European IPR Helpdesk

www.iprhelpdesk.eu

European IPR Helpdesk

Fact Sheet

Intellectual property in Biotechnology

June 2014

Introduction

Biotechnology is generally defined as "the application of science and technology to living organisms, as well parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services"[1]. This definition is deliberately broad and covers all modern biotechnology but also many other traditional or borderline activities. Taken all together, these activities belong to what is commonly called "Life Sciences".

Biotechnology is a field where technology advances rapidly but returns on investments may be slow. For this reason, it is important for public research organisations and enterprises to protect the innovation that they generate with Intellectual Property Rights (IPR), which provide a basis for return on investment in research and development, by granting monopoly rights for a certain period of time to their owners.

[1] "A framework for biotechnology statistics", OECD, Paris, 2005.

This fact sheet aims at giving a brief overview of:

- The different forms of Intellectual Property (IP) that can be relevant in biotechnology and focuses more specifically on patents;
- The role of biotechnology in innovation in Europe; and
- How to use patent information for innovation indicators.

1. Intellectual Property and Biotechnology

Biotechnology is usually subdivided into three sectors that may overlap, namely:

– Healthcare biotechnology or *red biotechnology* which plays an important role in drug discovery (insulin, erythropoietin, etc.) and today is improving outcomes for patients and addressing unmet medical needs for the future;

– Agriculture biotechnology or *green biotechnology* that is used to enhance plants in order to improve their resistance to disease, tolerance for herbicides or difficult environment conditions, or to achieve higher yields with less inputs (water, fertilizers, etc.);

– Industrial biotechnology or *white technology*, representing the "third wave" in biotechnology, because it follows innovation in the health and agricultural areas; this sector encompasses the application of biotechnology-based tools to traditional industrial processes ("bioprocessing") and the manufacturing of bio-based products (biofuels, bio-plastics and bio-based chemicals). In this technology enzymes and/or micro-organisms, such as fungi, yeast, bacteria (also referred as "biocatalysts"), are used to make intermediate and end-products more efficiently, reduce environmental impacts of processes and products and/or enable the creation of new products from renewable resources.

In principle, the results generated by the research activity of these different sectors can be protected by IPR. Thus all actors involved in a biotechnology-based industry should have a basic understanding of the different types of Intellectual property (IP) and related rights granted by the system, in terms of:

- ✓ What results can be protected;
- ✓ The IP rights at their disposal;
- ✓ What these rights entail;
- ✓ How long these rights last.

1.1 The different forms of Intellectual property in Biotechnology

The IP created by biotechnology companies that can take a number of different forms, consisting of vaccines, seeds, plants, medical devices and software, but also brands and domain names, among others. Most of these different assets may attract more than one form of IP protection. In the biotechnology sector the most relevant form of IP are patents, although other forms are also applicable and used in practice. The table 1 below[2] summarises the different forms of IP protection which can be used to protect biotechnology innovation.

Patents	• Isolated polynucleic acids, peptides and polypeptides, enzymes, microorganisms, viruses, vectors, antibodies, probes, vaccines, compositions, expression systems, cell lines, plants, seeds, transgenic organisms, methods for preparation or use of the above; • medical devices
Trade marks	• Words/name, computer icons, graphical designs, multimedia elements or use of the above; • medical devices
Registered designs	• Medical devices, biochemical, biophysical or bio-electrochemical apparatus
Trade secrets / know-how	• Laboratory notebooks, design workbooks, customer information, documented internal processes, "data exclusivity" on clinical data generated for therapeutic approval
Plant breeders' or plant variety rights	• Plant varieties, propagating and harvesting material from plant varieties
Domain names	• Web addresses

Table 1

The deployment of IPR will depend on a number of factors, including the actor's area of specialisation, structure, anticipated activities, and whether it is engaged in commercial activity.

[2] The table has been elaborated based on the "Biotechnology Intellectual Property management manual", Spruson & Ferguson, 2008.

SHORT REMINDER ON IP

PATENT

A patent is a legal document, through which a right is granted for an invention, a product or a process that provides a new way of doing something or offers a new technical solution to a problem. A patent provide exclusive rights for a fixed period of time in exchange for public disclosure of the invention. A patent enables the patent owner/holder to exclude unauthorised third parties from making, using, selling, offering for sale or importing for those purposes a product, a process, or a product obtained by a patented process for the term of the patent.

TRADE MARK

A Trade Mark is a "distinctive sign" that identifies certain goods or services as those produced or provided by a specific person or enterprise. Trademarks may be obtained for the brand name of a particular product or service.

COPYRIGHT and RELATED RIGHTS

provide the right to exclude others from copying creative works – including software – but do not cover ideas, procedures, methods of operation or mathematical concepts as such. Copyrights may apply to the literature developed in relations to a product

REGISTERED DESIGN RIGHTS

are awarded to the developer as IPR that protects the visual design of an item, which are not functional. Industrial design concerns more the aspect and aesthetic of the device, also in Life Sciences and biotechnology field.

DOMAIN NAME

A domain name is the main address of a web site. More precisely, a domain name consists of one or more parts that are conventionally concatenated, and delimited by dots, such as something.com. Domain names are susceptible to be protected as "distinctive signs", if identifying the source of a product or service.

PLANT BREEDER'S RIGHTS

are also known as plant variety protection rights. They are rights granted to the breeder of a new variety of plant which is distinct, uniform and stable. They provides for the breeder exclusive control over the propagating material (including seed, cuttings, divisions, tissue culture) and harvested material (cut flowers, fruit, foliage) of a new variety for a number of years.

TRADE SECRET and KNOW-HOW

are valuable forms of IP. The term "confidential business information" know-how and "trade secrets" are often used interchangeably but strictly speaking, the two latter are a subset of confidential information in the context of business, commerce or trade. Trade secrets are valuable as long as they are kept secret which can be done through confidentiality or non-disclosure agreements. In fact, although considered as other forms of IP, no rights are granted by the system[3].

1.2 Patents on biotechnological inventions

As in other technological fields, biotechnology patent are used to protect technical innovation, including the way it works, how it is made and even how it is used. They grant its owner the exclusive right to prevent others from making, using, selling, offering for sale, or importing an invention without his consent, on a defined territory for a limited period of time[4].

[3] For a deeper analysis on the relevance of trade secrets and know-how, see the European IPR Helpdesk fact sheet on "Confidential business information", available in the library.
[4] In Europe, the protection lasts 20 years from the first filing of the patent application.

The rationale behind the patent protection for biotechnology inventions is related to the fact that:

- Patents give the possibility to the inventor to recoup the development costs of a new biotech product;
- Patents require the disclosure of the new technology for the benefit of society. Putting the new technology into the public domain inspires further innovation and development by competing companies, much like scientific publications spawn new discovery efforts and new lines of inquiry. Thus patents are a very rich source of technical information.

Like other patents, biotechnology patents also contain:

- A description of the invention itself with specific details and the advantages that this invention brings in comparison with the known state of the art, and examples;
- A set of claims, which define the matter for which protection is sought. In biotechnology claims are mostly concerned with:
    - Product claims
    - Use claims
    - Method of production claims

What characterises biotechnology patent is that they are defined as patents belonging to a defined list of Patent Classification codes.

To be patentable biotechnological inventions need to meet the same criteria as inventions in other technology fields.

For an invention to be patentable it:

- Must be an **invention** and not a discovery, and not belong to the list of exclusions;
    E.g. discoveries, scientific theories and mathematical methods….
    The discovery of natural substances, such as the sequence or partial sequence of a gene, for instance, are not patentable because, without a description of the technical problem and the solution to it they are intended as technical teaching, which is not regarded as invention (Art.52(2)(a) EPC).
- Must be **new** (not belonging to the state of the art);
- Must involve an **inventive step** (not easily conceivable by any person having an expertise in the relevant discipline);
- Must be capable of **industrial application** (to be used in the industry).

1.2.1. What is patentable and what is not

The European Patent Convention[5] stipulates several exclusions from patentability of certain inventions, applicable mainly in the biotech field.

These exclusions are the following:

- **Any invention** whose commercial exploitation may considered **immoral or against the "ordre public"** and which concerns in particular:

  (a) Processes for cloning human beings;

  (b) Processes for modifying the germ line genetic identity of human beings;

  (c) Uses of human embryos for industrial or commercial purposes;

  (d) Processes for modifying the genetic identity of animals which are likely to cause them suffering without any substantial medical benefit to man or animal, and also animals resulting from such processes[6].

- **Plant and animals variety** or **essentially biological processes** for the production of plants and animals. A process for the production of plants or animals is essentially biological if it consists entirely of natural phenomena such as crossing and selection[7]. Note that plant varieties can be protected under the Community plant variety rights system in the EU, which is based on the International Union for the Protection of New Varieties of Plants (UPOV Convention), and provides a *sui generis* form of IP protection specifically adapted to the process of plant breeding and developed with the aim of encouraging breeders to develop new varieties of plants.

- **Methods for treatment** of the human or animal body, i.e. **methods for treatment by surgery** or **therapy**, and **diagnostic methods** practised on the human or animal body. The philosophy is that medical doctors should never be prevented from doing what their Hippocratic Oath obliges them to do, i.e. practice medicine ethically.

---

[5] See article 53 EPC.
[6] See rule 28 EPC.
[7] See rule 26 EPC. The Enlarged Board of Appeal of the EPO clarified this exclusion and interpreted the meaning of "essentially biological processes" in the Broccoli I case G 2/07 by stating that: *A non-microbiological process for the production of plants which contains or consists of the steps of sexually crossing the whole genomes of plants and of subsequently selecting plants is in principle excluded from patentability as being "essentially biological" within the meaning of Article 53(b) EPC. Such a process does not escape the exclusion […] merely because it contains, […], a step of a technical nature which serves to enable or assist the performance of the steps of sexually crossing the whole genomes of plants or of subsequently selecting plants. If, however, such a process contains […] an additional step of a technical nature, which step by itself introduces a trait into the genome or modifies a trait in the genome of the plant produced, […], then the process is not excluded from patentability under Article 53(b) EPC.*

However, according to Rules 26 and 27 of the EPC:

- **Biotechnological inventions** are defined as **"**inventions which concern a product consisting of or containing biological material or a process by means of which biological material is produced, processed or used**"**;
- **Biological material** means **"**any material containing genetic information and capable of reproducing itself or being reproduced in a biological system**"**. This definition covers living organisms and also DNA;
- **"Biotechnological inventions** should also be patentable if they concern:

  (a) **biological material** which is isolated from its natural environment or produced by means of a technical process even if it is previously occurred in nature;

  (b) **plants** or **animals** if the technical feasibility of the invention is not confined to a particular plant or animal variety;

  (c) **a microbiological** or other **technical process** or a **product obtained by** means of **such a process** other than a plant or animal variety **"** (Rule 27 EPC).

Together with the EPC, the Directive 98/44/EC on the legal aspects of **biotechnological inventions,** implemented by all member states, provides the basis for deciding on patentability of biotechnology applications at the EPO and puts greater focus on ethical considerations.

Besides the EPC provisions, the Directive rules out:

- The patenting of the entire human body in all its developmental phases;
- Processes for modifying the germ line genetic identity of human beings and the use of human embryos for industrial or commercial purposes.

Table 2 below[8] summarises what can be patentable and not patentable in the biotechnology field:

What is patentable?	What is not patentable?
Genes and nucleic acid molecules e.g.: - disease related genes for diagnosis - antisense, - siRNA molecules for therapy	**Sequences without a known function** e.g.: - Expressed Sequence Tags (ESTs) resulting from automated sequencing
Proteins e.g.: - insulin - erythropoietin for therapy - cellular receptors for drug screening	**Genetically modified animals which is suffering without any substantial medical benefit** e.g.: - a genetically modified animal which is solely used to test cosmetics

[8] Table two has been reproduced from "Patents on life? European law and practice for patenting biotechnological inventions", European Patent Office, Munich, Germany, 2009.

Enzymes e.g.: - protease for washing powder - cellulose-degrading enzymes for the production of bio-fuels	**Plant varieties as such** e.g.: - Golden delicious apples
Antibodies e.g.: - for cancer treatment - pregnancy tests - diagnostics	**Animal varieties** e.g.: - Holstein cattle
Virus and virus sequences e.g.: - hepatitis C virus - HIV for blood testing - development of vaccines and therapies	**Human embryos**
Cells e.g.: - haematopoietic stem cells for the treatment of leukaemia	**Processes which necessarily involve the use and destruction of human embryos**
Micro-organisms e.g.: - bacteria for bioremediation - yeast for food production	**Human germ cells** (sperm, oocytes)
Transgenic Plants e.g.: - herbicide resistant soybean - golden rice which accumulate pro-vitamin A - drought-resistant plants - algae and genetically modified yeast for capturing CO2 from the atmosphere	**Human-animal chimera**
Transgenic Animals e.g.: - disease models for research such as the genetically modified "oncomouse" - donor animals for xenotransplantation - dairy animals which produce medicaments in milk	

Table 2

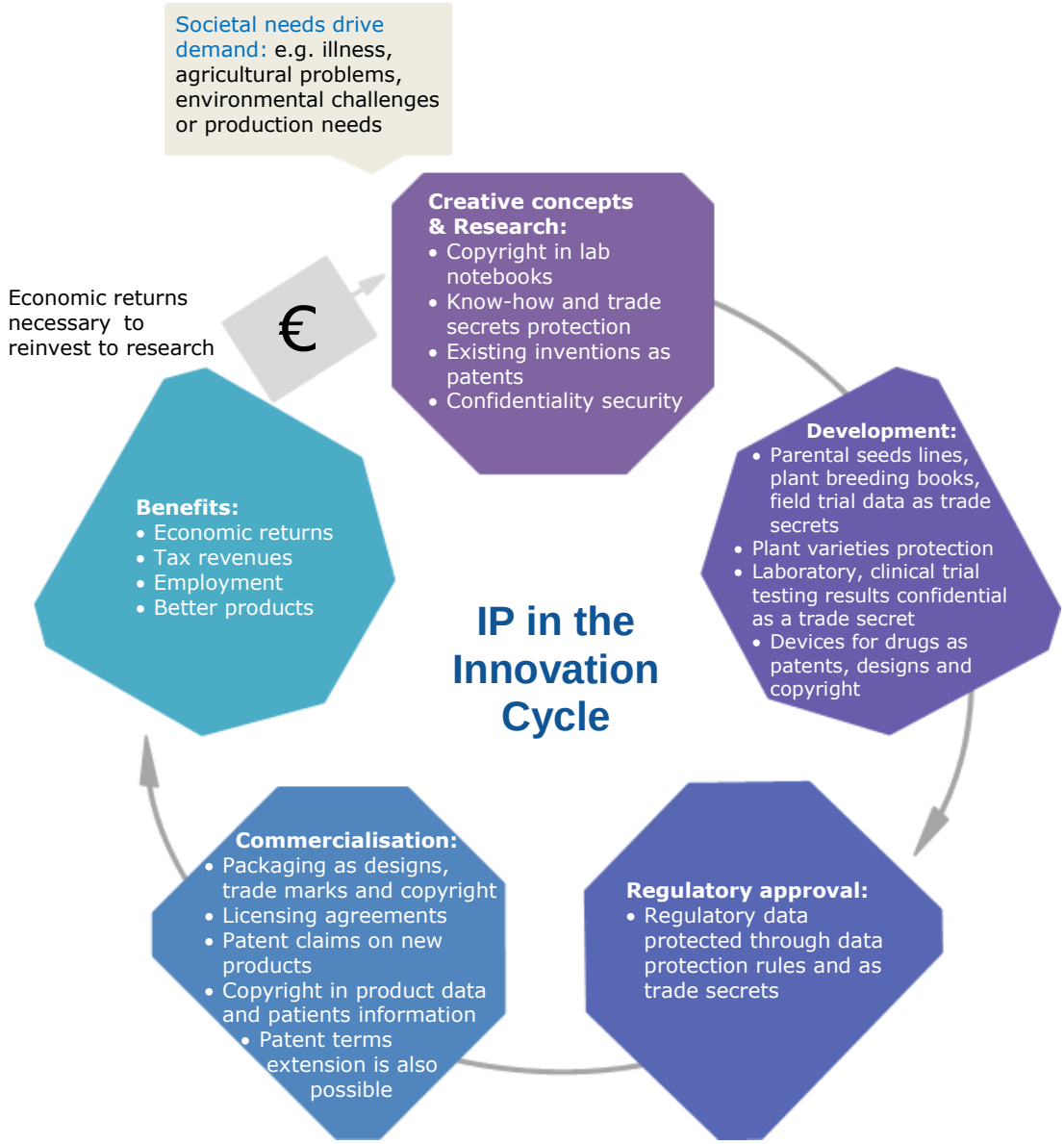
2. Biotechnology and innovation in Europe

Biotechnology makes a significant contribution to the modernisation of Europe's industry sectors. Its broad range of high-tech applications is increasingly playing a role in enhancing the EU market competitiveness, raising economic growth and improving the welfare of European citizens. Biotechnology has become the driving force of radical changes in innovation processes in various sectors.

2.1 The innovation cycle

Innovation can be described as a cycle - "innovation cycle" - because it is in fact a continuous process of discovery, validation development, registration and commercialisation, leading to the creation of value which can be reinvested in further innovations.

The innovation cycle in the biotechnology sector is complex, expensive and long, and success is uncertain. The diagram below[9] summarises the key phases of this cycle. ***Societal needs*** motivate researchers in public institutes and private companies to come up with ***creative new ideas and concepts***. Such research often leads to the ***development*** of new products. In many sectors, these products are then subjected to ***regulatory approval***, which is itself followed by ***commercialisation*** (either directly or indirectly by licensing agreements). These newly commercialised products ***provide benefits*** to enterprises, researchers, and society at large, but part of the sales revenue is ultimately ***reinvested into new research***.



[9] The diagram has been elaborated based on the EuropaBio brochure "How intellectual property rights promote innovation and create economic and societal value", available here.

Considering IPR in the innovation cycle ensures that the actors (public, private developers) are rewarded for their efforts and enable them to (re)invest in new technology and product R&D. Therefore, it is important that the fruits of the R&D investments are effectively protected and managed through a vigilant IP strategy because IP is a driving force behind continued innovation.

2.2 The European actors of the innovation cycle in Biotechnology

According to the Organisation for Economic Co-operation and Development (OECD)[10], four groups can be distinguished among the firm active in biotechnology and firms active in biotechnology R&D in the business sector:

- **Biotechnology firms** which use biotechnology to produce goods or services and/or to perform biotechnology R&D;
- **Biotechnology R&D firms** which perform biotechnology R&D;
- **Dedicated biotechnology firms** which devote at least 75% of their production of goods and services, or R&D, to biotechnology;
- **Dedicated biotechnology R&D firms** which devote at least 75% of their total R&D to biotechnology.

But also added to this list can be:

- **Public-sector biotechnology R&D**. University or Public Research Institutes inventions are often made with less effort than a proof of concept or prototype (*they use IP to take the innovations developed in their research laboratory to the market when a new outstanding technology is discovered*).
- **Plant breeders** that are using biotechnology R&D in addition to and in combination with traditional plant breeding methods (marker assisted breeding, new breeding techniques, etc.)

2.3 Open innovation: cooperation between SMEs, public research institutes and larger companies

Innovative products do not necessarily stem from an applied research activity. Open innovation is gaining more and more importance, mainly among SMEs, because this collaborative process permits companies that cannot afford to rely entirely on their own research to "use" IP from other organisations, under preferential conditions. Indeed, innovation is not only a matter of seeking IP protection, but also of understanding how IP is operating within the innovation cycle and the business strategy of companies, in order to develop competitive advantage through the use of IP.

Academia and other public research institutes: their role is essential in open innovation. Many universities have technology transfer offices which deal with

[10] Future prospects for industrial Biotechnology, OECD, Paris, 2011

these matters and generate significant additional resources for new R&D activities.

SMEs: their role cannot be underestimated. Thus, in industrial biotechnology and in pharmaceutical sectors, SMEs are the key players in the initial development of many innovations and, in agricultural biotechnology, collaborations with universities allow for major innovations. Moreover SMEs are often created as university start-ups to build on a promising innovation, which could attract the interest of larger companies in having it licensed or even permanently assigned. In this way access to venture capital for start-ups is facilitated in the research phase.

Larger companies: develop their own products but collaborate also with universities or public research institutes for the successful development of a product. Collaborations are often set up as licensing agreements in return for payment of royalties. In some cases, ownership of IP rights is transferred, or SMEs are acquired.

3. Practical advice: How to use biotechnology patent indicators

Patents are important in all technology fields but probably even more important for new and specialised fields such as biotechnology because they can contain information that may not be captured by other indicators. In fact, according to the OECD, patent information is essential for small companies because it allows them to come up with new ideas based on previous inventions and develop them into a viable product[11]. For this reason, those involved in this sector should be familiar with patent databases and how to use them.

3.1 How to find biotechnology patents?

Patents in biotechnology are available, as other patents, using two main kinds of tools:

- *Free-of-charge databases*. Organisations such as the EPO, the WIPO as well as some National Patent Offices provide free access to patent information on their websites. For example, Google as a private initiative offers access to the full US Patents database;
- *Commercial patent databases*, managed by private companies which charge for their use. They provide access to databases covering the whole patent literature or sectoral patent information;
- *Patent alerts of Branch Organisations.* For example, the German association of plant breeders (BDP) publishes a monthly overview of new (published/granted) patents in green biotechnology.

[11] "A framework for biotechnology statistics", cited.

Examples of patent databases:

Free-of-charge (available on the web): Google Patents; Espacenet; USPTO; Patent Scope; Eurasian Patent Organisation

Commercial: Questel-Orbit; Matheo Software patent; STN; Thomson innovation; Derwent;

A patent document contains several sections which can be analysed in order to connect the patent rapidly and easily to a relevant technology. The most relevant of these sections are:

- Title of the invention;
- Abstract describing the invention;
- List of claims;
- Patent classification codes.

These latter codes organise and index the technical content of a patent document and, in the case of biotechnology, patents are defined as patents belonging to a specific/defined list of patent classification codes.

The patent classification codes assigned by patent examiners during the patent examination process help to group inventions according to technical area and so to identify patents from a certain technological area. They are organised hierarchically and divided in sections and subsections.

The main patent classification systems relevant to organisations wishing to develop their technologies in the EU are: the International Patent Classification (IPC), the European Patent Classification (ECLA) and the Cooperative Patent Classification (CPC). Such systems provide for a hierarchical system of language independent symbols for the classification of patents and utility models according to the different areas of technology.

It can be noted that, in the biotechnology sector, the majority of patents are classified in the International Patent Classification sub-classes C12M to C12S. Note however that it is extremely difficult to capture all biotechnology patents using only those two sub-classes.

Generally speaking, the broader the technology field, the more difficult it is to identify the corresponding classes, as they will be spread across different higher level categories, and possibly mixed with other technologies which are not of interest.

Thus for instance, although the list of classes for biotechnology is concentrated in section A, C and G of the IPC, certain patents in the biotechnology field might be found in sections B, D and E but are mixed with other technology domains from

which they cannot be separated (e.g. bioinformatics can be assigned to G06F but this class includes other computer-related technologies)[12].

> Examples of IPC codes for patents in the biotechnology field: A01H1/00, A01H4/00, A61K38/00, A61K39/00, A61K48/00, C02F3/34, C07G(11/00,13/00,15/00), C07K(4/00, 14/00, 16/00, 17/00, 19/00), C12M, C12N, C12P, C12Q, C12S, G01N27/327, G01N33/(53*[13], 54*, 55*, 57*, 68, 74, 76, 78, 88, 92)[14].

For emerging technologies, a specific category or class might not yet be incorporated into the patent classification systems, which makes it difficult to identify patents related to these technologies afterwards. Therefore to select patents related to specific technological domains, one can either look at the IPC classes and subclasses, and/or search for appropriate key words within the text fields of the patent document. Such a method might exclude, or include, patents that are not relevant for a specific domain, but it makes it possible nonetheless to provide a relatively good picture of innovation in the same technology field.

3.2 How to get innovation indicators from biotechnology patents?

Based on the information available in a patent document, it is possible to build **innovation indicators**. These very important indicators are generally obtained by interpreting information provided in the patent bibliography notices (also called bibliographic references), although parts of them may be also retrieved *via* publication and business information.

They are generally built by cross-referencing the information present in what are the called bibliographic fields of the patent notices. Some indicators of particular relevance are for instance:

- The evolution of a firm's activities (information extracted from the "Patent assignee" and "Priority date" bibliographic fields);
- The company's fields of activity (from the "Patent assignee" / "IPC codes" bibliographic fields);
- The evolution of the interests for national markets (from the "Patent family" / "Priority year" bibliographic fields).

Generating indicators based on patents can help organisations to exploit empirical information to estimate factors that affect technological advance and successful commercialisation:

[12] For more information on patent searching, see the European IPR Helpdesk fact sheet on "How to search for patent information", available in the library.
[13] The asterisks indicate that those IPC codes also include subgroups up to one digit. For example in addition to the code G01N33/53, the codes G01N33/53(1), G01N33/35(2), etc., are included.
[14] "A framework for biotechnology statistics", cited.

- To measure the implication of R&D (or other) activity with respect to a technology;
- To assess one or more competitor organisations and their technology development activities (patent survey);
- To analyse the technology field and estimate the technological advance.

Indicators issued from patents can also help you to inform organisations when it comes to take strategic decisions on key issues. Accordingly, Porter and Cunningham[15] suggest for instance five applications of patent information which can be useful to inform any technological sector:

- Technological emphasis
- Technological share
- Rate of technology growth
- Patent quality
- National profile

More specifically, patent information in the biotechnology field can be used to perform a:

- Patent survey for a biotechnology company,
- Patent landscape for a product, a pathology, a device, etc.

Examples of innovation indicators for the biotechnology sector:

Patent survey for a biotechnology company	Patent landscape for a pathology
Publication trends	**Patent landscape overview**
▪ Distribution by date ▪ Distribution of patent family sizes ▪ Geographical distribution of patent filings ▪ Trend of geographical distribution of patent filings ▪ Geographical distribution of patent filings ▪ Assignee collaboration network	▪ Geographic breakdown of patent filings ▪ Main patent applicants ▪ Main inventors ▪ Main academic patent applicants ▪ Legal status of patent filings ▪ Countries of filings for main patent applicants ▪ Patent applicant network ▪ Main IPC sub-classes ▪ Backward citations map ▪ Main routes of administration claimed ▪ Main mechanisms of action claimed ▪ Technology breakdown of patent filings
Citations	**Natural products and traditional medicine**
▪ Patent family having most citations ▪ Patent families having most self-citations ▪ Forward/backward citations map ▪ Evolution of patents citing "company's" patents	▪ Geographic breakdown of patent filings ▪ Main patent applicants ▪ Main inventors ▪ Countries of filings for main patent applicants ▪ Patent applicant IP network ▪ Main IPC sub-classes

[15] A. L. Porter and J. Cunningham, "Tech Mining: Exploiting new technologies for competitive advantage - Generating and presenting innovation indicators", p. 249-288, New York, 2005.

	▪ Main IPC classes ▪ Backward citations map ▪ Main routes of administration claimed ▪ Main natural products claimed ▪ Main mechanisms of action claimed
Legal	**Formulation**
▪ Main IP attorneys ▪ Legal status of patent filings ▪ Patent granted by patent office ▪ Time for "Company" to grant US patents ▪ Distribution of total claims per US patents ▪ European patent opposition ▪ Main patent reassignment ▪ Actual or expected expiration date	▪ Geographical breakdown of patents filings ▪ Main patent applicants ▪ Main inventors ▪ Countries of filing for main patent applicants ▪ Patent applicant IP network ▪ Main IPC sub-classes ▪ Main IPC classes ▪ Backward citations map ▪ Main routes of administration claimed ▪ Main mechanisms of action claimed
Inventors	**New chemistry entity**
▪ Top and last inventors ▪ Evolution of the number of new inventors ▪ Main inventor collaborations	▪ Geographical breakdown of patent filings ▪ Main patent applicants ▪ Main inventors ▪ Countries of filing for main patent applicants ▪ Patent applicant IP network ▪ Main IPC sub-classes ▪ Main IPC classes ▪ Backward citations map ▪ Main routes of administration claimed ▪ Main mechanisms of action claimed
Technology	**Device**
▪ Main 20 IPC codes ▪ Evolution of top 15 IPC codes ▪ Main patent type filed ▪ Evolution of main patent types ▪ Main pathologies claimed ▪ Evolution of main pathologies claimed ▪ Main routes of administrations claimed ▪ Evolution of main routes of administration ▪ Main mechanisms of action claimed ▪ Evolution of main mechanisms of action claimed	▪ Geographical breakdown of patent filings ▪ Main patent applicants ▪ Main inventors ▪ Countries of filing for main patent applicants ▪ Patent applicant IP network ▪ Main IPC sub-classes ▪ Main IPC classes ▪ Backward citations map ▪ Main devices claimed

Table 3[16]

[16] This table has been adapted from the information provided in the patent surveys 2013 Acna and Viropharma, conducted by Knowmade and available here.

Useful information

- "A framework for biotechnology statistics", OECD, Paris, 2005: http://www.oecd.org/science/biotech/aframeworkforbiotechnologystatistics.htm
- "Biotechnology Intellectual Property management manual", Spruson & Ferguson, 2008: http://www.spruson.com/biotechnology-intellectual-property-management-manual/
- Fact sheet on "Confidential business information": http://www.iprhelpdesk.eu/Fact-Sheet-How-to-Manage-Confidential-Business-Information
- Fact sheet on "How to search for patent information": http://www.iprhelpdesk.eu/Fact-Sheet-How-to-Search-for-Patent-Information
- Patents on biotechnology European law and practice, European Patent Office, Munich, Germany 2014: http://documents.epo.org/projects/babylon/eponet.nsf/0/50e49b8a1ca12437c12575ad00372678/$FILE/biotechnology_brochure_en_2014.pdf
- "Patents on life? European law and practice for patenting biotechnological inventions": http://documents.epo.org/projects/babylon/eponet.nsf/0/50e49b8a1ca12437c12575ad00372678/$FILE/biotechnology_brochure_en.pdf
- "How intellectual property rights promote innovation and create economic and societal value": http://www.europabio.org/how-intellectual-property-rights-promote-innovation-and-create-economic-and-societal-value
- "Future prospects for industrial Biotechnology": http://www.oecd.org/sti/biotech/futureprospectsforindustrialbiotechnology.htm

GET IN TOUCH

For comments, suggestions or further information, please contact

European IPR Helpdesk
c/o infeurope S.A.
62, rue Charles Martel
L-2134, Luxembourg

Email: service@iprhelpdesk.eu

Phone: +352 25 22 33 - 333

Fax: +352 25 22 33 – 334

©istockphoto.com/Dave White

ABOUT THE EUROPEAN IPR HELPDESK

The European IPR Helpdesk aims at raising awareness of Intellectual Property (IP) and Intellectual Property Rights (IPR) by providing information, direct advice and training on IP and IPR matters to current and potential participants of EU funded projects. In addition, the European IPR Helpdesk provides IP support to EU SMEs negotiating or concluding transnational partnership agreements, especially through the Enterprise Europe Network. All services provided are free of charge.

Helpline: The Helpline service answers your IP queries within three working days. Please contact us via registration on our website – www.iprhelpdesk.eu – phone or fax.

Website: On our website you can find extensive information and helpful documents on different aspects of IPR and IP management, especially with regard to specific IP questions in the context of EU funded programmes.

Newsletter and Bulletin: Keep track of the latest news on IP and read expert articles and case studies by subscribing to our email newsletter and Bulletin.

Training: We have designed a training catalogue consisting of nine different modules. If you are interested in planning a session with us, simply send us an email at training@iprhelpdesk.eu.

DISCLAIMER

This Fact Sheet has been initially developed under a previous edition of the European IPR Helpdesk (2011-2014). At that time the European IPR Helpdesk operated under a service contract with the European Commission.

From 2015 the European IPR Helpdesk operates as a project receiving funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 641474. It is managed by the European Commission's Executive Agency for Small and Medium-sized Enterprises (EASME), with policy guidance provided by the European Commission's Internal Market, Industry, Entrepreneurship and SMEs Directorate-General.

Even though this Fact Sheet has been developed with the financial support of the EU, the positions expressed are those of the authors and do not necessarily reflect the official opinion of EASME or the European Commission. Neither EASME nor the European Commission nor any person acting on behalf of the EASME or the European Commission is responsible for the use which might be made of this information.

Although the European IPR Helpdesk endeavours to deliver a high level service, no guarantee can be given on the correctness or completeness of the content of this Fact Sheet and neither the European Commission nor the European IPR Helpdesk consortium members are responsible or may be held accountable for any loss suffered as a result of reliance upon the content of this Fact Sheet.

Our complete disclaimer is available at www.iprhelpdesk.eu.

© European Union (2014)