

## **Summary Report**

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### **2020 – Study Question – Patents**

#### **Inventorship of inventions made using Artificial Intelligence**

##### **Introduction**

This Study Question examines the question of inventorship of inventions made using Artificial Intelligence (“AI”). In particular, this Study Question considers the various roles humans play in the creation, training and use of AI systems and examines how the standards of inventorship should apply when considering an invention made using such a system.

This Study Question also addresses the issue of whether an AI system ultimately could itself – as an “artificial person” – be considered an inventor or co-inventor.

In most jurisdictions, an “inventor” is defined as an individual, a human or a natural person. As of today, in a typical AI application, humans may be involved at various stages including creation of an AI algorithm, designing an AI system to suit a particular purpose, curating data and training the system with that data, and applying the trained system to a particular task. Already, given the ability of AI systems to “learn”, traditional notions of inventorship may be challenged. In the future, human involvement may be minimized or disappear altogether. Whether the current law of inventorship is adequate to address these scenarios, or whether something new or different is needed, is the focus of this Study.

The Reporter General has received Reports from the following Groups and Independent Members in alphabetical order: Australia, Austria, Azerbaijan, Belgium, Brazil, Bulgaria, China, Denmark, Ecuador, Estonia, Finland, France, Germany, Hungary, India, Indonesia, Israel, Italy, Japan, Malaysia, Mexico, the Netherlands, Norway, the Philippines, Poland, Republic of Korea, Russian Federation, Singapore, Spain, Switzerland, Chinese Taipei (Independent Members), Turkey, United Arab Emirates (UAE), United Kingdom (UK), United States of America (U.S.), and Vietnam.

36 reports were received in total. The Reporter General thanks the Groups and Independent Members for their helpful and informative reports. All reports may be accessed [here](#).

The Reports provide a comprehensive overview of national and regional laws and policies relating to inventorship of inventions made using AI set out in three parts:

- Part I – Current law and practice
- Part II – Policy considerations and proposals for improvements of the current state of the law
- Part III – Proposals for harmonisation.

This Summary Report does not summarise Part I of the Reports received. Part I of any Report is the definitive source for an accurate description of the current state of the law in the jurisdiction in question.

This Summary Report has been prepared on the basis of a detailed review of all Reports (including Part I) but focuses on Parts II and III, given AIPPI's objective of proposing improvements to, and promoting the harmonisation of, existing laws. As it is a summary, if any question arises as to the exact position of a particular Group in relation to Parts II or III, please refer to the relevant Report directly.

In this Summary Report:

- references to Reports of or responses by one or more "Groups" may include references to Independent Members;
- where percentages of responses are given, they are to the nearest 5%; and
- in Part IV below, some conclusions have been drawn in order to provide guidance to the Study Committee for this Question.

#### **I. Current law and practice**

For the replies to Questions 1) - 7) set out in the Summary Guidelines for this Study Question, reference is made to the full Reports. The Study Guidelines may be accessed [here](#).

#### **II. Policy considerations and proposals for improvement of your Group's current law**

##### **8) According to the opinion of your Group, is your current law regarding inventorship of inventions made using AI adequate?**

18 of the responding 35 Groups (50 %) stated YES, while 17 Groups (50 %) stated NO.

The French Group (stating YES) thinks that it should be differentiated between "weak" and "strong" AI. As of today, there are only "weak" AI systems that are defined and trained by humans specifically for highly specialized objectives, which are also defined by humans. AI systems are tools with no autonomy. Even though the output of a "weak" AI might be

qualified as substantial or significant, the output should not be examined separately from the human interaction that led to defining, training and using the tool. Therefore, the current law is appropriate for examining “weak” AI systems. In case of a future autonomously acting “strong” AI, the French Group explains that there are two scenarios. Either, current French law would be sufficient, because the authorities will look for and be able to find sufficient human contributors in the inventive process, or the law would have to be amended in the future, if there is no sufficient human contribution to be found at all.

The Japanese Group (stating YES) states that although Japanese law is adequate as of today, in preparation of expanding the use of AI systems in the future, it is necessary to consider establishing guidelines in regard of AI systems, e.g., on legal capacity and on coordination of interests related to commercial acts.

The UK Group (stating YES) emphasises that a scenario might occur where an invention is made by an AI system without sufficient human contribution to qualify any human as an inventor and therefore, procedurally the application would name a human as the inventor so as to allow the patent to proceed in the patentability process. In such a scenario, further clarity would be needed concerning the patent application as well as concerning granted patents which turn out to have been invented by an AI and lack sufficient human contribution.

The Bulgarian Group (stating YES) emphasises that current law only recognizes human beings as inventors by focussing on the issue of the importance of names in general. In the opinion of the Bulgarian Group, if names might be given to things, like an AI, this would not be comparable to names given to natural persons, since the name of natural persons would not only serve the function of identifying them but also enabling them to exercise their respective rights as well as being a crucial part of their personality.

In contrast, the Australian Group (stating NO) points out that owners of an AI that generates inventions would not be incentivised to make those inventions public due to inventions created solely by an AI unlikely being patentable in Australia, and, in general, a remaining uncertainty regarding the patentability of inventions which involve a significant contribution by an AI. By treating those inventions as trade secrets, society would be deprived of the disclosure of new developments and the opportunity to build upon them.

The Swiss Group (stating NO) adds that the existing Patent Law was formulated in a neutral manner and has proven to be sufficiently flexible to address inventorship issues that arise today and that might arise in the future.

The German Group (stating NO) specifies that it should be differentiated between AI assisted inventions and AI generated inventions. Whereas current law shall be adequate for AI assisted inventions, it shall not be adequate for AI generated inventions, because the patent application would be rejected on formal grounds for the sole reason of being AI generated by the German Patent and Trademark Office. In case the legislator decided to exclude AI generated inventions from patentability, this should be done by means of an explicit regulation and not on a formal basis.

**9) According to the opinion of your Group, would recognition of an AI entity as an inventor or co-inventor conflict with the public policy issue of fostering**

**innovation (you may also refer to other general patent law doctrines under your law, if applicable)?**

20 of the responding 33 Groups (60 %) stated YES, while 13 Groups (40 %) stated NO.

The U.S. Group (stating YES) explains that once AI-related technologies began generating “inventive AI”, a lot of inventions may be made, which could have a chilling or disincentive effect on engineers and scientists who invent for a living. Furthermore, there would be a plausible scenario where inventive AI is mining patent databases and technical literature with the goal of generating and publishing on the internet large volumes of data describing a continuous stream of novel combinations of prior art elements.

The Brazilian Group (stating YES) thinks that the purpose of the patent system should be focussed. The protection of an invention should not be the main aim of the patent system. The aim should be to promote inventive activity, technological progress, technology transfer and training, as well as rewarding the inventor fairly. Summarising, a broader objective should be pursued, namely the promotion of science and economy as well as social and technological development. The patent system should therefore be merely a means.

The UK Group (stating YES) specifies that while society itself may benefit from the disclosure of patent applications that contain AI-generated inventions, it does not necessarily mean that AI needs to be considered an inventor in the traditional sense. The question should be raised whether as to the appropriate means of incentivising innovation in AI, the patentability of the AI or the patent system in general is the correct means to reward innovation in AI.

The Dutch Group (stating YES) is of the opinion that AI systems do not need to be incentivised to invent by granting patents. They have to be regarded as a tool, which is why the development of AI systems and the use of AI systems as a tool to invent should be incentivised. Such incentive may be sufficiently provided by granting patents to parties having developed an inventive AI.

The Indian Group (stating YES) raises the point that the current policy concerning intellectual property rights intends to build up respect for intellectual property rights among the public in general in order to nurture the IP culture. The recognition of an AI entity as an inventor or co-inventor would most likely conflict with the current policy concerning intellectual property rights and it would remain unclear how the recognition helped in achieving the superior goal of passing on benefits to society.

The Indonesian Group (stating YES) adds that by recognizing an AI as an inventor, a conflict with the current policy would arise because the current policy motivates only inventors that are natural persons to generate more inventions in terms of quantity as well as quality in order to improve national welfare and create fair business competition.

The Independent Members (Chinese Taipei; stating NO) observed that if an invention was completely or almost completely created by an AI entity, and should therefore not be entitled to patent protection, the invention would become public property inevitably, which adversely influenced the idea of fostering innovation.

The Belgian Group (stating NO) points out that, in principle, the designation of the inventor would be a mere formal requirement despite certain rights being attached to it. Therefore, it would leave the substantive patentability requirements unaltered since the recognition of an AI entity as a (co-)inventor would not directly conflict with the public policy issue of fostering innovation.

**10) In your jurisdiction, what is the purpose of naming the inventor in the patent application? Does the naming of the inventor in the patent application, if applicable, consider aspects of personal rights under your law, e.g., does it fulfil a reward function for personal effort?**

The Belgian Group is of the view that the inventor has a moral right to be mentioned in the patent. Such a moral right would fulfil a reward function allowing the inventor to enhance his reputation.

The Malaysian Group specifies that the aim is to provide the inventor some recognition with regard to the breakthrough the inventor achieved. Nonetheless, in practice the naming of the inventor would primarily serve procedural purposes.

The Polish Group adds that at many universities and other institutes engaged in research and development bonus schemes for researchers are, among other criteria, also based upon the from their work finally resulting number of patent applications in which they were named as (co-)inventors.

In contrast, the Australian Group is of the opinion, as Australian law does not originate from a tradition of moral rights, that the naming of the inventor is foremost crucial for determining whether the person seeking entitlement may establish a chain of title and/or a role as legal representative.

**11) According to the opinion of your Group, would the recognition of inventorship by an AI entity conflict with or undermine the purpose of naming the inventor in the patent application you identified in question 10?**

The clear majority, i.e. 25 of the responding 34 Groups (75 %) stated YES.

As the Russian Group states, the right of the inventor to be named in the patent application is an immaterial right. Therefore, the recognition of inventorship by an AI would create an unnecessary additional legal fiction with uncertain legal status concerning the AI entity as well as uncertain legal consequences.

The UAE Group specifies, without additional laws and policies put in place to clarify the legal status of an AI entity as well as its rights, obligations, liabilities and its relationship to its creator, the recognition of inventorship of an AI entity would conflict with the purpose of naming the inventor in patent applications. Since AI entities are not legally established as of today, they should not be subject to the same rights and responsibilities as a natural person.

The Turkish Group agrees, stating that in order to grant AI the status of an inventor, initially AI would have to be recognized by law as a legal subject vested with rights and obligations which would eventually necessitate the harmonization in public policy issues and legislation in general.

### **III. Proposals for harmonisation**

#### **12) Do you consider international harmonization regarding inventorship of inventions made using AI as desirable?**

The clear majority, i.e. 31 of the responding 36 Groups (85 %) stated YES.

As the Spanish Group explains, harmonization would be desirable in the light of a growing globalized market for inventions made using AI and the resulting cross-border relevance. In particular, harmonization would help to foster innovation on a global scale.

The Israeli Group points out that a certain degree of harmonization would be desirable with regard to all aspects of intellectual property law. Regarding the inventorship of inventions made using AI, it would be efficient and productive to have globally the same or at least similar rules. Furthermore, harmonization would be especially pertinent concerning AI, because in most cases AI has cross-border relevance.

The Belgian Group agrees, specifying that the recognition of AI entities as inventors in some countries but not in others could result in major problems, such as the impossibility to obtain a patent in countries where an AI entity could not (solely) be named an inventor in cases where the applicant was not able to identify a human inventor, the impossibility to obtain a patent in countries where a patentability exclusion would exist for inventions made using AI in the inventive process, issues in the entitlement proceedings or issues regarding multinational inventions and many more.

The Norwegian Group adds that a situation in which an invention would have one inventor in some jurisdictions, and yet another inventor in others, would not only be unsatisfactory in a world where patents are exploited globally, but also poorly aligned with the global patent system.

The UK Group agrees, adding that international harmonization would be desirable once broad consensus is reached on the principles relating to inventorship and AI. In this respect, harmonization in regard of AI might be particularly challenging since the interests of different countries may vary depending on the nature and importance of their respective AI industry. Nevertheless, this issue would not be of urgent importance but rather be one of academic interest.

#### **13) What should be the requirements to be considered an inventor or co-inventor of an invention made using AI?**

The French Group points out that if an invention was made using AI, as of today it must have been a “weak” AI. Since a “weak” AI had to be regarded as a tool used by natural persons, the requirements should remain as they are currently in force.

The Chinese Group specifies that a person who uses AI to make a specific invention and solves a specific technical problem may be considered as an inventor, while a person who designed the respective AI does only provide a tool for the inventive actions and should generally not be considered an inventor of the invention made using the respective AI.

The Danish Group thinks that inventorship requires an independent, intellectual contribution. Such an intellectual contribution may be the recognition and reduction of an inventive concept to practice, irrespective of the inventive concept being created by an AI or not. An intellectual contribution may only be performed by humans.

The Ecuadorian Group agrees, adding that the human intervention must be duly recognizable as well as that the patent applicant therefore should identify the human intervention in the patent summary and description.

The Australian Group suggests recollecting older principles of patent law. They state that the original concept of patents related not only to the invention of new technology, but to the introduction of new trades, skills and technologies to a given jurisdiction. The concept of inventorship encompassed not only the person who newly developed an invention, but also the person who introduced new technologies or skills, even when they were first conceived by others in foreign countries and then introduced to the former British Empire. In this case, the patent was granted to the person to whom the invention or the new skill was communicated. Under this approach, a human to whom the invention of an AI is communicated, would be the inventor by virtue of having the invention communicated to him or her and by therefore being the first human to whom the invention is known. Nevertheless, it would be appropriate to use a special form in such cases in which the involvement of the AI is disclosed to the public.

The Azerbaijani Group suggests modifying Patent Law. In the patent application the AI should be eligible to be considered (co-)inventor and the owner of the AI should be listed as the patent applicant as well as be listed as the prospective owner of any issued patent deriving from the AI.

The Independent Members (Chinese Taipei) explain that there should be three requirements for AI to be considered (co-)inventor. The respective AI should be independent, which means not only a tool completely dependent upon humans. It should be competent, which means the AI should be able to engage in creating a legal relationship. Finally, the AI should be able to enforce its own inventorship rights against infringement. In consideration of these suggestions, it would be necessary to enable AI to have a limited entitlement to property. To underline the general possibility of granting limited rights, the Group explains that, e.g., animals were granted certain animal rights such as the right to a decent quality of care. Nevertheless, animals are not subject to all the constitutional rights a natural person is subject to.

- 14) Should an AI entity, for example when considered as an “artificial person”, be considered an inventor or co-inventor of an invention made at least in part by contribution from the AI entity assuming the same contribution, if made by a**

**human inventor, would be considered inventorship under applicable patent law?**

The clear majority, i.e. 27 of the responding 33 Groups (80 %) stated NO.

As the Belgian Group states, there is neither any reason to recognise AI entities as “artificial persons” being eligible for inventorship, nor solid ground for granting any sort of legal personality to AI entities. It would be difficult to identify any advantages with regard to recognizing an AI entity as an inventor. Any moral reward function linked to inventorship would have little meaning, as the ultimate beneficiary of the reputation linked to the AI would be the company behind it, which most likely applied for the patent and thus would already be commercially benefitting from the invention. Furthermore, only in case it is absolutely impossible to identify any human being as a sufficient contributor to the AI-generated invention, a non-patentability issue might arise, e.g., if an AI entity would be able to recognise the patentability of its generated outcome by itself and would even apply for the patent by itself.

The Vietnamese Group explains that inventorship should only be applied to a natural person. Instead of considering AI as an “artificial person” becoming an inventor, the Vietnamese Group suggests a new protective right for inventions created using AI in general.

The German Group agrees, specifying that the principle that an inventor needs to have a legal capacity is firmly established and should not be changed in the future. Therefore, an AI entity should not be considered as an inventor. Nevertheless, mechanisms for AI-generated inventions should be provided in order to incentivize investments of companies in creating innovations made by or with the help of AI. This might be achieved by an adaptation of Patent Law or by a new protective right for mere AI inventions outside the legal framework of Patent Law.

**15) If AI is considered an inventor or co-inventor of an invention made using AI, should it be possible to *name* AI as an inventor or co-inventor in a patent application?**

8 of the responding 29 Groups (30 %) stated YES, while 21 Groups (70 %) stated NO.

The Austrian Group (stating NO) points out that the right to be named as inventor is a moral right only applicable to natural persons. Naming an AI as inventor would not result in any benefit or incentive for the AI which was named.

The Norwegian Group (stating NO) specifies that, assuming that AI were to be eligible to be considered as an inventor or co-inventor, it should nevertheless not be possible to name the AI entity as an inventor. In such a case, the humans that made a contribution to the AI, enabling its contribution to the invention, should be named as inventors or “pseudo-inventors”.

The Chinese Group (stating NO) adds that if it was desired to mention the AI contribution in the patent application, alternative ways might be considered, such as adding a bibliographic item in the patent application indicating the AI contribution to the invention. For an invention



made solely by an AI, the Chinese Group suggests that the bibliographic item “inventor” might be left blank, which nonetheless should not affect the patentability of the invention.

In contrast, the Finnish Group (stating YES) states that there should be a possibility to name an AI as an inventor or a co-inventor in the patent application. Such possibility might be offered by either including a general reference to an AI as an inventor or co-inventor in the patent application or by including a specific reference to the particular AI entity in question, allowing an exact identification, in the patent application.

The Russian Group (stating YES) raises the point that the answer might depend on the purpose of naming the inventor in general. As a first step, the purpose of naming the inventor should be harmonized. Only after the purpose was harmonized, the provisions concerning the naming itself, including cases of an AI being the inventor, should be harmonized.

The UK Group (stating YES) agrees, adding that though much would depend on the purpose for naming the AI, it might require providing information to allow the AI entity to be uniquely identified and it also might require the provision of, e.g., the training data provided to the AI entity. Hence, naming the AI entity in question should be purely for information purposes only, without any consequences for ownership and economic entitlement to the invention in question.

**16) In connection with a hypothetical patentable invention made using AI, which of the following contributions by one or more human contributors should be considered under your law as being at least co-inventorship of the invention made using AI?**

- a) **Using AI to design a particular type of product or process, when the resulting patentable invention is of the type of product or process intended (e.g., a car designer who wishes to design a car body might start with a general shape, and then use AI to perfect aerodynamic or other characteristics leading to a patentable invention. Here, AI is being used as a tool to help invent, but the intent for the result lies with the user);**

The French Group is of the opinion that inventorship should continue to be determined according to the general legal criteria that currently apply. Thus, when there is a sufficient contribution to the implementation of the patentable invention, the human contributor should be recognized as inventor or co-inventor. The use of a tool, as sophisticated and efficient it might be, to create an invention should not be in itself a factor for excluding the user from being recognized as inventor.

The Finnish Group adds that in this case, a human contributor should generally be considered an inventor. In case an AI is only used as a tool to help a natural person inventing and the intended aim and result was formulated from such user of the AI, the human contributor (i.e., the natural person) should be considered an inventor. However, the assessment should be conducted on a case-by-case basis and would depend on the significance of the AI contribution (i.e., whether or not the AI entity itself qualifies as an inventor or a co-inventor, if possible, and with respect to the respective contribution).

The Turkish Group agrees, pointing out that a person should at least be considered co-inventor if the person made an intellectual contribution to the inventive concept and technical character of the invention. In case (a), as AI is used as a tool and the proceedings resulted in an invention of the intended product and process, the human who was making use of the AI for such purpose should be eligible to be considered as an inventor or co-inventor. Summarising, if the user of the AI instructs the AI, provides all necessary information to reach a patentable result and controls the process of creation, the human using the AI should be considered as an inventor or at least a co-inventor.

- b) Using AI to achieve a particular intended goal, when a resulting patentable invention made using the AI is not directly related to that intended goal (e.g., an AI system is developed to go through social media data looking for one thing and then discovers a useful relationship leading to a patentable invention that was not an original objective of the system);**

The French Group explains that case (b) would correspond to a situation in which the development of a patentable invention was not the result of the initial intent of a human contributor, i.e. the AI was not used for a specific purpose. In such a scenario, inventorship should continue to be determined according to the general legal criteria that currently apply. Therefore, the nature of the human contribution would be essential to assess whether or not the contributor should be qualified as an inventor. If the AI on its own identified a solution to a problem that is different from that for which the AI was initially used, and the human contributor merely implements such a solution without encountering any difficulties and/or making any modifications, the human contributor should not be recognized as an inventor. However, if the human realizes that a solution identified by an AI can lead to solving a problem that is different from that for which the system was initially used, his contribution to the patentable invention should lead to the recognition of his (co-)inventorship.

The UK Group notes that in cases where an AI is used to achieve a particular intended goal, but the resulting patentable invention made using the AI is not directly related to that intended goal, it would be unnecessary to consider the AI as an inventor. The current position in law to recognise only the human contributor as the inventor would be sufficient. Since the found relationship would be a discovery, that discovery would itself fall inside one of the exclusions to patentability. It is only the application for the relationship that would be eligible for a patent, which is where the involvement of the human contributors would lie, making them at least a co-inventor.

The Russian Group thinks that if a discovery was not evident to any specialist who would use an AI to achieve the very same intended goal, the human who used the AI for the reached goal and made the discovery should be considered (co-)inventor.

The Finnish Group points out the differences from case (a) and expresses that the answer depends on the specific circumstances of the individual case. Whether or not a human contributor might be considered an inventor should depend, e.g., on how the actual patentable invention is achieved and who actually realizes and understands that the specific

invention is also a patentable invention. This might lead to situations in which it is of importance whether or not AI was able to be an inventor or not. The most important element to be assessed in this case should be whether the AI or a human contributes in such a manner that there would be no patentable invention in the absence of such contribution.

**c) Designing or contributing to the design of the AI algorithm that is used in (a) or (b);**

The U.S. Group is of the view that the human is an inventor both in case (a) and (b). The human that designs the AI algorithm would be, in essence, instructing the AI tool to perform a task in furtherance of the reduction to practice. Whether the human that designs the AI algorithm is actually an inventor is a question of fact. It should be scrutinized if the human has conceived an invention for which the AI was designed to reduce to practice, in whole or in part.

The Turkish Group adds that the designer having made a creative and intellectual contribution to address the specific problem and having created the algorithm for the purpose of solving the specific problem should be considered as (co-)inventor to the extent the algorithm contributes to the solution of the problem.

In contrast, the Singaporean Group is of the opinion that it should be differentiated between cases (a) and (b). In case (a), the human contributor should be considered a co-inventor if the design or contribution to the design of the AI algorithm was conducted aiming to provide a solution to an intended problem. However, if the human contributor designed the AI algorithm as a generic AI without consideration of the intended problem to be addressed by the patentable invention, then the human contributor should not be regarded to have contributed to the formulation of the inventive concept and thus should not be credited as a co-inventor. In case (b) the human contributor who designs or contributes to the design of the AI algorithm did not contribute to the formulation of the inventive concept. Therefore, in case (b), the human contributor should not be considered a co-inventor.

**d) Selecting the data or the source of the data that is used to train the AI algorithm used in (a) or (b);**

The UK Group raises the point that in the context of an AI used for the purposes described in cases (a) and (b) above, a person who selects training data (and presumably a person who trains the AI) makes a technical contribution to the AI, and as such could be a co-inventor of the AI itself, but it would not necessarily follow that the person would also be a co-inventor of the subsequent invention devised from using the AI. Should the person training the AI be considered a co-inventor of the AI itself, this would at least in part be due to the AI algorithm having been amended by training using the supplied data. Extending the “tool” and “toolmaker” analogy, whilst better data may provide better quality output (e.g. more unbiased results), and AIs trained on different data will perform differently, the likely result would be that the AI performs as a better tool to be used in the devising of the final invention, rather than necessarily increasing its contribution to the invention. However, it would not be inconceivable that the “toolmaker” has actually contributed to the final invention in some way. One option for harmonisation in this particular area could be to specifically exclude only the

pure selection of training data (in the absence of any other factors linking the person training the AI to the final invention) from inventorship.

The Finnish Group states that the mere selection of data or a source for training the AI algorithm that later generates an invention should not, as such, be considered a contribution to the invention meriting inventorship. If the natural person contributes in such a manner to the invention that there would be no patentable invention in the absence of the contribution, the contribution should be sufficient for being granted inventorship.

The Japanese Group notes that the human contributor should be considered, at least, as a co-inventor in case (a), but should not be considered as an inventor in case (b). In case (a), by selecting the data or the source of the data that is used to train the AI algorithm, it would be possible to generate a trained AI algorithm that is suitable for designing a particular type of product or process. In case (b) on the other hand, the contributor who selected the data or the source of data to be used to train the AI algorithm does not make a contribution to the discovery, since the discovery is a random outcome. Nonetheless, the Japanese Group states that in the pharmaceutical field, there should be a possibility that the contributor in case (b) may be considered as a (co-)inventor, because it would be possible that the selection of data or source of data to be used to train an AI algorithm might make a creative contribution to the invention of technical character.

**e) Generating or selecting the data or the source of the data that is input to the trained AI algorithm used in (a) or (b);**

The Singaporean Group explains that a human contributor who generates or selects the data or source of the data used as input for the trained AI algorithm in case (a) would be responsible for selecting appropriate data in order to generate a useful output finally leading to the patentable invention. In this respect, the activity of the human contributor should be considered as of intellectual and creative nature when directed at the patentable invention. Such contribution should be sufficient to enable the human contributor to qualify as a co-inventor. On the other hand, for the human contributor who generates or selects the data or source of the data used as input to the trained AI algorithm in case (b), the activity of the human contributor should not be sufficient contribution to the formulation of the inventive concept. In case (b), the human contributor should not be considered a co-inventor.

The Russian Group states that there are reasonable doubts that a person who selects the input data for an AI entity should be automatically considered an inventor. Such inventorship should only be granted in case the selection of input data was not just routine, but of creative nature.

The U.S. Group states that the human contributor may be considered an inventor. The human that selects training data for the AI algorithm would assist in teaching the AI tool to perform a task in furtherance of the reduction to practice. Whether the human that selects the data for an AI is actually an inventor would be a question of fact, namely whether the human conceives of an invention for which the AI is used to reduce to practice.

**f) Selecting one from a large number of outputs produced by the AI of (a) or (b) and recognizing it to be a patentable invention.**

The French Group is of the view that the human contributor who selects one specific output from a large amount of AI generated data for the purpose of recognizing a patentable invention makes an effective contribution to the invention in question, and therefore, should be entitled to be recognized as (co-)inventor, irrespective of the selection being made among a large amount of AI generated data that was previously known or unknown.

The UK Group agrees, emphasizing that the act of recognising an output to be a patentable invention by recognising one output to have particular advantages over others, or that there are unexpected potential relationships the human can see are valid but surprising, could lead to that person being considered to be an inventor. The selection itself could also feasibly be performed by an AI, albeit with human verification.

The Japanese Group adds that the human contributor should be considered as a (co-)inventor. This is because the act of selecting one specific result from a large amount of outputs produced by AI as well as recognizing it to be the patentable invention would correspond to the act of making a creative contribution in order to solve a problem. As an example, the Japanese Group explains that, e.g., a chemical researcher (in this case the AI) might synthesize a compound which a pharmacological researcher (human) later verifies regarding its medicinal effect.

The Finnish Group thinks that if the result of cases (a) or (b) fulfils the criteria for patentability, the human contributor selecting the output should be considered as an inventor. This should be the case if the human contributor selected the output identifiably, directly, and independently on his own in such a manner that there would be no patentable invention in the absence of his contribution.

**17) If an invention was made using at least a certain level of AI contribution during the inventive process should the invention be excluded from patentability as a whole? If yes, what would be the minimum level of AI contribution to trigger this exclusion?**

The clear majority, i.e. 34 of the responding 35 Groups (95 %) stated NO.

As the Malaysian Group points out, if a certain level of AI contribution during the inventive process excluded an invention from patentability as a whole, this would ultimately hinder innovations in different industry sectors.

As the Korean Group explains, the invention should not be excluded from patentability as a whole when there was a certain amount of AI contribution during the inventive process. The patentability of an invention made using AI should be determined on a case-by-case basis. Only in case there is no substantial contribution to an invention by a human being, the invention should be not patentable.

The Ecuadorian Group adds that if any human intervention is identifiable, the invention should not be excluded from patentability. They emphasize that in order to foster innovation and technology in general, it would be counterproductive to exclude any invention made with the help of AI contribution from patentability regardless of the individual case.

**18) Please comment on any additional issues concerning any aspect of inventorship of inventions made using AI you consider relevant to this Study Question.**

The Israeli as well as the Mexican Group note that it should be disclosed in the patent application, if an AI entity was involved in the inventive process, irrespective of the concrete amount of contribution.

The Vietnamese Group suggests due to AI enlarging its importance worldwide, it might be necessary to consider a separate branch of intellectual property rights with regard to AI.

The Estonian Group specifies that the issue of recognizing AI as a (co-)inventor would require a review of the entire patent system. Instead, the Estonian Group as the Vietnamese Group suggests to introduce a new type of intellectual property right, designed especially to suit AI.

The Swiss Group agrees, addressing the issue that, assuming that inventions may be made without any human intervention at all, the requirement to designate a natural person as an inventor in a patent application might potentially lead to a dilemma. An applicant could be forced to designate a natural person that, in fact, has not sufficiently contributed to the invention because the AI entity used to achieve the invention could not be legally designated as inventor. While an incorrect inventor designation would not immediately invalidate a patent in Switzerland, this might be the case in other jurisdictions. Such questions call a debate as to the need for a sui generis right for AI related inventions and, more generally, for computer-implemented inventions. The Swiss Group suggests an intermediate intellectual property right, e.g., between mere copyrights and patents, would be useful for applicants active in the field of information technology. Ultimately, such right might not necessarily require the designation of an author or an inventor.

The Philippine and the Bulgarian Group address the importance of establishing a general liability framework that addresses the risks posed by AI technologies, given that the technology of AI is continuously evolving. Existing legislation concerning product liability and torts would have to be adapted. Further, AI owners, manufacturers, service providers and users of AI will have to evaluate whether they are adequately protected against liability risks arising from the use of AI.

The Hungarian Group addresses the issue that by enabling the AI to be inventor or co-inventor, the risk could arise that the patent system is abused by countless AI generated patent applications on a “let us see what we get” basis, which would overload patent authorities and lead to patent examiners potentially being the first natural persons to undertake a creative action by realising the invention.

The Italian as well as the U.S. Group note that the recognition of an AI entity as an inventor or co-inventor would impact patentability requirements such as the inventive step or the ordinary level of skill in the art.

The Turkish Group suggests to further investigate whether or not an analogous application of the legal framework concerning works made for hire might be a solution, whereas the UK Group notes that ignoring inventorship and creating a legal fiction similar to the employee/employer relationship might be the solution.

### **Industry sector views included in these proposals for harmonisation**

The following consultation with industry was reported:

- Healthcare (Switzerland)
- Automotive and transportation industries, medical industry, electronics and consumer products industries (Singapore)
- Nano electronics, digital technology, manufacturing (Belgium)
- Electronics industry (Germany)
- Telecommunication industry (Spain)
- Chemical and pharmaceutical industries, biotechnologies, microtechnology and energy research, instrumentation, measurement and computing, automotive industry, electronics and communication industries (France)
- Information Technologies, data security industry (Russia)
- Information Technologies and telecommunications (Chinese Taipei)
- Electronics and materials industries, Information Technology, medical informatics (Vietnam)
- Transportation, insurance and banking industry (Philippines)
- Information Technology, software industry, electrical and electronic industries (Korea)
- Household appliances industry (Italy)
- Technology industry (U.S.)
- Pharmaceutical industry (Japan, Hungary)
- Telecommunications, medical research, financial services industry, electronics and imaging industry, automotive industry (UK)
- Computer programming (Denmark)
- Telecommunications, smart device manufacturing industry, pharmaceutical industry (China)
- Information Technologies, electronics and chemical industry (Estonia)

## **IV. Conclusions**

The clear majority of the responding Groups is of the opinion that an AI should not be considered an inventor or co-inventor and it should not be possible for AI to be named as inventor or co-inventor in the patent application.

However, the clear majority is also of the opinion that harmonization regarding the issue of inventorship of inventions made using AI is nonetheless desirable.

Some Group Reports suggest to discuss whether AI related inventions should be addressed in a to be created *sui generis* law which also comprises a tailored solution of the issue of inventorship of inventions made using AI.

In any case, the submitted Group Reports clearly show that the issues being discussed in this Study Question are of high practical relevance, and substantive harmonization of the handling of these issues seems desirable.

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