



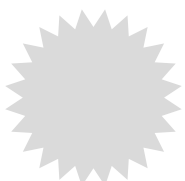
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# The role of intellectual property in the intelligence explosion

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## The Role of Intellectual Property in the Intelligence Explosion

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## Summary

1. Introduction. Artificial Intelligence is not coming: is already here. – 2. How Intellectual Property is approaching AI. – 2.1 Protecting Artificial Intelligence systems. – 2.2. Protecting Artificial Intelligence creations: can non-humans qualify as inventors and authors? – 3. AI as a tool for IP. – 4. Conclusion.

### Abstract

This article examines the future legal challenges of Intellectual Property related to Artificial Intelligence (AI), highlighting the role that AI can play in increasing the pace and scope of innovation to meteoric levels. Researchers are predicting AI will outperform humans in many activities in the next ten years, such as driving, writing and translating. Furthermore, they believe there is a 50% chance that AI will outperform humans in all tasks in 45 years and will even begin automating all human jobs in 120 years<sup>1</sup>. This phenomenon of AI superiority to human workers has come to be referred to as an intelligence explosion<sup>2</sup>. Advances in AI will transform modern life by reshaping all layers of today's world: healthcare, education, industrial production, entertainment, transportation and even public policing. While AI is making inroads into Intellectual Property by improving search and retrieval efficiency into IP offices, on the other hand, it poses some threats from which existing laws leave us unprotected; all that, despite the fact that its rise has so far occurred in a regulatory vacuum. The potential for further rapid advances in AI technology has prompted cries of alarm from many sides, including some calls for government regulation, beginning with Intellectual Property law, as it is the first branch of law to deal with such innovations years before they will even see the light of day. Little has been done, however, to accommodate for this fact. The IP legal framework needs to adapt to the thorny issues of ownership and patenting in the AI era if we don't wish to delay in reaping the benefits of this new age. And it must adapt quickly.

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<sup>1</sup> J. SALVATIER - A. DAFOE - O. EVANS - B. ZHANG - K. GRACE, *When Will AI Exceed Human Performance? Evidence from AI Experts*, ARXIV, 2017.

<sup>2</sup> *Ibid.*

# 1. Introduction

ARTIFICIAL INTELLIGENCE IS NOT COMING: IS ALREADY HERE.

*“Whereas the short-term impact of AI depends on who controls it, the long-term impact depends on whether it can be controlled at all”*

Stephen Hawking

When in 1955 John McCarthy first described Artificial Intelligence as “*the science and engineering of making intelligent machines*”<sup>3</sup>, he believed that it would have taken five to 500 years for its conceptual breakthroughs to come true. He wasn’t wrong. Today computers are able to create a staggering array of content, helping to crunch vast quantities of digital information and are even expected to predict litigation outcomes<sup>4</sup>.<sup>5</sup> Nevertheless, the Intellectual Property space is becoming increasingly competitive and companies relying on IP portfolios have a smaller window than ever before to ensure it is protected and exploited internationally. Up to 85 percent of a tech company’s value, in fact, lies in its IP portfolio, which is often a key driver in the most high-profile mergers and acquisitions<sup>6</sup>.

AI technology patents portfolios have been sharply rising in number as each company broadens the scope of its research activities. In the last five years alone there has been a 308% increase in the number of patents filed covering AI technologies with – not surprisingly – big tech companies dominating the field<sup>7</sup>. As the number of patent

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<sup>3</sup> JOHN MCCARTHY also stated that there is no “solid definition of intelligence that doesn’t depend on relating it to human intelligence” because “we cannot yet characterize in general what kinds of computational procedures we want to call intelligent”, J. MCCARTHY, *What is Artificial Intelligence?*, Stanford University, 2007, available at: <http://www-formal.stanford.edu/jmc/whatisai.pdf>. See also: S. RUSSELL – P. NORVIG, *Artificial Intelligence: A Modern Approach* (third edition), Prantice Hall, 2016.

<sup>4</sup> M. ZIMMERMAN, *Coming to Grips with Artificial Intelligence*, Georgetown University Law Library Lights, 2017.

<sup>5</sup> In a machine-learning statistical model developed by the Illinois Institute of Technology, Artificial Intelligence accurately predicted 69.7% of case outcomes and 70.9% of individual Justice outcomes over a 60-year period. By comparison, in a contest, human legal experts predicted only 59% of case outcomes and 67.9% of the individual Justice outcomes, K. D. ASHLEY, *Artificial Intelligence and Legal Analytics*, Cambridge University Press, 2017.

<sup>6</sup> A. CICCATELLI, *The future of Big Data and Intellectual Property*, Inside Counsel, 2017.

<sup>7</sup> IBM, Microsoft and Qualcomm garnered the highest share patents in a wide range of AI technology areas. See H. FUJII – S. MANAGI, *Trends and priority shifts in artificial intelligence technology invention: A global patent analysis*, available at: [https://is.gd/law\\_trends\\_in\\_AI](https://is.gd/law_trends_in_AI).



applications grows, patent litigation – the so-called sport of kings<sup>8</sup> or business of sharks<sup>9</sup> – follows.

Although there is currently little scholarship on the intersection of law and artificial intelligence technology, the European Union<sup>10</sup> and the United States<sup>11</sup> have started to give AI a legislative definition. However, the question is whether the little regulation reached so far is sufficient to address all issues raised by this disruptive technology. It seems not.

## 2. How Intellectual Property approaches AI

Today, the global copyright community is in general agreement that AI systems are based on software, and that all the standard computer program IP issues associated with developing software apply. Today it is also beyond question that “*programs are not only text ...they also behave*”<sup>12</sup>, and even if creative thinking and invention remain fundamentally human functions, increasingly capable computers are encroaching<sup>13</sup>. Giving protection to artificial intelligence systems – and perhaps more problematic still, to their creations – is leaving the legal universe with fundamental challenges.

### 2.1. PROTECTING ARTIFICIAL INTELLIGENCE SYSTEMS

The misconception that computer software cannot be protected by patents<sup>14</sup> is still somehow widespread. Software, much like AI, differs from computer hardware

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<sup>8</sup> J. BESSEN – M. J. MEURER, *Lessons for Patent Policies from Empirical Research on Patent Litigation*, Lewis & Clark Law Review, 1, 2, 2005.

<sup>9</sup> M. REITZIG – J. HENKEL – C. HEATH, *On Sharks, Trolls and Other Patent Animals – “Being infringed” as a Normatively Induced Innovation Exploitation Strategy*, Working Paper, 2006, available at <http://ssrn.com/abstract=885914>.

<sup>10</sup> Motion for a European Parliament Resolution A8-0005/2017, Committee on Legal Affairs of the European Parliament, 2017.

<sup>11</sup> In June 2011, Nevada became the first State to pass a law regulating driver-less robotic cars, a specific segment of Artificial Intelligence. See, Nev. Rev. Stat. Ch., 482A available at: <https://www.leg.state.nv.us/NRS/NRS-482A.html>.

<sup>12</sup> R. DAVIS, *Intellectual Property and software: The assumptions are broken*, in World Intellectual Property Organization, WIPO Worldwide Symposium on the Intellectual Property Aspects of Artificial Intelligence, Stanford University, 1991.

<sup>13</sup> P.M. KOHLHEPP, *When the Invention Is an Inventor: Revitalizing Patentable Subject Matter to Exclude Unpredictable Processes*, Minnesota Law Review, 2008.

<sup>14</sup> K. BERESFORD, *Patenting software under the European Patent Convention*, European Intellectual Property Review, 2000.

because it is essentially a set of instructions contained in a sequence of codes<sup>15</sup>, wherein each code instructs the physical hardware what to do and the computer follows the rules generating control signals<sup>16</sup>. For many years the United States precluded the patenting of the pure software code because as a “mathematical algorithm” it was either considered law of nature<sup>17</sup> or an abstract idea<sup>18</sup>. In the 80’s<sup>19</sup>, however, the U.S. Supreme Court began to follow a less strict theoretical path towards those seeking to patent software inventions. Justice Rehnquist<sup>20</sup> ruled that while the pure mathematical formula or algorithm itself remains unpatentable, an otherwise patentable invention does not become unpatentable merely because it uses an algorithm or a mathematical formula<sup>21</sup>. The reasoning of the Court was synthesized into a test called *Freeman-Walter-Abele*<sup>22</sup>, which, in brief, was a method to separate claims containing pure algorithms from algorithms conjunct with otherwise statutory subject matter. In the 90’s the Federal Circuit even diminished subject matter patentability as a meaningful impediment to software patentability<sup>23</sup> disclaiming the test and making any software invention that accomplished a useful result patentable, if not identified as merely abstract ideas or ‘useful’ truths.

One of the reasons hypothesized for this massive breadth of patentable subject matter is that courts, faced with explosive growth in computer software, were struggling to apply old doctrine of subject matter to an innovative and less tangible form of technology<sup>24</sup> and needed a new, more functional approach. In short, software that could be proved useful could now be patentable.

The continuing technological innovation, led by AI systems, is today forcing the judicial system to reconsider – again – the proper role of patentable subject matter

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<sup>15</sup> See: W. STALLINGS, *Computer Organization & Architecture: Designing for Performance*, 2006.

<sup>16</sup> *Id.*

<sup>17</sup> See, *Flook*, 437 U.S. at 593-594 (defining the mathematical algorithm as a law of nature).

<sup>18</sup> See, *Gottshalk v. Benson*, 409, U.S., 63-71 (1972), “It is conceded that one may not patent an idea. But in practical effect that would be the result if the formula for converting BCD numerals to pure binary numerals were patented in this case”.

<sup>19</sup> See, *Diamond v. Diehr*, 450 U.S., 175-192, 1981. In this case the court ruled that the inclusion of a mathematical formula or algorithm in an otherwise patentable invention does not render the invention unpatentable.

<sup>20</sup> Writing for the majority.

<sup>21</sup> *Id.*

<sup>22</sup> See, *Arrhythmia Research Tech., Inc. v. Corazonix Corp.*, 958 F.2d 1053, 1058, Fed. Cir. 1992.

<sup>23</sup> See, *AT&T Corp. v. Excel Commc’ns, Inc.*, 172 F.3d 1352, 1358-59, Fed. circ. 1999.

<sup>24</sup> P.M. KOHLHEPP, *When the Invention Is an Inventor: Revitalizing Patentable Subject Matter to Exclude Unpredictable Processes*, Minnesota Law Review, 2008.

and, although its breadth has lately reversed<sup>25</sup> – with commentators predicting the U.S. Supreme Court to soon revisit the proper scope of patentable subject matter<sup>26</sup> – a clear delineation is yet to be drawn.

In Europe, although inventions that apply machine learning are generally considered positively by the European Patent Office, a risk of claims persists, features being considered to fall into mathematical methods, schemes, rules and methods for performing mental acts or doing business<sup>27</sup>. It seems that on this matter Japan and, generally, Asian countries have been following the U.S.’s lead, while Europe is still more conservative on the issue<sup>28</sup>, even if the patentability of software is well established on both sides of the Atlantic and the computer programs’ patentability is no longer under questionability<sup>29</sup>. Context matters. Let us contrast Europe (whose patent requirements tend toward the more tangible) and the United States (whose inventions no longer have to be confined to the physical realm in order to be patentable, i.e. business methods).

Artificial Intelligence, including machine and deep learning systems, is just another form of software solution that does not rely exclusively on a linear set of programming instructions; rather, it has an undiscussed capacity to “reason” for itself<sup>30</sup>. The software industry is largely engaged in the sale of its Intellectual Property rights, rather than relying on the protection that property law grants on tangible products. Such business has become a free-standing profit center for some enterprises, and in many cases, it is even distinct from the core products and services sold by the same software companies. Software patents are increasingly deemed a

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<sup>25</sup> See, Nuijten, 500 F.3d 1346, 1357, Fed. circ., 2007, where the Court found that a signal containing an improved digital watermark for audio files did not fall into any of the four categories and was therefore unpatentable.

<sup>26</sup> See, R.S. GRUNER, *In Search of the Undiscovered Country: The Challenge of Describing Patentable Subject Matter*, 23 Santa Clara Computer & High Tech. L.J. 395, 400 (2007); S.A. MOTA, *What Is Patentable Subject Matter? The Supreme Court Dismissed LabCorp v. Metabolite Laboratories, But the Issue Is Not Going Away*, 11 Marq. Intell. Prop. L. Rev. 181, 185-92, 2007.

<sup>27</sup> B. HOYLE, *Can you protect Artificial Intelligence inventions at the European Patent Office?*, available at: [https://is.gd/law\\_AI\\_protection\\_EU](https://is.gd/law_AI_protection_EU).

<sup>28</sup> M. GUNTERSCHDORFER, *Software Patent Law: United States and Europe Compared*, 2 Duke Law & Technology Review 1-12, 2003.

<sup>29</sup> *Ibid.*

<sup>30</sup> To help design its jet engines, General Electric employed genetic algorithms. See, D. BREEDING, *Looking into engines Helps Cross the Best with the Best*, Mechanical Engineering, Sept. 2002. Engineers in Virginia developed a new and effective satellite communications antenna. See, A. EISENBERG, *When a Gizmo Can Invent a Gizmo*, New York Times, Nov. 25, 1999. See also R. PLOTKIN, *The Genie in the Machine: How Computer-Automated Inventing Is Revolutionizing Law and Business*, Stanford University Press, 2009.

business asset<sup>31</sup> of pivotal importance in the growing<sup>32</sup> software industry; consequently, the predictability of its protection under patent law plays a primary role in investment decisions and, accordingly, on long-term business success<sup>33</sup>.

## 2.2. PROTECTING ARTIFICIAL INTELLIGENCE CREATIONS: CAN NON-HUMANS QUALIFY AS INVENTORS AND AUTHORS?

Recent achievements and massive investments by tech companies in AI systems raise the question as to whether and how protection should be granted to autonomous machine creations. After decades of disappointment, the performances of self-learning and deep-learning systems is exceeding that of humans in several fields<sup>34</sup>, due in large part to a tremendous increase in the amount of data that can be fed to the systems<sup>35</sup>, so that AI, for example, no longer needs engineering inputs to generate new inventions. As long as computer algorithms and learning machine have become a new source of inventions and creativity, the temptation to give AI systems the same position in Intellectual Property law that humans have, has emerged<sup>36</sup>.

Under European patent law, the fact that an invention is made with artificial intelligence is completely irrelevant to the question of patentability. When the result is «new, involves an inventive step and is susceptible of industrial application»<sup>37</sup>, a patent shall be granted, regardless of how the invention was made, whilst under U.S. law «[w]hoever invents or discovers any new and useful process, machine, manufacture or

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<sup>31</sup> The software industry counted for the 12.9% of the global total spending on Research & Development, Booz & Company, *Percentage of global research and development spending in 2016, by industry*, available at: [https://is.gd/statistics\\_rd](https://is.gd/statistics_rd)

<sup>32</sup> The percentage of software-related utility patents issued in the U.S. has averaged an annual growth rate of 2.98% over the past quarter-century, available at: [https://is.gd/law\\_AIPatentsStats](https://is.gd/law_AIPatentsStats).

<sup>33</sup> P.M. KOHLHEPP, *When the Invention Is an Inventor: Revitalizing Patentable Subject Matter to Exclude Unpredictable Processes*, Minnesota Law Review, 2008.

<sup>34</sup> For instance, Microsoft reported that its neural network surpassed human-level performance in classifying images. Similarly, scientists of IBM and Google demonstrated a system that outperforms humans at separating and recognizing the speech of two people, in P. BLOCK, *The inventor's new tool: artificial intelligence. How does it fit in the European patent system?*, European Intellectual Property Review, 2017.

<sup>35</sup> Big data refers to the practice of combining huge volumes of diversely sourced information and analysing them, using more sophisticated algorithms to inform decisions. Big data relies not only on the increasing ability of technology to support the collection and storage of large amounts of data, but also on its ability to analyse, understand and take advantage of the full value of data (in particular using analytics applications), *Meeting the challenges of Big Data*, 2015, available at: [https://edps.europa.eu/sites/edp/files/publication/15-11-19\\_big\\_data\\_en.pdf](https://edps.europa.eu/sites/edp/files/publication/15-11-19_big_data_en.pdf).

<sup>36</sup> P. BLOCK, *The inventor's new tool: artificial intelligence. How does it fit in the European patent system?*, European Intellectual Property Review, 2017.

<sup>37</sup> Art. 52 of the European Patent Convention.

composition of matters, or any new and useful improvement thereof, may obtain a patent»<sup>38</sup>.

Is AI a “who”, then? Whereas the United States law requires the inventor to be «the *individual* [...] who invented the subject matter of the invention»<sup>39</sup>, the European Patent Convention does not provide a definition at all.

Although the patentability of the creation is not questioned, it is generally accepted that under both the EU and U.S. law only a natural person can be an inventor and consequently, corporations, associations, computers and all non-human beings are excluded by this definition for lacking the capacity to own moral and property rights<sup>40</sup>.

If on the one hand, an invention made with the aid of AI does not raise particular concerns – being the inventor the natural person who, using that software as a tool, has found the product or process that one wants to patent – on the other hand, an invention made solely by the AI opens a wide variety of problems. The current human-centric, traditional approach to AI inventions<sup>41</sup> seems, in fact, inadequate to regulate technological developments in automated AI systems producing inventions. Non-humans, including machines and animals, have not been regarded as inventors or creators in terms of – respectively – patent and copyright law, according to precedents in Intellectual Property rulings<sup>42</sup>. Although some scholars have argued that assigning inventorship and authorship to non-humans would be an innovative way to encourage AI development<sup>43</sup>, inventions made by AI systems are currently not included in the ambit of patent law, principally on the basis that – at least in the U.S. – they may not be held legally responsible in a court of law<sup>44</sup>. Today their ambiguous status persists<sup>45</sup>.

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<sup>38</sup> 35 U.S. Code § 101 - Inventions patentable.

<sup>39</sup> 35 U.S. Code § 100, term (f).

<sup>40</sup> Countries such as New Zealand, Ireland, South Africa and the UK have decided, under specific conditions, to give copyright to the person who made possible the creation of procedural automated works. See A. Guadamuz, Do androids dream of electric copyright? Comparative analysis of originality in artificial intelligence generated works, *Intellectual Property Quarterly*, 2017

<sup>41</sup> J.R. TUNG, *Who Owns the Creation of an Artificial Intelligence?* *Technologist*, Aug. 22, 2016, [https://is.gd/law\\_who\\_owns\\_AI\\_creations](https://is.gd/law_who_owns_AI_creations).

<sup>42</sup> S.Y. RAVID, X. LIU, *When Artificial Intelligence Systems Produce Inventions: The 3A Era and Alternative Model for Patent Law*, *Cardozo Law Review*, 2017. Available at: <https://ssrn.com/abstract=2931828>.

<sup>43</sup> R. ABBOTT, *I Think, Therefore I Invent: Creative Computers and the Future of Patent Law*, 57 *B.C. Law. Review*, 1079, 2016. See also C.R. DAVIS, *An Evolutionary Step in Intellectual Property Rights – Artificial Intelligence and Intellectual Property*, 27, *Computer Law & Security Review*, 601, 2011.

<sup>44</sup> An important precedent in US law happened in 2011. Mr. Slater, a British wildlife photographer, left his camera accessible to some macaques he was photographing during a trip in Indonesia. The animals eventually took a number of “monkey selfies” with his camera, bringing celebrity to the pictures. Mr. Slater began licensing the photos under the presumption that he owned their copyright. The judge,

Besides patents, artificial intelligence creations can be protected under the wider copyright umbrella - when they qualify as works of art, rather than inventions. However, there are some fundamental differences in the protection afforded by copyright and patent law.

The principal distinction regards the fact that the copyright owner cannot exclude others who independently invent substantially similar works to those produced by his own system. On the contrary, all those who independently develop inventions may be subject to patent rights and therefore, be excluded<sup>46</sup>. Secondly, under copyright's "fair use" doctrine, others can reproduce copyrighted inventions for «criticism, comment, news reporting, teaching, scholarship, and/or research», with no limitation, whilst patents do not grant any analogue right. Third, being patents registered, are easier to enforce. The impression hitherto is that patents provide AI creations wider and more easily enforceable IP rights than copyright.

Bringing the attention back to our initial question: who owns the creations of AI systems?

Artificial intelligence generated works, such as art, music, literature and animations can potentially be authored by the programmer<sup>47</sup>, the user<sup>48</sup>, the artificial intelligence device itself or can be joint authored by a combination of the programmer, the user and the AI<sup>49</sup>. In this analysis, we will take into account only works that have been

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however, ruled that he could not be deemed the author of the photograph solely by reason he was the owner of the camera and the photograph was found to be within public domain. The judge also clarified that an animal does not have legal standing in court, therefore, it may not sue or pursue copyright using the law. *Naruto v. Slater*, 2016, U.S. District Lexis 11041, North. District of California, Jan 23, 2016. Another key case is *People v. Frazier*, 173, California App. 4<sup>th</sup> 613, 2009. On liability regulations of AI machines, see also M.U. SCHERER, *Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies*, Harvard Journal of Law & Technology, 29, 2, 2016.

<sup>45</sup> *Ibid.*

<sup>46</sup> T. CASWELL – K. VAN AMBURG, *Copyright Protection on the Internet*, in E-Copyright Law Handbook, 7-1, 7-8 Lee Stapleton ed., 2003.

<sup>47</sup> Providing incentives to the programmer (the person responsible for creating the underlying algorithm of the artificial intelligence device) or to the owner, could be a possible way to provide a sustainable growth to the AI, according to K. HRISTOV, *Artificial Intelligence and the Copyright Dilemma*, The Journal of the Franklin Pierce Center for I.P., LVII, 3, 2017, available at: [https://law.unh.edu/sites/default/files/media/hristov\\_formatted.pdf](https://law.unh.edu/sites/default/files/media/hristov_formatted.pdf).

<sup>48</sup> End users - in other words those who arrange the creation of the content in the final form by providing the device instructions – have the smallest contribution to the initial development, and granting protective measures to them could be detrimental to the growth of the AI sector, *Ibid.*

<sup>49</sup> E. DOROTHEOU, *Reap the benefits and avoid the legal uncertainty: who owns the creations of Artificial Intelligence?*, Computer and Telecommunication Law Review, 2015.

autonomously generated by AI, since authorship of works generated by humans with the aid – through input, guidance or assistance – of AI, is recognized unequivocally.

The automation of the creative process falls into a legal grey area and raises the important question on whether a fully automated machine – that by definition cannot be creative – could be granted ownership of a work, if it completely lacks the creativity element. The current policy of copyright offices is to reject claims made for works not authored by humans<sup>50</sup>. The rationale underlying the existence of IP law is, in fact, to provide an economic return to the creator while preventing others from exploiting its content without authorization. AI, as a mere tool to produce content, does not appear to have any of these needs, thus it should not be granted protection under Intellectual Property law. If entitlement to IP rights had to be granted to AI, following the same reasoning, it would also have to be extended to computer software; if so, in a hypothetical scenario, where an AI software is translating some work or correcting some spelling mistake, we could not certainly say that the computer owns the copyright on the final content<sup>51</sup>.

However, the fact that the release of independently generated AI creative works falls into the public domain is leaving the academic community divided and some, on the contrary, believe that it would limit innovation, as a result of the impossibility for companies that have invested into the creation of AI machines to enjoy protection or the financial benefits associated with it, eventually dissuading them from investing<sup>52</sup>. It is undoubtable that such point is as strong as the former, but is equally true that, once again, we are trying to fit new concept into outdated legal categories. Asserting that the best solution has to be carefully balanced between private property rights and the public domain, would imply - once again - the use of such old categories, that, however, still appear to be the only theoretical principles considerable thus far. Policy makers must find the optimum balance to maximize investments of time, energy and capital in creative endeavors while minimizing restriction on the public's freedom to

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<sup>50</sup> The United States Copyright Office even addressed this subject into the Official Compendium of U.S. Copyright Office Practices, 2014.

<sup>51</sup> If you make a spelling mistake in something you're writing and the computer corrects it, who owns the copyright to the final product? Obviously not the computer. (...) The computer has no ownership of your writing, in R. HART, *If an AI creates a work of art, who owns the rights to it?*, 2017, available at: [https://is.gd/law\\_article\\_qzAICopyright](https://is.gd/law_article_qzAICopyright).

<sup>52</sup> K. HRISTOV (see footnote n. 47).

use the results of such creativity. Underestimating this would likely lead to a problematic over- or under-protection of Intellectual Property<sup>53</sup>.

### 3. AI as a tool for IP

The Intellectual Property industry is not immune to the impact of rampant automation. Document discovery and analysis is a key area where automation is already reducing the need for human involvement and has historically been a successful testbed for AI applications<sup>54</sup>. Administrative tasks are among the most time consuming and risky in law firms, patent offices and even judicial courts, and have traditionally been powered by paper, manual searches and lengthy decision-making processes where a single input error could mean risking millions of dollars in assets<sup>55</sup>. With the rise of automation follows the possibility to solve several of the huge problems that companies and firms are facing: lack of manpower and tight budget, while enhancing work quality and outcome accuracy<sup>56</sup>, reducing risks and increasing market competition, forcing legal providers to maximize their efficiency<sup>57</sup>.

In 2017, the world's first internet court held its first case using face and speech recognition<sup>58</sup> to automatically generate trial records<sup>59</sup> and AI to draft judgements<sup>60</sup>. Furthermore, AI is expected to be able to judge cases autonomously soon, as studies show that the litigation prediction has now reached a superior level of accuracy. UCL computer scientists even developed an algorithm that examined English language

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<sup>53</sup> A. BECKERMAN RODAU, *The problem with Intellectual Property Rights: Subject Matter Expansion*, Yale Journal of Law and Technology, 2010.

<sup>54</sup> T. BENCH CAPON, *A History of AI and Law in 50 papers: 25 years of the International Conference on AI and Law*, Artificial Intelligence and Law 215-319, 2012.

<sup>55</sup> T. STADYNG, *The Role of Artificial Intelligence in Intellectual Property*, 2017, available at: <https://is.gd/AIinIP>.

<sup>56</sup> Instead of wading through piles of paper, lawyers now deal with terabytes of data and hundreds of thousands of documents in seconds through e-discovery and legal research AI software.

<sup>57</sup> See: R. OWEN, *Changing times for the legal sector; technology is transforming the legal profession in ways that could make access to justice easier and more affordable*, The Western Mail, 18 October 2017.

<sup>58</sup> The Natural Language Processing "NPL" is expected to reach near 100% levels in the next few years. See M. McDONALD, *Artificial Intelligence can reduce 99% of review hours*, available at: [https://is.gd/law\\_AIred](https://is.gd/law_AIred).

<sup>59</sup> Speech automatic transcription is the most established class of cognition, with a relatively long history and wide use across industries such as call centers and legal discovery.

<sup>60</sup> "On 18 August, China has officially launched its first "Internet Court" in Hangzhou [...] the Chinese e-commerce capital [...] this court specializes in resolving Internet-related cases including disputes regarding contacts of online shopping, services and microfinance loans, Internet copyright disputes and domain name disputes". L. YANGJIN, *China's first internet court*, 2017, available at: [https://is.gd/law\\_firstIPCourt](https://is.gd/law_firstIPCourt).



datasets for 584 cases for which the software analyzed the information and made its own judicial decision. In 79% of the cases assessed, the AI verdict was the same as the one delivered by the court<sup>61</sup>. The fact that IP litigation in particular could be easily<sup>62</sup> automated should also have major impact on the way lawyers deal with their clients, prepare cases for trial<sup>63</sup>, and are even aware of the trial outcome, thanks to predictive software<sup>64</sup>. For companies, in fact, AI will be their best business strategy tool, since they rely on certainties to make key decisions regarding how and where to invest while their IP portfolio is being litigated.

The +484% worldwide increase in the number of patents covering new legal services technology<sup>65</sup> is a significant index of the high demand that the legal-tech field is putting on the market<sup>66</sup>; the surging need for technology in law can even be observed in universities and law schools that today are starting to incorporate computer coding into their curriculum. Even if the legal automation<sup>67</sup> has been around for a relatively short time, we have seen many examples of the impressive advancements that are putting the legal marketplace on the cusp of a revolution. Investment banks<sup>68</sup>, for example, have started to use AI to expedite productivity and machine-learning software are now capable of executing in few seconds what normally took lawyers more than 300,000 hours of work<sup>69</sup>. But the legal-tech space – although in these areas is the most profitable – is not just focused on IP, finance or consultancy services. A 19-year-old Stanford University student who created a service that helped appeal

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<sup>61</sup> See C. JOHNSTON, *Artificial Intelligence ‘judge’ developed by University College London computer scientists*, available at: [https://is.gd/article\\_law\\_UCL\\_AI\\_judge](https://is.gd/article_law_UCL_AI_judge).

<sup>62</sup> At least, more easily than criminal cases.

<sup>63</sup> The use of AI in legal proceedings took a significant step forward in 2016 in the case *Pyrrho Investments Ltd v. MWB Property Ltd*, when the High Court approved the use of predictive coding software in e-discovery. In that case, 17.6 million documents had been whittled down to 3.1 million.

<sup>64</sup> In 2014, Daniel Martin Katz, professor at Michigan State University law school created an algorithm to predict the outcomes of U.S. Supreme Court cases. It attained 70 percent accuracy for 7,700 rulings from 1953 to 2013. See J. SOBOWALE, *How artificial intelligence is transforming the legal profession*, 2016, available at: [https://is.gd/ABA\\_AItransformation](https://is.gd/ABA_AItransformation).

<sup>65</sup> The article is citing data from the World Intellectual Property Organization in the timeframe 2012-2015, available at: [https://is.gd/data\\_WIPO](https://is.gd/data_WIPO).

<sup>66</sup> “Legal tech” is the concept of using technology to solve legal problems. See T. MARTIN, *What does “legal tech” mean and why should you care*, available at: [https://is.gd/definition\\_legaltech](https://is.gd/definition_legaltech).

<sup>67</sup> Paradoxically, legal automation is old compared to the most recent machine learning and decision management AI technologies.

<sup>68</sup> The largest financial services of the world are planning to implement AI system reduce compliance and regulation costs, accounting 10% of all the operating costs for more than \$ 270 billion a year. See M. ARNOLD, *Banks AI plans to threatens thousands of jobs*, 2017, available at: [https://is.gd/FT\\_Banks\\_AI](https://is.gd/FT_Banks_AI).

<sup>69</sup> JP Morgan Chase implemented a learning machine called COIN (for Contract Intelligence), that interprets commercial-loan agreements and reviews documents with an impressively low error rate. See H. SON, *JP Morgan Software Does in Seconds What Took Lawyers 360,000 Hours*, available at: [https://is.gd/bloomberg\\_JPMorganAI](https://is.gd/bloomberg_JPMorganAI).

millions of dollars in parking fines using a Chatbot is now turning the platform to help refugees to fill out immigration applications in the U.S. and Canada, and even apply for asylum in the UK. The legal-tech business has now, more than ever, an infinite potential across all areas of the law and those who underestimate it are risking, sooner or later, being left behind.

## Conclusion

Artificial Intelligence isn't coming. It's already here. This paper has addressed how the old concepts of Intellectual Property are being stretched to the maximum to accommodate the disruptive consequences of the advent of Artificial Intelligence. Adequate and certain legal protection would in fact be necessary to properly incentivize Artificial Intelligence inventors and investors, as well as to unlock the economic potential related to this new technology, while ensuring a fair balancing of the interests of all stakeholders involved. However, no significant result has been achieved: the Europe and the U.S. have been addressing AI-related issues with discontinuity and a call for legislative action may be advisable.

Courts efforts to re-interpret patent law to duly protect Artificial Intelligence may end up in putting into question the very foundation of patent law itself: it is exemplificative that, for instance, the very prerequisite of patentable subject matter has been diluted in the context of the U.S. case law to extend the umbrella of protection granted under patent law.

On the other hand, the attempt to reward the owners of artificial intelligence systems, by allowing a return for the inventions or works of art created by AI, poses serious threats to the notion of inventorship and authorship, thus undermining the fundamental principles of both patent and copyright law.

In other words, granting Intellectual Property protection to Artificial Intelligence results, paradoxically, into challenging the very foundations of Intellectual Property law. Whether this should be interpreted as a threat or an opportunity to modernize Intellectual Property is a separate issue, certainly worth reflecting.

Some good news, however, comes from the use of the AI in the IP world. Moreover, given its ability to learn autonomously, AI is likely to yield in the future more benefits and advantages than those conceivable today.

In conclusion, the outdated nature of the current worldwide IP law is somehow failing to reflect this contemporary reality, resulting in the potential prejudice to the

incentives that inventors and creators have from protecting their Intellectual rights. The consequences of this gap are far reaching and may result in a significant delay in the progress of modern society, to the detriment of business and the entire collectivity.

From a policy standpoint, the regulators need to navigate this unfamiliar territory and adapt the regulatory framework to the thorny issues of ownership and patenting in the AI era if we don't wish to delay in reaping the benefits of this new age. And they must adapt it quickly.