

Patent strategies for the 21st century: AI, blockchain and climate change

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Monsieur le Recteur,
Monsieur le Ministre d'État,
Monsieur le Doyen,
Mesdames et Messieurs en vos titres et qualités,

J'ai l'honneur de porter la toge académique aujourd'hui, habit porteur d'un beau symbole, celui de l'exposition, de la transmission et de la possible remise en question des connaissances. Soucieuse de vous offrir une exposition compréhensible et une transmission optimale de mes idées, j'aimerais – si vous me le permettez – poursuivre ma leçon en anglais.

A patent is a type of intellectual property right. It is a twenty-year monopoly, granted by the state, as a reward for a technical invention. Some form of patent protection was known as early as ancient Greece, and traces of it can be found in the Middle Ages in Europe. A more formalised system originated in 15th century Florence and Venice, and the system was further refined in the 18th century in the UK, France and the US, with the Industrial Revolution.

So our patent system is old! It's positively geriatric. Can it keep up with the challenges of our 21st century society? I will consider this question for three new disruptive technologies: blockchain, artificial intelligence and clean energy technologies to mitigate climate change. Can we make our old patent system work for them?

I will start with blockchain. What is blockchain technology? It is a distributed ledger of information, a tool to record information and store transactions, using cryptographic techniques. These are stored in a chain of data packages, a "block" of data, hence the name. The information and transactions are digitally recorded with a time-stamp. This all happens in a peer-to-peer system. The contents of the system are distributed and verified in a decentralized way, so there is no central controlling entity. It is also important to note that in theory, these data blocks are unchangeable.



Now, for the sake of clarity: blockchain is not the same as bitcoin. Bitcoin is a cryptocurrency, a new form of digital money. Blockchain is the technology behind bitcoin. Some doubters say that bitcoin is a bubble. That may very well be the case, but even if bitcoin should collapse, blockchain, as the underlying technological design, will survive.

That is a good thing. Because blockchain has many useful applications. First and foremost, the application for banking comes to mind, but also insurance, health care, smart contracts, public administration and record keeping, as well as – for example – monitoring your electricity use. Even specifically for intellectual property, blockchain technology can be useful to record the ownership or the acquisition of patents, and even prior user rights, in an unchangeable way.

What are the challenges that blockchain poses to our patent system? Well, blockchain is a software-based system. So, it can – under certain conditions – be patentable as a computer-implemented invention. In recent years, we have seen a proliferation of patent applications for blockchain-related inventions across the world, especially in the financial sector, with as the main players the Bank of America, Barclays and MasterCard. IBM has also been filing a lot of patents, as have – unfortunately – patent trolls. Patent trolls are companies that don't actually make anything or do anything; their entire business model is solely based on the ownership of patents.

All of this begs the question: will there be another patent war in blockchain technology, like we had in the telecommunications sector? That war is still ongoing today. And you will say: "I thought that originally, the underlying philosophy of blockchain is that it is based on an open source model. That would prevent a potential patent war." That is true, but we see in recent years that blockchain is rapidly moving away from an open-source model. For example: the open-source R3 consortium saw very large players like J.P. Morgan and Goldman Sachs drop out of the consortium in 2017. So we are unsure what will happen with blockchain, as we appear to be moving from the open-source model to more proprietary rights.

Secondly, I would like to address artificial intelligence. Professeur Cabay has already very eloquently spoken of the copyright issues surrounding artificial intelligence. I would like to turn to some patent issues in relation to this same technology.

Artificial intelligence was a term first coined in 1956 by John McCarthy. It involves machines that can perform tasks that are characteristic of human intelligence. Think of planning, understanding language, problem solving, recognizing objects and learning in general.

Artificial intelligence is not the same thing as machine learning. Machine learning is one way of achieving artificial intelligence. This term was also coined in the 1950's by Arthur Samuel, who defined it as the ability to learn, without



being explicitly programmed. So you could conceivably obtain or achieve artificial intelligence without using machine learning, if a human being simply builds millions of lines of code with complex rules and decision trees. But of course machine learning is a much more efficient way of achieving artificial intelligence: it's a way of training an algorithm so that it can learn how to perform a task independently. Of course, this requires feeding huge amounts of data to the algorithm to allow it to adjust itself and improve.

Why is artificial intelligence useful? Well, it has already today revolutionised many domains of science and technology. Just to give you a few examples: facial recognition, machine translation, self-driving cars, but also the modelling of chemical processes. In a report of this year by the consultancy BCG, it was estimated that artificial intelligence can reduce manufacturing costs by 20%. This is already happening in the automotive and semi-conductor industries, which have fully embraced artificial intelligence already. But in the next 3-5 years, the expectation is that artificial intelligence will also become more prominent in sectors like fast-moving consumer goods, process industries and engineering, and chemical research and new materials.

What are the challenges for the old patent system? We can already today program a machine to formulate inventive ideas. You can even program it to subsequently draft the patent application that goes along with it. But for an artificial intelligence invention, the question arises: who is the inventor?

In our current patent system, we need a human inventor. In fact, the earliest applicants in the late '90s and '00s who obtained patents for artificial intelligence inventions, concealed the fact that artificial intelligence was the inventor and designated a human being as the inventor instead. Even today we have no rules in our patent system that would allow the inventor to be a machine, rather than a human.

A second issue is: imagine that, in trying to find a patentable invention, the artificial intelligence inventor infringes someone else's patent. Who is liable? The developer? The end user? The artificial intelligence itself? Professeur Cabay already referred to a European Parliament Resolution of last year with recommendations to the Commission to create a civil law set of rules on robotics to deal with this and other legal issues surrounding AI. The European Commission is currently supported by a High-Level Expert Group on artificial intelligence, to define and implement an artificial intelligence strategy. This group is also working on draft AI guidelines. One of the guidelines concerns the legal personality of artificial intelligence. In fact, our very own Professeur Nicolas Petit is a member of this High-Level Expert Group.

In any event, it is clear that some changes will have to be made to our current patent system to deal with these very new issues.

A third issue surrounding AI in the patent context is the following: is it not an unfair battle between human and machine inventors to display inventive



step? Inventive step is a requirement for patent protection. You can only get a patent for something that is actually an invention. You cannot get a patent for something that is obvious to a person skilled in the art. Clearly, it is much easier for a machine to sift through tons of data and identify an invention on the basis of patterns, than it is for a human being to do the same thing on the basis of trial and error. For artificial intelligence, to some extent, everything is obvious. So, we will need new rules to deal with this in our ancient patent law system.

The third new technology I would like to briefly discuss is technology that tries to mitigate climate change. We are all familiar with the 2015 Paris Agreement that sets as the target for countries to keep global temperature increases to well below 2°C as compared to pre-industrial times. This would require a stop of fossil CO₂ emissions from all human activity by mid-century. We see that in fact very little has happened; even worse, the US announced in June of last year that it would withdraw from the Paris Agreement, which means that even less will happen.

So, what are the challenges for our old patent system? We can assume that climate change is going to be a major problem in the decades to come, so we will need technology to address it. And where will we need this technology the most? The effects of climate change will mostly be felt in developing countries. But paradoxically, they have less resources to finance these technologies that will mitigate climate change. So, while the developed countries will own the patents, how will the developing countries get access to these technologies?

The most extreme proposal that you see circulating, is to exclude climate change technologies from patent protection or even more far-reaching, to revoke existing patent rights on such technologies. This would – to some extent – be possible, under article 27.2 of the TRIPS Agreement which refers to ‘ordre public’ and morality, including the avoidance of serious prejudice to the environment. But of course it’s easy to see the danger in such an extreme solution. If you go too far, inventors will not invest in R&D efforts at all, or they will not apply for patent protection. They will simply keep their technological advances as trade secrets, thereby preventing all dissemination altogether.

A less extreme alternative is to reduce the patent term of such technologies. Yet this is also not ideal, because inventors of such expensive technologies would not be able to recoup their investments.

So I am in favour of a third, less extreme solution. We should allow patents for climate change technologies, but we should create a system of reasonable access through patent pools and licenses. The idea is that inventors will contribute their inventions into the pool and are rewarded accordingly, possibly also by pooled government subsidies. In fact, blockchain technology and artificial intelligence can come in very handy to set up such a system, because one of the goals would be to ensure the transparency of these efforts to avoid duplicated R&D efforts.



We are really going to need intra- and inter-technology competition to solve this global problem. Most importantly, we will need to ensure that all countries have access to this pooled technology, and at a reasonable price, possibly with exemptions for the poorest developing countries, for example in the form of royalty-free licences. And we have a blueprint for this kind of system. We currently have a FRAND system for telecommunications, where licences are given on a Fair, Reasonable And Non-Discriminatory basis. This could serve as an example for climate change technologies as well.

In conclusion, of the three technologies that I have discussed, climate change technologies will require the most attention from scientists and patent specialists alike. Ironically, blockchain technology and artificial intelligence can make climate change worse in the intermediate term, because they require so much computer power and therefore energy. So they actually exacerbate the problem in the first step. But at the same time, these technologies can help create a patent pool system that will help us address the climate change problem.

It's clear in any event that our current old patent system will not suffice in its current form to facilitate climate change technologies. But we can draw lessons from the FRAND system that was put in place over the last 15 years for telecommunications. And I am hopeful: if we can do it for our smartphones and our tablets, I am sure that we can do it to mitigate the effects of climate change.

Je vous remercie pour votre attention.

