Andrea Caligiuri (ed.), *Legal Technology Transformation. A Practical Assessment*
(Editoriale Scientifica 2020) **ISBN:** 978-88-9391-985-2

CONNECTED AND AUTOMATED MOBILITY OF ROAD VEHICLES

CARMEN TELESCA

1. *Introduction*

The road haulage sector and, more generally, the mobility sector are an integral part of a rapidly evolving system capable of outlining new perspectives to be implemented and regulated by the legislator.

The introduction of self-driven vehicles, as a solution applicable to both public and private mobility, raises a number of legal and ethical questions in the face of an ever-increasing development of the technological sector.

The peculiar use of artificial intelligence in the road traffic sector has already been the subject of interest in recent years by the Member States of the European Union: in 2016, in fact, the "Declaration on cooperation in the field of connected and automated driving" was signed with the aim of facilitating the process of creating and marketing completely autonomous vehicles through the identification of a common regulatory framework to achieve perfect cohesion between vehicles and infrastructure, in full compliance with road safety rules.

From a defining point of view, self-guided vehicles can generally be qualified as those vehicles in which the driver can delegate certain functions (e.g. accelerating, steering, etc.) to the computerised system through a series of technological supports (e.g. Global Positioning System, sensors, etc.) that allow the vehicle to interface both with other users and with the road infrastructure.

In the most advanced form, with the increased potential of automation and connectivity, the driver, through a completely autonomous system, can be excluded from driving.[1]

The different levels of autonomous driving are qualified as the stages of technological evolution linked to this sector.[2]

[1] Cf. the Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, On the road to automated mobility: An EU strategy for mobility of the future, COM (2018) 283 final, 17 May 2018, where it is underlined that "The ability of vehicles to communicate will be key to integrate automated vehicles in the overall transport system. The different types of communication technologies are complementary and evolving over time with improvements (for example in coverage, speed, latency, security). This enables more and more advanced use cases of automated vehicles. Although most of the investment for connectivity should come from the private sector, the EU can help in providing regulatory approaches that foster the investments needed in vehicles and communication infrastructure (road and telecoms). […]". Cf. L. Butti, 'Auto a guida autonoma: sviluppo tecnologico, aspetti legali ed etici, impatto ambientale' (2016) Rivista giuridica dell'ambiente 435.

[2] The proposal for a classification of vehicles on the market, in relation to a more or less high level of automation, was drawn up by the European Parliament, within the Directorate-General for Internal

In view of this, a distinction must be made between partially automated and fully autonomous driving operations in order to correctly classify problems concerning safety and responsibility profiles. For semi-automatic vehicles (automation levels one to four), the driver is assisted by new technologies (e.g. radar, laser, etc.), while in cars with autonomous driving (level five), as already highlighted, it is not at all essential that there is a driver. It follows from this situation that, in the case of semi-automatic vehicles, the driver remains responsible in all circumstances, while in the case of totally autonomous driving the question of responsibility is more complex and it requires appropriate in-depth studies and ad hoc regulatory interventions by the legislator.

2. *The state of the art on the development of self-driving vehicles in Europe and Italy*

In terms of connected and automated mobility, the scenario, at European level, is quite varied. The European Commission, on 17 May 2018, presented the third mobility package, completing the process that had started in 2016 with the guidelines for mobility towards the low emission target and the two previous "Europe on the move" packages of 2017.[3]

The package mainly concerns road transport, which is analysed in relation to some specific aspects that can be traced back to automation, safety, and emission control for a more widespread protection of the environment.

The European Commission, in support of automation in the transport system, has developed a series of measures to encourage connectivity and infrastructure services.[4]

Specifically, the path identified by the Commission foresees the achievement of fully automated mobility for cars, trucks, and public transport sector by 2030.

Policies, Policy Department B: Structural and Cohesion Policies, Transport and Tourism, as part of the study 'Research for TRAN Committee – Self-piloted cars: the future of road transport?', 2016 <www.europarl.europa.eu>. In the United States, on the other hand, this classification has been adopted by the Department of Transportation and, moreover, it has been drawn up by the US standardisation body for the automotive and aerospace sectors, the so-called SAE International.

[3] With the third mobility package (Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*, Europe on the move. Sustainable Mobility for Europe: safe, secure, connected and clean,* COM (2018) 293 final, 17 May 2018?, the Commission's main objective is to "ensure a smooth transition towards a mobility system which is safe, clean and connected & automated. [...] The Commission is committed to supporting Member States in systematically identifying dangerous road sections and better targeting investment. According to the Commission, these two measures could save up to 10,500 lives and avoid 60,000 serious injuries over the period 2020-2030, contributing to the EU's long-term target of zero fatalities and serious injuries by 2050 (Vision Zero and Safe System approach)".

[4] The following communications from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions are exemplary in this respect: 5G for Europe: An Action Plan, COM (2016) 588 final, 14 September 2016; the communication Space Strategy for Europe, COM (2016) 705 final, 26 October 2016; and the communication A European strategy on Cooperative Intelligent Transport Systems, a milestone towards cooperative, connected and automated mobility, COM (2016) 766 final, 30 November 2016. With reference to the development of Cooperative Intelligent Transport Systems (C-ITS), the European Commission has adopted new rules.

The first step, to be completed by 2022, will be to ensure a perfect connection (via the internet) between self-driven vehicles that have to be able to interact with each other and with the external environment.[5]

With the Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, On the road to automated mobility: An EU strategy for mobility of the future,[6] it is hoped that the European Union will be able to achieve a uniform approach for the implementation of a mobility towards automation and, to this end, it will direct Member States towards the necessary actions for the adaptation of "basic services and infrastructures", also because the infrastructures dedicated to the operation of autonomous vehicles differ widely in each of the EU countries.

In this perspective, the Commission will also have the task of assessing, over time, the benefits of automation, both from a socio-economic and environmental point of view, in the whole transport sector through a regular joint analysis with the interested parties.

Following on from the work started by the Commission, the European Parliament, on 15 January 2019, adopted a non-binding resolution on self-driving in the whole maritime and inland waterway, air, rail, road transport sector with the primary aim of protecting users' and consumers' rights as well as the principles of transparency and competition.[7]

Among the Member States of the European Union, Germany was one of the first countries to adopt specific legislation in 2017 through a new road traffic law (*Straßenverkehrsgesetz* – StVG) covering vehicles with a high degree of automation and those with fully autonomous driving.[8]

The aim of this law is to achieve an "intelligent" mobility by raising road safety levels and controlling vehicle emissions in order to protect the environmental impact. First of all, in pursuit of these aims, the German legislator has modified the definition of motor vehicle as it is extended to motor vehicles driven either highly or fully automated.[9]

The concept of driver has also been reviewed, including, pursuant to Art. 1 of the StVG, anyone who activates a highly or fully automated driving function, i.e. anyone who for a certain period of time entrusts the control of the vehicle to the

[5] The European Commission, also in the above-mentioned Communication of 17 May 2018, COM (2018) 283 final, with reference to freight transport, has also proposed the creation of an exclusively digital platform to be used to facilitate the exchange of information, which will also produce benefits in the logistics sector, with the main aim of reducing the existing high degree of bureaucracy.

[6] See above (n 1).

[7] European Parliament resolution of 15 January 2019 on independent driving in European transport (2018/2089 (INI)), P8_TA(2019)0005.

[8] It is the Road Traffic Act (StVG) of 16 June 2017, which came into force on 21 June 2017. See Mario G. Losano, 'Il progetto di legge tedesco sull'auto a guida automatizzata' (2017) XXXIII Diritto dell'Informazione e dell' informatica 1.

[9] The reference contained in the Art. 1 of the StVG refers to vehicles equipped with special technical devices that make it possible to control driving after their activation and to comply with general traffic regulations. These systems can be deactivated directly by the driver and can also provide clear instructions to the driver by means of acoustic and optical signals, etc.

computerised system, while remaining physically in the passenger compartment of the vehicle.[10]

It should be noted that in the United Kingdom, in fact, a specific regulation on *Self-Driving Vehicles* (SDVs) was drawn up in 2015 and updated in February 2019 through the adoption of the *Code of Practice: Automated vehicle trialling*, which specifies the methods and conditions for testing SDVs.[11]

The *Code of Practice: Automated vehicle trialling* identifies the requirements for testing and specifies that "trialling any level of automated vehicle technology is possible on any UK road if carried out in line with UK law. Trialling organisations do not need to obtain permits or pay surety bonds when conducting trials in the UK. As part of complying with the law, they will need to ensure that they have: a driver or operator, in or out of the vehicle, who is ready, able, and willing to resume control of the vehicle; a roadworthy vehicle; and appropriate insurance in place". A further safeguard element in the testing phase is the necessary presence of an operator who can control the vehicle remotely where there is no driver inside the vehicle.

Significant examples of testing in the driverless cars sector are also recorded in countries outside the European Union. In the United States, in fact, there are car companies that, for several years now, have been testing automated vehicles even though their use on the road is not yet permitted in some states, so much so that a bill to adopt the Self-Drive Act is currently being discussed in Congress to uniformly regulate the homologation of this type of vehicle in all federal states.

Even in Canada, in the Ontario region, testing for SDVs was initiated and regulated by the Ontario Regulation 306/15 Pilot Project-Automated Vehicles and subsequently amended in January 2019. The Canadian test example always requires a driver, with special authorisation, to be on board the vehicle and to create easily accessible systems for deactivating the autopilot or signalling possible problems so that the driver can easily regain control of the driving functions.[12]

Similar experiences can also be seen in Singapore, where, as early as 2017, the Ministry of Transport amended the Road Traffic Act by including specific provisions for self-driven vehicles that require, in this country too, the presence of a driver on board, as a precautionary measure, if there are contingent problems that need to be solved.

Also in Italy, in recent years, a lot of progress has been made and with the decree of the Ministry of Infrastructure and Transport (hereinafter "Mit") No. 70 of 28 February 2018 (the so-called "Smart Road"), road testing for connected and automatically driven vehicles has been authorised.[13] The prospect is, first and foremost, that of upgrading the motorway network, with the expectation of charges to

[10] In any case, the driver is still obliged to take control of the vehicle immediately in special cases (e.g. malfunction of the acoustic and tactile devices, prohibitive weather conditions, etc.).

[11] The text of the Code of Practice: Automated vehicle trialling issued by the Department for Transport and the Centre for Connected and Autonomous Vehicles is available at <https://www.gov.uk/dft>.

[12] For more information on the US experience see the website <http://www.congress.gov/115th-congress/house-bill/3388>. The text of the Ontario Regulation 306/15 Pilot Project-Automated Vehicles is available at <http://www.ontario.ca/laws/regulation/150306>.

[13] Decree No. 70 of the Ministry of Infrastructure and Transport of 28 February 2018, called *Modalità attuative e strumenti operativi della sperimentazione su strada delle soluzioni di Smart Road e di guida connessa e automatica* (the so-called *Smart Road*), in *Gazzetta Ufficiale* No. 90, 18 April 2018.

be borne by the concessionaire or the operator. On 4 October 2018, the Italian technical support observatory for *Smart Road* and connected and automatically driven vehicles also approved the forms for the request to the Mit for the authorisation to test these vehicles on public roads and to obtain the prior authorisation of the managing body of the infrastructure section on which the test is to be carried out.[14]

The testing of automatically driven vehicles on public roads is authorised by the General Directorate for Motorisation of the Ministry of Infrastructure and Transport after receiving a positive opinion from the Technical Support Observatory for *Smart Road*. The first authorisation for the experimentation on public roads of the first self-driven vehicle in Italy was officially issued on 7 May 2019, and it states that the competent management of the Mit has successfully completed the necessary preliminary checks of suitable technical age for the circulation of the tested vehicle, of VisLab S.r.l., created as a spin-off of the University of Parma and acquired, in 2015, by the US company Ambarella Inc. The experiment, after about a year from its beginning, had a positive outcome and concerned the urban area and the last mile type D, E, F of precise road sections in the cities of Turin and Parma, in compliance with all the requirements laid down by the road operator and in the presence of a supervisor able to switch between automatic and manual operation of the vehicle, so as to guarantee, in all circumstances, maximum respect for safety.

3. *Prospects for reform in the field of motor vehicle liability*

The starting point, in order to analyse the profiles of responsibility, arises from a question: to verify whether the Italian legislation can be considered already prepared in the management of the regulation of the circulation of driverless and highly automated driving vehicles, or whether, instead, it is necessary an intervention by the legislator that affects, with amendments and/or additions, the legal regulations in force.

The resolution of the issue concerns, in particular, fully autonomous driving vehicles (level five) and highly automated driving vehicles, which can be driven

[14] The para. 2 of Art. 9 of the aforementioned Ministerial Decree No. 70/2018 provides that authorisation to test automatic driving vehicles on public roads *may be requested, individually or jointly, by the manufacturer of the vehicle equipped with automatic driving technologies, as well as by university institutes and public and private research bodies conducting experiments on vehicles equipped with driving automation technologies*. Cf. M. C. Gaeta, 'Automazione e responsabilità civile automobilistica' (2016) Responsabilità civile e previdenza 1717; A. Davola and R. Pardolesi, 'In viaggio col robot: verso nuovi orizzonti della r.c. auto ("driverless")' (2017) 5 Danno e responsabilità 616; C. Severoni, 'Prime considerazioni su un possibile inquadramento giuridico e sul regime di responsabilità nella conduzione dei veicoli a guida autonoma' (2018) Diritto dei trasporti 356; D. Cerini, 'Dal decreto "Smart Roads" in avanti: ridisegnare responsabilità e soluzioni assicurative' (2018) Danno e responsabilità 4401; S. Scagliarini, '"Smart roads" e "driverless cars" nella legge di bilancio: opportunità e rischi di un'attività economica "indirizzata e coordinata a fini sociali"' (2018) Quaderni costituzionali 497; C. Telesca, 'Driverless cars: profili di responsabilità civile e penale' (2019) Rivista di diritto della navigazione 183; S. Scagliarini, *Smart roads e driverless cars: tra diritto, tecnologie, etica pubblica* (Giappichelli 2019); S. Pollastrelli, *Driverless Cars: i nuovi confini della responsabilità civile automobilistica e prospettive di riforma*, in E. Calzolaio (ed.), *La decisione nel prisma dell'intelligenza artificiale* (Wolters Kluver 2020) 105; S. Pellegatta, 'Autonomous Driving And Civil Liability: The Italian Perspective' (2019) XVII Rivista di diritto dell'Economia, dei Trasporti e dell'Ambiente 135.

directly by a person or controlled remotely through advanced technological devices (levels three and four).[15]

As far as the concept of vehicle is concerned, in the first paragraph of Art. 46 of the Italian Traffic Code,[16] "vehicles" are defined as "all machines of any kind, circulating on the roads, driven by a person". The notion of vehicle, therefore, is inextricably linked to the presence of the human factor. This calls for further reflection: in order to try to guarantee new types of vehicles and, more generally, adequate protection for users, as it has already been done in German law, it is necessary to envisage legislative intervention to partially modify the aforementioned rule contained in the Italian Traffic Code.

What has just been highlighted appears to be closely linked also to the desire for a revision of the concept of driver, since it is also to be considered as such who, in the context of technological innovation in the entire sector, freely decides to activate the autonomous driving mode, remaining, however, always vigilant and ready to regain control of the vehicle if external circumstances or the computerised system should require it.[17]

In such a case an additional problem arises, namely that the driver of an automated vehicle will not easily be able to escape liability and to provide exonerating circumstances. For example, the data recorded by "black boxes"[18] could be useful in this respect, especially to check whether the vehicle was driven manually by a person or by computer devices at the time of the accident.

The Art. 2054 of the Italian Civil Code is the legal reference point for analysing liability for road traffic damages. This rule identifies a subjective criterion for attributing liability for alleged negligence to the driver, providing, verbatim, that "the driver of a vehicle that can circulate in traffic with freedom of choice of route is obliged to pay compensation for damage to people or property caused by the vehicle if the driver fails to prove that he or she did everything possible to avoid the damage".[19] This arrangement, also identifies, in the third paragraph, the joint

---

[15] In this regard, see A. Bertolini, 'Robot as products: the case for a realistic analysis of robotic applications and liability rules' (2013) Law, Innovation and Technology 214; Butti (n 1); Davola and Pardolesi (n 14); A Vedaschi and G. M. Noberasco, 'Gli autoveicoli a guida autonoma alla prova del diritto' (2019) Diritto pubblico comparato europeo 769.

[16] Legislative Decree No. 285 of 30 April 1992 "*Nuovo Codice della strada*", in *Gazzetta Ufficiale* No. 114, 18 May 1992, which came into force on 1 January 1993.

[17] Generally speaking, the driver is the person who takes over the direction of manoeuvres when driving a vehicle and their responsibilities. This assumption also refers to the contents of Art. 8 (Drivers) of the Vienna Convention of 8 November 1968 on traffic and road signs, ratified by the Italian Law No. 308 of 5 July 1995, in *Gazzetta Ufficiale* No. 174, 27 July 1995. The above-mentioned provision, in fact, provides that "Every moving vehicle or combination of vehicles shall have a driver. [...]. Every driver of a power-driven vehicle shall possess the knowledge and skill necessary for driving the vehicle; however, this requirement shall not be a bar to driving practice by learner-drivers in conformity with domestic legislation. Every driver shall at all times be able to control his vehicle [...]".

[18] They are mandatory data recording systems for highly or fully automated driving vehicles.

[19] To find out what many authors think, without in any way claiming to be exhaustive, see P. Trimarchi, *Rischio e responsabilità oggettiva* (Giuffrè 1961) 21; S. Rodotà, *Il problema della responsabilità civile* (Giuffrè 1964) 161 ff.; F. Galgano, *Trattato di diritto civile* (Wolters Kluwer 2015) III 230 ff.; F. Martini, 'L'obbligo assicurativo per la circolazione dei veicoli e dei natanti', in F. Martini and M. Rodolfi (eds), *Responsabilità da circolazione stradale* (Giuffrè 2018) 15 ff.; G. Alpa, *La responsabilità civile* (Giuffrè 2018) 472 ff.

responsibility of the owner of the vehicle, the usufructuary and the purchaser with a reserved dominion pact, who respond objectively, with the exception of situations for which they are able to demonstrate that the circulation has taken place against their will.[20]

With reference to the liability cases referred to in the Art. 2054 of the Italian Civil Code, the orientation of the judges of the Supreme Court of Cassation[21] was to consider the circulation of vehicles as a particular case of dangerous activity and, therefore, also from the point of view of liability, the Art. 2054 of the Italian Civil Code would be an application of the general principle contained in the Art. 2050 of the Italian Civil Code.[22]

A particularly important aspect to be assessed, in line with technological progress in the sector, is the identification of new responsible parties who will work alongside the driver and the vehicle owner. In this regard, it will be necessary to identify and regulate the responsibility of the manufacturer, which will be accompanied by that one of the supplier of the vehicle software, but also that one of the infrastructure, because if the accident is the result, for example, of programming defects or network malfunctions or other causes completely unrelated to the driver, the problem will arise of identifying which person or people is/are to be considered responsible.

Even though most reform projects developed in the sector are geared towards maintaining a subjective liability framework based on fault, it has been noted that the driver's focus on highly automated driving is lost in cases of fully autonomous driving.

The most widely held view according to many authors is that our regulatory system is based on the blame of a non-contractual liability of the person. This principle, if properly considered with the objective joint and several liability of the guarantee figures (owner, etc.) and the manufacturer/producer's liability could also remain valid for partially or totally connected and automated mobility systems.[23] This approach

---

[20] Cf. F. C. Barbarino, A. Franchina and S. Maci, *La responsabilità del produttore nella nuova disciplina* (Giuffrè 1989); R. Pardolesi, 'La responsabilità per danno da prodotti difettosi' (1989) Nuove leggi civili 497; A. Gorassini, *Contributo per un sistema della responsabilità del produttore* (Giuffrè 1990); G. Visintini, *Trattato breve della responsabilità civile* (Wolters Kluver 1996); G. Alpa and M. Bessone, *La responsabilità del produttore* (Giuffrè 1999); R. Scognamiglio, *Responsabilità civile e danno* (Giappichelli 2010).

[21] Cf. Supreme Court of Cassation (Joint Sessions), judgment of 29 April 2015, No. 8620; see S. Argine, 'Le Sezioni Unite e il concetto di circolazione stradale: luci ed ombre interpretative' (2016) Responsabilità civile e previdenza 214; A. Carrato, 'Le Sezioni unite chiariscono in via definitiva il concetto di "circolazione stradale" in funzione dell'operatività della disciplina della r.c.a.' (2015) 10 Il Corriere giuridico 1223; R. Pardolesi, 'Sul concetto di circolazione con riguardo al regime di assicurazione obbligatoria' (2015) 7-8 Foro italiano 2368. As a sign of conformity, it is also involved the Supreme Court of Cassation thanks to the Decree No. 25421 of 26 October 2017; see M. Marotta, 'Nella circolazione dei veicoli, in quanto attività pericolosa, è configurabile il caso fortuito' (2017) Diritto e Giustizia.

[22] Art. 2050 of the Italian Civil Code (Responsibility for the exercise of dangerous activities) provides that "anyone who causes damage to others in the performance of a dangerous activity, by its nature or by the nature of the means used, shall be liable to compensation, unless the person proves that he or she has taken all appropriate measures to avoid the damage". Cf. G. Mirabile, 'Le tendenze evolutive della giurisprudenza riguardo alla nozione di attività pericolosa' (2018) Responsabilità civile e previdenziale 454; L. Pari, 'Sulla configurabilità della navigazione aerea come attività pericolosa' (2018) Il Diritto marittimo 949.

[23] The concept of manufacturer includes both the car manufacturer that produces the vehicle and the company that takes care of the devices that are installed on board. With reference to the liability

should be supplemented, however, by a system based on the competitor's imputability of the guidance system supplier and/or software developer.

With a view to adapting to the changes that fully automated driving will bring to the entire transport system, a different perspective could be represented by identifying the figure of the manufacturer, as the person on whom liability for any accident caused by this category of vehicles should be directed.

In such situations, therefore, it would be desirable to introduce a "limited" strict liability system within which the producer can only be held liable if he or she does not comply with minimum safety standards.

4. *Concluding remarks*

In the face of rapid technological progress, the entire mobility system is facing multiple changes that are aimed at achieving greater safety for users in all modes of transport, reducing environmental impact by creating solutions based on sustainability, improving traffic flows through the implementation of information and digital technologies to achieve the ultimate goal of complete automation for vehicles.

Once the automation process is stabilised, it is assumed that the benefits will be multiple because innovative services to the community in terms of mobility will be guaranteed through public transport that is more flexible and closer to the needs of each user.

The experimentation of driving systems with a high level of automation, up to the total elimination of the driver, according to the estimates of some studies conducted at international level, should, among other things, provide for a drastic reduction in the number of accidents resulting from the circulation of vehicles, by about ninety percent compared to current parameters, as well as a significant reduction in carbon dioxide emissions into the air for a more profitable protection of the environment with a general economic saving estimated in the order of several billion dollars.

Environmental sustainability cannot, however, be assessed separately from economic parameters. For these reasons, encouraging sustainable mobility means implementing the private car sector alongside shared vehicles, as part of a broader system that makes it possible to connect driverless cars and smart cities, providing for a connection of the means of transport between them and with the infrastructure.

Mobility based on sustainable transport can only work if the whole system is adequate. This results into the need to build infrastructures and entire cities, the smart cities mentioned above, ready to welcome technological changes and to communicate with each other in a path of information exchange, connectivity, and simplification of urban viability.

---

regime, the manufacturer is liable, pursuant to Art. 114 of the Italian Legislative Decree No. 206 of 6 September 2005, the so-called *Codice del consumo* (Consumer's code), in *Gazzetta Ufficiale* No. 235, 8 October 2005, for damage caused by its defective products, but may provide proof of the facts that exclude its liability. The damaged party, on the other hand, is obliged to prove the defect, the damage and the causal link between defect and damage. The product can be considered defective, in general terms, if it lacks the minimum safety requirements and is dangerous for the people who use it and for third parties. Cf. Pardolesi (n 1); M. Bessone, 'La nozione di pericolo e il principio di responsabilità per i danni causati da attività pericolose' (1982) Rivista giuridica della circolazione e dei trasporti 855; M. Franzoni, *Dei fatti illeciti* (Giappichelli 1993) 491 ff.; Gaeta (n 14).

In order to proceed with the implementation of self-guided vehicles, in the near future, it will not be sufficient to adapt their technological equipment, but it will be necessary to foresee serious interventions on the existing infrastructures within the Italian territory and in the other countries of the European Union.

This is therefore a major challenge for Europe, where all States will have to work together to benefit from the development of automated road transport and they will also be able to compete with other countries such as China, Japan and the United States, which have already achieved excellent results in recent years.

In view of the expected benefits, however, it is impossible not to highlight how car manufacturers are revising the priorities and logic for the development of independent driving on vehicles because, according to data processed in the USA and disseminated in 2019 in the "Global Automotive Consumer Study", consumers have not yet gained the necessary confidence in self-driving vehicles and the most complex vehicles have high costs that are not justified by the perceived value.

A possible turning point could be to differentiate levels of self-driving according to the use of the vehicle and the environment in which it has to operate.

Specifically, levels from one (1) to three (3) could be dedicated to private customers while levels four (4) and five (5) could be dedicated to commercial uses such as autonomous shuttles and other on-demand mobility services, i.e. shared, operating in "simplified" environments such as urban centres with reduced costs borne by each user.

In conclusion, the legislator will have the task of regulating, in the more or less near future, the various aspects of road traffic, guaranteeing increasingly high levels of safety, in order to achieve an increasingly balanced mobility system aimed at protecting science, the economic interests of businesses, the fundamental rights of all citizens and environmental sustainability.