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**WHETHER INTELLECTUAL PROPERTY CREATED BY CONSCIOUS ARTIFICIAL
INTELLIGENCE SYSTEM BELONGS TO THE OWNER OF THAT SYSTEM?**

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ABSTRACT

Ownership of intellectual property created by conscious artificial intelligence system allocation is being analysed in this master thesis. The first chapter of this thesis reviews artificial intelligence system development, distinguishes conscious artificial intelligence system that is capable of performing intellectual activity autonomously. Also, it ascertains that current regulation does not cover artificial intelligence system in relation to intellectual property law, which evokes legal uncertainty thereof. The second chapter of this work reviews patentability and copyrightability criteria, as well as requirements for acquiring the ownership of intellectual property object. The general rule for acquiring intellectual property ownership is established, that it belongs to a person who created it. Furthermore, it is determined that only patentable or copyrightable objects are eligible to be owned, otherwise they would be public domains. In order to ascertain whether intellectual property created by conscious artificial intelligence system is patentable or copyrightable, case study methodology was performed in the third chapter of this thesis. From the preceding research, it was established that an object created by conscious artificial intelligence system is eligible for intellectual property protection. The fourth chapter of this work determines who owns intellectual property created by conscious artificial intelligence system. Whereas the results from the whole analysis in this work allowed to properly designate the owner of such object thus providing appropriate solutions to obviate legal uncertainty regarding this issue. Therefore, the purpose of this thesis is achieved.

SANTRAUKA

Šiame magistriniame darbe yra analizuojama intelektinės nuosavybės objekto, sukurto sąmoningo dirbtinio intelekto sistemos nuosavybės teisių paskirstymo problematika. Šis darbas yra sudarytas iš keturių dalių. Pirmojoje dalyje yra analizuojama dirbtinio intelekto vystymosi tendencijos, retrospektyva ir perspektyva, jo rūšys bei teisinis reguliavimas. Antrojoje dalyje yra apžvelgiamas intelektinės nuosavybės teisės turinys. Trečioje šio darbo dalyje yra nustatoma ir atliekama darbe naudojama metodologija, kuri padės atsakyti į darbe keliamą probleminį klausimą. Ketvirtoje dalyje yra nustatomas sąmoningo dirbtinio intelekto sistemos sukurto intelektinės nuosavybės objekto savininkas bei pateikiami siūlymai patobulinti teisinį reguliavimą susijusį su šia problematika.

Siekiant atsakyti į darbe keliamą probleminį klausimą, pirmojoje darbo dalyje yra nagrinėjami dirbtinio intelekto sistemos veikimo principai ir galimybės. Nustatyta, jog dirbtinio intelekto sistema skirstosi į silpną ir sąmoningą. Silpno dirbtinio intelekto sistema geba tik veikti pagal programuotojo sukurtą algoritmą, tuo tarpu sąmonę turinčio dirbtinio intelekto sistema geba savarankiškai atlikti intelektualius veiksmus, juos motyvuoti, kurti naują ir originalų objektą nepriklausomai nuo žmogaus veiksmų. Taip pat, nustatyta, kad nei Berno konvencijoje, nei nacionaliniuose teisės aktuose nėra įtvirtintas dirbtinio intelekto sistemos sukurtos intelektinės nuosavybės reguliavimas, bei aptarta teisinio subjektiškumo šiai sistemai suteikimo galimybė.

Antrojoje darbo dalyje analizuojama kokie objektai yra saugomi intelektinės nuosavybės apsauga. Pažymėtina, jog intelektinė nuosavybė yra skirstoma į dvi rūšis: industrinę nuosavybę ir autorių teises. Atsižvelgiant į tai, kad šios dvi rūšys saugo skirtingus objektus, kurių apsaugai atsirasti yra taikomi skirtingi kriterijai, šių rūšių objektai ir minėti kriterijai nagrinėtini atskirtai. Siekiant šio darbo tikslo įgyvendinimo bei norint išvengti perteklinės analizės, tam, kad būtų tinkamai išanalizuoti industrinės nuosavybės apsauga saugomi objektai ir nustatytas šių objektų nuosavybės turėtojas, pakanka nagrinėti tik patentuotinus objektus. Išnagrinėjus teisės aktus bei mokslininkų darbus nustatyta, jog sukurtas išradimas gali būti patentuotinas jeigu jis: 1) naujas; 2) nėra akivaizdus tos srities specialistui; 3) praktiškai pritaikomas. Tuo tarpu, remiantis ESTT jurisprudencija *Infopaq* byloje, teisės aktais bei moksliniais darbais, nustatyti kriterijai, kuriuos atitinkant kūrinys būtų apsaugotas autorių teisių apsauga, jog kūrinys turi būti: 1) autoriaus intelektinės veiklos vaisius; 2) išsiskiriantis iš kitų kūrinių, t. y. originalus. Taip pat, darbe yra nustatyta nuosavybės įgyjimo į intelektinės nuosavybės objektą bendra taisyklė, kad toks objektas priklauso tam, kas jį sukūrė.

Tik atitikus minėtus patentabilumo ir autorių teisių apsaugos kriterijus, objektas gali priklausyti savininkui. Priešingu atveju, šių kriterijų neatitikus, objektas laikomas viešu,

bešeimininkiu domenu, kurio naudojimas nėra apribotas. Todėl prieš nustatant kam priklauso dirbtinio intelekto sistemos sukurtas intelektinės nuosavybės objektas, yra būtina nustatyti ar šios sistemos sukurtas objektas gali būti apsaugotas intelektinės nuosavybės apsauga. Svarbu paminėti, kad egzistuoja nepagrįsta taisyklė, jog tik žmogaus sukurtas objektas gali būti apsaugotas intelektinės nuosavybės apsauga. Tačiau, silpno dirbtinio intelekto sistema yra naudojama kaip sudėtingas įrankis, veikiantis pagal programuotojo parašytą algoritmą, laikant, kad programuotojas sukūrė objektą, todėl šis objektas gali būti apsaugotas intelektinės nuosavybės apsauga jeigu jis atitinka patentabilumo ar autorių teisių apsaugos kriterijus. Tuo tarpu siekiant nustatyti ar sąmonę turinčio dirbtinio intelekto sistemos sukurtas objektas gali būti saugomas intelektinės nuosavybės apsauga, kaip alternatyva šio darbo problematikai, trečioje darbo dalyje buvo pritaikyta bylų analizės metodologija.

Trečioje darbo dalyje, atlikus metodologinį tyrimą, buvo nustatyta, kad sąmoningo dirbtinio intelekto sistemai nėra taikomas aukščiau minėtas reikalavimas, kad intelektinės nuosavybės objekto kūrėjas būtų žmogus, nes ši sistema, priešingai nei metodologijoje nagrinėjamoje byloje *Naruto et al v Slater* buvusi beždžionė, neatlieka veiksmų atsitiktinai, o veikia tik aiškiai nusistačiusi tikslą. Be to, nei Berno konvencija, nei JAV ar Anglijos teisinis reglamentavimas nenustato minėto nepagrįsto objekto kūrėjo reikalavimo, o *Garcia v. Google, Inc.* byloje, nurodoma, jog intelektinės nuosavybės objekto kūrėjo pripažinimui turėtų būti suteikiama daugiau laisvumo. Akcentuotina, kad šis objekto kūrėjo reikalavimas atsirado dar nesant sukurtai dirbtinio intelekto sistemai, kai be žmogaus daugiau nebuvo gebančių intelektualiai mąstyti ir atitinkamai veikti. Todėl, sąmonę turinčio dirbtinio intelekto sistemos sukurtas intelektinės nuosavybės objektas, atitinkantis patentabilumo ir autorių teisių apsaugos kriterijus, gali būti apsaugotas intelektinės nuosavybės apsauga.

Nustačius, jog dirbtinio intelekto sistemos sukurtas intelektinės nuosavybės objektas gali būti apsaugotas intelektinės nuosavybės apsauga, gali būti nustatomas subjektas, kuriam šis objektas priklauso. Ketvirtoje darbo dalyje nustatyta, kad intelektinės nuosavybės objektas, sukurtas silpno dirbtinio intelekto sistemos priklauso šios sistemos programuotojui arba naudotojui, priklausomai kurio veiksmiui lėmė, kad šis objektas buvo sugeneruotas. Tuo tarpu, kalbant apie sąmoningo dirbtinio intelekto sistemą, atsižvelgiant į tokios sistemos gebėjimą veikti autonomiškai bei į minėtą intelektinės nuosavybės įgyjimo bendrąją taisyklę, tokios sistemos sukurtas objektas negali priklausyti nei šios sistemos programuotojui, nei savininkui, o priklausytų pačiai sistemai, tačiau nesant sistemos teisinio subjektiškumo, pastaroji negali būti nuosavybės teisės subjektu. Atlikta analizė parodė, jog nesant subjektų, galinčių įgyti nuosavybės teisę į sąmoningo dirbtinio intelekto sukurtą intelektinės nuosavybės objektą, toks objektas laikomas bešeimininkiu, kas lemia, jog jo naudojimas nėra apribotas.

Pabrėžtina, jog dabartinis teisinis reguliavimas neužtikrina intelektinės nuosavybės teisės suteikiamos paskatos intelektinės nuosavybės kūrėjui. Todėl, šiuo atveju, yra rekomenduotina sąmoningo dirbtinio intelekto sistemai suteikti teisinį subjektiškumą. Tokiu būdu būtų užtikrinama minėta paskata tokios sistemos kūrėjams, kurie toliau vystytų technologijas, o tai būtų ir netiesioginė paskata mokslui bei visai visuomenei. Taip pat, siekiant sumažinti teisinį neapibrėžtumą dėl aukščiau minėtų priežasčių, yra rekomenduotina pašalinti nepagrįstą reikalavimą, kad intelektinės nuosavybės kūrėjas būtų žmogus. Galiausiai, iki kol bus sukurtas sąmoningo dirbtinio intelekto sistemos teisinis subjektiškumas, yra rekomenduotina sukurti teisinį pagrindą, kad tokios sistemos sukurtas intelektinės nuosavybės objektas priklausytų šios sistemos savininkui, nes tokiu būdu būtų užtikrinama minėta intelektinės nuosavybės suteikiama paskata ne tik šios sistemos savininkui, bet ir sistemos programuotojui, bei visai visuomenei.

INTRODUCTION

Novelty and relevance of this thesis. The use of artificial intelligence system is substantially increasing in everyday lives.¹ If technology advances in current rate, artificial intelligence system will reach the level of consciousness shortly², that will enable it to act without human interference and reason its actions.³ However, current legal regulation is not adjusted to legal issues that emerge along with evolving technologies in areas like ownership of intellectual property object. For this reason, it invokes the urge to anticipate consequences and adequately prepare legal regulation for it.

Considering intellectual property regulation, it would be arduous to determine the owner of an object created by conscious artificial intelligence system and it would spark intense discussions, due to the above-mentioned capabilities of such system to operate. The complexity of ownership designation is derived because conscious artificial intelligence system, the creator of an object, is not a legal entity. Furthermore, it might be presumed that the output of the system would be acquired by the owner of that system. This presumption is supported by the principle of accession which briefly designates ownership of a new object to the owner of creator of the new object.⁴

Moreover, many legal systems offer a high degree of protection to intellectual property creators.⁵ In order to maintain incentives out of intellectual property law, it is rather important to allocate the ownership of such objects properly. However, current regulations are not compatible handling such case regarding allocating ownership of intellectual property created by conscious artificial intelligence system, which is a matter of time when it leads to the courts.⁶ Additionally, there has been no judicial decision regarding this issue, nevertheless, scholars mention this legal uncertainty in their academic works⁷, but do not deeply analyse it. This indicates the **novelty** of this thesis. It is noteworthy that artificial intelligence system is already capable of creating intellectual property.⁸ After artificial intelligence system becomes conscious, rights of the legitimate owner will be infringed when adjudicating over ownership of intellectual property created by such system.

¹ Artificial intelligence system is installed in devices such as virtual personal assistants, mobile phones, video games, autonomous vehicles, news portals, social media websides. It is being installed into more devices due to rapid technological development, therefore it is becoming easier to obtain.

² Lyle N. Long, Troy D. Kelley, "Review of Consciousness and the Possibility of Conscious Robots", *Journal of aerospace computing, information, and communication* (Vol. 7, 2010), p. 81.

³ Drew McDermott, "Artificial Intelligence and Consciousness", *The Cambridge Handbook of Consciousness*, (Cambridge University Press, 2007), p. 39.

⁴ Herbert Hausmaninger, Richard Gamauf, *A Casebook on Roman Property Law* (Oxford university press, 2012).

⁵ E. g., Directive 2001/29/EC.

⁶ Ben Hattenbach, Joshua Glucoft, "Patents in an Era of Infinite Monkeys and Artificial Intelligence", *19 Stan. Tech. L. Rev.* 32 (2015).

⁷ E. g. Rex M. Shoyama, „Intelligent Agents: Authors, Makers, and Owners of Computer-Generated Works in Canadian Copyright Law“, *Canadian Journal of Law and Technology*.

⁸ Aaron Smith, Janna Anderson, *AI, Robotics, and the Future of Jobs* (2014), <www.pewinternet.org/2014/08/06/future-of-jobs> [visited 24 November 2016].

Because of the preceding, it is rather **relevant** to analyse legal issue regarding the ownership of intellectual property created by conscious artificial intelligence system.

The **issue** of this thesis is within legal uncertainty whether an intellectual property, created by conscious artificial intelligence system, belongs to the owner of that system. Moreover, the **hypothesis** is that the owner of conscious artificial intelligence system holds the ownership of intellectual property created by that system.

The **purpose** of this master thesis is to determine the content of ownership rights in intellectual property created by conscious artificial intelligence system thus providing the policy guidelines for the development of the new regulatory framework to adapt emerging innovations.

To reach the above-mentioned purpose of this thesis, the **objectives** are established:

1. review artificial intelligence system development trends, types and legal response thereof;
2. summarise the content of intellectual property ownership rights;
3. develop research methodology that would allow examining the content of ownership rights regarding intellectual property, created by conscious artificial intelligence system, and perform the research;
4. determine the allocation of ownership rights in intellectual property created by conscious artificial intelligence system, thus providing the policy guidelines for the development of the new regulatory framework to adapt emerging innovations.

Research methods used in this thesis. For objectives to be achieved, on artificial intelligence development and the content of intellectual property research, the historical method was used. Also, the comparative method was used to ascertain regulation of artificial intelligence system and to review both patentability and copyrightability criteria. What is more, throughout whole work systematic analysis, logical analysis and source analysis methods were used.

In order to reach the purpose of this thesis, it had to be established whether intellectual property created by conscious artificial intelligence system, is eligible to be protected by intellectual property safeguard. Therefore, single case study method was used. Such method selection process and its reasoning were extensively described in the third chapter of this thesis.

1. REVIEW OF THE ARTIFICIAL INTELLIGENCE SYSTEM DEVELOPMENT TRENDS, TYPES AND LEGAL RESPONSE THEREOF

In order to reach the purpose of this thesis it is essential to describe artificial intelligence system development trends, types and regulation, therefore, in this chapter, artificial intelligence system is reviewed along with types and regulation insights of it.

In the first section of this chapter, it will be discussed development origins and potential of artificial intelligence system while defining types of it. In the second section of this chapter, it will be analysed legal regulation and legal capacity perspectives of artificial intelligence system. Hereby, in this chapter, the first objective of this thesis – review the artificial intelligence system development trends, types and legal response thereof will be accomplished.

1.1. Development trends and types of artificial intelligence system

In this section retrospective and forthcoming progress of artificial intelligence system development is being reviewed while distinguishing it into two types by the capability to operate. Additionally, the concept of artificial intelligence will be established by analysing scholars' studies.

In several decades, the progress of 20th century will be reached multiple times in a year or even in less than a month, and approximately progress of the 20th century will be achieved 1000 times in the 21st century.⁹ Also, at current progress rate, we will observe 20000 years of progress in the whole 21st century, therefore in several decades artificial intelligence will reach human-level intelligence – so called “the singularity”.¹⁰ Since 1990's, researchers of artificial intelligence system also call it intelligent agents.¹¹ In 1994 a creative machine, which was close to generating ideas without any human interference, was created.¹² In artificial intelligence system's infancy, the system was capable of doing basic reasoning, pattern matching and other simple tasks they were given.¹³ Nowadays, studies are being substantially financed by companies to develop algorithms that can provide artificial intelligence system with the capacity to learn from data given.¹⁴ These algorithms are made not to operate accordingly to fixed instructions, but to make predictions and decisions.¹⁵ Furthermore, considering the tremendous technological advances such as artificial

⁹ Ray Kurzweil, *The Singularity is Near* (Viking, 2006), p. 39.

¹⁰ *Id.*; See also Ray Kurzweil, *The Law of Accelerating Returns* (2001), <<http://www.kurzweilai.net/the-law-of-accelerating-returns>> [visited 09 November 2016].

¹¹ Anja Oskamp, Arno R. Lodder, “Introduction: law, information technology, and artificial intelligence”, *Information Technology & Lawyers* (2006), p. 15.

¹² Stephen L. Thaler, “Synaptic Perturbation and Consciousness”, *6 Int'l J. Machine Consciousness* 75 (2014).

¹³ Shane Legg, *Machine super intelligence* (Doctoral Dissertation, University of Lugano, 2008), p. 79.

¹⁴ Maurice E. Stucke, Ariel Ezrachi, “Artificial Intelligence & Collusion: when computers inhibit competition”, *The University of Oxford Centre for Competition Law and Policy* (Working Paper CCLP (L) 40 2015), p. 4.

¹⁵ Christopher Bishop, *Pattern Recognition and Machine Learning* (Springer, 2006), p. 138.

intelligence system and its growth in capacity every two years¹⁶, it is expected that human-level intelligence (the singularity) will occur in 2047¹⁷, 2045¹⁸ or even in 2029¹⁹. It may be concluded that artificial intelligence system has been significantly improving – it is capable of solving issues by gathering data from the environment, and its capabilities are sharply advancing over time.

Definition of artificial intelligence system is distinguished differently by various authors. First of all, intelligence itself is mental ability which *inter alia* includes capability to “*reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly, and learn from experience*”.²⁰ Additionally, artificial intelligence system is capable of operating in a way which is inclined to be called intelligent by gathering data from environment, learning from it and then showing similar, adapted behavior, and seeking its foreseeable goals.²¹ The system has a tendency of performing properly in diverse external issues or situations, and is capable of succeeding with more than one objectives.²² Therefore, artificial intelligence may be defined as an entity that is capable of adapting inputs from environment, learning from it, and showing human-like behavior afterwards to succeed in its sought intentions. Yet, current artificial intelligence system is still behind human-level intelligence.²³ The difference between current artificial intelligence system and human-being intelligence is the consciousness, which is a matter of subjective character.²⁴ Therefore, onward two types of artificial intelligence will be distinguished: 1) weak artificial intelligence²⁵ and 2) conscious artificial intelligence²⁶.

1.1.1. Weak artificial intelligence system

Artificial intelligence system that is only a compilation of algorithms created to identify patterns from environment, analyse it, predict sequences, decide on analysed data²⁷ and generate

¹⁶ Yassir Elrayah, “The Rise of the Robots Technology and the Threat of a Jobless Future”, *International Journal of Business Information* (2016), p. 3.

¹⁷ Dom Galeon, *Softbank CEO: The Singularity Will Happen by 2047*, <<https://futurism.com/softbank-ceo-the-singularity-will-happen-by-2047>> [visited 24 February 2017].

¹⁸ Paul G. Allen, *The Singularity Isn't Near* (2011), <https://www.technologyreview.com/s/425733/paul-allen-the-singularity-isnt-near/#_ftnref1> [visited 04 February 2017].

¹⁹ Dom Galeon, Christianna Reedy, *Kurzweil Claims That The Singularity Will Happen By 2029*, <<https://futurism.com/kurzweil-claims-that-the-singularity-will-happen-by-2029>> [visited 05 January 2017].

²⁰ Linda Gottfredson, “Mainstream science on intelligence: An editorial with 52 signatories, history, and bibliography”, *Wall Street Journal* (Intelligence, 1997), p. 13.

²¹ Daniel Faggella, *What Is Artificial Intelligence? An Informed Definition* (2016), <<https://www.techemergence.com/what-is-artificial-intelligence-an-informed-definition/>> [visited 05 January 2017].

²² Shane Legg, Marcus Hutter, *A Formal Definition of Intelligence for Artificial Systems*, <http://www.vetta.org/documents/universal_intelligence_abstract_ai50.pdf> [visited 04 January 2017].

²³ See note 11: Anja Oskamp, Arno R. Lodder, p. 11.

²⁴ Uriah Kriegel, “Consciousness: Phenomenal Consciousness, Access Consciousness, and Scientific Practice”, *Handbook of Philosophy of Psychology and Cognitive Science* (2006), p. 28.

²⁵ Nils J. Nilsson, *The Quest for Artificial Intelligence: A History of Ideas and Achievements* (Cambridge university press, 2010), p. 388.

²⁶ See note 12: Stephen L. Thaler.

²⁷ See note 15: Christopher Bishop, p. 3.

outcome only by following algorithms²⁸ may be considered as weak artificial intelligence. Such system also requires constant training to improve its performance due to its ability to learn from experience, therefore the user of this system shall constantly pass on the feedback about the appropriate and inappropriate outcome to the system in pursuance of setting the range for the behavior.²⁹ This displays that weak artificial intelligence system strictly follows algorithms given and has ability to learn by analysing data collected from environment and from the feedback given, create output from analysed data by creating patterns. Currently weak artificial intelligence system is used in vast variety of devices and programs due to its capability to perform specific, clearly described tasks. This system is still quite simple, although it has the capacity of performing everything that demands thinking, on the other hand, it is still insufficient enough to exercise tasks that people or animals do without thinking.³⁰

This sums up that despite weak artificial intelligence capability to learn by observing and analysing gathered data, it still strictly follows very specific tasks inclined, which means that the output of this system is a mechanically processed task installed by programmer or user through algorithm.

1.1.2. Conscious artificial intelligence

Consciousness may be described as the “*function or process that allows a system to distinguish itself from the rest of the world*”³¹, hence the basis of consciousness in intelligent agents indicates capability to reason its actions.³² The distinction between conscious artificial intelligence system and weak artificial intelligence system is that the software of preceding system is self-developing, which is quite similar to human brain³³, while weak artificial intelligence system only improves its activity in specific sphere if the user of such system provides feedback or additional data to learn from. Therefore, artificial intelligence system that contains consciousness can be equated to human beings.

Potential of conscious artificial intelligent system is to operate indistinguishably from a human being, for instance, understand images, differentiate facial expressions, control machines and other abilities that human beings can perform.³⁴ Additionally, human brain and conscious artificial intelligence operating principles are quite similar because they both possess receptivity to

²⁸ See note 13: Shane Legg, p. 19.

²⁹ See note 11: Anja Oskamp, Arno R. Lodder.

³⁰ See note 25: Nils J. Nilsson, p. 318.

³¹ Donald Perlis, *Consciousness as self-function* (Department of Computer Science and Institute for Advanced Computer Studies), p. 10, <<https://pdfs.semanticscholar.org/3909/2b9a214b0264a4c1ff871e3fcc6ed1d80559.pdf>> [visited 14 January 2017].

³² See note 3: Drew McDermott.

³³ See note 12: Stephen L. Thaler.

³⁴ Christopher Schrader, *What is artificial intelligence and why do we need it?* (2016), <<https://www.quora.com/What-is-artificial-intelligence-and-why-do-we-need-it>> [visited 05 January 2017].

environment stimulation. Conscious artificial intelligence has cognitive ability to acquire vast scope of knowledge and skills not through installed algorithms, but through learning.³⁵ After exercising an action and it gathers observations about the structure of the environment and how to deal with it as feedback thus improving itself in order to increase positive results.³⁶ For this reason, it is necessary for the system to have access to specific knowledge in this manner enabling it to learn anything it needs.³⁷ This clarifies conscious artificial intelligence system ability to operate as a human being.

Because of preceding conscious artificial intelligence system capabilities, compared to other intelligent beings conscious artificial intelligence system can cope sufficiently well in challenging environments due to its ability to adequately estimate situations.³⁸ Scholars argue that such system will develop further and surpass human-level intelligence in every area such as general knowledge, social skills, creativity and others.³⁹ This indicates that conscious artificial intelligence system has the ability to apply novel cases independently from human intervention.⁴⁰ Therefore, conscious artificial intelligence system is capable of creating inventions, literary and other novel and original intellectual property objects which will be delineated in the next chapter.

With the above in mind, it may be concluded that conscious artificial intelligence will be able to operate without human intervention, reason its actions, solve issues, abstract, acquire abilities through learning, generate novel and original ideas, therefore, create objects that are protected by intellectual property protection and deal with other legal entities without any human interference, because it will be capable of operating as a human being.

1.2. Regulation of artificial intelligence system

Current regulation, the need for additional regulation and the perspectives of artificial intelligence system's legal capacity is being analysed in this section. Moreover, several legal systems will be compared in order to particularise the issue in regulation regarding artificial intelligence system and to formulate possible frameworks thereof.

Considering aforementioned rapid development of artificial intelligence system and its potential to operate identical to a human being, for instance, the ability to reason about itself, solve issues, create novel and original objects and deal with other legal entities, it is rather inconvenient to encounter a lack of regulation. Therefore, there is a substantial urge to fill the lack of regulation of

³⁵ Peter Voss, "Essentials of general intelligence: the direct path to AGI", article in a book: Ed. Ben Goertzel, et al., *Artificial general intelligence*, (Springer, 2007), p. 132.

³⁶ See note 22: Shane Legg, Marcus Hutter.

³⁷ See note 35: Peter Voss, p. 133.

³⁸ See note 13: Shane Legg, p. 82.

³⁹ Nick Bostrom, *How long before superintelligence?* (2008), <<http://www.nickbostrom.com/superintelligence.html>> [visited 07 January 2017].

⁴⁰ Imagination Engines Inc., *Artificial Neural Networks* (2005), <http://imagination-engines.com/iei_ann.php> [visited 12 January 2017].

artificial intelligence system properly in areas such as artificial intelligence system and other legal entity relations, ownership rights of artificial intelligence system created object and others. This will be discussed further while indicating capability for the system to become a legal entity.

Current regulation regarding artificial intelligence system and intellectual property relation will be compared further. Since Berne Convention does not specify the author⁴¹, it is up to the countries to issue their own regulation whether to consider artificial intelligence system as an author. For the comparison, in United States intellectual property regulations, artificial intelligence system authorship is not specified, however it does not restrict non-humans to be granted authorship⁴², however in practice, it is considered contrary.⁴³ In Lithuania, artificial intelligence system regulation regarding intellectual property is absence as well – the author is considered only natural or juridical entity.⁴⁴ Meanwhile, in United Kingdom, the authorship of computer-generated work is deemed to the user who directed computer to operate accordingly.⁴⁵ This rule would be applied to weak artificial intelligence system that requires algorithm installed by a human to operate. Whereas conscious artificial intelligence system that is capable of operating independently from human interference, the regulation is not clear. All of this briefly defines that current legislation in various countries does not significantly differ – artificial intelligence system and intellectual property relation is not regulated. Although, United Kingdom has more artificial intelligence friendly legal environment than other countries, yet there is still a lack of regulation regarding this issue, especially relating to conscious artificial intelligence system.

Furthermore, the research of artificial intelligence system examines both: technical possibilities for legal practice and legal regulation thereof. Scholars analyse legal questions regarding conscious artificial intelligence system on topics such as privacy, intellectual property law, identity, whether it is capable acting autonomously, legal status of it and others.⁴⁶ Because of its exclusive features, scholars struggle to categorise it as a legal entity.⁴⁷ Granting legal capacity for conscious artificial intelligence system would be a big step for the legal system to take, but before doing so, the issue rises how much of legal capacity should be assigned to conscious artificial intelligence system.⁴⁸ In order to decide on that, conscious artificial intelligence system must be prepared to operate respectively as legal entity – basic knowledge of law, economics, social

⁴¹ Berne Convention for the Protection of Literary and Artistic Works (09 September 1886, Berne; revised 24 July 1971), article 15.1.

⁴² U. S. Copyright act (1976), article 201.

⁴³ Ralph D. Clifford, “Intellectual Property in the Era of the Creative Computer Program: Will the True Creator Please Stand Up?” *Tulane Law Review* (Vol. 71:1675, 1997), p. 1684.

⁴⁴ Lithuanian Law on Copyright and Related Rights (19 May 1999, No. VIII-1185), article 2, section 5.

⁴⁵ U. K. Copyright, Designs and Patents Act (1988), article 9(3).

⁴⁶ See note 11: Anja Oskamp, Arno R. Lodder, p. 16.

⁴⁷ Ryan Calo, “Robotics and the Lessons of Cyberlaw”, *California Law Review* (2015), p. 546.

⁴⁸ Madeleine de Cock Buning, et al., *Mapping the Legal Framework for the introduction into Society of Robots as Autonomous Intelligent Systems*, <http://www.caaai.eu/wp-content/uploads/2012/08/Mapping-L_N-fw-for-AIS.pdf> [visited 06 January 2017].

behaviour standards and cognitive thinking should be installed in the system.⁴⁹ An alternative to conscious artificial intelligence personhood is issuing a mandate for artificial intelligence from its owner to perform certain legal activity.⁵⁰ In any case, current legal system might be on the verge of establishing conscious artificial intelligence system personhood⁵¹, which would solve many legal issues, yet regulation, including legal entity of it or issuing a mandate, is still in its infancy.

Therefore, when artificial intelligence system becomes conscious and develops cognitive thinking, adapts general idea of law, economy and social behaviour, subsequently it might be categorised as legal entity. However, current regulation of artificial intelligence system is quite poor, which is why legal inconveniences such as ownership of intellectual property created by conscious artificial intelligence system rises. In order to moderate such inconveniences, it is rather important to improve legislation including determining conscious artificial intelligence as a legal entity.

⁴⁹ Samir Chopra, Laurence White, “Artificial Agents – Personhood in Law and Philosophy”, *16th European Conference on Artificial Intelligence*, (2004), p. 5.

⁵⁰ See note 48: Madeleine de Cock Buning, et al.

⁵¹ See note 47: Ryan Calo, p. 549.

2. SUMMARY OF THE CONTENT OF INTELLECTUAL PROPERTY OWNERSHIP RIGHTS

In this chapter the perception of intellectual property and requirements to obtain intellectual property ownership rights will be discussed.

In the first section of this chapter, it will be summarised the concept of intellectual property and distinguished different types of it. The second section of this chapter is about the industrial property protection and the allocation of such object ownership. In the third section of this chapter, copyrightability and the requirements to allocate ownership of copyright object is ascertained. Afterwards, the content of intellectual property ownership rights will be reviewed and the second objective of this thesis will be approached.

2.1. Conception and types of intellectual property protection

Intellectual property law influences growth, development and competitiveness.⁵² Creators of intellectual property are granted protection over their work so they could benefit out of their creations, which encourage people to produce intellectual property. As one of the major merits of this protection is that it provides legal expression of creator's rights and prevents creator's works from unauthorised usage and dissemination which encourages fair trading that contributes to economic and social development.⁵³ In general, intellectual property law invokes the incentive to invent novel object. Therefore, intellectual property objects are increasing vastly.

Historically speaking, copyright, industrial property, trademarks and others were separate terms.⁵⁴ In Convention establishing World Intellectual Property Organisation⁵⁵ those separate terms were generalised into *intellectual property* term, which includes copyrights and related right, trademarks, geographical indications, industrial design and models, patents, layout-designs (topographies), undisclosed information.⁵⁶ From all of aforesaid, the concept of intellectual property can be made. Intellectual property is a work of literature, scientific, industrial and artistic activity that is created through intellectual activity. Furthermore, intellectual property law provides juridical protection to an object in order to indicate an incentive for creators and grants moral rights to it. Therefore, the main benefit of intellectual property law is to ensure statutory safeguard for creators

⁵² United Nations Economic Commission for Europe, *Intellectual property Commercialization: Policy Options and Practical Instruments* (United Nations, 2011), p. 1.

⁵³ An Industrial Property Rights Strategy for Europe, Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee, (Brussels, COM(2008) 465/3), p. 6.

⁵⁴ Vytautas Mizaras, *Autorių teisė*, Vol. 1 (Justitia, 2008).

⁵⁵ Convention establishing World Intellectual Property Organisation (14 July 1967), article 2.

⁵⁶ Agreement on trade-related aspect of intellectual property (TRIPS), (15 April 1994), part II, section 1-7.

of intellectual property objects so they could control the usage of those objects for a corresponding period as an incentive.⁵⁷

Intellectual property is divided into two types: (i) industrial property and (ii) copyright.⁵⁸ Both types have exclusive criteria for granting its protection which will be analysed in subsequent sections of this thesis. Briefly, industrial property includes scientific inventions, industrial designs, trademarks, geographic names and others.⁵⁹ Meanwhile, copyright objects differ in each country. In United Kingdom copyright consist of original artistic works such as literary, music, sound recordings, drama, films, broadcasts, typography of published editions.⁶⁰ While in the United States it additionally includes pictures, graphics, sculptures, architectural works, despite what form it was embodied in.⁶¹ In Lithuania, copyright also includes databases and performances of those works – so called related rights⁶², what is more, they are protected irrespective to forms of expression.⁶³ This comparative analysis displays that various countries more or less embrace same copyright objects. Industrial property and copyright, despite their disparity of effect, provide their holder a right to exclude others from using protected asset. Criteria for granting those rights and ownership of its objects will be discussed in following sections of this chapter.

2.2. Determination of industrial property ownership

Industrial property object ownership will be determined in this section. Before doing so, it is necessary defining criteria for object to be secured by industrial property protection and stipulate whether object created by artificial intelligence system conforms these criteria. Moreover, since industrial property subsists of variety of objects with different criteria for protection to be granted, analysing every type of it would be redundant and a surplus, whereas analysis of patentability will sufficiently expose the issue as whole industrial property in this work.

In the previous section, industrial property objects were defined, one of them is patent which protection is provided to the invention that meets established criteria. These criteria specified in national legislation and supranational conventions. It is established that any invention in technical field is patentable if it is new, involves an inventive step (non-obvious) and is capable of industrial application (useful).⁶⁴ The same requirements for patentability are indicated in TRIPS agreement⁶⁵,

⁵⁷ World Intellectual Property Organisation, *Intellectual Property Handbook* (2008), p. 3.

⁵⁸ See note 54: Vytautas Mizaras.

⁵⁹ Marija Vanda Antanaitienė, et al., *Praktinis įvadas į intelektinę nuosavybę: verslo vadyba* (Vilnius, 2001), p. 8.

⁶⁰ See note 45: U. K. Copyright, designs and patents act, chapter 1.

⁶¹ See note 42: U. S. Copyright act, article 102.

⁶² See note 44: Lithuanian Law on Copyright and Related Rights, article 1.

⁶³ V. Guobys, *Intelektinės nuosavybės apsauga Lietuvoje* (Vilnius, 1995), p. 26.

⁶⁴ United States Patent and Trademark Office, *General Information Concerning Patents* (2014), <<https://perma.cc/J88J-YUVA>> [visited 20 January 2017].

⁶⁵ See note 56: Agreement on trade-related aspect of intellectual property (TRIPS), article 27-1.

European Patents Convention⁶⁶ and Lithuanian Law on Patents⁶⁷. Therefore, the general rule states that an object can be patentable if it is novel, useful and non-obvious.

The first patentability criterion – novelty of an invention cannot be proven or established, and only its absence can be proven.⁶⁸ An invention is considered new if it is not foreseeable under current technical level, which is estimated by all gathered information before patent application is issued.⁶⁹ Novelty does not necessarily require an entirely new object; it may consist of already invented materials, which contain at least one substantial indicator or novel combination of attributes, or a novel use of intention.⁷⁰ Therefore, to enjoy patent protection, an object is not required to be entirely novel, but has to have substantial attributes that are exclusive and new. The other patentability criterion is non-obviousness, also called as an inventive step. Generally, an invention satisfies this criterion if it is not obvious to the specialist of that field.⁷¹ Non-obviousness may also be defined as noticeable inventiveness, as a result of creativity, and significantly advance to the invention.⁷² Therefore, it can be concluded that non-obviousness means that an invention has to be a noticeable inventive step that any person with ordinary skills would not achieve to create such invention. The third criterion for patentability is the capability for industrial application so-called usefulness or utility, which means that an object has to be applicable for some practical purposes, not just be theoretical.⁷³ Purposeless inventions or inventions for personal benefit only, are not considered useful and applicable. Therefore, an invention that cannot be applicable in industry, are not considered as useful, thus cannot be patented.

If an invention passes all above-mentioned criteria of patentability and patent protection is granted, the patentee gets exclusive rights to decide on the usage of such object, determine the price of it and other rights.⁷⁴ Meanwhile, an invention that is not considered patentable is at risk of being publicly available, meaning that an inventor would not receive any incentive out of freely available invention. Therefore, inventorship loses its importance if an object is not patentable because anyone can benefit from it. All of this displays the value of an invention being patentable.

After analysing criteria of patentability for an object in general, patentability of artificial intelligence system created an object can be discussed. Since weak artificial intelligence system operates by following algorithm, which is inclined by its programmer or user, therefore an object created by such system might be patentable depending on system's programmer or user activity –

⁶⁶ The European Patents Convention (05 October 1973), article 56.

⁶⁷ Lithuanian Law on Patents (18 January 1994, No. I-372), article 4(1).

⁶⁸ See note 57: World Intellectual Property Organisation, p. 19.

⁶⁹ Ramūnas Birštonas et al., *Intelektinės nuosavybės teisė* (Registru centras, 2010), p. 408.

⁷⁰ *V. Ž. v. UAB „Germeta“*, Lietuvos Aukščiausiasis teismas (2003, No. 3K-3-1031/2003).

⁷¹ See note 69: Ramūnas Birštonas et al., p. 410.

⁷² See note 57: World Intellectual Property Organisation, p. 20.

⁷³ See note 57: World Intellectual Property Organisation, p. 18.

⁷⁴ See note 69: Ramūnas Birštonas et al., p. 436.

whether they direct the system to create novel, non-obvious and useful object. For instance, IBM's artificial intelligence system called *Watson* generates novel, non-obvious and useful ideas by using databases and accumulating it.⁷⁵ Considering this, weak artificial intelligence system is fully capable of creating an output that satisfies patentability criteria, subsequently, such output is considered patentable. Meanwhile, patentability of conscious artificial intelligence system output will be analysed in the 3rd chapter.

Furthermore, ownership of invention is determined to a person who puts effort to invent it. The general rule is that inventor of an object is considered a person who contributed in the inventive process.⁷⁶ The inventor and the owner of an invention may differ when employment relations exists. According to so called work for hire doctrine, if employee's job is to invent for the employer, owner of the invention becomes the employer.⁷⁷ Another rule for acquiring object's ownership is called the principle of accession which states that new object is "*assigned to the person who owns another resource that has prominent connection to the new resource*".⁷⁸ Moreover, if no inventor claims the ownership, the next person who recognises it can claim the ownership.⁷⁹ Authors specify that ownership of patentable objects may be allocated only to humans.⁸⁰ Such point of view is speculated because only humans were capable of using intellectual activity to create an object – an invention that is considered an object of patent law. However, since conscious artificial intelligence system can perform an intellectual activity, the concept of human inventorship has to be revised.

2.3. Determination of copyright ownership

In this section, it will be analysed how the ownership of copyrighted object is designated. In order to do so, it is essential to determine criteria for an object to be safeguarded by copyright protection and identify whether a work of artificial intelligence system satisfies these criteria. All these queries will be considered further.

Ownership can only be allocated if an object is copyrightable. Otherwise, it would be identified as public domain, which means it would not belong to anyone. Therefore, it is rather important to determine criteria for copyrightability before analysing allocation of ownership. For

⁷⁵ IBM Research Computational Creativity, <<http://www.research.ibm.com/cognitive-computing/computational-creativity.shtml#fbid=kwG0oXrjBHY>> [visited 12 March 2017].

⁷⁶ U. S. Patent & Trademark Office, Manual of Patent Examining Procedure, article 2164, (2014) <<https://www.uspto.gov/web/offices/pac/mpep/s2164.html>> [visited 02 March 2017].

⁷⁷ Jeffrey I. Auerbach, *Patent Law Principles & Strategies* (2006), <<http://euro.ecom.cmu.edu/program/law/08-732/Patents/PatentLawPrinciples.pdf>> [visited 06 February 2017].

⁷⁸ Thomas W. Merrill, "Accession and Original Ownership", *Journal of Legal Analysis Yale Law School Scholarship Series Paper 4469* (2009), p. 465.

⁷⁹ Ryan Abbott, "I Think, Therefore I Invent: Creative Computers and the Future of Patent Law", *57 B.C.L. Rev.* 1079 (2016), p. 1098.

⁸⁰ See note 69: Ramūnas Birštonas et al., p. 413.

copyright protection to appear, work has to satisfy criteria of copyrightability which has to be both: 1) the result of intellectual activity and 2) original.⁸¹ Description of them will be laid following.

The result of intellectual activity means that the work must be an output of the intellectual labour of author.⁸² Work itself has to be an expression of author's intelligence and consist of thoughts and feelings.⁸³ Additionally, intellectual activity reflects through author's "*personality and his free and creative choices*".⁸⁴ Insofar it is presumed that only humans can perform a creative and intellectual activity because it is thought that only humans have the power to create.⁸⁵ However, this phenomenon⁸⁶ was approached because the fundamental principles of intellectual property and other regulations embodying those principles were created when technologies were unsophisticated and the only ones capable of intellectual activity were humans.⁸⁷ It follows that the purpose of such human-oriented requirement is to prevent copyrightability of objects that were generated mechanically and created by non-intelligent-beings. It means that aforesaid requirement for an author to be a human being is not strict – anyone of the capability of intellectual activity is eligible of creating copyrightable work. Therefore, it must be concluded that one of the criterion for copyrightability is that an object must be a result of intellectual activity performed by any kind of intelligence.

The second criterion that an object has to fit to be copyrightable is originality.⁸⁸ It is important to measure at what level of originality a work is considered copyrightable. Generally, originality level is sufficient enough when it is possible to distinguish a work from other daily, casual works. The standard for originality is "*in the sense that it is its author's own intellectual creation*".⁸⁹ Moreover, in countries where Common law is used, the threshold for an object to be copyrighted is rather modest compared to Civil law countries.⁹⁰ Supreme court of the United States explained, that "*originality is not a stringent standard; it does not require that facts be presented in an innovative or surprising way*".⁹¹ It consists of two elements: production has to be independently produced (not copied from other productions) by the author, and it has to include at least minimal

⁸¹ *T. V. v. UAB „Žemprojektas“*, Lietuvos Aukščiausiasis teismas (2010, No. 3K-3-536/2010); See also note 54: Vytautas Mizaras, p. 166.

⁸² See note 57: World Intellectual Property Organisation.

⁸³ See note 54: Vytautas Mizaras, p. 168.

⁸⁴ Judgement in *Painer*, C-145/10, Eu:C:2011:798, paragraph 90.

⁸⁵ See note 54: Vytautas Mizaras, p. 167.

⁸⁶ For instance in the Supreme Court of the Netherlands, 30 May 2008, C07/131HR, IER2008/58 case it was distinguished that a product is considered to be a "work" if it has original bearing and if it is an intellectual labor of human being (an author) without any reasonable statements to validate this request.

⁸⁷ See note 6: Ben Hattenbach, Joshua Glucoft, p. 50.

⁸⁸ Alfonsas Vileita. *Lietuvos Respublikos autorių teisių ir gretutinių teisių įstatymo komentaras*, (Lietuvos rašytojų sąjungos leidykla, 2000).

⁸⁹ Judgement in *Infopaq International*, C-5/08, EU:C:2009:465, paragraph 37.

⁹⁰ See note 48: Madeleine de Cock Buning, et al.

⁹¹ *Feist Publications, Inc. v. Rural Telephone Service Co.*, 499 U. S. 340 (1991), paragraph 49.

degree of creativity. Meanwhile, in Civil law countries – the author has to perform enough control over subject matter in order to satisfy sufficient level of originality.⁹²

Hence, the general rule is that when an object matches criteria of intellectual activity and originality, intellectual property protection is vested over that object. The more complex question is whether intellectual property law provided protection vests computer-generated works. If a computer or other technological device is used as a sophisticated tool to create an object, it is deemed that it is a result of its programmer or user intellectual activity. Therefore such object may be granted an intellectual property protection depending on user's behavior creating it, because human participation in the creative process is present.⁹³ Additionally, the perception of copyrightability evolves over time. For instance, after the camera was invented, photographs were considered just as a reflection of reality which does not consist of originality and creativity of an author, but the court ascertained that all forms “*by which the ideas in the mind of the author are given visible expression*” are eligible to be copyrighted.⁹⁴ Also, as mentioned in the previous chapter, conscious artificial intelligence system lacks legislation, therefore considering such system's capacity to learn and create without human interference⁹⁵, development of the system may also provoke evolvement of statutory expression of copyrightability, so the system authorship would be added while removing aforesaid human authorship requirement.

It is worth mentioning that in United States Copyright Act authorship is not defined in order to provide flexibility⁹⁶, which suggests flexible request for authorship. Meanwhile, copyright law provisions in European Union requires more flexibility to be included in order to accommodate technological development.⁹⁷ Therefore, weak artificial intelligence system's output satisfies copyrightability requirements, while copyrightability of object created by computer or any other technological device with a built-in conscious artificial intelligence system will be examined in 3rd chapter after performing the methodology of this work.

After determining when an object qualifies as a copyrightable work, the ownership of it may be discussed. The general rule is that the owner and the author of copyrighted work is the person who created it, at least for the first instance.⁹⁸ Creation is defined as a translation from an

⁹² See note 84: *Painer*, paragraph 87.

⁹³ National Commission on New Technological Uses of Copyrighted Works (CONTU), Final Report on the National Commission on New Technological Uses of Copyrighted Works, 3 Computer L. J. 53 (1981).

⁹⁴ *Burrow-Giles Lithographic Co. v. Sarony*, 111 U. S. 53, 56 (1884).

⁹⁵ Matt Miller, *Artificial intelligence, our final invention?* (2013) <https://www.washingtonpost.com/opinions/matt-miller-artificial-intelligence-our-final-invention/2013/12/18/26ed6be8-67e6-11e3-8b5b-a77187b716a3_story.html?utm_term=.5cebbf67b306> [visited 10 March 2017].

⁹⁶ *Garcia v. Google, Inc.*, 786 F.3d 733, 741 (9th Cir. 2015).

⁹⁷ Bernd Justin Jütte, The EU's Trouble with Mashups: From Disabling to Enabling a Digital Art Form, *Jipitec* 172 (2014), p. 186.

⁹⁸ See note 57: World Intellectual Property Organisation, p. 49.

idea to a fixed, tangible expression.⁹⁹ Various approaches of copyright object ownership allocations can be implicated in national legal systems, for instance, the one that includes employment relations.¹⁰⁰ Furthermore, if there is no author of creation, the next person that recognise this work can claim ownership.¹⁰¹ It is notable that this general rule is interpreted that only legal person can be deemed as an owner of a copyrighted work, which does not cover recent technological inventions. Since digital era arisen, policymakers should be prepared to cope adequately to evolving technologies and resulting issues such as ownership of conscious artificial intelligence intellectual property.

⁹⁹ *Community for creative non-violence v. Reid*, 490 U. S. 730, 737 (1989).

¹⁰⁰ See note 57: World Intellectual Property Organisation, p. 49.

¹⁰¹ See note 79: Ryan Abbott.

3. RESEARCH METHODOLOGY

In this chapter, research methodology of this thesis will be established and performed. In the first section of this chapter selection of method will be described. The second section of this chapter imposes data collection and analysis process of the corresponding method. While in the third section of this chapter the research methodology will be performed.

3.1. Method of the research

To successfully reach the purpose of this thesis, it is essential to determine suitable methodology. In order to decide on the particular methodology for this thesis, various methods were eliminated by answering a number of questions, which were drafted accordingly to the criteria that were generated by expected outcome of the research. Since there is no conscious artificial intelligence system created yet, the outcome of this research has to be broader yet adaptable to thesis issue. Therefore, drafted questions are: “whether there are enough resources for adequate research to execute?”; “whether there is enough time to execute the research?”; “whether there are legal regulations to compare with?”; “whether there are directly applicable cases?”; “whether there are alternatively applicable cases?”; “whether borders between phenomenon and the context being studied are obvious?”. By applying these questions to existing circumstances, the proper method can be determined.

In this situation, there are no resources, so the research has to be made without any expenses and it is restricted only by unlimited-access databases, and other publicly available literature. Moreover, the time for this research is strictly limited. Also, there is neither legal regulation, regarding ownership of intellectual property that is created by conscious artificial intelligence system, to compare with, nor directly applicable cases that are found on this issue. On the other hand, alternative cases may be applicable to this situation if perceived. Additionally, boundaries between phenomenon and context that is being studied are not obvious – the adaptation of discussed phenomenon, regarding ownership of conscious artificial intelligence system created intellectual property, and the content of the research being enacted is not clear.

According to the preceding, the most appropriate method for thesis research to perform is case study method, because it does not require any financial resources, it is not time-consuming and does not demand legal regulation on this issue to be present. Other methods do not satisfy criteria considering present circumstances. For instance, since there is a lack of conscious artificial intelligence system together with intellectual property specialists, to perform a proper survey or focus group methods regarding this issue, would require more time and financial resources than it is available. Meanwhile, to perform case study method, it is enough that there would exist at least one

alternative case to analysing phenomenon, which exists and is applicable to this research. For this reason, case study method was chosen, which allows seizing the complexity of a single case, as a proper method for this master thesis. Besides, this method is used within social sciences¹⁰², which vests legal science as well.¹⁰³ What is more, case study is described as a research method that includes empirical examination within particular real life events context.¹⁰⁴ Other authors also emphasise the importance of context, while stating that range between the issue being studied and the angle within being studied are not obvious.¹⁰⁵

Therefore, since other methods are not convenient to properly perform the research of this master thesis, because of the foregoing factors, it is reasonable to use the most suitable method – case study method.

3.2. Data collection and analysis

Case study is selected as the research method of this thesis therefore the approach to the method analysis is inductive, which begins by a collection of data and its analysis, to develop the general rule to follow up and concentrate on as a philosophy for further work.¹⁰⁶ It is the basis of this approach which comes forward as an outcome of the research, which management is narrated that “*you do not commence such a study with a clearly defined theoretical framework; instead you identify relationships between your data and develop questions and hypotheses or propositions to test these; theory emerges from the process of data collection and analysis.*”¹⁰⁷ It may be concluded that inductive approach, which is relevant to case study method, requires collecting data, and after analysing it, to develop a conception of subsequent work that allows establishing a general rule.

Considering the lack of cases regarding conscious artificial intelligence system¹⁰⁸, an alternative case has to be chosen which ascertains the ownership of non-human creator that is an intelligent-being although not a legal entity, which resembles analysed issue of this thesis.¹⁰⁹ Therefore, *Naruto et al. v. Slater et al.* case¹¹⁰ (hereinafter – “Monkey selfie”) perfectly fits to perform this work’s research property. Authors argue that Monkey selfie case has a significant

¹⁰² Johansson, Rolf, "Case study methodology", *The International Conference on Methodologies in Housing Research, Stockholm* (2003).

¹⁰³ Geoffrey Samuel, “Is Law Really a Social Science? A View from Comparative Law”, *The Cambridge Law Journal*, (2008), p. 288–321.

¹⁰⁴ Colin Robson, *Real world research* (2nd edition, Oxford, Blackwell. 2002), p. 178.

¹⁰⁵ Robert K. Yin, *Case study research: Design and method* (3rd edition. London: sage, 2003).

¹⁰⁶ A. Strauss, J. Corbin, *Basics of Qualitative Research* (3rd edition, California Sage, 2008); *See also* note 105: Robert K. Yin.

¹⁰⁷ Mark Saunders et al., *Research methods for business students* (5th edition, Prentice Hall, 2009), p. 490.

¹⁰⁸ Annemarie Bridy, “Coding Creativity: Copyright and the Artificially Intelligent Author”, *Stan. Tech. L. Rev.* 5 (2012), p. 18.

¹⁰⁹ Gerhard Roth, Ursula Dicke, “Evolution of the Brain and Intelligence”, *Trends in Cognitive Science* (Vol. 5, No. 5, 2005), p. 256.

¹¹⁰ *Naruto et al. v. Slater et al.*, No. 15-cv-04324, (N. D. CA, 2016).

impact on current intellectual property law legislation and it is particularly relevant regarding artificial intelligence system.¹¹¹ Monkey selfie case analyses the ownership of a series of photos made by monkey which is neither legal entity nor a human being. Whereas both monkey and conscious artificial intelligence system have consciousness¹¹², herewith both are not legal entities. Therefore, both animal and conscious artificial intelligence system are deemed as identical subjects for reaching the purpose of this thesis.

No other cases that were relevant to this research were found. Since there was only one suitable case found, single case study method¹¹³ has to be chosen. This method is exercised when there is a critical, extreme, unique or alternatively adaptive case.¹¹⁴ That means, it may be used as an alternatively adaptive case to the context being studied for the purpose of this thesis to be reached. Therefore, the Monkey selfie case, will be analysed as an alternative to studying context: ownership of intellectual property created by conscious artificial intelligence system issue.

3.3. Performance of methodology

Single case study methodology that was chosen will allow reaching the purpose of this thesis by determining in what situations human authorship requirement is not applicable to an object created by conscious artificial intelligence system, to enjoy intellectual property law protection. After all, without being protected by intellectual property law, the ownership of an object belongs to no-one, which makes it essential to analyse.

In Monkey selfie case¹¹⁵, male macaque named Naruto living in nature reserve located in Indonesia took photos of himself accidentally by pressing photographer's unattended camera button without any intent do create a result of intellectual activity – a photo. The photographer published those photos as his own. People for the Ethical Treatment of Animals issued an action against the photographer to the court while claiming that the owner of those photos should be considered the monkey called Naruto.

In order to refrain from asserting authorship to monkey, whose work was although original but not a result of intellectual activity due to accidentally and mechanically pressed the button, the court applied the human requirement for authorship, which states that works are not copyrightable if created “*automatically without any creative input*“.¹¹⁶ The Plaintiffs in this case stated that the

¹¹¹ Holly C. Lynch, “What Do-an Orangutan and a Corporation Have in Common?: Whether the Copyright Protection Afforded to Corporations Should Extend to Works Created by Animals“, *Ohio Northern University Law Review* (2015), p. 269

¹¹² See note 109: Gerhard Roth, Ursula Dicke, p. 254.

¹¹³ See note 107: Mark Saunders et al., p. 146.

¹¹⁴ *Id.*

¹¹⁵ See note 110: *Naruto et al. v. Slater et al.*

¹¹⁶ U. S. Copyright Office, *Copyrightable Authorship: What Can Be Registered*, paragraph 306 (2014), <<https://www.copyright.gov/comp3/chap300/ch300-copyrightable-authorship.pdf>> [visited 10 March 2017].

monkey is self-aware and is capable of consciously perform actions. They added that the authorship requirement is not defined purposefully to ensure authorship requirement flexibility, therefore anyone, including animals, who create original work can claim authorship.¹¹⁷ The Defendants admitted that rights to animals should be granted because they have personality, so these photographs would be copyrightable.

It is worth mentioning that, in previous chapters, human authorship requirement invalidity was also proven due to the outdated principles of intellectual property law which were legislated when human beings were the only intelligent agents.¹¹⁸ What is more, legislation in the United States¹¹⁹ and the United Kingdom¹²⁰, likewise Berne Convention¹²¹, do not specify human as intellectual property ownership holder. Therefore, the authorship is meant to be flexible, so the human requirement for authorship is not always considered applicable.

In this case the court refrained from assigning ownership to the monkey by applying human requirement for authorship. Such decision was made because the monkey did not foresee the result of its actions and took photos by accidentally and mechanically pressing the camera button, which means the monkey did not perform any intellectual activity. Meanwhile, conscious artificial intelligence system performance is oriented to approaching the goal¹²², meaning that the system would perform an intellectual activity because it would have intention to do so, therefore, it would not take a photo accidentally. Considering preceding, requirement for human participation in creative process for an object to be protected by intellectual property law would not be applicable to conscious artificial intelligence system which creates intellectual property object.

Authors note that Monkey selfie case¹²³, had a substantive impact on the legal approach to other non-human intelligent agents in general¹²⁴, which includes conscious artificial intelligence system. It may be concluded that research methodology of this thesis clarified that human requirement in intellectual property law does not apply to conscious artificial intelligence system. Therefore, because of conscious artificial intelligence system capability to perform intellectual activity independently from human interference and human requirement inapplicability to the system, intellectual property created by the system is eligible to be protected by intellectual property law protection.

¹¹⁷ See note 110: *Naruto et al. v. Slater et al.*; See also note 96: *Garcia v. Google, Inc.*

¹¹⁸ See note 54: Vytautas Mizaras, p. 167; See also note 6: Ben Hattenbach, Joshua Glucoft, p 50.

¹¹⁹ See note 43: Ralph D. Clifford, p. 1682.

¹²⁰ See note 45: U. K. Copyright, Designs and Patents Act.

¹²¹ See note 41: Berne Convention for the Protection of Literary and Artistic Works.

¹²² See note 21: Daniel Faggella; See also note 35: Peter Voss, p. 156.

¹²³ See note 110: *Naruto et al. v. Slater et al.*

¹²⁴ Joshua Jowitt, "Monkey see, Monkey sue? Gewirth's Principle of Generic Consistency and Rights for Non-human agents", *19 Trinity C. L. Rev. 71* (2016), p. 96.

4. OWNERSHIP OF INTELLECTUAL PROPERTY CREATED BY CONSCIOUS ARTIFICIAL INTELLIGENCE SYSTEM ALLOCATION AND NEW POLICY GUIDELINES DETERMINATION

In this chapter, legal issue within ownership of intellectual property created by conscious artificial intelligence system is approached thus providing policy guidelines for the development of the new regulatory framework to adapt emerging technologies.

In the first section of this chapter allocation of ownership rights in intellectual property created by weak artificial intelligence system will be reviewed. While the second section of this chapter will determine the allocation of ownership rights in intellectual property, created by conscious artificial intelligence system while distinguishing various potential claimants. Additionally, policy guidelines for new regulatory framework, to obviate legal uncertainty, will be determined. Hence the last objective and the purpose of this thesis will be achieved.

4.1. Ownership of weak artificial intelligence system generated product

In order to perceive the allocation of intellectual property created by conscious artificial intelligence system, it has to be analysed how the ownership of an object created by weak artificial intelligence system is assigned. For this reason, in this section, the ownership of an object created by weak artificial intelligence will be determined.

As analysed in the foregoing chapter, weak artificial intelligence is limited to operating by only following primary algorithms that are installed by programmer or user, which clearly describes the task, and is not capable of exercising anything outside the scope of its algorithm.¹²⁵ This means that weak artificial intelligence system operates in a way that programmer or user directed it to operate with some slight variations depending on the feedback received. Also, in the previous chapter of this thesis it was found that intellectual property safeguard can protect intellectual property created by weak artificial intelligence system. Furthermore, it was reviewed that the author of a work is considered a person who created it¹²⁶. Meanwhile, the inventorship of an object is deemed to a person who contributed in the inventive process.¹²⁷ This outlines that the owner of intellectual property is deemed an intelligent agent who contributed to the creation of an object. So the next matter is to determine who owns intellectual property created by weak artificial intelligence system.

¹²⁵ See note 15: Christopher Bishop.

¹²⁶ See note 57: World Intellectual Property Organisation, p. 49.

¹²⁷ See note 76: U. S. Patent & Trademark Office, article 2164.

One of the possible claimants for the ownership of such object is the system itself. However, foregoing exposes several reasons that the system is not eligible to claim the ownership. Firstly, the system only mechanically generates the output by following an algorithm, which is the real intellectual labour and expressed originality made by programmer or user of the system. Secondly, despite the preceding, artificial intelligence system currently is not a legal entity which means it is not eligible of having any ownership rights.¹²⁸ For these reasons, weak artificial intelligence system cannot be the owner of its output that is considered intellectual property.

The other claimant is the programmer of the system.¹²⁹ It may be argued that the object exists only because programmer's labour was put into creating an algorithm for weak artificial intelligence system to follow, and the output of such system was foreseeable by the programmer.¹³⁰ For instance, programmer of weak artificial intelligence system *Racter* claimed ownership to computer-generated book.¹³¹ Additionally, one of the main reasons of intellectual property protection is the incentive for the creator. Designating ownership to the programmer of the system would incentive him to develop more advanced systems.¹³² Therefore ownership of intellectual property created by weak artificial intelligence system would be allocated to its programmer, yet the scope at which the programmer has to contribute in weak artificial intelligence system's output in order to claim the ownership of it, is not clear.¹³³

Foregoing indicates that although programmer draws the range in which weak artificial intelligence system to operate, the user of the system provides data to perform in a particular way. In other words, a user contributes his intellectual activity and labour for the generated output. It may be concluded that if the output of weak artificial intelligence system performance is repeatable, it is considered that the system follows programmer's algorithm and generates the output, therefore programmer should be deemed as the owner of intellectual property.¹³⁴ However, if the output is the result of user's provided data, the output of weak artificial intelligence system should be allocated to the user. This may suggest that even if there is no regulation, there is no legal uncertainty regarding ownership of weak artificial intelligence system generated intellectual property.

¹²⁸ James Boyle, *Endowed by their Creator? The Future of Constitutional Personhood* (2011), <<https://www.brookings.edu/research/endowed-by-their-creator-the-future-of-constitutional-personhood/>> [visited 08 March 2017].

¹²⁹ Darin Glasser, "Copyrights in Computer-Generated Works: Whom, If Anyone, Do We Reward?", *Duke L. & Tech. Rev.* 0024 (2001).

¹³⁰ Shyamkrishna Balganes, "Foreseeability and Copyright Incentives", *122 Harv. L. Rev.* 1569 (2009).

¹³¹ Andrew J. Wu, "From Video Games to Artificial Intelligence: Assigning Copyright Ownership to Works Generated by Increasingly Sophisticated Computer Programs", *25 AIPLA Q. J.* 131, 156 (1997), p. 131.

¹³² Evan H. Farr, "Copyrightability of Computer-Generated works", *Rutgers Computer & Technology Law Journal* (1989), p. 80.

¹³³ Raquel Acosta, *Artificial intelligence and Authorship Rights* (2012), <<http://jolt.law.harvard.edu/digest/artificial-intelligence-and-authorship-rights>> [visited 20 March 2017].

¹³⁴ Pamela Samuelson, "Allocating Ownership Rights in Computer-Generated Works", *47 U. Pitt. L. Rev.* (1985), p. 1205.

Therefore, it is a matter of facts that determines whether the ownership should be allocated to programmer or user.

Considering all the preceding, although there is no clear legislation, scholars assume alike that programmer should be granted the ownership of weak artificial intelligence system mechanically generated intellectual property.¹³⁵ This is assumed because the intellectual and original labour that contributes to the output is made by the programmer by installing an algorithm, unless the user provides data to perform a particular task and uses the system as a sophisticated tool.

4.2. Ownership of conscious artificial intelligence system created product

This section determines the legal uncertainty within allocating the ownership of intellectual property created by conscious artificial intelligence system while adjusting performed methodology. In order to do so, various claimants for ownership will be distinguished. Hence, policy guidelines will be provided to contribute in developing regulatory frameworks for emerging technologies.

As described in previous chapters, conscious artificial intelligence system is capable of reasoning its actions¹³⁶ and operating as human brains do, in other words, it can think for itself.¹³⁷ What is more, the level of human intelligence will be exceeded shortly in areas such as general knowledge, creativity and others.¹³⁸ This theory suggests that conscious artificial intelligence system has the ability to perform novel and intellectual activity autonomously from human interference.¹³⁹ Therefore, the exclusiveness of consciousness in artificial intelligence system signifies the capacity to operate autonomously, develop itself by its will, create novel ideas and perform the intellectual activity.

Because of the foregoing indicated characteristics of conscious artificial intelligence system, legal uncertainty arises by applying existing regulation regarding intellectual property ownership. Since such conscious intelligent agent has the ability to operate and create original and novel objects independently from human intervention, it is argued who is the core for creating the output. Authors distinguish several claimants for the ownership of intellectual property created by such system: the system itself¹⁴⁰, owner¹⁴¹ of the system, programmer¹⁴² of it and nobody. All of these claimants have their reasons to claim the ownership.

¹³⁵ Randall Davis, "Intellectual Property and Software: The Assumptions Are Broken", in *World Intellectual Property Organization Worldwide Symposium On the Intellectual Property Aspects of Artificial Intelligence* (1991); See also note 108: Annemarie Bridy, p. 22.

¹³⁶ See note 3: Drew McDermott.

¹³⁷ See note 12: Stephen L. Thaler.

¹³⁸ See note 39: Nick Bostrom.

¹³⁹ See note 40: Imagination Engines Inc.

¹⁴⁰ Colin R. Davies, "An Evolutionary Step in Intellectual Property Rights – Artificial Intelligence and Intellectual Property", 27 *Comput. L. & Sec. Rev.* 601 (2011).

¹⁴¹ See note 79: Ryan Abbott, p. 1116.

¹⁴² *Id.*, p. 1107.

It is rather important to solve this issue, because failure in determining the owner of such intellectual property, the righteous interests will not be protected by applying current law.¹⁴³ Which makes it not only theoretical but practical issue as well. Also, after performing methodology in the 3rd chapter, it was ascertained that conscious artificial intelligence system created intellectual property can be protected by intellectual property safeguard, therefore ownership of such object can be analysed. In following subsections, it will be analysed and identified the owner of intellectual property created by conscious artificial intelligence system thus establishing regulatory frameworks to fill the lack of legislation. Also, every presumed claimant will be reasoned for and against whether they are eligible to be owner of such system created intellectual property.

4.2.1. Conscious artificial intelligence system as owner of its created products

As above-mentioned suggests, one of the possible claimants for ownership of intellectual property created by conscious artificial intelligence system is the system itself.

As analysed in previous chapters, generally, legal regulation ascertains that authorship or inventorship is deemed to a person who contributed creating an object.¹⁴⁴ Since conscious artificial intelligence is capable of operating independently from human interference¹⁴⁵, the labor of creating an object should be deemed as performed by the system. Moreover, exercised methodology from Monkey selfie case¹⁴⁶ showed that conscious artificial intelligence system created intellectual property can be protected by intellectual property safeguard. Also, there is no reason to consider programmer as the owner as it would be regarding weak artificial intelligence system.¹⁴⁷ Therefore, conscious artificial intelligence system may be designated the ownership of such object.

Nonetheless, it would not be eligible of owning any property due to lack of conscious artificial intelligence personhood, which creates legal uncertainty. This indicates that only after granting personhood to the system would enable it to own its created intellectual property. In this matter scholars argue that „*a computer should be given legal recognition as an individual under UK law to allow proper attribution of authorship and to allow respective claims to be negotiated through contract*“.¹⁴⁸ As mentioned above, Monkey selfie case¹⁴⁹ has significance on a legal approach to intelligent non-human agents¹⁵⁰ including conscious artificial intelligence system therefore that influence may also develop into awarding personhood to the system as well. However, there are good reasons for personhood not to be granted to the system. It would not make

¹⁴³ *Advanced Magnetic Closures, Inc. v. Rome Fastener Corp.*, 607 F.3d 817, 829 (Fed. Cir. 2010).

¹⁴⁴ See note 76: U. S. Patent & Trademark Office, article 2164; See also note 57: World Intellectual Property Organisation, p. 49.

¹⁴⁵ See note 40: Imagination Engines Inc.

¹⁴⁶ See note 110: *Naruto et al. v. Slater et al.*

¹⁴⁷ See note 79: Ryan Abbott, p. 1095.

¹⁴⁸ See note 140: Colin R. Davies.

¹⁴⁹ See note 110: *Naruto et al. v. Slater et al.*

¹⁵⁰ See note 124: Joshua Jowitt.

any sense to designate ownership of its created intellectual property, because artificial intelligence system itself does not need an incentive to its output.¹⁵¹ Also, it would be rather difficult to determine its architecture whether artificial intelligence operates autonomously – whether it is conscious or weak.¹⁵² After all, artificial intelligence system sometimes is used as sophisticated tool thus contributing to creations and is not considered as core creator.¹⁵³ Although, scientists would eventually find the way how to distinguish whether artificial intelligence is conscious or weak when interfering with it, which makes this argument invalid and the demand for the system’s personhood to be considerable. However, until this happens, conscious artificial intelligence system is not valid candidate for ownership of its output to be granted.

Having all of the above in mind, it may be concluded that after conscious artificial intelligence system personhood is granted, the ownership of intellectual property created by such system should be allocated to it. However, currently, due to lack of legal personhood, conscious artificial intelligence system is not eligible of owning its output.

4.2.2. Conscious artificial intelligence system created product belongs to its programmer

Programmer of conscious artificial intelligence system is the second claimant for ownership of intellectual property created by such intelligence.

Whereas conscious artificial intelligence system cannot claim ownership to its created intellectual property, then, as mentioned in the previous chapter, it is presumed that the first person to recognise this creation is can own it.¹⁵⁴ According to this, since programmer is the one who expects the system’s output, he would be the first to appreciate it, therefore he could hold the ownership. Same rule goes for the user of such system as well. Another argument in favour of the system’s programmer is the incentive it perceives. Since artificial intelligence system does not appreciate incentives, whilst programmer worked years to develop the system, therefore it would result “*fairer and more effective incentives*“.¹⁵⁵ In as much as it would boost scientists’ reputation, please their scientific curiosity and motivate to improve on artificial intelligence system and other technological development¹⁵⁶, which would impact all society, art and science.

However, as established previously, generally, ownership of copyrightable and patentable works is allocated to the person who contributed to creating such work.¹⁵⁷ Whereas, programmer of

¹⁵¹ See note 134: Pamela Samuelson, p. 1199.

¹⁵² See note 79: Ryan Abbott, p. 1109.

¹⁵³ *Id.*, p. 1093.

¹⁵⁴ *Id.*, p. 1098.

¹⁵⁵ *Id.*, p. 1108.

¹⁵⁶ *Id.*, p. 1094.

¹⁵⁷ See note 76: U. S. Patent & Trademark Office, article 2164; See also note 57: World Intellectual Property Organisation, p. 49.

conscious artificial intelligence system does not cause the fixation to the output of the system due to the system's capability to operate independently and reason its actions itself.¹⁵⁸ For this reason, an object created by the system cannot be acknowledged as programmer's ownership.

To consolidate the foregoing, there are some arguments justifying programmer's claims to ownership of intellectual property created by his developed conscious artificial intelligence system, such as incentive benefits to society and science. However, programmer does not contribute to creating intellectual property. Therefore, programmer of such system does not qualify as the owner of intellectual property which is created by his developed conscious artificial intelligence system.

4.2.3. Conscious artificial intelligence system created product belongs to its owner

The next claimant for the ownership of intellectual property created by conscious artificial intelligence system is the owner of this system. The ground argument for this claimant is, in the previous chapter mentioned, the principle of accession that is a general principle in law, which asserts that the ownership of a new object is designated to the owner of that creator.¹⁵⁹ As far as proven otherwise, owner of an object owns all the components of such object; it means that it is presumed that the owner of an object acquires all the increase, improvement, or output of that object.¹⁶⁰ For this reason, if any accession from conscious artificial intelligence system occurred, for instance, intellectual property object is created, it would presumably belong to the owner of the system due to the principle of accession.

Another argument in favour of conscious artificial intelligence system's owner is the work for hire doctrine. This doctrine is a method to grant authorship or inventorship not to the real creator. Hence, since conscious artificial intelligence system is a program that is a property of a person, its creations through this doctrine can be recognised as its owner's property.¹⁶¹ It is worth mentioning that allocating ownership of intellectual property created by conscious artificial intelligence system to the owner of that system would not only implement direct incentive to the owner but also to the developers of the system because of increased demand for artificial intelligence systems.¹⁶² Besides, increased demand for technological innovations would benefit whole society as well, considering increased technological approachability.

Although assigning system's creations to the system's owner would be beneficial for the most subjects, nevertheless current regulation regarding ownership of intellectual property, which is special regulation compared to the principle of accession, establishes otherwise. As already

¹⁵⁸ See note 3: Drew McDermott.

¹⁵⁹ See note 78: Thomas W. Merrill.

¹⁶⁰ Acquisition of property rights, Legal System of Civil Law in the Netherlands, <<http://www.dutchcivillaw.com/content/legalsystem044.htm>> [visited 06 January 2017].

¹⁶¹ See note 108: Annemarie Bridy, p. 27.

¹⁶² See note 79: Ryan Abbott, p. 1116.

ascertained in methodology by examining Monkey selfie case¹⁶³, intellectual property created by conscious artificial intelligence system may be protected by intellectual property protection. Also, it is already analysed that the ownership is assigned only to the legal person who put labour into invention process.¹⁶⁴ Since the owner of the system does not contribute to such system's output due to the system's capability to operate and create novel objects autonomously from any human interference¹⁶⁵, therefore the owner of the system is not eligible to own of its creations.

This sums up that, the owner of the system could claim the ownership of intellectual property created by the system if the principle of accession or work for hire doctrine was applied. Despite the fact that designating ownership to this subject would be the most beneficial incentive regarding economic and technological growth aspects, yet, current intellectual property regulation that is special regulation compared to the general principle of accession, strictly determines that in order to claim ownership, a person must contribute to the output. Therefore, owner of conscious artificial intelligence system cannot claim ownership of intellectual property created by that system.

4.2.4. Conscious artificial intelligence system created product belongs to nobody

Among above-mentioned claimants for the ownership of intellectual property created by conscious artificial intelligence system, there is an option that such object is considered to be ownerless (*res nullius*)¹⁶⁶.

Since current regulation established that ownership of intellectual property object is assigned to a person who created it¹⁶⁷, the only claimant might be eligible for ownership of it is conscious artificial intelligence itself. Yet, existing legislation determines that only legal person may be deemed as author or inventor.¹⁶⁸ Considering that conscious artificial intelligence system is not a legal entity, it cannot be granted ownership of its created works despite that the system is the author or creator in fact.¹⁶⁹ Therefore, there are no eligible claimants for ownership of intellectual property object created by such system. If there is no perfect claimant for assigning ownership, authors argue that it should not be granted to anyone simply because it is the best of the worst possible choice.¹⁷⁰ If there is a lack of claimants, it should be in public circulation.¹⁷¹ In general,

¹⁶³ See note 110: *Naruto et al. v. Slater et al.*

¹⁶⁴ See note 76: U. S. Patent & Trademark Office, article 2164; See also note 57: World Intellectual Property Organisation, p. 49.

¹⁶⁵ See note 40: Imagination Engines Inc.

¹⁶⁶ See note 143: *Advanced Magnetic Closures, Inc. v. Rome Fastener Corp.*

¹⁶⁷ English Oxford Living Dictionaries, <https://en.oxforddictionaries.com/definition/res_nullius> [visited 23 March 2017].

¹⁶⁸ See note 76: U. S. Patent & Trademark Office, article 2164; See also note 57: World Intellectual Property Organisation, p. 49.

¹⁶⁹ See note 69: Ramūnas Birštonas et al., p. 413; See also note 57: World Intellectual Property Organisation, p. 49.

¹⁷⁰ See note 128: James Boyle.

¹⁷¹ See note 7: Rex M. Shoyama, p. 136.

¹⁷² See note 134: Pamela Samuelson, p. 1226.

public domain means the commons of intellectual property objects that intellectual property law does not protect¹⁷², therefore it is free to use.

An ownerless intellectual property object does not compose direct incentive for its creators, which may slow down further development processes. For this reason, it might be argued that designating ownership to any of above claimants might be more beneficial than selecting absence in ownership. Notwithstanding, businesses will certainly find other ways to generate benefit for instance by exploiting it as a trade secret, so scientists who created conscious artificial intelligence system would still receive an incentive to evolve technologies.

Therefore, to clarify the issue of this thesis, in accordance with current legal regulation, ownership of intellectual property created by conscious artificial intelligence system is not allocated to anyone. This suggests that such object is a public domain which is not protected by intellectual property protection. Yet, if legislation adapts emerging consciousness in artificial intelligence system and legal personhood is granted to that system, ownership of the output of such system would be granted to conscious artificial intelligence system. Although, until personhood is granted to the system, the most beneficial ownership of intellectual property created by conscious artificial intelligence system assignment would be to the owner of the system due to the scale of prosperity out of incentive received.

¹⁷² Jessica Litman, "The Public Domain", *Emory Law Journal* (1990).

CONCLUSIONS

1. Considering that consciousness in artificial intelligence system is estimated to be developed in several decades, therefore, two types of artificial intelligence system were distinguished in this thesis: 1) weak artificial intelligence system, which is capable of operating by strictly following algorithms that are drafted by programmer; 2) conscious artificial intelligence system which has the capacity to reason its actions similarly to human brain, to operate independently from human interference and is capable of performing intellectual activity while creating novel and original output. The lack of regulation regarding artificial intelligence system and intellectual property relation creates legal uncertainties which might be resolved by awarding legal personhood to the system. Hence, the first objective of this thesis is achieved.

2. To estimate the allocation of intellectual property object ownership, criteria for patentability and copyrightability has to be analysed, because only patentable or copyrightable object is eligible to be an object of ownership. Criteria for an object to be patented, are that it has to be novel, useful and non-obvious. Meanwhile, criteria for copyrightability, are that an object would be original and be a result of intellectual activity. Also, current regulation determines that only human beings are eligible creators of intellectual property objects. If preceding criteria are satisfied, the ownership of it will be assigned to the person who contributed to the creative process. While an object that does not meet patentability or copyrightability criteria is considered public domain which usage is unlimited. Therefore, the second objective of this thesis is reached after summarising the content of intellectual property ownership rights.

3. Since weak artificial intelligence system is operating as a sophisticated tool of its user, patentability or copyrightability criteria depends on user's behaviour. Additionally, methodology exercised in this work clarified that object created by conscious artificial intelligence system would also be patentable or copyrightable because such system is able to intentionally create novel and original output throughout its intellectual activity, and because the requirement for human participation in creative process for an object to be deemed patentable or copyrightable is not applicable to such system. After ascertaining that intellectual property protection can vest an object created by conscious artificial intelligence system, it is possible to examine the ownership of such object allocation, consequently the third objective of this thesis is approached.

4. Although there is no legal regulation regarding weak artificial intelligence system and intellectual property relation, but there is no legal uncertainty concerning ownership of such the system's generated intellectual property because the intellectual and original labor that contributes to the output is made by the programmer by installing algorithm to the system, unless the user of that system provides data to perform particular task and uses the system as a sophisticated tool.

Therefore, intellectual property created by weak artificial intelligence system would belong to system's programmer or user, depending on who provided data which was processed by the system in order to achieve the output.

5. Four claimants are distinguished as possible owners of intellectual property created by conscious artificial intelligence system: the system itself, its programmer, its owner or no-one. Since conscious artificial intelligence system is capable of creating original and novel objects while operating independently from human interference, by applying the general rule for acquiring ownership of intellectual property object that is relevant currently, conscious artificial intelligence system would be assigned as the owner of its created intellectual property. Yet, the system is not eligible to become owner due to the lack of legal personhood. Meanwhile, neither programmer nor owner of the system could be considered as owners of system's output because they do not contribute to creative process. After eliminating all claimants, intellectual property created by the system would be assigned to no-one, therefore it would become a public domain, which would not provide any incentives thus slacking developments processes.

6. Several adjustments may be recommended to improve current regulation. In order to diminish legal uncertainty, the requirement for human participation in the creative process, for an object to be protected by intellectual property protection, is suggested to be removed. Also, considering preceding characteristics and capabilities of conscious artificial intelligence system and the impact on legal approach to the system due to Monkey selfie case, legal personhood should be granted to the system. Additionally, until legal personhood is granted to such system, the ownership of its output is preferred to be designated to the owner of that system because such allocation would ensure the most effective incentives. Therefore, after ascertaining the owner of intellectual property which created by conscious artificial intelligence system, and providing new regulatory guidelines, the fourth objective of this thesis is achieved.

7. By applying current regulation, the ownership of intellectual property created by conscious artificial intelligence system would not be assigned to anyone. This resolves the issue of this thesis and disproves the hypothesis raised. Therefore, the purpose established in this thesis is reached.

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