

Regulation Study for Interoperability in the
Adoption the Autonomous Driving in European
Urban Nodes

AUTO CITS

6th Open Workshop
Lisbon, 28th February 2019
Legal Challenges regarding
autonomous driving

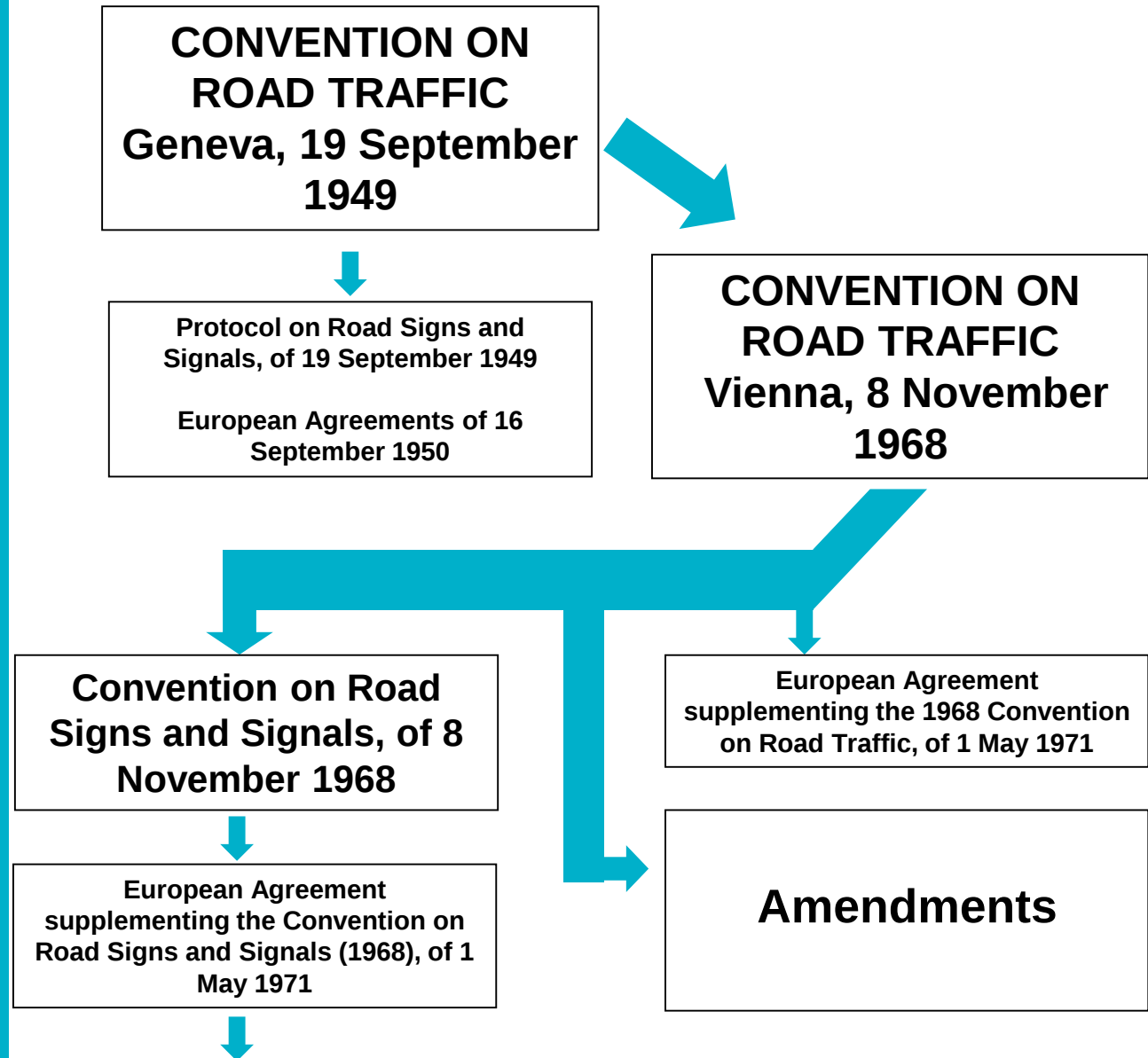
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Legal Challenges Regarding Autonomous Driving



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Article 8

1. Every vehicle or combination of vehicles proceeding as a unit shall have a driver.

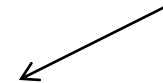


1949 Covention

ARTICLE 8

Drivers

1. Every moving vehicle or combination of vehicles shall have a driver.



1968 Covention

Portuguese Road Code

Article 11

Driving vehicles and animals

1 - Any vehicle or animal that circulates on the public road must have a driver...

The March 2014 amendment to the article 8 of the 1968 Vienna Convention on Road Traffic

(in force since 23rd of March, 2016)

5bis.

Vehicle systems which influence the way vehicles are driven shall be deemed to be in conformity with paragraph 5 of this Article and with paragraph 1 of Article 13, when they are in conformity with the conditions of construction, fitting and utilization according to international legal instruments concerning wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles*

Vehicle systems which influence the way vehicles are driven and are not in conformity with the aforementioned conditions of construction, fitting and utilization, shall be deemed to be in conformity with paragraph 5 of this Article and with paragraph 1 of Article 13, when such systems can be overridden or switched off by the driver.

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From this moment on, the existence of advanced driving assistance systems not subjected to type-approval, no longer constitutes a violation of the 1968 Vienna Convention. So, even if these systems are not foreseen in the UNECE vehicle regulations, they are compatible with the 68 Convention as long as those systems can be disconnected and can be overruled by the driver...

... what are these above mentioned regulations?

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Under the Agreement concluded on 20 March 1958 in Geneva (and two others after it), an Administrative Committee was established for the production of binding technical regulations for States Parties to this Agreement.

The regulations concerning: road vehicles, equipment or accessories; technical requirements; test methods; conditions for the granting of type-approval and reciprocal recognition.

The UNECE World Forum for Harmonization of Vehicle Regulations (WP.29) is a unique worldwide regulatory forum within the institutional framework of the UNECE Inland Transport Committee. Three UN Agreements, adopted in 1958, 1997 and 1998, provide the legal framework allowing Contracting Parties (member countries) attending the WP.29 sessions to establish regulatory instruments concerning motor vehicles and motor vehicle equipment.

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By ...

Decision of the European Council of 27 November 1997

... The European Union has bound itself with the abovementioned technical regulations and has transposed them into EU Internal Law through Parliament and / or Commission Directives.

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Automated
vehicles

So...

... what are we talking about
when we talk of highly
automated vehicles and
autonomous vehicles?

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Automated vehicles SAE classification

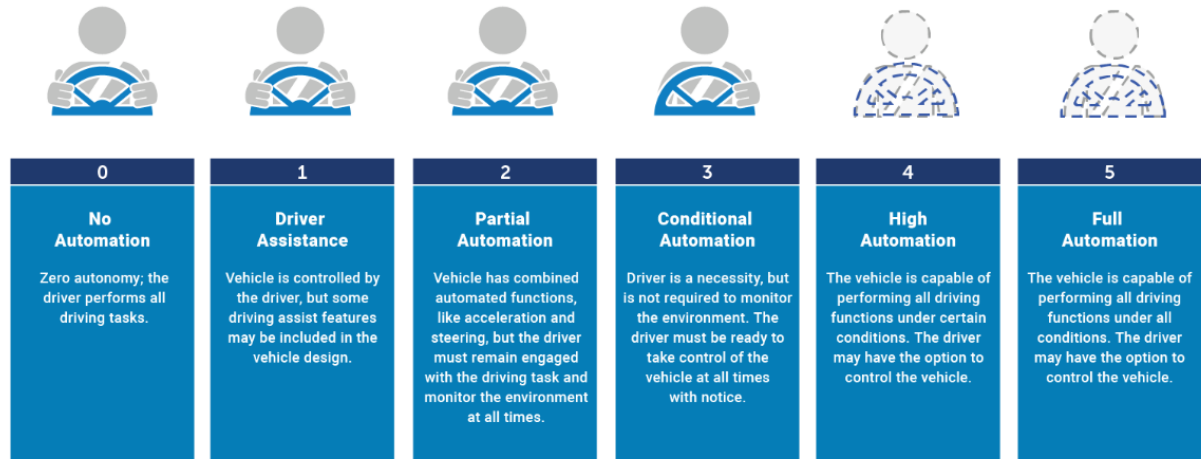
SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/Deceleration	Monitoring of Driving Environment	Fallback Performance of Dynamic Driving Task	System Capability (Driving Modes)
Human driver monitors the driving environment						
0	No Automation	the full-time performance by the <i>human driver</i> of all aspects of the <i>dynamic driving task</i> , even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	Driver Assistance	the <i>driving mode</i> -specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i>	Human driver and system	Human driver	Human driver	Some driving modes
2	Partial Automation	the <i>driving mode</i> -specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i>	System	Human driver	Human driver	Some driving modes
Automated driving system ("system") monitors the driving environment						
3	Conditional Automation	the <i>driving mode</i> -specific performance by an <i>automated driving system</i> of all aspects of the <i>dynamic driving task</i> with the expectation that the <i>human driver</i> will respond appropriately to a <i>request to intervene</i>	System	System	Human driver	Some driving modes
4	High Automation	the <i>driving mode</i> -specific performance by an automated driving system of all aspects of the <i>dynamic driving task</i> , even if a <i>human driver</i> does not respond appropriately to a <i>request to intervene</i>	System	System	System	Some driving modes
5	Full Automation	the full-time performance by an <i>automated driving system</i> of all aspects of the <i>dynamic driving task</i> under all roadway and environmental conditions that can be managed by a <i>human driver</i>	System	System	System	All driving modes

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Automated vehicles

NHTSA Classification



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Automated
vehicles

What are they?

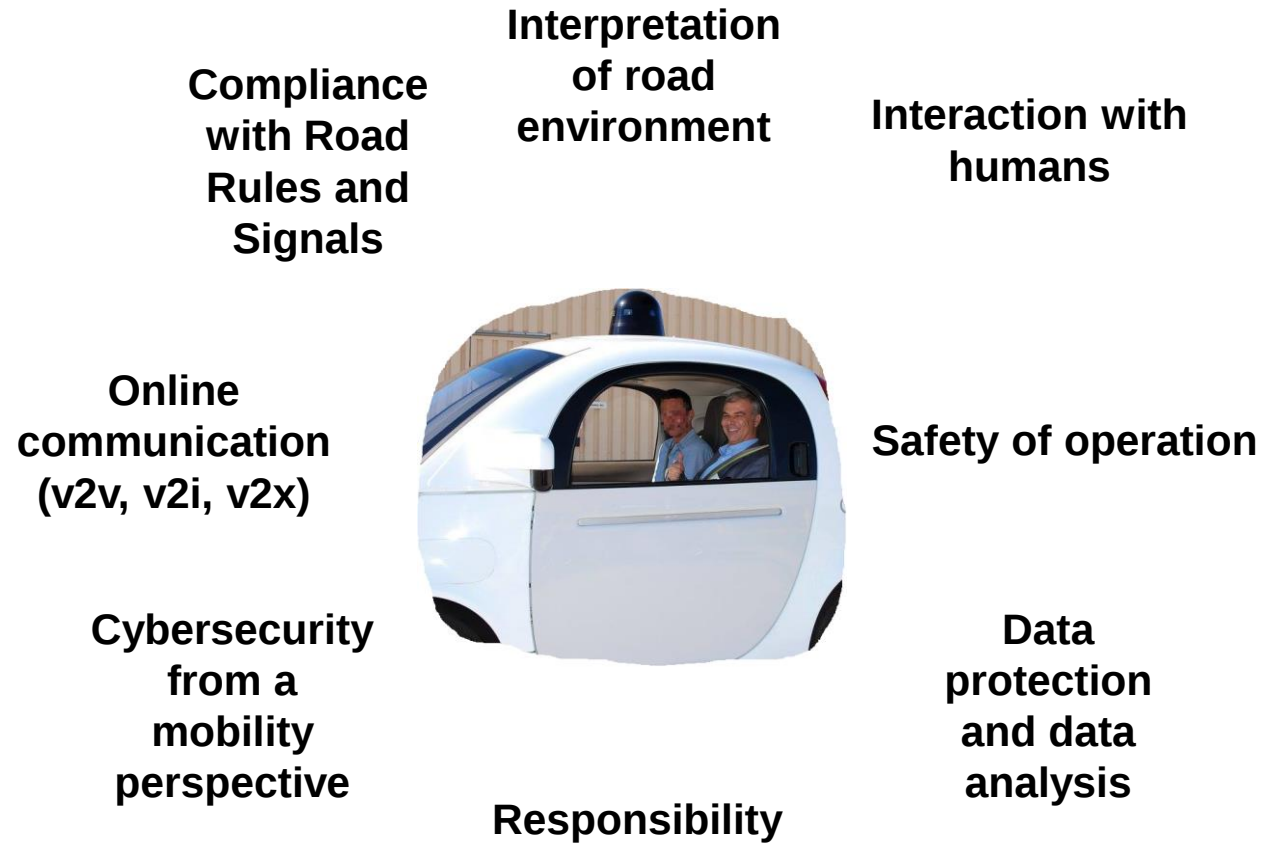


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Highly automated / autonomous vehicles bring with them the promise of a road safety increment by reducing crashes caused by human error (generally considered to be the cause of more than 90% of all road accidents), but also pose innumerable questions and doubts, and create new regulation necessities.

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New problems



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Compliance with Road Rules and Signals

In order to live up to the expectations of an increase in road safety, these vehicles need to comply with all traffic rules signs and signals. That poses some new questions:

- ➡ How can we be sure that the vehicle “has knowledge” of all the rules and can recognize all signs and signals?
- ➡ Who is responsible for certifying that?
- ➡ How will authorities know, *ex post*, that a certain vehicle did or didn't comply with traffic rules and signals?
- ➡ If it doesn't comply and commits infringements, what will be the legal course of action?

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Interpretation of the
road environment

The correct interpretation of the road environment (including the rules, signs and signals earlier mentioned) is essential in order to allow the vehicle to determine the right course of action. Being this a obvious fact:

- ➡ How can we be sure that it has all the technology needed for a correct interpretation of the road environment so that it can avoid risk??
- ➡ While no standards are established, how can we be sure of this?
- ➡ What behaviour will the vehicle assume before a situation where it *“does not compute”*
- ➡ Should we expect that the same interpretation of the road environment will trigger on the AV a similiar response to that that would be triggered in a human?

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Interaction with humans

The interaction of the machine with humans is of the utmost importance:

- ➡ Firstly there's a need for the simplest interaction possible with the HMI, avoiding long periods of inattention to the traffic, and we should establish a path to standardization of HMIs in order to avoid HMIs with major differences between them;
- ➡ These AVs also need to understand human behavior, it's signals and body language in order to better take decisions, namely they should recognize all enforcement agents signals;
- ➡ AVs also need to interact with other road users, either being them drivers of manual vehicles, motorcyclists, cyclists or pedestrians.

AVs should, always, choose the best possible course of action regarding the safety of its operation and the safeguard of human life without any hierarquization.

The German Federal Ministry of Transport and Digital Infrastructure's Ethics Commission report comprises 20 propositions. The key elements are:

- a) Automated and connected driving is an ethical imperative if the systems cause fewer accidents than human drivers (positive balance of risk).**
- b) Damage to property must take precedence over personal injury.**
- c) In hazardous situations, the protection of human life must always have top priority.**
- d) In the event of unavoidable accident situations, any distinction between individuals based on personal features (age, gender, physical or mental constitution) is impermissible.**
- e) In every driving situation, it must be clearly regulated and apparent who is responsible for the driving task: the human or the computer.**
- f) It must be documented and stored who is driving (to resolve possible issues of liability, among other things).**
- g) Drivers must always be able to decide themselves whether their vehicle data are to be forwarded and used (data sovereignty).**

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Cybersecurity from a
mobility perspective

Cybersecurity is one relevant factor to have in attention regarding the operation of AVs and their safety, especially considering the high need of communication (being it long range or short range communications)

This fact hasn't gone unnoticed to W29 that has started to create recommendations for cybersecurity related to AVs.

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Responsibility

Etymologically, “responsibility” relates to the ability or duty to give a “response”. In the context of CAD, responsibility could also mean “the duty of a person to account for decisions taken by and attendant actions performed by the automated vehicle system and/ or the software on which it is based, to assume liability and, if necessary, be willing to accept any legal consequences.



**Civil
Liability**

**Administrative
Liability**

**Criminal
Liability**



**Extension of product liability beyond
date of sale and warranty period...**

“Proximity driven liability”

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Resolution on the deployment of highly and fully automated vehicles in road traffic

Global Forum for Road Traffic Safety (UNECE - WP1)

resolution on the deployment of highly and fully automated vehicles in road traffic adopted on 20th September 2018

This resolution is divided in three parts accordingly to the recipient of the recommendations:

- Automated driving systems makers and car builders;
- Automated driving systems users in highly and fully automated vehicles; and
- Governments.

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Resolution on the deployment of highly and fully automated vehicles in road traffic

Recommendations for automated driving systems

Recommendations for automated driving systems in highly and fully automated vehicles

Automated driving systems in highly and fully automated vehicles should:

- (a) Make road safety a priority;
- (b) Monitor and safely interact with the surrounding traffic environment;
- (c) Endeavour to safely tolerate errors of the vehicles' users, inside and outside of the vehicle, and of other road users in order to minimize potential effects of such errors;
- (d) Comply with traffic rules, including those referring to:
 - (i) Interacting safely with other road users;
 - (ii) Following instructions from law enforcement authorities, and those authorized to direct traffic;
 - (iii) Maintaining smooth and safe flow of traffic.
- (e) Only operate within their ODD;
- (f) Be capable of achieving a state that maximizes road safety when a given trip cannot or should not be completed for example in case of a failure in the automated driving system or other vehicle system;
- (g) React to unforeseen situations in a way that minimizes danger to the vehicle's users and other road users;
- (h) Communicate with their users and other road users, in a clear, effective and consistent way, by providing sufficient information about their status and intention, and enabling an appropriate interaction;
- (i) Clearly and effectively provide appropriate notice, if the vehicle leaves its ODD;
- (j) Operate in a way that enables verification as to whether or not they are or were performing dynamic control; and
- (k) Enable their deactivation in a safe manner.

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Resolution on the deployment of highly and fully automated vehicles in road traffic

Recommendations for users of automated driving systems

Recommendations for users of automated driving systems in highly and fully automated vehicles

Users of automated driving systems in highly and fully automated vehicles should:

- (a) Be aware and informed of their proper use prior to starting the journey;
- (b) Meet the requirements for their safe use and follow the procedures for their use;
- (c) Be able to communicate with the vehicle;
- (d) Understand if, and when, it is necessary to exercise dynamic control to complete a journey. If the user is required to exercise dynamic control, or chooses to do so, they must:
 - (i) Hold the necessary driving permits; and
 - (ii) Comply with traffic rules.
- (e) Act lawfully at all times so as not to compromise road safety regardless of whether they or automated driving systems are exercising the dynamic control.

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Resolution on the deployment of highly and fully automated vehicles in road traffic

Recommendations for Governments

Further recommendations

Governments should consider:

- (a) Promoting public awareness and understanding of the safe use of highly and fully automated vehicles to help secure the potential safety, mobility, and socioeconomic benefits;
- (b) Adopting policies in accordance with their privacy regulations regarding the necessary data to assess:
 - (i) The safety impact of the use of highly and fully automated vehicles to support technological and regulatory advancement;
 - (ii) The causal factors involved in road traffic safety incidents, such as collisions, or traffic rule violations with highly and fully automated vehicles to resolve legal issues.
- (c) Working on security measures including cybersecurity, to safeguard the proper functioning of automated driving systems in highly and fully automated vehicles; and
- (d) Incorporating the recommendations in this Resolution into their domestic legal and policy frameworks for road traffic in a way that recognizes their national context, working with civil society and industry.

Thank you...

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