Artificial intelligence call for views: patents

Response to Open Consultation: 7 September 2020

Goal: The government wants to make the UK a global centre for AI and data-driven innovation.

Jane Hill: Biography

Jane Hill is a barrister (registered as Carol Jane Hill). She has had considerable experience of the legal challenges posed by emerging technologies; she worked in the UK, EU and USA on legal issues relating to the Internet when it was a new phenomenon, particularly e-commerce, internet transactions generally, information security and standardisation.

She is working on a PhD, "AI as Inventor", at the University of York but currently on a leave of absence due to complications arising from the coronavirus pandemic. A large part of the research has concerned the relationship and interaction between human and AI as well as justifications of intellectual property law and moral (or other) justifications of property.

She has also recently incorporated Innovative Exploits Ltd., a consultancy company, with the aim of assisting innovators to take their ideas from conception to exploitation.

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1. What role can/does the patent system play in encouraging the development and use of AI technologies?

The role of a patent system has already been set out in the call for views paper.

The patent system is not simply patent legislation. It consists of legislation, the UKIPO and the courts. Each has a role to play and should work co-operatively to ensure the smooth functioning of the system as a whole.

I would stress the international element. IP should be a prominent issue in all international dealings and in bi-lateral trade talks in particular in working to ensure that UK patents will be enforceable in foreign courts.

In ensuring the patent system is fit for purpose, it may be necessary to use a "light touch" approach. The UK should lead the way in IP reform but not be the guinea pig. AI is still, in terms of its full potential, still in its infancy.

Heavy-handed alterations to inventorship and patent criteria (novelty and obviousness) could have unintended and unpredictable impact. Too much too soon could result in a loss of confidence in the system and result in prospective patent holders feeling inhibited about making applications.

Having a well-tuned but stable patent system is more likely to promote innovation in the UK.

I have also reviewed the Independent Hargreaves Report 2011. Many of the matters I would have raised are expressed in the final recommendations; they just need updating and reconsidering.

2. Can current AI systems devise inventions?
Particularly:
a) to what extent is AI a tool for human inventors to use?
b) could the AI developer, the user of the AI, or the person who constructs the datasets on which AI is trained, claim inventorship?

If users of computer systems cannot claim the output as their own then why would anyone use those systems? Why should this be different in respect of a system which uses processes known, in the vernacular, as AI? If a person can claim copyright to a photo where he merely has to press a button and the camera system does 99% of the work, why should a human inventor not be able to claim the output of a system that similarly does 99% of the hard work?

Artificial Intelligence (AI) is a popular epithet which has been applied to certain advances in computer processing systems. The epithet, itself has given rise in some literature to it being attributed whether explicitly or implicitly with an anthropomorphic character. The tenor of this debate, despite the fact that it specifically discounts explicit anthropomorphism is nonetheless in jeopardy of falling into that implicit category.[1] At the end of the day, AI is a combination of hardware components, training data, some highly evolved mathematics and an essential quantity of human know-how.

As a matter of principle, law should not endorse the concept that machines can act autonomously without human accountability or that machines are liable for their actions. A better approach (in this context) is to consider AI as assistive technology. Given that AI is likely to be as much a part of our day to day lives as electricity,[2] it is time to move away from the concept that (in IP terms) it as a stand-alone intelligence and begin to see it as "augmenting" human intelligence[3]. Also, despite the fact that the concept is now firmly established in legal vocabulary, it is time to start moving away from terms such as "computer- generated works" and see them as the product of a human with AI under its direction and command.

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[1] See for example Wilson TD, Lindsey S, Schooler TY (2000) A model of dual attitudes. Psychol Rev 107(1):101–126; Złotowski J., Sumioka H., Eyssel F., et al. (2018) *Model of Dual Anthropomorphism: The Relationship Between the Media Equation Effect and Implicit Anthropomorphism* International Journal of Social Robotics (2018) 10:701–714; Reeves and Nash (1996) *The Media Equation: How People Treat Computers, Television and New Media Like Real People and Places* Stanford CSLI Publications. https://doi.org/10.1007/s12369-018-0476-5

[2] Andrew Ng WIPO (2019) Technology Trends: AI https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf

[3] Artificial Intelligence: Potential Benefits and Ethical Considerations, Francesca Rossi EN Policy Department C: Citizens' Rights and Constitutional Affairs European Parliament PE 571.380 https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/571380/IPOL_BRI%282016%29571380_EN.pdf

Dr. Thaler and Prof Abbott do not suggest an anthropomorphic character to DABUS but that the machine acted autonomously[4]. In this case, DABUS appears to have been functioning in the capacity of an assistive technology, described as "augmented intelligence" in the EESC Opinion of 2017[5] and other literature. The fact that the invention was devised during a period when the machine was acting autonomously, should not put its user (Dr. Thaler) outside the definition of inventor in s. 7(2) Patents Act 1997. It was the combination of Dr. Thaler's direction and instructions to the machine together the AI processes that resulted in the devising of the inventions. By way of illustration, the following US guidance on the role of an inventor in devising an invention may be helpful:

"In arriving at … conception [the inventor] may consider and adopt ideas and materials derived from many sources … [such as] a suggestion from an employee, or hired consultant … so long as he maintains intellectual domination of the work of making the invention down to the successful testing, selecting or rejecting as he goes…even if such suggestion [or material] proves to be the key that unlocks his problem."[6]

There may be many contributors to the research and testing relating to an invention and fact that a machine or system has been designed and trained by others for that purpose does not, in itself, make them contributors to the invention.[7] On the other hand, someone who constructs a training dataset that it is to be used for the purpose of devising a patent claim may be construed as a joint inventor.

The fact that the second DABUS patent appeared to be random should be considered in the category of an unexpected research result but as it was based on the same input criteria as the first attributed to the AI user.

c) are there situations when a human inventor cannot be identified?

If AI systems are regarded as assistive technology to complement or augment the intelligence or capability of the human inventor, then this problem is minimised.

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[4] See also Abbott, R., *I Think, Therefore I Invent: Creative Computers and the Future of Patent Law*, 54 B. C. L. Rev. 1079-1126 (2016) and further information at https://artificialinventor.com/

[5] Opinion of the European Economic and Social Committee 2017 on 'Artificial intelligence — The consequences of artificial intelligence on the (digital) single market, production, consumption, employment and society' (own-initiative opinion), particularly paras 1.6, 3.25 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016IE5369&from=EN

[6] USPTO Guidance 2018 2137.01 Inventorship [R-07.2015] Manual of Patent Examining Procedure (MPEP), Ninth Edition, Revision 08.2017, Last Revised January 2018 https://www.uspto.gov/web/offices/pac/mpep/index.html
Morse v. Porter, 155 USPQ 280, 283 (Bd. Pat. Inter. 1965). See also *New England Braiding Co. v. A.W. Chesterton Co.,* 970 F.2d 878, 883, 23 USPQ2d 1622, 1626 (Fed. Cir. 1992) (Adoption of the ideas and materials from another can become a derivation.)

[7] UK Patent Act 1977: the inventor is "the actual deviser of the invention", this may include contributions made by others but the contribution must be relevant to a specific claim and in itself contribute to "inventiveness": not be general knowledge or covered by prior art etc. see Markem Corporation v Zipher Ltd [2005] EWCA (Civ) 267; [2005] R.P.C. 31. ; Henry Brothers (Magherafelt) Ltd v Ministry of Defence [1999] R.P.C. 442; Yeda Research and Development Co Ltd v Rhône-Poulenc Rorer International Holdings Inc (HL) [2007] UKHL 43; [2008] R.P.C. 1. (Terrell 18th Ed., 4-10)

3. Should patent law allow AI to be identified as the sole or joint inventor?

No, for the reasons identified herein, IP law, including patent law should start to move away from the idea of computer-generated or AI- generated works.

4. If AI cannot be credited as inventor, will this discourage future inventions being protected by patents? Would this impact on innovation developed using AI? Would there be an impact if inventions were kept confidential rather than made public through the patent system?

If the answer to any part of this is, yes then it because we are looking at the role of AI through the wrong lens, so to speak, and not only succumbing to anthropomorphic impulses but also descending into the realms of pathetic fallacy.

As I have already stated, IP systems need to support and protect innovation generated through the use of AI but not by attributing an invention or work to a machine. If a legal fiction needs to exist, it should be to attribute the person(s) most closely connected with the generation of work to be credited with inventorship authorship etc. and AI as assistive technology. To do otherwise risks destabilising the patent system and the distorting the economic considerations that support it.

It may be suggested that the way forward is to permit companies to be attributed with inventor status, i.e. without the need for identifying an individual person. That is a different debate entirely.

Again, each of the various forms of IP protection, including trade secrets lends itself to different types of IP. Where the invention has to be made public in order to exploit it, trade secret / confidentiality and licensing arrangements are unlikely to be effective in the long run. They are not a substitute for a patent.

5. Is there a moral case for recognising AI as an inventor in a patent?

There is not, in my view, a convincing argument to suggest that there is a moral (deontological) case to justify an AI system being entitled to claim property rights as an inventor, even if those rights are to be held by another legal person/patentee.

There are two recognised moral or deontological theories supporting property rights: Locke based on labour theory and Hegel and Kant based on personality theory.

The moral property theories all contain a theological element but, even if it is possible to secularise the argument, they are all concerned with the human condition. This is not capable of application to a non-human and to try to do so, of necessity, involves attributing to the system qualities that it does not possess and ends up as pathetic fallacy.

Lockean theory is generally taken to underpin US property law which puts the right to hold property beyond even the US Constitution. That is indeed the essence of Lockean theory, he is essentially concerned with the relationship between individuals and government and finds that the right to hold property derived independently from government authority is the affirmation of liberty and the guarantee against the exercise of absolute and arbitrary authority.

A moral entitlement to property rights is also associated with principles not just of liberty but self-realisation, the right to livelihood and the right to the fruits of one's labour leading to social benefit, efficiency and common good. The moral right to be mentioned as an inventor cannot then be relegated to the status of mere kudos despite the fact that as an employee, he has no beneficial rights in the patent as against the employer except as provided by statute.[8] Nonetheless, in law to date, the inventor has been the root of all property rights. Mention also carries with it professional reputation and credentials.

There is a moral philosophical argument for a human "inventor" to claim property rights over the output of an AI system even if the system is regarded as wholly autonomous through both labour (Locke)and personality theory (Hegel, Kant)[9]; this is unlikely to apply to other actors.

It may be highly controversial amongst academics but the primary justification for patent law, as expressed in practice, is utilitarian: that is to say, promoting social benefit and economic growth. As such, economic and Coasean theory may come into play and are equally relevant; a contention that is generally resisted by moral theorists. It has also been expressed in US law that moral property rights are not the determining factor in relation to intellectual property[10].

Looking at patent systems historically, the evidence seems to suggest that inventors were selected as first patent owners as the most convenient and effective way to incentivise technological advance. 500 years of experience also tends to suggest that that this is the correct approach.

6. <u>If AI was named as sole or joint inventor of a patented invention, who or what should be entitled to own the patent?</u>

It is my firm view that AI should not be named as an inventor.

It may be considered useful that information regarding whether specified AI processes have been used to devise an invention is gathered by the UKIPO but that, in itself, is problematic. What processes do we want to call intelligent? McCarthy may have coined the phrase for the now famous

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[8] S. 39(1) Patent Act 1977 (Terrell 18th Ed.:) "Ownership as between employer and employee is governed by the Act and not by contract."

[9] See e.g. Waldron J. (2013) *To Bestow Stability upon Possession, Hume's Alternative to Locke*, Philosophical Foundations of Property Law Ed. James Penner and Henry Smith**,** Oxford Scholarship Online: January 2014 DOI: 10.1093/acprof:oso/9780199673582.001.0001 R

[10] Thomas Jefferson, in his capacity as Secretary of State sat as one of the first patent examiners from 1790-3 and wrote, *"Inventions … cannot, in nature, be a subject of property. Society may give an exclusive right to the profits arising from them, as an encouragement to men to pursue ideas which may produce utility, but this may or may not be done, according to the will and convenience of the society, without claim or complaint from anybody."* Thos Jefferson letter 13th August, 1813 to McPherson, cited by Walterscheid E.C., (1995) Patents and the Jeffersonian Mythology, 29 J. Marshall L. Rev. 269; letter *available at:* *https://founders.archives.gov/?q=Volume%3AJefferson-03-06%20Recipient%3A%22McPherson%2C%20Isaac%22&s=1511311112&r=1*
This has been referred to in the US Supreme Court: noting that the Constitution protects the rights of authors and inventors, "the[ir] reward **...** is wholly secondary" to that of society. (U.S. v. Line Material Co., 333 U.S. 287, 316 (1948)); "[t]he sole interest of the United States **...** [is] the general benefits derived by the public from the labors of authors;" (*Sony Corp. of Am. v. Universal City Studios, 464 U.S. 417, 429 (1984));* "encouragement of individual effort by personal gain is the best way to advance public welfare **... (**Mazer v. Stein, 347 U.S. 201, 219 *(1954). Pearlman, R. (2018). Recognizing artificial intelligence (ai) as authors and investors under U.S. intellectual property law. Richmond Journal of Law & Technology,24(2), i-38.*

Dartford House Conference in 1955[11] but in 2007 he wrote, "we cannot yet characterize in general what kinds of computational procedures we want to call intelligent."[12] The same still could be true today; there is no precision as what amounts to an AI system.

Certainly, if this is made a requirement, it should be made clear that it is not a ground for refusing or invalidating a patent or, per se, for conducting further inquiry as to how the invention was devised.

7. Does current law or practice cause problems for the grant of patents for AI inventions in the UK?

In relation to the Thaler/ DABUS case. Dr. Thaler may, by now, have painted himself into a corner but, he could claim inventorship notwithstanding that the machine acted autonomously in generating the inventions. His claim, as I understand it, is that he was the designer, creator and "trainer" of DABUS but, most importantly, he was the person under whose "direction" the machine generated the inventions. By this analysis, there is a strong case that Dr. Thaler was the inventor under s. 7(2) Patent Act 1977. His case is further supported by a philosophical (moral) argument as outlined above and, I suggest, in the public interest as supporting the social and economic (utilitarian) objectives of patent systems.

8. Could there be patentability issues in the future as AI technology develops?
   - the scope of applicable prior art to "novelty",
   - the determination of "obviousness", "inventive step" and
   - the hypothetical person skilled in the art.

Extending scope could impact on the patent system as a whole.

See also my answer at Q. 14

9. How difficult is it to secure patent protection for AI inventions because of the list of excluded categories in UK law? Where should the line be drawn here to best stimulate AI innovation?

Almost inevitably, there will be challenges to be faced. I would agree and support the suggestion of a further review as suggested.

10. Do restrictions on the availability of patent rights cause problems for ethical oversight of AI inventions?

It is proper that, to the extent it can be effective, the patent system should play its part in the ethical

[11] McCarthy J (1955) *A Proposal for the Dartford Summer Research Project on Artificial Intelligence*
[12] McCarthy J. (2007) *What is Artificial Intelligence?* http://www-formal.stanford.edu/jmc/whatisai.pdf Last accessed 22 August 2019

oversight of AI inventions.

11. Does the requirement for a patent to provide enough detail to allow a skilled person to perform an invention pose problems for AI inventions?

This is a question which is complex and requires further investigation – please see my answer to Q1

12. In the future could there be reasons for the law to provide sufficient detail of an AI invention for societal reasons that go beyond the current purposes of patent law?

This seems to me to be outside the role of patent law but if relevant data can be collected with a minimum of inconvenience, then it seems logical to request it, I suspect there are good reasons that this should not be mandatory.

13. Does or will AI challenge the level of inventive step required to obtain a patent? If yes, can this challenge be accommodated by current patent law?

See Q14

14. Should we extend the concept of "the person skilled in the art" to "the machine trained in the art"?

In my view, no. The preferred way forward is to adjust the expectation of the skilled person together with what might reasonably be expected of the availability of AI as augmented intelligence or an assistive tool.

15. Who is liable when AI infringes a patent, particularly when this action could not have been predicted by a human?

A human (individual or legal person) is and should always be ultimately liable for the operation of an AI system notwithstanding that the system might "do" something unforeseen or "unpredicted."

Whilst "black box" AI processes may be unintelligible to humans, the output is measurable and meaningful. In reality, all machinery, including AI systems require inspection/auditing and maintenance/ updating. Part of "maintaining" an AI system is to minimise the chance of it doing something "unpredictable".

"Who" is actually liable will depend on the facts of each case although greater experience may show that certain actors are more likely to be liable than others.

The first question for the would-be complainant is identifying to whom the complaint or claim should be addressed. It could be that where an AI system is being used, the company or person using it, should provide contact details of a representative, nominated to accept complaints or service on behalf of all the actors involved in the AI. It might also be that details of other actors could

either be published or made available on request. At an early stage of the proceedings, consideration could be given as to who the defendants in the case should be. Judges could exercise discretion as to costs.

In other, more complex situations regarding AI, the idea of a legal entity designed specifically to deal with legal claims has attractions. It should be backed by adequate resources: capital, guarantee, bond or insurance and the various actors bound by contractual agreements. It might be different from the usual corporate structure in that there could be a requirement for oversight by trustees or auditors with a duty to ensure that the entity maintains adequate reserves and complies with regulatory constraints.

In the absence of any such published information, it could be a rebuttable presumption that the apparent user or operator is the person who accepts liability. Such a person could then seek to join another culpable party but still be liable for costs and possibly damages incurred as a result of any delay.

16. Could there be problems proving patent infringement by AI? If yes, can you estimate the size and the impacts of the problem?

The inevitable answer is that there could be problems proving patent infringement where AI systems are involved. There will inevitably be cases where the parties and the judge decide that infringement cannot be proved on "conventional" evidence alone and that evidence as to the operation of an AI system is relevant and crucial.

It is still pertinent to ask whether the orders sought would be granted if the processing had been done by "conventional" computing processes? If no, then what is the (material) difference caused by the fact that the processing is done by an AI system?

However, this question appears to go to the question of AI processes which are not yet capable of being made intelligible to humans, the "black box"; one can only respond that if it cannot be made intelligible then it can hardly be used as evidence. Of course, input data and outputs can be measured and interpreted; that may have value as evidence. Independent expert evidence would probably assist a judge in determining if and how that evidence might be relevant and how it could best be made available. Expert evidence might also be useful to assist a judge in understanding competing technical evidence between the parties on substantive issues.

As far as infringement occurring "in the cloud", this is an old *anxiety* which goes back to the earliest days of the Internet. (E.g. would internet service providers (ISPs) be liable for copyright royalties because of caching; would contracts be invalidated if they were concluded in cyberspace; would governments not be able to tax e-commerce (Internet shopping); could companies avoid taxation if they operated entirely in a "virtual" environment?) The key to addressing the problem is to look for anchor points that are concrete (*and human centric*): who is the patent holder, who is responsible for the infringement, where is the effect of the infringement manifested/ operative?

If the overall result is that the claimant cannot adduce even prima facie evidence of infringement and his application for a third party inspection of a competitor's systems fails to rise above the "fishing exercise" standard, then it may be an indication that the subject matter of the patent renders it unenforceable and may not suitable for patent protection.

I have not answered the trade secrets questions but, increasingly, it is apparent that in some cases, trade secret protection, is the only appropriate solution.

Addendum

In this addendum, I am adding to the question on novelty, obviousness and the skilled person.

In my response, I advocated that there should be a move away from the concept of AI as an inventor and the notion of computer-generated works generally. It is anthropomorphic and results in what one can only describe as "pathetic fallacy". It is not the best of ideas to vest (even notionally) rights or liabilities in a technology that is likely to develop and change rapidly together with the popular conception of it. Laws, even if they seek to regulate technology, operate effectively by regulating people.

In respect of patent law:

Patent law is an exception to the principles of competition law.

Its aim must be to produce robust patents capable of enforcement nationally and internationally which support the competitiveness of UK businesses.

However, a patent system must continue to support the principles of competition by ensuring fairness and transparency and using the tools available to them to try to prevent under or oversaturation of the patent landscape (cf. patent thickets). Contrary to popular view, the patent landscape is not unlimited (the “Lockean” ideal), with competitors very often targeting specific areas in order to compete in the marketplace.

Oversaturation or setting the bar too high to obtain a patent could well inhibit investment in those areas and deprive the market (society) of a valuable resource. A healthy patent system is one that maintains that balance.

I would also repeat that the UKIPO and the Courts, at all levels have an important role to play in ensuring the success of the patent system and their potential should not be underestimated. Cf. the US system in which, since 1793, the Supreme Court has been allocated a pivotal role in defining patent law.

The patent process:

The first step is to decide whether the proposed invention is patent eligible - to this end, it is important to define the boundaries separating and preserving what in US law have been called the "building blocks" of innovation[13]. It is not always a simple task to identify what they are and this should be the subject of continuous review - for the sake of transparency and legal certainty, this needs to be done so that the public are kept informed and involved.

At this stage, one also needs to be mindful that the patents applied for are sufficiently defined and the test /standard of the “skilled person” is relevant in this regard. Not all innovation is suitable for

[13] *Alice Corp. Pty. Ltd. v. CLS Bank Int'l,* 573 U.S. 208; Mayo v. Prometheus, 566 U.S. 66 (2012). For greater explanation see e.g. USPTO Manual of Examining Procedures (MPEP) 2106 Patent Subject Matter Eligibility [R-10.2019]

patent protection. If it is not capable of being sufficiently defined then the disclosure objective is not satisfied, the scope of the patent is difficult to describe and the patent may not be enforceable.

Utility and patent eligibility provide the base line for the patent examination.

Novelty and Obviousness are the "tools" by which the patent system can adjust the "balance" of saturation within the patent landscape. The standard is that of the "skilled person".

Novelty and obviousness work in different ways but to date have been working efficiently.[14] They can be applied by patent offices and in the courts without recourse to the legislature.

The key (in my view) to maintaining their on-going efficiency is to maintain the "skilled (human) person" standard - that does not exclude the use of AI systems. As I suggested in my response, the way forward is to continue to view creativity and inventorship as "human" even if the majority of the work is apparently done by machine, (computer or AI-assisted resulting in augmented (human) intelligence). In this way the standard of the "skilled person" can be adjusted, without recourse to legislation, by taking into account technological advances on the basis that the "skilled person" might reasonably be expected to take advantage of those advances in the inventive/ research process. It allows the UKIPO and the Courts to assess when and in what respect the scope of novelty needs to be adjusted or what, in fact, ought to have been obvious. For the sake of transparency, (if the UKIPO substantially changes or adjusts its method of assessing the “skilled person” standard then) public consultation should take place and changes should be *publicly* notified.

In terms of imposing ethical standards or gathering data for societal reasons, I can see no good reason that patent offices should not, in principle, be involved in this process. It must take into account that some data should be maintained as proprietary, particularly if to force disclosure would undermine a company's competitiveness or give unfair advantage to other competitors.

Jane Hill

[redacted]

[14] Note: I have not embarked in a discussion as to the ongoing debate about (non) obviousness but restricted my response to a pragmatic suggestion concerning the “skilled person” standard.