

WIPO Conversation
IP and Frontier
Technologies

AI Inventions



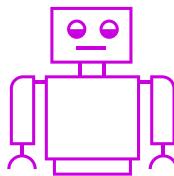
AI Inventions

Patent applications in the artificial intelligence (AI) field increased by 718 % between 2016 and 2022, and the AI market is expected to grow to USD 191 billion by 2024.

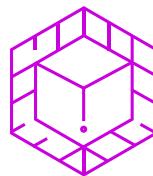
Advances in computing power, algorithmic capabilities and the growing availability of data have brought AI innovations into many areas of our lives. AI is also a key component of emerging technologies such as the Internet of Things (IoT), robotics and the metaverse. AI innovations present significant opportunities for economic growth.



Internet of Things (IoT)



Robotics



Metaverse

 **AI is a fast-moving area for policymakers to watch closely**

Current state of play

AI is a remarkable tool, with the potential to accelerate innovation and development. AI systems have become very efficient in audio, text and image recognition. They gain insights by processing vast amounts of data.

However, many scientists consider current AI systems to be unintelligent. AI is not adaptable, and it lacks a real understanding of the world. It needs to be designed to solve specific, pre-set tasks. Its predictions are influenced by the quality of the model and data. Incorrect assumptions can lead to biases and skewed outcomes. This is sometimes referred to as “garbage in, garbage out.”

Key IP considerations

Intellectual property (IP) is a key driver of innovation. The current IP system was designed to foster human innovation and creation. However as AI develops, it is changing the human element of innovation.



Policymakers will need to consider

- how AI innovation fits into the current IP system;
- how to balance the value of human and AI innovation as AI develops rapidly to become more autonomous; and
- how to ensure that the IP system continues to foster innovation in this economically significant area.

Definitions of AI inventions

It is important to define what is meant by an AI invention as each type will raise distinct questions relating to IP.

AI models or algorithms

	Definition Inventions on core AI technology itself.
	Example New or improved AI techniques, models or algorithms.
	Illustrative IP questions Can an AI model be patented, or is it simply mathematical method? Does copyright provide enough protection for AI models and algorithms? Are AI models the same as computer-implemented inventions? What level of technical effect is required for patentability?

AI-assisted inventions

	Definition Inventions made using AI as a tool in the inventive process.
	Example The use of AI in drug discovery to select drug candidates.
	Illustrative IP questions Who is the inventor: the data provider, the AI model developer or the owner of the AI? How does the definition of a person skilled in the art changed due to AI tools becoming more widely used? Will the use of AI as a tool raise the bar for inventive step?

AI-based inventions



Definition	Inventions in which AI is part of the inventive concept.
Example	A translation device incorporating AI deep learning.
Illustrative IP questions	What are the enabling disclosure requirements for the AI model and training data? Would the person skilled in the art be able to replicate the invention?

AI-generated inventions



Definition	Inventions made autonomously by AI, without human input.
Example	The DABUS applications, in which an AI system was claimed to have generated new inventive concepts.
Illustrative IP questions	Should AI-generated inventions benefit from patent protection? Does patent law require the naming of a human inventor or can an AI system be named? What are the arguments for recognizing AI inventors and human inventors? What alternative IP policy solutions could be envisaged?

Can AI invent autonomously?

DABUS is an AI system that was reported to have conceived of two inventions. DABUS patent applications have been filed around the world, claiming that the inventions were made by DABUS without human input.

Many computer scientists believe that AI is not yet able to invent autonomously. However, the DABUS patent applications highlight difficult IP policy questions surrounding AI. As AI technology quickly evolves, there is a need to consider the options should AI reach the stage of inventing autonomously.



Many countries have rejected the DABUS applications, as the relevant patent laws require the naming of a human inventor. From a policy perspective, it is worth asking whether IP law should continue to require that a human be named as the inventor, whether it should allow an AI inventor to be named or whether there are alternative solutions.

AI-generated inventions: Implications for IP policy

Each of the possible approaches to AI inventorship has potential implications across the complex IP legal framework. Options will need to be considered in the context of local innovation ecosystems.



Policymakers will need to keep a close eye on who the inventor is under patent law and the technical capability of AI technology to assess when these scenarios may become relevant.

Illustrative examples:

No changes to the current IP laws – human inventors only

- Will the lack of patent protection for AI-generated inventions lead to an increased reliance on trade secrets protection, feeding the black box problem of AI?
- Will investment in AI be disincentivized?
- Would it be a ground for patent revocation if a human were wrongly named as an inventor of an AI-generated invention?

Allowing AI models to be named as inventors

- Do AI systems need IP incentives at all?
- Who should own an AI-generated invention?
- Is joint inventorship between an AI inventor and a human inventor the answer?
- Would this disincentivize human invention and make human inventions obvious?
- Who is the inventor under patent law, and what technical capability would AI need to qualify as an inventor?

Alternative solutions to AI inventorship

- Would AI innovation best be incentivized with a new *sui generis* IP right?

Alternative solutions to solely human inventorship or allowing AI inventorship might be a compromise. Such alternative solutions include completely removing the requirement to name an inventor at all, naming the person with the closest connection to the AI as the inventor, naming a human inventor but requiring a note to be added explaining the involvement of AI, or a *sui generis* right for AI inventions.

The role of the patent system



Policymakers may want to go back to basics, bearing in mind economic analyses of IP inventorship and the social purpose of the patent system when considering the available options.

The patent system forms a bargain between the inventor and the public. In return for disclosure of the invention, the inventor has limited-time exclusive rights to exploit it, after which the invention passes into the public domain. From a social purpose perspective, allowing AI to be an inventor might detract from the patent bargain. From an economic point of view, the patent system is viewed as a policy tool to incentivize investment. While AI itself cannot be incentivized by IP, IP protection could incentivize inventors to develop AI invention machines.

Trade secrets as an alternative to patents

Inventors of AI innovations (including AI models and algorithms) are faced with the dilemma of trying to patent their inventions or turning to trade secrets. While patents provide an easier means of enforcement, the patentability of AI innovations can be uncertain, making trade secrets a cheaper option. The table below shows the advantages and disadvantages of using trade secrets to protect IP.



Advantages of trade secrets

No disclosure is required, so the invention never enters the public domain

Unlimited duration

No registration fees

Avoids uncertainty in the patentability of AI inventions

Disadvantages of trade secrets

Open to reverse engineering

Difficult to detect infringement

Difficult to enforce, with limited remedies

More difficult to transfer, license and sell

Reduced disclosure and transparency for the public

AI technology is advancing rapidly, and innovators need support now with IP questions around AI models, AI-assisted inventions and AI-based inventions.

Case studies

Real-life stories from innovators in the AI space show that the IP questions they face focus on AI models, AI-assisted inventions and AI-based inventions. Significant human input is still an important part of the inventive process and AI innovations.

The table below shows the role IP has played in real-life cases.



Invention	AI-assisted invention producing personalized bone replacement tailored using CT scans and 3D printing.
Role of IP	IP allows the technology to be commercialized and protected, but also ensures that the invention does not infringe existing IP.





Invention AI predictive model enhancing tractor utilization, using satellite imagery and machine learning techniques.

Role of IP IP gives the company the freedom to promote and share knowledge.

Invention AI-based invention of a diabetic retinopathy screening system, which detects early signs of specific diabetes-induced eyesight deterioration.

Role of IP IP is key to getting traction in the business world.

Support for innovators

As AI becomes a strategic capability with significant economic impact, many WIPO member states and IP offices are seeking ways to foster innovation in the AI field, close the technology gap and encourage economic growth.

Some examples include



Specific examples can be found in the [WIPO AI and IP Clearing House](#), which gathers together the main government instruments and policy updates relevant to AI and IP.



Further reading

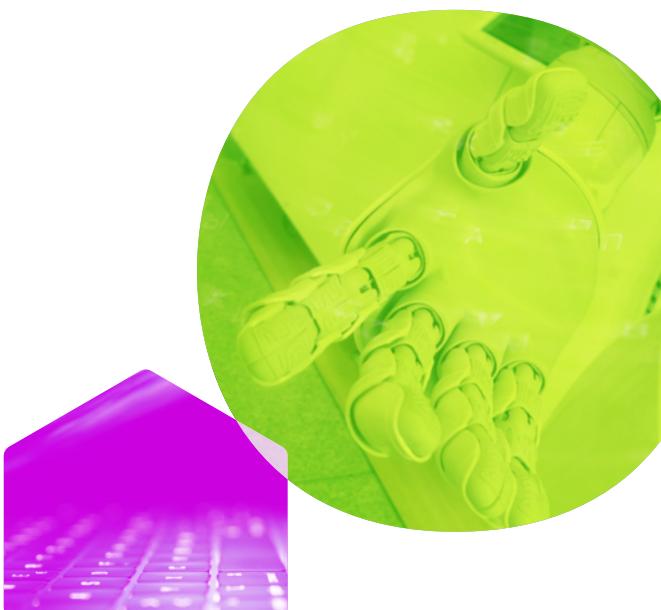
The WIPO Conversation on IP and Frontier Technologies is a leading global forum to facilitate discussion and share knowledge among all stakeholders on the impact of frontier technologies, including AI, on IP.

The discussion in the sixth session of the WIPO Conversation focused on the full range of AI inventions to help policymakers understand potential policy choices. More information about the [sixth session of the WIPO Conversation](#), including the program, presentations, summary and webcast, can be found on the meeting page.

More information about IP and frontier technologies is available on the WIPO website: www.wipo.int/ai

Next steps

To keep informed about the next session of the WIPO Conversation, sign up for the IP and Frontier Technologies Division's newsletter by sending an email to frontier.tech@wipo.int.





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