In Pole Position

HOW GERMANY IS LEADING THE WAY IN PREPARING FOR DRIVERLESS CARS

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Autonomous vehicles once belonged in the realm of science fiction, however, with the technological advancements of the last 10 to 15 years it is no longer fiction but fact that road traffic will soon include such vehicles. That is why Germany's current government decided to address this topic despite the upcoming federal election. Driven by the German Ministry of Transport and Digital Infrastructure initiative (*Bundesministerium für Verkehr und digitale Infrastruktur*) ("BMVI"), the German Parliament (*Bundestag*) passed the Act on Autonomous Driving (the "*Autonomous Act*") on 20 May 2021, confirmed by the Federal Council (*Bundesrat*) on 28 May 2021. The Autonomous Act came into force on 28 July 2021, its explicit goal being to "make *Germany a global pioneer in autonomous driving*".[1]

1. Defining autonomous cars

Autonomous vehicles are referred to as Connected and Autonomous Vehicles ("CAVs"), as this term emphasizes the vital role of network connectivity for enabling automated and autonomous features. Based on SAE International's definitions (a global non-profit association of aerospace, automotive and commercial vehicle industries established to advance progress in mobility-promoting technology), CAVs are categorised according to their level of autonomy.[2] There are 6 levels, briefly outlined below:

Level 0	Performance by driver of all dynamic driving tasks, even if assisted by active safety systems such as automatic braking systems.
Level 1	Driver Assistance – vehicles capable of "sustained" and specific execution of lateral or longitudinal vehicle control. Driver performs all other dynamic driving tasks.
Level 2	Partial Driving Automation – vehicles capable of "sustained" and specific execution of lateral and longitudinal vehicle control (ie control of speed and direction).
Level 3	Conditional Driving Automation – vehicles capable of controlling all dynamic driving tasks in certain contexts. Driver to intervene when requested.
Level 4	High Driving Automation – vehicles capable of controlling all dynamic driving tasks and do not require human intervention. Confined to certain geographical areas.
Level 5	Full Driving Automation – vehicle capable of controlling all dynamic driving tasks in all contexts. Driver not required.

Recently, the German Federal Highway Research Institute (*Bundesamt für Straßenwesen,* "BASt") published a simplified model, distinguishing between assisted, automated and autonomous modes only, whereby assisted mode stands for level 2, automated mode for level 3 and autonomous mode for levels 4 and 5.

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[1] BMVI, "Germany will be the world leader in autonomous driving", https://www.bmvi.de/SharedDocs/EN/Articles/DG/act-on-autonomous-driving.html (28 May 2021)

[2] SAE International, "Surface Vehicle Recommended Practice: Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles", https://www.sae.org/standards/content/j3016_202104/ (April 2021)

2. Prior legal framework: Act on Automated Driving (*Gesetz zum autonomen Fahren*)

The Automated Act entered into force on 21 June 2017, amending the Road Traffic Act (*Straßenverkehrsgesetz*, "StVG"), introducing three new sections to the StVG (sections 1a et seqq).[3] The Automated Act defines highly or fully automated driving functions for Germany. It states automated vehicles to be those using automation systems capable of: (i) the control of driving tasks (eg longitudinal and lateral control); (ii) complying with relevant traffic rules; (iii) alerting a driver to take over control (with a sufficient time buffer); (iv) being deactivated by a driver at any time; and (v) indicating when the automation system is malfunctioning (section 1a (2) (nos 1-5) StVG). This means automated vehicles in Germany are Level 3 CAVs, since automated vehicles as such can take over driving tasks while a human must at all times be able to seize control over the car.

The Automated Act essentially sought to regulate for Level 4 CAVs. However, given the requirement for an "alert" driver (section 1b StVG), the automated vehicle definition did not correspond to the SAE International categorisations, which is why the Automated Act regulates Level 3 CAVs only. Autonomous driving (Level 4 and upwards) does not require a human driver, the difference between Level 4 and Level 5 being very subtle. On both levels, the car controls its every move itself, making human supervision dispensable. Human beings in the car are reduced to a passenger role. While Level 4 vehicle operation is only possible under specific conditions – such as location within geographically defined areas – Level 5 CAVs literally take autonomous driving to yet another level: Here, the vehicles master even the most complex situations independently, regardless of location and surface.

The Automated Act governed data processing compliance, as a Level 3 CAV stores position and time data when using its automated faculties. It must also store the same data when the system prompts a driver to retake control. The manufacturer collects this data via a blackbox and may transmit it to authorities (including the Federal Motor Vehicle Transport Authority (*Kraftfahrt-Bundesamt*, "KBA") and competent state authorities) if requested. The relevant authorities can store this set of data to the extent necessary to determine legal claims in relation to traffic incidents (defined under section 7 (1) StVG). Similarly, third parties ("*Dritte*", a legal term lacking specificity) may receive data under the same terms, but in a depersonalised form.

The Automated Act does not modify the StVG's liability regime. Thus, it maintains that both a driver, in the case of fault (section 18 StVG), and a *Halter* (registered vehicle keeper), irrespective of fault due to their absolute liability (section 7 (1) StVG), of an automated vehicle shall have liability when an automated vehicle using the automated systems causes damage.

3. The Autonomous Act

3.1 Interim Solution and Scope

The Autonomous Act is part of the Federal Government's aim to create "*clear legal requirements*" for the use of CAVs. In the absence of EU and international legislation (see below, 3.9), the Autonomous Act aims to create legal certainty for the operation of Level 4 ("autonomous") CAVs under regular operation within defined operating areas ("DOAs").[4] The Autonomous Act shall serve as an interim solution, limited as to time, territory and factual scope.[5] As soon as the EU will introduce legal specifications regarding

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[3] BMVI, "Eight Act amending the Road Traffic Act", https://www.bmvi.de/SharedDocs/EN/Documents/DG/eight-act-amending-the-road-traffic-act.pdf?__blob=publicationFile (16 June 2017)

[4] For further details on the provisions of the Autonomous Act, see the Autonomous Act https://www.bmvi.de/SharedDocs/DE/Anlage/Gesetze/Gesetze-19/gesetz-aenderung-strassenverkehrsgesetz-pflichtversicherungsgesetz-autonomes-fahren.pdf?__blob=publicationFile (8 February 2021)

[5] Schrader, ZRP 2021, 109, 110

type approval and the operation of automated and autonomous vehicles, the Autonomous Act will be amended accordingly.

Contrary to the first impression and some public statements, the Autonomous Act does not provide for an unlimited scope of operating Level 4 CAVs, as even within the DOAs their unlimited use is not permitted. In particular, the Autonomous Act does not allow for the use of an autonomous driving mode by a customer outside of business purposes, eg activating the auto-pilot to read a book or watch a movie without being able to/having to regain control over the car if needed: A situation like this is something that is still up in the air.

According to its explanatory memorandum, the Autonomous Act rather aims at creating regulatory space for the testing of autonomous systems. In this light, it appears reasonable that the law focuses on fields of practical use such as autonomous buses for public transport (*People Movers*) as well as on autonomous vehicles to transport goods (*Goods Movers*). Other possible fields of use include hub-2-hub-traffic (between distribution centres), demand-dependent offers at off-peak times as well as *dual-mode vehicles*, eg in the context of Automated Valet Parking. Additionally, the Autonomous Acts provides for regulation for autonomous systems in vehicles of the German army, the federal and the state police forces, the civil defence and disaster control, the fire brigades and the rescue services.

Being the first of its kind, the Autonomous Act provides – as an interim solution – initial regulations on: (i) the operation of CAVs; (ii) requirements of CAVs; and (iii) requirements of technical operators, manufacturers producing CAVs and the registered vehicle keepers (*Halter)* of CAVs.

3.2 Key Terms

- "*Motor vehicles with autonomous driving functions*" ("MVADF") within the meaning of sections 1d (1), 1e (2) StVG are CAVs that can/have:

    - autonomously carry out driving tasks within a DOA without a human driver operating the vehicle;
    - without a traditional driver intervening or a technical supervisor constantly monitoring the vehicle;
    - comply with traffic regulations;
    - an accident avoidance system compliant with the ethical specifications set out in the Autonomous Act (see below);
    - enter into a Minimum Risk Manoeuvre if continuation of driving would violate traffic regulations;
    - communicate with a technical supervisor if necessary;
    - a reliable network connectivity, in particular to communicate with the technical supervisor; and have
    - technical properties able to autonomously put the vehicle in a minimum risk state in case network connectivity is lost or in case an unauthorised party gains access over the vehicle.

    Further technical requirements will be prescribed by a future statutory ordinance (see *Legal Ordinance and Timelines, 3.10*).

- "*DOAs"*, within the meaning of section 1d (2) StVG, are public road sections where MVADFs may operate. The locations and extent of DOAs are to be designated by statutory ordinance(s), and the operation of MVADFs on DOAs has to comply with all other relevant sections of the StVG. According to the Autonomous Act's explanatory memorandum, it is possible to operate an MVADF in multiple DOAs.[6]

- *"Technical Supervisor",* being defined as the natural person who can deactivate/partially control the operation of the automatous functions of the MVADF (see section 1d (3) StVG), replaces the concept

[6] https://dserver.bundestag.de/btd/19/274/1927439.pdf, p. 20 (19 August 2021)

of the de-facto driver (*Fahrzeugführer*). The Technical Supervisor may either be present in the MVADF or supervise the MVADF remotely. Level 5 CAVs do not require a supervising human being as such, meaning that the Autonomous Act is to be applied to Level 4 CAVs only.

- "*Minimum Risk Condition*" is when an MVADF puts itself in a condition or state that achieves the greatest possible road safety for other road users (see section 1 d (4) StVG). This can be autonomous or at the instruction of the Technical Supervisor.

3.3 Ethics

The prospect of autonomous decisions by CAVs raises a number of ethical dilemmas, notably in the context of road safety. The Autonomous Act, building on the "material findings" of the Ethics Commissions report on Automated and Connected Driving (*Ethik-Kommission*),[7] specifies some ethical requirements for MVADFs.[8] In accordance with section 1e (2), (2a-e) StVG, the MVADF has to have an accident prevention system, that:

(i) prioritises loss prevention and damage reduction;

(ii) takes into account the hierarchy of the legally protected rights/assets in events of unavoidable damage to different legal interests (ie humans and property), and prioritises the protection of human life; and

(iii) does not distinguish between persons based on personal characteristics (such as age, gender, and physical or mental state) in events of unavoidable damage to multiple persons.

The issue of whether an algorithm should provide for quantity-based reasoning remained unsolved. In particular, this relates to a situation in which the algorithm would have to decide to harm (or even kill) one person instead of a group of persons in case of an imminent accident.[9] Overall, the Autonomous Act provides for sophisticated legal requirements in cases of ethical dilemmas that could occur anywhere in the world. It remains to be seen how both the envisaged EU directive and other legislators address this situation.

3.4 Obligations of the Halter, Technical Supervisor and OEM

According to section 1f (1) StVG, the registered vehicle keeper (*Halter*) is required to procure for the MVADF's compliance with road safety standards and environmental standards. Alongside complying with general road traffic regulations, the *Halter* must in particular ensure: (i) regular maintenance of the autonomous capabilities; and (ii) that the MVADF is supervised by a Technical Supervisor. To operate the MVADF, the *Halter* must apply for and receive approval of the vehicle from the KBA. [10]

In accordance with section 1f (2) StVG, the Technical Supervisor must, when the MVADF indicates, respond appropriately to the instructions. This involves abiding to the instructions provided by the MVADF, deactivating the autonomous functions of the MVADF if required following an assessment of information provided by the MVADF, and/or taking other appropriate actions to ensure road safety (including the immediate notification of passengers).

According to section 1f (3) StVG, the manufacturer (*Hersteller*) has to:

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[7] https://dserver.bundestag.de/btd/19/274/1927439.pdf, p. 22 (19 August 2021)

[8] BMVI, "Ethik-Kommission: Automatisiertes und vernetztes Fahren", https://www.bmvi.de/SharedDocs/DE/Publikationen/DG/bericht-der-ethik-kommission.pdf?__blob=publicationFile (Juni 2017)

[9] The Ethics commission left this issue open due to the lack in standardisation and codability and proposed to *systematically process respective lessons learned*, https://www.bmvi.de/SharedDocs/EN/publications/report-ethics-commission.pdf?__blob=publicationFile, p. 11 (June 2017)

[10] https://dserver.bundestag.de/btd/19/274/1927439.pdf, p. 20 (19 August 2021)

- prove to the KBA and competent authorities that the electronic and electrical architecture of and associated with the MVADF is secured against attacks;
- provide a risk assessment to the KBA, with evidence of: (i) how it was carried out; and (ii) that critical MVADF elements are protected against hazards;
- provide evidence of the MVADF's sufficient and secure network connection;
- provide in the operating manual and to the KBA a binding declaration of the MVADF's autonomous capabilities;
- offer to provide training to persons involved in the operation of the MVADF; and
- immediately notify the KBA and state authority in the event the OEM detects there is manipulation of the electronic and electrical architecture of the MVADF.

The requirements to be met by *manufacturers* appear to be rather extensive. Notably, this applies to their responsibility to ensure a sufficient and secure network connection, given that in reality this is a responsibility shared between network providers and the *manufacturers*, also depending on the locations of the DOA. However the onus is upon the *manufacturers* to determine the DOA for the time being (*zunächst*) and to obtain the respective state authority's approval. It remains to be seen how manufacturers and *Halters* will share responsibilities in reality.[11] Maybe a future ordinance based on the Autonomous Act will shed light on this, along with introducing further obligations in relation to minimum technical specifications.

3.5 Data Processing

The *Halter* is primarily responsible for the collection, storage and transmission of data generated by the MVADF (see section 1 g (1) StVG). Notably, the *Halter* is, inter alia, required to save:

- position data, and data on the activation and deactivation of autonomous functions (including usage of alternative driving manoeuvres);
- other operational data (including data on speed, acceleration, longitudinal and traverse direction);
- system monitoring data (including data on software status, environmental conditions, network connection data, status of lighting equipment and power supply); and
- commands and information sent externally to the MVADF.

According to section 1 g (2) StVG, the above data is stored (i) if the Technical Supervisor has intervened, (ii) in case of a conflict scenario, in particular if an MVADF is involved in an accident or near-accident, (iii) in events of unplanned lane changes, or (iv) if the autonomous systems are disrupted (the latter including where the MVADF fails to act as it should).

Section 1 g (3) of the StVG only partially reflects the principles set out in Article 25 (1) and (2) of the General Data Protection Regulation, privacy-by-design and privacy-by-default. According to said section of the StVG, the manufacturer must inform the *Halter* in precise, clear and "easy" language of the setting options for privacy and for the processing of data generated when the MVADF is operated in the autonomous driving function. In other words, the vehicle's default settings must be set in a privacy-friendly manner in regards to the privacy-by-default principle, and the software must enable the *Halter* to make corresponding changes to the settings. [12]

On the request of the KBA and/or state authorities the *Halter* shall transmit the data to them, as long as the request is "*necessary for monitoring the safe operation of the MVADF*".

The KBA and state authorities can use such data for necessary monitoring of the MVADF and, if the data is depersonalised, use it for traffic-related public interest purposes (eg for "*scientific research in the field of digitisation, automation and networking*") and traffic accident research (section 1 g (5), (6) StVG).

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[11] https://dserver.bundestag.de/btd/19/274/1927439.pdf, p. 22 (19 August 2021)
[12] https://dserver.bundestag.de/btd/19/274/1927439.pdf, p. 26 (19 August 2021)

This is limited to research by universities, research institutions, and certain federal, state and local authorities (including the authorities responsible for approval and monitoring of DOAs).

The Autonomous Act currently neither addresses the technical requirements for how data will be collected and transmitted nor ownership of data generated by the MVDAF, a gap to be filled by ordinance(s). Future legislation is also likely needed in regards to further clarification on OEMs' permissions to access data.

3.6 Liability & Insurance

The Autonomous Act does not provide changes or updates to the current liability framework in relation to road traffic. The *Halter* is liable for damages caused in connection with the use of an MVADF (absolute liability as set forth in section 7 (1) StVG); consequently, the *Halter* must purchase and maintain liability insurance (section 1 Obligatory Insurance Law (*Pflichtversicherungsgesetz*, "PflVG"). As MVADFs are not controlled by a driver in the traditional sense, there is no room for making such de-facto driver (*Fahrzeugführer*, section 18 StVG) liable as well. In other words, from the perspective of the damaged person, this person loses another potential debtor apart from the *Halter*. However, in the event that the Technical Supervisor has breached duties when exercising its supervisory role and has acted culpably, the Technical Supervisor may be personally liable in connection with damages caused by such a breach.[13] Consequently, the autonomous Act provides for an amendment of section 1 Obligatory Insurance Law (Pflichtversicherungsgesetz, "PflVG")), obliging the Halter to purchase liability insurance for damages caused by the Technical Supervisor. The extent and scope of this insurance, however, is not defined within the Autonomous Act. It is not yet clear how the motor insurance market will position itself in this regard, in particular how respective terms and insurance premiums will turn out to look like.

3.7 Reactivation of autonomous functions

Fully aware of rapid progress in the CAV sector, the Autonomous Act lays down rules for vehicles with deactivated preinstalled "dormant" autonomous capabilities. However, such deactivation must not be subsequently cancelled in whole or in part (section 1h (2) StVG). Namely "over-the-air" software updates from the manufacturer could initiate such subsequent reactivation of inactive, "dormant" autonomous faculties. However, according to section 1h (2) StVG, this is only allowed if (i) the approval of the KBA has been obtained and (ii) relevant and sufficient national or international law is adopted.[14]

3.8 Testing

The Autonomous Act lowers legal requirements for testing purposes.

According to section 1i StVG, MAVDFs can also be used outside of DOAs in order to allow a larger operating range for them (prototypes) as part of their testing.[15] In return, higher requirements are placed on the technical supervision and monitoring of the test vehicles. Above all, instead of simply being able to deactivate the vehicle, it must also be possible to override it on site, ie for a human being present in the vehicle to take over control of the vehicle.

3.9 International Framework: UN and EU

German laws on CAVs are required to comply with relevant international regulations that Germany is a signatory to. Currently, there are limited international regulations in relation to CAVs. United Nations Economic Commission for Europe ("UNECE") is at the forefront of the legal framework for CAVs and has

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[13] https://dserver.bundestag.de/btd/19/274/1927439.pdf, p. 32 (19 August 2021)
[14] https://dserver.bundestag.de/btd/19/274/1927439.pdf, p. 29 (19 August 2021)
[15] https://dserver.bundestag.de/btd/19/274/1927439.pdf, p. 29 (19 August 2021)

issued international standards, including key principles for safety and security of Level 3 or higher CAVs and rules on Automated Lane Keeping Systems.

Legally, Germany cannot pass national rules that contradict EU vehicle legislation. At EU level, the approval framework for motor vehicles is currently set by Regulation 2018/858. According to its scope of application and the technical specifications, this regulation assumes the presence of a person driving the vehicle and thus comprehensive controllability of the vehicle. In contrast, autonomous driving functions are characterized precisely by the fact that they do not provide for a human being to engage in driving. Therefore, level 4 autonomous driving functions could be regulated by law at national level in accordance with the derogation procedure from Articles 42 and 43 of Regulation (EC) 2018/858.[16]

3.10 Legal Ordinance & Timelines

The Autonomous Act has been adopted by the Bundestag on 20 May 2021 and received consent of the Bundesrat on 28 May 2021. It was announced on 27 July 2021 in the German Federal Law Gazette and entered into force on 28 July 2021.

As noted above, given the Autonomous Act is only intended to provide a basic framework for the operation of MVADFs, there are a number of points requiring further legislation via the enactment of statutory ordinance(s). Currently, the statutory ordinance(s) will address crucial areas such as (section 1j StVG):

- the technical requirements of MVADFs in order to gain a licence from the KBA;
- the procedure for the approval of MVADFs;
- precise provisions on data storage and protection, including the technical details of how the data will be stored (eg the accuracy of positional data required);
- the specifics of the OEM's obligations in relation to the safety, security and data generation of the MVADF; and
- further details on the obligations of the *Halter* and Technical Supervisor.

4. Summary

4.1 Interim state

The Autonomous Act explicitly addresses that it be subjected to review in 2023, and to be amended as soon as sufficient requirements for the approval and operation of Level 4 CAVs are in place at EU level. For this reason, too, depersonalised and empirical evaluations of the application of its regulations are planned for after 2023 and, if necessary, until 2030 (section 1l StVG). The focus will be on (i) its impact on the development of autonomous driving, (ii) its compatibility with data protection regulations, and (iii) the findings obtained on the basis of testing approvals pursuant to section 1i StVG.

Germany is part of various UNECE working groups and is "*actively lobbying for the adaption of international rules and standards*" to CAVs. Germany has been chairing a CAV-specific working group (GRVA Working Party) which is focusing on harmonising the international rules on IT and software related issues and practical requirements for CAVs.[17] In the context of the EU, the EU Member States agreed on important steps in the Amsterdam Declaration in 2016 and, as previously stated, regulation 2019/2144 will, in conjunction with implementing acts, provide the initial EU framework for the approval of CAVs (and in particular MVADFs) in the EU. We can expect Germany to cause the EU to use the Autonomous Act's leading principles as blueprint for EU legislation.

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[16] As pointed out in the explanatory memorandum, https://dserver.bundestag.de/btd/19/274/1927439.pdf, S. 21, B (19 August 2021)

[17] BMVI, "Germany will be the world leader in autonomous driving", https://www.bmvi.de/SharedDocs/EN/Articles/DG/act-on-autonomous-driving.html (28 May 2021)

4.2 International Standards

The Autonomous Act is one of the first pieces of legislation globally addressing even the possibility of Level 4 CAVs.

In 2020, according to KPMG, Singapore had the most advanced legislation in relation to CAVs.[18] Their current legal framework includes a definition of CAVs that broadly encompasses Level 3 to Level 5 CAVs. It also enables consumers to operate such CAVs as long as they have specific authorisation from the Singapore Land Transport Authority. This framework, however, is in the context of trials and therefore does not go as far as the Autonomous Act, which allows for CAV's operation within their regular use.[19]

The Netherlands, another frontrunner in terms of policy, has adopted a bill on autonomous driving for Level 5 CAVs. Again, however, this is for experimental use (if large scale).[20] The UK has passed legislation on autonomous vehicles,too. This, however, is currently limited to addressing insurance liability issues and the UK will only begin drafting CAV framework legislation following the conclusion of its Law Society's consultation into the sector.[21]

The Autonomous Act leaves some questions unanswered. It remains to be seen whether the envisaged ordinance(s) will close those gaps. Notwithstanding, Germany is at the forefront of legislating for Level 4 CAVs. In this light, you could argue that the Autonomous Act puts Germany in pole position worldwide. While pole position is important at the start, the next few years will reveal to what extent the Autonomous Act's framework will set international standards, in particular initially at EU level.

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[18] KPMG, "2020 Autonomous Vehicles Readiness Index", https://home.kpmg/xx/en/home/insights/2020/06/autonomous-vehicles-readiness-index.html

[19] Singapore Statutes Online, "Road Traffic (Autonomous Motor Vehicles) Rules 2017", https://sso.agc.gov.sg/SL/RTA1961-S464-2017?DocDate=20170823, (19 August 2021)

[20] Government of the Netherlands, "Self-driving vehicles", https://www.government.nl/topics/mobility-public-transport-and-road-safety/self-driving-vehicles (2021)

[21] Law Commission, "Automated Vehicles", https://www.lawcom.gov.uk/project/automated-vehicles/ (2021); UK Parliament, "Automated and Electric Vehicles Act 2018", https://bills.parliament.uk/bills/2163 (20 July 2018)

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