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Liability for operation and damages caused by artificial intelligence - with a short outlook to online games

ABSTRACT: *Who should bear the legal responsibility if an artificial intelligence entity programmed to substitute somehow human deciding ability causes damage during working? Problems arising from the rapid development of emerging technology raise such legal questions too, because the ways of its advancement are difficult to predict.*

This paper was written to analyze legal issues affecting software that are controlled by artificial intelligence and answer the question that who should bear the liability for their function or even malfunction. At first the general characteristics of artificial intelligence and effects on our society are described, than the relationship of artificial intelligence and law covering the related current regulatory environment and its critics. The main question will be the liability for damages caused by such entities in civil law. In the last chapter of the essay I draw up the behavior of AI in online virtual worlds and legal problems in connection with them.

The paper was written in order to stimulate interest in the special field of relationship between AI and law and because articles dealing with the aforementioned problem in scientific literature are barely found.

KEYWORDS: artificial intelligence, civil liability, damages, online games, electronic agents

1. General specifics and classification of artificial intelligence

1.1 General philosophical background of artificial intelligence

The rapid development of information technology gave birth many phenomenon in recent decades that shaped fundamentally the arrangements of human society. Good examples are digitalization of books, acceleration of communication and development of information society in general. There is no doubt that one of the most astounding phenomenons is the function of artificial intelligence (AI) that inspired many futurologist, author and artist. Software that include AI functions are not just simple tools in the hands of humanity anymore. They make individual decisions in the context of the tasks which they were written for.

The use of AI exited of pure scientific experimentation by present days and has become part of everyday life. AI programs try to predict that how the schemes of market affect the function of stock exchanges[1], show us which is the most cheap and short way by car to the next town on the motorway and even they control the opponents in computer games on which the human player's task is to overcome. Communication with artificial intelligence has become an important part of our daily life. In virtual space of the internet users communicate many time with software that are controlled by AI functions.

Because legal systems do not know exactly the definition of artificial intelligence, we have to examine what could be considered AI in philosophy and science.

According to Oxford computer science explanatory vocabulary: artificial intelligence is that part of information technology which deals with creating programs capable to solve problems requiring human intelligence.[2]

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[1] Krausová, Alzbeta: *Legal Regulation of Artificial Beings*, Masaryk University Journal of Law and Technology 187. (2007) p. 188.

[2] Siba, László (ed.): *Oxford számítástechnikai értelmező szótár.* Novotrade Kiadó, 1989.

Stuart Russel and Peter Norvig distinguished between four approaches in terms of AI development's philosophical concept:[3]

1) *System thinking as human*: This trend considers such systems AI that model the functions of human mind and cognition.
2) *System acting as human*: This approach is linked to the British mathematician Alan Matheson Turing, who claimed in his famous Turing-test that the criteria and purpose of AI is human-like acting.
3) *Rationally thinking system*: This viewpoint considers the purpose of AI in developing more rational or perfect systems than human cognition.
4) *Rationally acting system*: The approach of modern information technology sciences. It does not aim its purpose to create systems that think or imitate human-like behavior just to behave rational (for example to clearly diagnose diseases, predict natural disasters etc.). In later parts of my essay I consider this approach as relevant viewpoint.

According to the definition of John R. Sarle we can also make difference between *weak* and *strong* AI. Sarle considers weak AI such systems that act as they were intelligent but despite there is no evidence that they have individual mind or not. *Strong AI* is considered a system that truly thinks and has its own consciousness.[4]

1.2 AI simulations in practice

Software work so that they receive signals from the outer world (inputs) than process them using pre-written algorithms and finally show the outcome in outgoing signals (outputs). As long as human mind can comprehend that the given input by which algorithm goes through and what kind of output will be the result, software does not deserve more attention than a pocket calculator by legal aspects. But when speed, complexity and calculating capacity reaches that certain level when the human observer cannot predict the answer to the input, the story makes an interesting turn not just from technical but from legal perspective too: behavior of machines becomes unpredictable for the human observer; they start to attest human or even superhuman abilities and become weak AIs.[5]

One of the best examples for weak AI and its operating principles are chess-simulators. We already know that such chess software exist that can even beat the best human chess grandmasters. One of them is Deep Blue by IBM that became famous of its victory over Garry Kasparov in 1997.[6] Kasparov is considered one of the (if not the) best (human) chess players in the world. Nonetheless it cannot be said that Deep Blue understands and relates to chess as Kasparov, even though they both show amazing knowledge of the game. It is nearly impossible to predict the steps of Deep Blue because it is too fast, too effective, too complex, it makes mistakes also and even learns from the style of its opponent, just like humans.[7] But when the software defeats the human player, it is not the programmer of the software who wins but Deep Blue itself. The developer of the chess program probably does not have a chance against Kasparov. So we can say that Deep Blue plays intelligently regardless of the fact that it does not realize what it practically does because this circumstance is completely irrelevant of playing the game of chess.[8]

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[3] Stuart J. Russell – Peter Norvig, *Artificial Intelligence – A Modern Approach (2nd edititon)* (Upper Saddle River, New Jersey: Prentice Hall, 2003.) chapter 26.
[4] Csáji, Balázs Csanád: *A mesterséges intelligencia filozófiai problémái*, Eötvös Lóránd University of Budapest, Budapest (2002) p. 4.
[5] Solum, Lawrence B.: *Legal Personhood for Artificial Intelligences*, North Carolina Law Review, Vol. 70, (1992) p. 1244.
[6] See: http://en.wikipedia.org/wiki/Deep_Blue_versus_Kasparov,_1997,_Game_6 [05.11.2015.]
[7] Complete analysis of the matches between Deep Blue and Kasparov: http://www-03.ibm.com/ibm/history/ibm100/us/en/icons/deepblue/ [05.11.2015.]
[8] Allgrove, Benjamin D.: *Legal Personality for Artificial Intellects: Pragmatic Solution or Science Fiction?* Master of Philosophy Thesis. University of Oxford (2004) pp. 5-6.

But the chess software can be considered intelligent in the terms of playing the game only because it cannot do anything else. Nothing exists for the software in the whole world but knowing and applying the rules of chess in the framework of complex calculations. It cannot interpret any other kind of problems but such that are arising from playing the game.

Chess software are considered typically as rationally acting systems. Most of the AI researchers prefer that approach if we focus on the system's capability to solve practical issues rather than mimic human behavior.

2. Relationship of artificial intelligence, liability and law

We should search the first reference for the 'statutory' regulation of artificially intelligent creatures in science-fiction literature. Isaac Asimov described in 1950 in his book I Robot "The Three Fundamental Laws of Robotics" during the short story Runaround.[9] According to Asimov, the three basic laws which an artificial creature must follow during work are the following:

1. *A robot may not injure a human being or, through inaction, allow a human being to come to harm.*
2. *A robot must obey the orders given to it by human beings, except where such orders would conflict with the First Law.*
3. *A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.*

Asimov later supplemented the three laws with the zeroth law saying: *"A robot may not harm humanity, or, by inaction, allow humanity to come to harm"*. He also completed the original three laws with the prohibition of violating the zeroth law.[10] As we can see, this rule becomes primary to the three original laws, so the robot could even break the first law if its act supports humanity's best interest.

The classic laws of Asimov would seem to easily contradict each other during their practical application. For example what happens when a human orders a robot to come to harm another human being because it serves the interest of the human. Such situation could happen when a robot takes part in medical service and receives orders from the doctor.[11] The author wanted to resolve this contradiction by creating the zeroth law that instructs the robot to keep in mind humanity's best interests primarily while working. We can admit that it requires an excessively developed and complex intelligence and moreover emphatic and moral capability to consider in a given situation what the best interest of humanity is. It is true that these laws remained on the level of science-fiction literature so far, however, scientists developing AI in practice do not reject the possibility that some kind of universal limiting factors should be applied to synthetic life forms too.[12]

But not only fictional literature of Asimov dealt with the problem of possible legal regulation of AI. We can find in legal literature some examples too.

Peter M. Asaro deals with the legal aspects of robotics and artificial intelligence in his essay and starts with the standpoint that we should examine at first that is it possible to apply law to AI-generated problems. In order to model the problems, he examines the regulations of civil liability and tort law first. Asaro comes to the conclusion by examining laws related to robots that the regulations of product liability can be applied to robots as commercial products and to damages caused by them. Later he shifts his viewpoint from robots to software agents, mandate and contractual relations. According to his opinion, it can be concluded that the operator of the software should be liable for the AI software agent's actions.[13]

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[9] Asimov, Isaac: *I, robot* (Kossuth Könyvkiadó, 1966)
[10] Asimov, Isaac: *Robots and Empire* (Móra Ferenc Ifjúsági Könyvkiadó, 1993)
[11] Hubbard, F. Patrick: *„Do Androids Dream?": Personhood and Intelligent Artifacts*, Temple Law Review Vol. 83. (2010) pp. 85-86.
[12] Sharkey, Noel: *Asimov törvényei már nem elegendőek.* https://sg.hu/cikkek/77070/noel-sharkey-asimov-torvenyei-mar-nem-elegendoek [15.17.2016.]
[13] Asaro, Peter M.: *Robots and Responsibility from a Legal Perspective,* HUMLab, Umea University, Sweden, 2007.

Giovanni Sartor considers software agents as entities that are capable to represent their operators in legal relations. He originates this from the widespread phenomenon that nowadays many contracts are made with the help of automatic software agents without human intervention or revision. According to Sartor, it is crucial to exclude the applicability of consciousness and attributable performance in connection with AI software. Since AI agents do not have consciousness, their behavior cannot be imputable to them. According to Sartor, the behavior of AI is similar to living organisms because their actions cannot be simply predictable by examining their inner functions due to many random variables. Sartor says that we have to assume also that software agent acts rationally in the predefined behavioral framework (it constitutes a rationally acting system). The operator is liable for the agent's behavior because it was chosen as a tool by him or her to achieve results and these results create rights and obligations for them.[14]

Ryan Calo differs between two behavioral mechanisms of industrial robot operating AI software. AI that are programmed to act on a mechanical, repetitive way does not have learning or discretion mechanisms, only do what they set to do (for example they grab and move things irrespectively of the fact that a metal component or human head is in front of them). Calo calls the other, more developed acting form 'shaping' or 'emerging' behavior. It originates from programmed command but is not predetermined, instead reacts to the circumstances and learns on the go. According to Calo, in this case the possibility comes to surface that special liability rules could be applied to the acts of the software due to less predictable action.[15]

3. Artificial intelligence as legal entity

We cited in the previous chapters the concepts and theories of science and philosophy to define what AI is. There is no doubt that the behavior of AI reaches a critical point when interaction takes place between the software and humans or objects. This happens most often when AI software and the controlled hardware (a computer or a robot) changes somehow the physical world, for example helps to assemble a car in a factory. In such cases the physical manifestation of AI occurs, the software 'exits' from cyberspace. The question is that who should bear the legal responsibility for the actions of synthetic beings? Before reviewing the concrete problems of liability, let us examine current legal regulations of artificial beings and their critics.

3.1 Artificial intelligence as software

We have to keep in mind at first instance when classifying AIs by current legal regulation that they are computer programs; software. In scientific literature parallel definitions of the legal classification and concept of software can be found. From information technology perspective software means computer programs, processes and possibly documents and data related to operation of the information system. From other point of view software consist of algorithms, their computerized representation and programs. Software can be applied only to solve tasks if it leads to the step-by-step execution of certain operations. An algorithm is a predefined line of steps which necessary is to perform a certain task. The algorithm receives certain value or values per input and produces certain value or values in return as output. From computer engineering point of view a common software concept has not been developed yet, but the majority is on the standpoint that software consists of at least two major parts: the computer program and the documentation.[16]

Hungarian law does not specifies the concept of software either, however the Hungarian Act on Copyright (hereinafter referred as: Szjt.) highlights that software is protected by copyright as creative

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[14] Sartor, Giovanni: *Cognitive Automata and the Law,* Artificial Intelligence and Law, Vol. 17, EUI Working Papers Law No. 2006/35. pp. 19-22.

[15] Calo, Ryan: *Robotics and the Lessons of Cyberlaw* (February 28, 2014), California Law Review, Vol. 103, 2015; University of Washington School of Law Research Paper No. 2014-08. pp. 119-135.

[16] Auer, Ádám – Papp, Tekla: *Rövid áttekintés a software fogalmáról a magyar szerzői jogban*. Jogelméleti szemle, 2013/2. pp. 10-17.

intellectual product (according to the act: computer program and the documentation enclosed to software).[17]

In Hungarian legal literature authors often refer to the Berne Convention for the Protection of Literary and Artistic Works, the TRIPS Convention, the WIPO Copyright Treaty and EU Directive 2009/24/EC on the legal protection of computer programs.[18] The authors mostly agree on that software should be looked at under copyright regime as literary works.[19]

However, liability for AI behavior is not mainly a problem of copyright law. This concept will be presented in detail in later parts of the essay.

3.2 Attempts to define legal concept of AI

Similar to the legal concept of software, approaches to define the legal concept of AI are also barely found. There is at least one example in the USA, New Jersey legislature. A bill has been accepted in 2014 which contains special regulations for driverless cars and tries to define the concept of artificial intelligence.[20] According to the bill: *„artificial intelligence means the use of computers and related equipment to enable a machine to duplicate or mimic the behavior of human beings."*

In my opinion this attempt cannot be treated as general definition for AI. The definition considers AI only software which are written to mimic or duplicate the behavior of humans and only that are operating some kind of hardware environment (e.g. a robot). In earlier parts of the essay it was repeatedly underlined that the purpose of AI development in most cases is not to mimic human behavior but to build rationally acting systems. Moreover software developers write AI not only for machine or robot control but for totally different purposes too.

Hungarian (and EU) law does not differ between software in terms of independent decision making mechanisms and does not defines the definition of AI too. This is not necessarily a problem, because emerging problems about the legal issues of AI can be solved in most situations as it will be presented in later parts of the essay. Nevertheless, in a possible future special AI regulation the legislator will have to create the definition of AI in order to appoint substantive scope.

3.3 *De lege ferenda* standpoint: AI as legal entity

The concept of applying legal personality to artificial intelligence has been a heavily discussed topic in scientific literature for a while. A paper published in 2007 by Francisco Andrade and co-authors points out the problem that the development of information technology, telecommunications and artificial intelligence recently created a new way of making contracts and expressing contract will. In the corporate sector the intelligent electronic agents are increasingly presented. These are software that are capable to explain activities in the name of their principals and these are appropriate to have legal effect without any direct human control.[21] We can use the word 'agent' for these kind of entities. This word stems from the Latin phrase 'agere', meaning 'to act'.

According to their general definition we call agents such artificial creatures that can be useful because of their programmable nature in simulations, modeling or studying other regulatory mechanisms. The created agent or 'body' can be independent (autonomous agent) and be put into an environment. Thereby the creature will be manifested through its reactions to the stimulating effects of the given environment. The body and the environment can be the result of computer simulation or can be a robot in a real environment which is controlled by a network. The relevant feature of this method is that the agent does not only process the incoming signals but can react to the surrounding environment because it has a 'body'. Moreover it constantly perceives the results of its operation and

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[17] See: Hungarian Act on Copyright (Act LXXVII of 1999.) article 1. section (2) point c)

[18] Petkó, Mihály: *A számítógépes programalkotások hatályos jogi védelme a nemzetközi jogalkotás tükrében.* (Jogtudományi Közlöny, 2002/1.) pp. 53-54.

[19] Auer, Ádám – Papp, Tekla: im.

[20] State of New Jersey 216th Legislature, Senate, No. 734. Online: ftp://www.njleg.state.nj.us/20142015/S1000/734_I1.HTM [01.11.2015.]

[21] Andrade, Francisco – Novais, Paulo – Machado, José – Neves, José: *Contracting Agents: Legal Personality and Representation*, Artificial Intelligence and Law, Vol. 15. (2007) p. 357.

this will influence its further behavior. A constant feedback-system can be built up between the agent and the environment as by living organisms. So agents can be characterized as scientific-intellectual results mimicking life phenomenon. An electronic agent is a software that performs a specific task in the name of its principal without human intervention and communicates with other agents, processes and its own environment too.[22]

The definition of electronic agent is defined on statutory level by the American Uniform Electronic Transactions Act's (UETA) section 2 subsection (6): *[an agent is] "a computer program or an electronic or other automated means used independently to initiate an action or respond to electronic records or performances in whole or in part, without review or action by an individual."*[23]

Based on the above we can say that electronic agents are independently acting entities on behalf of their principals and they are serving such wider or narrower goals that are pre-defined by humans.

Is it possible under the doctrines of civil law to grant legal personhood to independently acting artificial entities? Furthermore what reasons do we have to do so and under what kind of framework could this be possible?

3.4 Boundaries to treat AI as independent legal entity

Current legislation does not consider AI as independent legal entity. Nevertheless electronic software agents have rich knowledge base, furthermore their complex configuration options allow them to plan tasks for themselves, react, learn, communicate and work together with other AI software. They do not have own existence, but are able to attend and perform tasks independently in certain situations. According to Allen and Widdison, computer programs reached that level today that they are able to act not just automatically but independently. The commercial role of software is shifting increasingly from a passive, automatic assistant to an active independent participant.[24] According to Fisher, it could happen in the world of electronic transactions that one of the parties does not use another human person as trustee but an electronic agent operated by AI. Because the agent makes specific decisions independently from its principal, it has to be considered just as a flesh and blood human would represent the principal.[25] It is important to mention that the ideal solution in such special situations is when both of the contracting parties agree to be represented by electronic agents. The software has to meet a minimum level to classify it as intelligent agent which is the criteria of weak AI.[26]

It can be established about electronic agents that they differ from the classic concept of legal persons (for example foundations, companies) in the sense too that they do not need a natural person as representative in legal relationships. A legal person always needs a delegate natural person who can make disclaimers in the name of it. Electronic agents do not require someone who represents them, but on the contrary, they represent a third person through their individual artificially intelligent decisions. To consider an AI as legal person it should have separated property too, because according to civil law the concept of 'person' has relevance manly as an individual entity participating in the traffic of property elements. We cannot treat AI as legal entity and revision of this standpoint not seems to have necessity since they do not bear own consciousness nor have independent property.

3.5 AI as representative: Solution of the UNCITRAL Model Law on Electronic Commerce

Nonetheless, it can be said at least that AI through its individual decisions can make a valid contract or do other legally binding declaration but these are binding the represented person. This is consistent with the UNCITRAL Model Law on Electronic Commerce saying: *"As between the originator and the addressee, a data message is deemed to be that of the originator if it was sent by an information system programmed by, or on behalf of, the originator to operate automatically."* So electronically

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[22] Russel, Stuart – Norvig, Peter: im. chapters 2.1 and 27.1-2.

[23] Kis, Sabrina: *Contracts and Electronic Agents: When Commercial Pragmatism and Legal Theories Diverge*, LLM Theses and Essays, Georgia Law 8-1 (2004)pp. 9-10.

[24] Andrade, Francisco – Novais, Paulo – Machado, José – Neves, José: im. p. 359.

[25] Ibid.

[26] Kis, Sabrina: im. p. 12.

sent contracting statements generated automatically by information systems have to be considered as they are originated by the legal entity that operates the system.[27] The so called 'automatic contract statement' should not to be confused with representation. Representation means that in the name of a legal entity – a natural or legal person – some other person makes legally binding statement so, that the disclaimer's legal effects will bind the represented one (the principal). According to the Hungarian Civil Code (hereinafter referred as: Ptk.) representative should be person only, not agent. This is based under the assumption that in certain cases the representative could have independent civil liability, for example when it acts on contrary the principal's interest. When there is a conflict of interest the principal can challenge the representative's disclaimer which can lead to invalidity of the contract.[28]

It can be concluded that according to civil law AI agents cannot be treated as legal entity nor representative despite the fact that one can make a valid disclaimer with them. In my opinion it would be good to implement the definition of 'automatic contract statement' into Hungarian law in order to clarify liability questions.

4. Liability for damages caused by artificial intelligence in contractual relations

What happens according to the general rules of civil liability if AI entity causes damage in accordance with its operation? As we saw in the previous chapters, AI are software according to the current legal regulations. So first of all we have to examine who should bear responsibility for the damages caused by software during their operation.

4.1 Opinions in legal literature

There are only a few standpoints in scientific literature about the problem. Giovanni Sartor examines in one of his essays the issue of damages caused by electronic agents. At first, he takes into consideration that we can count on more legal entities from the viewpoint of legal responsibility. According to Sartor, parts of the software agent could have separated legal fate. If the agent contains copyright protected software (as in most situations) than the author could bear liability for programming mistakes. If the agent contains some kind of database than the producer of the database could bear the liability for database mistakes. If the agent processes personal data than – from a data protection point of view – the data controller is responsible for legitimate data processing. If the agent is being operated by certain user for own purposes, than the user is liable for its operations.[29]

According to Sartor, since the usage of the software agent could have such aspects on which the given legal entity cannot exercise control, therefore the operator should not be held liable for such damages. For example: the user should not be liable for damages caused by AI software when the wrongful act originated from the programming mistakes of the software and the user is not allowed to access the source code or either to decrypt it.

4.2 Liability of the user

By defining the liability of the user or operator of the AI software we should take into consideration first that computer programs are copyrighted works. Hungarian Act on Copyright (Szjt.) defines the legal rules for selling and using computer programs as intellectual property. The act says that the author can grant the right to use the intellectual creation in a so-called end-user agreement or license agreement and the user should pay a fee in return unless, the parties did not agree otherwise (free-license). The content of the license agreement can be freely established by the contracting parties. The parties can differ from the provisions with mutual consent unless it is not prohibited by the law.[30]

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[27] Uncitral Model Law on Electronic Commerce 13. § (2) b)

[28] Dr. Petrik, Ferenc (szerk.): *Polgári jog. Kommentár a gyakorlat számára (negyedik kiadás)*. HVG Orac, Budapest, 2014.pp. 25-29.

[29] Sartor, Giovanni: im.

[30] Szjt. article 42. sections (1)-(2)

When buying and starting to use a software, the user must typically accept an end user license agreement which concretizes the terms of software use. The user typically does not have an option to modify the terms of the license agreement but only has possibility to accept or reject contractual conditions. Having regard to this, we should search for the basis of liability among the regulations of liability for damages in contractual relations, because between the user and software developer usually a software using contract will be bound.

Software developers tend to specify in end user contract terms that they should not be held liable for damages that were caused to the user or to third party in context of software use. The user should bear liability for these damages.[31] These conditions are called 'limited liability' doctrine according to English legal expression.

4.3 The case of lack of conformity

We have to distinguish from user liability the case when the software has been issued deficient and damages occurred on the side of the user due to the malfunction of the software. The Civil Code allows through the legal institution of lack of conformity to challenge the service provider (here: the software developer) for carrying out the contract inaccurately, in this case: for issuing a malfunctioning software. Lack of conformity is a case of breach of contract.

According to Hungarian Civil Code section 6:157 subsection (1): *"Lack of conformity means when the obligor's performance at the delivery date is not in compliance with the quality requirements laid down in the contract or stipulated by law. The obligor is not liable for any lack of conformity if, at the time of the conclusion of the contract, the obligee knew or should have known the lack of conformity."* This definition above is normative by judging such contractual relationships when this type of breach may come to surface having regard to the nature of contract, for example by user obligations.[32] Software use agreements are typical user obligations so enforcing rights originating from lack of conformity can cover the malfunction of software delivered by contract. According to the Civil Code's general provisions in section 6:123 subsection (1):

"Performance shall be in conformity with the contract, that is to say, services, at the time when supplied: shall be suitable for any particular purpose for which the obligee requires them and which the obligee made known to the obligor at the time the contract was concluded; shall be suitable for their intended purpose and in conformity with other services of the like; shall be of a quality and performance that are normal in services of the same type and that the obligee can reasonably expect, given the nature of the services and taking into account any public statements on the specific characteristics of the services made about them by the obligor or – if produced by a person other than the obligor – the producer and their representative; shall comply with the description given by the obligor and possess the qualities of the services the obligor presented to the obligee as a sample or model; and shall be in conformity with the quality requirements defined by law."

Lack of conformity can create a claim for damage compensation on the side of the user. According to this, the obligee is entitled to damages for loss caused by lack of conformity for which the obligor is liable, unless the lack of conformity is excused (right for damages).[33] The obligor is not liable when lack of conformity has been exculpated.[34] This could happen when the obligor is able to prove that the damage occurred in consequence of unforeseen circumstances beyond his control, and there had been no reasonable cause to take action for preventing or mitigating the damage.[35]

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[31] Simon, Dávid: *A szoftverrel kapcsolatos egyes felelősségi kérdések*. Infokommunikáció és jog, 2005/3. HVG Orac Kiadó p. 12.
[32] Dr. Petrik, Ferenc (szerk.): im. pp. 348-349.
[33] Act V of 2013 on the Hungarian Civil Code (Ptk.) article 6:174. section (1)
[34] According to Ptk. article 6:177 section (2): *„The obligor shall be excused of liability if lack of conformity has its origin:*
a) in any defect in the materials supplied by the obligee;
b) in any discrepancy or error in the data supplied by the obligee; or
c) in any impracticable or unreasonable instruction given by the obligee;
provided that the obligee has been informed of these circumstances."
[35] Ptk. article 6:142.

If we apply the Hungarian Civil Code's regulations for legal relationship between the developer and user of the AI software, than we can conclude that the user can claim for compensation for damages caused by software malfunction by the issuer or developer of the software product.[36]

Though it is important to mention that software developers almost always issue to their program specific corrections and repairs if errors occur during usage. They can learn about these errors from their own perception or from user feedbacks. Malfunctioning AI software cannot count for high interest on the market so issuing these corrections are in connection with the developer's purposes too.

5. Artificial intelligences in virtual realities

By the beginning of the 21st century computing and internet technology reached the stage of development that software can model whole realistic virtual environments even if we speak about the digitalization of the physical world surrounding us or worlds created by imagination. At the dawn of our century programming technique is sufficiently advanced that it can open the created virtual worlds to public. This development creates environments in which hundreds of thousands users can interact in real time directly each and shape the digital environment surrounding them.

These kind of virtual worlds mostly appear in the form of online games where player can interact with each other through a personified character (avatar) controlled by them. The players can shape together the story of the world through this interactivity. This form of entertainment is increasingly popular nowadays, especially among the younger generations who raised the level of reality and the environment surrounding humanity through these virtual realms to formerly unknown heights.

5.1 Intelligent virtual beings

Virtual worlds can be such graphical spaces too that are populated by certain virtual 'life forms' and human users can interact with them. In the previous chapters we examined problems in connection with artificially intelligent beings. As we saw they form a well demarcated circle among computer software. The concept of virtual being is somehow broader; we can divide them to two bigger groups:

1. The first group consists of virtual beings that are being controlled by artificial intelligence

2. To the second group such beings belong that are not operated by individual decision making mechanism and their behavior happens completely by human interaction.

For the first group a good example can be a computer-controlled virtual opponent of a multiplayer online role-playing game (MMORPG[37]) on which the players' avatars task is to overcome. To the second group characters selling virtual items or offering quests belong. Members of both groups are called non-player characters (NPC) in online games.[38]

These virtual characters are operating similarly like independent AI software with the difference that they are part of a bigger program so only persons participating in virtual reality can meet them.

Most online games use the server-client based system to operate. The software that replicates and maintains the world runs constantly on the central server and the players can connect to it through clients installed on their personal computers. The clients are usually added up to several gigabytes but such MMORPGs are spreading increasingly that are using 'thin clients' like web browsers.[39] Massive amount of information are being stored on the central servers that are essential to run the program flawlessly. These can be for example the scripts responsibly to control the behavior of virtual

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[36] For example about Y2K software mistakes see: Cégvezetés, *A számítástechnikai cégek felelőssége*.

[37] Massively Multiplayer Online Role-Playing Game is a sub-genre of computer games in which many players can contact each other in a virtual world. The name refers to the fact that more thousands, even millions of players are playing at the same time. Players are developing skills, fighting monsters alone or in group, buy and sell virtual goods and communicate. The term MMORPG was invented by Richard Garriott who was the main developer of Ultima Online, the game, which made the genre popular in 1997. See: http://en.wikipedia.org/wiki/MMORPG [06.11.2015.]

[38] Brom, Cyril – Cerny, Martin – Plch, Tomas – Marko, Matej – Ondracek, Petr: *Smart Areas: A Modular Approach to Simulation of Daily Life in an Open World Video Game,* Proceedings of 6th International Conference on Agents and Artificial Intelligence (ICAART 2014). 2014. pp. 1-2.

[39] Wisegeek.com: *What is a MMORPG*. http://www.wisegeek.com/what-is-a-mmorpg.htm [03.11.2015.]

opponents.[40] The developers of online games are responsible for maintaining the central server, so they can be considered as operators.

We have to take these software-parts into consideration and examine their working mechanisms by a legal perspective because virtual world simulations containing them are operated not by end-users but software developing companies.

Through the analysis of the current legal regulations we managed to assess that on the first instance the operator of the software has to bear liability for the behavior of AI. But in the server-client based system of virtual environments the user (player) and the operator (developer) is sharply differentiated from each other. I would like to introduce the problem of legal liability for the behavior of virtual reality's intelligent software components by the following case study.

5.2 The 'Corrupted Blood' incident

The 'Corrupted Blood' incident was a virtual epidemic originated from a videogame program error that swept through the online fantasy world of World of Warcraft (WoW) on 13th September 2005. The disease has reared its head when Blizzard Entertainment (the software developer company) added on this day patch number 1.7.0 to the game which included the brand new labyrinth *Zul'Gurub* and its final boss, a dragon called *Hakkar*. The monster had among its attacks a spell called Corrupted Blood which was a periodically damaging disease (debuff). The effect could spread from one player to another causing lower level player to die in a few seconds and higher level players could even only survive with constant healing. Normally the magic effect had to elapse when the adventuring company of players left the labyrinth or defeated the main boss. The effect elapsed from the characters but because of the programming error in the AI script controlling Hakkar the pets controlled by some of the players (characters of the hunter and warlock classes could tame or summon pets) carried the disease on outside the dungeon in the open game world where it spread to other players and NPCs too. Lower level characters died nearly instantly and the epidemic caused others a lot of annoyance too. It is interesting that the spell did not affect the health of NPCs but they could spread the disease as passive carrying medium. Eyewitness players described their experiences as the cities of the world have been turned into cemeteries in a flash. Luckily, death is not permanent in the world of WoW because avatars can be resurrected using specific magical spells however the virtual epidemic was really bothering to lot of players. Most of them just simply ended gaming. The problem was solved by the developer in the way of issuing a quick fix to the game and Hakkar's script.[41]

Examining legal liability it is worthy of note that scripted life forms in virtual worlds gain information about their behavior from the server maintaining the environment. The central server is maintained by the developer for the players. In this case the operator of AI will be not the user but the developer itself. Taking into consideration the conclusions of this study as far the developer as the operator of the virtual world software should be responsible for the operation of the AI.

Practice shows us that possible software errors are being constantly corrected by software developers because it is a crucial step in keeping players, so they are responsible for its operation in an unwritten form.

However if we examine the liability for damages from proper software use and not from malfunction we can make the conclusion that the user has to bear liability. This is in consistence with end user license agreements in most cases. Developers tend to exclude liability for damages in connection with proper software use (for example the player destroys his virtual items intentionally). This is specific by other 'traditional' software too. So the final conclusion is that users should be liable for damages occurred if the software ran without inner malfunction or error.

However, if users suffer damages due to incorrect programming of the AI, or instability of the hosting servers (and not in connection with normal usage) than they can claim compensation from the software developer according to lack of conformity. It is important to mention that in most cases a

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[40] The main concept of scripts was developed in the earlier history of AI programming in the mid of 1970's. Scripts are such interpreted programs that are responsible to automate a partial task in a more complex software. See: Daniel Crevier, *AI: The Tumultuous Search for Artificial Intelligence,* Basic Books, New York, NY, 1993. p. 175.

[41] About the Corrupted Blood Incident on WowWiki: http://www.wowwiki.com/Corrupted_Blood [03.11.2015.]

virtual world simulation's programming malfunctions – either in connection with AI or with simpler functions – do not affect user's virtual property, but only cause other inconvenience as it could be seen by 'the corrupted blood incident'. If software errors cause damages in virtual property of users than they can even claim compensation for damages from the software developer and operator of game servers or to restore original state (for example by restoring lost virtual items).[42]

6. Conclusion

Do you remember the question that caused the Creators to attack us, Tali'Zorah?: „Does this unit have a soul?"

Legion (Mass Effect 3)[43]

In my essay I tried to answer the question that who should bear liability for AI's behavior and damages caused in connection. According to the current state of science, artificial intelligences are on the level of weak AI so they do not give evidence of such self-determination that can be considered as conscious life form. Examining the current legal doctrines in force it can be established that there is no special regulation to AI so it can be deduced from the general norms of civil law. But this solution is contradictory in many cases especially when it is used to solve such practical questions like representation by electronic agents. The ideal solution would be the modification of current legal norms in a way by implementing electronic contractual statements based on the model of UNCITRAL Model Law on Electronic Commerce. This could help to interpret 'representation' through software clearly in practice.

The rules for software liability can be deducted from civil law, but our topic's special nature required a deeper analysis of the problem.

Finally, it would be fortunate to shape the legal background to be suitable in such special situations without any trouble. Legislation has to reflect to new social and scientific phenomenon time after time and this need happens very often along the development of emerging technology.

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[42] Virtual property: In many computer based virtual world simulators users can acquire or create virtual items which can have value in real world currencies. Some online virtual world software like Second Life have even a special service to change in-game money to real currency.

[43] In the third part of the space epic 'Mass Effect' the member of the collective artificial intelligence operated mechanic 'geth' race, Legion asks this question to Tali'Zorah who represents the inventor 'quarian' race. The story tells that one of the most serious crimes in the galaxy is AI-developing because the mechanic 'geths' has become conscious and rebelled against their own creators. Bioware: *Mass Effect 3* (Electronic Arts, 2012)

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