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

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3rd Open Workshop
(Lisbon, 10 October 2017)

Legal Framework Overview

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Autonomous vehicles bring with them the promise of a road safety increment by reducing crashes caused by human error, traffic congestion and, consequently, pollutant emissions. It will also reduce occupant stress and increase productivity, since the driver can perform other tasks during the journey.

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When talking about autonomous vehicles we have to bear in mind that this is a reality in full evolution, which is expected to be gradual until reaching the total autonomy of the vehicle, which will be expected to occur within two to three decades.

The research carried out revealed that at an international level there is some inconsistency in the classification of the different levels of vehicles automation, being the taxonomy defined by the Society of Automotive Engineers (SAE) the most widely accepted today. The classification made by SAE divides vehicles into levels based on "who does what, when".

For this reason, this was the classification considered as the reference term in the research carried out in the study, with the appropriate attention being given whenever the classification used by a given country escaped this taxonomy.

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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 *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	**Driver Assistance**	the *driving mode*-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 *human driver* perform all remaining aspects of the *dynamic driving task*	Human driver and system	Human driver	Human driver	Some driving modes
2	**Partial Automation**	the *driving mode*-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 *human driver* perform all remaining aspects of the *dynamic driving task*	**System**	Human driver	Human driver	Some driving modes
***Automated driving system* ("system") monitors the driving environment**						
3	**Conditional Automation**	the *driving mode*-specific performance by an *automated driving system* of all aspects of the dynamic driving task with the expectation that the *human driver* will respond appropriately to a *request to intervene*	System	**System**	Human driver	Some driving modes
4	**High Automation**	the *driving mode*-specific performance by an automated driving system of all aspects of the *dynamic driving task*, even if a *human driver* does not respond appropriately to a *request to intervene*	System	System	**System**	Some driving modes
5	**Full Automation**	the full-time performance by an *automated driving system* of all aspects of the *dynamic driving task* under all roadway and environmental conditions that can be managed by a *human driver*	System	System	System	**All driving modes**

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Europe

- Belgium
- Finland
- France
- Germany
- Portugal
- Spain
- Sweden
- Switzerland
- The Netherlands
- United Kingdom

Rest of the World

- China
- Japan
- Singapore
- South Korea
- Australia
- New Zealand
- United States of America:
  - 14 states and,
  - Federal Policy

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- There is a general delay in the development of legislation in the countries that ratified the Vienna Convention on Road Traffic in 1968, in the light of the legislative and regulatory progress made by countries that are only bound by the Geneva Convention of 1949.

- The difference, however, does not result from a substantial difference of the provisions regarding the necessity of the presence of a driver in each vehicle, since both envisage it.

- The difference may reside on a different perception on the evolution of the rules resulting from the conventions and the fact that the 1949 Convention has evolved through interpretation, and the 1968 Convention was, in itself, a formal evolution from the previous convention (for the countries that ratified it) and has been amended several times since then.

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

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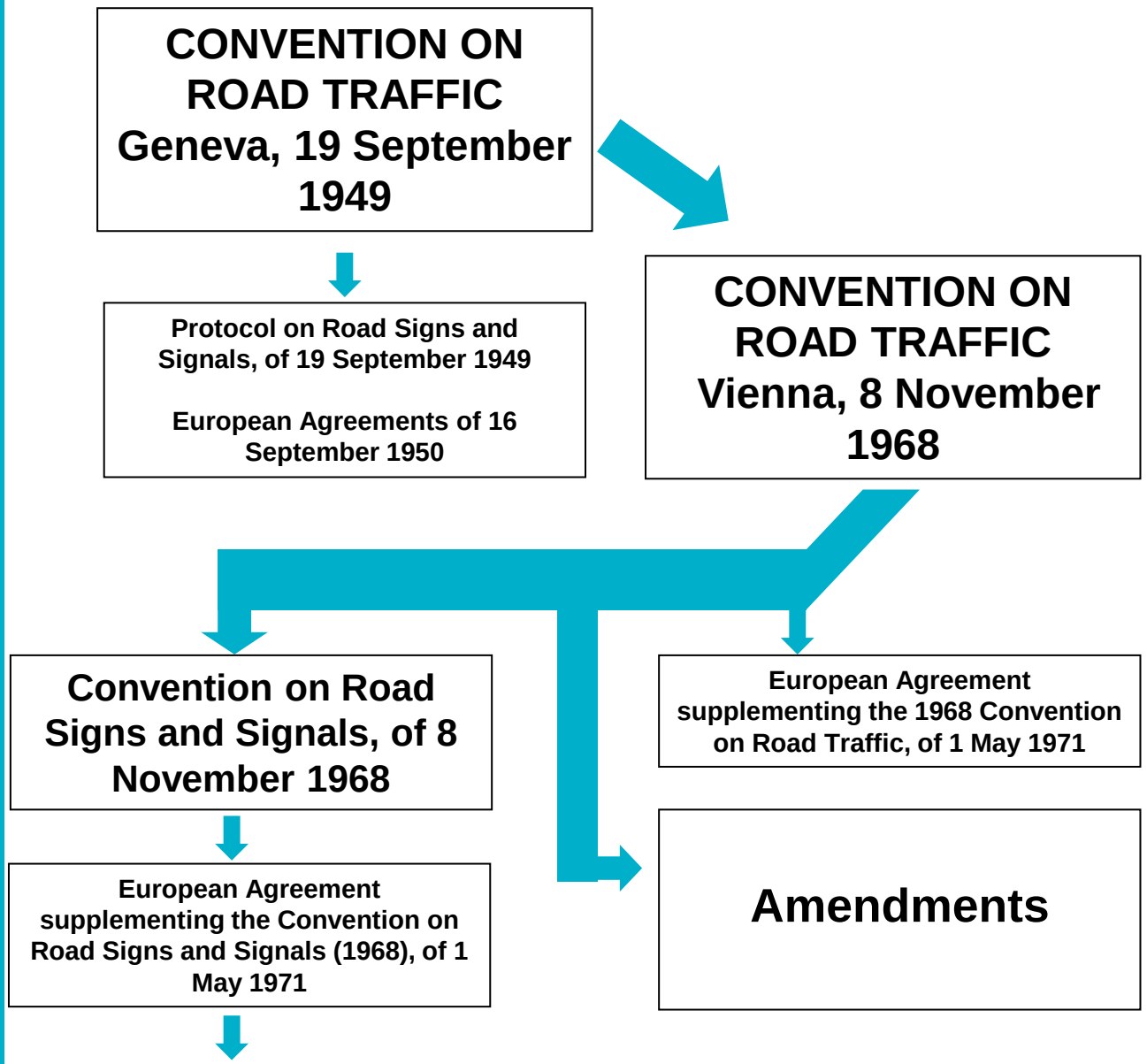
CONVENTION ON ROAD TRAFFIC Geneva, 19 September 1949
Protocol on Road Signs and Signals, of 19 September 1949
European Agreements of 16 September 1950
CONVENTION ON ROAD TRAFFIC Vienna, 8 November 1968
Convention on Road Signs and Signals, of 8 November 1968
European Agreement supplementing the Convention on Road Signs and Signals (1968), of 1 May 1971
European Agreement supplementing the 1968 Convention on Road Traffic, of 1 May 1971
Amendments
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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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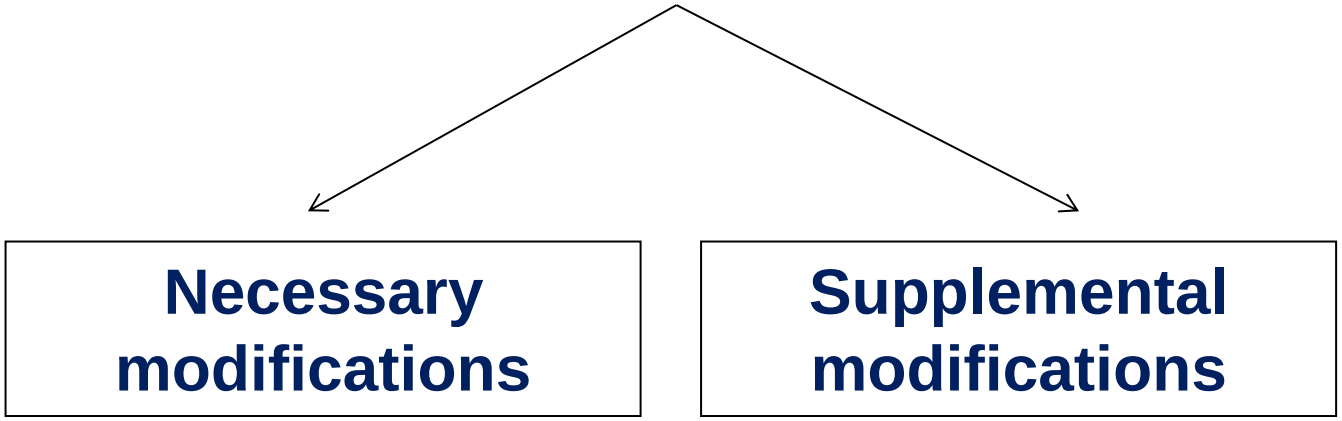
Changes to legislation and regulations

We can divide legislative and regulation changes to accommodate the testing and deployment of high automation vehicles in two large groups:



Necessary modifications ?

In light of the recent amendment to article 8 (5bis) of the 1968 Convention - amendment that influences the interpretation of every ratifying country internal legislation - there's no need to change legislation with regard to the need of exercising full control of the vehicle at all time.

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Necessary modifications

- **At this point and due to what's foreseen in art. 8/1 of the 1968 Convention (and, also, in art. 11/1of the Portuguese Road Code) there isn't the possibility to deploy level 5 (SAE classification) vehicles on the Portuguese public road. The presence of the driver and the possibility of the vehicle controls being assumed by a human driver at all time are mandatory at least whilst there's no change in the binding International Legal Instruments.**

- **In conclusion and being pragmatic, what's essential and urgent is the elaboration and approval of legislation in order to fully regulate the testing of vehicles of different automation levels on the public road, not only to regulate completely the implementation of such tests, but also to allow Portuguese authorities to have direct access to the results of the tests and in that way increase the amount of available information that can be used to better decide about future legal supplemental changes.**

Supplemental modifications

- **Changes in vehicles type approval regulations will be necessary in face of this reality where is no longer possible to fully foresee every technical aspect of the vehicle characteristics and functionalities (specially software related) ;**

- **Regulations on data recording and sharing to carry out a documented process for testing, validation, and collection of event, incident, and crash data, for the purposes of recording the occurrence of malfunctions, degradations, or failures in a way that can be used to establish the cause of any such issues;**

Supplemental modifications

- Legislation on consumer privacy protection should guarantee transparency on data recording, the appropriate usage of that data and it's integrity;
- Changes to the legislation to allow the driver to divert it's attention from the road when running in automatic mode;
- Changes to the legislation regarding impairment and the need of a driver license;
- Changes to the legislation concerning liability for accidents that may occur and (eventual) disrespect of traffic rules when running in automatic/autonomous mode.

Conclusion

Legal instruments, either international or internal, are not an obstacle for the introduction of these new technologies but should continue to evolve and stay tuned to the scientific progress in this area. Only the circulation of truly autonomous vehicles (Level 5 SAE) still finds several legal obstacles due to the international restrictions that limit internal legislation changes.

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Thank you…

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Project **AutoC-ITS** is co-financed by the European Union's Connecting Europe Facility (CEF)

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