I have worked in patents on and off since 2013, and accumulated nearly five years's experience as a part-qualified patent attorney. I have worked for three private practice firms, as part of their electronics teams, and I have helped prosecute hundreds of patent applications, responding to office actions from patent offices of the following territories: UK, EPO, PCT, US, China and Taiwan. I have dealt with a wide range of subject matters including software, computed-implemented inventions, GUIs, data analytics, IOT, electronics, mobile networks, 3G, 4G and 5G communication standards, and quantum computing. I also have an undergraduate degree in Electrical and Electronic Engineering and a PhD in Materials Science (quantum chemistry).

I am submitting this view as a supporter of the World Ethical Data Foundation (WEDF), who are a new foundation that promotes the discussion of the ethical aspects of data and its related technologies. They have given me permission to use their name for this submission and we plan to publish this submission, and a related article, on their website, *worldethicaldata.org*.

I would like to thank John Marshall, WEDF founder and an old friend, for his cheerful support and encouragement, and Lauren Esquilant, researcher and junior editor at WEDF, for her help looking into a tricky legal point for me, and for her enthusiasm.

The views expressed here are my own, which I have formed as a result of personal research, careful thought, and my years working in the patent industry, and do not necessarily reflect the views of anyone else at WEDF.

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30th November 2020

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General Comments about AI and the Patent System

At some point in the future - we may already be here - an AI-inventor could allow an unskilled person to invent. It could also allow an unskilled person to invent very quickly and at low cost. The most immediate risk posed by AI-inventors would therefore be a sudden deluge in patent applications for AI-created inventions (henceforth referred to as ACIs), just like we have seen over the past two decades with computer-related and ICT inventions.

If what has happened in the computer and ICT fields is anything to go by, this sharp increase in ACIs will lead to an acceleration or even an evolutionary leap in the following problems already rife in the computer and ICT fields: backlogs at the patent office, patent thickets, many low quality patents being granted, many low quality patent applications still pending, and patent trolling. These ill effects may already outweigh the benefits of a patent system in the computer-related and ICT fields. There is a risk that ACIs may cause these ill effects to worsen and spread to other fields.

A longer term risk, which is a common result of new technology, is that of accelerated winner-take-all effects. Imagine how the first drug company to operate a super AI-inventor could get granted so many commercially useful patents at once that they are propelled into a position of sudden and overwhelming market dominance.

It is unlikely that these risks can be avoided or mitigated for long by simply not allowing the patenting of ACIs. As you will read below in my answer to question 3, it appears all too easy for AI owners to disguise ACIs as human inventions. Most patent attorneys would let their clients do this, if to say ‘no’ would risk losing them as a client. The more AI develops and becomes commonplace, the more it would become common practice for ACIs to be filed as human inventions, and the more pressure there would be for everyone else to follow suit, for fear of being left behind by their competitors.

Therefore it is probably wiser to allow the patenting of ACIs - at the very least this will encourage applicants to be honest and transparent about how they use AI.

However, it is important for the IPO and other patent offices to start thinking *now* about how to deal with the above-mentioned problems, before they get out of control. It is doubtful that simply improving efficiency at the patent offices or making small adjustments to fees will be enough. I believe more dramatic changes to the patent system should be considered, to discourage and reduce the negative behaviours that occur from certain businesses, that may accelerate dramatically once AI becomes prevalent.

A detailed discussion of these broader issues is outside the purview of this ‘call for views’, but for now I will highlight three areas where I believe some radical changes should be discussed and considered: inventive step (Section 3 of the Patent Act), transactions in patents (section 30 PA) and measures aimed at helping individuals and small companies.

<u>Answers to Questions 1, 2c), 3, 5, 6, and 11 to 15.</u>

Q1. What role can/does the patent system play in encouraging the development and use of AI technologies?
I believe the focus of the patent system should not be the positive aim of encouraging innovation, but rather on discouraging bad behaviours such as stealing and rent-seeking.
I believe this approach would actually produce a more positive outcome, and a development of more useful and innovative AI technologies, both inside and outside the patent system.

Q2. Can current AI systems devise inventions? Particularly:

c) are there situations when a human inventor cannot be identified?
Yes, probably. But even if the answer is 'no', it appears we are very close to it being 'yes' based on what we know already about the Dr. Thaler case.

Dr Thaler seems to believe that his AI DABUS invented the fractal beverage container without any human inventor. Yet it could still be argued that Dr. Thaler was the human inventor because he seemingly built DABUS by himself (or almost) over many years, applied it to a particular field, recognised the inventive output and filed for a patent application.

However, imagine if hundreds or even thousands of people had worked on the development and training of DABUS, and imagine more time had passed to allow the AI to become more self-sufficient and idiosyncratic before it came up with the fractal beverage can. In that case we would probably say there were no human inventors.

Q3. Should patent law allow AI to be identified as the sole or joint inventor?
Yes. The strongest reason to allow AI inventors to be identified, and hence allow ACIs, is that if you don't, many applicants will just omit to mention the AI inventor, or replace the AI inventor with a plausible human inventor, such as a researcher or a project leader. There would be a strong temptation to disguise an ACI as a human-created one when the invention is high-value, there is little chance of being found out, and there is no real punishment for being found out (the patent just becomes invalid).

Note that there have already been reported cases of such ACIs being filed and granted as patents e.g. the cases of Dr. Thaler and Siemens (see The Reasonable Robot by Ryan Abbott).

Hence as long we are to have a patent system, and as long as we do not require applicants to provide evidence upon filing as to *how* all the inventors contributed to the invention, then ACI patents will likely become a widespread reality in many fields, whether or not AI inventors are allowed.

We should therefore, at the very least, set up a process that encourages the honest disclosure of such AI involvement, so that credit for the invention is given as fairly as

possible, the derivation of ownership is clear and transparent, and we can more clearly see how prevalent and useful AI really is.

Hence, patent law should allow AI to be identified as 'inventor' or as a separate new category, 'AI Inventor'. Having a special category would be preferable as it would be more convenient for keeping track of the prevalence of AI inventors in different fields, and also may be psychologically more acceptable to inventors, applicants, and the wider public.

However, we should avoid a situation whereby transparency and accountability is diminished by allowing patent applications to be published without any human names attributed to the invention. Therefore, if an 'AI-inventor' is named, the AI user(s), whether or not they are themselves inventors - should have to be named, and have a right to be named, in a category separate to 'inventor'. There should be no default ownership attributed to being an 'AI user' like there is for being an 'inventor'.

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

Yes. There is a moral case that the applicant of an ACI is *obliged* to recognise AI as the inventor. This allows honesty and truth to prevail, which is a good thing in itself and also tends to lead to better outcomes for everyone involved with the ACI, and the wider world.

Recognising AI as an inventor would give arise to the following good outcomes:
i) encouraging the right people to be credited for contributing to an ACI, such as a person who wisely and carefully developed or trained the AI.
ii) preventing people from taking false credit for contributing to an invention, such as a mere owner of the AI.
iii) allowing others, including the wider public, to learn about the real prevalence of ACIs, and the people and companies involved.
iv) encouraging more honesty and cooperation amongst inventors, applicants and patent offices - there is no need to hide or obscure the inventive contribution made by AI.

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

A lot of uncertainty about ownership can be avoided by having clearly written agreements between inventors and AI owners, developers, trainers and users, and any relevant employers. Such agreements should be encouraged by the patent office. However, there will still be cases where this does not happen, and in such cases patent law and laws concerning ownership of AI need to be clear.

Until AI becomes conscious or capable of suffering, it should have no legal rights of its own and cannot reasonably be considered a legal person. Therefore the AI cannot and should not own a patent.

But someone has to own an ACI patent. That person should be the legal owner of the AI as no other person makes quite as much sense. Having the AI owner as automatic owner of the ACI patent would be consistent with employee-created inventions, where the employee's ownership automatically passes to their employer.

What about if there is no clear owner? If there is no owner of the AI - say it is open-source - then there can not be, nor should there be any owner of the AI contribution to the invention and the right to claim ownership should be effectively forfeited. Effectively in this case an open-source AI would be a means to promote open-source 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?
I don't know. But if an ACI is too complicated or too long to be useful to a skilled person, then is the public really getting a good enough deal in exchange for allowing a patent to be granted for it?

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?
Yes - see answer to question 5, points iii) and iv):

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?
Yes. This is the key area that can be used to rein in potential excesses and winner-take-all effects that might arise from ACIs.

The bar for inventive step should rise in accordance to what the skilled person knows about AI, and what AI tools they would be expected to have access to.

The patent office could do this by keeping track of the number and proportion of AI inventors in each field (this is where having a separate 'AI inventor' field could be useful), and following up with its own research, including interviewing inventors.

Another measure to consider is whether to alter Section 3 of the patent act so that the prior art considered in the assessment of inventive step includes 2(2) <u>and</u> 2(3) prior art (as they do in the US).

A further measure could be to allow Examiners to use 'reverse-2(3)' prior art (that is, any later filed patent applications that cite your patent application as 2(3) prior art) as an argument that a claim is not inventive.

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

Yes, in some fields at some point. If ACIs ever become so prevalent in a field, that human-only inventions become a tiny minority in the field, then "the person skilled in the art" should be changed to "the machine trained in the art" or "the person skilled and/or machine trained in the art", in that field.

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

The AI owner. If an AI owner is allowed to reap the benefits of an ACI patent, then it only seems fair that the AI owner should be liable for infringement by the same AI. As a default the AI owner should take reasonable actions to stop the AI infringing and pay any remedies due.

In the case of an AI creating and producing an infringing product - for example imagine the beverage container created by DABUS - it seems reasonable that the owner of the AI should be under the same obligations as an employer whose employees had created and produced the same product.

However, there may be situations in AI - especially for *methods* - where infringement is inevitable, and it is not reasonable to expect the infringer to be able to reliably stop the infringing action - these situations have to be decided upon on a case by case basis.

There may reach a point where many (or all) computer methods have to be excluded from patentability in fields where AI is prevalent, for reasons analogous to why methods of medical treatment and diagnosis are excluded from patentability - that is, we may not wish to restrict how an AI ‘chooses’ to solve problems in certain situations.