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Liability and emerging digital technologies: an EU perspective**

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1. Introduction

Emerging digital technologies (EDTs), e.g. Internet of Things and of Services (IoT/IoS), Artificial Intelligence (AI), advanced robotics and autonomous vehicles (AV)¹, can lead to fundamental discoveries, opening up new possibilities, and significantly improving the lives of many – in particular by bringing major benefits to our society and economy through better healthcare, more efficient public administration, safer transport, a more competitive industry and sustainable farming. Machine-learning, for example, can be used to make more accurate and faster medical diagnoses, carry out dangerous and repetitive tasks, and free up valuable time. In more general terms, such technologies have the potential to transform products, services and ac-

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¹The category of emerging digital technologies is not fully defined and exhaustively identified in the European documents on the topic, where they are indicated with the exemplificative list of “Internet of Things (IoT), Artificial Intelligence, advanced robotics and autonomous systems”. In this work the wording of the EU institutions is adopted.

tivities, procedures and practices in several economic sectors and in relation to many aspects of society.

However, as “smart machines” develop in a way that may make them pursue their tasks with diverse degrees of autonomy², their new and enhanced potential could bring in risks – or increase the existing ones – for both those who offer them and those who use them.

This scenario certainly raises challenges for regulators and policymakers that have to face the ontological difficulty of foreseeing and possibly controlling the impact of EDTs on economy and society. An ecosystem where both citizens and businesses can trust the technology they interact with is in fact fundamental to both unlocking the potential of the above mentioned new technologies and enabling them to ameliorate people’s lives. An environment of trust and accountability around the development and use of AI-powered devices and autonomous self-learning systems includes therefore the design of legal rules on liability – or the adaptation of existing ones – to the risks generated by their use.

The adequacy and completeness of liability regimes in the face of technological challenges are indeed crucial for society. If the system is inadequate or flawed or has shortcomings in dealing with the damages caused by EDTs, victims may end up partially compensated. On the other hand, an overprotective liability regime risks to stifle the development and use of EDTs – and in the last instance innovation – by introducing systems that overcompensate for harm generated during the operation of such technologies.

In this context many are the questions that arise and are in need of an answer. Does the current legislative framework in the EU address all the possible damages that can derive from the use of EDTs, or encompass a general clause suitable to cover all of them? What – if any – gaps do the current legal framework reveal? What possible amendments are currently being studied and proposed? Given the features of emerging digital technologies, would a one-size-fits-all solution be preferable, or should a technology-specific oriented solutions be adopted? Does it make sense to recognize autonomous systems as legal entities who may be held liable in damages? Should specific obligations be imposed on providers of EDTs as to the design of the technology (i.e. “safety by design”)? Should safe harbours aimed at enabling a data-driven economy be adopted? Where to strike a balance between the need to compensate victims and encouraging innovation?

² On the concept of autonomy see *infra* para. 3.

To answer the above questions one should identify the normative foundations on which a liability regime for new technologies may be built on³. While it is often maintained that the objective of the liability system is to compensate victims, this cannot be the only goal of regulators but it should go hand-in-hand with promoting innovation by providing incentives towards those actors who are best situated to take precautions against harm. To do this, it becomes crucial to understand whether the existing rules present gaps in considering the possible damages that occur in the context of the use of IoT, AI, advanced robotics and autonomous systems, and identifying possible solutions that would build trust in these technologies. All this can take place only by striking a balance between the need to compensate possible victims and the desire to incentivise innovation. The adequacy and completeness of liability regimes in the face of technological challenges are indeed crucially important for society. If the system is inadequate or flawed or has shortcomings in dealing with damages caused by emerging digital technologies, victims may end up totally or partially uncompensated, even though an overall equitable analysis may make the case for indemnifying them. The social impact of a potential inadequacy in the existing legal regimes to address new risks created by emerging digital technologies might compromise the expected benefits. In addition, certain factors, such as the ever-increasing presence of emerging digital technologies in all aspects of social life, and the multiplying effect of automation, can also exacerbate the damage these technologies cause. Damages can easily become viral and rapidly propagate in a densely interconnected society. For these reasons answering the question as to whether the current liability regime is fit to encompass the damages that might derive from the use of EDTs is urgent and crucial to their own development.

In the following paragraphs, a first attempt to ascertain whether the current liability regimes are fit for the new digital environment is undertaken. To this end, in the following paragraphs, after having surveyed the EU institutions' position on this issue and the current liability regimes, the feature of EDTs will be analysed to illustrate how these impact on the current liability notions. Finally, the findings of the recently adopted Report on Liability for AI and emerging digital technologies⁴ will be analysed as

³R.H. WEBER, D.N. STAIGER, *New Liability Patterns in the Digital Era*, in T.E. SYNODINOU, P. JOUGLEUX, C. MARKOU, T. PRASTITOU (eds.), *EU Internet Law*, Springer 2017, p. 197.

⁴EXPERT GROUP ON LIABILITY AND NEW TECHNOLOGIES – New Technologies Formation, *Liability for Artificial Intelligence and other Emerging Digital Technologies*, 2019, <https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupMeetingDoc&docid=36608>.

they provide a valid starting point for discussing any adjustments that may be needed.

2. The EU policy on liability in the context of EDTs

At the moment the debate on whether the current liability regime is fit for the purpose is quite lively within the European Union, in particular as to what extent the existing liability schemes are adapted to the emerging market realities that follow the development of new technologies such as AI, advanced robotics, IoT and the like. In this regards, the EU institutions have adopted a series of documents that in part tackle to topic, in part highlight the need for further analysis.

For example, in February 2017, the European Parliament adopted a Resolution on Civil Law Rules on Robotics with recommendation to the Commission⁵, which proposed a whole range of legislative and non-legislative initiatives in the field of robotics and AI. In particular, it asked the Commission to submit a proposal for a legislative instrument providing civil law rules on the liability of robots and AI. In February 2018, the European Parliamentary Research Service (EPRS) published a study on “A common EU approach to liability rules and insurance for connected and autonomous vehicles”⁶, as an added value assessment accompanying the Resolution on Civil Law Rules. On April 25 2018 the Commission published a Staff Working Document on Liability for Emerging Digital Technologies⁷, accompanying the Commission’s Communication on Artificial Intelligence for Europe⁸, which provides the starting point of the discussions on liability and EDTs.

⁵EUROPEAN PARLIAMENT, *Civil Law Rules on Robotics*, Strasbourg, 16 February 2017, 2015/2103(INL), http://www.europarl.europa.eu/doceo/document/TA-8-2017-0051_EN.html.

⁶EUROPEAN PARLIAMENT RESEARCH SERVICE, *A common EU approach to liability rules and insurance for connected and autonomous vehicles*, authored by Tatiana Evas, PE 615.635, February 2018.

⁷COMMISSION STAFF WORKING DOCUMENT, *Liability for emerging digital technologies* – Accompanying the document Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions Artificial intelligence for Europe, SWD/2018/137 final.

⁸COMMUNICATION OF THE EUROPEAN COMMISSION, *Artificial Intelligence for Europe*, Brussels, 25 April 2018 COM(2018) 237 final, <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52018SC0137>.

All these documents, as well as the following Sibiu Communication of May 2019⁹, stress that a robust regulatory framework should address the ethical and legal questions surrounding AI, including those related to liability. In its 2018 AI Communication, the Commission also announced the adoption of a report assessing the implications of emerging digital technologies on existing safety and liability frameworks by mid-2019. In its 2019 Work Programme, it confirmed it would “continue work on the emerging challenge of Artificial Intelligence by enabling coordinated action across the European Union”¹⁰.

In order to provide an answer, in March 2018, the Commission set up an Expert Group on Liability and New Technologies¹¹, operating in two different formations: the Product Liability Directive formation and the New Technologies formation. This second formation was in particular asked to assess “whether and to what extent existing liability schemes are adapted to the emerging market realities following the development of the new technologies such as Artificial Intelligence, advanced robotics, the IoT and cybersecurity issues”. The experts were requested to examine whether the current liability regimes are still “adequate to facilitate the uptake of ... new technologies by fostering investment stability and users’ trust”. If case of shortcomings, the expert group was invited to make recommendations for amendments, without being limited to existing national and EU legal instruments. However, recommendations were to be limited to matters of extracontractual liability, leaving aside in particular corresponding (and complementary) rules on safety and other technical standards. As a result of the expert group’s activity in November 2020 the Report “Liability for Artificial Intelligence and other Emerging Digital Technologies”¹² was published. This undertakes an assessment of existing liability regimes in the wake of emerging technologies and it concludes that the current ones in force in the Member States ensure at least basic protection of victims whose damage is caused by the operation of such new technologies.

⁹ EUROPEAN COMMISSION, *Europe in May 2019 Preparing for a more united, stronger and more democratic Union in an increasingly uncertain world*, The European Commission’s contribution to the informal EU27 leaders’ meeting in Sibiu (Romania), 9 May 2019, https://ec.europa.eu/commission/sites/beta-political/files/euco_sibiu_communication_en.pdf.

¹⁰ COMMUNICATION OF THE EUROPEAN COMMISSION, *Commission Work Programme 2019 Delivering what we promised and preparing for the future*, Strasbourg, 23 October 2018, COM(2018) 800 final, https://ec.europa.eu/info/sites/info/files/cwp_2019_en.pdf.

¹¹ See <https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=3592>.

¹² See *supra* note 4.

3. The current legal liability framework

To understand how the development and use of EDTs impact the current liability notions is necessary to preliminary reconstruct the current liability framework, which at European level is only partially harmonised. The existing EU tort law rules are in fact limited to product liability law under Directive 85/374/EC (“PLD”)¹³, liability for infringing data protection law (Article 82 of the GDPR)¹⁴ and liability for infringing competition law (Directive 2014/104/EU)¹⁵. There is also a well-established regime governing liability insurance with regard to damage caused by the use of motor vehicles (Directive 2009/103/EC)¹⁶, which though does not touch upon liability for accidents itself. Similarly, not dealing directly with liability but with product safety is the regime introduced under Directive 2001/95/EC on general product safety¹⁷, which requires that products (with the exceptions of pharmaceuticals, medical devices and food) meet all statutory safety requirements provided by EU and national laws or comply with national standards.

Similarly, at a national level there are not Member States’ liability provisions that contain liability rules specifically applicable to damage resulting from the use of EDTs, with the exception of those jurisdictions that have regulated the use of AVs, where they also provide for coverage of any damages caused, by insurance or by reference to the general rules¹⁸. At the

¹³ Council Directive 85/374/EEC of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products, *OJ L 210*, 7 August 1985, pp. 29-33.

¹⁴ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), *OJ L 119*, 4 May 2016, pp. 1-88.

¹⁵ Directive 2014/104/EU of the European Parliament and of the Council of 26 November 2014 on certain rules governing actions for damages under national law for infringements of the competition law provisions of the Member States and of the European Union Text with EEA relevance, *OJ L 349*, 5 December 2014, pp. 1-19.

¹⁶ Directive 2009/103/EC of the European Parliament and of the Council of 16 September 2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability, *OJ L 263*, 7 October 2009, pp. 11-31.

¹⁷ Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001 on general product safety, *OJ L 11*, 15 January 2002, pp. 4-17.

¹⁸ See, among many, R. DIEHL, M.I. THUE, *Autonomous Vehicle Testing Legislation: A Review of Best Practices from States on the Cutting Edge*, 21 *J. Tech. L. & Pol’y* 197 (2016), and, in the US: M. GEISTFELD, *A Roadmap for Autonomous Vehicles: State Tort Liability, Automobile Insurance, and Federal Safety Regulation*, in 105 *Cal. L. Rev.*, 1611 (2017).

moment, therefore, harmful damages that arise during the use of EDTs are likely to be compensated under existing rules in tort and contract law.

In general, domestic tort laws include a rule introducing fault-based liability with a broad scope of application, accompanied by several more specific rules which either modify the premises of fault-liability (especially in the distribution of burden of proof), or establish liability independently from fault (strict or risk-based liability). Most liability regimes also encompass the notion of liability for others (indirect or vicarious liability), which can in turn be – depending on the case or the country – fault – or risk-based.

While this is not the place to engage in a comparative analysis of each Member State's liability framework, it may be said that they all share some common principles. A general rule of liability for fault is in fact part of the legal systems of all EU members, and it is also central to the principles restating the common core of European private law¹⁹. In a nutshell, when an actor fails to take due care, and this negligence causes harm to another – or she causes such harm intentionally – this actor is liable to compensate the victim. Usually what triggers liability is harm to the fundamental interests of a person, such as life, health, bodily integrity, freedom of movement, private property, and in some countries also purely economic losses and harm to human dignity. In addition, all Member States legal systems encompass product liability as a result of the PLD implementation. On this base, a damage claim for harm generated by a defective product does not require a finding of fault on the part of the manufacturer, as, in principle, this should be a strict – not fault-based – liability²⁰. However, the regime that the PLD introduces resembles more a watered-down version of negligence liability than a strict liability regime since a claimant must in any case prove the defect and that such defect generates the harm that she suffered²¹. Moreover, limits to the compensation may be imposed, depending on the national implementation of the directive, and manufacturers may show that the defect was not linked to their activity (alleging, for example, the risk development defence)²². In sum, for as much as product liability could be of any use, it only covers damages generated by defective products, leaving outside the provision of services, for which then the default negligence-based regime revives.

¹⁹ EUROPEAN GROUP ON TORT LAW (ed.), *Principles of European Tort Law*, Article 1.101 (1) e (2), <http://civil.udg.edu/php/biblioteca/items/283/PETL.pdf>. For a comment see FRANCESCO D. BUSNELLI, et al., *Principles of European Tort Law: Text and Commentary*, Springer, Vienna, 2005.

²⁰ *Principles of European Tort Law*, Recital 2, “liability without fault”.

²¹ PLD (note 13), Article 4.

²² See *infra* para 5(i).

As a result, the current EU scenario is quite fragmented. In the first place, even though a fault-based liability is common ground, negligence and fault can be given different interpretation across Member States. In the second place, although the PLD should in principle introduce a harmonized strict liability regime for defective products, in practice its implementation has not been consistent in all Member States and, in any case, it does not seem to encompass many of the instances generated by the use of EDTs²³. In the third place, the hypotheses of strict and vicarious liability heavily depend on the traditions of each legal national framework and therefore they cover a set of not uniform cases.

4. New technologies, new features

The question as to whether the current liability regimes are fit for the new digital era comes from the fact that EDTs present features that are unknown to the previous generation of technologies. Namely: complexity, opacity, autonomy, predictability, openness, data-drivenness and vulnerability. Even though these features are gradual in nature, their combination may however seriously challenge the traditional liability notions.

On the one hand, EDTs demonstrate a high degree of complexity due to the interdependency between the different components and layers, ranging from tangible parts and devices (e.g. sensors, actuators, hardware), to software components, data, and connectivity features. The presence of numerous interdependencies in the value chain increases the variety of players involved, which in turn amplifies the overall complication. In addition, the more complex EDTs become, the less those exposed to them can comprehend the processes that may have caused harm to themselves or to others. The opacity of these systems may only increase when self-learning features are in place, as algorithms no longer come as readable code but amount to black-boxes that are almost impossible to understand. It is this same self-learning capability that makes EDTs autonomous, i.e. capable of performing tasks and interact with the surrounding environment with less, or entirely without, human control or supervision. Many of the operations provided through and by EDTs can be almost fully autonomous, as IoT-

²³ For a survey of the issues as to the application of the Product Liability Directive to the EDTs see C. DE MEEUS, *The Product Liability Directive at the Age of the Digital Industrial Revolution: Fit for Innovation?*, in 8 *Journal of European Consumer and Market Law*, 149 (2019).

devices, advanced robots and all systems empowered by AI are developing increased capabilities to interpret the environment (via sensing, actuating, cognitive vision, machine learning, etc.), to interact with humans, to cooperate with other actors, and to learn new behaviours and execute actions autonomously without human intervention. However, the more autonomous systems are, the less they depend on other players (i.e. manufacturers, owners, users, etc.), the greater their impact on their environment and on third parties is. From the ability to operate autonomously by virtue of their interaction with the environment derives EDTs' unpredictability. Many systems are in fact designed to not only respond to pre-defined stimuli, but to identify and classify new ones and link them to self-chosen corresponding reactions that have not been pre-programmed as such. To do this they rely on the data they have been trained with, as well as the data that they keep collecting while interacting with the surrounding environment, which in turn alters the initial algorithms. As a result, the more external data systems are capable of processing, the more difficult it becomes to foresee the precise impact that they will have once in operation.

On the other hand, in order to operate and self-develop, EDTs depend on external information that is not pre-installed but generated by built-in sensors or communicated from the outside by data sources, in other words they are data-driven. This exposes these new technologies to issues whenever the data is flawed or missing, due to an error in communication or in relation to the external or internal source. Strictly linked to the data-drivenness is the feature of openness. In order to operate EDTs need not only to interact with data sources but also with other systems. They are in fact not completed once put into circulation, rather, for their nature, they depend upon subsequent inputs, such as updates and upgrades. For these reasons EDTs are deemed to be "open by design", so to permit external input either via some hardware plugin or through some wireless connection. However, this constant interaction with outside information is what also makes these new technologies vulnerable to cybersecurity breaches, which can cause the systems to malfunction and/or modify its features in a way likely to cause harm.

5. New technologies and traditional liability notions

Because of their features EDTs raise several open questions as to the capacity of the known liability regimes to encompass the harm generated by their use. Indeed, besides the well-known issues of lack of accountabil-

ity²⁴ and transparency²⁵, EDTs do challenge traditional liability concepts such as damages, causal link, and duty of care.

As for the notion of damages, in addition to “traditional” damages (harm to persons and properties), there are also those connected with the transfer of data, privacy, and confidential information security. Interconnected devices may also constitute targets of cyber-attacks: in the case of smart homes, for example, poor security measures at design, manufacturing or operation stage may allow cyber-attackers to take control of a device and modify its functioning or the functioning of other smart devices in the same ecosystem. Now, while injuries to a person or to a physical property can trigger liability, compensation of pure economic loss is not universally accepted, nor is the case of destruction of data as property loss. Similarly, also in the scenario in which personality rights are adversely affected, such as the case in which data is released in violation of the right to privacy, differences exist among jurisdictions.

The most controversial element of the liability regime is however the causal link between the victim’s harm and the defendant’s sphere. In principle, in tort law the victim should show that the damage originated by some conduct or risk attributable to the defendant. However, in the case of EDTs such a proof can become quite difficult. Interconnected devices, for example, such as smart homes or AVs, are the result of a combination of hardware, software, connectivity and data, which may make it impossible to identify the real source of the damage. Providing evidence of causation is even harder when dealing with self-learning AI systems fueled by machine learning and deep learning techniques and based on multiple external data collection. Advanced robots and all products empowered by AI may in fact act in ways that were not envisaged at the time that the system was first put into operation, and these behaviours may be so autonomous to interrupt the causal link. In a strict liability regime, such a proof could be less problematic as it would be enough to be to prove that the risk triggering the strict liability materialised; however, strict liability only applies in very limited cases.

As liability is mainly fault based, the other fundamental element that the use of EDTs challenges is the definition of the duty of care that the perpetrator should have discharged, behaviour that caused then the damage.

²⁴ M. PEREL, N. ELKIN-KOREN, *Black Box Tinkering: Beyond Disclosure in Algorithmic Enforcement*, in 69 *Fla. L. Rev.*, 181 (2017).

²⁵ F. PASQUALE, *The black box society: The secret algorithms that control money and information*, Harvard University Press, 2015.

While statutory language may in certain cases define such duties, in many others they are reconstructed by the court based on social beliefs about the prudent and reasonable course of action in the circumstances at stake. In the case of EDTs a lack of well-established models of proper functioning of these technologies and the fact that they develop as a result of learning without direct human control makes it difficult to apply fault-based liability rules. While the processes running AI systems cannot all be measured according to duties of care designed for human conduct, an accepted standard of care for the creation and operation of autonomous systems has not emerged yet.

6. The Report on Liability for AI and emerging digital technologies: a call for adjustments?

A first indication on the way in which the EU institutions intend addressing the issue of EDTs and liability is provided in the Report on Liability for Artificial Intelligence and other emerging digital technologies (“Report”) that has been recently adopted by the Expert Group appointed by the European Commission²⁶. Interestingly enough, in its assessment of existing liability regimes in the wake of emerging digital technologies, the expert group concludes that the rules in force in the Member States ensure at least basic protection of victims for damages generated in the use of EDTs. However, the specific characteristics of these technologies and their applications²⁷ make it more difficult to offer these victims a claim for compensation in all cases where this seems justified. It may also be the case that the allocation of liability is unfair or inefficient. To rectify this, it is likely that some adjustments need to be made to EU and national liability regimes. By saying this the Report confirms the issue-oriented approach that the EU institutions have adopted within the Single Market Strategy.

Being therefore aware that a size-fits-all solution is not possible, the Report identifies four main categories where adjustments may be needed: (*i*) cases where a (reinterpreted) product liability can still be applied; (*ii*) cases in which strict liability should be extended also to other entities; (*iii*) cases in which there is the need to further develop the notion of duty of care;

²⁶ See above note 4.

²⁷ See above para. 4.

and (*iv*) cases that can be addressed through vicarious liability, by equalling the device to a human auxiliary.

(*i*) As a starter, product liability remains a very useful tool to address the damages that may occur in the use of EDTs as long as a defect can be identified²⁸. However, to use product liability there are some adjustments that the current regime introduced by the PLD needs to undertake. In the first place, the PLD should be interpreted in a way that it encompasses also digital content and not just tangible products. While once digital content might not have been commonly used, nowadays, it fulfils many of the functions that tangible movable items used to when the PLD was drafted and adopted. For this reason, damages caused by defective digital content should trigger the producer's liability, in particular in the case in which defective digital elements are linked to other products, some of which come separately from the tangible item (for example, an application to be downloaded into the user's house assistant), or in the case of updates taking place after that a product has entered the market²⁹. In the second place, it is likely that if it is the digital content to be defective, it will be extremely hard for the claimant to identify the causal link between the harm and the defect. In these cases, therefore, a reversion of the burden of proof might be needed, or at least the burden of proof should be alleviated with regard to the causal relationship between a defect and the damage. Lastly, the possibility for the producers to invoke the unpredictability of the defect should be eliminated in those cases in which it was foreseeable that the technology would develop unpredictably. In other words, the development risk defence, which allows the producer to avoid liability for unforeseeable defects, should not be available in cases where it was predictable that unforeseen developments might occur³⁰.

(*ii*) Still in relation to strict liability, the Report states that this could be appropriate only when the risks generated by the EDTs concretize in a public space. If this is the case, the person who is in control of the risk connected with the operation of the EDT and who benefits from its operation should be held liable³¹. In practice, this is the regime that already ap-

²⁸ Report, 42.

²⁹ This is also in line with what provided in two directives of recent introduction: Directive (EU) 2019/771 on the sale of goods that a seller is also liable for such digital elements being in conformity with the contract, including for updates provided for as long a period as the consumer may reasonably expect, and Directive (EU) 2019/770 establishes a similar regime for digital content and digital services.

³⁰ *Ibid*, p. 43.

³¹ *Ibid*, p. 39.

plies in some Member States to autonomous vehicles and in some cases also to drones. The situation varies though significantly across jurisdictions, for example in relation to the coverage of economic loss, which is provided only in few countries. Instead, EDTs that move in public spaces (namely vehicles, drones and the like) are likely to require a general rule of strict liability within the whole digital single market for the significant harm to third parties that they can cause.

Interestingly enough, the Report also points out that, in particular in the context of autonomous cars, the concept of operators is preferable to that of “owner”, “user” or “keeper” of the technology³². While, in the past, the vast majority of accidents used to be caused by human error, in the next future most accidents will be caused by the malfunctioning of technology, though not necessarily of the autonomous vehicle itself. The term of “operator” refers to the person who is in control of the risk connected with the operation of EDTs and who benefits from such operation. For example, in the case of a fleet of autonomous vehicle, the operator is likely to be the entity that organizes, maintains and offers the services and it is on this that a strict liability regime should be on, without the exclusion of product liability on the side of the producer in case of a defective element.

(iii) In the opinion of the experts the issue which is likely to require further attention is the identification of a duty of care in the use of EDTs. While it is known that, in the case of more traditional technologies, operators have to discharge a range of duties of care that span from the choice of technology – in particular in light of the tasks to be performed and the operator’s own skills and abilities – to the organisational framework – in particular with regard to proper monitoring – and to maintenance³³, the real contours of a duty of care in the use of EDTs is still to be established. In addition, the Report also highlights the need to consider that producers have to share part of this enhanced duty of care by designing, describing and marketing products in a way effectively enabling operators to comply with their duties; and by adequately monitoring the product after putting it into circulation³⁴. This is because the more advanced technologies become, the more difficult it is for operators to develop the right skills and discharge all duties. While the risk of insufficient skills should still be borne by the operators, it would be unfair to leave producers entirely out of the equation.

³² *Ibid*, p. 41.

³³ *Ibid*, p. 44.

³⁴ *Ibid*, p. 45.

(iv) One option proposed for addressing the risks of emerging digital technology is the potential expansion of the notion of vicarious liability, which could be applied to situations where autonomous technologies are used in place of human auxiliaries³⁵. In other words, when harm is caused by an autonomous technology used in a way functionally equivalent to the employment of a human auxiliary, the operator's liability for making use of the technology should correspond to the existing vicarious liability regime of a principal for its own auxiliaries. This equivalent application encounters however two main issues. Firstly, vicarious liability regimes are modelled primarily on human behaviours, while in the case of a technological auxiliary there is not a human behaviour to assess. Secondly, vicarious liability regimes are highly different across Member States and the recourse to them runs the risk to increment the degree of fragmentation. Now, the first obstacle may be overcome by deciding that when an autonomous technology outperforms a human auxiliary, the duty of care should be determined by the performance of a comparable available technology which the operator could be expected to use³⁶. The fragmentation issue instead cannot be overcome without intervening on the Member States' national regimes.

Beside the adjustment so far mentioned, the Report introduces two main novelties that ought to be carefully considered as they are likely to significantly contribute to govern the issue of EDTs and liability in the next future. These amount to the requirement of logging by design³⁷ and to the notion of commercial or technological units³⁸.

As to the former, EDTs offer unprecedented possibilities of reliable and detailed documentation of events that may enable the identification of what has caused an accident. This can usually be done using log files, which is why the expert group suggests to impose, under certain circumstances, a duty to provide for appropriate logging and to disclose the data to the victim in a readable format. The real innovation though is about the effects of a lack of compliance with the logging obligations, which would trigger a rebuttable presumption that the condition of liability to be proven by the missing information is fulfilled³⁹. In other words, the absence of logged in-

³⁵ *Ibid*, pp. 45-46.

³⁶ *Ibid*, p. 46.

³⁷ *Ibid*, pp. 47-49.

³⁸ *Ibid*, pp. 55-57.

³⁹ *Ibid*, p. 48.

formation – or the failure to give the victim reasonable access to it – would reverse the burden of proof and significantly ease the life of a claimant.

As to the latter – the notion of commercial or technological unit – this refers to the digital ecosystem that two or more persons cooperate to create on a contractual or similar basis. A commercial or technological unit is a notion that becomes very useful in complex context such as the Internet of the Things, where it becomes almost impossible for the claimant to identify a specific tortfeasor⁴⁰. In such a case all the entities part of the unit – for example all the diverse producers or operators of the various devices that contribute to the creation of a smart house – are to be considered part of the same unit and – in the expert group’s opinion – to be deemed jointly and severally liable⁴¹. The reason why such a notion ought to be adopted is that it would avoid the risk to undercompensate victims of damages derived from complex technologies as compared with those that are damaged by technologies that are manufactured or operated by just one clearly identifiable producer. In determining, finally, what counts as a commercial and technological unit the Report pinpoints several elements, among which a joint or coordinated marketing activity for the different elements of the complex EDT at issue; the degree of their technical interdependency and interoperation; and lastly the degree of specificity or exclusivity of their combination⁴².

⁴⁰ See R.H. WEBER, *Liability in the Internet of Things*, in 6 *Journal of European Consumer and Market Law*, 207 (2017).

⁴¹ *Ibid.*, p. 56.

⁴² *Ibid.*

