Machine yearning: AI and patents

Patent Strategy surveys more than 60 senior in-house patent lawyers across different industries to find out what they think about artificial intelligence.
Artificial intelligence has taken the world by storm. Businesses are building and investing in AI to drive efficiencies within departments, build smarter and more lucrative products and even to trawl through data and generate new ideas. But the AI revolution presents new challenges to patent departments in how they protect and utilise these lucrative new innovations.

Patent Strategy has put together a survey to find out whether businesses are using the technology, what they feel are the key challenges to protecting AI-related inventions and how they would like to see patent offices and private practice firms react.

**Knowledge needed**

Patent Strategy’s *Machine Yearning: AI and patents* survey shows that most businesses have filed, or are planning to file, an artificial intelligence-related patent application but few are certain of how to, or whether they can, get patent protection for these products.

The data showed that just under half of in-house counsel (44%) had filed a patent application for an AI or AI-enabled product, and another quarter were planning on filing one within the next five years; only 11% said they would never file one.

But when asked what their biggest challenge to getting patent protection for an AI product was, 57% of respondents cited ‘excluded subject matter’ (31%) or a lack of internal or external counsel expertise in the field (26%).

Fewer in-house lawyers were as concerned with the more arduous challenges of finding prior art in non-traditional places (13%); wading through the vast number of AI filings to determine freedom to operate (8%); or having to wait during long grant processes (3%) – although counsel say these are still important issues.

Sources say that this data is reflective of the lack of knowledge between businesses, law firms and patent offices, when it comes to patent rules for technology, despite its growing prominence. They add that businesses – in particular traditionally non-tech firms – often do not have sufficient technical knowledge of the technology, and that patent offices have not sufficiently interpreted and clarified software patentability laws.

“There is a mutual lack of knowledge between patent offices and businesses,” says the head of IP strategy at a manufacturing company. “Patent offices are not sure where to draw the line on what is patentable and what is not and many businesses do not have the necessary technical knowledge of the technology.” He adds that his firm has had success in patenting AI products but only because it is lucky enough to employ a patent attorney who spent several years at a large software company that is a major AI patent filer.
much the application but when it comes to describing how a system works. That can be very difficult. "

AI is not easy to learn, depending on the type – not so lately, although that may change. The US Patent and Trademark Office just came out with due guidance I would probably be an engineer or external counsel. I am not an expert in the field and if I was understanding, and adds that excluded subject matter includes scientific theories and mathematical methods, aesthetic creations and programs for computers – which is a problem for AI patentability because the technology is seen by some as pure mathematical methods and nothing else.

Digital guidance

Survey respondents were clear about what they expected from patent offices to alleviate the uncertainty surrounding AI patenting. Almost two thirds of in-house lawyers (63%) said that the most important improvement these organisations could make to ease the patenting process was to issue guidance on AI patenting laws, making use of pointers and examples.

More than a quarter of respondents (27%), however, said the best improvement that patent offices could make to ease the AI patenting process was to work with them to better understand their filing challenges. Few respondents (5%) thought that patent offices expanding their AI-knowledge base was the way to go and no one suggested a different improvement to the three listed in the survey.

"In India objections are constantly raised under Section 3k of the Indian Patent Act, which means it is hard to file software patents as such. But if you draft the claims in a particular way or manner, you can file such a registration," says the IP strategy manager at an automotive company.

He adds that if the drafter is well aware of case studies of successful AI patent applications that include details on how and why it was granted, gaining patent protection should not be a problem. "Interpretation of the laws and the impact that they have on the way that attorneys draft patents is very important. If businesses knew how to draft claims that illustrate technical steps, by referring to detailed guidance, patenting software-related products would be easier."

Rosario at Peloton adds that the Section 101 debacle over patent exclusion for business methods, such as stock-predicting algorithms, has been driving patent practitioners and examiners crazy for four years, and the situation would benefit from good guidance containing relevant examples and pointers.

"It would be very helpful to know what is patentable, and what is not, when it comes to AI," he adds.

The sporting goods senior patent lawyer says patent offices have started to engage with the topic of AI but many are reluctant to publish guidance because little case law has been generated on the matter compared with other areas, and few want to risk publishing inaccurate pointers or tips.

The desire to see patent offices issue AI guidance is likely to be why 71% of survey respondents said that the European Patent Office (EPO) offered the best service for patenting an AI or AI-enabled product, out of the big five patent offices, based on factors such as examiner leniency in practice, application ease and guidance.

The office published guidance that came into force in November 2018, where it outlined that an inventor must show the claimed subject matter has a technical character (although it may contain non-technical features) and that all features contributing to the technical character are taken into account for assessment of the inventive step.

The results may have been influenced by the fact that most respondents to this survey were based in Europe. But it is worth noting that around half of North American respondents cited the EPO for best service when it came to patenting AI, while approximately 15% of Europeans said the same for the USPTO.

"The fact that so many businesses want to see guidance from patent offices is not surprising and it is why the EPO has done so well in this question," says...
“There is a mutual lack of knowledge between patent offices and businesses. Patent offices are not sure where to draw the line on what is patentable and what is not”

the head of IP at an energy company. “The EPO has a consistency of applying the rules to a problem that is better than the other offices.”

A US patent attorney at a global pharmaceutical manufacturer adds that the EPO has taken the lead among patent offices in making the AI examination landscape more inviting.

“It is the political issue of AI being the hot area of computer science right now and making the patent landscape around it friendlier to spur economic growth. The Europeans recognised that before the US and the PTO is now trying to catch up.” He adds that he attended a public policy meeting in Washington DC recently where there was a recognition that improvements were needed to ease the technology’s patenting process.

The head of IP strategy at a manufacturing company agrees that the EPO has the best potential for making AI patenting easier. He adds that the USPTO has a strong history for patenting digital innovations, which is likely why 24% of respondents said it offered the best service. The PTO’s traditional status in the digital world, he says, is why the EPO has tried to make themselves more attractive to businesses looking to commercialise AI.

It is worth noting that the Japanese Patent Office (JPO) has issued similar guidance to that published by the EPO, but was not cited by a single in-house lawyer for the best service. This result may have occurred because no respondents were based in Japan, and consequently votes that would have gone to the JPO for its efforts were snatched up by the EPO.

Law firm reliance

Considering the lingering uncertainty in the AI patenting space, businesses may choose to rely more heavily on their external counsel for advice – particularly the quarter of our survey respondents who will file for an AI patent in the next five years.

An IP attorney at a global automotive company, which is a key autonomous vehicle filer, points out that while businesses will seek to have the necessary skillsets in house, patent departments have limited resources and will likely choose to outsource a lot of work on technologies that they’re less knowledgeable about.

“We use external counsel for quite a few of these AI and tech-related matters to help move them along,” he says.

With that in mind, law firms should have an understanding of what clients and potential clients want to see from external lawyers when it comes to patenting AI-related products.

When given the opportunity to say what external counsel could do regarding patenting an AI, or product making use of AI, 37% of respondents chose to write down their thoughts; most had the same sort of comments.

Most in-house counsel said they wanted private practice firms to improve their technical knowledge of the subject to draft claims better and advise businesses on whether an application for a particular AI product would pass examiner scrutiny.

“External attorneys are more familiar with the legal framework, but less familiar when it comes to products to be covered by the claims,” wrote the patent counsel at an automotive firm. “They should inform themselves about the market and the industry in general.”

The head of IP at a European university also wrote: “[Law firms] should advise on when patent protection is appropriate or when it is, in fact, more of a ‘software only’ or know-how invention. In other words, they should know when to not file a patent.”

Responding to these comments, the pharmaceutical firm’s US patent attorneys adds that it is important for external counsel to act as the bridge between what the normal in-house attorney thinks is patentable and the realities of the machine learning space.

“Outside counsel can, or should be able to, speak the language of data scientists more readily than us. They should be there to help us recognise and assess the invention.”

Patent Strategy’s landmark survey shows that despite the growing prominence of artificial intelligence across different industries, most businesses have yet to attain real legal certainty when it comes to protecting their lucrative inventions. Patent offices are making impressive strides in the area – particularly the EPO – but clearly more needs to be done.

Law firms can help in this process but need to make sure they’re properly advising their clients – particularly on whether or not patent protection is even worth pursuing on a particular AI product.
Artificial intelligence will be used for invention discovery across multiple industry sectors, according to Patent Strategy’s Machine Learning: AI and patents survey.

Of the respondents, two thirds said that AI was either already being used for invention discovery in their industries or that it would be used in that function within the next five years. Only 5% of respondents said the technology would never be used as an invention-discovery tool in their industries.

Those who suggested that AI was already being used to help create products worked in the life sciences sectors, including pharmaceutical, medical device, biotech and agriculture. Two respondents worked in the confectionery and automotive industries.

Counsel who said the technology would be used for invention discovery within the next one to 10 years worked in various sectors, including software, finance, energy, nutrition, telecoms, chemistry and manufacturing. Respondents who said AI would ‘never’ be used to discover inventions represented automotive, technology and tool manufacturer companies.

Sources say that AI and machine learning have huge potential to help them create products and processes. They add, however, that the technology is currently not good enough for effective invention discovery in most sectors – and where it is being used for invention discovery, it is not sophisticated enough to generate ideas by itself.

‘AI is certainly now being used in drug development and discovery,’ says a patent attorney at a global pharmaceutical company. ‘Companies may not go as far as to make a product out of the discovered drug at this point, but everyone is using AI in some aspect of drug discovery.’

The patent attorney adds that weak AI (or narrow AI) has been used for that function in areas such as genomics for at least 20 years, and that what the industry is seeing now and will see in the near future is largely a progression of that use.

The head of IP strategy at a metals manufacturer says that AI is a fascinating topic but the technology is not quite good enough for invention discovery now.

‘Even keeping the legal requirement for human inventors in mind, AI will take huge steps towards innovative inventive ideas,’ he says.

He adds that the technology can already optimise designs, and that it has significant potential in enhancing the structural strength of machines or other objects.

Charles Clark, director of IP at multinational energy company Centrica, adds that AI invention discovery is a non-issue for now. ‘I do not think AI is capable of
inventing anything by itself yet,” he says. “Ultimately, the technology may be used for that purpose in the future but who knows whether it will in the end or not.”

He points out that there are services available that use algorithms to pull ideas from multiple industries and determine if there is a solution in one field that could be applied to a problem in another, seemingly unrelated, field. But even there, significant human intervention is needed to make the process work.

Vivek Doulatani, IP strategy manager at Indian automotive start-up Ather Energy, adds that while AI invention discovery is probably about 10 years away in his sector, it is coming.

“If you look at pharmaceuticals, AI can generate drugs by arranging and rearranging molecules and hence multiple inventions,” he says. “But that process does not work as well in automotive because you’re not sure what the design should be.”

He adds that AI is a long way from developing technical or operational specifications.

Inhuman hurdles

Considering AI’s current shortfalls in invention discovery, it is not surprising that few businesses have filed a patent application for a machine-invented product or process. When asked whether the role of AI was disclosed in a patent application for an invention discovered by a machine, most respondents (78%) said that the question was not applicable to their business.

Just over a fifth of in-house counsel (22%), however, indicated that they had filed for such a patent; and of those people, more than three quarters (77%) said that they had either not disclosed the role of the machine or did not know whether the contribution had been stated or not.

If you have applied to patent an invention discovered by AI, did you disclose the role of the AI in the specification?

IP offices do not require applicants to make such an admission. If machine learning begins to play a bigger part in identifying solutions and inventions, however, laws surrounding AI-invention disclosure might change. Patenting AI-discovered inventions might then become more difficult as issues of inventorship, obviousness and plausibility arise.

Data from Patent Strategy’s 2019 AI and patents survey suggested that most in-house counsel were aware of these potential patenting barriers – although consensus on the key challenge was split between ‘the bar for obviousness being raised’ and a ‘lack of human inventor’.

All jurisdictions require a human inventor to be registered in a patent application, and that condition could lead to arguments over who actually found the invention in an AI-aided discovery. Furthermore, patent offices may choose to raise the bar for inventive step for machine-invented products and processes, or may find it difficult to understand how a machine came up with a particular idea.

Clare at Centrica says that using algorithms to put drugs together in the pharmaceutical industry could be construed as number crunching more than invention discovery. “How would the patent office know it was ‘invented’ by a computer and not me?” he asks. “I put the data into the computer and wrote the code, so the discovery belongs to me. That is where we are at the moment.”

The head of IP at a European pharmaceutical firm points out that a person who identifies a problem but does not contribute to the solution is not an inventor, and adds that the same logic may be applied to machine-aided discoveries.

“Just as if I were to ask a PhD student to solve a problem and she goes away and comes up with the solution, she would be the inventor and not me”

Within the next year 10% Within the next five years 17% Within the next 10 years 5%

Don’t know 27%

Never 5%

It is being used for that now 25%
“AI can generate drugs by arranging and rearranging molecules and hence multiple inventions. But that process does not work as well in automotive because you’re not sure what the design should be.”

“We as humans do not know what the technical reasons are behind an AI’s designs for machines of other objects,” he says. “How can patent examiners tell if the invention is patentable if we cannot explain how it works, despite the fact that we can all see that it does work?”

These barriers might also have a severe impact on how companies protect their inventions. Gareth Jones, vice president of IP at drug discovery firm Benevolent AI, says that most people have considered the barrier of non-human inventors, but few have thought about the economic and societal impact that that situation could bring, and what patent-focused businesses should be doing to handle that.

He adds that, as an example, if the pharmaceutical industry used AI to take over the generation of new medicines and the patent system became flooded by machine-generated applications, it might be deemed that patents are no longer suitable for that type of invention – if it even qualified as an invention. That distinction could lead to changes in patent law that require a machine’s input into the invention process to be disclosed.

“That would fundamentally change the pharmaceutical industry and make other forms of protection, such as market and data exclusivity, much more important,” he says. He adds that this hypothetical impact would of course vary between different industries, depending on AI’s capacity to generate ideas in their field and their reliability on the patent system.

AI is perhaps a long way from becoming a vital part of the invention discovery process in most industries. But most patent counsel agree that it is coming. Depending on what a business does and how heavily it relies on the patent system, in-house and external counsel may want to start thinking about how that will affect patent strategies now.
Patent Strategy’s survey shows that more than half of businesses are using, or will use, artificial intelligence to make their patenting functions more cost-efficient.

The data showed that most in-house counsel (53%) had either started to use an AI tool for patenting or planned to use one for that purpose within the next five years; only 10% said they would never use one.

“Making patent attorneys’ lives easier is where the excitement of using AI lies,” says Charles Clark, director of IP at UK-based energy company Centrica. He adds that the traditional process of an inventor coming to a patent attorney with an invention, who then conducts an iterative process and files an application three months later, is too time-consuming.

“I know of a start-up that is working to reduce this iterative process into a three-hour slot of an inventor sat at a terminal and inputting the information. If all goes well, a description is pinged out by the computer and it is left to the attorney to top and tail it – to write the claims and do the value-added work,” he says.

In terms of what businesses believe is or will be the best use for AI in the patenting process, prior art search was the most popular choice, claiming 44% of the vote.

Carlos Rosario, IP attorney at California-based truck tech company Peloton Technology, says he agrees with this finding. He explains that one of the hardest tasks for his company is conducting prior art searches when industry terminology differs between different companies and regions.

“We refer to ‘platooning’ trucks when we talk about trucks that follow one another. But another company may use the term ‘convoy’ for the same thing. Is a patent attorney, examiner or litigator necessarily going to look for the other term?”

He adds that platooning trucks is a fairly simple example of differing terminologies, and there are technologies out there that use many different terms. An AI solution could make it much easier to search for all the necessary terms.

Clark at Centrica adds that AI could also make prior art searches easier for traditionally non-tech companies that are developing technology-enabled products and finding that their competitor landscapes have expanded.

Toni Santamaria, European head of IP at pharmaceutical firm Accord Healthcare, agrees that AI will be a useful tool in this area, and points out that it could be used by companies such as his to better plan litigation strategies. “If we can conduct more efficient searches that better produce prior art, we can better plan to challenge patents.”
When will your business use an AI solution for its patenting function?

- Don’t know 37%
- It already has 15%
- Within the next two years 10%
- Within the next five years 17%
- Within the next ten years 5%
- Within the next fifteen years 10%
- Never 10%

Which patent process could be most improved by AI?

- Prior art searches 44%
- Prosecution (drafting specification and/or reply to office action) 3%
- Infringement detection 9%
- Portfolio analysis 19%
- Document translation 15%
- Other 10%

What is the most important benefit IP departments can reap by using AI in their patenting functions?

- Speed 34%
- Cost savings 31%
- Patent quality 9%
- Insight into competitor patenting 15%
- Other 12%

Would you welcome the introduction of an AI solution into various patent offices?

- Yes 48%
- No 17%
- Don’t know 35%

Results shown as percentages

**Missing out?**

Some sources say that they are discouraged by the number of businesses surveyed that either do not know if they will ever use an AI solution for their patenting function or never will (48%).

Aaradhana Sadasivam, senior IP manager at Singapore-based life sciences lab Temasek, says that businesses that don’t end up using a machine to make patenting more cost-efficient are missing out. “How do people otherwise expect to effectively sift through the mountains of data without spending too much money and time?” she asks.

Clark at Centrica agrees, adding that those companies are undoubtedly missing a trick. “We are using some AI software for patent searching. In many regards it is tremendous – it goes off and ticks away for a few hours and brings back a whole load of stuff that would not have been pulled out by a more classic approach.”

He adds that the quality of such solutions can only get better, and he can see a point where the technology can pull out 80% of the relevant prior art within 10 minutes coming soon.

The reason some in-house lawyers may be hesitant to adopt AI tools is because the technology is often seen as too expensive and not very good. The senior patent counsel at a German sportswear company says he found this to be the case when looking at such software products. “The technology is very costly and I am not sure that it performs well enough yet,” he says.

The head of IP strategy at a California-based media firm says that some companies might be reluctant to adopt new technological solutions because they cannot yet see the benefit of them – or perhaps because they are a little stuck in the mud. “If great products come out that are going to help you streamline your internal operations, obviously you will use them. But until you can see what they will do for you, it is hard to say what you’re going to do.”

And you have the green eye-shade patent attorneys in the corner who will never adopt a solution because they have never done it and do not think that should be how it is done. That is the older generation, however, and the newer generation will use the right products when they come out.

**Better, faster and stronger**

An AI solution’s immediate value, of course, lies in its ability to automate or augment processes and allow businesses to shed costs. It is thus not surprising that just under two thirds of respondents (65%) said that cost-savings or speed were the most important benefits that IP departments could reap by using an AI tool in their patenting functions.

Sources point out that getting through mundane tasks faster allows patent attorneys to spend more time on more important processes. The head of IP at a medical device and biotech company explains that it is important for patent attorneys to spend more time on more value-adding tasks, such as portfolio and competitor analysis, so that can help the business gain competitive advantage.

The sportswear senior patent counsel adds: ”If you use AI tools wisely, you can save time and use that to increase the quality of your work in drafting applications or office actions. Consequently, you contribute more to the company.”

In this way, AI solutions also help save money. The technology enables patent managers to reduce overheads in the form of internal and external resources and, if they choose, reinvest that capital in more valuable ventures. If a business uses a law firm to conduct its prior art searches, for example, it could use an AI solution to bring that task in-house and reinvest the saved costs in strategic advice.

“We are not looking to get rid of external counsel because we need someone to prepare cases and develop strategies,” says Santamaria at Accord. “But perhaps we could avoid using external searches from outsourced providers.”

Counsel may also have selected cost-savings and speed in this question because those options represent immediate and demonstrable return on investment. Rosario at Peloton says: “Patent quality is the thing that attorneys ultimately hope they bring to the field. But speed and cost reductions are immediate gains, and creating better patents is more medium or long term.”

The media company associate general counsel adds that patent departments, like every other department, are accountable to the business and need to be able to show demonstrable and quantifiable ROI.

But patent departments do not only rely on their own people to help complete their work; they rely on...
external attorneys and examiners too. And it seems that while they want to reduce costs and buttress efficiency with AI solutions in their own businesses, they want law firms and patent offices to do the same.

Most businesses (63%) want to see IP offices and private practice firms using AI solutions to streamline their processes. Sources agree, however, that patent offices could benefit more from the use of automated solutions than law firms.

Santamaria at Accord says that patent offices could use automation tools to drive faster and more accurate prior art searches that would lead to faster grant times and more valuable registrations. Law firms, on the other hand, could automate more mundane tasks but could not do the same for their strategic advice.

Sadasivam at Temasek adds that having AI solutions in businesses, law firms and patent offices will likely put everyone on the same page when it comes to infringement and litigation because they will have access to the same databases and be able to pull and analyse information from those as easily as each other.

Few businesses have brought on machines to drive cost efficiencies in their patenting function – but that will change soon. Search and analysis solutions are getting better all the time, and as firms start to see their worth to patent attorneys and their bottom lines, they will probably start to invest in them. Those companies that are stuck in the mud are safe for now, but may soon face the risk of being overtaken by more tech-zealous competitors.

“Making patent attorneys’ lives easier is where the excitement of using AI lies”