Artificial Intelligence and Civil Liability[1]

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Although modern innovations already provide an artificial intelligence-driven devices or software's capability to function fully autonomously without the involvement of any person, the issue of the specificity of the application of civil liability is, *inter alia*, weighed at the European Union level. This is linked to the current legal framework of the European Union and its Member States, which has been developed and adopted over a period of time when the operation of devices or software has requested at least an indirect involvement of a person in order to execute a specific task. In contrast, contemporary technological achievements in the design of artificial intelligence provide the ability of an artificial intelligence-driven device and software to take independent decisions regarding the conduct of a particular activity, or, on the contrary, on abstaining from carrying out a particular activity, without any person's involvement. In such circumstances, there is a need to review and reassess the content of the existing regulation with regard to the application of civil liability both in the fault liability and in the model of strict liability (including product liability), and to establish certainty in the conceptual understanding of artificial intelligence and its isolation from simple process automation.

Keywords: artificial intelligence, fault-based liability, strict liability, damage, causation.

Contents

Introduction

News headlines mention the words "artificial intelligence"[2] and contemplate its impact on the economic sector and related economic prospects increasingly often.[3] At the same time, economic forecasts suggest that profits of the artificial intelligence software market might exceed the threshold of 100 billion euro in 2025,[4] which, in turn, quite clearly illustrates the goal enshrined in society to reach a new technological breakthrough similar to that made at some point by the creation of an internal combustion engine. Although historically a person's liability in relation to damage inflicted upon a third party was evaluated using the fault-based liability model recognised in the Roman law, the industrial revolution and the mechanical solutions that have been created as part of it challenged the possibility of its application. Notably, the use and presence of steam engines, railway, sources of increased risk on a daily basis set the framework for determining civil liability of a specific person within a strict liability model or the so-called "no-fault liability". If we consider historical events in conjunction with current achievements of the technology sector, we can concur with the opinion that further development of artificial intelligence might result in the fourth industrial revolution, which would, in turn, change the world economy, society as a whole, and, consequently, also the field of jurisprudence.[5] It cannot, therefore, be excluded that increasingly broader daily use of artificial intelligence will be the foundation for improving the current legal regulation, thereby fostering correct application of civil liability for the damage inflicted as a result of operation of artificial intelligence.

1. Understanding the Concept of Artificial Intelligence and Forms of Its Manifestation

Since critical functions today are already performed by means of software, the note of the European Commission that artificial intelligence is already part

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[2] See, for instance: *Marr, B.* Is Artificial Intelligence (AI) A Threat to Humans? *Forbes*, 2020. Available: https://www.forbes.com/sites/bernardmarr/2020/03/02/is-artificial-intelligence-ai-a-threat-to-humans/#5a406685205d [last viewed 05.03.2020]; Open Future. Don't trust AI until we build systems that earn trust. *The Economist*, 2019. Available: https://www.economist.com/open-future/2019/12/18/dont-trust-ai-until-we-build-systems-that-earn-trust [last viewed 05.03.2020]; *Kirkland, R.* The economics of artificial intelligence. McKinsey & Company, 2018. Available: https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/the-economics-of-artificial-intelligence# [last viewed 05.03.2020].

[3] See, for example: Artificial Intelligence in the Real World. The business case takes shape. The Economist Intelligence Unit, 2016. Available: https://eiuperspectives.economist.com/sites/default/files/Artificial_intelligence_in_the_real_world_1.pdf [last viewed 03.03.2020].

[4] See, for instance: Statista. Revenues from the artificial intelligence (AI) software market worldwide from 2018 to 2025. Available: https://www.statista.com/statistics/607716/worldwide-artificial-intelligence-market-revenues/ [last viewed 05.03.2020]; *Abdallat, A.* From ROI To RAI (Revenue From Artificial Intelligence). Forbes, 2020. Available: https://www.forbes.com/sites/forbestechcouncil/2020/01/15/from-roi-to-rai-revenue-from-artificial-intelligence/#63fdb8001fcc [last viewed 05.03.2020].

[5] See Ministry of Environmental Protection and Regional Development. Informative report "On development of artificial intelligence solutions". 2019, p. 6. Available: http://www.varam.gov.lv/lat/likumdosana/normativo_aktu_projekti/publiskas_parvaldes_joma/?doc=27521 [last viewed 14.02.2020].

of our lives can be regarded as *prima facie* justified.[6] Thus, for instance, certain software is used to pilot drone aircraft, perform surgeries,[7] calculate radiation doses,[8] diagnose melanoma,[9] and complete transactions for acquisition and disposal of shares on a stock exchange.[10] Moreover, in the United States an algorithm is used to evaluate the probability that a specific person will reoffend.[11] The recently published communication from the European Commission "On Artificial Intelligence – A European approach to excellence and trust" assumes that artificial intelligence will be able to change our lives by improvements in an number of sectors.[12] However, prior to providing a further evaluation of the probability of application of civil liability in case of damage caused by artificial intelligence, the concept of artificial intelligence should be elaborated.

The origins of the definition of the concept of artificial intelligence are linked to the explanation provided by the British cryptographer Alan Turing in the second half of the 20th century. According to him, any device may be regarded as "intelligent", if its manifestation is equivalent to or hard to distinguish from other person.[13] It has been generally recognised that artificial intelligence is closely related to computer sciences, where intellectual processes are automated via intelligent software.[14] Furthermore, in the aspect of automation of intellectual processes, notably, it is manifested as the ability of the respective software to obtain and process the information necessary for making specific decisions

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6   European Commission. Communication from the Commission: Artificial Intelligence from Europe. Brussels, 2018, p. 1. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri= CELEX:52018DC0237&from=EN [last viewed 02.02.2020].

7   *Vladeck, D. C.* Machines without Principals: Liability Rules and Artificial Intelligence. *Washington Law Review*, Vol. 89, issue 1, 2014, p. 118.

8   *Chagal, K.* Am I an Algorithm or a Product? When Products Liability Should Apply to Algorithmic Decision-Makers. The 46th Research Conference on Communication, Information and Internet Policy. 2018, p. 32. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3241200 [last viewed 01.03.2020]; See also: *Lenardon, J. P. A.* The Regulation of Artificial Intelligence. Tilburg, 2017, p. 43. Available: http://arno.uvt.nl/show.cgi?fid=142832 [last viewed 02.02.2020].

9   For details, see: *Lappuķe, R.* Mākslīgais intelekts kā cilvēces darbarīks. *Jurista Vārds*, No. 38 (1096), 2019, p. 13.

10 See European Commission. Commission Staff Working Document: Liability for Emerging Digital Technologies. Brussels, 2018, p. 11. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/PD F/?uri=CELEX:52018SC0137&from=en [last viewed 02.02.2020]; See also: *Chagal, K.* 2018, pp. 3–5. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3241200 [last viewed 01.03.2020].

11 *Stankovic, M., Gupta, R., Rossert, B. A., Mayers, G. I., Nicoli, M.* Exploring Legal, Ethical and Policy Implications of Artificial Intelligence. White Paper, 2017, p. 28. Available: http://globalforumljd. com/new/sites/default/files/documents/resources/Artificial-Intelligence-White-Paper-Draft-5Oct2017.pdf [last viewed 30.01.2020]; See also: *Kucina, I.* Mākslīgais intelekts (algoritmi) tiesā un prognostisku lēmumu taisnīgums. *Jurista Vārds*, No. 38 (1096), 2019, pp. 1415.

12 European Commission. White Paper on Artificial Intelligence: a European approach to excellence and trust. Brussels, 2020, p. 1. Available: https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf [last viewed 23.02.2020].

13 See *Turing, A.* Computing Machinery and Intelligence. *Mind*, Vol. LIX, issue 236, 1950.

14 See *Bathaee, Y.* The Artificial Intelligence Black Box and the Failure of Internet and Causation. *Harvard Journal of Law & Technology*, Vol. 31, issue 2, 2018, p. 898. Available: https://jolt.law.harvard. edu/assets/articlePDFs/v31/The-Artificial-Intelligence-Black-Box-and-the-Failure-of-Intent-and-Causation-Yavar-Bathaee.pdf [last viewed 08.02.2020].

or predicting the initially unknown outcome[15] via *machine learning*[16] or self-learning, and as the ability of a system driven by artificial intelligence to mimic the mental capacity that is specific to a human.[17]

Similarly, Professor at Stanford University John McCarthy once characterised artificial intelligence as intelligent software development science,[18] which, in turn, resulted in public discussions whether intellect may be more than an inherent feature of a biological being, i.e., whether it can be artificially created.[19] At the same time, the paradigm of complete autonomy upheld by artificial intelligence theorists provides that "smart" algorithms are able to "feel – think – act" without other person's involvement. Such an attitude, *inter alia*, correlates with the opinion once expressed by the Professor at Oxford University Nick Bostrom that unlike other technologies, artificial intelligences are not merely tools, they are potentially independent agents.[20]

As apparent from the communication from the European Commission of 25 April 2018, "On Artificial Intelligence" the concept of "artificial intelligence" refers to "[..]. systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals [..]. artificial intelligence based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems) or artificial intelligence can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones, etc.)".[21] Similarly, the expert group specifically set up by the European Commission has admitted that artificial intelligence should be related to such software systems designed by humans, which are capable of not only independently interpreting the available set of information for making a specific

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[15] Artificial Intelligence and Human Development: Toward a research agenda. International Development Research Centre. Canada, 2018, p. 10. Available: https://www.idrc.ca/sites/default/files/ai_en.pdf [last viewed 10.02.2020]; See also: *Smith, C., McGuire, B., Huang, T.* The History of Artificial Intelligence. University of Washington, 2006, p. 4. Available: https://courses.cs.washington.edu/courses/csep590/06au/projects/history-ai.pdf [last viewed 01.01.2020].

[16] When artificial intelligence uses the so-called machine learning abilities and deep learning abilities. For details, see: *Nguyen, G., Dlugolinsky, S., Bobak, M., Tran, V., Lopez, G., Heredia, I., Malík, P., Hluchý, L.* Machine Learning and Deep Learning frameworks and libraries for large-scale data mining: a survey. Artificial Intelligence Review. 52, 2019, pp. 80–85. Available: https://www.researchgate.net/publication/329990977_Machine_Learning_and_Deep_Learning_frameworks_and_libraries_for_large-scale_data_mining_a_survey [last viewed 08.02.2020].

[17] *Kingston, J. K. C.* Artificial Intelligence and Legal Liability. 2016. Available: https://www.researchgate.net/publication/309695295_Artificial_Intelligence_and_Legal_Liability [last viewed 10.01.2020].

[18] *Smith, C., McGuire, B., Huang, T.* 2006, p. 4.

[19] See *Cerka, P., Grigiene, J., Sirbikyte, G.* Liability for damages caused by artificial intelligence. 2015. Available: https://is.muni.cz/el/1422/podzim2017/MV735K/um/ai/Cerka_Grigiene_Sirbikyte_Liability_for_Damages_caused_by_AI.pdf [last viewed 10.02.2020].

[20] *Bostrom, N.* When Machines Outsmart Humans. *Futures*, Vol. 35:7, 2000, pp. 759–764. Available: https://nickbostrom.com/2050/outsmart.html [last viewed 20.01.2020].

[21] European Commission. Communication from the Commission: Artificial Intelligence from Europe. Brussels, 2018, p. 1. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0237&from=EN [last viewed 09.02.2020].

decision, but also capable of introducing correction and adapting their behaviour by analysing the consequences resulting from their actions.[22]

It follows from the provided explanations that, beyond a known degree of autonomy, artificial intelligence also features the ability to alter its operation. In other words, artificial intelligence can generally be characterised by four vital elements, namely, the ability of the system:

- to alter its initial algorithm via *machine learning*;
- to adapt to previously unknown situations;
- to independently interpret the available set of information for making a specific decision;
- to perform a set of actions, which cannot be done by a traditional computerised system.

The Chairman of the Department for Civil Cases of the Supreme Court of the Republic of Latvia A. Strupišs has expressed his opinion that any type of "intellect" can be suggested only if functioning of a software (incl. a device) does not depend on an algorithm developed by a specific person.[23] The provided explanation is acceptable, since functioning of artificial intelligence primarily does not rest on a uniform linear series of codes, but instead depends upon the experience available to the system for resolution of specific problems, which, in turn, distinguishes artificial intelligence from traditional computerised systems (simple automation of processes or data processing).[24]

In the aspect of understanding the concept of artificial intelligence, the stages of development of artificial intelligence should be considered, which, despite being interrelated, should be distinguished:[25]

- Artificial *narrow* intelligence, whose main operation is mainly intended for performing one narrowly defined or limited task. An example here is voice assistants, which collect and adapt necessary information to provide answers as accurate as possible to the question being asked. However, it should be noted that the manifestation of artificial *narrow* intelligence in the form of a voice assistant will be unable to independently complete transactions for acquisition and disposal of shares on a stock exchange and vice versa. Although artificial *narrow* intelligence-based software is able to

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[22] European Commission. High-Level Expert Group on Artificial Intelligence. A Definition of AI: Main Capabilities and Disciplines. Brussels, 2018, p. 6. Available: Https://ec.europa.eu/futurium/en/ai-alliance-consultation [last viewed 10.01.2020]; See also: *Chagal, K.* The Reasonable Algorithm. *Journal of Law, Technology & Policy*, Forthcoming. 2018, p. 117. Available: http://cyber.haifa.ac.il/images/Publications/THE%20REASONABLE%20ALGORITHM.pdf [last viewed 23.02.2020].

[23] See *Strupišs, A.* No diskusijas konferencē "Komerctiesības un mākslīgais intelekts: Quo vadis?" [From the discussion at the conference "Commercial Law and Artificial Intelligence: Quo Vadis?"]. *Augstākās Tiesas Biļetens*, No. 16, 2018, p. 111. Available: http://www.at.gov.lv/files/uploads/files/2_Par_Augstako_tiesu/Informativie_materiali/BILETENS16_WEB.pdf [last viewed 31.01.2020].

[24] *Cole, G. S.* Tort Liability for Artificial Intelligence and Expert Systems. *10 Computer L.J.*, No.10 (2), 1990, p. 145. Available: https://repository.jmls.edu/cgi/viewcontent.cgi?article=1416&context=jitpl [last viewed 03.03.2020].

[25] See also: Ministry of Environmental Protection and Regional Development. Informative report "On development of artificial intelligence solutions". 2019, p. 4. Available: http://www.varam.gov.lv/lat/likumdosana/normativo_aktu_projekti/publiskas_parvaldes_joma/?doc=27521 [last viewed 14.02.2020]; See also: *Terjuhana, J.* Mākslīgā intelekta trenēšana, izmantojot personas datus [Training artificial intelligence by using personal data]. *Jurista Vārds*, No. 38 (1096), 2019, p. 31; *Kaplan, A., Haenlein, M.* Siri, Siri in My Hand, Who's the Fairest in the Land? On the interpretations, illustrations and Implications of artificial intelligence. *Business Horizons*, 62 (1), 2019. Available: https://www.sciencedirect.com/science/article/pii/S0007681318301393 [last viewed 31.01.2020].

introduce changes in the way it processes information and makes decisions via *machine learning*, it is not capable of functioning outside the areas of activities initially defined by a specific person (the framework of their algorithm). This allows for recognition that artificial *narrow* intelligence-based software entirely depends on its developer. For example, according to experts, the stage of development of artificial *narrow* intelligence includes state-of-the-art computer systems, such as *Watson*[26] and *AlphaGo*.[27]

- Artificial *general* intelligence, whose main operation is intended for imitating the human decision-making process in a broadly defined "task" field.[28] Current developments in creating artificial *general* intelligence by the non-profit organisation established by Elon Musk can be mentioned as an example.[29] The main operation of artificial *general* intelligence, unlike that of artificial *narrow* intelligence, is not limited to the performance of a single specific task, because artificial *general* intelligence aims to mimic a human-level skill set in a number of situations,[30] at the same time ensuring the ability of such a system to continuously improve its operation.[31] In other words, artificial *general* intelligence will secure the ability of software to function in several (incl. not interrelated) task fields regardless of the set of information available to it.

If we look at the breakdown of artificial intelligence into its development stages, a conclusion can be made that the explanation of the concept of "artificial intelligence" provided by the senator A. Strupišs characterises artificial *general* intelligence, autonomous functioning and further development of which is not influenced by other person or the content of the task initially defined for the system. Although we can admit that artificial *general* intelligence is related to future technologies,[32] most of the industry representatives consider

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[26] The Watson computer system uses cognitive computing to provide the most relevant answers resulting from interpretation of available information. For details, see: International Business Machines Corporation. Watson Anywhere. Available: https://www.ibm.com/watson [last viewed 09.02.2020]; It is also worth to mention that the treatment plan prescribed to cancer patients by the Watson computer system matches the one prescribed by 99 % of qualified doctors. For details, see: Ministry of Environmental Protection and Regional Development. Informative report "On development of artificial intelligence solutions". 2019, p. 8. Available: http://www.varam.gov.lv/lat/likumdosana/normativo_aktu_projekti/publiskas_parvaldes_joma/?doc=27521 [last viewed 14.02.2020].

[27] AlphaGo is the first computer programme, which has won in the GO table game world championship. For details, see: DeepMind AlphaGo. Available: https://deepmind.com/research/case-studies/alphago-the-story-so-far#what_is_go_ [09.02.2020]; See also: *Yu, R., Ali, G.* What's Inside the Black Box? AI Challenges for Lawyers and Researchers. *Legal Information Management.* Vol. 19, issue 1, 2019, p. 5. Available: https://www.cambridge.org/core/journals/legal-information-management/article/whats-inside-the-black-box-ai-challenges-for-lawyers-and-researchers/8A547878999427F7222C3CEFC3CE5E01 [last viewed 11.02.2020].

[28] For details, see: *Chagal, K.* The Reasonable Algorithm. 2018, pp. 115–118.

[29] The OpenAI non-profit organisation established by Elon Musk in cooperation with other industry companies are committed to ensure that artificial general intelligence benefits all the humankind. Individual projects being implemented by OpenAI can be last viewed on this website: https://openai.com/progress/ [last viewed 31.01.2020].

[30] *Rosa, M., Feyereisl, J.* A Framework for Searching for General Artificial Intelligence. 2016, p. 6. Available: https://arxiv.org/pdf/1611.00685.pdf [last viewed 05.03.2020].

[31] *Yampolskiy, R., Fox, J.* Artificial General Intelligence and the Human Mental Model. Singularity Hypotheses: A Scientific and Philosophical Assessment. Springer, 2012, p. 8. Available: http://intelligence.org/files/AGI-HMM.pdf [last viewed 05.03.2020].

[32] *Terjuhana, J.* 2019, No. 38 (1096), p. 32.

that the development stage of artificial *general* intelligence might be reached to the fullest in the first half of the 21st century.[33] Regardless of whether such forecasts are correct or not, there is a reason to start discussions about the matters of civil liability application, because in case of simple automation of processes the developer of the respective algorithm would, most probably, face civil liability (unless other factors excluding liability of the developer of the algorithm were stated).

A *prima facie* evaluation might lead to a recognition that the "developer" of the system would face liability for causing damage to a third party in case of artificial *narrow* intelligence, because the main functioning of artificial *narrow* intelligence, although it is autonomous and unpredictable, does, to a known extent, depend on its developer (for example, in terms of the functions the specific system implements). However, despite the previously mentioned, the considerations in the context of this article regarding artificial *general* intelligence may also apply to artificial *narrow* intelligence-based software, because the decisions made as part of its operation may be objectively unpredictable for its developer, and the decision-making process of such systems may limit the possibility of finding causation.

To resume, the concept of "artificial intelligence" in this article may apply to the stage of development of artificial *general* intelligence, i.e., systems developed by human beings, autonomous functioning of which may change on its own and differ completely from the initially built algorithm, and, as a result, a system similar to human intellect is able via *machine learning* to take independent, unpredictable decisions without involving other persons in several, not interrelated task fields.

2. Compliance of Currently Existing Regulatory Framework and Potential Analogy

Throughout the development of the mankind, there has always been the risk of damage being inflicted as a result of operation of mechanical devices, however, the probability of occurrence of these risks was mainly caused by the involvement of a specific person.[34] However, in case of artificial intelligence, the situation is different – the probability of occurrence of a risk depends on the decisions independently made within the scope of autonomous functioning of artificial intelligence rather than on the involvement of a specific person. Moreover, it should be taken into account that as a specific automated system becomes more complex, its functioning and even faults over time may become not just unpredictable, but also unavoidable.

Being influenced by legal vacuum, the European Parliament has once proposed to conceptually evaluate whether, for instance, it would be reasonable to grant autonomous robots the status of "electronic persons" and establish

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[33] *Mack, E.* These 27 Expert Predictions About Artificial Intelligence Will Both Disturb and Excite You. https://www.inc.com/eric-mack/heres-27-expert-predictions-on-how-youll-live-with-artificial-intelligence-in-near-future.html [last viewed 21.02.2020].

[34] See *Asaro, P. M.* The Liability Problem for Autonomous Artificial Agents. 2016, p. 190. Available: https://www.aaai.org/ocs/index.php/SSS/SSS16/paper/download/12699/11949 [last viewed 10.01.2020]; See also: *Abbott, R.* The Reasonable Computer: Disrupting the Paradigm of Tort Liability. University of Surrey School of Law. *George Washington Law Review*, No. 86, issue 1, 2018, p. 2. Available: http://epubs.surrey.ac.uk/821098/ [last viewed 10.01.2020].

the need for obligatory insurance.[35] However, it was quite reasonably recognised in the report published by the expert group of the European Commission relatively recently that such a proposal is generally evaluated as contradictory and challenging with regard to the ethical dimension.[36] At the same time, we should recognise that, according to a *prima facie* evaluation, such a solution would, in fact, restrict any application of liability to the natural and legal persons, who own such an "electronic person",[37] not to mention the method and procedure of securing victim's ability to bring its claim for compensation of damage against an "electronic person". Similarly, also the summarised conclusions of the conference "Commercial law and artificial intelligence: quo vadis" of the University of Latvia and the Ministry of Justice of 2017 provide that liability for the damage inflicted by artificial intelligence should be requested not from a "synthetic creature", but from a specific person,[38] which, unambiguously, can be accepted.

It has already been generally recognised that civil liability is a liability that results from an unauthorised action, supplements or replaces other, already violated liability or newly arises due to tort and manifests as the tortfeasor's duty to prevent or mitigate the damage caused to the victim as a result of the unauthorised activity.[39] Therefore, civil liability may be understood as the tortfeasor's duty towards the victim with regard to the compensation for inflicted damage. In turn, wrongful actions in private law can be stated only if there has been an infringement of rights (unlawful conduct).[40] This, *inter alia*, already follows from the "result theory" included in the content of Section 1635 of the Civil Law,[41] which means that a precondition for statement of a wrongful action is an infringement of rights (rather than a bare consideration whether the action of the person meets the reasonable person standard).[42]

So far, there has been no doubt and it is possible to reasonably recognise that liability for the damage inflicted as a result of autonomous functioning of artificial intelligence would be related to the evaluation of conformity of action of a specific person subject to law. However, it should be taken into account that in the fault-based liability model it is first necessary to state negligence or malicious intent, where negligence is stated on the basis of objective criteria existing outside

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[35] European Parliament. Report with recommendations to the Commission on Civil Law Rules on Robotics. 2017, p. 18. Available: https://www.europarl.europa.eu/doceo/document/A-8-2017-0005_EN.pdf [last viewed 23.02.2020].

[36] European Commission. Liability for Artificial Intelligence and other emerging digital technologies. Report from the Expert Group on Liability and New Technologies – New Technologies Formation. 2019, p. 38. Available: https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupMeetingDoc&docid=36608 [last viewed 08.02.2020]; See also: *Lappuķe, R.* Mākslīgais intelekts kā cilvēces darbarīks [Artificial intelligence as a tool of humankind]. *Jurista Vārds*, 2019, No. 38 (1096), pp. 14–15.

[37] European Commission. Liability for Artificial Intelligence and other emerging digital technologies. Report from the Expert Group on Liability and New Technologies – New Technologies Formation. 2019, p. 38. Available: https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupMeetingDoc&docid=36608 [last viewed 08.02.2020].

[38] *Lielkalne, B., Cehanoviča, A.* Komerctiesības un mākslīgais intelekts: quo vadis? *Jurista Vārds*, 2017, No. 50 (1004), pp. 6–8.

[39] See *Torgāns, K.* Saistību tiesības. I daļa. Mācību grāmata. Rīga: Tiesu namu aģentūra, 2006, p. 205.

[40] *Kārkliņš, J.* Vainas, prettiesiskas rīcības un atbildības ideja privāttiesībās. LU: *Juridiskā zinātne*, No. 8, 2015, p. 170.

[41] Civillikums: LV likums [Civil Law] Amended: 28.01.1937. Available: https://likumi.lv/ta/id/225418-civillikums [last viewed 11.02.2020].

[42] See *Kārkliņš, J.* 2015, p. 171.

psyche (reasonable person standard), while malicious intent is stated on the basis of the person's psychic attitude to his or her wrongful action.[43] Meanwhile, in the strict liability model it is necessary for the specific risk to materialise, which is considered the cause of the inflicted damage.

In accordance with Section 1649 of the Civil Law, in claims arising from wrongful action, the tortfeasor shall be liable for any, even ordinary negligence. This, in turn, means that the measure of "ordinary negligence" is the standard of care of a "reasonable person"[44]. Therefore, in order to determine a person's civil liability for a tort, it should be established that the person did not act as a reasonable person in respective conditions. However, a rhetorical question can be posed – how a failure to follow the required standard of care can be stated in actions of a specific person in accordance with the degrees of fault regulated by the Civil Law (in the form of negligence or intent), if autonomous functioning of artificial intelligence occurs outside any person's control. *Inter alia*, the opinion has been publicly expressed, proposing that in the places where technology is acting autonomously, it should be unreasonable to regard action of a specific person as incompliant with the reasonable person standard.[45] At the same time, it is recognised in the legal doctrine that if the developer of artificial intelligence is unable to anticipate the probability of occurrence of negative consequences, then all the more so the probability of occurrence of such consequences cannot be anticipated by some other third party.[46]

It should also be taken into account that artificial intelligence software is based on complex neural networks and those consist of several layers of electronic synapsis, which considerably restrict or even prevent obtaining of information about the decision-making process of that artificial intelligence.[47] Modern innovations already secure the ability of artificial *narrow* intelligence to gain experience via *machine learning* from its previous attempts and committed mistakes similarly to biological beings, while at the same time keeping the reasoning of the decision taken unknown to others. This, in turn, may restrict the possibility of applying civil liability, because causation is one of preconditions of civil liability, which exists both in contract and tort law, and applies to the preconditions for compensation of pecuniary and non-pecuniary damage.[48] At the recent 78th international conference of the University of Latvia, Professor

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[43] See *Torgāns, K., Kārkliņš, J.* Civiltiesiskās atbildības modeļi pēc vainojamības pazīmes. *Jurista Vārds*, 2015, No. 35 (887). Available: www.juristavards.lv; See also: *Kārkliņš, J.* 2015, p. 156; See also: *Buls, L.* Vainas nozīme deliktu tiesībās. LU 72. konferences rakstu krājums. Tiesību efektīvas piemērošanas problēmātika. Rīga: LU Akadēmiskais apgāds, 2014, p. 198.

[44] *Von Bar, C., Clive, E., Schulte-Nölke, H.* (eds.). Principles, Definitions and Model Rules of European Private Law: Draft Common Frame of Reference (DCFR). New York: Oxford University Press, 2010, p. 3275.

[45] *Borges, G.* Liability for machine-made decisions: gaps and potential solutions. Saarland University. Available: https://www.rechtsinformatik.saarland/images/pdf/news/2017-10-27-OECD-AI-Conf-Borges-position-paper.pdf [last viewed 03.09.2018].

[46] See *Bathaee, Y.* 2018, p. 924.; See also: *Yu, R., Ali, G.* 2019, p. 5.

[47] See *Yu, R., Ali, G.* 2019, p. 5.

[48] *Torgāns, K.* Līgumu un deliktu tiesību problēmas. Rīga: Tiesu namu aģentūra, 2013, p. 185; See also: *Torgāns, K.* Saistību tiesības. Otrais papildinātais izdevums. Rīga: Tiesu namu aģentūra, 2018, p. 170.

Kalvis Torgāns also recognised that the aspect of causation is a matter to be considered separately.[49]

The ability of artificial intelligence to function autonomously compels to review the methodology of determining causation in case of damage caused by artificial intelligence, because, for example, within the framework of the cause intervention doctrine, a decision taken within the scope of autonomous functioning of artificial intelligence might be regarded as an "external cause", and the causal link would, therefore, cease to exist and the possibility of application of civil liability would be excluded. The communication from the European Commission of 2020 "On Artificial Intelligence" provides that the application of the currently existing regulatory framework may potentially be challenged, because the possibility to track the decision-making process of artificial intelligence-based software is relatively limited,[50] which, in turn, may complicate the possibilities of victims to get compensation for inflicted damage in accordance with the legal framework of the European Union and Member States.[51]

It is, therefore, necessary to find alternative technological solutions, whereby it would be possible to track the decision-making process of artificial intelligence, thus determining how much and to what extent the specific person or other circumstances have affected autonomous functioning of artificial intelligence. Such an approach would ensure differentiation between the initial algorithm of artificial intelligence and the set of information accumulated via *machine learning*, as well as determining how autonomous functioning of artificial intelligence has been influenced by other, initially unknown factors. Thus, for instance, some work is already ongoing for the achievement of this goal to create systems, which will be able to identify and provide comprehensive information on decision-making process of artificial intelligence.[52] This information, in turn, might be used to correctly apply civil liability and its allocation among the persons involved, who would have affected functioning of artificial intelligence-based software or device. Considering the fact that the purpose of this article is not a profound analysis of all the challenges that have been identified so far (understanding the clause of a reasonable person, identification of causation and possibility of application of strict liability), individual details will be covered further below, which together raise doubts about suitability of the currently existing regulatory framework for the application of civil liability for damage inflicted by artificial intelligence.

In the fault-based liability model, problems are identified already in the possibility of application of Section 1635 of the Civil Law, because, in accordance

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[49] 78th international scientific conference of the University of Latvia – Civil Law and its Significant in the Next Decade, 2020. Available: https://www.youtube.com/watch?v=OzwLUff-Bw0 [last viewed 04.03.2020].

[50] European Commission. White Paper on Artificial Intelligence: a European approach to excellence and trust. Brussels, 2020, p. 10. Available: https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf [last viewed 23.02.2020].

[51] European Commission. White Paper on Artificial Intelligence: a European approach to excellence and trust. Brussels, 2020, p. 12. Available: https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf [last viewed 23.02.2020].

[52] See, for instance: *Wiltz, C.* DeepMind Is Working on a Solution to Bias in AI. 2019, Available: https://www.designnews.com/design-hardware-software/deepmind-working-on-solution-bias-ai/114545260161648 [last viewed 14.02.2020]; See also: Microsoft. Causality and Machine Learning. Available: https://www.microsoft.com/en-us/research/group/causal-inference/ [last viewed 14.02.2020].

with the grammatical structure of this provision, the victim is entitled to ask for satisfaction "[..]. from the infringer [person subject to law – author's comment] insofar as he or she may be held at fault for such act". Considering the fact that in case of damage caused as a result of autonomous functioning of artificial intelligence this "autonomously functioning source of damage" rather than its owner would have to be regarded as tortfeasor and, taking into account the fact the current regulatory framework does not provide for recognition of artificial intelligence as a person subject to law, a conclusion can be made that the application of civil liability based on Section 1635 of the Civil Law is impossible, not to mention the possibilities of establishing fault of software, because the actions performed by it, in essence, do not and cannot exhibit negligence or intent.[53]

Although one might agree with the opinion expressed in the legal doctrine that the fault-based liability model is not intended for determining liability for damage caused by such a device, which has *machine learning* abilities,[54] however, the possibility should be evaluated to establish civil liability for the damage caused to a third party by properties of a thing in ownership or possession. Namely, one of types of tort liability, when liability is not established for own fault, is liability for a thing – animals, safety of immovable property and so on.[55]

Liability for damage caused by artificial intelligence by its structure might *prima facie* most closely correspond to responsibility for damage caused by an animal. There is also an opinion in the legal doctrine that the liability applied for damage caused to a third party as a result of autonomous functioning of artificial intelligence might be related to the cases, when damage has been caused by a domestic animal,[56] because a device driven by artificial intelligence would not be considered a thing in its classical meaning.[57] It is also recognised that there is a certain similarity between artificial intelligence and an animal, because they may have a form of consciousness and ability to react to the environment, as well as the ability to act autonomously[58] and unpredictably.[59] This gives rise to a presumption that civil liability of a specific person might be established by analogy with liability applicable for damage caused by domestic animals.

Thus, for instance, Section 2363 of the Civil Law provides that "the keeper of a domestic or wild animal shall be liable for losses caused by such animal, unless the keeper can prove that he or she took all safety measures required by the circumstances, or that the damages would have occurred notwithstanding all of the safety measures". It should be considered that civil liability under Section 2363 of the Civil Law is established in the fault-based liability model with the help of presumption of fault. If a person is unable to prove that he or

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[53] *Bathaee, Y.* 2018, p. 906.

[54] *Hilgendorf, E., Uwe, S.* Robotics, Automatics, and the Law: Legal issues arising from the Autonomics for Industry 4.0 Technology Programme of the German Federal Ministry for Economic Affairs and Energy. Nomos, 2017, p. 17.

[55] See *Torgāns, K., Kārkliņš, J.* 2015., No. 35 (887); See also: *Torgāns, K., Kārkliņš, J., Bitāns, A.* Līgumu un deliktu problēmas Eiropas Savienībā un Latvijā. Prof. K. Torgāna zinātniskā redakcijā. Rīga: Tiesu namu aģentūra, 2017, pp. 311–315.

[56] For details, see: *Chessman, C. F.* Not Quite Human: Artificial Intelligence, Animals, And the Regulation of Sentient Property. University of California. 2018, p. 7.; See also: *Asaro, P. M.* 2016, p. 193.

[57] *Vladeck, D. C.* 2014, p.121.; See also: *Lenardon, J. P. A.* 2017, p. 29.

[58] *Chessman, C. F.* 2018, p. 7.

[59] *Turner, J.* Robot Rules: Regulating Artificial Intelligence. Palgrave Macmillan, 2018, p. 56.

she took all safety measures to prevent the damage, he or she shall be liable for the damage.[60] This, in turn, means that similarly to Section 1635 of the Civil Law we still have an unresolved issue of determining criteria for establishment of fault of the owner of artificial intelligence, i.e. which action is to be regarded as sufficiently reasonable to prevent occurrence of liability. There is an opinion in the legal doctrine that, for example, in case of automated devices, it would be reasonable to evaluate whether the device performed as well as it should have, i.e. performed up to the standards achievable by the majority of such devices, as well as the performance specification set by its manufacturer rather than evaluate compliance of certain person's action in accordance with the reasonable person standard.[61] Considering the fact that liability for damage caused by domestic animals is evaluated in the fault-based liability model, the owner of artificial intelligence would have an opportunity to defend himself or herself demonstrating that all the required safety measures have been taken. Since artificial intelligence functions autonomously, the security of the initial algorithm would have to be verified, however, this might, in turn, restrict the possibility of application of civil liability in general.

Consequently, none of the reviewed civil liability models are applicable, because the liability included in Section 1635 of the Civil Law cannot be applied in essence, while the potential analogy to the application of liability under Section 2363 of the Civil Law does not solve the previously described problems in the possibility of identification of causation, as well as the ability of the owner of artificial intelligence to respond by taking all the necessary security measures.

While it should be borne in mind that the relevant exceptions form the possibility to impose strict liability model when, for example, the direct cause of the damage is not the materialization of the risk of the increased risk source (if artificial intelligence-driven software or device were to be recognized as such), but rather the action exercised by a third party,[62] the problem with civil liability in the case of damage caused by artificial intelligence would not be solved just by applying the strict liability model. This is mainly due to the fact that strict liability for damage caused as a result of operation of software is not widely known in the European Union, although such a civil liability model is applied to operators of narrowly defined computer systems in individual cases.[63] All the more so, the autonomous nature of artificial intelligence challenges the possibility of application of product liability regulation, because there is still uncertainty whether artificial intelligence as a set of algorithms can be covered

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[60] See *Torgāns, K., Kārkliņš, J., Bitāns, A.* 2017, p. 314; See also: *Torgāns, K.* (sc. ed.). Latvijas Republikas Civillikuma komentāri: saistību tiesības (1401.–2400. p.). Rīga: Mans īpašums, 1998, p. 643.

[61] See *Vladeck, D. C.* 2014, p. 132.

[62] For details, see: *Karklins, J.* Third-party's fault as an exclusion from strict liability. Legal Science: Functions, Significance and Future in Legal Systems II 16–18 October, 2019, Riga. Collection of research papers in conjunction with the 7th International Scientific Conference of the Faculty of Law of the University of Latvia. Riga, LU Akadēmiskais apgāds, 2020.

[63] European Commission. Liability for Artificial Intelligence and other emerging digital technologies. Report from the Expert Group on Liability and New Technologies – New Technologies Formation. 2019, p. 26. Available: https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupMeetingDoc&docid=36608 [14.02.2020]; See also: European Commission. White Paper on Artificial Intelligence: a European approach to excellence and trust. Brussels, 2020, p. 13. Available: https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf [last viewed 23.02.2020].

by the "product" concept,[64] as well as whether the unpredictable decisions within the scope of autonomous functioning of artificial intelligence may be regarded as a "defect".[65]

Finally, the civil liability system aims to protect third parties against harm, and therefore, the reasonable question is whether artificial intelligence is a third party, which is protected from harm by the legislator? It is also unclear who would be responsible for harm and towards whom, if harm were to beinflicted by one object of artificial intelligence to another artificial intelligence. Since civil remedies aim to protect pecuniary and non-pecuniary benefits of a person, then artificial intelligence as an object to be protected would have to be classified into one of these groups. If it is considered to be pecuniary asset (property), then any compensation is received by its owner. However, if the owner would not be responsible for the damage caused by artificial intelligence, would it be justified to grant that person a compensation for damage, if someone damages or destroys his or her object of artificial intelligence? Perhaps the owner is only entitled to compensation of non-pecuniary (moral) damage?

3. Alternatives and future prospects

Although this paper does not intend to review and provide an extensive evaluation of all the publicly declared alternatives in resolving the problems that have been identified so far, the author points out individual opinions, which are worth to mention for illustration purposes. Thus, for instance, the European Parliament has proposed to determine the scope of civil liability depending on the level of instructions given to an artificial intelligence-based system and its degree of general autonomy, thereby setting the scope of liability proportionally among the subjects involved in the development of the artificial intelligence-based system.[66] The European Commission also offers to follow "risk-based approach", and therefore a special regulation would have to be developed only for individual sectors considering the specifics of the sector and the intended use of artificial intelligence.[67] Thus, for instance, the European Commission believes that the use of artificial intelligence potentially involves high risk where it meets the following cumulative criteria: (a) artificial intelligence is employed in a sector where significant risks can be expected to occur (for instance, healthcare, transport, energy and so on); (b) the artificial intelligence application in the sector in question is used in such a manner that significant risks are likely to arise (however, whilst healthcare generally is the "risk sector" referred to in clause (a),

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[64] European Commission. Liability for Artificial Intelligence and other emerging digital technologies. Report from the Expert Group on Liability and New Technologies – New Technologies Formation. 2019, pp. 26–29. Available: https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupMeetingDoc&docid=36608 [last viewed 08.02.2020].

[65] See, for instance: *Barfield, W.* Liability for autonomous and artificially intelligent robots. Paladyn. *Journal of Behaviour of Robotics*, Vol. 9, issue 1, p. 196. Available: https://www.degruyter.com/view/j/pjbr.2018.9.issue-1/pjbr-2018-0018/pjbr-2018-0018.xml [last viewed 20.03.2019].

[66] European Parliament. Report with recommendations to the Commission on Civil Law Rules on Robotics. 2017, p. 17. Available: https://www.europarl.europa.eu/doceo/document/A-8-2017-0005_EN.pdf [last viewed 23.02.2020].

[67] European Commission. White Paper on Artificial Intelligence: a European approach to excellence and trust. Brussels, 2020, p. 17. Available: https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf [last viewed 23.02.2020].

a flaw in the appointment scheduling system in a hospital will normally not pose risks of such significance as to justify legislative intervention).[68]

The possibility of introducing an obligatory insurance system is also considered, according to which the manufacturer of an artificial intelligence-based device would be obliged to insure the devices it developed, at the same time establishing an additional compensation fund in order to ensure that damages can be compensated for in cases where no insurance cover exists,[69] or there would be problems in the possibility of application of existing regulation.[70] At the same time, it is indicated that the compensation fund might be funded via contributions from tech industry representatives, but with administration function being performed by some independent or public authority.[71] It is interesting to note that back in 1928 Professor of the University of Latvia Vasilijs Sinaiskis expressed a farsighted opinion that "[..] in the cases where a technical fault is the reason of people's losses and there is no and cannot be any person's fault, then, as we see, we should speak not of no-fault liability in case of infringement of rights, because such liability does not exist, but of such a concept, which has nothing in common with infringements of rights. This concept is the concept of legal solidary assistance".[72]

According to Professor V. Sinaiskis, the "concept of legal solidary assistance" would be manifested as an obligatory insurance, whereby people, in accordance with the rules set out in the regulatory enactments, would be obliged "[..] to take care of those, who are related to them in some way [..]".[73] Although Professor V. Sinaiskis applied this concept to "employers and lessors", as well as "persons with no social insurance", he also thereby quite clearly illustrated the need to find solutions in cases, where the damage caused cannot be related to the fault of a particular person. It must be recognised that such an approach is similar to the proposal of the European Parliament to establish a collective "compensation fund", which would provide settlement in the cases, when regulatory enactments do not sufficiently resolve the matter of compensating the damage caused by artificial intelligence. It is quite likely that the existence of such an alternative concept in the modern age of technology is required, because it cannot be denied that legal regulation cannot anticipate all situations in life (relating to further stages of development and yet unknown forms of manifestation of artificial intelligence), which might, in turn, result in an infringement of specific person's rights.

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[68] European Commission. White Paper on Artificial Intelligence: a European approach to excellence and trust. Brussels, 2020, p. 17. Available: https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf [last viewed 23.02.2020].

[69] See European Parliament. Report with recommendations to the Commission on Civil Law Rules on Robotics. 2017, p. 20. Available: https://www.europarl.europa.eu/doceo/document/A-8-2017-0005_EN.pdf [last viewed 23.02.2020].

[70] *Van Rossum, C.* Liability of robots: legal responsibility in cases of errors or malfunctioning. Ghent University, 2017, p. 43. Available: https://lib.ugent.be/fulltxt/RUG01/002/479/449/RUG01-002479449_2018_0001_AC.pdf [last viewed 23.02.2020].

[71] *Yeung, K.* A Study of the Implications of Advanced Digital Technologies (Including AI Systems) for the Concept of Responsibility Within a Human Rights Framework. Council of Europe, 2019, p. 62. Available: https://rm.coe.int/responsability-and-ai-en/168097d9c5 [last viewed 03.03.2020].

[72] *Sinaiskis, V.* Tiesību pārkāpuma ideja senatnes un tagadnes civiltiesiskā sabiedrībā. *Jurists*, 1928, pp. 144–150. Available: http://periodika.lv/periodika2-viewer/view/index-dev.html?lang=fr#issueType:P|issue:/p_001_juri1928n05|article:DIVL136|panel:pa [last viewed 01.03.2020].

[73] *Sinaiskis, V.* 1928, pp. 144–150.

The reviewed alternatives just provide a comprehensive idea of potential solution models and further evaluation is required for the specifics of application of civil liability in case of damage caused by artificial intelligence. Moreover, it should be taken into consideration that artificial intelligence makes us re-evaluate a number of other aspects related to civil liability, for instance, patenting of a constantly changing algorithm[74], determining copyright to the work created as a result of artificial intelligence, unauthorised infringement of reputation of artificial intelligence and so on. Although current technological solutions have only been a basis for starting a discussion of the problems identified in present-day regulatory framework, it cannot be excluded that new forms of manifestation of artificial intelligence will neccessitate creating a completely new regulation, which would be suitable for artificial intelligence.

Summary

1. The conceptual scope of artificial intelligence should be viewed in conjunction with the classification of artificial intelligence by its development stages – artificial *narrow* intelligence and artificial *general* intelligence. The classification of artificial intelligence into development stages is particularly important in evaluation of the scope of applicable civil liability.
2. Modern technologies have developed only at the level of artificial *narrow* intelligence and therefore autonomous functioning of software is limited only to the performance of narrowly defined tasks, for example, processing of information using a voice assistant or the ability of vehicles to function in limited way without involvement of a person and similar processes. Although artificial *narrow* intelligence-based software to a certain extent depends on its developer, it uses the already mentioned *machine learning*, which makes it different from a traditional computerised system.
3. In order to bring certainty to the concept of artificial intelligence and its difference from simple automation of processes, artificial intelligence should be understood as systems developed by human beings, autonomous functioning of which may change on their own and differ completely from the initially built algorithm, and, as a result, a system similar to human intellect by means of *machine learning* is able to take independent, unpredictable decisions without involving other persons in several, not interrelated task fields. Autonomy and independence are the fundamental features differentiating artificial intelligence from a simple automation of processes.
4. In case of damage caused by simple automation of processes, the developer of the respective algorithm would, most probably, face civil liability, unless other factors excluding liability of the developer of the algorithm were stated. On the other hand, in case of damage caused by artificial intelligence, the application of civil liability is challenged, due to the fact that the decision

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[74] Comp. Intellectual Property Office. Artificial Intelligence – a worldwide overview of AI patents and patenting by the UK AI sector. 2019, p. 4. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/817610/Artificial_Intelligence_-_A_worldwide_overview_of_AI_patents.pdf [last viewed 05.03.2020]; European Patent Office. Patenting Artificial Intelligence. Conference summary. 2018. Available: http://documents.epo.org/projects/babylon/acad.nsf/0/D9F20464038C0753C125829E0031B814/$FILE/summary_conference_artificial_intelligence_en.pdf [last viewed 05.03.2020].

made within the scope of autonomous functioning of those systems and the causal link may be untraceable, thus limiting the possibility of determining causation.

5. The application of civil liability for damage inflicted by artificial intelligence causes problems, because in the fault-based liability model it is, first of all, necessary to identify negligent action of a specific person (at least in the form of ordinary negligence) or intent, which, in turn, has a direct causal link to the damage caused to a third party. On the other hand, according to the strict liability model, in case of product liability – a defect in the respective product, which is considered to be the cause of the damage, or in case of a source of increased risk – the materialisation of the risk of the source of increased risk, which is considered the cause of the inflicted damage.

6. Until now, artificial intelligence-based software has increasingly been made of complex neural networks and those consist of several layers of electronic synapsis, which, in turn, can make it impossible to track the decision-making process of that artificial intelligence. Consequently, this calls for reviewing the methodology of determining causation in case of damage incurred by artificial intelligence, because, for example, within the framework of the cause intervention doctrine, a decision taken within the scope of autonomous functioning of artificial intelligence might be considered an external cause (the causal link would cease to exist and the possibility of application of civil liability would be excluded).

7. In order to promote the possibility to identify causation, it is necessary to find alternative technological solutions, whereby it would be possible to track the decision-making process of artificial intelligence, thus determining how much and to what extent the specific person has affected autonomous functioning of artificial intelligence. Such an approach would not only ensure differentiation the initial algorithm of artificial intelligence and the information accumulated via *machine learning*, but also contribute to determining how the functioning of artificial intelligence has been influenced by other unknown factors. Some work is already ongoing to attain this goal – to create systems, which potentially would be able to identify and analyse the basis for the decisions made within autonomous functioning of artificial intelligence. Such information, in turn, might potentially be used to correctly determine the scope of civil liability and its distribution among the persons involved, who have affected the functioning of artificial intelligence.

8. Section 1635 of the Civil Law does not solve the problem of application of civil liability for the damage caused by artificial intelligence, because the specific infringement of rights by act or omission, which has caused damage to a third party, would have been committed by artificial intelligence rather than a specific person. In addition, the application of Section 1635 of the Civil Law is limited by the fact that software does not and cannot exhibit negligence or intent with regard to the actions performed by it.

9. Although Section 2363 of the Civil Law might apply by analogy in case of damage caused by artificial intelligence, it would not limit the opportunity of the owner of the artificial intelligence to refer to the implementation of "objectively necessary security measures" and "impossibility to anticipate the harm", thus limiting the application of civil liability in essence. This, in

turn, makes it necessary to review the reasonable person's action standard, if damage has been caused by artificial intelligence.

10. The possibility of application of the strict liability model is doubtful due to the fact that strict liability for damage caused as a result of operation of software is not widely known in the European Union, although such a civil liability model is applied to operators of narrowly defined computer systems in individual cases. At the same time, the autonomous nature of artificial intelligence also challenges the possibility of application of product liability regulation, because there is still uncertainty whether artificial intelligence as a set of algorithms can be covered by the "product" concept, as well as whether the unpredictable decisions taken within the scope of autonomous functioning of artificial intelligence may be regarded as a "defect".

Sources

Bibliography

1. *Buls, L.* Vainas nozīme deliktu tiesībās [The role of fault in tort law]. LU 72. konferences rakstu krājums. Tiesību efektīvas piemērošanas problemātika [Abstract Collection of University of Latvia 72nd Conference. Problems of effective application of law]. Riga, LU Akadēmiskais apgāds, 2014.

2. *Karklins, J.* Third-party's fault as an exclusion from strict liability. Legal Science: Functions, Significance and Future in Legal Systems II 16–18 October, 2019. Riga Collection of research papers in conjunction with the 7th International Scientific Conference of the Faculty of Law of the University of Latvia. Riga, LU Akadēmiskais apgāds, 2020.

3. *Kārkliņš, J.* Vainas, prettiesiskas rīcības un atbildības ideja privāttiesībās [The idea of fault, illegal actions and liability in private law]. LU: *Juridiskā zinātne*, No. 8, 2015.

4. *Kucina, I.* Mākslīgais intelekts (algoritmi) tiesās un prognostisku lēmumu taisnīgums [Artificial intelligence (algorithms) in courts and fairness of prognostic decisions]. *Jurista Vārds*, No. 38 (1096), 2019.

5. *Lappuķe, R.* Mākslīgais intelekts kā cilvēces darbarīks [Artificial intelligence as a tool of humanity]. *Jurista Vārds*, No. 38 (1096), 2019.

6. *Lielkalne, B., Cehanoviča, A.* Komerctiesības un mākslīgais intelekts: quo vadis? [Commercial Law and Artificial Intelligence: Quo Vadis?]. *Jurista Vārds*, No. 50 (1004), 2017.

7. *Strupišs, A.* No diskusijas konferencē "Komerctiesības un mākslīgais intelekts: Quo vadis?" [From the discussion at the conference "Commercial Law and Artificial Intelligence: Quo Vadis?"]. *Augstākās Tiesas Biļetens*, No. 16, 2018. Available: http://www.at.gov.lv/files/uploads/files/2_Par_Augstako_tiesu/Informativie_materiali/BILETENS16_WEB.pdf [last viewed 31.01.2020].

8. *Terjuhana, J.* Mākslīgā intelekta trenēšana, izmantojot personas datus [Training artificial intelligence by using personal data]. *Jurista Vārds*, No. 38 (1096), 2019.

9. *Torgāns, K.* Saistību tiesības. I daļa. Mācību grāmata [Contract Law. Part I. Textbook]. Rīga: Tiesu namu aģentūra, 2006.

10. *Torgāns, K.* Saistību tiesības. Otrais papildinātais izdevums [Contract Law. Second supplemented edition]. Rīga: Tiesu namu aģentūra, 2018.

11. *Torgāns, K.* Līgumu un deliktu tiesību problēmas [Problems of contract and tort law]. Rīga: Tiesu namu aģentūra, 2013.

12. *Torgāns, K.* (sc. ed.). Latvijas Republikas Civillikuma komentāri: saistību tiesības [Comments of the Civil Law of the Republic of Latvia: Contract Law]. Rīga: Mans īpašums, 1998.

13. *Torgāns, K., Kārkliņš, J.* Civiltiesiskās atbildības modeļi pēc vainojamības pazīmes [Models of civil liability by characteristic of imputability]. *Jurista Vārds*, No. 35 (887), 2015.

14. *Torgāns, K., Kārkliņš, J., Bitāns, A.* Līgumu un deliktu problēmas Eiropas Savienībā un Latvijā [Problems of contracts and torts in the European Union and Latvia]. Prof. K. Torgāns (sc.ed.). Rīga: Tiesu namu aģentūra, 2017

15. *Sinaiskis, V.* Tiesību pārkāpuma ideja senatnes un tagadnes civiltiesiskā sabiedrībā [The idea of violation of rights in the civil society of antiquity and present]. Jurists, 1928. Available: http://periodika.lv/periodika2-viewer/view/index-dev.html?lang=fr#issueType:P|issue:/p_001_juri1928n05|article:DIVL136|panel:pa [last viewed 01.03.2020].

16. *Abbott, R.* The Reasonable Computer: Disrupting the Paradigm of Tort Liability. University of Surrey School of Law. *George Washington Law Review*, No. 86, issue 1, 2018. Available: http://epubs.surrey.ac.uk/821098/ [last viewed on 10.01.2020].

17. *Asaro, P. M.* The Liability Problem for Autonomous Artificial Agents. 2016. Available: https://www.aaai.org/ocs/index.php/SSS/SSS16/paper/download/12699/11949 [last viewed 10.01.2020].

18. *Barfield, W.* Liability for autonomous and artificially intelligent robots. Paladyn. *Journal of Behaviour of Robotics*, Vol. 9, issue 1, 2018. Available: https://www.degruyter.com/view/j/pjbr.2018.9.issue-1/pjbr-2018-0018/pjbr-2018-0018.xml [last viewed 20.03.2019].

19. *Bathaee, Y.* The Artifical Intelligence Black Box and the Failure of Internet and Causation. *Harvard Journal of Law & Technology*, Vol. 31, issue 2, 2018. Available: https://jolt.law.harvard.edu/assets/articlePDFs/v31/The-Artificial-Intelligence-Black-Box-and-the-Failure-of-Intent-and-Causation-Yavar-Bathaee.pdf [last viewed 08.02.2020].

20. *Borges, G.* Liability for machine-made decisions: gaps and potential solutions. Saarland University, 2018. Available: https://www.rechtsinformatik.saarland/images/pdf/news/2017-10-27-OECD-AI-Conf-Borges-position-paper.pdf [last viewed 03.09.2018].

21. *Bostrom, N.* When Machines Outsmart Humans. *Futures,* Vol. 35:7, 2000. Available: https://nickbostrom.com/2050/outsmart.html [last viewed 20.01.2020].

22. *Cerka, P., Grigiene, J., Sirbikyte, G.* Liability for damages caused by artificial intelligence. 2015. Available: https://is.muni.cz/el/1422/podzim2017/MV735K/um/ai/Cerka_Grigiene_Sirbikyte_Liability_for_Damages_caused_by_AI.pdf [last viewed 10.02.2020].

23. *Chagal, K.* The Reasonable Algorithm. *Journal of Law, Technology & Policy*, forthcoming. 2018. Available: http://cyber.haifa.ac.il/images/Publications/THE%20REASONABLE%20ALGORITHM.pdf [last viewed 23.02.2020]

24. *Chagal, K.* Am I an Algorithm or a Product? When Products Liability Should Apply to Algorithmic Decision-Makers. The 46th Research Conference on Communication, Information and Internet Policy, 2018. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3241200 [last viewed 01.03.2020].

25. *Chessman, C. F.* Not Quite Human: Artificial Intelligence, Animals, And the Regulation of Sentient Property. University of California, 2018.

26. *Cole, G. S.* Tort Liability for Artificial Intelligence and Expert Systems. *10 Computer L. J.*, No. 10 (2), 1990. Available: https://repository.jmls.edu/cgi/viewcontent.cgi?article=1416&context=jitpl [last viewed 03.03.2020].

27. *Hilgendorf, E., Uwe, S.* Robotics, Automatics, and the Law: Legal issues arising from the Autonomics for Industry 4.0 Technology Programme of the German Federal Ministry for Economic Affairs and Energy, Nomos, 2017.

28. *Kaplan, A., Haenlein, M.* Siri, Siri in My Hand, Who's the Fairest in the Land? On the interpretations, illustrations and Implications of artificial intelligence. *Business Horizons*, 62 (1), 2019, Available: https://www.sciencedirect.com/science/article/pii/S0007681318301393 [last viewed 31.01.2020].

29. *Kingston, J. K. C.* Artificial Intelligence and Legal Liability. 2016. Available: https://www.researchgate.net/publication/309695295_Artificial_Intelligence_and_Legal_Liability [last viewed 10.01.2020].

30. *Kirkland, R.* The economics of artificial intelligence. McKinsey & Company, 2018. Available: https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/the-economics-of-artificial-intelligence# [last viewed 05.03.2020].

31. *Lenardon, J. P. A.* The Regulation of Artificial Intelligence. Tilburg, 2017. Available: http://arno.uvt.nl/show.cgi?fid=142832 [last viewed 02.02.2020].

32. *Mack, E.* These 27 Expert Predictions About Artificial Intelligence Will Both Disturb and Excite You. Available: https://www.inc.com/eric-mack/heres-27-expert-predictions-on-how-youll-live-with-artificial-intelligence-in-near-future.html [last viewed 21.02.2020].

33. *Marr, B.* Is Artificial Intelligence (AI) A Threat to Humans? *Forbes*, 2020. Available: https://www.forbes.com/sites/bernardmarr/2020/03/02/is-artificial-intelligence-ai-a-threat-to-humans/#5a406685205d [last viewed 05.03.2020].

34. *Nguyen, G., Dlugolinsky, S., Bobak, M., Tran, V., Lopez, G., Heredia, I., Malík, P., Hluchý, L.* Machine Learning and Deep Learning frameworks and libraries for large-scale data mining: a survey. Artificial Intelligence Review, 2019. Available: https://www.researchgate.net/publication/329990977_Machine_Learning_and_Deep_Learning_frameworks_and_libraries_for_large-scale_data_mining_a_survey [last viewed 08.02.2020].

35. *Rosa, M., Feyereisl, J.* A Framework for Searching for General Artificial Intelligence. Available: https://arxiv.org/pdf/1611.00685.pdf [last viewed 05.03.2020].

36. *Smith, C., McGuire, B., Huang, T.* The History of Artificial Intelligence. University of Washington, 2006. Available: https://courses.cs.washington.edu/courses/csep590/06au/projects/history-ai.pdf [last viewed 01.01.2020].

37. *Stankovic, M., Gupta, R., Rossert, B. A., Mayers, G. I., Nicoli, M.* Exploring Legal, Ethical and Policty Implications of Artificial Intelligence. White Paper, 2017. Available: http://globalforumljd. com/new/sites/default/files/documents/resources/Artificial-Intelligence-White-Paper-Draft-5Oct2017.pdf [last viewed 30.01.2020].

38. *Turing, A.* Computing Machinery and Intelligence. *Mind*, Vol. LIX, issue 236, 1950.

39. *Turner, J.* Robot Rules: Regulating Artificial Intelligence. Palgrave Macmillan, 2018.

40. *Vladeck, D. C.* Machines without Principals: Liability Rules and Artificial Intelligence. *Washington Law Review*, Vol. 89, issue 1, 2014.

41. *Van Rossum, C.* Liability of robots: legal responsibility in cases of errors or malfunctioning. Ghent University, 2017. Available: https://lib.ugent.be/fulltxt/RUG01/002/479/449/RUG01-002479449_2018_0001_AC.pdf [last viewed 23.02.2020].

42. *von Bar, C., Clive, E., Schulte-Nölke, H.* (eds.). Principles, Definitions and Model Rules of European Private Law: Draft Common Frame of Reference (DCFR). New York: Oxford University Press, 2010.

43. *Yampolskiy, R., Fox, J.* Artificial General Intelligence and the Human Mental Model. Singularity Hypotheses: A Scientific and Philosophical Assessment. Springer, 2012. Available: http:// intelligence.org/files/AGI-HMM.pdf [last viewed 05.03.2020].

44. *Yeung, K.* A Study of the Implications of Advanced Digital Technologies (Including AI Systems) for the Concept of Responsibility Within a Human Rights Framework. Council of Europe, 2019. Available: https://rm.coe.int/responsability-and-ai-en/168097d9c5 [last viewed 03.03.2020].

45. *Yu, R., Ali, G.* What's Inside the Black Box? AI Challanges for Lawyers and Researchers. *Legal Information Management*, Vol. 19, issue 1, 2019. Available: https://www.cambridge.org/core/ journals/legal-information-management/article/whats-inside-the-black-box-ai-challenges-for-lawyers-and-researchers/8A547878999427F7222C3CEFC3CE5E01 [last viewed 11.02.2020].

Normative Acts

1. Civillikums: LV likums [Civil Law]. Amended: 28.01.1937. Available: https://likumi.lv/ta/ id/225418-civillikums [last viewed 11.02.2020].

Other Sources

European Union and National Institution Policy Planning Documents

1. Vides aizsardzības un reģionālās attīstības ministrija. Informatīvs ziņojums "Par mākslīgā intelekta risinājumu attīstību" [Ministry of Environmental Protection and Regional Development. Informative report "On the development of artificial intelligence solutions"]. 2019. Available: http://www.varam.gov.lv/lat/likumdosana/normativo_aktu_projekti/publiskas_parvaldes_ joma/?doc=27521 [last viewed 14.02.2020].

2. European Commission. Communication from the Commission: Artificial Intelligence from Europe. Brussels, 2018. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=C ELEX:52018DC0237&from=EN [last viewed 02.02.2020].

3. European Commission. Commission Staff Working Document: Liability for Emerging Digital Technologies. Brussels, 2018. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?u ri=CELEX:52018SC0137&from=en [last viewed 02.02.2020].

4. European Commission. White Paper on Artificial Intelligence: a European approach to excellence and trust. Brussels, 2020. Available: https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf [last viewed 23.02.2020].

5. European Commission. Communication from the Commission: Artificial Intelligence from Europe. Brussels, 2018. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=C ELEX:52018DC0237&from=EN [last viewed 09.02.2020].

6. European Commission. High-Level Expert Group on Artificial Intelligence. A Definition of AI: Main Capabilities and Disciplines. Brussels, 2018. Available: https://ec.europa.eu/futurium/en/ ai-alliance-consultation [last viewed 10.01.2020].

7. European Parliament. Report with recommendations to the Commission on Civil Law Rules on Robotics. 2017. Available: https://www.europarl.europa.eu/doceo/document/A-8-2017-0005_ EN.pdf [last viewed 23.02.2020].

8. European Commission. Liability for Artificial Intelligence and other emerging digital technologies. Report from the Expert Group on Liability and New Technologies – New

Technologies Formation. 2019. Available: https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupMeetingDoc&docid=36608 [last viewed 08.02.2020].

9. European Commission. White Paper on Artificial Intelligence: a European approach to excellence and trust. Brussels, 2020. Available: https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf [last viewed 23.02.2020].

10. European Parliament. Report with recommendations to the Commission on Civil Law Rules on Robotics. 2017. Available: https://www.europarl.europa.eu/doceo/document/A-8-2017-0005_EN.pdf [last viewed 23.02.2020].

Internet Resources

1. *Abdallat, A.* From ROI to RAI (Revenue from Artificial Intelligence). *Forbes*, 2020. Available: https://www.forbes.com/sites/forbestechcouncil/2020/01/15/from-roi-to-rai-revenue-from-artificial-intelligence/#63fdb8001fcc [last viewed 05.03.2020].

2. Artificial Intelligence and Human Development: Toward a research agenda. International Development Research Centre. Canada, 2018. Available: https://www.idrc.ca/sites/default/files/ai_en.pdf [last viewed 10.02.2020].

3. Artificial Intelligence in the Real World. The business case takes shape. The Economist Intelligence Unit, 2016. Available: https://eiuperspectives.economist.com/sites/default/files/Artificial_intelligence_in_the_real_world_1.pdf [last viewed 03.03.2020].

4. DeepMind AlphaGo. Available: https://deepmind.com/research/case-studies/alphago-the-story-so-far#what_is_go_ [last viewed 09.02.2020].

5. European Patent Office. Patenting Artificial Intelligence. Conference summary, 2018. Available: http://documents.epo.org/projects/babylon/acad.nsf/0/D9F20464038C0753C125829E0031B814/$FILE/summary_conference_artificial_intelligence_en.pdf [last viewed 05.03.2020].

6. Intellectual Property Office. Artificial Intelligence – a worldwide overview of AI patents and patenting by the UK AI sector. 2019. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/817610/Artificial_Intelligence_-_A_worldwide_overview_of_AI_patents.pdf [last viewed 05.03.2020].

7. International Business Machines Corporation. Watson Anywhere. Available: https://www.ibm.com/watson [last viewed 09.02.2020].

8. Microsoft. Causality and Machine Learning. Available: https://www.microsoft.com/en-us/research/group/causal-inference/ [last viewed 14.02.2020].

9. Open Future. Don't trust AI until we build systems that earn trust. The Economist, 2019. Available: https://www.economist.com/open-future/2019/12/18/dont-trust-ai-until-we-build-systems-that-earn-trust [last viewed 05.03.2020].

10. Statista. Revenues from the artificial intelligence (AI) software market worldwide from 2018 to 2025. Available: https://www.statista.com/statistics/607716/worldwide-artificial-intelligence-market-revenues/ [last viewed 05.03.2020].

11. *Wiltz, C.* DeepMind Is Working on a Solution to Bias in AI. 2019. Available: https://www.designnews.com/design-hardware-software/deepmind-working-on-solution-bias-ai/114545260161648 [last viewed 14.02.2020].

12. 78th international scientific conference of the University of Latvia – Civil Law and its Significance in the Next Decade, 2020. Available: https://www.youtube.com/watch?v=OzwLUff-Bw0 [last viewed 04.03.2020].