Netherlands Patent Office
Ministry of Economic Affairs

Your digital innovation: software patents

Patents involving software innovation – key points of interest

A Netherlands Patent Office publication for entrepreneurs who are considering patent protection for a wide range of digital innovations, from robotics to artificial intelligence.

Contents

Introduction

Can you protect software with a patent, or not? Is patent protection for software only possible when it is combined with hardware? Also, what is the situation regarding patents for artificial intelligence? This brochure explains these issues in more detail.

What need is this brochure intended to serve?

The topic of software patents regularly prompts questions from entrepreneurs and innovative companies. This may partly be due to the conflicting messages and differing accounts that circulate on this topic. This brochure addresses many of these questions, including:

- What specific requirements apply to software patents, or to combinations of software and hardware?
- On what basis can you file a patent application for software or for artificial intelligence (AI)?
- How can you find out what patent applications others have already filed?

Accordingly, once you have read this brochure, you will understand what filing a patent application for software involves.

Intellectual property rights and other forms of protection

There is more to intellectual property rights than patents on technology alone. For instance, they can also provide protection for texts, images, source code, brand names, designs, or databases. For each type of product, development, or invention, there is a specific right with its own rules. Anyone who wants to use or copy it must first obtain your consent. Your ability to prevent others from using your intellectual property can give you a unique position in the market.

Using trade secrets to protect confidential information can often help maintain a competitive advantage. In addition, you can also derive rights from contracts that govern the ownership of, or access to, information.

In many instances, different forms of protection can be combined. A collection of intellectual property, whether limited or extensive, is also referred to as a portfolio. Investors refer to it as an IP (or Intellectual Property) portfolio.

Software patents therefore frequently form part of a wider protection strategy. More details on the various protection options:

- The various forms of protection are described in the brochure entitled The basics of intellectual property.
- The brochure entitled Your digital innovation: control, ownership and licensing provides a comprehensive overview of protection options for digital innovations.

Information and advice

If you have any questions about protecting your innovation after reading this brochure, please let us know.

- **Free** advice on intellectual property is available from the Netherlands Patent Office.
- You can find a patent attorney who can provide professional advice by consulting the register of the Netherlands Institute of Patent Attorneys. With regard to this specific topic, you can use the register to find patent attorneys who specialise in ‘computer science/mathematics (i)’.

Many commercial consultants offer their services as patent specialists, including for AI related matters. A key consideration is whether they can meet the required quality standards. Accordingly, working with a recognised patent attorney is advisable. This individual is a patent attorney (a regulated profession) and does not use titles such as *patent specialist*.

Computer-implemented inventions

In many cases, software forms part of an invention, such as a programmable – electronic – component. For patent purposes, inventions that include one or more software-based aspects fall under the category of 'computer-implemented inventions'. Yet software can often be a source of contention in patent matters. What is the reason for this?

Electrotechnical inventions and software

Inventions are typically described in terms of their elements and components, how these relate to one another, and how they operate. For example, mechanical engineering inventions are often based on a set of tangible elements, such as axles, bearings, and couplings. When assembled correctly, these elements act together in a specific way to perform a particular function. The function and operation of the assembly are determined entirely by its elements and the way in which they are assembled. For instance, this could involve a vehicle engine or a transmission system that connects the engine to the vehicle's wheels.

The same principle may also apply to electrotechnical inventions. In such cases, electrical components are assembled to form an electrotechnical system or electronic circuit. This system or circuit performs a function by processing electrical signals to achieve the intended result. For example, this may involve radios, televisions, or lighting systems. You may also use devices which convert changes in the environment into electrical signals (*sensors*) and devices which convert energy into motion (*actuators*) within assemblies that combine mechanical and electronic elements to create a working system. Today, many electrotechnical systems are controlled by software referred to as *embedded systems*. Example 1, which relates to a thermostat, shows how a patent application may be filed for a combination of software and hardware.

Example 1: *A digital heating thermostat as a computer-implemented invention*
Older types of central heating thermostats operate mechanically, using a bimetallic strip and a mercury switch. These thermostats were replaced by heating thermostats equipped with electronic components. The electrical signal from the temperature sensor is compared with a preset voltage value by means of a comparator. That voltage value reflects the setpoint (desired value) for the temperature, i.e. the temperature at which the room should be maintained. If the electrical signal from the temperature sensor exceeds the preset voltage value, the comparator sends a signal to the central heating boiler. At that point, the boiler switches itself off because the temperature in the room where the sensor is located has risen to the required level. When the temperature-sensor signal drops below the preset voltage value, the comparator sends a signal to the central heating boiler to switch on again.

Many modern thermostats have circuits that are controlled by a processor. In such devices, the temperature-sensor signal is converted into a digital form and passed to the processor. The processor is programmed to read the signal value from the temperature sensor and compare it with a setpoint, which may be entered using a keypad, for example. The processor can retrieve the setpoint from a value stored in memory. The processor instructs the system to compare the temperature sensor's signal value to the selected setpoint and, where required, to produce a control signal for the central heating boiler. The result is a fully digital heating thermostat with flexible functionality. A system of this kind is eligible for patent protection. In this case, the system combines thermostat control with temperature sensors, a processor, a keypad, and an output signal, plus the measurement and control functionality implemented in the processor.

Patent requirements

Patents can be used to document a technical solution to a technical problem, giving you exclusive rights. This is illustrated in Example 1, which concerns the digitally operated heating thermostat.

The technical solution must meet three *conditions for patentability*. When assessing these conditions, examiners mainly focus on the claims set out in your patent. The claims define the scope of protection and thus form the key component of the patent. These are the three conditions:

1. **Novelty**
   Your invention must not have been disclosed anywhere before the patent application was filed. Not even by yourself. The term *disclosed* indicates that others had access to information about the invention without any obligation to keep that information confidential.
2. **Inventiveness**
   Your invention may not be too obvious. The invention should be an original idea that could not easily be conceived by other professionals, in other words it should be *inventive*. This is also referred to as the *inventive step* or *level of invention*.
3. **Industrial applicability**
   Your invention is a product or process that is technologically feasible. Often the application is obvious from the invention or product itself, or from the way it works. If the industrial applicability is unclear, the patent application must describe how the invention can be used in practice.

In the case of software patents, there is an extra requirement. This extra requirement must be met before the conditions for patentability are considered. We will discuss this in greater detail in the next section.

Is software excluded from patentability or not?

Article 52 paragraph 2 of the European Patent Convention stipulates that computer programs are not regarded as patentable inventions. This seems to indicate that computer programs are excluded from patentable subject matter. However, paragraph 3 of that same article stipulates that this exclusion is limited to software 'as such'. See the words printed in bold typeface below, in the box on Article 52 of the European Patent Convention. The use of the phrase 'as such' in this article has been a source of contention regarding software patents.

Article 52 of the European Patent Convention: *Patentable inventions*

1. European patents shall be granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application.
2. The following in particular shall not be regarded as inventions within the meaning of paragraph 1:
   a. discoveries, scientific theories and mathematical methods;
   b. aesthetic creations;
   c. schemes, rules and methods for performing mental acts, playing games or doing business, and **programs for computers**;
   d. presentations of information.
3. Paragraph 2 shall exclude the patentability of the subject-matter or activities referred to therein only to the extent to which a European patent application or European patent relates to such subject-matter or activities **as such**.

Source code is considered to be software 'as such' and is consequently considered non-patentable. Source code is often treated as creative text for copyright purposes, which enables it to be protected against unauthorised copying. This is discussed in greater detail in the brochure entitled Your digital innovation: control, ownership and licensing.

Technical effect

In 1998, a European decision marked an important development in the patenting of software-related inventions. Decision T 1173/97, commonly referred to as the IBM decision (Computer Program Product), is an important ruling by the European Patent Office on the patentability of computer programs. The decision stipulated that you can file a patent application for a computer program if, when it is run on a computer, it produces a further technical effect which goes beyond the 'normal' physical interactions between program (software) and computer (hardware). In essence, the decision states that software invariably produces a technical effect when run on a computer. The focus shifted to the requirement for a 'further technical effect'. This drew a distinction between computer programs with a technical character and those with a non-technical character. It marked a breakthrough in how software-related inventions were considered for patenting from that point onwards.

Today, there is broad agreement among patent professionals that software providing a technical solution to a technical problem necessarily produces a further technical effect and may therefore be eligible for patent protection. A computer-implemented invention (CII) may involve a combination of hardware and software, such as systems for automatically activating brakes in cars or controlling robots. However, it could also be purely software-based, such as a data-compression algorithm or a method for managing cache memory.

Incidentally, a CII, like any other invention, must be novel and involve an inventive step to be eligible for patent protection. This is discussed in greater detail in the next section.

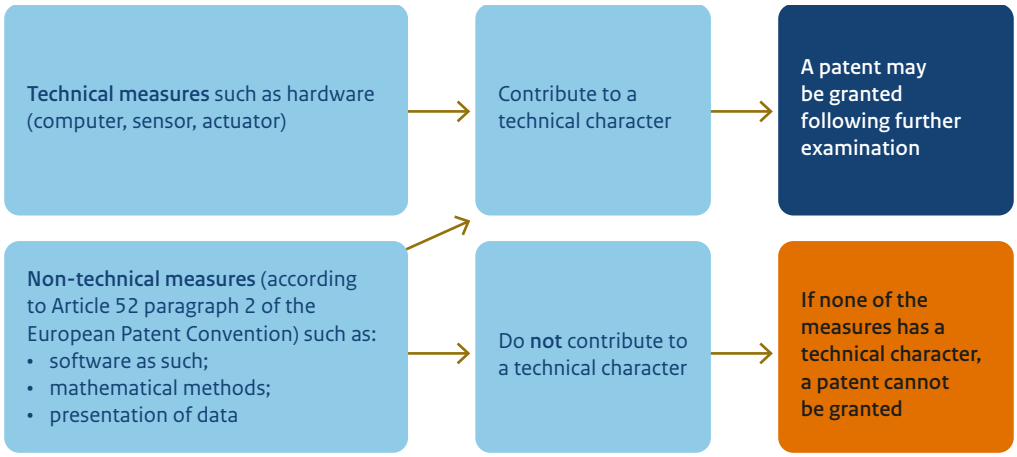
Computer-implemented invention: two-hurdle approach

In a computer-implemented invention, the invention often consists of operational steps performed by software running on a computer. How do patent examiners assess patents of this kind?

Technical and non-technical measures

Patent claims may include a combination of technical and non-technical measures. In many cases, technical measures involve hardware elements, such as computers or sensors, whereas non-technical measures concern software as such. Diagram 1 depicts the technical and non-technical measures set out in the claims of a patent application. In certain cases, non-technical measures may support the technical character of the claims (see the diagonal arrow). Accordingly, when non-technical measures are combined with technical measures, this can also give rise to an allowable claim.

Diagram 1: *Technical and non-technical measures can both support the technical character of the claims made in a patent application*



Where an invention contains both technical and non-technical measures, the European Patent Office adopts a two-hurdle approach. Diagram 1 relates to the first hurdle: the technical character.

First hurdle for computer-implemented inventions: technical character

For the first hurdle, it is essential that a claimed invention in a patent contains at least one technical measure. Only then can patent examiners assume that the claimed invention, taken as a whole, has a 'technical character'. This requirement may be met, for example, by including a computer or processor as a measure, provided that its functionality reflects a physical component or signal. At the same time, careful wording of the claims is essential to clear the first hurdle. Occasionally, patent applications will be rejected because they fail to describe the technical implementation in sufficient detail. Under European practice, this has to be explicitly specified in order to clear the first hurdle.

Tip for describing the technical character of a software-related invention
It should be evident from the patent claim that the invention features a technical implementation involving a computer, for instance through the use of the phrase *computer-implemented method.*

Second hurdle for computer-implemented inventions: novelty and inventive step

A major obstacle is often the question of whether the invention, as defined in the claims, is novel and involves an inventive step. That is the second hurdle that you need to clear. Only measures that contribute to the technical character of the invention may be taken into account when assessing novelty and inventive step. The challenge is to ensure that as many non-technical measures as possible contribute to a technical effect that serves a technical purpose. This approach ensures that patent examiners still take non-technical measures into account when assessing novelty and inventive step. This means you may be more likely to be granted a patent.

For example, a mathematical operation, which is a non-technical measure, used for data compression may contribute to the efficient transmission of data, which is a technical effect serving a technical purpose. Accordingly, both technical and non-technical measures may support the technical character of the invention, that is, its technical effect. Applications in the field of digital audio, image, or video processing – such as encoding, compression, and analysis – count as technical purposes, for example. This could also include algorithms for searching a hard disk or image recognition.

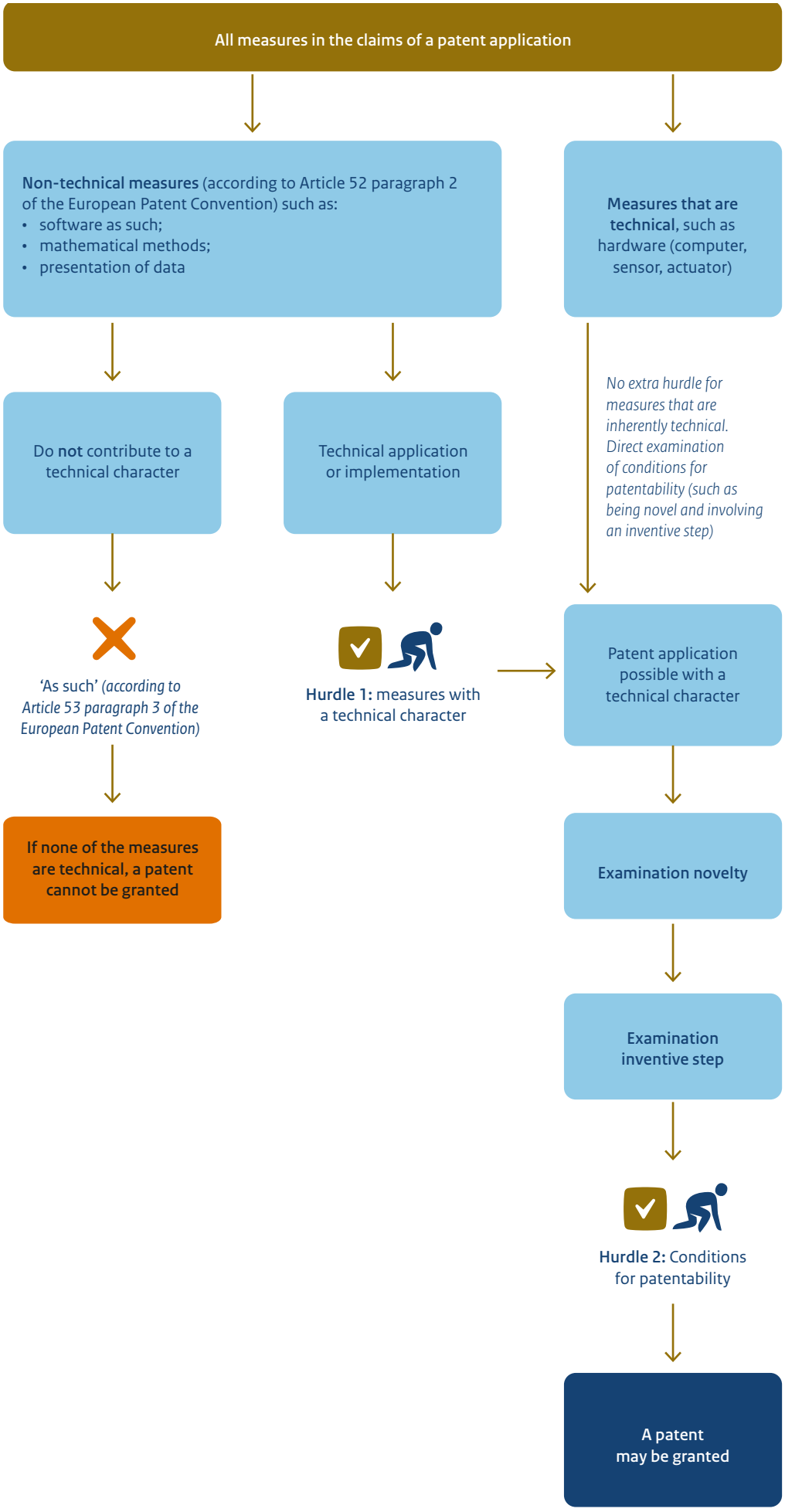
Similarly, software that does not enhance the invention's technical character does not count towards its inventive step. Consequently, a general purpose such as 'controlling a technical system' is insufficient. The patent claim must specify the technical purpose. For instance, rather than stating in general terms that the invention uses software for data processing, you should specify the specific processing steps and the associated technical improvements over state of the art technology. Such descriptions can support the view that the software contributes to the technical character of the invention and that an inventive step is involved.

Tip concerning emphasis on technical functionality
Emphasise the technical functionality achieved through the use of the computer and the software. In this way, you are stressing that this is a technical applicability involving an inventive step. For example, you may state that the processor has been configured to perform 'this', where *this* refers to the technical yet software-based measure

Two-hurdle approach

This two-hurdle approach is applied by patent examiners when evaluating the claims of patent applications involving computer-implemented inventions. Diagram 2 depicts a graphic overview of the steps involved.

Diagram 2: *Two-hurdle approach in European patent applications for computer-implemented inventions*



Examples of software patents

What could be considered a computer-implemented invention that produces a 'further technical effect'? In this section, you will find several examples of software patents that can help clarify this issue.

Example 2: Computer-implemented software-related invention

The European Patent Office has granted a patent for a technique that can enhance the identification of background music in video footage. The technique relies on closed-captioning (subtitle) data to locate a segment that is free of dialogue. Video-clip segments of this kind are relatively free from interference, allowing the background music to be identified more reliably.

The European Patent Office considers that, in specific situations, the way information is presented can help to solve a technical problem. For this purpose, the user must be capable of carrying out a specified technical task reliably and objectively, using human physiological data, while being continuously monitored by the computer. Example 3 presents two cases concerning the presentation of information via graphical user interfaces (GUIs). In the first case, the patent was declared invalid, in the second case the patent was upheld.

Example 3: *Presentation of information through the GUIs of kidney dialysis equipment*

Case 1: patent declared invalid

Operating instructions Case T 0336/14 EPO

The patent includes instructions on how to operate a kidney dialysis machine. Does this activity qualify as a technical task? No, because although the information enables the user to understand how the machine operates, it does not assist the user in performing a technical task. This does not constitute a technical problem with a technical solution. Accordingly, in this case, the patent was declared invalid.

Case 2: patent upheld

Dialysis system Case T 0690/11 EPO

The patent describes a system that enables users to set the physical parameters used in kidney dialysis. In addition, the GUI displays internal information on the machine's status and the progress of the treatment, in real-time. The purpose of this information is to ensure that the treatment is performed more safely and efficiently. This is a technical task. The information displayed in the GUI is not subject to personal preferences and can be viewed objectively in the same way by all concerned. Furthermore, the user is able to intervene at any point during the treatment, if necessary. The system offers a technical solution to a technical problem. Accordingly, the patent was upheld.

Description of the invention in a patent application

Many inventions involve integrating a processor or computer into a system that includes instructions for a particular functionality. When drafting a patent application for this type of system, you need to consider what the processor needs to do to achieve the intended result.

Flip your thinking

Drafting a suitable description can be challenging, as there is often a tendency to describe how the system is used. For instance, with respect to the heating thermostat in Example 1, you might describe the invention as follows: 'When a temperature setpoint is selected via the keypad, the thermostat regulates the central heating boiler to heat the room where the thermostat is located to the desired temperature.' This is not an appropriate way to draft the claims of a patent application. Nor is copying an algorithm or source code word for word a suitable approach to drafting a patent claim.

When drafting a patent application, you should focus on the internal workings of the system, or better yet, on how the computer operates. What operations does the computer need to perform to achieve the intended effect? Thus, in the thermostat example, these operations might include reading the temperature sensor value, detecting the keypad inputs, identifying the selected setpoint, comparing the temperature sensor reading with that setpoint, and transmitting a control signal to the central heating boiler..

Engaging a patent attorney

Drafting a patent application – especially the claims – requires specialist training to ensure it is done properly. We therefore recommend hiring a patent attorney. We recommend that, for software patents, you consult a patent attorney with experience in drafting software patents.

Table 1 lists various approaches to describing computer-implemented inventions in a patent application. These might take the form of a specific method, but they can also be based on a product with a defined structure or functionality.

Table 1: How would a patent attorney describe a computer-implemented invention?

Approaches to describing patents for computer-implemented inventions that include both a method and a product			
Type of description	**Method**	**Product**	
		Structure	Functionality
Sample text	Method implemented on a processor, and consisting of the following steps:	System for..., containing a processor...	..., where the processor is config-ured for...

You may find it helpful to answer the following questions before seeking the advice of a patent attorney:

1. What technical problem have I solved and how is this achieved?
2. Who are my competitors? And what advancements have they introduced in the area of my own invention?
3. Which aspects of my invention represent an improvement over the competition? Consider, for example, increased speed, shorter time, or lower energy consumption.
4. What information is already available in patent databases relating to the area of my invention?

Artificial intelligence

One particular category of computer-implemented inventions that has seen very rapid growth in recent years is artificial intelligence (AI). How can you protect AI?

AI and intellectual property

AI is used, for example, for speech and image recognition, or for identifying traffic situations encountered by autonomous vehicles as they navigate their environment. Input data is used to train and test the model (or neural network) for specific applications.

When considering how to protect AI, you should take into account your business plan's entire value chain. It is often possible to combine several different forms of protection. For instance:

- Contracts regarding the ownership of data or training data.
- Copyright on software source code.
- Protection of the database that you have compiled. Copyright does often not apply to data itself, although it can apply to collections of data. It depends on how creatively you have structured your database. European database rights can also apply where the creation of a database involves the collection of material from multiple sources.
- A patent that adds value to your business plan by protecting technologies.
- Trade secrets, such as a new AI training algorithm. To this end, it can be useful to categorise the information (public or confidential) and to restrict access to information labelled as confidential, or refrain from sharing it until suitable contractual agreements are in place.

You can, therefore, protect elements of AI in various ways by means of contracts, trade secrets, copyright, database rights, or a patent.

Patent on AI-related inventions

What aspects of an AI-related invention can be protected by means of a patent? This could involve items such as:

- technical modifications that an inventor may need to implement to ensure that their AI-based application operates as intended;
- the approach used to train a neural network and the technical steps involved;
- the task performed by the neural network (its technical functionality) and the technical application of the result;
- algorithms, provided they contribute to the invention's technical character. The algorithm should either serve a technical purpose or contribute to a technical solution.

Claims for AI-related inventions

AI-related inventions may comprise several aspects that can form the basis of a patent, including:

1. **generating training data** for use in a model, such as an artificial neural network;
2. **training the model** with the training data (machine learning);
3. **implementing the trained model** to analyse new data;
4. **modifying the input data** to make it more suitable for use in an AI model;
5. **modifying the output data** from the AI model to make it more suitable for use in the application.

It is important, where possible, to present independent conclusions in the patent application for each of these aspects (method, system, device, use). In this regard, it is important to bear in mind that the entity generating the data may not be the one that uses the model. It is thus important to make this distinction. Using conclusions in different categories, or in the same category but covering distinct aspects of the invention, may enable both parties to be held liable in the event of infringement.

Described in a replicable manner for AI

In patent practice, an invention should be described in a replicable manner by an expert in the relevant technology. A *replicable manner* refers to the requirement that the description provides enough detail to enable the invention to be reproduced. But how can this requirement be met when the invention involves AI? To this end, various elements are taken into account when assessing 'sufficiency of disclosure':

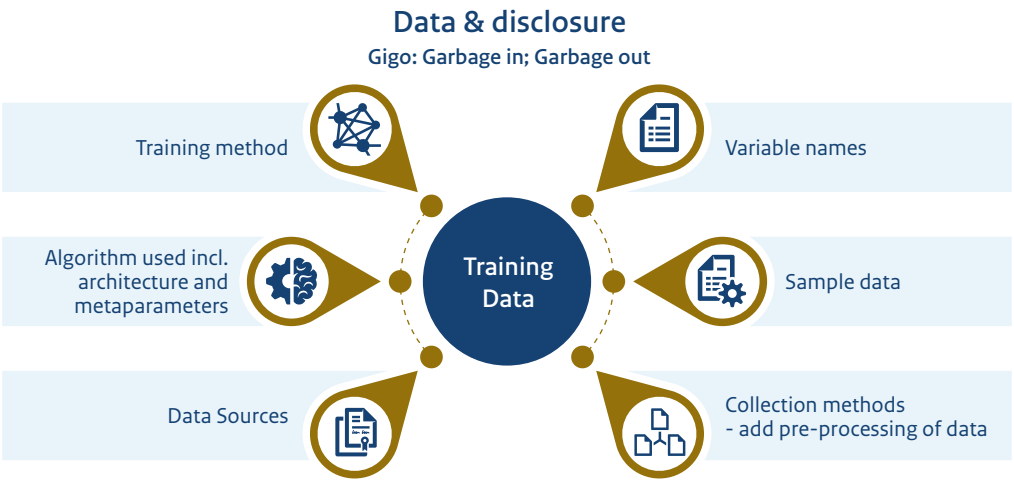
- Has the data been described in sufficient detail? How is the data obtained? What form does the data (or its storage) take? What pre-processing steps are necessary to prepare the data for the training model?
- What approach is used to train the network? Which computer programs are required?
- Which algorithm is used?
- Are the results sufficiently reproducible on the basis of the description?

Suppose that the essence of your invention is a training algorithm for a neural network. In that situation, a lack of sufficient detail regarding the training data may lead the patent examiner to reject the application. This is because a skilled practitioner would be unable to reproduce the result based on the information contained in the patent application.

In the case of medical applications, for example, extra care should be taken regarding the replicable description if the training data consists of medical data that is not publicly available.

Diagram 3 illustrates the details that may be disclosed with regard to the data.

Diagram 3: *An AI-related invention should be described in a replicable manner, including the data itself. (Source: IPR Helpdesk, 'Intellectual Property and Artificial Intelligence – Advanced', 2021, www.iprhelpdesk.eu)*



AI as the technical inventor

In the case of inventions generated by an AI, who should be regarded as the owner of the work? Could an AI itself be regarded as the inventor? At the global level, a consensus on this issue has yet to be reached.

- In line with European and United States practice, inventions created with the involvement of AI cannot (yet) list the AI as the inventor, since an inventor is required to be a natural person. Decisions from the Boards of Appeal of the European Patent Office and the Supreme Court of the United Kingdom have further confirmed this.
- Several cases in Australia and South Africa have named an AI as the inventor.
- Germany has adopted a middle-ground stance between these two positions. While it does require the inventor to be a natural person, it also recognises the AI's contribution.

When an AI is involved, ownership of the dataset can also be a relevant factor. The individual or organisation providing the data is typically not disclosed. It could be helpful to draw up a contract that clarifies these arrangements and anticipates future needs. This is because, as the field is still evolving, there may be future developments or changes in the relevant legislation.

Considerations relating to patents for digital innovation

Seeking patent protection requires an investment of both time and money. Moreover, the patent application – and therefore the invention itself – is disclosed after 18 months. Applying for a patent therefore entails strategic considerations, and this is especially the case for digital innovations. Accordingly, you should base your patent strategy on your business plan.

Three protection options

As mentioned above, many inventions whose functionality is largely determined by software may indeed be patentable. However, the desirability of doing so remains open to question. Here we present three options for managing protection:

1. By analysing the functionality or technical operation of a product or system, you may obtain a clearer understanding of its structure, function, and operation, potentially allowing you to reproduce or improve it (reverse engineering). If this could enable someone to disclose details of the technical operation, it may be advisable to file a patent application. This is because the invention will likely become public in any event, even if it is not disclosed through publication of the patent application.
2. In some situations, such as with cloud services, software-driven functionality cannot always be determined from outside the system. In cases like this, it may be preferable not to file for a patent and instead keep the underlying technology as a trade secret. Once the patent application is published, you would no longer be able to keep this trade secret.
3. Another approach is to disclose your invention by means of a *defensive publication*. A defensive publication is a document in which you disclose the technology underlying your invention in a way that establishes a verifiable publication date. You can use a publication of this kind to prevent others from filing a patent application for the material you have disclosed. The drawback is that, once this material has been disclosed, you will no longer be able to file a patent application for it yourself. This may trigger a downward spiral in the retail price of your product, which has less impact on competitors as they have not had to bear the cost of its development.

For more details about patenting, maintaining confidentiality and publishing, download the brochure entitled Patents for your business.

In which situations could you prefer a patent application?

A patent helps prevent others from benefiting from your investment without providing you with compensation. How concerned would you be if a competitor were to make commercial use of the same invention? If this is a significant concern for you, consider seeking patent protection. You could, for instance, file a patent application for these reasons:

- You wish to prevent others from appropriating your technology and eventually using it to gain an exclusive position.
- Exclusivity or licencing arrangements can deliver higher profit margins.
- You intend to sell your technology or your company to a party for whom patent protection is important. Intellectual property rights enable you to accumulate value while also strengthening your negotiating position.
- You intend to enter into a collaboration and therefore wish to obtain patent protection for your invention before doing so. In some cases, companies (including larger organisations) may not be willing to work with you until you have filed a patent application.
- Investors also often require you to have patent protection in place. They anticipate that protected innovations are more likely to generate a return.

- A patent can create an impression of exclusivity and innovation that deters potential competitors.
- You can combine a patent with a trade secret. In this way, you can benefit from patent protection in countries that are prepared to grant it, while also enjoying the additional protection offered by confidentiality.

In which situations might it be preferable not to file a patent application?

There may be additional reasons why choosing not to file a patent application could be preferable. For instance:

- substantial application fees, often amounting to several thousand euros per country;
- the publication (disclosure) of your patent application – in which your invention is described – after 18 months. For software-based digital innovations, maintaining confidentiality (in full or in part) is often a viable alternative;
- rapid changes in the field. When an invention is expected to have a limited lifespan, pursuing a patent may sometimes offer little long-term benefit;
- the cost and effort involved in pursuing legal action in the event of infringement. Some software-based digital innovations can be effectively kept secret by competitors. As a result, it can be challenging to detect and address infringements.

To make an informed decision, consult patent databases

Whether or not you choose to file a patent application, it is advisable to base your decision on information from patent databases. This approach helps you identify similar patent applications and better assess the novelty of your invention. In addition, knowledge of other parties' intellectual property can serve as a useful source of inspiration, while also helping to ensure that you do not infringe their rights. The next section provides guidance to help you begin searching for patents in a patent database.

Searching patent databases

Do you want to know which patents already exist in the field of digital innovation? Or find out who your competitors are and which patents they hold? Or assess the state of the art? If so, it is time to explore the world of patent databases, such as Espacenet. You can compare the information in patent databases to stars: when you study them, you are effectively looking back in time (the light you see was emitted long ago), yet there is much to see and learn.

Search terms and patent classes

When you start searching patent databases, it may seem sensible to rely on commonly used field-specific terms. However, if you limit your patent database searches to the field-specific terms you already know, you risk overlooking relevant results. This may cause you to mistakenly conclude that your invention is still unknown. Why might using field-specific terms cause you to miss some existing patents? There are two reasons for this.

Firstly, the language used in patents differs from everyday language. Patents are described using specific terminology, often with words that may not naturally come to mind. For example: *swivable* is used, rather than *rotatable*. Many other synonyms can be called to mind, such as: *pivoting, pivot, pivoted, twist, turn, circle, whirl, slew, twiddle, spinning and roll*. So if you rely solely on *rotation* as a search term, you are likely to overlook many relevant results.

Secondly, your searches will generally be limited to terms and synonyms in the languages with which you are familiar. The standard languages available for searching patent databases are English, French, and German. Patents originally drafted in other languages are frequently translated with the aid of machine translation systems. Even when patents are translated, there is no guarantee that the terms you search for will correspond to the language used in the patent documents.

Therefore, restricting your search to specific terms may limit the number of documents that appear in your hit lists. You can avoid these issues by using *patent classes* (also known as *patent classifications*). Patent databases are organised into classes that group related technical subjects. This class-based structure is comparable to a card index system. Once you have located a relevant patent, its documentation will list the classes under which it has been classified. Using these classes in your patent database searches can help you identify other relevant patent documents. The Netherlands Patent Office offers free, tailored assistance to help you search patent databases.

Tip for patent searches
Be aware that using search terms can sometimes limit the number of items in your hit lists. For this reason, the use of patent classes is advisable.

Please note: Espacenet only lists those patents that have been disclosed. Any patent applications filed less than 18 months ago will not yet have been disclosed by the patent-granting office.

Examples of topics in patent databases

Table 2 lists a range of topics in the field of digital innovations and computer-implemented inventions. In addition, the patent classes used in the International Patent Classification (IPC) have an accompanying English description. The right-hand column contains hyperlinks to sample patents.

Table 2: A range of patent classes covering technical topics associated with digital innovations and computer-implemented inventions

Topic	IPC class	English example of a patent class	Sample patent
3D printing	B33Y	Additive manufacturing: the manufacture of 3D objects via additive deposition.	KR20180081016A EP3040187A1 US2016059489A1
Advanced Driver Assistance Systems	B60K35	Control systems specially for hybrid vehicles	US9580073B1
Algorithm	G06K9/00	Methods (...) for reading or recognising printed or written characters or for recognising patterns, e.g. fingerprints	US10860735B2
	G06F21/00	Security arrangements for protecting computers, (...) programs or data against unauthorised activity	EP1224600A1 US10394578B2
App	H04W4/00	Services specially adapted for wireless communication networks; Facilities therefor	US2017034694A1 WO02076175A2
Artificial intelligence (AI)	G06N	See Point 7, under 'Information sources'	WO2020079499
Augmented reality	G06T19/00	Manipulating 3D models or images for computer graphics	US9495801B2
Blockchain	G06Q20/00	Payment architectures, schemes or protocols	US2017124535A1
Computer models	G06N	Computer systems based on specific computational models	US2019325316A1 US2020302315A1
Computer program	G06F17/00	Digital computing or data processing equipment or methods, specially adapted for specific functions	GB2391631A US2019340485A1
Computer games	A63F13/00	Video games: games that use electronically generated 2D or 3D images	US2021086066A1 US2018293844A1
Drones	B64C2201	Unmanned aerial vehicles; equipment therefor	GB2455374A US2021237899A1
Encryption	H04L9/00	{Cryptographic mechanisms or cryptographic) arrangements for secret or secure communication	US2004202317A1 US2011116627A1 US2014321638A1
Image analysis	G06T7/00	Image analysis	KR20050046769A
	G06K9/00	Methods or arrangements for recognising patterns	US10702232B2 US2002141631A1
Internet of Things (IoT)	H04W80	Wireless network protocols or protocol adaptations to wireless operation, e.g. WAP	EP1410664A1
	G16Y30/00	IoT infrastructure	EP3332561A1

Topic	IPC class	English example of a patent class	Sample patent
Medical imaging	A61B6/00	Apparatus for radiation diagnosis, e.g. combined with radiation therapy equipment	US10223789B2
	A61B5/00	Measuring for diagnostic purposes	US2002052549A1
Mobile communication networks	H04W	Wireless communication networks	US20170290013
Navigation	G01C21/00	Navigation	US2016069695
	G01S19/00	Satellite radio beacon positioning systems	EP3327534
Operation robots	A61B34/30	Surgical robots	WO2021146535A1
Robotics	B25J5/00	Manipulators mounted on wheels or on carriages	KR101259494
Virtual-reality glasses	G02B27/01	Head-up displays	US10746990B2
Self-driving or autonomous vehicles (AGV)	G05D1	Control of position, course or attitude of land, water, air or space vehicles, e.g. using automatic pilots	US11040609B2

Information sources

Would you like to find out more about patents and software patents? For more information, you can consult the following sources:

1. The brochure entitled Your digital innovation: control, ownership and licensing contains further details about intellectual property.
2. The various forms of protection are described in the brochure entitled The basics of intellectual property.
3. For more general information about patents, see the brochure entitled Patents for your business.
4. Many commercial consultants offer their services as patent specialists, including for AI. The question is whether they truly deliver quality. Looking for a patent attorney? If so, check the register of the Netherlands Institute of Patent Attorneys.
5. Further information on the European Patent Office's approach to computer-implemented inventions is available in the EPO Guidelines. There you will find details about the examination: Guidelines section G-II. There is also general information on a range of digital technologies, including hardware, software, and AI.
6. *Artificial intelligence* is a broad term that encompasses many patent classifications. The World Intellectual Property Organization (WIPO) has published The story of AI in Patents. A publication about the trend: WIPO Technology Trends – Artificial Intelligence.
7. The IPR Helpdesk, for international information about Intellectual Property Rights (IPR): www.iprhelpdesk.eu.

Contacting the Netherlands Patent Office

Do you want to find out more about patents or other forms of protection?

The Netherlands Patent Office can discuss the various options with you.

The Netherlands Patent Office not only registers Dutch patents, it also provides free advice. The Netherlands Patent Office is the go-to independent sounding board when it comes to intellectual property.

The Netherlands Patent Office's patent consultants:

- provide constructive feedback on a broad IP portfolio spanning all technological fields;
- help you think through ways of building a sustainable competitive advantage based on intellectual property;
- support you in searching patent databases for technical topics tailored to your needs.

Table 3 lists some of the free information and services offered by the Netherlands Patent Office.

Table 3: Free information and services provided by the Netherlands Patent Office

Services	Description	Information
Workshops and webinars	Sign up for one of our workshops, webinars and presentations. Such as the Patents Masterclass.	Take a look at our events calendar for a comprehensive overview.
Help in searching patent databases	The Netherlands Patent Office can give you support in searching patent databases. For instance, by providing insight into technical developments in the area relevant to your innovation.	Contact our office for a free personalised patent search. A patent advisor can provide guidance to help you begin searching patent databases.
Talk to a patent advisor	Our patent advisors can answer your questions, both digitally and on-site in your region. They work confidentially and independently.	You can request a meeting with one of our patent advisors through our website.
Public Information	Our Public Information staff are available to answer your questions on working days between 8.30 am and 5.00 pm.	Call +31 88 042 4002, send an email to info@octrooicentrum.nl or check our website www.octrooicentrum.nl.

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