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The paper focuses on the main question: who is liable when an accident caused by an autonomous car occurs? The author begins with a reconstruction of the legal framework in force first in Europe and also in Italy on the autonomous vehicle and distinguishes each level of autonomy. This is followed by an explanation of the different theories that could be applied to the problem as a solution, ie from defective product liability to compliant product liability in Germany and the United States. The work provides a proposal, ie the recognition of legal personality to the autonomous vehicle, but not as a surrogate for the natural person, but as a legal person (see ie private entities). The author shows how this is possible using the analogia iuris method and how this brings the legal system back into harmony.

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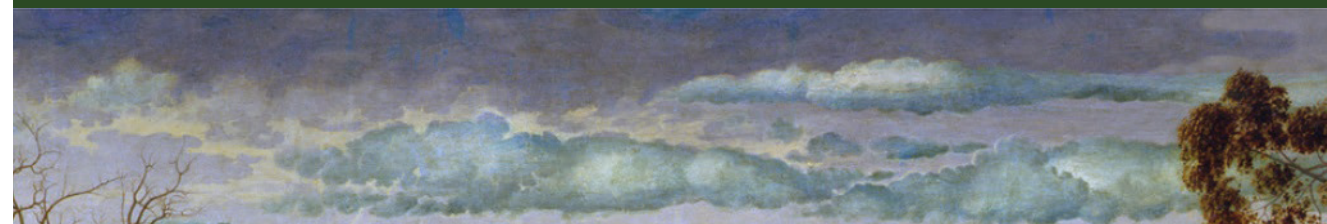
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Emanuela Maio

# Civil Liability and Autonomous Vehicles



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# Civil Liability and Autonomous Vehicles

*by* EMANUELA MAIO



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## Introduction

This work is the result of an in-depth reflection on the new items of tort law, and discusses liability in the autonomous vehicle.<sup>1</sup> It reports the contents of a lecture given at the School of Higher Education on the Future of the Automobile for Smart Mobility under the Motor Vehicle University of Emilia Romagna (MUNER),<sup>2</sup> which focused on key aspects of responsibility.

The theme of the school was the impact of evolving technology<sup>3</sup> on legal problems which urgently require solutions. This paper focuses on the new dimension of liability when the link between behavior and event is broken. It discusses the widely recognized problem of whether there can be non-personal civil liability outside the cases specified by legislation.

In the case of new technologies in autonomous vehicles, the problem is no longer that of identifying the responsible party, but identifying the perpetrator of the event and the party which controls the perpetrator and is thus the real responsible party. The focus thus

<sup>1</sup> This paper reports an extended lecture presented at the Future of automotive for Intelligent Mobility at the Motor Vehicle University of Emilia Romagna (MUNER) 15<sup>th</sup> November-3<sup>rd</sup> December 2021.

<sup>2</sup> The school on 'Future of automotive for intelligent mobility' was a MUNER-sponsored education opportunity which presented cutting-edge trends in the automotive sector. It was held by the MUNER educational eco-system, set up in the Italian Motor Valley, sponsored by the four universities of the Emilia Romagna Region and by ten high-end international brands in the car sector, and funded by the Regione Emilia Romagna. School website: [highereducation-muner.it/description/](https://highereducation-muner.it/description/).

<sup>3</sup> The lecture was given in the session 'Automotive and Private Law', with a focus on the Tesla case.

shifts to the product rather than the event,<sup>4</sup> although as we see below, different legal systems specify varying solutions.

In order to have a clear picture of the problem it is necessary to clarify exactly what an autonomous vehicle is and how tort law is built up. Once these two points are clear, the relationship between them in the case of an accident is described.

The research method is based on the construction of tort law, levels<sup>5</sup> of autonomy of vehicles and case law. With reference to case law, it is important to emphasize that there are different solutions<sup>6</sup> which reflect on the Tesla case. This in fact is proof that there is still no single legislative solution for this new frontier.

The work consists of three steps, the first on the meaning of autonomous vehicle and the second on liability when an accident is caused by an autonomous vehicle. The third step focuses on a proposed solution, namely the recognition of a legal personality for autonomous vehicles similar to that of private entities.

<sup>4</sup> As will be seen in this essay, an attempt will be made to understand whether liability in the autonomous vehicle refers to the area of strict liability or to the area of producer liability.

<sup>5</sup> The Society of Automotive Engineers (SAE) developed an industry-standard scale from zero to five of driving automation, although there are many gray areas where features might overlap.

<sup>6</sup> The reason, as will be seen, is the absence of a legal framework, which means that many different solutions are possible.

Summary: 1. The definition of autonomous vehicle in the light of sustainable development. International overview. – 2. The European Union legal framework. – 3. The ‘Smart Road Decree’. – 4. A brief introduction to the civil liability in Italy. – 5. Civil liability and autonomous vehicles: the different theories. – 5.1. Liability for damage by compliant products applied to autonomous driving vehicles. – 6. An overview of the German Motor Vehicle Liability Act. – 7. The civil liability and autonomous vehicle in the USA. – 8. The Tesla case. – 9. A proposal for a solution.

1. *The definition of autonomous vehicle in the light of sustainable development. International overview*

As noted in the introduction, our first step is to define an autonomous vehicle in order for legal ramifications to be correctly described.

The Italian Ministerial ‘Smart Road’ Decree 70/2018<sup>7</sup> in Article 1, entitled ‘Definitions’, Clause 1, Subsection f states that a ‘self-driving vehicle’ means a vehicle equipped with technologies capable of adopting and implementing driving behaviors without the active intervention of the driver, in certain road environments and external conditions.

To avoid confusing the self-driving vehicle with a hybrid self-driving vehicle, Article 1, Clause 1, Subsection f also excludes from the definition of autonomous vehicle ‘a vehicle approved for circulation on Italian public roads according to the rules in force and equipped with one or more driving assistance systems, which are activated by a driver for the sole purpose of implementing driving behaviors decided by himself and which, however, require continuous active participation by the driver in driving activity’. So, the Italian legal system does not

<sup>7</sup> Published: [gazzettaufficiale.it/eli/gu/2018/04/18/90/sg/pdf](http://gazzettaufficiale.it/eli/gu/2018/04/18/90/sg/pdf).



recognize different levels of autonomy, but if driving involves any human intervention, it is not a case of self-driving.

The *ratio* for this may be legal in nature, because it is easier to identify responsibility in this way instead of having to make different cases on the basis of levels of autonomy.

Note that this solution is adopted in Italy, but not in other countries, as described below. It may be that Italian legislators believed that a clear definition would assist on the one hand the judge in deciding on cases and on the other in adapting legal provisions to new technologies. It is however the case that there are no self-driving cars on the road in Italy today, but there are hybrid cars, which leads to a real problem in identifying who is responsible when an accident occurs.

Before discussing this problem, we now briefly describe the origins of the ‘Smart Road’ Decree.

The use of autonomous vehicles is part of a much wider project: the EU aim of sustainable mobility.<sup>8</sup> Even before the COVID-19 pandemic, this was a key challenge for the EU, and today it has become one of the most sensitive objectives across the EU, including Italy, partly as a result of European economic aid to states.

The National Recovery and Resilience Plan (NRP), approved at European level on 13<sup>th</sup> July 2021 by a Council Implementing Decision, under ‘Mission 2: Green Revolution and Ecological Transition’, provides for the component (M2C2), ‘Renewable Energy, Hydrogen, Grid and Sustainable Mobility’ with resources of EUR 23.78 billion.<sup>9</sup> Sustainable mobility itself is linked to the principle of sustainable development,<sup>10</sup> which was already known, but which has become a

<sup>8</sup> A. Gordon, *Autonomous Vehicle Interaction Control Software and Smart Sustainable Urban Mobility Behaviors in Network Connectivity Systems*, in *Contemporary Readings in Law and Social Justice*, 2021, 13(1), p. 42: ‘Autonomous vehicles acting in accordance with traffic rules adequately and operating safer than human drivers configure positive perceptions towards self-driving cars as regards road sharing by use of big geospatial data analytics. In essential decision-making processes throughout progress of a self-driving car, intelligent motion planning is instrumental in obstacle avoidance, having as an objective the safest route to navigate, configuration of appropriate behavior, and convenient trajectory initiation by increase in efficiency while preserving road boundaries and traffic rules as relevant issues’.

<sup>9</sup> See [temi.camera.it/leg18/temi/l-innovazione-nel-trasporto-stradale-e-la-mobilita-sostenibile.html](https://temi.camera.it/leg18/temi/l-innovazione-nel-trasporto-stradale-e-la-mobilita-sostenibile.html).

<sup>10</sup> The origin is described in N. Nelson, *Land and Resource Management: III Colorado Journal of International Environmental Law and Policy*, 1996, 8, p. 59: ‘Five years after a global action plan for sustainable development emerged from the UN Conference on

fundamental principle in many countries<sup>11</sup> since the UN Conference on Environment and Development (UNCED)<sup>12</sup> in 1992.

It is interesting to see how ‘the term “sustainable development” originated with the World Commission on Environment and Development, more commonly known as the Brundtland Commission. That Commission was established by the United Nations as an independent body charged with examining the world’s environmental and development problems and making proposals to solve those problems. Its report, entitled *Our Common Future*, was published in 1987,<sup>13</sup> and it is from that report that sustainable development as a term and a concept arises’.<sup>14</sup>

Ecological economist Herman Daly was the first to supply a definition of sustainable development, stating that the rate of utilization of renewable resources should not exceed their rate of regeneration.

Environment and Development (UNCED), domestic legal legislation remains the primary impetus for sustainable development in the world. Although the goal of sustainable development has been included in many international treaties since the UNCED, the primary impetus for real change in sustainably managing resources of primarily developing nations remains the enactment and enforcement of domestic law and regional agreements, with the political encouragement and financial support of developed nations, multilateral lending institutions, and international nongovernmental organizations (NGOs)’.

<sup>11</sup> N. Nelson, cit., p. 59, provides an overview of the reaction of various countries after the Commission. ‘The Philippine government, for example, this year issued Philippine Agenda 21: A National Agenda for Sustainable Development, a “common covenant” among Philippine NGOs, government, and businesses. “China has also established an Agenda 21 plan at the national level”. A working group of the Asia-Pacific Economic Cooperation organization will meet in Hong Kong in 1997 to discuss strategies to address the sustainability of the marine environment’.

<sup>12</sup> United Nations Conference on Environment & Development, Rio de Janeiro, Brazil, 3<sup>rd</sup>-14<sup>th</sup> June 1992 AGENDA 21, was the first worldwide Commission on it, where ‘in order to meet the challenges of environment and development, States have decided to establish a new global partnership. This partnership commits all States to engage in a continuous and constructive dialogue, inspired by the need to achieve a more efficient and equitable world economy, keeping in view the increasing interdependence of the community of nations and that sustainable development should become a priority item on the agenda of the international community. It is recognized that, for the success of this new partnership, it is important to overcome confrontation and to foster a climate of genuine cooperation and solidarity. It is equally important to strengthen national and international policies and multinational cooperation to adapt to the new realities’. See *Sustainabledevelopment.un.org*.

<sup>13</sup> Brundtland Report, (*Our Common Future*), World Commission on Environment and Development (WCED) 1987.

<sup>14</sup> C. Chiasson, *Sustainable development*, in *Feature on Environmental Law*, 1999, p. 2.

The Bruntland Report<sup>15</sup> added that ‘Sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs’. This definition involves two elements.

The first is equity between the present and future generations with regard to the use of resources. This is understood to imply careful and well-considered current use of resources, particularly non-renewable resources, to ensure continued availability for future generations. ‘In this regard, factors such as improving environmental sustainability through pollution control plans, support for green buildings and alternative energies, efficient water and waste management, and existence of policies that help counter the impacts of climate change are essential to ensure the long-term sustainability of cities’.<sup>16</sup>

The second element is integrated decision-making which takes factors other than the purely economic into account. This sees the environment and the economy as being interconnected and focuses on considering all consequences of decisions made and actions taken.

To achieve the desired result, the 2002 Declaration of Johannesburg indicated ‘the three pillars of sustainable development – economic development, social development and environmental protection – at local, national, regional and global levels’.<sup>17</sup>

The three pillars are inter-linked and today the hypothesis of sustainable development entails sustainable mobility, which also affects economic development and environmental protection. Promoting sustainable mobility in fact means narrowing the social gap and ensuring fewer emissions from fewer cars. We are already moving in this direction thanks to the sharing economy,<sup>18</sup> examples of which, like car- and bike-share schemes, and more recently e-scooters, can be found in Italian cities.

Autonomous vehicles are part of this picture. They meet the need for a sustainable economy and respond to the advent of IoT in transport,<sup>19</sup>

<sup>15</sup> B. Savioli, *Ambiente e sviluppo sostenibile tra diritto internazionale e ricadute interne*, in *Percorsi costituzionali*, 2016, p. 589 ss.; F. Fracchia, *Lo sviluppo sostenibile. La voce flebile dell'altro tra protezione dell'ambiente e tutela della specie umana*, Napoli, 2010.

<sup>16</sup> A. Vegara, *The critical factors for the competitiveness of cities*, WIT Transactions on Ecology and the Environment, 2016, 204, pp. 47-56.

<sup>17</sup> Article 5 of Johannesburg declaration: [europa.eu/rapid/press-release\\_IP-02-1133\\_it.pdf](http://europa.eu/rapid/press-release_IP-02-1133_it.pdf).

<sup>18</sup> For an overview of the various aspects of the issue see Aa.Vv., *Sharing economy. Profili giuridici*, Di Sabato D. and A. Lepore eds, Napoli, 2018.

<sup>19</sup> The definition of intelligent transport in Article 4 European Parliament and Council Directive 2010/40/EU of 7<sup>th</sup> July 2010 on the framework for the deployment of

which entails greater connectivity of cities (Smart cities).<sup>20</sup> Smart mobility is one dimension of sustainable mobility, and means ease of access and use of modern transport systems in urban and intercity transport. It is measured by indicators including ease and portability at local and national level, the availability of information and communication technology infrastructure, as well as the availability of sustainable, innovative and secure transport systems.<sup>21</sup>

## 2. *The European Union legal framework*

The principle of sustainable development also plays a key role at European level, and Article 3 of the Treaty of European Union, Paragraph 3, states that the European Union ‘shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment. It shall promote scientific and technological advance’.

As noted above, sustainable mobility is an offshoot of the principle of economic development, and the EU is world leader in road safety. It also has the potential to become world leader in the field of connected and automated mobility, which would lead to a sea change in mobility efficiency and reduction of road fatalities. International statistics in fact show that 94% of accidents have the human factor among their

Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, [2010] OJ L. 207/1 is as follows: “Intelligent Transport Systems” or “ITS” means systems in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as for interfaces with other modes of transport’.

<sup>20</sup> A. Nezai, N. Abdellah and K. Yazid, *The potential offered by smart cities to promote smart tourist destinations*, in *Technium Social Sciences Journal*, 2021, 22, p. 659 “Smart or intelligent” has become a new buzzword to describe technological, economic and social developments fueled by technologies that rely on sensors, Big Data, open data, new modes of connectivity and exchange of data and information, and the term was added to cities (smart city) to describe efforts that aims to use technologies in an innovative way to optimize the use of resources, efficient and equitable governance, sustainability and quality of life’.

<sup>21</sup> R. Giffinger and N. Pichler-Milanović, *Smart cities: Ranking of European medium-sized cities: Centre of Regional Science*, Vienna University of Technology, 2007.

causes. Because the self-driving car will be electric, there will be a fall in harmful emissions as well as congestion.

The use of Intelligent Transport Systems (ITS), smart vehicles and autonomous mobility is expected to support the achievement of ‘zero fatalities’ by 2050. The European Commission thus plans to work within the framework of the ITS Directive to ensure secure and reliable communications between vehicles and infrastructure.

The ITS Directive 2010/40/EU on the ‘Framework for the deployment of Intelligent Transport Systems in the field of road transport and interfaces with other modes of transport’ in force since 26<sup>th</sup> August 2010 is the reference legislation for ITS in Europe.

‘This Directive establishes a framework in support of the coordinated and coherent deployment and use of Intelligent Transport Systems (ITS) within the Union, in particular across the borders between the Member States, and sets out the general conditions necessary for that purpose’.<sup>22</sup>

### 3. *The ‘Smart Road Decree’*

The Italian ‘Smart Road’ Ministerial Decree was approved in this context in 2018. Article 9 of the decree provides for authorization to experiment with autonomous vehicles.

First of all, note that autonomous vehicles include both public and private transport, and in Italy trials are taking place in both types. The present paper notes examples in Padova, Turin and Livorno, but the focus is on private transport, with regard to civil liability when an accident occurs.

In Italy, the first trial of a self-driving car took place in Parma, at VisLab,<sup>23</sup> which started as a spinoff of the University of Parma, and later became part of the Ambarella group.

There is currently no single regulatory framework governing liability, and the issue is open and attracting increasing interest. On 16<sup>th</sup> February 2017, the European Parliament adopted a resolution containing recommendations to the Commission concerning civil law

<sup>22</sup> Article 1 European Parliament and Council Directive 2010/40/EU of 7<sup>th</sup> July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, [2010] OJ L. 207/1.

<sup>23</sup> See *Vislab.it*.

rules on robotics, for the adoption of a common regulatory system in the field of robotics. The aim is to recognize the ‘legal personality’ of robots and their civil liability towards third parties.

The attention of European institutions to the issue shows that this legal-economic problem is affecting several EU countries. The European Commission passed the first draft of the Code of Ethics for the use of Artificial Intelligence on 18<sup>th</sup> December 2018.

In Italy, too, there is an absence of specific legislation in this area, so that problems of future protection arise.

As noted above, scientists and legal experts<sup>24</sup> were widely in favor of recognizing legal personhood of robots, but on 20<sup>th</sup> October 2020 the European Parliament adopted three resolutions and two proposals for regulations on ethics, liability and intellectual property of AI systems.<sup>25</sup>

Liability of AI systems negates the idea of a robot having legal personhood<sup>26</sup> and introduces instead the civil liability of the operator. This is because ‘the concept of ‘liability’ plays an important double

<sup>24</sup> G. Teubner, *Soggetti giuridici digitali? Sullo status privatistico degli agenti software autonomi*, P. Femia ed., Napoli, 2019; ibidem, *Ibridi ed attanti. Attori collettivi ed enti non umani nella società e nel diritto*, Milano, 2015; S. Chopra and L. White, *Artificial Agents – Personhood in Law and Philosophy*, in *Proceedings of the 16<sup>th</sup> European Conference on Artificial Intelligence*, ECAI, 2004; Gleß S. and Seelmann K., *Intelligente Agenten und das Recht*, Baden-Baden, 2016; A. Matthias, *Automaten als Träger von Rechten*, Berlino, 2010.

<sup>25</sup> P. Serrao D’Aquino notes in *La responsabilità civile per l’uso di sistemi d’intelligenza artificiale nella Risoluzione del Parlamento europeo del 20 ottobre 2020: “Raccomandazioni alla Commissione sul regime di responsabilità civile e intelligenza artificiale”*, in *Diritto pubblico europeo Rassegna* online, 2021, f. 1, p. 251. ‘È esclusa l’opzione radicale di attribuire la personalità giuridica ai sistemi di IA, ipotesi teorizzata da alcuni studiosi anglosassoni e, comunque [...] non impossibile sul piano giuridico-concettuale (per la personalità attribuita agli enti e, in una certa misura, per il riconoscimento di patrimoni separati), ma fortemente inopportuna per l’innescarsi di problemi eticamente e politicamente drammatici, connessi all’inevitabile riconoscimento anche di poteri e di diritti dell’IA (The radical option of attributing legal personhood to AI systems is excluded. This hypothesis is theorised by Northern European and American scholars and, in any case [...] is not impossible from a legal-conceptual point of view – given that personhood can be attributed to entities and, to a certain extent, given the recognition of separate assets. But it is highly inappropriate because it triggers ethically and politically important problems connected with the inevitable recognition of AI powers and rights)’. See also U. Salanitro, *Intelligenza artificiale e responsabilità: la strategia della Commissione europea*, in *Riv. dir. civile*, 2020, no. 6, p. 1246 ss.; A. Fusaro, *Quale modello di responsabilità per la robotica avanzata? Riflessioni a margine del percorso europeo*, in *NGCC*, 2020, no. 6, p. 1344 ss.

<sup>26</sup> This is because recognizing legal personhood of the robot involves questions of ethical behavior.

role in our daily life: on the one hand, it ensures that a person who has suffered harm or damage is entitled to claim and receive compensation from the party proven to be liable for that harm or damage, and on the other hand, it provides the economic incentives for natural and legal persons to avoid causing harm or damage in the first place or price into their behaviour the risk of having to pay compensation'.<sup>27</sup>

In order to justify the application of civil liability in these cases, the European legislator notes that 'using the term "automated decision-making" would avoid the possible ambiguity of the term AI. "Automated decision-making" on the other hand involves a user initially delegating, partly or completely, a decision to an entity by way of using software or a service. That entity in turn uses automatically executed decision-making models to perform an action on behalf of a user, or to inform the user's decisions in performing an action'.<sup>28</sup> This appears to refer to autonomous vehicles and the different levels of autonomy.<sup>29</sup> This difference is reasonable, because nowadays there are as yet no self-driving cars on the road, and although they will undoubtedly arrive during our life-times, they will work on the basis of data entered by the manufacturer.

However, an automated decision is different from an autonomous decision, and the legal concept of will is fundamental in this difference.<sup>30</sup> So, the first point to be clarified is whether AI systems<sup>31</sup> can express their own free will<sup>32</sup> by using the data entered into their databases by their manufacturer.

It appears that European legislation opted to regulate automated decision-making of autonomous vehicles, which means that they apply

<sup>27</sup> The European Parliament Resolution of 20<sup>th</sup> October 2020 made these recommendations to the Commission on a civil liability regime for artificial intelligence (2020/2014(INL)) in *Europarl.europa.eu*.

<sup>28</sup> European Parliament resolution of 20<sup>th</sup> October 2020 with recommendations to the Commission on a civil liability regime for artificial intelligence, Section G (2020/2014(INL)) in *Europarl.europa.eu*.

<sup>29</sup> See Section 5.

<sup>30</sup> Here the problem of free will and AI arises, especially as AI can be applied in different ways, for example in a smart contract and in an autonomous vehicle, etc. This problem is discussed in more depth in the following sections. For an overview of free will and IA, see G. Resta and Z. Zenkovich, *Volontà e consenso nella fruizione dei servizi in rete*, in *Riv. trim. dir. proc. civ.*, 2018, f. 2, p. 411 ss., and G. Finocchiaro, *Il contratto nell'era dell'intelligenza artificiale*, in *Riv. trim. dir. proc. civ.*, 2018, f. 2, p. 445.

<sup>31</sup> For AI system, read 'autonomous vehicle'.

<sup>32</sup> See G. Maira, *Intelligenza umana e intelligenza artificiale*, in *Federalismi.it*, no. 7, 2021, which offers a scientific explanation of the difference.



to a real case on the basis of data entered into a database for a hypothetical case, which may or may not correspond to what has occurred.

The proof of this is the European Parliament proposal for a liability regime for Artificial Intelligence,<sup>33</sup> which is probably the result of the logical reasoning that non-recognition of legal personhood implies that AI systems are not recognized as possessing free will. Inability to decide on its own means that the system is unable to take responsibility for itself, so that it becomes an object rather than a subject of law.<sup>34</sup>

<sup>33</sup> Initially, however, the European Parliament had opted for the assignment of a heritage to robots rather than subjectivity. See European Parliament Resolution of 16<sup>th</sup> February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)), [2017] OJ, C 252-239, p. 16.

<sup>34</sup> See also G. Finocchiaro, *Il contratto nell'era dell'intelligenza artificiale*, in *Riv. trim. dir. proc. civ.*, 2018, f. 2, p. 445. Finocchiaro reaches a partly different conclusion, but states that: 'si tende ad antropomorfizzare il fenomeno, come se le intelligenze artificiali coinvolte fossero emanazioni di soggetti umani. Ciò ha condotto anche [...] a riferirsi al programma informatico come "rappresentante" e, per giungere a questo risultato, a prospettare una soggettività giuridica. Tuttavia questa operazione appare non necessaria. Infatti, anche qualora si configurasse il *software* come rappresentante, ciò che rilevarebbe comunque sarebbe, in termini di responsabilità, in ultima analisi, il patrimonio del rappresentante, al fine del risarcimento del danno. Dunque, occorrerebbe, comunque attribuire un patrimonio al rappresentante, cioè al *software* (there is a tendency to anthropomorphise the phenomenon, as though artificial intelligences involved were emanations of human subjects. This has also led [...] to referring to the computer program as a "representative" and, in order to achieve the result, to envisage a legal subjectivity. However, this operation seems unnecessary. In fact, even if software were configured as a representative, what would be relevant in terms of liability would in any case be, in the final analysis, the assets of the representative, for the purpose of compensation for the damage. Therefore, it would in any case be necessary to attribute assets to the representative, ie to the software)'. This issue is also discussed by M. Costanza, *L'Intelligenza Artificiale e gli stilemi della responsabilità civile*, in *Giur. it.*, 2019, p. 1686 and U. Ruffolo, *Intelligenza artificiale, Machine learning, e responsabilità da algoritmo*, in *Giur. it.*, 2019, p. 1709, who argues that: 'l'entità robotica resta un "bene" anche se e quando dovesse essere in qualche misura "personificata", magari con l'attribuzione di risorse attingendo alle quali rispondere, ad un qualche titolo, per sinistri che abbia contribuito a causare [...] Non è, in altri termini, indispensabile la transizione da bene a persona [...]. Si può essere "responsabili", e titolari di risorse patrimoniali, anche senza avere personalità giuridica, e comunque senza dover necessariamente ricevere la equiparazione allo status della persona umana. E si può essere responsabili anche quando si sia enti ai quali sia irriferribile il concetto di "colpa", essendo questa (non solo sempre più oggettiva, ma) ormai ridotta ad uno tra i tanti criteri di attribuzione della responsabilità; e non l'unico, e neppure il preminente (the robotic entity remains an "asset" even if and when it is to some extent "personified", perhaps with the allocation of resources from which to respond, in some capacity, for accidents it has contributed to causing [...]. In other words, the transition from asset to personhood is not indispensable [...]. Something can be "responsible", and holder of patrimonial resources, even without having legal personhood,



This is probably why European legislation aims to provide certain protection in the future by implementing old legal tools for future AI case law. This is particularly clear in the Resolution, which reads: ‘The legal system of a Member State can adjust its liability rules for certain actors or can make them stricter for certain activities’.<sup>35</sup>

The EU makes reference to solutions adopted in each Member State, but it has not designed a new framework of legal protection, or any specific regulation.<sup>36</sup>

In Italy, too, there is an absence of specific legislation in this area,<sup>37</sup> and problems relating to protection will arise in the future.

#### 4. *A brief introduction to the civil liability in Italy*

Before focusing on liability in autonomous vehicles, it is necessary to clarify the purpose of this section. It is not a general treatise on responsibility, but rather looks in depth at one particular aspect. Some background is supplied below.

The European Parliament Resolution of 20<sup>th</sup> October 2020 with recommendations to the Commission on a civil liability regime for artificial intelligence suggests that civil liability is the most appropriate legal tool for protection.

Liability in the autonomous vehicle can be better understood through the construction of liability rather than its history.<sup>38</sup> Here we

and in any case without necessarily having to be treated as a human being. And even a body to which the concept of “fault” cannot be attributed can be liable, since this criterion (not only increasingly objective, but) now reduced to one of the many criteria for attributing liability, is not the only criterion, nor even the pre-eminent one’.

<sup>35</sup> See C) of European Parliament Resolution of 20<sup>th</sup> October 2020 with Recommendations to the Commission on a Civil Liability Regime for Artificial Intelligence (2020/2014(INL)), cit.

<sup>36</sup> European Parliament Resolution of 20<sup>th</sup> October 2020 in fact contains a proposal for a single European regulation in the short term.

<sup>37</sup> See M. Ratti, *Riflessioni in materia di responsabilità civile e danno cagionato da dispositivo intelligente alla luce dell'attuale scenario normativo*, in *Contr. Impr.*, 2020, f. 3, p. 1179.

<sup>38</sup> M. Bianca, *La responsabilità*, in *Tratt. dir. civ.*, Milano, 1994, p. 726, F. Galgano, *Tratt. dir. civ.*, 3, cit., p. 199 ss.; P. G. Monateri, *La responsabilità civile*, in *Tratt. dir. civ.* Sacco, Torino, 1998, 22; M. Franzoni, *L'illecito*, in *Tratt. resp. civ.*, Milano, 2010, p. 506. Among the numerous works on civil liability, see also G. Visintini, *Fatti illeciti: Fondamenti e nuovi sviluppi della responsabilità civile*, Pisa, 2019; G. Villa, *Il tort of negligence nel sistema inglese dei fatti illeciti*, in *Contr. Impr.*, 2011, 1, p. 273.

briefly describe the meaning and construction of liability, moving from general to specific and identifying any elements common to both.

Article 2043 of the Italian Civil Code defines civil liability as: ‘any intentional or negligent act that causes unjust damage to others, [which] obliges the person who committed the act to compensate for the damage’.

The first part of the definition indicates a tort, ie an individual performs an act with malice or negligence causing an event which damages the subjective legal sphere of a third party. The relation between act and event is causal link. The causal link identifies who is responsible for the tort. Having ascertained who is responsible, the judge will sentence the party to pay damages, according to the second part of Article 2043 of the Civil Code above. This last point refers to the type of link between the tort and the damage, ie the legal link.<sup>39</sup>

In order for there to be civil liability, both causal and legal links must be present. This legal provision follows the general principle of personal liability.

The question examined here is whether the Italian legal system allows for non-personal liability.

Cases where there is no causal link between the act and the damage can be decided on the basis of strict liability. However strict liability can be at odds with the general principle of personal liability, because liability can lie with a person who did not directly and materially cause the harmful event.

In order to avoid conflict, legislation provides for only limited cases where strict liability<sup>40</sup> can occur. These cases are exceptions to the general principle of personal liability, and apart from these exceptions, strict liability is not possible.

The reference is to Articles 2047 to 2054 of the Civil Code, but in reality there are different types<sup>41</sup> of strict liability, most of which

<sup>39</sup> For an in-depth description of Italian civil liability see V. Geri, *Il rapporto di causalità in diritto civile*, in *Resp. Civ. Prev.*, 1983, nn. 3-4, p. 338 ss.; G. Valcavi, *Intorno al rapporto di causalità nel torto civile*, in *Riv. Crit. Dir. Priv.*, 1995, II, p. 481 ss.; M. Taruffo, *La prova del nesso causale*, in *Riv. Crit. Dir. Priv.*, 2006, I, p. 101 ss.

<sup>40</sup> M. Comporti, *Fatti illeciti: responsabilità oggettive*, Milano, 2009, in *Il Codice Civile, Commentary by Schlesinger*, ed. Busnelli, Artt. 2049-2053, Milano, 2013, p. 210.

<sup>41</sup> V. Geri, *Il rapporto di causalità in diritto civile*, cit. Differentiates between the case when the liable party does not have a particular role or position, and the case when the liable party is responsible for the tort on the basis of role: ‘Laddove si risponde senza colpa, o, come impropriamente suol dirsi, in via obbiettiva, l’accertamento del nesso causale, anche se

(Italian Civil Code, Articles 2047, 2048, 2049) have in common that the perpetrator of the harmful event is under the control of another person. Only if the latter demonstrates that everything necessary was done to prevent the perpetrator from committing damage is it possible to hold him or her liable.

In the area of strict liability there are also cases where the particular link between subject and object which led to the tort makes the subject liable (Italian Civil Code, Articles 2051; 2052; 2053). In these cases, the liable party is the one which has obligations linked to ownership. An owner can be liable for damages when he or she has failed to take care of property and this failure has led to damage to a third party, for example when the roof of a building falls and causes damage to a passer-by.

On the other hand, there are cases where the causal link exists, but the perpetrator of the harmful event is not liable, such as when he or she acts by *force majeure* or necessity (Italian Civil Code, Article 2045). The two cases (*force majeure* and necessity) are derogations from the main principle of personal liability and are clearly provided for by legislation.

We now discuss whether Italian civil liability corresponds to the idea of civil liability in the European Parliament Resolution of 20<sup>th</sup> October 2020 on ‘a civil liability regime for artificial intelligence’, as regards autonomous vehicles.

The problem arises because the Italian Civil Code contains a specific article on ‘vehicle circulation’, linked to Law no. 990 of 24<sup>th</sup> December

non riferito direttamente a colui che è chiamato a rispondere, deve pur sempre ricorrere con riferimento alla sua sfera giuridica (where one is liable without fault, or, as it is improperly termed, objectively, the assessment of the causal link, although it may not refer directly to the person liable, must always refer to the legal sphere)’. Geri continues ‘forse soltanto nella responsabilità qualificata “normativa o legale”, nella quale il soggetto è chiamato a rispondere in dipendenza di una sua posizione, come avviene ad esempio per l’esercente dell’impianto nucleare nel quale si sia verificato un incidente esso pure di carattere nucleare, il problema della causalità assume un rilievo secondario, se pure, anche in tale caso, l’impianto costituisca l’occasione necessaria, il teatro dell’evento dannoso e ne derivi quindi talvolta l’esigenza di accertamenti quanto mai vicini a quelli propri del rapporto di causalità (It is perhaps only in the case of “regulatory or legal” liability, where the individual is held to account on the basis of his or her role or position, as for example in the case of an operator at a nuclear plant where an accident, possibly a nuclear accident, has occurred, that the problem of causality becomes of secondary importance. In this case, the nuclear plant constitutes the necessary condition, the scene of the harmful event, and therefore sometimes gives rise to the need for investigations very similar to those focussing on a cause relationship’.

1969, ‘Assicurazione obbligatoria della responsabilità civile derivante dalla circolazione dei veicoli a motore e dei natanti’ (Compulsory insurance against civil liability arising from the use of motor vehicles and boats) and to Legislative Decree no. 285 of 30<sup>th</sup> April 1992, ie ‘Nuovo codice della strada’ (New Highway Code). However, European legislation, particularly the 1968 Vienna Convention, recently amended and currently in force, makes it mandatory for every moving vehicle to have a driver who must be in full control of the driving.

The driver of the car can only let go of the steering under certain conditions, but must supervise it at all times and must be able to rapidly regain control. Regulation UN/ECE R79 makes the same specifications.<sup>42</sup>

It is clear that to date that civil liability in car accidents has been mainly linked to human action. For example, Italian Civil Code Article 2054, Comma 1 on ‘vehicle circulation’ clearly identifies the responsibility. It states: ‘The driver of vehicle other than a vehicle running on rails shall be obliged to compensate for damage to persons or property caused by the vehicle. [...]’.

This is still in the field of civil liability, but not strict liability, because here the vehicle is a tool under the full control of the driver.

Unfortunately, however, self-driving cars do not seem to be covered by Article 2054 of the Italian Civil Code, and so far there have been no proposals accepted for new regulation. This could mean that there is no legal protection available against accidents for autonomous vehicles, because they are not covered by either civil liability or strict liability, which can only be provided for in a typical case by law.

## 5. Civil liability and autonomous vehicles: the different theories

Where does liability lie when an accident is caused by an autonomous vehicle? The driverless car is the latest technological development in

<sup>42</sup> On the topic see I. Ferrari, *Analisi comparata in tema di responsabilità civile legata alla circolazione dei veicoli a guida autonoma*, in *Smart Roads e driverless cars: tra diritto, tecnologie, etica pubblica*, ed. S. Scagliarini, Torino, 2019, p. 99; A. Di Rosa, *Il legal framework internazionale ed europeo*, in *Smart Roads e driverless cars: tra diritto, tecnologie, etica pubblica*, ed. S. Scagliarini, Torino, 2019, p. 65.

Artificial Intelligence (AI), although today full automation has not yet been reached.<sup>43</sup>

A few car companies are building the next generation of driverless car, the main ones being Tesla and Audi. Technologically in fact it should already be possible to build a fully automated vehicle, but companies are prevented from doing so by national legislation.<sup>44</sup> They thus opt to make cars with options, which when switched on, will give life to the fully autonomous car.

Before analysing possible liability profiles, we should distinguish between autonomous vehicles, and from now on it is important to stress that in Italy vehicles are not classified as higher than third level.

Five levels of automation are defined by the Society of Automotive Engineers (SAE).<sup>45</sup> The first two<sup>46</sup> are not relevant to this discussion because the driver still has full control over the vehicle. The degree of automation becomes more interesting moving upwards.

Level 2 – partial automation: the driver gives the car control over the accelerator and steering in particular situations, but the control systems require the driver to be ready to intervene at all times.

<sup>43</sup> Some researchers have noted the difference between the self-driving car and the driverless car, and point out that the self-driving car exists today, but not yet the latter. See U. Ruffolo and E. Al Mureden, *Autonomous vehicles e responsabilità nel nostro sistema ed in quello statunitense*, in *Giur. it.*, 2019, p. 1709: ‘La diffusione dell’automobile “che si guida da sola” attraverserà due fasi: quella già attuale, con veicoli selfdriving a bordo dei quali il guidatore deve rimanere vigile anche quando inerte; quella successiva, ma il cui avvento si attende tra non meno di qualche decennio, nella quale l’auto diventerà driverless, priva di comandi manuali, e solo ad essa sarà riservata la circolazione [...]’ (The spread of the “self-driving” car will go through two phases. The current phase sees self-driving vehicles in which the driver on board must remain alert even when not moving. The next phase, expected in no less than a few decades, is when the car will become driverless, without manual controls, and only driverless cars will be permitted to circulate [...]).

<sup>44</sup> In Italy see ‘Decreto del Ministero dei trasporti del 28 febbraio 2018, recante Modalità attuative e strumenti operativi della sperimentazione su strada delle soluzioni di ‘Smart Road’ e di guida connessa e automatica, attuativo dell’art. 1, comma 72, l. 27 dicembre 2017, n. 205 (Decree of the Ministry of Transport of 28<sup>th</sup> February 2018, on Implementation modalities and operational tools for road testing of Smart Road and connected and automatic driving solutions, implementing Article 1, Paragraph 72, Law 27<sup>th</sup> December 2017, no. 205)’.

<sup>45</sup> See *Sae.org*.

<sup>46</sup> SAE levels 0 to 2 are those where ‘you are the driver whenever these driver support features are engaged, even if your feet are off the pedals and you are not steering. You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety’. See *Sae.org*.

Level 3 – conditional automation: the driver may not have continuous control over the longitudinal and lateral movement of the vehicle. It is complex to predict how and when the driver will take control of the vehicle again.

Level 4 – high level of automation: vehicles travel alone in certain situations such as motorways or self-parking. The driver introduces the autopilot and resumes driving outside the automated zones. If the driver does not resume driving, the system intervenes by moving the vehicle to a safer position.

Level 5 – (top level) complete automation: the vehicle drives itself, without any intervention by the driver.

Given that the maximum authorized level of automation is now Level 3 in Italy, problems with the identification of responsibility profiles arise with Levels 2 and 3. At Levels 4 and 5 it is slightly less difficult to identify responsibility for a road accident, because the European Parliament in Resolution of 20<sup>th</sup> October 2020, indicates that the producer or the operator are alternatively responsible. The Resolution also provides for cases in which both are jointly liable.<sup>47</sup>

The greater the automation of the machine, the simpler it is to indicate who is responsible. It is reasonable to say that at higher levels of automation, the manufacturer (or operator) is responsible, because no human input is required. It is not however clear who will be responsible when the accident falls outside the responsibility of manufacturer or operator. It may be that such unforeseeable cases will be assigned to *force majeure*.

The German legal system is today the only system to enact a law on liability on autonomous vehicle accidents. In order to avoid assigning cause to *force majeure*, Section 63 of the StVG (Road Traffic Act) lays down that a satellite navigation system must be installed in highly and fully automated vehicles which records when the automated control of the vehicle has been switched on and when the system has instructed the driver to take control of the steering wheel of the vehicle.<sup>48</sup> This means that either the producer or the owner will be liable and damaged party will be compensated.

<sup>47</sup> Article 11 ‘Joint and several liability’: ‘If there is more than one operator of an AI-system, they shall be jointly and severally liable. If a frontend operator is also the producer of the AI-system, this Regulation shall prevail over the Product Liability Directive [...]’.

<sup>48</sup> See B. Roshan, *Automatisiertes und autonomes Fahren im Überblick*, in *NJW-Spezial*, 2021, p. 138.

It is also true, as we will see below, that the level of automation is not the same everywhere. For example, in Germany the level of automation is 4°, while in Italy it is still 3° and on trial, which is why some aspects of protection are covered by law in Germany and not yet in Italy.

There are more difficulties at SAE Levels 2 and 3 because they involve a mixed system of self-driving and driver control. Note however that at Level 2, driver distraction is taken account of in legislation, and in some States<sup>49</sup> Tesla might be held liable for facilitating distraction, or at least for not preventing it in car design.

So, because levels of autonomy are different, it is clear that civil liability will differ between them. There is thus no single answer to question asked at the beginning, and different theories can be applied.

With the aim of resolving these issues, the European Commission set up a High Level Group on the Competitiveness and Sustainable Growth of the Automotive Industry in the European Union (GEAR 2030)<sup>50</sup> in 2015. GEAR is intended to address the various issues that will arise as vehicles move into the next generation of transport.

Some academics believe that GEAR will successfully resolve the problem,<sup>51</sup> but others do not believe that it will. On one hand, at lower SAE levels, the vehicle is still subject to human control, and it is not possible for the law to be completely different from current legislation

<sup>49</sup> See below.

<sup>50</sup> GEAR has drafted a roadmap for automated driving, 'Prioritising the Safety Potential of Automated Driving in Europe', published by European Transport Safety Council (ETSC) in *Etsc.eu*. The report identifies economic growth in many sectors linked to traffic, described on the Platform for the Deployment of Cooperative Intelligent Transport Systems in the European Union (C-ITS) in [ec.europa.eu/transport/sites/transport/files/themes/its/doc/c-its-platform-finalreport-january-2016.pdf](http://ec.europa.eu/transport/sites/transport/files/themes/its/doc/c-its-platform-finalreport-january-2016.pdf).

<sup>51</sup> One such academic is E. Al Mureden, *Autonomous cars e responsabilità civile tra disciplina vigente e prospettive de iure condendo*, in *Contr. impr.*, 2019, no. 3, p. 909 'una prospettiva de iure condendo, appare indifferibile l'individuazione di linee di indirizzo che consentano la creazione di un nuovo sistema di regole capaci di governare i molteplici aspetti che concorrono nella regolamentazione della circolazione dei veicoli di livello 4 e 5 nei quali l'intervento del pilota risulterà sempre più marginale fino ad essere sostanzialmente relegato ad ipotesi del tutto residuali (with respect to law in a transitional stage or in the process of being established, it is essential to identify guidelines to create a new system of rules able to govern the many aspects involved in regulating the circulation of Level 4 and 5 vehicles, in which the intervention of the driver will be increasingly marginal, to the point of being essentially relegated to residual hypotheses)'. See also G. Calabresi and E. Al Mureden, *Driverless car. Intelligenza artificiale e futuro della mobilità*, Bologna, 2021.



enshrined in Article 2054 of the Italian Civil Code, which is today applicable to autonomous vehicles at Levels 2 and 3.<sup>52</sup>

On the other hand, the fact that the law makes simpler provision for more advanced technologies may make them too expensive, and thus safer technologies may be penalized.<sup>53</sup>

Among current articles on civil liability, Article 2049 of the Italian Civil Code ‘Liability of masters and employers’ states that: ‘Masters and employers are liable for the damage caused by an unlawful act of their servants and employees in the exercise of the functions to which they are assigned’. The Article is still in force, and was probably at one time applied to mobility. In fact, before cars, humankind relied on the strength of animals to move longer distances and the servant, or employee, was often the human agent guiding the animal.

It could thus be reasoned that the artificial intelligence of today corresponds to the human intelligence of the servant of the past,<sup>54</sup>

<sup>52</sup> U. Ruffolo and E. Al Mureden, *Autonomous vehicles e responsabilità nel nostro sistema ed in quello statunitense*, in *Giur. it.*, 2019, p. 1705.

<sup>53</sup> U. Ruffolo and E. Al Mureden, cit., pp. 1704 and 1705: ‘le regole non possono essere differenziate troppo a seconda che la conduzione sia umana od invece automatizzata, almeno fino a quando entrambe coesisteranno. [...] La seconda considerazione, non meno rilevante, è quella che, applicando criteri e metodi sia di analisi economica del diritto, sia di law and economics, eventuali norme nuove che impongano al pilota automatico capacità di percezione ed analisi dell’ambiente circostante più elevate di quelle umane si tradurrebbero, di fatto, in ostacoli non sempre giustificati, dal punto di vista economico ed etico, alla industrializzazione e fruizione di nuove tecnologie. Le quali riceverebbero una penalizzazione del tutto ingiustificata, specialmente se si considera che le stesse si rivelerebbero comunque capaci di assicurare maggiore sicurezza e diminuire significativamente i sinistri da circolazione su strada [...]’ (the rules cannot be differentiated too much according to whether driving is human or automated, at least as long as both coexist. [...] The second consideration, which is no less important, is that, by applying criteria and methods of both economic analysis of the law and of law and economics, any new rules imposing on the autopilot the ability to perceive and analyse the surrounding environment at a higher level than human beings would in fact result in obstacles to the industrialisation and use of new technologies which are not always justified from an economic and ethical point of view. They would be penalised in a totally unjustified manner, especially since they would in any case be able to ensure greater safety and significantly reduce road accidents [...]).

<sup>54</sup> U. Ruffolo and E. Al Mureden, *Autonomous vehicles e responsabilità nel nostro sistema ed in quello statunitense*, in *Giur. it.*, 2019, p. 1707 ‘il committente che incarica della guida un autista è responsabile della altrui conduzione “intelligente” ex art. 2049 c.c., rispondendo per l’illecito di quel commesso (dunque per il deviante dispiegarsi di quella intelligenza umana) (the principal who entrusts a driver with the task of driving is liable for the “intelligent” driving of others under Article 2049 of the Civil Code, answering for the wrongful act committed by that driver – ie for the deviant deployment of that human intelligence –)’. See also U. Ruffolo, *La responsabilità vicaria*, Milano, 1976, who differentiate



who was not responsible for his or her actions, and executed actions while not free in spite of possessing will. In this way Article 2049 of the Civil Code could be ‘updated’ to apply to autonomous vehicles in the case of accident, in a new objective interpretation.<sup>55</sup>

This theory, which in some doctrines is applied to AI,<sup>56</sup> is termed vicarious liability. The solution is however somewhat unsatisfactory because AI is a sort of extension of human intelligence. The autonomous vehicle moves on the basis of data entered by an operator, who unlike the servant has fully executive will and space to make free decisions. The ‘servant’ in this case is not fully controlled by another human.<sup>57</sup>

between the servant (non-labile) and the carter, the latter will be liable for damage caused by horse, even if it is not his. Ruffolo call it *Vicarius* liability (Article 2052 Italian Civil Code); G. Visentini, *Trattato breve della responsabilità civile*, Padova, 2005, p. 619; C. De Menech, *La responsabilità vicaria nel diritto vivente*, in *Nuova Giur. Comm.*, 2017, 11, p. 1604.

<sup>55</sup> See E. Betti, *Interpretazione della legge e degli atti giuridici*, 2<sup>a</sup> ed., ed. C. Crifò, Milan, 1971, p. 99 ss., the interpretation ‘coglie l’atto nella sua concreta individualità, nel suo contenuto di spirito e di pensiero e nel senso che ha nell’ambiente sociale, spoglio di ogni qualificazione giuridica definitiva (the interpretation captures the act in its concrete individuality, in its spirit and thinking and in the meaning it has in the social environment, stripped of any definitive legal qualification)’.

<sup>56</sup> See G. Teubner, *Soggetti giuridici digitali? Sullo status privatistico degli agenti software autonomi*, P. Femia ed., Napoli, 2019.

<sup>57</sup> Similar reasoning can be found in M. Costanza, *L’Intelligenza Artificiale e gli stilemi della responsabilità civile*, in *Giur. it.*, 2019, p. 1686. ‘Pur aparendo la previsione dell’art. 2049 c.c. suscettibile di interpretazione analogica, la sua specialità sembra impedirne la estensione oltre i confini dei comportamenti umani. Difficile identificare la *eadem ratio* con riferimento ai danni cagionati dall’operato di agenti non umani per difetto della loro “intelligenza” artificiale, dal momento che la norma responsabilizza il committente per una specifica ipotesi di fallibilità del (dell’intelligenza del) suo “commesso”, ossia il compimento di un “fatto illecito”, il cui elemento soggettivo è specificamente ragguagliato alla natura umana di quella intelligenza. Potrebbe non essere congruo, allora, estendere la *eadem dispositio* ad entità non umane, insuscettibili di compiere “illeciti” e di agire con dolo o colpa (Although it appears that the provision of Article 2049 of the Italian Civil Code can be interpreted in the same way, its specific nature appears to prevent its extension beyond the confines of human behaviour. It is difficult to identify the *eadem ratio* damage caused by the actions of non-human agents due to a defect of their artificial “intelligence”, since the Article makes the commissioning agent liable for the specific hypothesis of fallibility of (the intelligence of) the person commissioned, in other words, for the performance of an “unlawful act”, the subjective element of which is specifically compared to the human nature of that intelligence. It might not be appropriate, then, to extend the *eadem dispositio* to non-human entities, which are incapable of committing “torts” and acting with malice or guilt)’.

This argument of vicarious liability was defeated when the offence of plagiarism was repealed.<sup>58</sup> It is not in fact possible to verify that the will of one subject is totally reset and replaced by the will of another subject.

Finally, the main differences between the types of intelligence is that AI does not so far have the capacity for free self-determination<sup>59</sup> while human beings do. AI cannot be equated with a person having the necessary capacity, and cannot be equated with the perpetrator of an offence committed in the course of the duties performed for another subject<sup>60</sup>.

Comparing AI and human intelligence on the same plane would mean admitting the legal personhood of AI, but this goes against the thinking of European legislation which has recently ruled it out, and suggested instead the application of civil liability norms to the operator or manufacturer of AI.

The focus thus shifts away from the individual, identified to date in the Italian Civil Code, to another subject. Liability could in fact be shifted from the driver to the producer, thus applying the consumer code in harmony with the European Parliament resolution on 'a liability regime for artificial intelligence', which states that current national liability laws are sufficient to provide fair protection. The EP Resolution recalls Council Directive 85/374/EEC of 25<sup>th</sup> July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products<sup>61</sup>.

The main question here is whether or not Council Directive 85/374/EEC on defective products can be applied in Italy to product liability, which was introduced in Articles 114 to 127 of the Italian Consumer Code. There is also doubt as to whether liability for dangerous activity can be possibly applied to autonomous vehicles.

In the Italian legal system, liability for dangerous activity (Article 2050 Civil Code) is close to product liability; both can be applied in

<sup>58</sup> See Corte cost., 8<sup>th</sup> June 1981, no. 96 and commentary by G. Vaccari, *La sentenza della Corte costituzionale sul reato di plagio. Un passo avanti nel raccordo tra le norme costituzionali e quelle ordinarie*, in *Parlamento*, nn. 6-8, p. 49 ss.

<sup>59</sup> As national constitutions of various EU Member States show, the right to self-determination is recognized only for human beings. See the Italian Constitution Article 2 Cost., and the German constitution Article 2 GG.

<sup>60</sup> Cass., 4<sup>th</sup> June 2007, no. 12939, in *Giur. civ. massime*, 2007, p. 6.

<sup>61</sup> Council Directive 85/374/EEC of 25<sup>th</sup> July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products [1985] OJ, L. 210/29.

the same case and the former does not exclude the latter,<sup>62</sup> but they have two different fields of application.

Product liability arises when damage is caused by faulty manufacture, and liability for dangerous activity depends not on the product but on the type of activity, which may pose risk. A typical example is the sale of tobacco.<sup>63</sup> Liability for dangerous activity is sometimes<sup>64</sup> differentiated into defective product liability and harmful product liability, and damage caused by a dangerous activity comes under harmful product liability.

The question is whether the damage resulting from an accident with an autonomous vehicle is in the area of product liability or dangerous activity liability or both. It might be thought that the European Parliament resolution is in favour of product liability, but it is interesting to note what happens in the Italian legal system.

In Italy, the legislation covering car accidents (Article 2054 Civil Code), indicates responsibility of the driver, or jointly of driver and owner except when the vehicle owner can prove that the vehicle was used without his or her permission. This does not appear to be completely applicable to SAE Levels 3 and 4 of autonomous vehicles, because in these vehicles the driver is not only the operator: thanks to IA the vehicle is an operator too. Along with owner and driver, there is now the third element of the autonomous vehicle.

<sup>62</sup> Art 127 of the Italian Consumer Code ‘Liability pursuant to other legal provisions’ indicates (Comma 1) that: ‘The provisions of this Title shall neither exclude nor limit the rights of injured parties under any other law’.

<sup>63</sup> There is an interesting analysis of A. Spangaro, *Il danno da prodotto conforme: dai derivati del tabacco ai telefoni cellulari*, in *Giur. it.*, 2019, p. 1312 ss., recalling the stages in the history of tobacco damages.

<sup>64</sup> E. Al Mureden, *Il danno da prodotto conforme tra responsabilità per esercizio di attività pericolosa ed armonizzazione del diritto dell’Unione europea*, in *Corr. giur.*, 2020, 5, p. 688 clearly explains the difference: ‘Nella prima categoria [prodotto difettoso] ricadono i prodotti che risultino difformi rispetto alle caratteristiche delineate dalle norme tecniche standardizzate o, ove queste non siano presenti, a quelle definite dallo stato dell’arte; nella seconda [prodotto dannoso], invece, rientrano i prodotti dai quali possano scaturire rilevanti danni per coloro che li utilizzano o vengono a contatto con essi. Le due categorie coincidono solo occasionalmente [...] (The first category [defective products] includes products which differ from the characteristics outlined in the standardised technical rules or, where these do not exist, from those defined by the state of the article. The second category [harmful products], on the other hand, includes products which can cause significant harm to those who use them or come into contact with them. The two categories overlap only occasionally)’.

Cases where the driver is the autonomous vehicle lie outside Article 2054 Civil Code because when the automatic pilot is on, the vehicle acts alone. Malfunction could be due to faulty construction, which is why it has been suggested<sup>65</sup> that the manufacturer is liable for product failure, where the product is the autonomous vehicle.

The European Parliament Resolution does not entirely follow this theory, and given that advances are taking place rapidly, calls for an update of Council Directive 85/374/EEC on defective products. The European Parliament suggests that it is important to rewrite the notion of product to include new technologies such as the autonomous vehicle.<sup>66</sup> This implies that the norms on product liability, as they are today, are not appropriate for autonomous vehicles. They could lead to failure to protect the injured person in the event of an accident when an autonomous vehicle is involved.

Moreover, if product liability norms were applied, there are also cases when the injured person is a occupant of the vehicle, and the protection would be as though the person were a consumer.<sup>67</sup> But it is unclear what would happen if the injured person were not in the vehicle. Product liability could not apply in this case because

<sup>65</sup> A. Amidei, *Intelligenza artificiale e product liability: sviluppi del diritto dell'Unione Europea*, in *Giur. it.*, 2019, p. 1720, applies the theory of product liability to the damage caused by AI. He writes: 'nell'ambito degli *smart product*, il semplice fatto che l'insorgere di un comportamento "distorto" dell'A.I. non fosse prevedibile da parte del suo produttore non può in ogni caso escludere di per sé la responsabilità dello stesso per il danno cagionato da un difetto del bene. [...] In altri termini, in tema di product liability, così come non rileva che il produttore sia o meno incorso in colpa nel non avvedersi di un difetto del bene messo in commercio, parimenti non rileva che fosse o meno possibile per il produttore medesimo avvedersene (in the context of smart products, the fact that A.I.'s "wrongful" conduct is not foreseeable by its manufacturer can in no case exclude the latter's liability for damage caused by a defect in the goods. [...] In other words, on the subject of product liability, just as it is irrelevant whether or not the producer was at fault in failing to notice a defect in the goods marketed, it is equally irrelevant whether or not it was possible for the producer to notice it)'.

<sup>66</sup> See section on 'Liability and Artificial Intelligence', Point 8 of European Parliament Resolution of 20<sup>th</sup> October 2020, *europarl.europa.eu*, in which it 'urges the Commission to assess whether the Product Liability Directive should be transformed into a regulation, to clarify the definition of "products" by determining whether digital content and digital services fall under its scope and to consider adapting concepts such as "damage", "defect" and "producer" [...]'.

<sup>67</sup> This interpretation explains how product liability, and thus the Italian Consumer Code, could be applied in the case of autonomous vehicle accident.

the injured person would not be the ‘consumer’. So what type of protection could there be?

There is the hypothesis of liability for dangerous activity (Article 2050 Civil Code). There could be product liability when the injured party is an occupant of the vehicle, and liability for dangerous activity when a third person is involved. In both cases, the manufacturer would be liable.

This solution could be in line with Article 127 of the Italian Consumer Code, which admits the possibility of applying product liability together with another type of liability (ie liability for dangerous activity).<sup>68</sup>

### 5.1. *Liability for damage by compliant products applied to autonomous driving vehicles*

Another possible case is that the product complies with legal requirements but nevertheless causes damage.<sup>69</sup> Who is responsible? We now examine the solutions described above to ascertain whether they are applicable in this case, as well as other potential solutions.

First of all, it is necessary to ascertain the level of vehicle automation and the identity or nature of the injured party.

As far as the level of vehicle automation is concerned, the reference is to full automation (ie SAE Level 5), because although it

<sup>68</sup> Art. 127, comma 1, Consumer Code: ‘Le disposizioni del presente non escludono né limitano i diritti attribuiti al danneggiato da altre leggi (The provisions hereof shall neither exclude nor limit any rights conferred upon the aggrieved party by any other law)’.

<sup>69</sup> This is not in fact the first time that the liability for damage by a compliant product has been invoked in Italy. It occurred in the history of tobacco damages (see Footnote 63), when after Law no. 428/1990 it was no longer possible to claim that a consumer would be unaware of the harm caused by tobacco (see Trib. Catanzaro, 8<sup>th</sup> February 2011, no. 444, in *Danno e Resp.*, 2012, p. 88.; Trib. Roma, 12<sup>th</sup> April 2010, no. 8037, in *Danno e Resp.*, 2012, p. 84; Trib. Brescia, 10<sup>th</sup> August 2005, in *Danno e Resp.*, 2005, p. 1210). It is not only the manufacturer who is responsible if consumers are not informed; it is the joint responsibility of manufacturer and consumer. This is termed assumption of risk. See G. Baldini, *Il danno da fumo*, Napoli, 2008, p. 58; F. Cafaggi, *Immunità per i produttori di sigarette: barriere culturali e pregiudizi di una giurisprudenza debole*, in *Danno e Resp.*, 1997, p. 753; G. Ponzanelli, *I problemi della tutela risarcitoria da fumo attivo*, in *Resp. Civ. e Prev.*, 2005, p. 959; A. Lamorgese, *Il danno da fumo*, in *Resp. Civ. e Prev.*, 2003, p. 1184; B. Ferraris and G.B. Origoni, *Il contenzioso per il risarcimento dei danni alla salute prodotti dal fumo*, in *Resp. civ. e prev.*, 2004, p. 1448.

decreases at each level, Levels 1 – 4 involve human intervention in driving.<sup>70</sup> This means that if the product is at a level of automation below Level 5, there is a possibility that the driver and not the manufacturer is responsible.

This might not be the case if damage by a compliant product is actually damage caused by a fully self-driving vehicle. Can it be said that the manufacturer is responsible in this case? If there is no suggestion that the product is defective, it may not be possible to assign product liability to the manufacturer.<sup>71</sup> The manufacturer could perhaps be held liable for a dangerous activity, but driving is in itself a risky activity and applying Article 2050 of the Italian Civil Code in this case makes no sense. Indeed, the fact that the damage falls within the normal area of risk, as the product complies with the law, places the risk within the normal area of risk inherent in driving.

On the other hand, identification of the injured party is not relevant to identifying the party responsible or the type of liability, as was appropriate in the case above. This situation is justified by the automation level of vehicle (Level 5), because the occupant of the vehicle is considered as the third person, who is outside the vehicle.

It appears that civil liability could be applied under Article 2043 of the Italian Civil Code, but to whom? At first sight, the manufacturer could also be indicated as liable in this case. But this is incorrect for two reasons: a) Article 2043 of the Italian Civil Code concerns personal liability, while here an individual who is not direct author of tort would be held liable in a particular type of strict liability. It is well-known however that Italian legislation usually prefers to provide strict rules on liability; b) Claiming manufacturer liability entails defect in a product, whereas the hypothesis in this case is liability for a compliant product.<sup>72</sup>

<sup>70</sup> See Section 5 for SAE vehicle automation levels.

<sup>71</sup> Italian judgements have often excluded manufacture liability when the product complies with the law (see Cass., 15<sup>th</sup> March 2007, no. 6007, in *Resp. civ. prev.*, 2007, II, 158; Cass., 13<sup>th</sup> December 2010, no. 25116, in *Nuova giur. civ. comm.*, 2011, I, p. 590; Cass. 29<sup>th</sup> May 2013, no. 13458, in *Corr. Giur.*, 2014, p. 31).

<sup>72</sup> Note that here we are not referring to the case in which the product complies with the law but causes damage precisely because it was made according to legal standards. Such cases are covered by Article 118, lett. (d) of the Italian Consumer Code, which excludes liability: ‘se il difetto è dovuto alla conformità del prodotto a una norma giuridica imperativa o a un provvedimento vincolante (if the defect is due to the conformity of the product with a mandatory legal norm or binding measure)’. Italian legislation also uses the

Article 2043 of Italian Civil Code is thus not applicable here either, so who is liable? The Italian legal system again appears to be ill-suited to discipline this new phenomenon, so perhaps it is worth considering solutions from Europe or the USA.

## 6. *An overview of the German Motor Vehicle Liability Act*

On 28.7.2021, the Autonomous Driving Act (BGBl. I 3108) came into force in Germany. The law regulates the operation of motor vehicles with autonomous driving functions in defined operating areas in order to ‘be able to leverage the potential of these technologies and enable society to participate in them’ (BT-Drs. 19/27439, 1).

The law on autonomous driving covers the fourth level<sup>73</sup> of automation, in which the role of the vehicle driver is eliminated. The driver becomes the occupant, because the vehicle is able to perform the task of driving independently in previously defined operating areas.

The vehicles in question are described here as ‘motor vehicles with autonomous driving functions’, see 1 d para. 1 StVG. Automation level 4 (or SAE Level 4) is today operated frequently. This innovation requires certain legal regulations, especially with regard to terms, participants and their obligations, technical requirements and data processing. These were introduced with the Autonomous Driving Act through additions and amendments to the StVG and PflVG.

The obligations of the parties involved are then standardised in § 1 f. The parties involved are the operator (Paragraph 1), the technical supervision (Paragraph 2) and the manufacturer (Paragraph 3). The operator is responsible for road safety, environmental compatibility

term defective product for this, with the meaning of a kind of ‘legally defective product’. Here we discuss the pure theory of liability for damage by a compliant product applied to autonomous driving vehicles.

<sup>73</sup> For the problem of legal definitions of the level of automation see L. Seida, *Das Gesetz zum autonomen Fahren*, in *ZD-Aktuell*, 2021, no. 0536: ‘Problematisch ist die Übereinstimmung der Kategorisierung der Automatisierungsgrade durch Stufen oder SAE-Level und den vom Gesetzgeber verwendeten Begrifflichkeiten. Der Gesetzeswortlaut verwendet die Orientierung anhand Stufen oder SAE-Levels nicht. Aus der Gesetzesbegründung ergibt sich jedoch, dass das Gesetz zum autonomen Fahren Fahrzeuge des SAE-Levels 4 meint (It is unhelpful for the SAE classification of levels of automation and the terms used in legislation to differ. Legal formula do not use SAE levels. But the explanatory notes to the law show that the law on self-driving vehicles refers to SAE Level 4)’.



and maintenance of the system functions, and must ensure that the technical supervision fulfils its tasks.

Technical supervision has various functions: assessing and enabling alternative driving maneuvers or deactivating the autonomous system when the vehicle system gives the appropriate signals, initiating necessary traffic safety measures and immediately contacting the occupants when the vehicle enters the minimum risk state.

The manufacturer has the following functions: providing the required evidence to the Kraftfahrt-Bundesamt (Federal Motor Transport Authority) or the competent authority with regard to the security of the electronic systems, carrying out risk assessment, equipping the car technically in accordance with the requirements of Para 1 and Para 2 and fulfilling reporting obligations, for example in the event of unauthorised access to the radio link. The manufacturer is also required to offer the vehicle owner training.

‘Since the driver as such ceases to exist, and thus as a liable party, in the meaning of § 18 StVG, ceases to exist, only the liability of the owner can be considered (§ 7 para. 1 StVG)’.<sup>74</sup>

Furthermore, liability-relevant behaviour on the part of the technical supervisor cannot be excluded. This is why supervision is taken into account in supplement addition to § 1 PflVG and why the owner’s liability insurance must also refer to it.<sup>75</sup>

We now look at whether there is the same situation in the US.

## 7. The civil liability and autonomous vehicle in the USA

The construction of tort law in the USA<sup>76</sup> reflects its goals. The function of tort law explains how liability is regulated when an accident occurs with autonomous vehicles.

<sup>74</sup> See L. Seyda, cit.: ‘Da der Fahrer als solcher und somit als Haftpflichtiger i. S. d. § 18 StVG wegfällt, kommt hinsichtlich der Haftung nur noch eine solche des Halters in Betracht (§ 7 Abs. 1 StVG)’.

<sup>75</sup> See A. De Franceschi, *Intelligenze artificiali e responsabilità civile nell’esperienza tedesca*, in *Rapporti civilisti e intelligenze artificiali: attività e responsabilità* P. Perlingieri, S. Gioia and I. Prisco. Atti del 15° Convegno SISDic, Napoli, 2020, p. 45.

<sup>76</sup> The origins of US tort law are in the UK system, although there are some differences such as the focus on verifying the duty of care and the consequences of its breach. See Z. ZENCOVICH, *La responsabilità civile*, in *Dir. priv. Comp.*, 2008, p. 383.



Three are the functions of liability in the common law system: a) compensation; b) deterrence; c) punishment.<sup>77</sup> Compensation aims at restoring the situation to the *status quo ante* and focuses on protecting the injured party. The function of deterrence is to discourage the perpetrator of a possible future offence. The punitive function is a particular feature of tort law in the common law system and consists of overcompensating the injured person because the protection is on him.

The point of view changes between civil and common law systems; the former focuses on the injured party while the latter looks at the plaintiff and his action.

The criterion for qualifying the action of the injuring party is duty of care and compliance. In order to verify the agent's compliance with the duty of care, the foreseeability<sup>78</sup> of the risk becomes important, ie the possibility of foreseeing that such conduct may lead to damage to a third party.

<sup>77</sup> G. Ponzanelli, *La responsabilità civile, profili di diritto comparato*, Bologna, 1992; G. Calabresi, *The complexity of tort. The case for punitive damages in Liber amicorum* per Francesco D. Busnelli, Milano, 2008; P. Cane, *The anatomy of tort law*, Hart Publishing, Oxford, 1997.

<sup>78</sup> G. Villa, Il tort of negligence *nel sistema inglese dei fatti illeciti*, in *Contr. Impr.*, 2011, 1, p. 270 ss.: 'Dal 1932, anno in cui fu pronunciata la sentenza Donoghue v Stevenson, l'elaborazione della dottrina e della giurisprudenza è sfociata nell'elaborazione di ben quattro distinti parametri in grado di accertare la sussistenza del duty of care: a) prevedibilità (foreseeability), come sinonimo di potenziale valutazione del rischio e del soggetto su cui tale pregiudizio potrebbe ricadere. In tale prospettiva rientra prepotentemente il concetto di uomo ragionevole elaborato dalla giurisprudenza ed illustrato di seguito; b) vicinanza (proximity) intesa nella duplice accezione di vicinanza geografica e rapporto che pone in stretta correlazione due soggetti, la prima di semplice comprensione (si pensi ad un incidente stradale in cui vittima e danneggiante sono nello stesso luogo), la seconda, invece, è di difficile contestualizzazione soprattutto nella sua manifestazione non fisica quanto mentale/ psicologica; c) opportunità del rispetto della diligenza (nelle sue forme di fairness, justice e reasonableness); d) politica comportamentale (policy) intesa come idoneità di una condotta a ledere in più modi una sfera giuridica, dando origine simultaneamente a più danni. (Since the Donoghue v Stevenson judgement of 1932, doctrine and case law have developed four distinct parameters for determining the existence of the duty of care: (a) foreseeability, or the assessment of the risk and of the person whom the injury might potential damage; (b) proximity, in the dual meaning of geographical proximity and relationship between two subjects. Geographical proximity is easy to understand (think of a road accident in which the victim and the injured party are in the same place). The relationship between two subjects on the other hand is difficult to contextualise, especially in its non-physical as well as mental/ psychological manifestation; (c) desirability of due diligence (in fairness, justice and reasonableness); (d) policy, understood as the suitability of a conduct to damage a legal sphere in several ways, giving rise to different acts of damage simultaneously)'.

In the common law system there is, however, a fundamental difference in the role of duty of care (and its proof) between the UK and the US. In the US there is no verification of it, because strict liability is more widely permitted in the US than in the UK.

In the US system, at the origin of an offence there is neither a moral reproach nor a fault, but rather an objective failure to comply with social obligation. Proof of the injured party's negligence follows, but if damage would not have occurred if the plaintiff's conduct had been correct, duty of care has been breached. The wrongful conduct of the injurer proves the damage *ex se*.

'Finally, there is another difference in tort law in the US system [...]: damages. In other systems, damages focus on restoring the status quo ante through monetary compensation, and the US system also aims at punishing the tortfeasor as a form of deterrence to avoid future tortfeasors'.<sup>79</sup>

The functions of tort law show that the personality principle and civil liability are not strongly linked in the US system, the proof of this being manufacturer liability. The plaintiff must generally demonstrate the following elements: the product contained a defect; the defect existed at the time the product left the manufacturer's control; the defect rendered the product unreasonably dangerous; and the defect actually and proximately caused the plaintiff's injuries.

It is clear that a plaintiff claiming strict liability need not prove fault by the manufacturer, because manufacturers can be liable even if they acted reasonably in designing and manufacturing the product and followed all applicable procedures and protocols, but nonetheless produced a product later judged to be 'defective'.<sup>80</sup>

The question is whether this form of strict liability can be applied to autonomous vehicles when an accident occurs. In order to answer this, it is necessary to clarify whether highly automated cars are allowed in the US system and therefore whether strict liability, ie product liability, can be applied to them.

The possibility of authorizing highly automated cars appears to be contained in vehicle regulations. Indeed, the US are not party to the 1968 Vienna Convention, which states in Article 1, Section v) that 'the

<sup>79</sup> Z. Zencovich, cit., p. 389.

<sup>80</sup> See, ie *Myrlak v. Port Auth. of N.Y. & N.J.*, 723 A.2d 45, 52 (N.J. 1999); *Greenman v. Yuba Power Prods., Inc.*, 377 P.2d 897, 900 (Cal. 1963).

term “driver” means any person who drives a vehicle, motor vehicle or any other form of transport’. At the same time, the US are one of 95 States party to the 1949 Geneva Convention on Road Traffic in which Article 4 defines a driver as ‘any person who drives a vehicle, including cycles, or guides draught, pack or saddle animals or herds or flocks on a road, or who is in actual physical control of the same’.

The last part of Article 4 refers to driver as the person ‘who is in actual physical control of the [vehicles]’. ‘This focus on fundamentals is consistent with a broad and flexible understanding of the term “driver” as defined in Article 4 and used throughout the treaty. Like many of the U.S. state definitions which appear to be underpinned by the same ideas, the definition in Article 4 includes contemplates both “driv[ing]” and “actual physical control”. And it is nonexclusive, referring to “any” person rather than to “the” person. An automated vehicle might therefore have multiple simultaneous drivers, including a person who is physically or electronically positioned to provide real-time input to the vehicle, a person who turns on or dispatches the vehicle, and/or a person who initiates or customizes that automated operation’.<sup>81</sup>

In terms of definition, such persons might even be non-human and it is not compulsory for the driver to be human. This would mean an automated car is permitted.<sup>82</sup> There are however different disciplines in the various states<sup>83</sup> of the US. Various regulations with different options have emerged since 2015 after Nevada State’s initiative in 2011.

The National Highway and Transportation Safety Administration (NHTSA) has termed the phenomenon of different regulations on Highly Automated Vehicles (HAVs) a kind of legislative patchwork, and notes that it does not allow for a harmonious development of these new technologies.<sup>84</sup>

<sup>81</sup> B.W. Smith, *Automated vehicles are probably legal in the United States*, 1 Tex. A&M L. Rev. 411 (2014).

<sup>82</sup> About it: B. W. Smith, cit.; M.A. Geistfeld, *The Regulatory Sweet Spot for Autonomous Vehicles*, in 53 Wake Forest L. Rev. 2018, 354; E. Fraedrich, S. Beiker and B. Lenz, *Transition pathways to fully automated driving and its implications for the socio technical system of automobility*, in *Eur. J Futures Res* (2015) 3: 11.

<sup>83</sup> See the continuously updated website of the National Conference of State Legislatures (NCSL), in [ncsl.org/research/transportation/autonomous-vehicles-self-drivingvehiclesenactedlegislation.aspx#Enacted%20Autonomous%20Vehicle%20Legislation](http://ncsl.org/research/transportation/autonomous-vehicles-self-drivingvehiclesenactedlegislation.aspx#Enacted%20Autonomous%20Vehicle%20Legislation)).

<sup>84</sup> B. W. Smith, cit.

In 2017 the NHTSA, together with U.S. Department of transportation, published the New Federal Guidance for Automated Driving Systems (ADS): A Vision for Safety 2.0 and outlined the Federal Automated Vehicle Policy. The report entitled Preparing for the Future of Transportation: Automated Vehicles 3.0 is more recent. The aim of both reports is to redesign the legal framework to remove limits to the growth of new technologies at a fair allocated cost.<sup>85</sup>

The subsequent Self-Drive Act on one hand outlines the role of federal law in promoting the testing and deployment of highly automated vehicles. On the other hand, it aims to update federal vehicle safety standards by removing any reference to the human driver.<sup>86</sup>

Note that the doctrine is pre-emptive, and stating that only the Department of Transportation has jurisdiction in this matter, it prevents State legislators from promulgating state legislation which conflicts with federal legislation.<sup>87</sup>

<sup>85</sup> See M. A. Geistfeld, *The Regulatory Sweet Spot for Autonomous Vehicles*, in *Wake Forest L. Rev.*, 2018, p. 354 and E. AL Mureden, *Autonomous vehicles e responsabilità nel nostro Sistema e in quello statunitense*, in *Giur. it.*, 2019, p. 1716.

<sup>86</sup> For instance, 'Arizona previously regulated autonomous vehicle testing and operation by executive order. The Legislature held off on enacting autonomous vehicle statutory requirements to allow flexibility for technology companies testing in the state. However, in March, the Legislature enacted, and the governor signed, HB 2813, establishing standards for driverless vehicles in the state. Notably, the law does not distinguish between testing and operating autonomous vehicles on public roads and allows commercial services such as passenger transportation, freight transportation and delivery operations to be fully autonomous. A fully autonomous vehicle can operate on public roads without a human driver, but only if the operator submits a law enforcement interaction plan that addresses the protocol developed by the Arizona Department of Public Safety and certifies to the Department of Transportation that the vehicle meets certain standards and is titled, registered, licensed and insured. The vehicle also must follow federal laws and standards, comply with all traffic and vehicle safety laws and achieve a "minimal risk condition" if the automated driving system fails', in [ncsl.org/research/transportation/arizona-advancesautonomousvehicle-policy-and-technology-magazine2021.aspx](https://ncsl.org/research/transportation/arizona-advancesautonomousvehicle-policy-and-technology-magazine2021.aspx).

<sup>87</sup> See M. A. Geistfeld, *cit.*, p. 112: 'Relying on this type of approach, the U.S. Supreme Court interpreted the meaning of substantively identical statutory provisions in *Geier v. American Honda Motor Company*, 529 U.S. 861 (2000). Similar to the federal HAV legislation, the National Traffic and Motor Vehicle Safety Act of 1966 contains a provision that expressly preempts "any safety standard" that is not identical to a federal safety standard applicable to the same aspect of performance'. And like the federal HAV legislation, the 1966 Act contains a saving clause, which 'says that "[c]ompliance with" a federal safety standard "does not exempt any person from any liability under common law"'. On this see also *Morgan v. Ford Motor Co.*, no. 34139 (W.V. Sup. Jun. 18, 2009).

The above means that if a vehicle complies with the federal standards laid down by the NHTSA, the manufacturer is not liable, because these are the limits beyond which liability cannot arise.<sup>88</sup>

We now look at what happens and who is liable when an accident occurs, but the autonomous vehicle complies with federal rules.

If we follow the above reasoning, the manufacturer is liable only for a defective product, but it is necessary to distinguish what level of autonomy the vehicle has.

The NHTSA automation scale starts at Level 0, with no automation, and goes up to Level 5, where vehicles do not require any human attention.

At NHTSA level 2, the driver is responsible for ‘monitoring the roadway and safe operation and is expected to be available for control at all times at short notice’. Suppose the braking system does not give the driver sufficient notice, resulting in an accident. In this case, the plaintiff may argue it was defective because a system with more advanced notice would have avoided the accident.

But manufacturer liability is not automatic in this case, and to determine whether a design is defective, courts use two tests, the risk-

<sup>88</sup> The principle was established through a consistent interpretation of the *National Traffic and Motor Vehicle Safety Act* of 1966, which refers to conventional vehicles. See M.A. Geistfeld, *cit.*, using the tool of interpretation of the law over time, this principle should also be applied to the highly autonomous vehicle. The opinion of P. Perlingieri, *Il diritto civile nella legalità costituzionale*, Napoli, 2020, II, p. 345 is that: ‘L’interpretazione giuridica prende le mosse dal fatto, dalla fattispecie concreta, che di per sé, è piena di originario significato. Il fatto, soprattutto quando sussiste in un atto di iniziativa e autonomia, contribuisce alla sua regolamentazione. È anche constatazione storica che “il senso normativo degli enunciati di legge non può essere individuato” nella sua pienezza senza l’impatto con “un preciso problema concreto” collocato nella totalità dell’esperienza (Legal interpretation moves from the fact, from the concrete case, which is itself full of original meaning. When the fact arises from an autonomous initiative, it itself contributes to its own regulation. It is a historical observation that “the legal meaning of rules cannot be fully identified” without considering a “specific concrete problem”)’. See also R. Sacco, *Il concetto d’interpretazione del diritto*, Torino, 2003; G. Zagrebelsky, *il diritto mite*, Torino, 1992, pp. 180 ss. and 187 ss.; G. Grondona, *I moti del diritto e le metodologie dell’interpretazione (in margine ad alcune pagine di Tullio Ascarelli)*, in *Oss. dir. civ. comm.*, 2016, p. 115 ss.; E. Caterini, *L’«arte» dell’interpretazione, tra fatto, diritto e persona*, in Perlingieri G. and D’Ambrosio M. eds, in *Fonti, metodo e interpretazione*, in *ADP*, 2017, p. 25 ss. Cf G.H. von Wright, *Valuations or How to say the Unsayable*, in *Ratio Iuris*, 2000, 13, p. 347 ss.

utility test and, less frequently, alone or in conjunction with the first, the consumer expectations test.<sup>89</sup>

‘The risk-utility test balances the likelihood and magnitude of foreseeable harm against the burden of precaution against the harm. The examination often includes an analysis of whether an alternative design solution would have solved the problem without impairing the utility or adding unnecessary cost.

The consumer expectations test provides that a device is defective regardless of where in the everyday consumer experience the product’s design violated minimum safety assumptions. The consumer expectation test is utilized in some states where the harm occurs within the ordinary experience of the consumer’.<sup>90</sup>

Although courts have held the consumer expectations test unsuitable for cases involving complex technical and scientific information, some states still apply the test outlined in the Restatement (Second) of Torts.<sup>91</sup>

Some states have in fact established liability where the ordinary consumer purchases or uses a dangerous product and in ordinary common knowledge is unaware of the danger, including when there exist minimum consumer safety expectations.<sup>92</sup>

The question about liability where the autonomous vehicle complies with federal rules is similarly complicated to answer.

The first answer would exclude manufacturer liability where the manufacturer complied with all the Federal rules, but in this case, the person harmed by the use of the compliant product might not be protected.

<sup>89</sup> C. McClelland, *The Difference Between Artificial Intelligence, Machine Learning, and Deep Learning Medium* (2019), [medium.com/iotforall/the-difference-between-artificialintelligence-machine-learning-anddeep-learning-3aa67bff5991](https://medium.com/iotforall/the-difference-between-artificialintelligence-machine-learning-anddeep-learning-3aa67bff5991), writes that “[r] egardless of the doctrinal label attached to a particular claim, design and warning claims rest on a risk factor under on a risk-utility assessment”. Consumer expectations are recognized merely as a risk factor under this standard. However, in many jurisdictions, courts often either (1) recognize an alternative consumer expectation test or (2) exclusively rely on a consumer expectations test’.

<sup>90</sup> C. McClelland, *cit.*

<sup>91</sup> *Contra* Pruitt v. Gen. Motors Corp., 86 Cal. Rptr. 2d 4, 6 (Ct. App. 1999) (stating that air bags are too complex a technology for the Court to apply the consumer expectations test); Patrick Clendenen & David Fialkow, *The Trend Toward Using The Risk-Utility Test* Law360 (2010), [www.law360.com/articles/207474/the-trend-towardusing-the-risk-utility-test](http://www.law360.com/articles/207474/the-trend-towardusing-the-risk-utility-test).

<sup>92</sup> *Crump v. Versa Prods., Inc.*, 400 F.3d 1104, 1108 (8<sup>th</sup> Cir. 2005).

Several important rulings<sup>93</sup> in fact state that compliance with federal standards is the minimum guarantee of product safety, but does not exclude the manufacturer's liability.<sup>94</sup> In case law, *Lubbock Manufacturing Co. v. Perez*,<sup>95</sup> confirms the principle that 'compliance with federal and state requirements for the manufacture and sale of products does not immunize a manufacturer or seller from liability'.

This principle has also been applied to vehicles. In the case of *Sours v. General Motors Corp.*<sup>96</sup> the judge held General Motors liable even though it built the vehicle in accordance with NHTSA standards, because it should have taken additional measures to provide a reasonable level of protection for the occupants of the vehicle. Similar was the decision in *Jackson v. Spain*, where Volkswagen's compliance with federal safety standards was considered 'only one piece of the evidentiary puzzle',<sup>97</sup> and not sufficient to exclude the manufacturer's liability.

There are other rulings,<sup>98</sup> however, which establish that the safety standard set out in the statutes and detailed in the regulations issued by government agencies constitutes an upper limit, compliance with which excludes the manufacturer's liability.<sup>99</sup>

These scenarios are also outlined in Point b), Section 2 of Restatement Third, Torts, Product liability, which read 'although the great majority of courts find conformance with product safety regulations nonconclusive on the issue of defectiveness, courts

<sup>93</sup> For instance, *Washington State Physicians Ins. Exch. & Ass. V Fision Corp.* 858 P.2d 1054, 1069 (Wash 1993), in E. Al Mureden, *Il danno da prodotto conforme*, Torino, 2016, footnote 38, p. 108 where the Court states that compliance with the rules laid down by the Food and Drug Administration does not exclude the liability of the manufacturer, who produces drugs that comply with the minimum standard laid down by the agency, because the obligation to take additional precautions still falls on the manufacturer.

<sup>94</sup> G. Calabresi, *The Cost of Accidents: A Legal and Economic Analysis*, New Haven, 1970; Id., *Costo degli incidenti e responsabilità civile. Analisi economico-giuridica*, Translation by A. De Vita, V. Varano and V. Vigoriti, Introduction S. Rodotà, reprinted with introduction by E. Al Mureden, Milano, 2015; Id., *The Future of Law Economics*, New Haven and London, 2016.

<sup>95</sup> *Lubbock Mfg. Co. v. Perez*, 591 S.W.2d 907, 914 (Tex. Civ. App. 1979).

<sup>96</sup> See *Sours v. General Motors Corp.*, 717 F.2d 1511, 1517 (6<sup>th</sup> Cir. 1983).

<sup>97</sup> See *Jackson v. Spagnola*, 503 A.2d 944, 949 (Pa. Super. Ct. 1986).

<sup>98</sup> See ie, *Bic Pen Corp. v. Carter*, No 05-0835 (Tex. Apr. 18, 2008).

<sup>99</sup> E. Al Mureden, *Il danno da prodotto conforme*, Torino, 2016, p. 110.



occasionally recognize special circumstances in which conformance is conclusive on the facts of the particular case'.<sup>100</sup>

In order to identify the liable party, the focus shifts from formal compliance by the manufacturer to the actual damage caused by the product through a case-by-case analysis. Some rulings find a difference between a defective product and a harmful product, because only sometimes are these the same. But in other cases, the harmful product may be compliant,<sup>101</sup> and this can explain why manufacturer liability is not automatic.

So, it is always necessary to refer to the actual case;<sup>102</sup> this is the best way to identify who is responsible and thus implement the principle of legal certainty and the protection of the injured party.

<sup>100</sup> See *Ramirez v. Plough, Inc.*, 863 P.2d. 167, 176 (Cal. 1993); *Jones v. Hittle Serv., Inc.* 549 P.2d. 1386, 1390 (Kan. 1976); *Beatty v. Trailmaster Prods., Inc.*, 625 A.2d. 1005, 1014 (Md. 1993); *Dentson v. Eddins & Lee Bus Sales Inc.*, 491 So.2d 942, 944 (Ala. 1986).

<sup>101</sup> E. Al Mureden, *Il danno da prodotto conforme tra responsabilità per esercizio di attività pericolosa ed armonizzazione del diritto dell'Unione europea*, in *Corr. giur.*, 2020, f. 5, p. 688: '[I]l prodotto non conforme rispetto alle caratteristiche tecniche prescritte dal legislatore, e quindi difettoso, può sicuramente assumere in alcune circostanze un carattere dannoso (si pensi, ad esempio, all'automobile il cui difetto provochi un incidente o al telefono cellulare difettoso che, per ipotesi, esplode durante il funzionamento), ma potrebbe, in altre, risultare – quasi paradossalmente – completamente privo di rischi (è il caso, ad esempio, dell'automobile o del telefono cellulare non funzionanti e per questo motivo assolutamente privi di rischi); al tempo stesso il prodotto conforme alle caratteristiche tecniche prescritte dalla legislazione sulla sicurezza potrebbe conservare significativi margini di dannosità proprio perché perfettamente funzionante. In quest'ultimo caso l'utilizzatore o colui che entra in contatto con il prodotto si troverebbe a subire un danno derivante da un prodotto pienamente conforme agli standard legislativi di sicurezza ed utilizzato secondo modalità appropriate, ma, nondimeno, caratterizzato da un'elevata capacità di produrre danni (A product that does not comply with the technical characteristics prescribed by the legislator, and is therefore defective, can certainly be harmful in certain circumstances – ie a car whose defect causes an accident, or a defective mobile phone which could explode during use – but could, almost paradoxically, be completely risk-free in other circumstances – this is the case, for instance, with a car or a mobile phone that is not working and is therefore completely safe –; at the same time, a product that complies with the technical characteristics prescribed by safety legislation could retain significant margins of harmfulness precisely because it is fully functional. In the latter case, the user or the person who comes into contact with the product would be harmed by a product that fully complies with legislative safety standards and is used in an appropriate manner, but nevertheless has a high capacity to cause damage)'.<sup>102</sup>

<sup>102</sup> P. Perlingieri, *Filosofia del diritto e civilisti a confronto*, 1987, in *Id.*, *Scuole tendenze e metodi. Problemi del diritto civile*, Napoli, 1989, p. 321, writes: 'è opportuno individuare non quello che si vuole che esista nell'ordinamento, ma quello che seguendo un corretto procedimento ermeneutico, effettivamente è possibile rinvenire esistente nell'ordinamento



In the next section we will see how the above can be applied to a case currently pending before a court and whether this method leads to a solution which can be shared by different legal systems.

### 8. *The Tesla case*

On April 29, 2018,<sup>103</sup> a group of motorcyclists along with their motorcycles were parked behind a small van on the far-right lane of the Tomei Expressway in Kanagawa, near Tokyo, Japan. The group had stopped following an accident involving an individual riding with the group. The decedent, 44-year-old Yoshihiro Umeda, was part of this group and was standing alongside several motorcycles in an effort to redirect traffic away from the scene of the accident in order to provide aid and assistance to a friend who had been involved in the separate, unrelated traffic collision that occurred earlier.

At or around 2:11 p.m., the driver of a 2016 Tesla Model X vehicle entered onto the Tomei Expressway, and the driver turned on the Autopilot function of his Tesla vehicle. The Tesla proceeded along the highway for approximately 30 minutes without incident while Tesla's Autopilot system and related suite of technologies, including Traffic Aware Cruise Control, Autosteer, and Auto Lane Change, kept the vehicle cruising along the far right lane and tracking another vehicle in front of it.

At approximately 2:49 p.m., the vehicle that the Tesla had been tracking in front slowed down considerably and indicated by its traffic blinkers that it was preparing to switch to the immediate left-hand lane, in order to avoid the group of parked motorcycles, pedestrians, and van that were ahead of it. At some point before 2:49 p.m., the driver of the Tesla vehicle began to feel drowsy and had begun to doze off.

As the vehicle in front of the Tesla Model X 'cut-out' of the lane and successfully changed to the immediate left-hand lane, the Tesla vehicle, which was traveling at a relatively low speed, began to accelerate automatically to the speed that its driver had previously set when Tesla's Case Traffic Aware Cruise Control (TACC) feature was engaged. Therefore, the Tesla began rapidly accelerating from about 15 km/h to approximately 38 km/h.

(it is appropriate to identify not what one wants to exist in the legal system, but what, following a correct hermeneutical procedure, can actually be found to exist in the system)'.<sup>103</sup>

<sup>103</sup> Umeda v. Tesla Inc., Case no. 20-cv-02926-SVK (Cal, 2020).

The Tesla Model X's sensors and forward-facing cameras did not recognize the parked motorcycles, pedestrians, and van that were directly in its path, and it continued accelerating forward until striking the motorcycles and Mr. Umeda, crushing and killing Mr. Umeda as it ran over his body.

This entire incident occurred without any actual input or action taken by the driver of the Tesla vehicle, except that the driver had his hands on the steering wheel as measured by Tesla's Autosteer system. Indeed, the Tesla Model X was equipped with an Event Data Recorder (EDR) which is intended to enable Tesla to collect data and record information from its vehicles and also provides information on various processes of the vehicle's functioning systems when a crash occurs. The information regarding vehicle speed as extracted from the Tesla Model X provides proof of the foregoing facts.

The case is pending, because Tesla has agreed to have the case decided in Japan and not in California. What the Japanese court decides will also have effect in California.

What is the difference between Japan and California?

In the US, there is strict product liability, which shifts to motor vehicle accident liability.

Developments in self-driving vehicles in Japan were motivated by the Japanese government's target of having an automated vehicle service on Tokyo's public roads in time for the 2020 Tokyo Olympic Games (which were postponed). This led to a series of ongoing regulatory developments.

In terms of civil liability for accidents caused by self-driving cars, the Japanese Ministry of Land, Infrastructure, Transport and Tourism published a report in March 2018<sup>104</sup> focusing on whether the JASLA should be amended during the transition period where SAE Level 0 to SAE Level 4 vehicles would share the road.

### 9. *A proposal for a solution*

The different solutions in the countries outlined in the present study show, on the one hand, the difficulty of finding a clear framework for the issue of 'civil liability and autonomous vehicles' and on the other hand, the need to ensure legal protection when an accident occurs. These are two sides of the same coin, because if

<sup>104</sup> See *Milt.go.jp*.

there is no legal regulation of accidents, there is a gap in protection for the injured party. The issue is not only fair compensation for the injured party, it is also the attribution of liability to the person actually responsible.

Each country has tried to adopt objective criteria to achieve these goals, but has always been faced with the same choice: to attribute liability to a person for a specific fault or to opt for the different approach of strict liability.<sup>105</sup>

In the field of autonomous vehicles, it is becoming increasingly difficult to get the protection right, because in order to identify the responsible party, it is first necessary to distinguish the level of autonomy<sup>106</sup> of the vehicle and to understand what type of vehicle is involved.

When we talk about a type of machine involved, the reference is to the type of artificial intelligence (AI)<sup>107</sup> applied to it. The relationship between the level of autonomy of the car and its type of AI becomes crucial, because it tells us when the causal link between the driver's behaviour and the accident is broken. But the level of machine autonomy does not always correspond to the same type of artificial intelligence, meaning that autonomy is not synonymous with AI. It follows that the level of autonomy of the vehicle does not by default reveal the level of artificial intelligence.

If we consider the autonomous vehicle as an executive operator,<sup>108</sup> it is necessary to trace it back to an original will that entered the data into the system, and the producer is thus identified as the liable party.

<sup>105</sup> For the Italian system see Sections 4, 4.1 and 4.2 above, and for the German and US systems, see Sections 5 and 6.

<sup>106</sup> On this point, see Section 5.

<sup>107</sup> On the notion of artificial intelligence (AI) see Cons. St., 25<sup>th</sup> November 2021, no. 7981, in *Gazzetta amministrativa.it*.

<sup>108</sup> M. Costanza, *L'AI: de iure codito e de iure codendo*, in *Intelligenza artificiale. Il diritto, i diritti, l'etica*, U. Ruffolo ed., Milano, 2020, pp. 417-418: '[Il] primo avvicinamento della legislazione all'intelligenza artificiale si è mosso essenzialmente sull'alternativa della sua funzione collaborativa con l'azione umana o sostitutiva. Nella prima ipotesi almeno nell'ambito di rilevanza dell'illecito extracontrattuale la presenza (attiva) della mano o della mente umana manterrebbe il caso nel sistema tradizionale. Nell'altra evenienza, invece, il soggetto responsabile è il produttore (The legislator's first approach was prompted by the alternative dual functions of AI, which can either be cooperative with human action or replace it. In the first case, in the context of liability, the active human presence brings it to the traditional system. In the second, the producer is responsible)'].

But the solution might be different when the autonomous vehicle is also capable of machine learning.

Machine Learning is both precursor to and a branch of AI studies that allows a machine to automatically learn from and improve past data without manually programmed updates. The goal of AI is to create computer systems indistinguishable from humans to solve complex problems, and machine learning is what we see in modern AI marketed technologies. ‘Machine Learning allows computers to learn directly from data without being explicitly programmed’.<sup>109</sup> When these decisions become similar enough to those of a human, we call it Artificial Intelligence. We now examine the effect of AI on liability profiles.

Superficially, we could exclude any form of strict liability and assign responsibility to AI, given that it has the skills to learn and therefore to decide.<sup>110</sup> This however would mean recognizing

<sup>109</sup> I. A. Wardell, *Product liability applied to automated decision*, 2022 Student Works, in [scholarship.shu.edu/student\\_scholarship/1214](http://scholarship.shu.edu/student_scholarship/1214). ‘There are three main branches of machine learning (1) supervised models, (2) unsupervised models, and (3) deep learning. Supervised models utilize weighting systems to categorize information based on training data. The machine is trained using labels where each element is assigned an input-output pair. The machine then learns these pairs through training against the test data. In an unsupervised learning model, the machine does not have pre-labeled or precategorized data and learns through only the inputs. This model requires little human interaction. In more advanced systems, machine learning is beginning to reach the stage in development where the computer decides the final outcome. The culmination of these methods results in an automated, human-like decision tree. Deep learning mimics how the brain functions, based on the concept of biological neural networks, or in computers Artificial Neural Networks. The layering of these neurons that connect to other neuron layers provides a system where each discreet neuron layer can identify a specific feature. Common examples of deep learning are Alexa, Google, and Siri, which utilize natural language processing algorithms and self-driving cars, which use neural networks for object recognition’. See also A. Cánepa, *What You Need to Know about Machine Learning* (Packt Publishing Ltd, 2016); O.A. Osoba & W. Welser, *The Risks of AI to Security and the Future of Work* RAND Corporation (2017), A. Gonfalonieri, *How Amazon Alexa works? Your guide to Natural Language Processing (AI)*, in *Towards Data Science* (2018).

<sup>110</sup> Some published studies and doctrine recognise AI as having the same dignity as a human person, see A. Santosuosso, *Diritto, scienza, nuove tecnologie*, Padova, 2016, p. 44.

Artificial Intelligence as a legal entity.<sup>111</sup> Legislation does not however seem prepared to do this.<sup>112</sup>

This issue sounds similar to the recognition of the liability of private bodies or companies,<sup>113</sup> which is enabled by the organic relationship<sup>114</sup>

<sup>111</sup> M. Costanza, cit., p. 411, argues that: ‘La considerazione che l’AI segue processi cognitivi non schematizzabili *ex ante*, perché il processo si formerebbe “autonomamente” sorprende, impreparata, la legislazione, imperniata segnatamente sul presupposto di consapevolezze funzionali non solitarie, ma segnate dal trattamento di consapevolezze trasferibili a chi è richiesto di assentirvi (Legislation is surprised and unprepared for the fact that AI elaborates its will in autonomy without pre-established schemas, because it assumes AI to have an awareness transferred from another subject)’. On the impact of the recognition of legal personality see also U. Ruffolo ed., *La “personalità elettronica”*, in *Intelligenza artificiale. Il diritto, i diritti e l’etica*, Milano, 2020, who reflects on the recognition of a legal electronic personality through the qualification of the AI as a “macchina morale” (se non anche come macchina emotiva), e dunque come centro di imputazione di responsabilità sia etiche sia giuridiche. Ne conseguirebbe, dunque, la necessità etica di formalizzazione legale della personalità elettronica non tanto per sanvire i “doveri”, quanto per tutelarne i diritti (“moral machine” – also as an emotional machine –, and thus as a centre of imputation of both ethical and legal responsibilities. The ethical necessity of legal formalisation of the electronic personality therefore follows not so much to sanction its “duties” as to protect its “rights”). See also on the same issue: A. Lepore, *I.A. e responsabilità civile. Robot, autoveicoli e obblighi di protezione*, in *Tecn. e dir.*, 2021, 1, p. 190; P. Femia, *Enabling accountable collaboration in Distributed, Autonomous System by intelligent Agents*, in *Advances in Intelligent System and Computing* F. Amato, P. Femia and F. Moscato eds, Cham, 202°, p. 807 ss.; M. Porcelli, *Tecnologie robotiche e responsabilità per danni tra prospettive reali e falsi miti*, in *Tecn. e dir.*, 2020, 2, p. 506.

<sup>112</sup> See A. Amidei, *La governance dell’Intelligenza Artificiale: profili e prospettive di diritto dell’Unione Europea*, in *Intelligenza artificiale. Il diritto, i diritti, l’etica*, U. Ruffolo ed., Milano, 2020, p. 571.

<sup>113</sup> In favour of recognising the civil liability of private bodies see A. Falzea, *La responsabilità penale delle persone giuridiche*, in *La responsabilità penale delle persone giuridiche in diritto comunitario*, Messina Conference Proceedings 30<sup>th</sup> April-5<sup>th</sup> May 1979, Milano, 1981, p. 150; F. Guerrera, *Illecito e responsabilità nelle organizzazioni collettive*, Milano, 1991; D. Kleindieck, *Deliktshaftung und juristische Person. Zugleich zur Eigenhaftung von Unternehmensleitern*, Tübingen, 1997. Versus see G. Minervini, *Gli amministratori di società per azioni*, Milano, 1956, 367 ss., cf also Id., *Alcune riflessioni sulla teoria degli organi delle persone giuridiche private*, in *Studi in onore di G. Valeri*, 1955, II, Milano, p. 51 ss.; F.C. Von Savigny, *System des heutigen römischen Rechts*, Berlin, 1840, II, p. 227 ss.; O. Gierke, *Die Genossenschaftstheorie und die deutsche Rechtsprechung*, Berlin, 1887; J. van den Heuvel, *De la situation légale des associations sans but lucrative en France et en Belgique*, Paris, 1884. For Italian doctrine see F. Ferrara, *La teoria della persona giuridica*, in *Riv. dir. civ.*, 1910, p. 785 ss.; Id., *La responsabilità delle persone giuridiche*, in *Riv. dir. comm.*, 1914, I, p. 490 ss.; S. Pugliatti, *Gli istituti del diritto civile*, Milano, 1942.

<sup>114</sup> M.S. Giannini, *Organi (teoria gen.)*, in *Enc. Dir.*, XXXI, 1981, p. 45; for an overview on the oldest Italian doctrine on the organic relationship of private bodies in the civil field,

between the private body and the human person acting exclusively for the benefit and interest<sup>115</sup> of the former.

But could this also apply to AI? The issue is whether a legal identity can be given to an autonomous vehicle as an AI. It is not clear whether the theory of the legal personality of private bodies can also be applied to autonomous vehicles, because the two situations – private bodies and autonomous vehicles – might seem similar, but the assumptions are different.

Private bodies are an expression of human personality,<sup>116</sup> and it is thus simpler for legislation to recognise their legal personality.

see C. Maiorca, *La nozione di organo nel diritto privato*, in *Annali Camerino*, 1937, II, p. 62 ss.; G. Minervini, *Sulla teoria degli organi delle persone giuridiche private*, in *Riv. trim. dir. proc. civ.*, 1953, 7, p. 935 ss. Versus A. FALZEA, «Capacità», in *Enc. dir.*, 1960, 6, p. 31.

<sup>115</sup> See Articles 5 and 6, Legislative decree no. 231/2001 ‘Disciplina della responsabilità amministrativa delle persone giuridiche, delle società e delle associazioni anche prive di personalità giuridica, a norma dell’articolo 11 della legge 29 settembre 2000, n. 300’. See S. Gennai and A. Traversi, *La responsabilità degli enti*, Milano, 2001 and C. Salvi, *La responsabilità civile*, Milano, 2019.

<sup>116</sup> Two aspects need to be distinguished; the legal identity of private bodies and the possibility of these bodies being holders of personality rights. The first step has been the recognition of private bodies as subjects of law that is legal persons see R. Orestano, *Il problema delle «persone giuridiche» in diritto romano*, Torino, 1968, I. Once private entities were qualified as subjects of law, and therefore as legal persons, the problem arose of recognising their personality rights. On this issue P. Perlingieri, *Intervento*, in *Il riserbo e la notizia, Atti del convegno di studio tenuto a Macerata nei giorni 5-6 marzo 1982*, Napoli, 1983, p. 267 ss. writes: ‘Se il fondamento del diritto individuale è quello del libero sviluppo della persona fisica (e di questo si tratta), bisogna stare attenti ad invocare, come è stato invocato, l’estensione analogica delle norme in tema di persone fisiche alle persone giuridiche. Si può giungere per questa strada – invocando la tutela della persona umana a coprire il segreto bancario, il segreto industriale, ecc. Ma tali segreti, se sono interessi tutelati dall’ordinamento, devono trovare nella meritevolezza di interessi il fondamento della loro tutela (If the basis of individual rights is the free development of the natural person, one must be careful about invoking, as has been invoked, the analogical extension of the rules on natural persons to legal persons. One can go this way – by invoking the protection of the human person – to cover banking secrecy, industrial secrecy, etc., but such secrets, if they are interests protected by the legal system, must have the basis of their protection in the merits of the interests)’. Cf A. Zoppini, *I diritti della personalità delle persone giuridiche (e degli enti organizzati)*, in *Riv. dir. civ.*, 2002, p. 853 ss. ‘La “realtà” normativa della persona giuridica si risolve essenzialmente in una figura unitaria di produzione e d’imputazione di effetti giuridici, il che significa che l’ordinamento consente la creazione d’un’autonoma organizzazione quale presupposto dell’imputazione di situazioni soggettive strumentali al compiersi d’una determinata attività [...] In questi termini, e in questi limiti, può senz’altro dirsi che le situazioni soggettive che si appuntano alla persona giuridica sono diverse da quelle che

Book 1 of the Italian Civil Code, ‘Persons and the family’ distinguishes between the human person and the legal person or identity. The Italian Constitution expresses one of its main aims in Article 2: ‘The Republic recognises and guarantees the inviolable rights of the person, both as an individual and in the social groups where human personality is expressed’. Together, the two extracts say that since the human person can also realise his or her personality through private bodies or social groupings, private bodies have been given legal identity.

If we say that autonomous vehicles are also an expression of human personality, their legal personality can be recognized. In reality, however, there is a big difference between private bodies and autonomous vehicles, because in the case of private bodies there is interaction with the human subject, and the human acts in the interests and for the benefit of the group, whereas in the case of AI this is not the case, because it is the machine that learns and acts.<sup>117</sup> In fact, the roles are reversed, because in private bodies or social groupings it is the human subject acting, while in AI it is the machine acting for the human subject.

This could be another argument that we cannot apply the *analogia iuris* method,<sup>118</sup> because they – private bodies and autonomous

si appuntano alle persone fisiche [...] L'imputazione secondo uno schema metaindividuale delle situazioni giuridiche soggettive richiede, conseguentemente, di “accertare, caso per caso, la congruenza del diritto soggettivo in questione con i caratteri dell'ente che ne chiede tutela”; e ciò vale segnatamente per i diritti della personalità, attraverso i quali si vogliono tutelare l'autonomia e l'identità dell'organizzazione che funge da centro di imputazione di diritti e di doveri (The normative “reality” of the legal person is essentially a unitary figure of production and imputation of legal effects [...]) It can therefore be said that the subjective situations recognised for legal persons are different from those recognised for natural persons [...] The attribution of subjective legal situations according to a meta-individual scheme therefore requires “verifying, case by case, the congruence of the subjective right in question with the characteristics of the entity requiring protection”. This applies in particular to personality rights, through which it is intended to protect the autonomy and identity of the organisation that acts as the centre of imputation of rights and duties’.

<sup>117</sup> Here of course the reference is to the hypothesis of fully automated vehicles (Level 5). For the differences between the various levels of vehicle automation, see Section 5.

<sup>118</sup> P. Perlingieri, *Il diritto civile nella legalità costituzionale*, Napoli, 2020, II, p. 357: ‘L'argomento analogico realizza un'interpretazione di una disposizione, o di più disposizioni esistenti, estendendone l'operatività in misura diversa secondo le direttive insite nel sistema ordinamentale. Esso – sia nell'analogia strettamente intesa, quella *legis*, sia nell'analogia con ricorso ai principi, quella *iuris* – presuppone l'individuazione di una *ratio* e quindi di un principio che ha una sua possibile sfera di applicazione oltre la specifica ipotesi normativa (Analogical interpretation makes an interpretation of one or more rules and extends their applicability according to the internal guidelines of the legal system. In



vehicles – are two different situations.<sup>119</sup> It is necessary to analyse the real situation.<sup>120</sup>

Note that in both cases – private bodies and autonomous vehicles – it is never the acting subject who is responsible. It is in fact the manufacturer who is liable when the accident occurs and is caused by an autonomous vehicle.

This reasoning has its basis in the objective of civil liability, which is ‘based on a preventive, behavioural-correcting function’, which could

its twofold guise of *analogia legis* and *analogia iuris*, it presupposes the identification of a principle, which may also be extended beyond the specific case provided for in the rule). See also L. TULLIO, *Analogia tra eguaglianza, ragion d’essere e meritevolezza*, Perlingieri G. and M. D’ambrosio eds, in *Fonti, metodo e interpretazione*, in *ADP*, 2017, p. 101.

<sup>119</sup> P. Perlingieri, *o.u.c.*, p. 360: ‘L’analogia si fonda su una ragione di eguaglianza comparativa secondo il criterio dell’eguale trattamento degli eguali, mentre l’argomento a contrario si fonda sul non assoggettamento alla medesima normativa delle situazioni valutate come diverse (Analogy is based on a reason of comparative equality, whereby equal facts must be treated equally, whereas the *argomento a contrario* is based on the reason that different situations cannot be governed by the same rule)’. See also L. Gianformaggio, *L’analogia giuridica*, in E. Diciotti and V. Velluzzi eds, *Filosofia del diritto e ragionamento giuridico*, Torino, 2008, p. 140 ss.; Ead., *Analogia*, in *Dig. disc. priv., Sez. civ.*, 1987, I, Torino, p. 140 ss.; V. Velluzzi, *Analogia giuridica, uguaglianza e giurisprudenza della Corte di giustizia europea*, in *Teoria e critica della regolazione sociale*, 2009, p. 221. On the analogical method applied to European law, see also K. Langebucher, *Argument by Analogy in European Law*, in *Cambridge Law Journal*, 1998, p. 481 ss., who argues that: ‘[...] It is not so easy to claim the applicability in European law of [...] constraints on reasoning by analogy, namely the requirement of a legislative basis for the restriction of individual rights. One reason for this is the fact that the main focus of the division of power between the various Community institutions is to ensure the autonomy of the Member States rather than the rights of individual European citizens’; G. Itzcovich, *L’interpretazione del diritto comunitario*, in *Materiali per una storia della cultura giuridica*, 2008, 2, p. 429 ss.

<sup>120</sup> G. Filanti, *Interpretazione, nuova retorica e fattispecie*, in C. Cicero and G. Perlingieri eds, *Liber amicorum per Bruno Troisi*, 2017, I, Napoli, p. 515, who argues that the interpreter: ‘valuta, filtra, seleziona, modella secondo la propria cultura, la propria sensibilità, per costruire la fattispecie e fissare così la regola iuris del caso concreto (the interpreter evaluates, filters, selects, models according to his own culture, his own sensibility, in order to construct the case and thus fix the regola iuris of the concrete case)’. This means that ‘l’interpretazione (giuridica) non è concepibile in “astratto”, ma solo in relazione ad un caso o ad un insieme di casi, con riferimento ai quali si ritiene che (o meglio, e prima ancora: ci si domanda se) una certa norma giuridica sia applicabile (Legal interpretation is not conceivable in the “abstract”, but only in relation to a case or set of cases, with reference to which one considers that (or preferably, one asks whether) a certain legal rule is applicable’: G. D’Amico, *L’insostituibile leggerezza della fattispecie*, in *Ars interpretandi*, 2019, 1, p. 54. On the same issue see E. Betti, *Interpretazione della legge e degli atti giuridici*, Milano, 1949, p. 124.



‘disappear as soon as the manufacturer no longer bears the risk of liability since this is transferred to the robot (or AI system)’.<sup>121</sup>

Some researchers<sup>122</sup> believe that recognizing an artificial legal personhood could entail the risk of inappropriate use of legal status,<sup>123</sup> and that similarly the comparison with the limited liability of companies is misplaced, because in that case a natural person is always ultimately responsible.

The problem is precisely that on one hand applying the same principles, *analogia iuris*, to artificial intelligence as to the natural person is in conflict with the comparison between the legal person and AI, here an autonomous vehicle. The inapplicability of *analogia iuris* for the natural person and self-driving vehicles, qualified as AI, is clear. The two situations cannot be compared.

The human aptitude for thinking cannot be equated with the learning of machines, which, although they have the capacity to learn from experience, owe their skill to someone who programmed them to do so. In this respect, one thinks of computing systems, which are able to perform difficult mathematical operations more quickly and with more certain results than the human mind.

But the same argument cannot be used to exclude the applicability of *analogia iuris* for comparing AI to legal persons. Self-driving vehicles as well as private bodies<sup>124</sup> represent forms of manifestation of the human personality; they are both a projection of the human person.

However, by creating legal identity for a social grouping or private body, the legislator did not intend to create a surrogate of the human person,<sup>125</sup> but to implement the evolution of the relationship between

<sup>121</sup> C.C. Danesi, *New reflection on civil liability in the use of artificial intelligence arising from the «liability for artificial intelligence and other emerging digital technologies» report*, in *Rapporti civilisti e intelligenze artificiali: attività e responsabilità*, P. Perlingieri, S. Gioia and I. Prisco eds, Atti del 15° Convegno SISDic, Napoli, 2020, p. 409.

<sup>122</sup> Opinion of the European Economic and Social Committee Artificial intelligence – The consequences of artificial intelligence on the (digital) single market, production, consumption, employment and society on [eurlex.europa.eu/legal-content](http://eurlex.europa.eu/legal-content).

<sup>123</sup> Cf. G. Wagner, *Robot liability*, in [papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3198764](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=3198764), p. 1.; G. Borges, *Rechtliche Rahmenbedingungen für autonome Systeme*, in *Neue jur. Wochenschr.*, 2018, p. 982.

<sup>124</sup> The proof of this argument is also provided by the Civil Code which, in Book I, Title II, puts both natural and legal persons under the same label ‘person’.

<sup>125</sup> The main criticism stems from the assertion that private entities cannot be legal persons, since they cannot have the capacity to have and exercise rights, because they have neither interests nor aims. See R. Jhering, *Geist des römischen Rechts auf den verschiedenen*

human and community,<sup>126</sup> where personality can be developed. Although the human personality can be traced back to the unity of the human person, its manifestations are multiple and at the same time autonomous.

The autonomy of the various aspects of the human personality is now embodied in private entities and now in self-driving vehicles. In light of this, it is clear that the focus shifts from the recognition of an artificial person as a surrogate for the natural person to the recognition of a further hypothesis of a legal person.<sup>127</sup>

Once the principle underlying the recognition of the legal personality of private bodies has been clarified, it is evident that it is not correct to say that 'a natural person is always ultimately responsible' in the case of private bodies (legal persons). This is the case when it is established that the natural person who is a member of the entity acted in his own

*Stufen seiner Entwicklung*, Aus. 4, 1888, III.1, p. 356: 'Die juristische Person als solche ist völlig genußunfähig sie hat keine Interessen und Zwecke, kann also auch keine Rechte haben, den Rechte sind nur da möglich, wo sie ihre Bestimmung erreichen, d.h. einem berechtigten Subject diene können – ein Recht, das in der Person des Berechtigten nie diesen seinen Zweck zu erfüllen vermag, ist ein Widerspruch gegen die Grundidee des Rechtsbegriffs (The legal person as such is completely incapable of enjoyment in other words the exercise of a right; the possession and fruition of a right or privilege are not possible, it has no interests and purposes, and can therefore also have no rights, because rights are only possible where they can achieve their purpose, ie serve the legal subject that is legal person- a right that is never able to fulfil its purpose in the person of the beneficiary is a contradiction to the basic idea of the concept of rights)'. The same thinking is of J. van de Heuvel, cit., p. 42 ss.; G. Vareilles Sommiers, *Le personnes morales*, Paris, 1919, p. 47; H. Kelsen, *Einleitung in die rechtswissenschaftliche Problematik*, 1934, p. 89. The Italian authors who disagreed with the theory of fiction are: T. Ascarelli, *Personalità giuridica e problemi delle società*, in *Problemi giuridici*, Milano, 1959, I, p. 237: who states that: 'la normativa espressa con persona giuridica costituisce pur sempre strumento di interessi individuali e non può mai metter capo alla tutela di interessi non risolubili in interessi di individui (the term legal person is always an instrument of individual interests and can never be used to protect interests that are not individual)'; F. D'Alessandro, *Persone giuridiche e analisi del linguaggio*, in *Studi in memoria di Tullio Ascarelli*, Milano, 1969, I, p. 264 ss. Cf F. Galgano, «Persona giuridica», in *Dig. disc. priv. sez. civ.*, XIII, Torino, 1995, p. 403, who on the one hand admits the legal capacity of private bodies, but on the other makes it clear that: 'La persona giuridica è in conclusione solo uno strumento del linguaggio giuridico utile per riassumere una complessa disciplina normativa di rapporti intercorrenti tra perone fisiche (The legal person is only a tool or legal artifice of legal language, which serves to summarise the complex legislative framework on relations between natural persons)'.

<sup>126</sup> P. Perlingieri, *La personalità umana nell'ordinamento giuridico*, Napoli, 1972.

<sup>127</sup> The arguments of R. Orestano, cit., pp. 77 and 78, could help us in this direction, he states that a common meaning of legal person cannot be possible, but must be specified in the individual concrete case/legal system.

interest,<sup>128</sup> and it means that in the first instance it is the legal person itself that is liable.

The same reasoning can be followed for the autonomous vehicle, when it is a self-driving car. It follows that in the first instance the autonomous vehicle is responsible, while the liable party changes according to the condition provided for by law, such as the vehicle being a defective product.<sup>129</sup>

Recognition of the legal personality of self-driving vehicles would also entail the creation of assets for them, separate from the manufacturer's assets, as is the case for private entities (legal persons).

The creation of an asset fund for autonomous vehicles would solve the problem of damage compensation when an accident occurs. It would also enable there to be an insurance policy<sup>130</sup> for which the autonomous vehicle would always be the owner.

Recognition of autonomous (self-driving) vehicles as legal entities would be a way of bringing the legal system into harmony following its underlying principles.

<sup>128</sup> Note 110.

<sup>129</sup> See Section 5.

<sup>130</sup> Today there is only English Trinity Lane insurance (see *Adrianflux.co.uk*), which has a 'driverless mode' clause, but it only covers certain types of damage linked to a defective product. The above proposal for direct liability of the autonomous vehicle could, on the other hand, guarantee full compensation. See also *Automated an electric Vehicles Act 2018* 19<sup>th</sup> July 2018, in [legislation.gov.uk/ukpga/2018/18/contents/enacted](https://legislation.gov.uk/ukpga/2018/18/contents/enacted).

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## Table of Contents

<i>Introduction</i>	5
1. The definition of autonomous vehicle in the light of sustainable development. International overview	7
2. The European Union legal framework	11
3. The ‘Smart Road Decree’	12
4. A brief introduction to the civil liability in Italy	16
5. Civil liability and autonomous vehicles: the different theories	19
5.1 Liability for damage by compliant products applied to autonomous driving vehicles	28
6. An overview of the German Motor Vehicle Liability Act	30
7. The civil liability and autonomous vehicle in the USA	31
8. The Tesla case	40
9. A proposal for a solution	41
<i>Author Index</i>	51





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