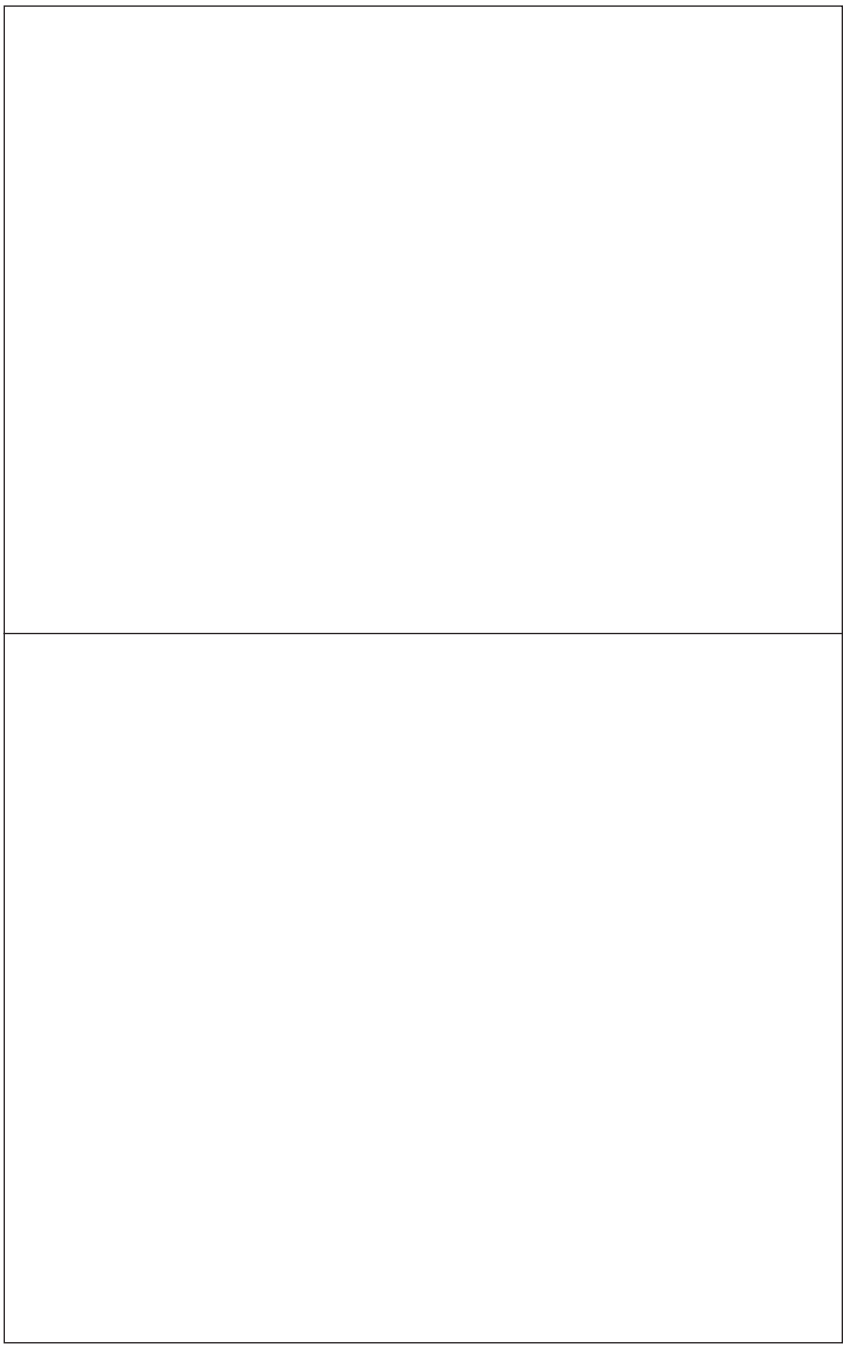
Sebastian Lohsse/Reiner Schulze/Dirk Staudenmayer (eds.)

Liability for Artificial Intelligence and the Internet of Things

Münster Colloquia on EU Law and the Digital Economy IV

Nomos



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Preface

As digitalisation has become a fundamental trend changing our economy into a digital economy, EU legislation is increasingly faced with the task to provide for a legal framework, a European Digital Single Market allowing to reap economic growth from digitalisation. While attention so far has mainly been paid to contract law, challenges obviously extend beyond this area of law. This becomes particularly clear with a view to Artificial Intelligence (AI). Being a key driver in building a digital economy, AI not only is an important factor for reaping economic growth but also brings about risks that have to be dealt with.

In accordance with the aim of the "Münster Colloquia on EU Law and the Digital Economy" to discuss how EU law should react to the challenges and needs of the digital economy, the 4th Münster Colloquium, held on 12–13 April 2018, focused on possible EU law responses to such risks arising from the use of AI. With "Liability for Robotics and in the Internet of Things" the Colloquium not only addressed questions relating to the reasonable allocation of these risks but also shed light on possible forms of liability taking into account traditional concepts of liability as well as possible new approaches.

This volume collects the contributions to this fourth Münster Colloquium. The editors kindly thank Karen Schulenberg for her invaluable support in organizing the Colloquium and in preparing this volume.

October 2018

Sebastian Lohsse
Reiner Schulze
Dirk Staudenmayer

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Introduction

Liability for Artificial Intelligence

*Sebastian Lohsse / Reiner Schulze / Dirk Staudenmayer**

I. Artificial Intelligence and Liability Challenges

Artificial intelligence (AI) is a technology of ground-breaking importance. It is an 'enabling' technology which is likely to have an economic impact comparable to the effect of for instance the introduction of electricity into the economy. From the vast amount of sectors where AI will play this role agriculture could serve as example. Whereas long ago farmers used mechanical pumps driven by human or animal muscle power in order to water their fields, when electricity was introduced, such pumps were connected to a grid – the electricity network – and became electrical pumps. Now the same process is taking place with the introduction of AI. Once again, pumps are connected to a grid – the cloud – now getting access to AI and thus being turned into 'smart' pumps. Via the Internet of Things (IoT) these 'smart' pumps are connected with sensors distributed in the field which allow the pumps to decide for example which plants to water when, how much water to use and when to buy the water, i.e. to choose the time when water supply is offered at the cheapest price. The same transition can be done with practically every product: every product can become a 'smart' product[1].

AI therefore is a key driver of the transition of our economy into a digital economy and an important factor for reaping economic growth stemming from digitalisation. Promoting digitalisation and this transition is part of the connected Digital Single Market, one of the big ten priorities of the European Commission. Preparing a framework which creates the nec-

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1 Kevin Kelly, 'How AI can bring on a second Industrial Revolution', Ted Talk, recorded live at TED Summit June 2016 <https://www.ted.com/talks/kevin_kelly_how_ai_can_bring_on_a_second_industrial_revolution> accessed 8 August 2018.

essary technical, legal and other conditions for a successful digitalisation and transition to the digital economy would allow new business models to flourish while creating the users' trust necessary for them to embrace the advantages of the digital economy.

With regard to the tasks which the transition to the digital economy assigns to the legislation of the European Union, the attention has over the past years focused on contract law (for example the supply of digital content and the online trade of goods) and data protection. As far as AI as a part of this process of digitalisation is concerned, however, the challenges clearly extend beyond these areas of law. In particular, AI gives reason to focus also on potential risks arising from its use. Thus, the legal perspective is expanded to include a field of law which belongs to the 'classic' core fields of private law alongside contract law: non-contractual liability or 'tort law' as it is called in the Common law and several European sets of rules, e.g. the Principles of European Tort Law.

The main risks to be dealt with are related to the autonomous nature of AI powered systems and the complexity of the IoT. Autonomous systems have self-learning capacities which allow them to undertake or omit certain actions which are not necessarily predictable in advance and may therefore create undesirable results leading to injury or damage. This is coupled with the fast growing complexity of the IoT where in a multi-layered system with many actors it may be difficult, if not impossible to establish the cause for a certain damage which occurred. Thus, the acceptance of AI and the IoT and the chance of reaping the economic advantages which are promised by this new technology will very much depend on legal certainty as to the allocation of liability arising from damage associated to the use of AI and the IoT.

The Commission considered such legal certainty essential for the roll-out of IoT already in its Digital Single Market Strategy of 2015.[2] The actual discussion of liability for autonomous systems and in the IoT was initiated by the Data Economy Communication of January 2017[3] and the ac-

2 European Commission, 'A Digital Single Market Strategy for Europe' (Communication) COM (2015) 192 final, 14.

3 European Commission, 'Building a European Data Economy' (Communication) COM (2017) 9 final of 10.1.2017, 13ff.

companying Commission Staff Working document.[4] Soon afterwards the European Parliament adopted a Resolution on Civil Law Rules on Robotics which attracted a lot of political and media attention because it contained far-reaching requests to the Commission. Among others the Parliament asked the Commission in the area of liability to submit, on the basis of Article 114 TFEU, a proposal for a legislative instrument on legal questions related to the development and use of robotics and AI foreseeable in the next ten to fifteen years.[5] The mid-term review of the Digital Single Market Strategy in May 2017 announced that the Commission will consider the possible need to adapt the current legal framework to take account of new technological developments including robotics and AI, especially from the angle of civil law liability[6]. The European Council conclusions of October 2017 then invited the Commission to put forward a European approach to AI.[7] Bearing in mind their political weight these conclusions are of particular importance.[8]

A first step in the consideration whether and how to adapt the current legal framework was taken with the European Commission Communication on 'Artificial Intelligence for Europe'[9] and the accompanying Commission Staff Working Document on 'Liability for Emerging Digital Technologies'.[10] Broadly speaking, the AI Communication pursues the purpose to promote innovation and to facilitate the uptake of this new technology in order to position Europe better in the global race towards developing and mastering AI and to reap the economic advantages of the roll-out of this technology. The scope of the Communication is obviously much broader than just liability. It deals with industrial and research policy,

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4 European Commission, Commission Staff Working document on the free flow of data and emerging issues of the European data economy, SWD (2017) 2 final of 10.1.2017, 40ff.

5 European Parliament, Resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)), paras 49ff.

6 European Commission, 'A Connected Digital Single Market for All' COM (2017) 228 final of 10.5.2017, 11.

7 European Council meeting of 19 October 2017 – Conclusions, EUCO 14/17, 7.

8 On the political importance of European Council conclusions cf H Reichenbach/T Emmerling/D Staudenmayer/S Schmidt, *Integration: Wanderung über europäische Gipfel*, (1st edn, Nomos 1999) 117.

9 European Commission, 'Artificial Intelligence for Europe' (Communication) COM (2018) 237 final of 25.4.2018.

10 European Commission, 'Liability for emerging digital technologies' (Staff Working document) SWD (2018) 137 final of 25.4.2018.

mentions possible socio-economic impacts and aims at ensuring an appropriate legal and ethical framework. Considerations about civil law liability are a part of this framework.

One of the aims of this legal framework is to create legal certainty for businesses and users. For businesses producing and using smart goods and services it is key to ensure investment stability. Such businesses need to know what kind of liability risks they are running as well as whether and to what extent they need to insure themselves to cover such risks. It is also important to create users' trust. If damage happens – and in the light of recent accidents not even the strongest supporters of AI are arguing any more that AI will make accidents disappear –, effective redress schemes need to be available to ensure fair and fast compensation. This trust element is so important because it will contribute to societal acceptance. Without such acceptance, users will not embrace AI and the new technology will not therefore be able to produce the undoubtedly available economic and societal advantages which it promises to deliver.

How then should potential liability risks be dealt with? As often explained in the introductions to law on non-contractual liability,[11] the industrial revolution gave rise to a new development in this field. Whereas traditionally liability had in principle but for very few exceptions always been based on fault ('subjective liability') the 19th century's developments led to an increase of cases of 'strict liability' or 'objective liability', i.e. liability independent of fault.[12] A typical 19th century example is the steam train chugging along the tracks and endangering fields and forests with its sparks and thus leading to the introduction of statutory provisions on objective liability. The 20th century has not only experienced an expansion of the types and numbers of dangerous equipment and machines but also an expansion of the corresponding legislative responses – from cars to aeroplanes to nuclear power stations. Moreover, the legal responses to these developments have become more complex and, in part, more subtle e.g. through the different combinations of individual liability, mandatory

11 See, for example, H Kötz and G Wagner, *Deliktsrecht* (13th edn, Vahlen 2017), para 29ff, 494ff; B McMahon, 'The Reaction of Tortious Liability to Industrial Revolution: A comparison: I' [1968] 3 Irish Jurist (N.S.) 18.

12 For details see the different volumes of the series *Comparative studies in the development of the law of torts in Europe* (eds J Bell and D Ibbetson), in particular Volume 5: W Ernst (ed), *The Development of Traffic Liability* (Cambridge 2010).

insurance, limitations of liability, recourse possibilities and supplementary compensation through public-law-funds.

With the digital revolution the development of non-contractual liability has possibly reached such a new stage once again. Arguably, the complexity of issues involved calls for more than a mere introduction of another type of strict liability. In particular, it is far from sure whether and to what extent strict liability is an appropriate means of dealing with the risks of AI and the IoT, ensuring legal certainty, and guaranteeing the reaping of the economic advantages of AI at all. Accordingly, it will be necessary to consider not only whether and in how far legal approaches and instruments which have emerged since the industrial revolution can be adapted so as to deal with the challenges arising from digitalisation. Rather, one also has to ask whether completely new answers have to be found in order to deal with the specific risks of the digital age.

II. Appropriate Regulatory Level

Apart from the aspects just mentioned, the situation to be dealt with is much more complex than its 19th century predecessors due to the different regulatory levels that have been established over the last decades. Before concentrating on issues of substantive law one therefore has to decide on which of these regulatory levels an appropriate framework should ideally be created. Should one act at national level, i.e. adapt existing national law or create an independent national law? Or would it be more appropriate to have a harmonised or unified law in the European legal framework? Or does a model or binding international law respond better to the global dimension of the digital world?

From a policy perspective, seeking solutions at the regional level, i.e. from the European legislator, seems to be the most efficient way. In many respects, isolated national answers would not satisfy the cross-border – or better borderless – character of data flows and transactions in the digital world and the associated risks. The share of smart products in cross-border trade flow is likely to increase significantly. Just to take a banal example: Amazon's AI powered ('Alexa') loudspeaker Echo Dot was the best-sell-

ing of all products on Amazon.com during the last Christmas season[13]. Having different national laws regulating smart products would create barriers to cross-border transactions. Global responses through international conventions would thus seem the best approach. However, such responses seem to be unrealistic bearing in mind the present global race for leadership in AI in which the big players China and the US are enjoying a pole position. With its 'Next Generation Artificial Intelligence Development Plan'[14], China wants to become global leader in AI by 2030. In the US, where industry makes considerable investments, the role of government as a regulator is seen as minimal[15]. Given these different political perceptions and economic interests such worldwide agreements are rather unlikely. For the time being, a European response is thus called for, and Europe's chance is to develop AI in a way which ensures societal acceptance[16], while at the same time making the most out of the growth potential of AI for the Digital Single Market.

III. Actors to be held responsible

With a view to the concrete rules to be adapted or established the most fundamental question to be discussed is which actors in the value chain should be responsible for which risks when putting AI powered products on the market or using them, thereby creating the risk of damage. Two approaches spring to mind for the attribution at European level of risks to private actors in the use of AI and in the IoT. On the one hand, there is the question of the responsibility of the producer.[17] On the other hand, it is to

13 <https://www.businesswire.com/news/home/20171226005146/en/Amazon-Celebrates-Biggest-Holiday-Million%C2%A0People-Trialed-Prime> accessed 10 July 2018.

14 <https://flia.org/notice-state-council-issuing-new-generation-artificial-intelligence-development-plan> accessed 10 July 2018.

15 European Political Strategy Center, 'The Age of Artificial Intelligence' (Strategic Note) 3, <https://ec.europa.eu/epsc/sites/epsc/files/epsc_strategicnote_ai.pdf> accessed 10 July 2018.

16 cf ibidem, 5.

17 At the Colloquium on which the present volume is based, this question was central to the discussions within the section on 'Traditional Liability Requirements and New Sources of Damages'; see the contributions by G Wagner, 'Robot Liability', J-S Borghetti, 'How can Artificial Intelligence be Defective?' and C Amato, 'Product Liability and Product Security: Present and Future', in this volume.

be considered whether and in which manner it is appropriate to introduce specific liability for the operator or user of an autonomous system.[18] Both approaches could also be considered together as part of an overall regulatory landscape. As these approaches are dealt with in more detail in the contributions to this volume, we confine ourselves to a short introduction.

As to the former approach, one could build on the earlier pioneering European legislation in liability law, namely the Product Liability Directive (PLD)[19], which was passed in 1985 and has since been revised, discussed, and interpreted by the courts. This is one of the approaches which has already been picked up by the Commisson. Already before the adoption of the AI Communication, the Commission had launched the Expert Group on Liability and New Technologies[20] with its two branches, one looking at the interpretation and possible revision of the PLD and the other one at liability for new technologies from a holistic point of view. The aim of the Product Liability branch is to help the Commission to interpret the provisions of the PLD and assess the extent to which its provisions are adequate to solve questions of liability in relation to traditional products but also new technologies. It will assist the Commission in drawing up guidance on the application of the PLD, among others with a particular view to emerging technologies like AI, IoT and robotics. Questions to be faced with respect to this approach mainly relate to the scope and the means by which the Directive gives rise to liability for autonomous systems and/or whether legislative measures to clarify or amend the Directive are necessary. Just to give an example of one of these issues: Would a software programmer be liable if a mistake in the code resulted in damage caused by the IoT-hardware or does Art 2 of the Product Liability Direc-

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18 This question was discussed at the Colloquium on which the present volume is based within the section on 'New Approaches: Basis for Liability and Addressees'; see the contributions by B A Koch, 'Product Liability 2.0: Mere Update or New Version?', E Karner, 'Liability for Robotics: Current Rules, Challenges, and the Need for Innovative Concepts', G Spindler, 'User Liability and Strict Liability in the Internet of Things and for Robots', G Borges, 'New Liability Concepts: the Potential of Insurance and Compensation Funds' and G Comandé, 'Multilayered (Accountable) Liability for Artificial Intelligence', in this volume.

19 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 (Product Liability Directive) [1985] OJ L 210, 29–33.

20 cf <http://ec.europa.eu/newsroom/just/item-detail.cfm?item_id=615947> accessed 10 July 2018.

tive prevent such liability because only 'moveables' are to be regarded as products for the purposes of the Directive?[21] Generally speaking the question arises to what extent the Directive's notion of products stemming from the time before the digital revolution can cover new types of 'products' like 'software' or 'data'. As far as such adaptations based on the existing provisions cannot be regarded as sufficient, it will have to be considered whether, and by which means, the legislator should further develop product liability for the 'digital age'.[22]

However, as just mentioned, it is by no means clear whether or in how far the producer's liability is indeed an appropriate means of dealing with the risks arising from AI and the IoT. As the scope of the Expert Group with its two branches shows, the Commission wants to analyse all relevant aspects in a comprehensive manner. The New Technologies formation thus has a broader scope. It shall assess whether and to what extent existing EU and national liability schemes are apt to deal with the new technologies such as AI, IoT and robotics. It shall identify the shortcomings and assess whether the overall liability regime is adequate to facilitate the uptake of these new technologies by fostering investment stability and users' trust. In case the existing overall liability regime is deemed not to be adequate, the New Technologies formation shall provide recommendations on how it should be designed. The regulatory framework to be considered for analysis should include national tort law as well as any possible specific national liability regimes, the rationale or contents of which may be relevant. Questions of liability should be analysed holistically

21 On this question, see, for example, D Fairgrieve et al, 'Product Liability Directive' in P Machnikowski (ed), *European Product Liability. An Analysis of the State of the Art in the Era of New Technologies* (Intersentia 2016) 17 (46 ff); B A Koch, 'Produkthaftung für Daten' in F Schurr and M Umlauft (eds), *Festschrift für Bernhard Eccher* (Verlag Österreich 2017) 551–570; as well as the contributions by B A Koch, 'Product Liability 2.0: Mere Update or New Version?', 104–106, G Spindler, 'User Liability and Strict Liability in the Internet of Things and for Robots', 128–129, and G Wagner, 'Robot Liability', 41–42, in this volume.

22 On this issue, see, for example R de Bruin, 'Autonomous Intelligent Cars on the European Intersection of Liability and Privacy' [2016] 7 EJRR 485–501; S Horner and M Kaulartz, 'Haftung 4.0. Rechtliche Herausforderungen im Kontext der Industrie 4.0' [2016] InTeR 22–29; H Zech, 'Gefährdungshaftung und neue Technologien' [2013] JZ 21–29; as well as the contributions by C Amato, 'Product Liability and Product Security: Present and Future', 'B A Koch, 'Product Liability 2.0: Mere Update or New Version?' and H Zech, 'Liability for Autonomous Systems: Tackling Specific Risks of Modern IT', in this volume.

looking at various actors (e.g. liability of owners/operators, insurers) and legal relationships (e.g. questions of redress in the technology value chain). The New Technologies formation shall also assist the Commission in developing EU-wide principles which can serve as guidelines for possible adaptations of applicable laws at EU and national level.

As far as liability beyond the scope of the PLD and thus liability of persons other than the producers is concerned, a starting point for the discussion obviously is the aforementioned development since the industrial revolution of strict, objective liability of operators and users of dangerous objects and equipment. This question would steer European legislation into unchartered territory because the development of strict liability so far has primarily been within the national context (and was extended by international agreements rather than through European law).[23] Accordingly, it remains to be seen whether the European legislator's level of reluctance in the field of non-contractual liability can indeed be maintained, or whether the central importance of digitalisation for the internal market rather requires the introduction of strict liability rules at European level.

The finding that product liability alone is unable to deal with the challenges and thus has to be supplemented by a 'strict liability' of the user or the operator of the AI in autonomous systems[24] is supported by the fact that numerous risks are dependent on the type and the extent of the use of AI, but can hardly be traced back to a defect. In principle, in this context, the same rules apply to the 'vehicle without a driver' as to vehicles with a driver[25] for which the strict liability of the user or the operator – in addition to product liability – is generally regarded as necessary. Besides, the development of the risk potential of AI is not only regularly dependent on the interference with numerous different digital products (including services such as the various information services for 'self-driving cars' re-

23 On this development, see, for example, from a comparative legal perspective G Brüggemeier, 'European Union', *International Encyclopedia for Tort Law* (2nd edn, Kluwer Law International 2018) in particular 241–242.

24 On this issue, see also the contributions by G Spindler, 'User Liability and Strict Liability in the Internet of Things and for Robots' and G Wagner, 'Liability for Autonomous Systems: Tackling Specific Risks of Modern IT', 45–47, in this volume.

25 For German and Austrian law see E Karner, 'Liability for Robotics: Current Rules, Challenges, and the Need for Innovative Concepts', 121, in this volume.

garding the nature of the road, the traffic situation, the weather etc.).[26] Rather, this risk potential varies also depending on the constant change which the respective 'autonomous system' and its AI themselves are subject to through learning processes with the help of external artificial intelligence. The result of this change of 'self-learning' AI may even not be predictable for its operator and insofar justify the characterisation of 'autonomous systems' as 'black box'[27]. Such lack of predictability might be seen as an argument to deny the operator's responsibility and thus his liability. Such argument, however, seems to be highly doubtful. Instead, it has to be considered that the operator has created the increased risk potential by continuously operating the 'autonomous system' and thereby obtaining benefits.

Obviously, dealing with these issues of strict liability would by no means be a trivial task. It is not simply a case of introducing a new category of risk into the catalogue of provisions on 'strict liability'. Rather, one has to take into account that there are different types of risk and to consider which party should ultimately bear the economic costs. Especially the latter question is of key importance if one keeps in mind the objective to facilitate the roll-out of the new technology and to harvest its economic and societal advantages. Concretely speaking, this translates into the need not to disincentivise producers to produce and put smart products on the market and users to purchase and use them.

The type of risk can be relevant in different ways. One would need to decide if all risks should be covered or whether a distinction should be made. Such distinctions could be done according to the likelihood of materialisation of the risk in form of a damage or in terms of what the damage relates to, i.e. death, bodily harm, health, damage to property, financial loss. Linked to this is the question whether only natural persons should be compensated or also legal persons.

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26 See also the contribution by G Spindler, 'User Liability and Strict Liability in the Internet of Things and for Robots', in this volume, 126–128.

27 For more details see the contributions by G Spindler, 'User Liability and Strict Liability in the Internet of Things and for Robots', 139, and H Zech, 'Liability for Autonomous Systems: Tackling Specific Risks of Modern IT', 190–119, in this volume.

IV. Overall Concept of Liability

Apart from all this, the development of new concepts relates to the determination of the substantial frame of reference. Would one conceptually start from the use of 'artificial intelligence' or the use of 'autonomous systems'? How would these concepts be defined and which parts of these concepts would actually be sufficiently relevant (and determinable) in order to be covered by a provision on liability?

The latter leads to a number of further questions which would be crucial for the contours of any possible future liability framework in this field, independently of the premise on which it is based. In particular, it would have to be considered whether a general provision for liability of operators or users of AI in the IoT would be appropriate or whether sector specific provisions would be preferable.[28] For both approaches there are models to be found in the Member States' liability law and in the scientific projects for European liability law.

A general rule for objective liability offers i.a. the advantage of a higher flexibility regarding its application in the case of new risks arising in the course of technological development and would insofar also serve a uniform application of law. However, it would certainly be associated with all disadvantages entailed by general clauses and undefined legal concepts with regard to predictability and legal certainty. In particular, it may prove especially difficult to describe the particularities or the necessary degree of a special, extraordinary risk in a sufficiently precise way (in order to prevent, for example, that every use of AI in a smartphone could be covered by strict liability).

Sector specific regimes could partly follow models which liability law has already developed for certain areas long before the introduction of AI (for example the liability for vehicles in road traffic or the liability provisions for medical products). They would insofar at least partly be based on experiences of the hitherto existing legislation and could better ensure the legal coherence in the areas concerned. Admittedly, the price that would inevitably have to be paid for this approach is the liability law always 'lagging behind' the technological development due to the time period needed

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28 See also the contributions by J-S Borghetti, 'How can Artificial Intelligence be Defective?', 72, E Karner, 'Liability for Robotics: Current Rules, Challenges, and the Need for Innovative Concepts', 122–123, and G Spindler, 'User Liability and Strict Liability in the Internet of Things and for Robots', 134–136, in this volume.

for the evaluation of risks, the discussions of legal policy and the legislative procedure.

Furthermore, the conditions of any liability claim for AI related damages would need to be examined in depth. Should there be a possibility to avoid liability on the basis that the potentially liable person, e.g. the producer or operator, has undertaken certain efforts or done everything possible in this sphere, e.g. respected all safety standards or downloaded all updates, to avoid the damage. If such a defence is possible, what would be the benchmark? This is particularly relevant for self-learning autonomous systems which may develop undesirable behaviour which is not or cannot be foreseen at the time of putting them on the market. At the same time this is one of several points where the link with the applicable safety legislation creating safety standards is particularly relevant.

Other modalities are also linked to this 'black box' character of self-learning algorithms. It raises the questions whether any kind of 'defect', wrongful behaviour or omission of action or any other relevant facts would need to be a necessary condition for a successful damages claim or whether the sheer damage occurred would be sufficient to establish liability. Very closely linked to this would be the question who would bear the burden of proof for which relevant facts. Another modality would be important for the insurability of damages. It would be relevant to decide whether liability claims would have a threshold, which would ensure that only claims of a certain significance could be raised, and a cap which would exclude damage beyond a specific amount.

Furthermore, setting such a set of provisions on liability will not be sufficient. It will rather have to be incorporated into the (in part not yet existing) context of European and national liability law as well as to take into account economic needs like allowing the insurance of such new risks. For example, 'strict liability' for mobile 'autonomous systems', be these self-driving cars or other systems such as devices used in a 'smart home', in medical care or in other fields, will probably not survive without adequate voluntary or mandatory insurance and therefore without including insurance in the economic and legal system of liability.[29] In addition, careful consideration will have to be given to the relationship between such 'strict

29 See also the contributions by G Borges, 'New Liability Concepts: the Potential of Insurance and Compensation Funds', B A Koch, 'Product Liability 2.0: Mere Update or New Version?', 100, 112, and G Spindler, 'User Liability and Strict Liability in the Internet of Things and for Robots', 134, 141, in this volume.

liability' of the operator or user to the (contractual and non-contractual) responsibility of producers and suppliers of digital content – which is a particular challenge in light of the concurrence between the numerous and greatly varying 'deliveries' of data for the operation of such equipment and systems.

V. Outlook

Overcoming all these challenges will no doubt require cooperation between jurists, economists and IT specialists. Where the jurists' tasks de lege ferenda in this team effort are concerned, an element of legal creativity will probably be necessary. The economic developments are still in progress and in any case may only be predicted, whereas the legal answers will have to cover the recent as well as the unknown future developments. However, as the discussions at the conference have shown, a careful readjustment of traditional concepts of liability will probably be sufficient and completely new concepts seem not be called for. Well established concepts such as the general concept of fault liability, the notion of strict liability in certain sectors, and concepts such as product liability, vicarious liability, compulsory third party insurance or compensation funds seem well apt to deal with the new challenges and do not have to be questioned as such. Yet at the same time probably none of these traditional concepts in itself will be sufficient to deal with the new challenges. Rather, a multi-layered sector-specific approach based on a combination of carefully readjusted traditional concepts of liability seems to be called for. Thus, the main task appears to lie in the arrangement and balancing of relevant sectors, appropriate layers, and their readjustment. All that remains a difficult task. This volume's contributions will hopefully be regarded as helpful in this respect, not least with a view to possible regulatory responses. A next step has already been announced in the AI Communication. The Commission will publish by mid-2019 a report on the broader implications for, potential gaps in and orientations for the liability and safety framework for AI, IoT and robotics.[30]

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30 cf European Commission (n 9) 17.