

UKIPO - WIPO Conference

Keynote Speech

Lord Kitchin, Justice of the Supreme Court

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Introduction

1. It is a pleasure to be here with you at the opening session of ‘AI: decoding IP’. There is now unfolding before us a technology which will be so disruptive it has been called the 4th industrial revolution.

2. Not surprisingly, it has generated some extreme reactions. Professor Stephen Hawking described it in characteristically colourful terms at the opening of the Centre for Future Intelligence in Cambridge in 2016.¹ At its bleakest, his perspective was one of autonomous machines running out of control and displacing humans, or acting in a way which could not be explained and had the potential to cause great harm. He thought there was no deep difference between what could be achieved by a biological brain and what could be achieved by a computer, and it followed, as he put it, that “the rise of powerful AI will be either the best or the worst thing ever to happen to humanity. We don’t yet know which.” Elon Musk has described AI as “summoning a demon” and “our biggest existential threat”.² On a more prosaic but none-the-less important level, nay-sayers fear that automation will decrease the number of job opportunities, particularly for those less skilled.

3. I am not one of these pessimists. The promise of AI is profound, and the systems which embody it will be powered by astonishing improvements in processing technology and the availability of vast amounts of data from which they can learn. That volume of available data will grow still faster as the Internet of Things develops. We are, even now, interacting with machine learning systems everyday through, for example, image recognition systems, personal assistants such as Alexa and Siri, recommender systems such as those of Amazon and Netflix, search

¹ University of Cambridge, “‘The best or worst thing to happen to humanity’ - Stephen Hawking launches Centre for the Future of Intelligence’ (19 October 2016). Available at <<https://www.cam.ac.uk/research/news/the-best-or-worst-thing-to-happen-to-humanity-stephen-hawking-launches-centre-for-the-future-of>> last accessed 20 June 2019.

² The Guardian, ‘Elon Musk: artificial intelligence is our biggest existential threat’ (27 October 2014). Available at <<https://www.theguardian.com/technology/2014/oct/27/elon-musk-artificial-intelligence-ai-biggest-existential-threat>> last accessed 20 June 2019.

engines, the detection of bank fraud by identifying unusual patterns of activity, and the use of machine translation.

4. But many more exciting applications are coming fast. In medicine, AI has the potential to improve the diagnosis of disease. IBM's Watson and other engines may assist many doctors by analysing large numbers of publications to identify treatment options.³ The process of drug discovery may be transformed by using predictive algorithms and the use of AI to analyse vast amounts of genetic data.⁴ In education, AI may track the progress of different students, and identify areas of possible further study.⁵ Autonomous vehicles may well improve road safety and reduce congestion and pollution;⁶ they may increase productivity in agriculture and safety in shipping and in air travel; and they may make humans having to work in certain hazardous conditions a thing of the past.⁷ AI has the capacity to improve logistics,⁸ the arrangement of storage facilities,⁹ the delivery of goods and so forth. It may bring dramatic improvements in public services.¹⁰ Groups or individuals at risk of dropping out of school or employment, or families with children at risk may be identified, and arrangements made to support them.¹¹ The Inland Revenue has unleashed its computer which may help to identify potential tax evasion.¹²

³ IBM Watson Health, 'Artificial Intelligence in medicine'. Available at <<https://www.ibm.com/watson-health/learn/artificial-intelligence-medicine>> last accessed 20 June 2019.

⁴ Genetic Engineering and Biotechnology News, 'Adding Artificial Intelligence to Drug Discovery' (1 April 2019). Available at <<https://www.genengnews.com/insights/adding-artificial-intelligence-to-drug-discovery/>> last accessed 20 June 2019.

⁵ Forbes, 'How Is AI Used in Education - Real World Examples Of Today And A Peek Into The Future' by Bernard Marr (25 July 2018). Available at <<https://www.forbes.com/sites/bernardmarr/2018/07/25/how-is-ai-used-in-education-real-world-examples-of-today-and-a-peek-into-the-future/#414e5364586e>> last accessed 20 June 2019.

⁶ Microsoft, 'Artificial Intelligence and road safety: A new eye on the highway' (4 March 2019). Available at <<https://news.microsoft.com/apac/features/artificial-intelligence-and-road-safety-a-new-eye-on-the-highway/>> last accessed 20 June 2019.

⁷ Health and Safety at Work, 'Cisco's AI workplace safety trial wins £300k government grant' (31 January 2018). Available at <<https://www.healthandsafetyatwork.com/news-and-prosecution/cisco-ai-PPE-workplace-safety-trial-wins-government-grant>> last accessed 20 June 2019.

⁸ Forbes, 'The Future of Artificial Intelligence in The Workplace' last accessed 20 June 2019. (11 January 2019). Available at <<https://www.forbes.com/sites/vishalmarria/2019/01/11/the-future-of-artificial-intelligence-in-the-workplace/#3ce4d4a673d4>> last accessed 20 June 2019.

⁹ Smart Data Collective, '5 Ways Big Data Is Impacting the Self-Storage Industry' (26 October 2018). Available at <<https://www.smartdatacollective.com/ways-big-data-impacting-self-storage-industry/>> last accessed 20 June 2019.

¹⁰ Gov.uk, 'A guide to using artificial intelligence in the public sector' (18 June 2019). Available at <<https://www.gov.uk/government/collections/a-guide-to-using-artificial-intelligence-in-the-public-sector>> last accessed 20 June 2019; Deloitte, 'Lifting performance in the public sector with an AI-augmented workforce'. Available at <<https://www2.deloitte.com/tl/en/pages/public-sector/articles/lifting-performance-public-sector-ai-augmented-workforce.html>> last accessed 20 June 2019.

¹¹ The Verge, 'Can AI fix education? We asked Bill Gates' (25 April 2016). Available at <<https://www.theverge.com/2016/4/25/11492102/bill-gates-interview-education-software-artificial-intelligence>> last accessed 20 June 2019.

¹² The Times, 'HMRC deploys robots to check tax returns' (22 March 2018). Available at <<https://www.thetimes.co.uk/article/hmrc-deploys-robots-to-check-tax-returns-rl78q7h05>> last accessed 20 June 2019.

Machine learning and AI are already making improvements in the legal sector, with chatbox interfaces, the analysis of disclosure, the generation of legal documents and the prediction of the outcomes of disputes.¹³ AI may also help to identify persons likely to reoffend and police forces to combat crime.

5. Some have predicted that by 2025 AI and machine learning could have a global economic impact of between \$5 and \$7 trillion each year.¹⁴ Certainly, the UK Government sees AI and data processing and management as one of the Four Grand Challenges which, if met, will put the UK at the forefront of those countries developing the industries of the future, and will create thousands of good quality jobs, drive economic growth and improve our quality of life. Interestingly, it also underpins another of the government's Grand Challenges: shaping the future of mobility and how people, goods and services are moved around the country.¹⁵

6. These are not simply a statement of good intentions. As explained in the AI Sector Deal, the Government is making a substantial financial commitment to increase the supply of skills at all levels; to make sure we have the right data infrastructure; to develop our innovative economy by boosting the spend on research and development and by taking a series of other positive steps to make the UK an attractive place in which to establish creative industries.¹⁶ No doubt this is also mirrored in the strategies of governments of other countries including, in particular, the USA, China, Japan, Korea, Germany and France. But how this national investment compares to that of the technology companies is another question. McKinsey estimates the major players invested a combined total of between \$26 - 39 billion in 2016 alone.¹⁷ And it has to be said the investment in the US and China far exceeds that of any European country.¹⁸

7. The public, so far as they are aware of AI, can see its advantages but do have their worries. Many have expressed concern that jobs will be lost, but they are also anxious that AI machines

¹³ The Law Society, 'Six ways the legal sector is using AI right now' (13 December 2018). Available at <<https://www.lawsociety.org.uk/news/stories/six-ways-the-legal-sector-is-using-ai/>> last accessed 20 June 2019.

¹⁴ McKinsey Global Institute, 'A Future that Works: Automation, Employment, and Productivity' (January 2017).

¹⁵ Department for Business, Energy & Industrial Strategy, 'Policy paper: The Grand Challenges' (22 May 2019). Available at <<https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges>> last accessed 20 June 2019.

¹⁶ Department for Business, Energy & Industrial Strategy and the Department for Digital, Culture, Media & Sport, 'Policy paper AI Sector Deal', (21 May 2019). Available at <<https://www.gov.uk/government/publications/artificial-intelligence-sector-deal/ai-sector-deal>> last accessed 20 June 2019.

¹⁷ McKinsey Global Institute, 'Artificial Intelligence the Next Digital Frontier?' (June 2017).

¹⁸ McKinsey Global Institute, 'Artificial Intelligence the Next Digital Frontier?' (June 2017).

may cause harm, that we will lose control of our private data, that life will become less personal, and that machines may restrict the exercise of free will.

8. Setting these fears to rest will need public engagement. It will also require workers in this field to provide technical solutions and develop ethical standards, preferably on an international basis and in conjunction with government. They must, for example, address the black box problem and consider how to make the process of decision making more transparent. Can biases be avoided? Can personal data be safely and reliably anonymised? Can we make sure that results generated by AI are robust and verifiable? Is there a risk that AI systems may collude in relation to, for example, pricing?

9. These are all challenging issues, and researchers are working hard to address them with pragmatic solutions. But they are also challenging issues for regulators and lawmakers and present some fundamental questions. To what extent should government implement a legal framework which, on the one hand, promotes these technologies or, on the other hand, regulates and controls their development? Too much regulation will stifle innovation and too little may lead to public and political rejection. We have seen that before in other areas of technology. Does this science engage fundamental rights? Should we attribute some kind of personality to robots, as we do to companies and partnerships? That may seem a little far-fetched but in 2017 Saudi Arabia granted citizenship to a robot called Sophia.¹⁹ Bill Gates has suggested robots should pay taxes.²⁰ And serious consideration has been given to whether liability should attach to robots. Legislators and policy makers must also have regard to ethical and societal implications, but how should they be taken into account? And can they be embodied in legislation or are they better left to industry?

10. It is against this complex and multi-textured background that we must consider the impact and role of Intellectual Property, and here too AI challenges some of our basic assumptions.

11. In November 2018, a painting generated by AI went under the hammer at Christie's in New York. It was called 'Portrait of Edmond Belamy' and is one of a group of portraits of the

¹⁹ British Council, 'Should Robots be Citizens'. Available at <<https://www.britishcouncil.org/anyone-anywhere/explore/digital-identities/robots-citizens>> last accessed 20 June 2019.

²⁰ The Financial Times, 'Bill Gates calls for income tax on robots' by Richard Waters (19 February 2017). Available at <<https://www.ft.com/content/d04a89c2-f6c8-11e6-9516-2d969e0d3b65>> last accessed 20 June 2019.

fictional Belamy family made under the supervision of Obvious, a Paris-based collective.²¹ They used for this purpose a generative adversarial network or GAN.

12. The picture sold to an anonymous bidder for \$432,000 – over 40 times its estimated value. Is it appropriate that this work should be protected by copyright? If it is, who is the author? And how long is its term? What exactly is the creative effort and activity any such copyright is intended to incentivise? These fascinating and important questions are just some of those which we must grapple with in this new world.

13. I am going to come back to copyright, but first want to say a little about patents.

Patents

14. The general topic of AI and patents raises many questions, the first of which is whether inventions which embody AI can be patented themselves.

15. The position in Europe is governed by the EPC. The basic requirements of patentability are set out in Art 52: there must be an invention, it must be new and non-obvious and it must be capable of industrial application. Invention is not defined but we know from the guidelines and the case law of the EPO that it must have a technical character.²² We also know that computer programs “as such” are excluded, as are mathematical methods, again “as such”.²³ But these exclusions are not all they seem, and provided the claimed invention has a technical character and serves a technical purpose, protection can be secured.

16 How do AI inventions fit into this picture? The EPO has now published guidance to the effect that AI is based on particular kinds of computational models and algorithms and is therefore to be treated in the same way as mathematical methods.²⁴ So there is once again a presumption AI is not patentable, and the challenge is to define the invention in such a way as to confer some technical character upon it.

²¹ Intellectual Property Magazine, ‘Painting by numbers’, by Gregor Pryor and Reed Smith (30 November 2018).

²² EPO, ‘Case Law of the Boards of Appeal’. Available at <https://www.epo.org/law-practice/legal-texts/html/caselaw/2016/e/clr_i_d_9_1_1.htm> last accessed 20 June 2019.

²³ EPO, ‘Guidelines for Examination 3.3 Mathematical Methods’. Available at <https://www.epo.org/law-practice/legal-texts/html/guidelines2018/e/g_ii_3_3.htm> last accessed 20 June 2019.

²⁴ EPO, ‘Guidelines for Examination 3.3.1 Artificial intelligence and machine learning’. Available at <https://www.epo.org/law-practice/legal-texts/html/guidelines2018/e/g_ii_3_3_1.htm> last accessed 20 June 2019.

17. In the US the position is governed by section 101 of title 35 of the US Code. This limits patentable subject matter to any new and useful process, machine, manufacture or composition of matter. Natural phenomena and laws of nature are not eligible; nor are mathematical algorithms. The Supreme Court looked at this issue in the *Alice v CLS Bank* case, and its judgment suggests that a patentable invention must bring about some technical improvement or advance.²⁵ So the US approach has some similarities to the European.

18. This legislative and jurisprudential framework may make it difficult to patent what some describe as the fundamental elements or building blocks of AI. Nevertheless, the EPO and the USPTO are granting many patents for inventions of a technical character which are powered by AI.²⁶ In Europe, and I think the same applies to the US, these filings are predominantly in the fields of autonomous vehicles; the life sciences; medicine and diagnostics; personal devices; energy conservation; telecommunications and logistics.²⁷ In terms of the number of applications for each territory, the US, China and Japan lead the field, suggesting that they are the inventive powerhouses in this area; but not far behind are filings through the PCT and in the EPO.²⁸ As for the national offices in Europe, filings are highest in Germany, the UK and France.²⁹

19. The overall picture is therefore one of vigorous AI research activity and reasonable success in securing patent protection. But the need to engage in what may be seen as the indirect patenting of real advances in AI does pose serious questions as to whether new approaches to the requirements for patentability are called for, and whether in this new world the patent system is falling short in its aim to incentivise innovation. Is the exclusion of inventive software still appropriate? If it is, should that exclusion extend to non-obvious advances in the building blocks of AI, irrespective of their application?

²⁵ *Alice Corp. v CLS Bank International*, 573 U.S. 208, 134 S. Ct. 2347 (2014).

²⁶ Mondaq, 'Patenting Artificial Intelligence at the European Patent Office' (30 April 2019). Available at <<http://www.mondaq.com/uk/x/801304/Patent/Patenting+Artificial+Intelligence+At+The+European+Patent+Office>> last accessed 20 June 2019.

²⁷ Mondaq, 'Patenting Artificial Intelligence at the European Patent Office' (30 April 2019). Available at <<http://www.mondaq.com/uk/x/801304/Patent/Patenting+Artificial+Intelligence+At+The+European+Patent+Office>> last accessed 20 June 2019.

²⁸ WIPO, 'Technology Trends 2019: Artificial Intelligence' (January 2019), at pg 16. Available at <https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf> last accessed 20 June 2019.

²⁹ WIPO, 'Technology Trends 2019: Artificial Intelligence' (January 2019), at pg 22. Available at <https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf> last accessed 20 June 2019.

20. But this is just the start. Intelligent machines mimic the traits of the neural networks of the human brain, and they are increasingly capable of generating new and interesting ideas for themselves. Of course, there will be many cases where the AI may be regarded as another laboratory tool, albeit a rather sophisticated one. Here the inventor will likely be the person who has harnessed the AI for a particular purpose, or who has recognised the advance inherent in the computer's output. But there will also be cases, and potentially more and more of them, where the AI has carried out all or the predominant part of the creative and innovative work.

21. Professor Ryan Abbott points out in one of his many interesting papers in this area that this has been a reality for some time.³⁰ In 1994 Stephen Thaler described what he called the "Creativity Machine" which he patented and which had the capacity to create new ideas.³¹ He exposed it to his favourite music and over a weekend it generated thousands of new songs. It also generated the subject matter of a number of other patents. This computational creativity has also been a feature of other machines, such as the "Invention Machine" made by the computer scientist John Koza, and IBM's Watson.³²

22. Are these computer-generated inventions properly patentable? If so, who is the inventor and to whom should the invention belong? How is obviousness to be assessed and, for that purpose, who is the person skilled in the art, and what is the common general knowledge? These are fundamental questions which will be examined by you all over the next two days, but let me just foreshadow some of the issues now.

23. There can be no doubt that traditional notions of inventorship in the Europe and the US contemplate human inventors and human conception, and this is reflected in the terms of the governing legislation. It speaks of human creation and of inventors as individuals. More fundamentally, patent systems are intended to encourage and reward innovation. Inventors disclose their inventions to the world in return for a monopoly of a certain duration. Do the same considerations apply to inventions generated by AI? I am not sure that they do. Computers do not respond to rewards or incentives, although maybe one day they will.

³⁰ Ryan Abbott, 'I Think, Therefore I Invent: Creative Computers and the Future of Patent Law', 57 *B.C.L. Rev.* 1079 (2016).

³¹ Lexology, 'Protecting Creativity by Artificial Intelligence'. Available at <<https://www.lexology.com/library/detail.aspx?g=f96d3914-b394-4816-92ce-aa45330982e4>> last accessed 20 June 2019.

³² Ryan Abbott, 'I Think, Therefore I Invent: Creative Computers and the Future of Patent Law', 57 *B.C.L. Rev.* 1079 (2016), at pg 1087.

24. Others say we should consider the persons who have to invest in the computer, supervise its operation and reward its programmers. They are unlikely to make a commitment of that kind unless they can see a benefit in doing so. On the other hand, if we allow the notion of inventorship to escape from its human boundaries, where will it end and will the system become swamped by computer generated inventions and end up stifling *human* innovation?

25. Another question concerns the standard for assessing obviousness. A patentable invention must be new and not obvious in the light of existing public knowledge, what we call the state of the art. Obviousness is to be assessed from the perspective of a notional person who is skilled in the art, but who has no imagination or creative capacity. If the invention would be obvious, that is to say, it would lie in the path of such a person, it is not patentable. Where does AI fit into this landscape? Are these notional skilled but unimaginative persons to be treated as being AI or having access to it? If not, might there come a time when they are? If so, will many inventions made or facilitated by AI necessarily be obvious? In terms of the common general knowledge, how does one assess what is routine information to a computer?

Copyright

26. Now let me say a little about copyright because this too raises what I think are some really difficult and fascinating questions. The EU acquis in relation to copyright is now extraordinarily complex and consists of no fewer than 11 Directives and two Regulations.³³ Be that as is may, there has been no doubt for many years that original computer programs are protected by copyright, and such is recognised by TRIPS, the WIPO Copyright Treaty and Union law.³⁴ Altogether more problematic is whether copyright subsists in works which are generated by computers, and in particular autonomous AI.

³³ List available at <<https://ec.europa.eu/digital-single-market/en/eu-copyright-legislation>> last accessed 20 June 2019.

³⁴ Article 10 of The TRIPS Agreement. Article 4 of the 1996 WIPO Copyright Treaty includes the same clarification in similar terms.

27. The creation of seemingly original and creative works by AI is now reality. IBM's Watson has written a cookbook;³⁵ Forbes Magazine uses a tool called Bertie to write drafts of news stories;³⁶ and The Washington Post has used a robot called Heliograf to help its reporters.³⁷ In the world of artistic works, The Next Rembrandt project has used AI to create works of art in Rembrandt's style.³⁸ Perhaps even more fundamentally, AI can now be used to generate new and better software.

28. Are these new works themselves the subject of copyright? This question is not answered directly by EU legislation. But the decisions of the Court of Justice in *Infopaq* and other cases suggest that works of this kind must be the author's own intellectual creation to merit protection, and that such a work dictated solely by function and whose creation has involved no personal input is not protected.³⁹

29. On the other hand, we must also recognise that, under UK domestic law, the Copyright Designs and Patents Act of 1988 includes a special framework dealing with computer generated works. Such a work is defined in section 178 as one generated by computer in circumstances such that it has no human author, and section 9 says that the author of a literary, dramatic, musical or artistic work which is computer-generated is the person who made the arrangements necessary for its creation. It may be thought pretty clear that Parliament intended that computer-generated works should be protectable. And it conferred on them a period of protection of 50 years.⁴⁰ Whether these provisions are applicable to works generated by AI, whether they are compatible with Union law and whether they provide a direction in which Union law should travel are further questions I am sure you will be considering.

30. The position in other territories is also illuminating. The principle of human authorship and creativity underpins the US copyright system even though it is debatable whether this is an explicit requirement of the US Copyright Act itself. It is a certainly a feature of Copyright Office Practice and this no doubt reflects the decisions of appellate courts such as that of the Supreme

³⁵ IBM, 'Chef Watson has arrived and is ready to help you cook' (1 January 2016). Available at <<https://www.ibm.com/blogs/watson/2016/01/chef-watson-has-arrived-and-is-ready-to-help-you-cook/>> last accessed 20 June 2019.

³⁶ The New York Times, 'The Rise of the Robot Reporter' (5 February 2019). Available at <<https://www.nytimes.com/2019/02/05/business/media/artificial-intelligence-journalism-robots.html>> last accessed 20 June 2019.

³⁷ *Ibid.*

³⁸ Available at <<https://www.nextrembrandt.com/>> last accessed 20 June 2019.

³⁹ Case C-5/08, *Infopaq Int'l A/S v Danske Dagblades Forening* [19 July 2009] ECR I-6569

⁴⁰ Section 12(7) of the Copyright Designs and Patents Act 1988.

Court in *Feist Publications v Rural Telephone Service*.⁴¹ This principle appears to retain all of its vigour today, as we have seen in the engaging case of the ‘selfie’ photograph taken by Naruto, the six-year-old macaque.⁴²

31. Is it time to move on? Should it be recognised that there is an element of creativity in works generated by computers? Providing the work is not a copy of another, has the time come to accept that modern computers and algorithms can introduce any necessary element of originality which merits protection. Is there an absurdity in distinguishing between the protectability of the ‘Portrait of Edmond Belamy’ and traditional work of lesser artistic interest?

Conclusion

32. In this introduction I have not touched on confidentiality, respect for fundamental rights under the European Convention, protection of personal data under the GDPR and database rights, all of which have a bearing on AI and must be considered. But in this exciting world it is as well to ask ourselves: what is our objective? What are we trying to achieve? What are we trying to incentivise, and what is the appropriate term of protection? The law may be a little way behind the technology at this stage. But time and time again law makers have met challenges such as these. Now is the time to do so for AI. I am sure the discussions and debates over the next two days will be lively and enlightening, and I wish you all well.

⁴¹ *Feist Publications, Inc., v Rural Telephone Service Co.*, 499 U.S. 340 (1991).

⁴² *Naruto v Slater* (N.D. Cal., 2016).