilitate the interpretation of *driver* as meaning what/who performs the dynamic driving task.

#### **7.4. Arguments for and against the *functioneel daderschap* approach**

The incentive to put only automated vehicles into circulation that have been tried and tested could stimulate road traffic safety, in line with the aims of the Conventions. The *functioneel daderschap* approach also provides clarity regarding the responsibilities of the parties involved. The approach does not require a substantial revision of the Conventions, thus avoiding a, possibly unsuccessful, complicated and lengthy amendment process. A possible disadvantage of the *functioneel daderschap* approach, however, is that it might hinder innovation. If manufacturers are confronted with high fines or the possible withdrawal of the type-approval of their automated vehicle, this could make manufacturers hesitant to put new automated vehicles with new technologies into circulation. That way, road traffic could be deprived of technology that benefits road safety. Another disadvantage is that not all

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<sup>56</sup>See, however, on no-fault insurance schemes for self-driving vehicles: M Schellekens (n 7).

contracting parties to the Conventions might be familiar with this theory or a similar doctrine, making this *functioneel ouderschap* approach incongruous with their legal system.<sup>57</sup>

## 8. Concluding remarks: the way forward

### 8.1. The four approaches

Given the current interpretation of the notion of *driver*, an automated vehicle does not have a *driver* within the meaning of the Conventions. Four approaches on how to accommodate automated driving in the Conventions have been discussed.

The first approach, drawing inspiration from maritime and aviation traffic law, ties in with the existing approach in art. 11 paragraph 9 Vienna Convention (requiring conformity with the rules of overtaking). Despite this, the approach does require an extensive overhaul of the Conventions.

The Conventions could be regarded as *living instruments*, which opens up the possibility to revise their terms by new ways of interpretation. This can be done by interpreting the notion of *driver* per function that the notion has within the Conventions (the second discussed approach). This provides flexibility, but it also causes uncertainty as the correct interpretation might not always be clear to the national legislator or judge. It also does not answer the question of who is responsible for the operation of the automated vehicle.

The third approach, regarding the start button as a control of the vehicle, does answer this question. If the start button is regarded as a control of the vehicle, the user can be regarded as the driver of the automated vehicle. This would mean that the user is responsible for the operation of that vehicle (which might or might not be acceptable).

The fourth approach, *functioneel ouderschap*, puts responsibility for the operation of the automated vehicle with the manufacturer of that vehicle. The acts of the self-driving system are considered to be the acts of the manufacturer.

Given these four approaches, which approach is most suitable for a driverless future?

### 8.2. Towards a driverless future

Out of the four approaches concerning the revision of the Conventions in order to accommodate automated driving, the *functioneel ouderschap* approach offers a considerable benefit over the other approaches: it provides a clear legal framework without the need for extensive amendments having to

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<sup>57</sup>Erik Gritter, 'Effectiviteit en aansprakelijkheid in het economisch ordeningsrecht' (2003) dissertation University of Groningen, Chapter 4.

be made to the Conventions. The definition of driver will need to be deleted from the Conventions in order to enable the *functioneel daderschap* approach, but that is just a minimal change compared to the overhaul of the Conventions that is required when following the approach from maritime and aviation law discussed above. The only approach that does not require any amendments to the Conventions is that which treats the start button of the automated vehicle as a control within the meaning of the notion of *driver*, making the user the driver of the automated vehicle. However, that approach also puts the responsibility for the performance of the dynamic driving task with the user, who has no actual influence over the performance of the dynamic driving task. The manufacturer has, through the hardware and software it equips the vehicle with, the most influence over the performance of the dynamic driving task. By contrast, the *functioneel daderschap* approach gives the opportunity to put the responsibility for the performance of the dynamic driving task with the (legal) person that has the most influence over the performance of the dynamic driving task: the manufacturer. The *functioneel daderschap* approach therefore provides an answer to the question who is responsible for the performance of the dynamic driving task, a question that is left unanswered by the approach adhering to maritime and aviation traffic law and the approach concerning a different interpretation of the notion of *driver* depending on its function. Therefore, it is concluded that, out of the discussed approaches, the *functioneel daderschap* approach is the most suitable for the Conventions in order to accommodate automated driving, providing a clear and acceptable legal framework for all the parties involved.

## Disclosure statement

No potential conflict of interest was reported by the author.

## Notes on contributor

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