Fully automated driving and its challenges for criminal law

Rosario Alessandretti[1]

A. Introduction

We are living in the techno age. Things that were used to be seen in science fiction movies have turned in reality.

Artificial intelligence, robots, 3D tissue printing, autonomous weapons, autonomous vehicles (AV) will surround us, in the near future, more and more, until they will be part of our lives.

No hands on the steering wheel, no foot on the gas pedal. Driving in the future will no longer be dependent on a human driver and could in this way become faster, safer and more eco-friendly. Automated driving is expected to be nothing less tan the biggest revolution in transport since the invention of the automobile.

This means that new risks would emerge and societies should rethink which of them would be tolerable and which ones would entail prohibited risks.

In this sense, taking into account that norms are the ones that determine society's identity[2], they should reflect these changes.

The aim of this paper is to analyse the current state of the criminal liability of the driver in cases of fully autonomous cars.

So this article will explained: firstly (I), the difference between semi and fully AVs; secondly (II) the current state of road traffic law in Argentina;

[1] Graduated as a lawyer at the University of Buenos Aires. Currently enrolled in a master in Criminal Law, Universidad de San Andrés.

[2] G. Jakobs, Imputation in Criminal Law and the Conditions for Norm Validity, *Buffalo Criminal Law Review*, Vol. 7, No. 2 (January 2004), pp. 491-511.

thirdly (III) the possible criminal liability of the driver in cases of fully automated driving and fourthly (IV) a conclusion will be outlined.

I. Levels of automation

Before dealing with any further research questions related to AVs, it is particularly necessary to acquire a sort of taxonomy stating clear and categorical distinctions between different modes (levels) of automation.

The mentioned taxonomy can significantly help to easily differentiate AVs depending on who is responsible for monitoring the driving environment.

Furthermore, stating clear levels of automation eliminates confusion and is useful across numerous disciplines (engineering, legal, media, and public discourse).

In this sense, a global association of automotive engineers called SAE International carried out a report concerning levels of automation for defining driving automation in on-road motor vehicles (also known as standard J3016TM)[3].

It has been adopted in September 2016 by the U.S. Department of Transportation in Federal Policy for safe testing and deployment of AVs[4].

Furthermore, the organization signed an agreement with the German Institute of Standardization, which fortifies the acceptance of SAE automation levels as the global standard[5] .

[3] "Taxonomy and Definitions for Terms Related to On-Road Motor Vehicle Automated Driving Systems", Standard J3016, SAE Inter- national, USA, 2014.

[4] "Federal Automated Vehicles Policy. Accelerating the Next Revolution in Roadway Safety", U.S. Department of Transportation – National Highway Traffic Safety Administration. USA, September 2016.

[5] "SAE International and DIN Announce Agreement to Publish SAE Autonomous Vehicle Definition Standard in German," 15 August 2016. Available at:

Thus, it has become the core reference and a guideline for all stakeholders in this transformational technology.

The report defines six levels of driving automation span from no automation to full automation.

Elements indicate minimum system capabilities for each level. A key distinction is between level 2, where the human driver performs part of the dynamic driving task, and level 3, where the automated driving system performs the entire dynamic driving task.

The term "dynamic driving task" includes the operational (steering, braking, accelerating, monitoring the vehicle and roadway) and tactical (responding to events, determining when to change lanes, turn, use signals, etc.) aspects of the driving task, but not the strategic (determining destinations and waypoints) aspect of the driving task[6].

TABLE 1 SUMMARY TABLE ON LEVELS OF AUTOMATION (Copyright © 2014 SAE International).

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**

http://www.prweb.com/releases/2016/08/prweb13615380. htm, (accessed 30 June 2018).

[6] "Taxonomy and Definitions for Terms Related to On-Road Motor Vehicle Automated Driving Systems", Standard J3016, SAE International, USA, 2014.

II. Road Traffic Law in Argentina

Argentina has not dealt with the issue of legalizing autonomous cars yet. There are two laws which regulate road traffic.

Law 24.449 states, in article 5, a general definition of automobile: *the automobile for the transport of people of up to eight seats (excluding driver) with four or more wheels, and those with three wheels exceeding a thousand kg of weight*[7], which would not present problems when implementing these technologies *a priori.*

One of the main limitations for the implementation of autonomous vehicles is found in article 40 of the present law, since it requires *to be able to circulate with a motor vehicle, it is indispensable: a) That its driver is authorized to drive that type of vehicle and to carry it with him the corresponding license; b) Carrying the identification card, identifying it.*

In that sense, the law implicitly requires a driver with a license in the automobile. However, that is because when that law was enacted, autonomous vehicles were out of the question. So the law does not attempt to ban them.

For its part, Law 26.363 has as main objectives the creation of the National Road Safety Agency, which have as functions: *a) Coordinate, promote and oversee the implementation of policies and strategic measures for the development of a safe transit throughout the national territory; b) Promote the updating of regulations on road safety; c) Propose modifications tending to the harmonization of the regulations in force in the different jurisdictions of the country; d) Permanently assess the effectiveness of technical and legal standards; [...] n) Coordinate with the competent authorities of all provinces and the Autonomous City of Buenos Aires, the implementation of the mandatory technical review system for all vehicles; [...] u) Carry out and encourage the investigation of traffic accidents, planning the strategic policies for the adoption of the pertinent preventive measures*

[7] ARGENTINA. Law 24449 [online]. [Buenos Aires]: Infoleg. Available at: http://servicios.infoleg.gob.ar/infolegInternet/anexos/0-4999/818/texact.htm

and promoting the implementation of them, through the Permanent Observatory on Road Safety, to be created in accordance with the Article 18 of this law; v) Make recommendations to the different organisms linked to the problem of road safety in terms of vehicle safety, infrastructure, road signs and any other that establishes the regulation; [...].

In this way, it would be in her hands the continuous updating of these rules, evaluating and proposing all those changes that it considers correct in order to allow this type of innovations in the streets of our country.

As it was said, argentine´s legislation has not dealt with the AVs issue yet. So, to the analyze made in this paper, I propose to imagine a scenario in which the use of AVs were allowed in Argentina.

III. Criminal liability of the driver in cases of fully automated driving

Taking into account that autonomous cars are not forbidden, legal challenges in the area of criminal law arise. Replacing the driver with a computer makes the legal treatment of that new AV operator extremely difficult.

The most important issue that need to be faced is how driver´s liability in negligence- if it exists- will be dealt with in the context of automated driving.

The structure of that kind of liability requires, in first place, a violation of the duty of care. The duty of care is established using two variables: risk of potential damage and the possibility of avoiding the risk[8].

[8] E. Hilgendorf,"Automated Driving and the Law", in VV.AA., Robotics, Autonomics, and the Law. Legal issues arising from the AUTONOMICS for Industry 4.0 Technology Programme of the German Fedral Ministry for Economic Affairs and Energy, Baden-Baden, Germany, 2017, p. 182.

The allowable risk ("erlaubtes Risiko") and the reliance principle ("Vertrauensprinzip"), an essential principle for road transport under which one may rely on other drivers to drive safely, limit the duty of care[9].

In fact, if AV are not banned, the use of such vehicles entails an allowable risk.

In this regard, JAKOBS states that "when the laws determine how a car or airplane should be designed to be safe in traffic, or when it is possible to recognize what a good standard of medical behavior is, this means at the same time that the remaining residual risk is allowed, at least in normal cases[10]".

Furthermore, the point is that with the promise of AV technology, humans should justifiably rely on the AV to drive for them- to keep them reasonably safe so long as the human operator is working within the parameters set by the manufacturer[11].

So, taking this scenario into account, it can not be said that the driver of an AV violates the duty of care.

Besides, this type of cars act in a highly complex and ultimately unpredictable way. The unpredictability is intended: the machines of the future are supposed to be equipped with the ability to adapt and to learn[12].

---

[9] Idem.

[10] G. Jakobs, La imputación objetiva en Derecho Penal, ed. Ad-Hoc, Buenos Aires, 2009, p.28.

[11] C. Westbrook, "The Google made me do it: the complexity of criminal liability in the age of autonomous vehicles", Michigan State University College of Law Review, vol. 97, 2017, p. 130.

[12] S. Beck,"Google Cars, Software Agents, Autonomous Weapons Systems-New Challenges for Criminal Law, in VV.AA., Robotics, Autonomics, and the Law. Legal issues arising from the AUTONOMICS for Industry 4.0 Technology Programme of the German Fedral Ministry for Economic Affairs and Energy, Baden-Baden, Germany, 2017, p. 243.

This entails that not only the duty of care is not violated, but also that there is a lack of predictability. Two essential variables required by the law of negligence.

So it is neither possible simply to demand that the construction of unpredictable machines *per se* be prohibited, nor- if the machines meet with social acceptance- can the damage they cause be attributed in the same way as when it is caused by a person[13].

It is equally imposible to use current criminal law to construct someting along the lines of the English "strict liability", because this would contradict the principle of culpability.

It seems that if no negligence is proved, the criminally responsible entity may be the manufacturer. Since in most cases, a vehicle manufacturer is a legal entity, it is highly important to consider the issue of corporate criminal responsibility. Argentina does have legislation in this area but it concerns corruption cases.

It is clear that the driver can not be held criminal responsible in cases of AVs so there is a gap of criminal liability that the law must challenge and rethink.

IV. Conclusion

Legal regulation of autonomous vehicles is a fairly complex object of research, all the more exciting, though. The most significant benefit of autonomous vehicles is a much safer driving environment. Accidents, however, will always be an aspect of motor vehicle travel and it must be decided who is to be held responsible in such cases.

Argentina has not yet a legal framework that is well equipped to address and adapt to all the challenges in legal regulation of autonomous vehicles that

[13] Id. p. 244.

arise in the coming years. Legislative adjustments are needed. However, having considered the massive reduction of injuries and fatalities caused by road accidents, and the other benefits of the autonomous technology, it is absolutely worth making those legal changes that will lead to clearer rules and practical reality.

This in in turn requires a broad cooperation of lawmakers and technical professionals in order to achieve the most appropriate solutions. That is exactly what it is attend to call for by the main contribution of the article which is giving a brief insight to some legal aspects of autonomous vehicles for technical professionals.