Europäisches Patentamt
European Patent Office
Office européen des brevets

Patent teaching kit



Table of contents

About the patent teaching kit 4

Introduction 5

Terms of use 5

Core module 1

Protect your ideas! 7

An introduction for students of science, engineering, medicine and business administration

Core module 2

How patents work 97

An introduction for law students

Sub-module A

Searching for patents 173

How to use the *esp@cenet* database

Sub-module B

The use of patents by a university spin-off 191

Sub-module C

Understanding patent claims 233

(a) Toy ball 237

(b) Heating element for a washing machine 247

(c) Material for a synthetic lawn 257

(d) Double pipe 267

(e) Electrical power converter 279

(f) Drug for the treatment of cancer 289

(g) Automatic power switch for hearing aid 299



About the patent teaching kit

The patent teaching kit consists of two core modules and three sub modules. While the core modules offer an introduction to the world of patents, the sub modules allow a more in depth coverage of specific patent related topics, depending on the learning needs of the students.

Core module 1 is designed for students of science, engineering, medicine and business administration, core module 2 for law students. Both modules contain background information to support the delivery of the lectures. For each slide, you will find approximately one page of background information. Brief teaching notes shown beneath the slides in PowerPoint are intended to be useful during the lecture.

Reading the background information is not a requirement to be able to deliver a successful lecture. It is intended as optional background information for yourself, for example to find additional details or to prepare for the more advanced questions that students might have. It is not intended that you include this information in the lecture as this would be excessive.

The topics covered in the sub-modules are understanding patent claims, searching for patents and the use of patents by a university spin-off. They are particularly useful for teaching graduate or Ph.D. students who are specifically interested in patents. Searching for patent documents is a very important competence for any scientist or engineer. We thus recommend offering a small lecture on patent searching using the provided material.

The sub-modules contain less background information and less elaborate speaking notes. Most of the optional material can also be used by teachers without a great deal of prior knowledge of patents. However, we suggest that a teacher using sub-module C on "Understanding patent claims" should have good prior knowledge of the patent granting process in order to be able to successfully deliver the lecture and answer students' questions.

For those teachers intending to customise the lectures, to go into more detail or to address further topics, the patent teaching kit provides optional slides in most modules. By the end of your lecture, your students will have acquired some indispensable basic knowledge and will have been motivated to learn more. The website of the EPO then provides further information to support learning opportunities.

Introduction

Patents play a very important role in today's knowledge economy. Large corporations, small businesses and start-ups use patents to protect their ideas and assets from being copied and to defend their competitive edge. Increasingly, universities are also making use of patents to safeguard and commercially exploit their research results, and to facilitate technology transfer to industry partners.

Today's students are the engineers, researchers, lawyers, politicians, and managers of tomorrow. An awareness of what intellectual property is and how it can be protected will stand these students in good stead for their future careers. For this reason, it is important they have access to information on the patent system.

To support the dissemination of knowledge on intellectual property, the European Patent Academy has developed this comprehensive teaching kit. The kit provides teaching professionals at universities with the tools and information they need to deliver a one- to two-hour lecture on the role of patents. It comprises presentation materials, case studies and relevant real-world examples. In addition, extensive teachers' notes provide useful background information and tips on delivery for the lecturer.

The kit is designed for use with students of any level, studying in any faculty, and it assumes no prior knowledge of the subject matter. It is particularly useful for students of natural sciences, engineering, law, medicine and business administration, providing them with basic knowledge of the patent system.

Terms of use

This patent teaching kit has been prepared by the European Patent Office (EPO).

The patent teaching kit and any of its parts may be modified or translated on condition that the EPO is credited as the provider of the original, and that it is clearly stated that changes have been made to the original material, that the modified or translated version has not been authorised by the EPO, and that the EPO shall not be responsible for the correctness of any such modified or translated version. Any other reference to the EPO, and in particular its official logo, shall be removed from any such version.

The patent teaching kit and any of its parts, as well as any modification or translation thereof, shall be used for non-commercial purposes only.

© European Patent Organisation 2009. All rights reserved.

Core Module 1
Protect your ideas

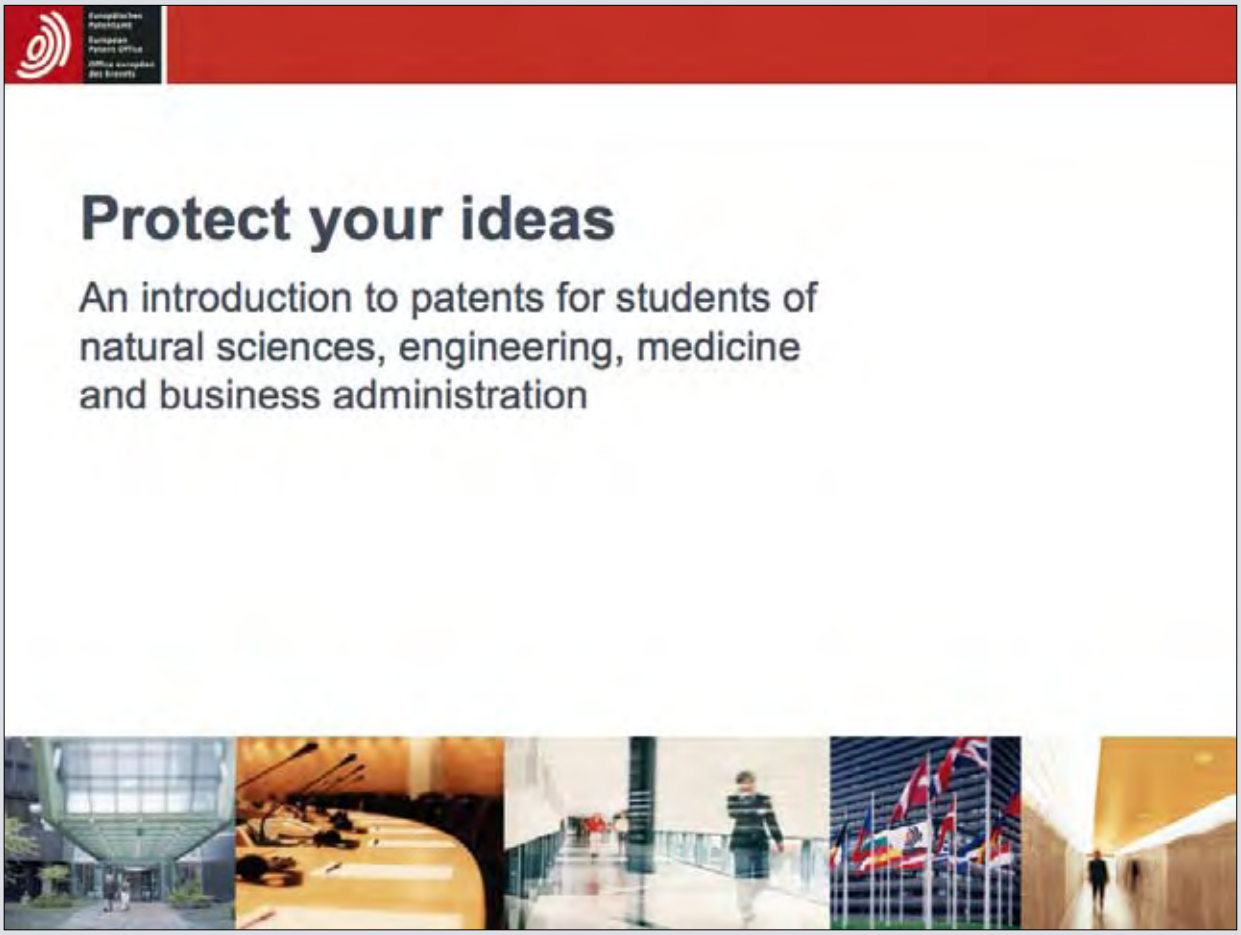
An introduction to patents
for students of natural sciences,
engineering, medicine
and business administration

Table of contents
Core module 1

Introduction to intellectual property rights	Slide 1 – 7	11
Why do patents exist?	Slide 8 – 12	28
Worldwide patent application rates	Slide 13 – 14	38
Basic facts about patents	Slide 15 – 20	42
Essentials on patent filing	Slide 21 – 26	54
To patent or not to patent?	Slide 27 – 29	66
The economic value of patents	Slide 30 – 33	74
Patents – the invaluable source of information	Slide 34 – 43	82

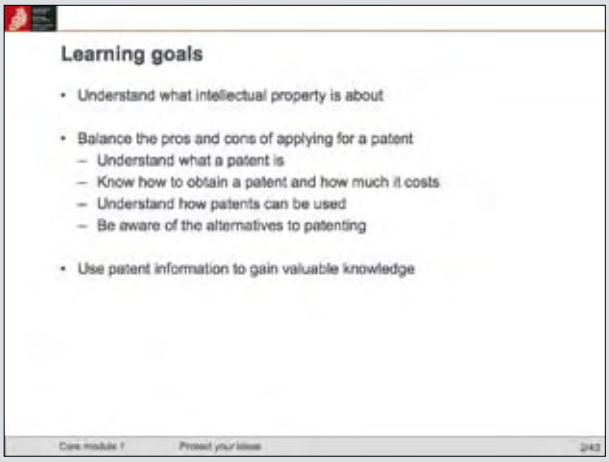
Overview

Slide 2	Contents of the lecture
Slide 3	Overview of different forms of intellectual property
Slide 4	Some IP found in a mobile phone
Slide 5	Importance of intellectual property
Slide 6 (optional)	Examples of valuable intellectual property
Slide 7 (optional)	Patents are all around us
Slide 8 (optional)	The first account of a "patent system"
Slide 9	The patent system
Slide 10 (optional)	An early English patent issued in 1617
Slide 11 (optional)	GB Patent No. 913 – Watt's radically improved steam engine
Slide 12 (optional)	Developments in the number of steam engine patents
Slide 13 (optional)	Worldwide patent applications per year
Slide 14 (optional)	Filing rates at selected patent offices
Slide 15	The "social contract" implicit in the patent system
Slide 16	Rights conferred by the patent
Slide 17	What does a patent look like?
Slide 18	Sample patent
Slide 19	Structure of the description
Slide 20	What can be patented at the European Patent Office?
Slide 21	What not to do when considering filing a patent application
Slide 22	Where to apply for a patent
Slide 23 (optional)	The patent procedure at the EPO
Slide 24 (optional)	The PCT procedure
Slide 25	Cost of a national patent application – Germany
Slide 26	Cost of a European patent up to grant
Slide 27	Advantages and disadvantages of patenting
Slide 28	Alternatives to patenting
Slide 29	How patents are used
Slide 30 (optional)	Licensing income of US universities
Slide 31 (optional)	The value of European patents
Slide 32 (optional)	Share of patent classes in total portfolio value
Slide 33 (optional)	Patent management
Slide 34	15-25% of all research efforts in vain
Slide 35 (optional)	Re-inventing the wheel – literally
Slide 36:	Much information only available in patents
Slide 37	Solutions found in patent documents
Slide 38	Searching for patents can be easy ...
Slides 39-43	... but some basic knowledge is needed


Protect your ideas
An introduction to patents for students of natural sciences, engineering, medicine and business administration

Slide 2
Contents of the lecture

The slide shows students what they can expect from the presentation.


Learning goals
• Understand what intellectual property is about
• Balance the pros and cons of applying for a patent
– Understand what a patent is
– Know how to obtain a patent and how much it costs
– Understand how patents can be used
– Be aware of the alternatives to patenting
• Use patent information to gain valuable knowledge

Slide 3
Overview of different forms of intellectual property

Patents are granted for technical inventions only. They must be applied for at a patent office. Patent applications are examined in a process that may result in the refusal or grant of a patent. Patents normally last for a maximum of 20 years from the date of filing. Depending on the country, the patent belongs either to the first inventor to file an application (Europe and most other countries, "first to file") or to the first person to make the invention (in the USA, "first to invent").

In some countries a special, less powerful kind of patent called a "utility model" (or "petty patent") is also available. Utility models usually offer less effective protection for a shorter period of time. Most countries require inventions to be new in order for them to receive utility model protection. Others, for example Germany, also require them to involve an inventive step. But most countries examine neither novelty nor inventive step and will register any utility model that complies with the formalities (whether or not the utility model meets the legal requirements must then be decided later in the courts, if there is a legal dispute).

Copyright does not need to be registered. It "automatically" exists when the work is created. Any original, creative, intellectual or artistic expression is protected by copyright. Examples include novels, scientific literature, theatre plays, software, photographs and paintings, music, sculptures, television broadcasts, etc. Even the smell of a perfume may be (indirectly) protected by copyright: national courts have ruled that the blend of ingredients that goes into a perfume can represent an original work of authorship and therefore be protected by copyright.

Incidentally: the terms "all rights reserved" or "copyright by ..." are not needed in order to establish copyright. They are only used because they could improve the position of the owner of the right in an infringement lawsuit in the USA (the infringer cannot claim innocent infringement). However in Europe as well as in the USA, copyright protection exists regardless of whether you explicitly state it or not.

The duration of a copyright is roughly the life of the author plus 70 years, but this depends on the specific case and country.

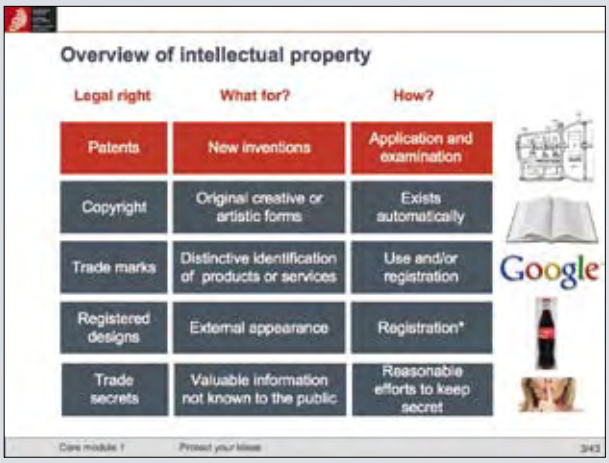
Trade marks are distinctive signs identifying and distinguishing the commercial source of goods or services. Such signs can consist of words, logos, names and colours, as well as any other means of identifying commercial origin, such as the shape of products and their packaging, and possibly even sounds or smells. For instance, most Disney characters are registered as trade marks!

Trade marks can be created simply by using them (as for example Google did) or by explicitly registering the trade mark, for example at the national patent and trade mark office, as most companies prefer. It is easier to prevent competitors from copying or damaging your trade marks if they are registered. The main requirement for the registration of trade marks in the European Union is that the trade mark must not be devoid of any distinctive character (Article 7 of Council Regulation (EC) No. 40/94): *http://oami.europa.eu/EN/mark/aspects/pdf/4094enCV.pdf*. In Europe, the trade mark must be represented graphically in order to be registered, which can be a challenge for trade marks based on smell.

Trade marks last as long as they are used and can be registered with the national trade mark offices or international bodies (e.g. EU).

Upon opposition by the proprietor of an earlier trade mark, the later trade mark for which an application is filed will not be registered if it is identical or similar to the earlier trade mark and the goods or services to which the trade mark applies are identical or similar to the goods or services for which the earlier trade mark is registered. Registration will be refused if a likelihood of confusion exists on the part of the public in the territory where the earlier trade mark is protected (Article 8 of Council Regulation (EC) No. 40/94): *http://oami.europa.eu/EN/mark/aspects/pdf/4094enCV.pdf*.

In the European Union, trade marks are protected at national level by trade mark laws that have been harmonised on the basis of the Trade Mark Directive (89/104/EEC, consolidated version enacted as 2008/95/EC). In addition, the Community Trade Mark Regulation has established a uniform regime for protection operating at Community level.



Patents: Only inventions can be patented and they will be disclosed to the public. The patent office will examine the patent application to determine whether the stringent requirements for a patent grant are met.

Copyright: Copyright includes, for example, literature, art, drama, music, photographs, recordings, broadcasts, etc.

Trade marks: Trade marks are distinctive signs or indicators of the source of a product or service, e.g. names, logos, colours applied to the owner's products or services, which distinguish them from products or services provided by competitors.

Registered designs: Registered designs protect the external appearance of a product. They do not give any protection for technical aspects. They include new patterns, ornaments and shapes. To be officially registered, designs need to be original and distinctive. The artistic aspects of a design may also be protected by copyright.

Unregistered designs also enjoy some protection: An unregistered design is a free, automatic right that you get when you present a design to the public. It gives you the right to stop anyone from copying your design but typically the protection afforded by an unregistered design is of more limited duration than that available for a registered design.

Trade secrets: This is an alternative to patents. Trade secrets cover information not known to the public. If the possessor of such information is careful to keep the information confidential (e.g. by **signing non-disclosure agreements** with employees/partners) he can sue anyone who steals it. However, trade secrets offer no protection against reverse-engineering or against competitors who independently make the same invention.

Infringement of trade mark rights occurs if an identical mark is used for identical goods or services, or if an identical or similar mark for identical or similar goods or services gives rise to a likelihood of confusion, or if use of a mark which has a reputation without due cause takes unfair advantage of or is detrimental to the reputation or the distinctive character of the infringed trade mark. The proprietor of an earlier mark is also entitled to oppose the application for, or cancel the registration of, another mark which would be infringing.

Registered designs (USA: design patents) protect the ornamental design, form, appearance or style of objects. Registered designs only protect the aesthetic aspect and they are not intended to protect any functional aspect of the product. Designs can be registered with a national office, with the EU's Office for the Harmonization of the Internal Market (OHIM) for EU-wide protection or through the Hague System for the international registration of industrial designs, which is administered by the World Intellectual Property Organization (WIPO).

A Community registered design may be obtained by deposit (no substantive examination is undertaken) at OHIM. The requirements are absolute novelty and individual character. The duration of protection for a Community registered design is a maximum of 25 years from the date of application to register. They are granted in five-year terms which are renewable.

Unregistered designs also enjoy protection under certain conditions. You get a free, automatic right when you present an original design to the public: it gives you the right to stop anyone from copying your design but typically the protection afforded by an unregistered design is of more limited duration than that available for a registered design.

A Community unregistered design requires no formalities for subsistence. Like the Community registered design, the requirements for a Community unregistered design are absolute novelty and individual character. The duration of protection for a Community unregistered design is a maximum of three years following publication of the design in the European Community.

Other forms of IP not shown here include plant variety protection (USA: "plant patents"), semiconductor topography and trade secrets.

A **trade secret** does not represent a right itself – it is a piece of information that is protected by law under certain conditions. A trade secret is information that is (a) not known to the public, (b) more valuable if not known to the public and (c) subject to reasonable efforts to maintain secrecy. Such reasonable efforts include for example **non-disclosure agreements** (NDAs) with employees and business partners and measures to prevent industrial espionage.

The exact determinants of trade secrets and the protection they offer depend on national law. Trade secrets offer limited protection; only improper means of discovering the trade secret are prohibited. Competitors are not prohibited from developing and using the same technology independently or from reverse-engineering the technology.

All these intellectual property rights concern different aspects of intangible assets and can potentially help an inventor to protect his innovation **at the same time**. For example, the inventor might use a patent to remain the only company that offers a certain feature and a trade mark and design patents to communicate the special features of his products to consumers. He might also choose to keep some aspects of the production process secret, and if he makes serious efforts to maintain secrecy then he can enjoy the protection of trade secret law.

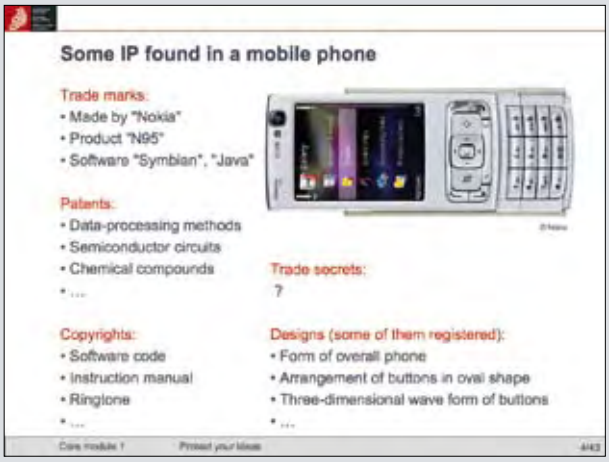


Slide 4
Some IP found in a mobile phone

Many students will not be aware of the wealth of intellectual property it takes to make and market a mobile phone today.

Examples of the different kinds of IP discussed in the previous slide are given for a mobile phone. This will help students understand how to protect different aspects of their own intellectual creations.

Trade secrets are not mentioned here simply because we don't know what secrets mobile phone companies and their suppliers might have.


Some IP found in a mobile phone
Trade marks:
• Made by "Nokia"
• Product "N95"
• Software "Symbian", "Java"
Patents:
• Data-processing methods
• Semiconductor circuits
• Chemical compounds
• ...
Trade secrets:
?
Copyrights:
• Software code
• Instruction manual
• Ringtone
• ...
Designs (some of them registered):
• Form of overall phone
• Arrangement of buttons in oval shape
• Three-dimensional wave form of buttons
• ...

Slide 5
Importance of intellectual property

In today's knowledge economy, intellectual property is very important. Start-up companies use IP in order to protect themselves from large industrial competitors copying their products (examples given: Dolby and Gore, see below). Large companies also use IP in order to reap the benefits of their investments. Even seemingly "traditional" industries like the steel industry use IP to protect their intangible assets such as newly developed steel formulations (example given: Sandvik, see below).

Most technical inventions need substantial investment before they can be produced and used. In order to attract funding, inventions must offer the potential to generate income. This perspective is greatly enhanced if IP protection is available. (If there were no IP protection, then competitors could offer the same products or service at a lower price because they didn't invest in research and development.)

Intellectual property laws allow the owner to transfer the right to use the intellectual property to another party, i.e. to grant a licence. The conditions under which the licence is granted can be determined by the owner of the IP. For this reason, buying a film on DVD almost never means actually buying the intellectual property – rather it usually means that the owner of the film sold a licence to use the film under certain terms, for example excluding the right to rent the DVD to others and excluding the right to copy it. Licensing is very common.

Because the licensor (the owner of the IP who grants the licence) can determine the terms of the licence, IP can actually be used to enforce "public ownership" of intellectual property. For example, open source software developers rely on intellectual property protection (copyright) to ensure that people building upon their work have to adhere to certain terms. Because they own the copyright, Linux developers are able to demand that improvements to the Linux code (that they give away for free) have to be free to use, too. You cannot develop or adapt the Linux code if you do not agree to these terms. In that way, the Linux developers ensure that their IP is not exploited by anyone to set up new proprietary rights. It is the intellectual property system that enables Linux developers to create free knowledge that will remain free. This could be compared to a wealthy family buying a natural forest in order to ensure that nobody will grab the land and cut down the trees for personal profit. If there were no property rights, then the family could not protect the forest from those wanting to cut down the trees.

Another (fairly advanced) example is the Creative Commons licence (see *www.creativecommons.org*) that enables an author to allow everybody to use his work, subject to certain conditions, e.g. that they must state his name or that the work cannot be used commercially. If the audience is not familiar with licensing, we suggest not mentioning this example.

Other examples of using the IP system for public benefit rather than to achieve profits are organisations such as TransFair (Fairtrade coffee) and the Forest Stewardship Council (wood produced without devastating natural forests). These organisations licence their trade marks (FAIRTRADE; FSC) only to those companies prepared to sign up to certain environmental and/or moral criteria. And the IP system ensures that unlicensed use of the trade marks can be prevented. So consumers can be confident that all products bearing the mark really do adhere to the promised standards.

Company examples

Sandvik is a maker of special steel products. It is worth EUR 10 000 million on the stock exchange. A subsidiary recently set up to hold all the intellectual property of the firm has a book value of EUR 1 800 million (the subsidiary has approximately 12 employees).

Dolby Laboratories pioneered noise reduction technology in the 1960s. They used a combination of patents to protect the technology and trade marks to identify Dolby as an indicator of quality to customers. In this way, what was a small start-up company was able to do business with large established companies and became a successful, growing high-tech company.

W.L. Gore was founded by the Gore family in the basement of their house in 1958. W.L. Gore developed and patented new products based on PTFE (Teflon®). Enjoying patent protection for their major products and being able to build strong brands such as Gore-Tex®, the company now has 8 000 employees.



Note

Sandvik's subsidiary company, which holds the IP, has only 12 employees and has a book value of EUR 1 800 million (in 2007).

Dolby Laboratories

– Invented noise-reduction technology in the 1960s.
– Used a combination of patents to protect the technology and trade marks.
– Became a successful high-tech company.

W.L. Gore

– Founded by the Gore family in the basement of their house in 1958.
– PTFE (Teflon®) related high-tech products.
– Patent protection and strong trade marks (Gore-Tex®).
– Now has 8 000 employees.

Additional examples for audiences familiar with the concept of licensing technology:

ARM Ltd.

– Develops energy-efficient microprocessors but does not make them (earns licensing royalties).
– Founded 1990, now market leader in microprocessors for mobile phones.
– ARM founder Hermann Hauser: *"I gave (the design team) two things which National, Intel and Motorola had never given their design teams: the first was no money; the second was no people. The only way they could (design a microprocessor) was to keep it really simple."*

LINUX

The Linux operating system and other open source software are free to use, but users must accept the general public licence (GPL), which includes an agreement to put any improvements under the GPL too.

Creative Commons

A range of sample licences for books, software, photos, etc. Authors may grant free use but require, for example, that their names be stated or that use be non-commercial.

ARM Ltd. was founded in 1990 to develop energy-efficient microprocessors. The company develops the technology and then licenses its intellectual property to third parties who actually make the products. More than 10 000 million ARM microprocessors have since been manufactured under licence from ARM. The company has grown to more than 1 800 employees and is the world leader in mobile phone microprocessors. (Here is an amusing anecdote that describes how ARM started: ARM founder Hermann Hauser recalls the early days of processor development at ARM and their success factor: *"I gave (the design team) two things which National, Intel and Motorola had never given their design teams: the first was no money; the second was no people. The only way they could (design a microprocessor) was to keep it really simple."*

If your audience is not familiar with the concept of licensing technologies, you do not need to mention ARM or the Creative Commons licence at this point.



Slide 6 (optional)
Examples of valuable intellectual property

Explaining the value that can be created with intellectual property could be an important motivator for a student audience. This slide contains examples of the value of a number of intellectual property assets.

Coca-Cola (registered trade mark): Value of the brand (brand = trade marks and the whole Coca-Cola customer experience) is estimated to be EUR 27 000 million (estimates published by Millward Brown Optimor, *http://www.brandz.com/upload/BrandZ_2007_Ranking_Report.pdf, and interbrand, http://www.interbrand.com/best_brands_2007.asp*).

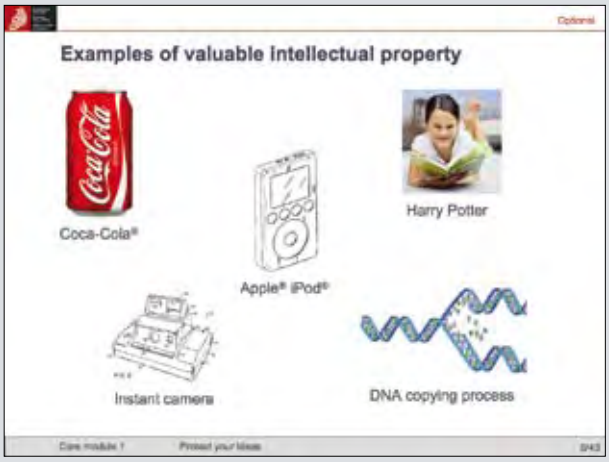
Apple iPod (registered trade marks and registered designs, also some patents): The extremely successful iPod bases its competitive advantage not so much on technical innovation but on customer experience and distinctive design. Apple has filed several US 'design patents' (called registered designs in Europe) on the iPod's design. Apple also applied for user interface-related patents on the iPod.

Harry Potter (registered trade marks and copyright): The author of the original Harry Potter book, J.K. Rowling, held all associated IP rights. This meant that she was the only person allowed to write a sequel to that book. She is reported to have earned EUR 750 million from her intellectual property rights on the Harry Potter story.

Instant camera (patents): Before the advent of digital cameras, instant camera technology was very valuable. In 1991, Kodak was found to have infringed patents held by Polaroid and was required to pay Polaroid EUR 550 million in damages.

DNA copying process (patents): The Nobel Prize-winning and patented DNA polymerase invention sold for EUR 190 million in 1991.

For comparison: The **"Hope diamond"**, one of the largest and most valuable blue diamonds in the world, is worth about EUR 125 million. At 2008 prices, gold is worth around EUR 18 000 per kg. That means J.K. Rowling converted her imagination to the equivalent of 42 tons of gold – true intellectual property magic!



Coca-Cola

Brand worth EUR 27 000 million according to various market research firms. TRADE MARK

Apple iPod

More than 100 million units sold. TRADE MARK, REGISTERED DESIGNS, PATENTS (user interface)

Harry Potter

Author J.K. Rowling converted her imagination to the equivalent of 42 thousand kilos of gold – true intellectual property magic (she earned approximately EUR 750 Million from her COPYRIGHT).

Instant camera

Kodak had to pay EUR 550 million to Polaroid for having illegally used Polaroid's patented inventions.

DNA copying process

Nobel Prize-winning technology was patented, PATENT sold for EUR 190 million.

Compare the value of IP with the Hope Diamond (a famous large blue diamond):

EUR 125 million.

Slide 7 (optional)
Patents are all around us

The aim of this slide is to show students that patents are relevant to almost every company – not just high-tech companies. There are a huge number of patents covering almost every product you can buy, so patents are of interest to everyone.

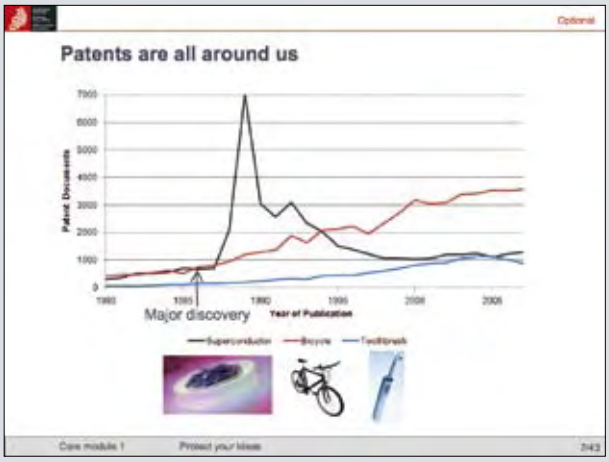
This slide shows charts and pictures illustrating patents in three different technical domains. They will be displayed in this sequence:

1. Superconductors
Patents applications are filed for breakthrough innovations (click with mouse to get first chart).
This chart, for example, shows applications relating to superconductors, a class of materials that conduct electric current without any loss. In 1986, researchers discovered so-called high-temperature superconductors that opened up the possibility of real applications for superconductors. A year later, these researchers received the Nobel Prize in Physics for their invention. They were granted a patent in the record time of 18 months. As you can see, their invention is followed by a huge increase in patent applications in the field: their invention initiated a phase of high inventive activity. However, even today superconductors are still not a mass-market product and most of these patents did not turn out to be valuable at all. It is no wonder, therefore, that research interest has decreased and the number of patent applications for superconductors has reduced almost to the level it was before the discovery of high-temperature superconductivity.

2. Bicycles
Many of the patents applied for are actually for simple inventions that concern things we use every day. You might think that the technology of bicycles is quite old and that there won't be many bicycle patents today but the opposite is the case. In fact, during the last decade more patents have been applied for relating to bicycle technology than superconductor technology! Incidentally, more than 100 million bicycles are produced every year worldwide – so no wonder there are large number of companies in fierce competition in this market. By way of comparison, the number of cars manufactured per year is around 40 million (same source). Global superconductor production was estimated by Siemens in 2005 to be 800 km of wire (bicycle chains: more than 100 000 km).

3. Toothbrushes
Even seemingly trivial things such as the opening of a tetra pack, a razor blade or a toothbrush may be covered by patents. In 2005, more than 1 000 patent documents relating to toothbrushes were published! (Incidentally, one of the many toothbrush manufacturers, Colgate, reported that just one of its factories produces 900 million toothbrushes a year.)

It is important to note that **despite the high number of patents, no company has a monopoly on bicycles or toothbrushes** – not even on superconductors. Instead, many companies have small proprietary technologies that make their bicycles, toothbrushes or superconductors a little better than those of the competition and thus help them to stay competitive.



Superconductors

1987: Nobel Prize in Physics for high-temperature superconductors invented in 1986. No substantial market until today.

Bikes

100 million bikes sold every year!

Toothbrushes

Well in excess of one billion sold every year (one plant reportedly manufactures 900 million a year).

Data sources

The chart shows the number of patent documents found on the free worldwide patent database at *www.espacenet.com*. A search for the keywords 'bicycle or bike or bicyclette or Fahrrad', 'toothbrush or Zahnbürste' and 'superconduct*' was performed. The production figures for bicycles and cars were taken from reports by the Earth Policy Institute, the US National Bicycle Dealers Association, and the International Organization of Motor Vehicle Manufacturers.

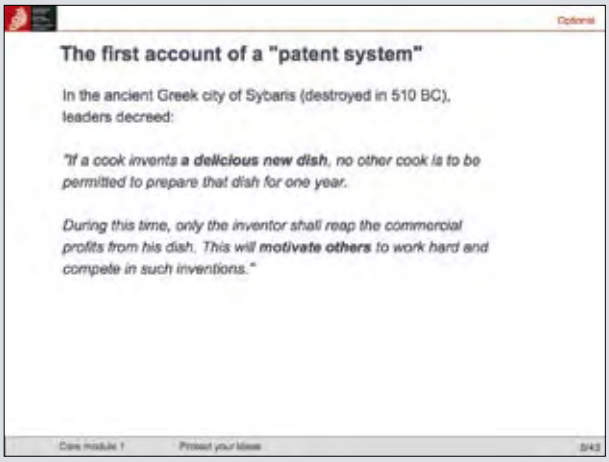
Slide 8 (optional)
The first account of a "patent system"

History of the patent system: the first account of rights comparable to patents is from ... yes: the ancient Greeks!

The Greek writer Athenaeus reported that this decree was alleged to have been in force in the city of Sybaris. Note that although the rule "just" concerns recipes for meals, the Greek writer mentioned the economic profits a cook could generate from a proprietary recipe!

The aim of this patent on recipes for delicious meals is reported to have been to encourage cooks to work hard and compete with each other in "culinary innovation". This goal is very similar to the main objective of today's patent system.

Note:
An important additional goal of the current patent system is the dissemination of information on inventions so that others can build on them.



Aim

To motivate people to innovate, which is identical to the main aim of today's patent system.

Slide 9
The patent system

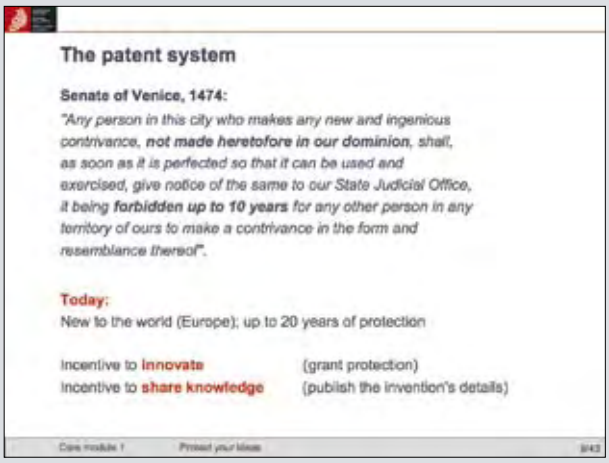
From this slide onwards, the presentation focuses on patents.

The first account we have of a formal patent law dates back to 1474 AD, when the Senate of Venice introduced a patent law. The aims of this patent law were to promote innovation and protect the honour of inventors. Venice is believed to have issued about 600 patents (approximately 5 patents per year) from 1474 to 1594, the year when Galileo was granted a patent.

Galileo was granted a patent on a water pump he invented. He did not provide the details of his invention before the patent was granted – he only stated its prospective use and performance. He was given a privilege to use the invention exclusively, provided he made the device within a year. The requirement to actually make the invention in order not to lose the patent was common in the Venetian patent system.

The text of Galileo's patent reads:
"That by the authority of this Council is granted to Mr Galileo Galilei that for the space of the next twenty years others than him or his agents are not allowed in the city or any place in our state to make, have made, or, if made elsewhere, to use the device invented by him for raising water and irrigating fields, by which with the motion of only one horse twenty buckets of water that are contained in it run out continuously; under pains of losing the devices which will go to the supplicant, and 300 ducats, a third of which will be for the accuser, a third for the magistrate who undertakes the prosecution, and a third for our Arsenal; the supplicant being obligated, however, to have made known this new type of device within one year, and that it has not been invented or recorded by others, and that a patent has not been granted [on the same device] to others; otherwise the present grant will be void."

The main goals of today's patent system are to promote innovation (by offering protection to the results of the inventive work) and to give an incentive to share knowledge (by requiring the publishing of the invention's details when a patent is sought), so that people can learn from each other. This dual nature of the patent system is sometime referred to as a contract between society (which gets the knowledge) and the inventor (who gets the exclusive rights).



Venice patent law

- Invention new to a certain region
- 10 years
- Details not published
- Galileo Galilei: patent on water pump in 1594

Today

- New to the world (European Law)
- 20 years
- Details published

Main goals of today's patent system

(a) Incentive to innovate (protect results so the inventor can reap benefits -> makes it easier to attract investment)

(b) Incentive to share knowledge (to get protection the inventor must publish the details; patent databases promote technology transfer)

This dual nature of the patent system is sometimes referred to as a **contract** between society (which gets the knowledge) and the inventor (who gets the exclusive rights).

Slide 10 (optional)
An early English patent issued in 1617

An important motive behind the setting up of patent systems was to encourage investment in technology and innovation. Some of the earliest patent systems did not require an invention to be new to the world. Rather, it had to be new to the country that granted the patent.

The first person or company introducing an invention into the country and making the necessary investments would be given a temporary monopoly in order to enable them to recoup their investment before competitors could enter the market.

In England the Crown (i.e. the King or Queen) historically granted diverse monopolies, not just for inventions, but also on salt, playing cards, etc. The fees collected generated income for the Crown.

In 1624 the English Parliament adopted the Statute of Monopolies, declaring all monopolies granted by the Crown to be void except those based on patents for inventions, on the grounds that the extensive monopolies that had been granted and that did not relate to inventions were against the public interest.

An early patent on an invention granted in England is shown here. It was issued in 1617.

The patent granted a monopoly on making and distributing precise maps of the major cities of England to the patent holders. The publication explains that, in other countries, precise maps of cities have been made using printing techniques, but that in England no such maps exist so far. This is attributed to the high cost of preparing the maps and engravings and the absence of a monopoly on making them. Because the maps might be copied by competitors, rendering the original investment worthless, no one would invest in making them if the King did not grant a monopoly. England was said to lag behind developments in continental Europe because it had not yet granted a monopoly on such maps. The patent privilege was granted by the King in order to overcome that deficit.

At the time, very few patents were granted. Between 1617 and 1769, only 912 patents were issued – about six patents per year on average. Patent number 913 covered the famous invention by James Watt of a radically more efficient steam engine.

Patents had, however, also been granted for more than 150 years prior to 1617. The published patent seen here – "Number 1" – is the first in a more formal system that replaced the ad hoc and arbitrary system which preceded it. Most historians accept that the first English patent was granted in 1449 to John of Utynam, a glass-maker, so that he could share his technological secrets with his apprentices without fear of competition from them. Thus the patent ensured the transfer of knowledge, whilst protecting the inventor for a set period of time. For more information see *http://www.myoutbox.net/popcho1.htm*.

Patents issued in England prior to 1624 were not always granted for inventions. They sometimes covered exclusive trading rights (e.g. the right to import Spanish wine to London) granted by the King to his favourites. As such the system was prone to corruption, which led to the 1624 law which formalised the grounds on which such monopolies could be awarded (e.g. on merit for new inventions).



The main goal of early patent laws was to encourage investment in technology in the country concerned.

The requirement was therefore for an invention to be **new to the country**, not new to the world.

In England, the Crown (i.e. the King or Queen) historically granted diverse monopolies, not just for inventions, but also on salt, playing cards, etc.

In 1624 the English Parliament declared all monopolies granted by the Crown to be void except those based on patents for inventions.

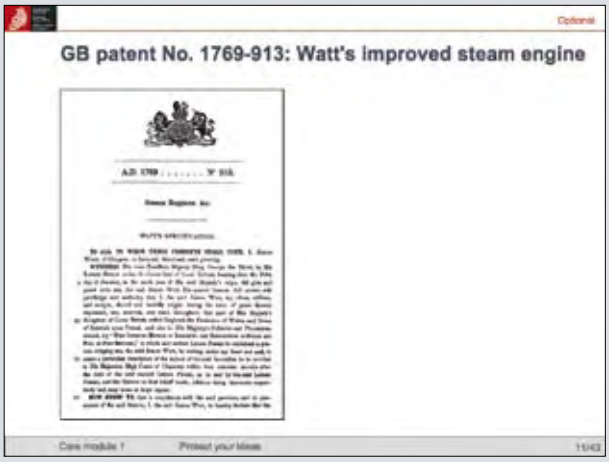
The first patent granted in England gave the holders a monopoly on making and distributing precise maps of the major cities of England. The patent document explicitly states that if no such patent existed, nobody would be prepared to make the huge investment needed to draw and print such detailed maps.

Slide 11 (optional)
GB Patent No. 913 – Watt's radically improved steam engine

The breakthrough steam engine patent granted to Watt was for a "New Invented Method of Lessening the Consumption of Steam and Fuel in Fire Engines". A major improvement was the use of a separate condenser to condense the steam outside the cylinder. This invention reduced fuel consumption by 60%. It also increased the power available from a cylinder of a given size.

At the time patents were valid for only six to twelve years. The patent was about to expire when factory magnate Matthew Boulton founded a company with Watt to begin commercialising the invention. Boulton used his political contacts to achieve a decision by Parliament to extend the patent until the end of the 18th century.

Today, most patent offices grant a lot more than six patents per year. After the breakthrough of James Watt and as steam engine technology spread throughout the world, hundreds of patents were issued for steam engines alone.



The breakthrough steam engine patent granted to Watt related to a **"New Invented Method of Lessening the Consumption of Steam and Fuel in Fire Engines".**

- Contained separate condenser to condense the steam outside the cylinder
- Reduced fuel consumption by 60%
- Increased the power available from a cylinder of a given size.

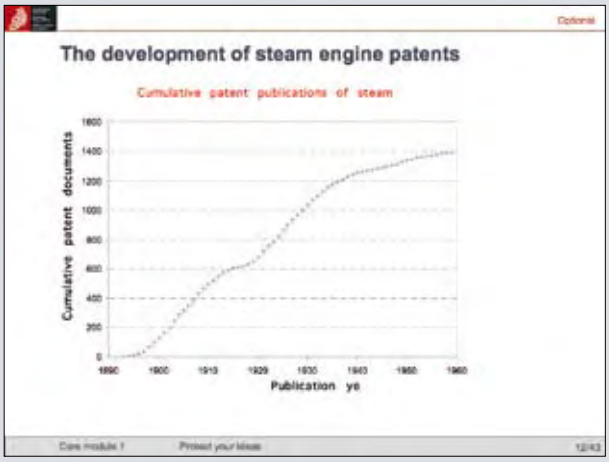
Note that this is the 913th patent of the year 1769. It is not the 913th patent since 1617. Patents were issued in the same number sequence each year. So there would be a patent number 913 in 1769, 1770, 1771 and so on.

Slide 12 (optional)
Development in the number of steam engine patents

This chart shows the development in the number of steam engine patents over time. While in the early years of steam engine technology very few patents were applied for (among them some by James Watt himself), there was a sharp increase from the end of the 19th century onwards. From about 1930, other technologies such as steam turbines and diesel engines began to replace steam engines in practical applications. For example, in the USA all steam locomotives had been retired by the mid 1950s.

The development of steam engine patenting mirrors the development of the patent system itself; with today's huge technological knowledge stock, a huge number of inventions are made and patented every year, most of them representing quite small improvements rather than the major technical leaps of the early days of technological development.

In the 18th century, it was easy to be aware of all the relevant patents in a particular industry as there was just a handful of them. Today that situation has changed radically, and not only in steam engine technology. This represents a significant challenge to companies endeavouring to avoid infringing other companies' patents.



From about 1930, other technologies such as steam turbines and diesel engines began to replace steam engine technology. In the USA all steam locomotives had been retired by the mid-1950s.

Data source

The data was collected from the *esp@cenet* online database. The *esp@cenet* coverage of patents issued in the 18th and 19th century in particular is not complete, which is why the number of steam engine patents per year prior to 1893 is zero.

Slide 13 (optional)
Worldwide patent applications per year

The chart shows the number of inventions for which patent protection has been sought per year worldwide. Multiple international patent applications covering the same invention are counted only once. The total number of individual worldwide patent applications is much higher than the number of inventions, as generally patents on the same invention are applied for in multiple countries (by the same patent applicant).

The data shown here include inventions applied for at more than 80 patent offices around the world, including the European Patent Office, the United States Patent and Trade Mark Office and the Japan Patent Office.

Individuals and companies currently apply for patents on about 1 million inventions each year! Some of these applications are rejected by the patent office(s) concerned, but the majority lead to a patent being granted.

The large number of patent applications is not a completely new phenomenon: even in 1980 protection was being sought for more than 600 000 inventions per year and, since then, countries such as Korea and China have joined the race for technological innovation.

The long-term trend, which can actually be traced back to the end of World War II, is towards even higher numbers of inventions.

Data source: PATSTAT, the European Patent Office's Patent Statistical Database, October 2007 edition.



The graph shows the number of inventions ("patent families") for which patent applications have been filed at around 80 patent offices worldwide.

The actual total number of individual patent applications around the world is much higher, as many companies apply for patents for the same invention in more than one country.

Trends in patenting mirror technological and economic development.

The next slide shows which countries have driven growth since the mid-1990s

Source: the EPO's PATSTAT database.

Slide 14 (optional)
Filing rates at selected patent offices

As can be seen in this graph, the number of worldwide patent applications has increased tremendously since the end of World War II, reflecting the unprecedented impact of technical innovation on economic growth that has occurred since then.

During the last 25 years, the number of patent applications in Korea has grown at an extraordinary rate, reflecting the economic growth in Korea. In China, patent applications have soared over the last ten years.

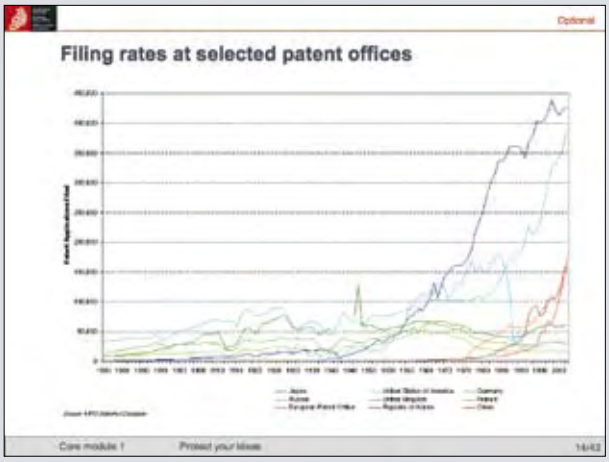
However, although the Korean and Chinese patent offices now receive more patent applications than the German, French and UK offices combined, this does not necessarily mean that China and Korea are more innovative than these European countries. Many Western companies apply for patents in China and Korea but no longer apply for patents at national level in Europe. This is because, since 1977, it has been possible to obtain European patents via the European Patent Office.

It is also interesting to note the sharp drop in patent applications in Russia when the Soviet Union collapsed. Also, in three of the post-war decades (the 1960s, 1970s and 1980s) more patents were applied for in Russia than in the USA, an amazing fact given the economic system at the time!

Obviously, patents served a different purpose in communist systems; while the possibility of receiving a patent to exclude others from using the invention existed, most patents were not meant to exclude (state-owned) companies from using the invention. Rather, the patent system was intended to motivate inventors by providing a means to receive both public recognition and monetary compensation for the use of the invention.

As the majority of inventors are employed by a company or organisation, in our current free market economy these inventors "only" receive public recognition plus a small monetary compensation (depends on national employee inventor law). Thus, from the personal perspective of the majority of inventors, the "communist" and "capitalist" patent systems actually did not differ a great deal. Hence it is not that surprising that both systems produced a comparable number of inventions.

Data source: WIPO, *http://www.wipo.int/ipstats/en/statistics/patents/index.html*



This chart: patent applications **per office** (the same invention may appear multiple times if patented in multiple countries).

High growth rate since the end of **World War II** reflects the technological and economic prosperity of the post-war period.

In the last two decades: high growth rate in **Korea** (from 1983) and **China** (from 1998) reflects the increasing economic importance of these two countries (many of the patent applications in these countries are filed by foreign – i.e. European and US-based – companies).

Note the large number of patent applications in the **Soviet Union.** From the employee-inventor perspective (who in our current system effectively does not in most cases own his own invention), the two patent systems (communist and capitalist) might often not have been so different: Both systems effectively provided employee inventors with public recognition and a small monetary compensation.

More statistics are available at: *http://www.wipo.int/ipstats/en/statistics/patents/index.html*

Slide 15
The "social contract" implicit in the patent system

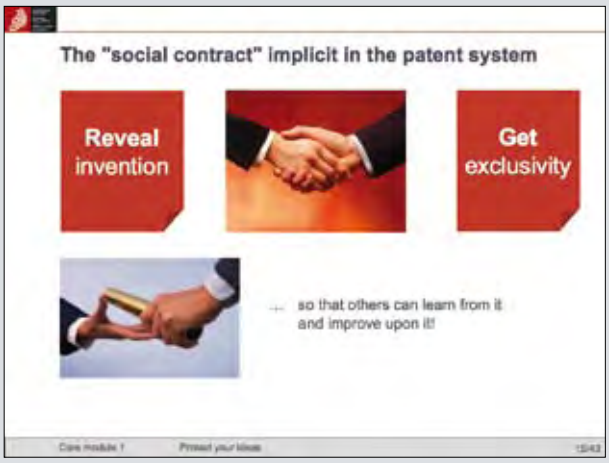
Patents are sometimes considered as a contract between the inventor and society. The inventor is interested in benefiting (personally) from his invention. Society is interested in ...

- encouraging innovation so that better products can be made and better production methods can be used for the benefit of all;
- protecting new innovative companies so that they can compete with large established companies, in order to maintain a competitive economy;
- learning the details of new inventions so that other engineers and scientists can further improve them;
- promoting technology transfer (i.e. from universities to industry).

So both parties are interested in a contract that grants protection to innovators (thereby also increasing the motivation to innovate) in exchange for disclosure of the invention. This social contract is institutionalised in the form of patent law.

In this context, two requirements for patent protection emerge almost naturally: first, if the invention is not new to the world, then the inventor doesn't have anything to disclose, and society has no reason to conclude the above-mentioned contract with him; second, if the invention is new but obvious to a person skilled in the art, then the inventor doesn't possess anything the public is eager to learn and there is also no reason to exchange exclusivity for the publication of the invention.

The inventor benefits from the patent system because he or she is granted the exclusive rights to commercially exploit the invention. These rights are transferable. In particular, the owner of the patent can licence the patent to third parties so that they may use it subject to certain conditions.



Background note

Inventions need to be new to the world to be granted patent protection (in Europe):
If an invention has already been revealed to the public there is nothing to "trade" for exclusivity, and therefore no "social contract".

Patent owners can forbid others from using their invention for a certain time. They can also can choose to license their invention to others or to allow everybody to use the invention for free. Thus, whether or not a patented invention is used by one company only depends on the patent owner's decision. Many important technologies such as CDs, DVDs, mobile phone technology and digital TV are covered by numerous individual patents that companies license to each other (cross-licensing).

Slide 16
Rights conferred by the patent

The patent owner has the right to prevent others from making, using, offering for sale, selling or importing a product that infringes the patent, for a limited amount of time. If you own a patent, you can exclude everybody from commercially using the invention – even inventors who subsequently independently make the same invention. However, some exceptions exist. For example, if another company independently makes the same invention and starts using it before the patent owner applies for the patent, in many jurisdictions the first company will be allowed to continue using the invention. The legal rights conferred by patents also do NOT extend to acts done privately and for non-commercial purposes or acts done for experimental purposes relating to the subject-matter of the patented invention.

Patent rights can be transferred, for example by selling, licensing or donating the patent.

The patent does not grant the right to use the invention. For example, before a new drug can be sold to customers it needs the formal approval of government agencies.

If using your invention means using the intellectual property of others, then you need to have their permission! For example, if your biotech invention involves copying DNA, then you need to have the permission of the company that owns the intellectual property (Roche). Given that owning a patent doesn't give you the right to use the invention, it is important to know what other intellectual property rights might interfere with the usage of the invention. **To establish whether or not you are free to use your patented invention, you have to perform a patent search.** It is best to do this before starting development in order not to waste time and effort by duplicating what others have already done. If in doubt, ask a patent professional or patent attorney.

Given the enormous number of patents that exist today, it is quite difficult for many companies to ensure that their products do not unknowingly infringe a patent. But despite the difficulties, companies have no option but to carefully search and analyse patents.

Patent infringement cases can be very costly, especially in the United States. Besides demanding licence fees and infringement damages, the patent holder can forbid the production and distribution of all the products covered by the patent. Some statistics on the number of court proceedings on patent infringement (approximate figures only): US: >1000/year; Germany: 600/year; France: 300/year; UK: 70/year; Netherlands: 50/year.

The average cost for patent infringement court proceedings (excluding the resulting licence fees and indemnification for the patent owner!) is about EUR 125 000 in the UK and about EUR 25 000 in Germany – the sum largely depends on the values at stake. Some insurance companies offer insurance to cover the cost of court proceedings, but only if the client has a reasonable patent monitoring process in place. For more information on patent litigation and associated costs see the presentation by Walter Holzer, available at *http://www.ip4inno.eu/*

Some uses of patent rights might potentially conflict with competition law – i.e. if large companies use their IP to foster monopolies. Further legal information on this topic can be found at *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2004:101:0002:0042:EN:PDF.*

Ownership of patent rights
If an invention is made by an engineer working for a company or another institution, he is usually required either by law or by his employment contract to transfer his rights to the invention to his employer. This depends on national law. Article 60 of the European Patent Convention states:

(1) The right to a European patent shall belong to the inventor or his successor in title. If the inventor is an employee the right to the European patent shall be determined in accordance with the law of the State in which the employee is mainly employed; if the State in which the employee is mainly employed cannot be determined, the law to be applied shall be that of the State in which the employer has his place of business to which the employee is attached.

(2) If two or more persons have made an invention independently of each other, the right to the European patent shall belong to the person whose European patent application has the earliest date of filing; however, this provision shall apply only if this first application has been published under Article 93 and shall only have effect in respect of the Contracting States designated in that application as published.

The text of the European Patent Convention is available at: *www.epo.org/epc*



The legal rights conferred by patents do **not** extend to:

– acts done privately and for non-commercial purposes
– acts done for experimental purposes relating to the subject matter of the patented invention.

If commercialising your invention means using the intellectual property of others, then you need to have their permission!

To make sure that your invention really is yours, you need to carry out a patent search. If you are not a patent expert, ask a patent professional, e.g. a patent attorney.
It is best to perform the patent search before starting development in order not to waste time and effort!

Patent applications can be filed by the inventor or the inventor's employer. **Inventions are usually the property of the company that employs the inventor.** This also holds true for university researchers in many – but not all – countries.

Slide 17
What does a patent look like?

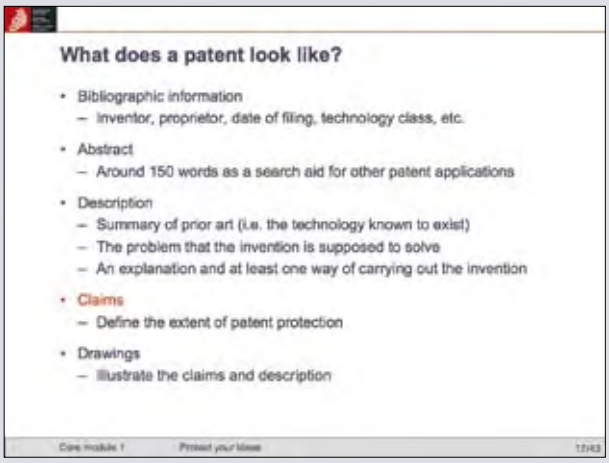
More about bibliographic information
A patent application will usually name the inventors and the person or organisation that applied for the patent. The patent may show the proprietor of the patent at the point in time when it was granted rather than the original applicant. The bibliographic data contained in a patent also includes the date of filing and the date the patent was granted, the patent number and the technology class. The date of filing is very important because this determines the date the patent will lapse (20 years after the date of filing; some exceptions exist) and it is also important for determining the prior art (the prior art is everything communicated to the public before the date of filing).

The technology class is important because this class allows you to search easily for all patents that pertain to a specific technology domain. This is discussed in sub-module A on searching patents. The rest of the bibliographic information is also useful for finding relevant patents. For example, to find the patents applied for by certain companies or inventors in a field, you can perform a search for their names. However, it is important to be aware that the patent applicant named on the patent application might no longer be the owner of the patent. When a patent is sold or transferred, for example when a company is bought, the new owner is not obliged to inform the patent office and the patent office will not issue a new patent publication even if it learns about the transfer of ownership (patent reassignments known to the patent offices are available in special databases only).

More about claims
From a legal perspective, the most important part of the patent document is the claims, as they define the extent of the patented technology. If a company's product or process falls within the scope of the claims then there may be an infringement and the patent owner can stop the company's activity through an action brought in the courts. Damages and other remedies may be awarded by the courts if an infringement of the patent is found to have occurred.

The claims will often change during the application process; frequently they will be narrowed down because part of the invention claimed in the application is found not to be new (i.e. prior art exists against the patent) or because the patent office considers that what is being claimed by the patent applicant is much broader than he has disclosed in his explanation of how to repeat the inventive process. This second issue is called insufficiency of disclosure.

Patent claims are often difficult to read. Legal interpretation of the claims of a patent is a task best performed by patent attorneys or other patent professionals. However, engineers, scientists and managers can benefit from a basic understanding of patent claims so that they can make a quick estimate of whether a certain patent might cover their products or not. In **sub-module C: Understanding patent claims**, you will find presentations designed to give students a basic understanding of patent claims. The lecture is based on practical examples from diverse technical disciplines.



Bibliographic information

Who applied for the patent, who invented it, etc. – the technology class is very useful for searching (discussed later).

Abstract

Useful to search for patents and quickly browse through search results.

Description

Contains a full and detailed description of the invention so that others can understand and replicate it.

Claims

Define the scope of patent protection.

Drawings

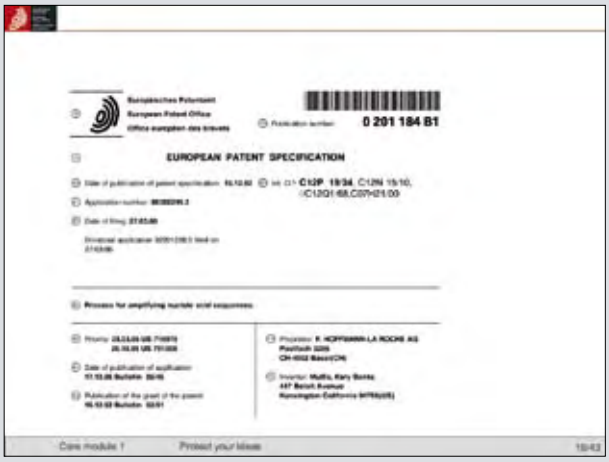
Help with understanding and interpreting the claims and the description.

Slide 18
Sample patent

This slide shows the front page of a sample patent.

The application was filed at the European Patent Office in 1986 following a patent application in respect of the same invention filed with the US Patent and Trademark Office in 1985. The patent was granted in 1992 – six years after it had been filed and one year before the inventor received the Nobel Prize for this invention.

The main claim of the patent is (not shown on the slide): *"A process for amplifying at least one specific nucleic acid sequence contained in a nucleic acid or a mixture of nucleic acids wherein each nucleic acid consists of two separate complementary strands, of equal or unequal length, which process comprises: (a) treating each of the two strands of each different specific nucleic acid sequence being amplified with a primer under conditions such that for each different sequence being amplified an extension product of each primer is synthesized which is complementary to a nucleic acid strand, wherein said primers are selected so as to be substantially complementary to the different strands of each specific sequence such that the extension product synthesized from one primer, when it is separated from its complement, serves as a template for synthesis of an extension product of the other primer; (b) separating the primer extension product from the templates on which they were synthesized to produce single-stranded molecules; and (c) treating the single-stranded molecules generated from step (b) with the primers of step (a) under conditions such that a primer extension product is synthesized using each of the single strands produced in step (b) as a template."* (European patent application No. EP0502588A2)



This slide shows the front page of a sample patent as published.

The patent was applied for by Cetus Corporation, the employer of inventor Kary Mullis, who invented the Polymerase chain reaction, a basic tool of biotechnology.

Before the European Patent was granted, Cetus Corporation sold it and other related patents to Hoffmann-La Roche AG (reportedly for approximately USD 300 million). This is why the document shows Hoffmann-La Roche as the proprietor.

The inventor was awarded the Nobel Prize in Chemistry in 1993.

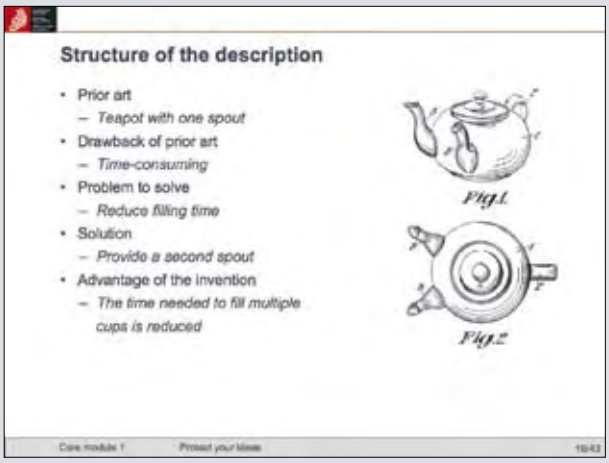
Slide 19
Structure of the description

The items shown on the slide will be found in most patent documents as part of the description. They give a rough overview of what to expect from this part of the patent document.

For reference, Rule 42 EPC, which lays down the legal requirements for descriptions of European patents, is given below:

(1) The description shall:
- (a) specify the **technical field** to which the invention relates;
- (b) indicate the **background art** which, as far as is known to the applicant, can be regarded as useful to understand the invention, draw up the European search report and examine the European patent application, and, preferably, cite the documents reflecting such art;
- (c) disclose the invention, as claimed, in such terms that the **technical problem**, even if not expressly stated as such, and its **solution** can be understood, and state any **advantageous effects** of the invention with reference to the background art;
- (d) briefly describe the **figures** in the drawings, if any;
- (e) **describe in detail at least one way of carrying out** the invention claimed, using examples where appropriate and referring to the drawings, if any;
- (f) indicate explicitly, when it is not obvious from the description or nature of the invention, the way in which the invention is industrially applicable.

(2) The description shall be presented in the manner and order specified in paragraph 1, unless, owing to the nature of the invention, a different presentation would afford a better understanding or be more concise.



This slide shows the typical structure of a description in a patent. The description relates to the drawings. Often a picture is worth a thousand words!

The invention shown is from the UK. It can be found in patent application GB360253, which was filed in 1930.

Slide 20
What can be patented at the European Patent Office?

Under the European Patent Convention *"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."*

An invention must be new to the world in order to be considered for a European patent; at the date of filing, there should have been **no previous public disclosure** of the invention, be it in the form of a publication, a talk at a conference, a prototype presentation or a blog on the internet, etc.

There must also be an "inventive step", which is quite difficult to assess because the EPO must compare the invention with what would have been obvious to an imaginary "skilled person".

Background information
The European Patent Office uses the so-called "problem-and-solution approach" to assess inventive step. In this approach there are three main stages: (i) determining the "closest prior art", (ii) establishing the "objective technical problem" to be solved, and (iii) considering whether or not the claimed invention, starting from the closest prior art and the objective technical problem, would have been obvious to the skilled person.
(Source: *http://www.european-patent-office.org/legal/gui_lines/e/c_iv_9_8.htm*).

Patentability requirements vary from country to country. In particular, the USA has a patent system that is quite different from the European system in many important details. In this patent teaching kit, we only refer to a few differences that we feel are of most interest to students. For example, countries such as the USA and Japan have a so-called **grace period**: After having disclosed the invention (in any way, see above) you still can apply for a national patent during the grace period (which is one year in the USA). So students who have already published their invention might still be able to get some patent protection.

Patents cannot be granted in respect of ideas, concepts, discoveries, computer programs as such, business methods, teaching methods, diagnostic methods, medical therapies, etc. However, if a computer algorithm is used to achieve a technical result, e.g. in an electronic control device, it can be patented. The technical effect of the computer algorithm must go beyond the normal physical effects involved in the execution of the program (e.g. of electric currents flowing in computers when calculating). For more information on this topic see the Guidelines for Examination in the European Patent Office (Section C.IV.2.3.6) (*http://www.epo.org/guidelines*)

Each jurisdiction has its own exclusions from patentability. For example, in the USA patents on software as such and on business methods were regarded as patentable for some time. However, in recent court decisions this practice has been limited.

Other conditions also apply; the invention must have an industrial application and not interfere with morality or ordre public, etc. (see Article 53 EPC). For example, the requirement of industrial applicability may be a hurdle in biotechnology.

Articles 52 and 53 of the EPC provide a comprehensive list of matter excluded from patentability in Europe. Article 52 covers what is considered not to be an invention and Article 53 covers what is excluded from patentability even if it is an invention. The text of the European Patent Convention is available at: *www.epo.org/epc*



This slide refers to patent applications filed with the European Patent Office (under the European Patent Convention, or EPC).

The patent will cover only those aspects of your invention that are new and inventive.

Note

The USA has a one-year grace period – you can apply for a US patent up to one year **after** having disclosed the invention to the public.

Inventions must have an industrial application in order to be patentable. However, the patent office does not examine whether the invention is of economic value. This requirement is only very rarely a practical hurdle for patent applications (exceptions exist for example in some fields of biotechnology).

Slide 21
What not to do when considering filing a patent application

This slide elaborates on the previously mentioned requirement of novelty. For an invention to be novel, there must be no public disclosure of the invention prior to the filing of the patent application (for exceptions see note below). Only the **aspects that are new** can be protected by a patent.

Any public disclosure prior to filing the application will destroy the novelty of your invention. Public disclosure can include talking about the invention in a lecture, a seminar or an exhibition, publishing an article or mentioning it in a blog entry. Furthermore, selling a product that incorporates the invention may be considered a public disclosure (see the case law of the Boards of Appeal of the European Office, 5th edition, 2006, I.C.2. pages 67ff., available at *http://www.epo.org/case-law*).

It is therefore important that you do not tell anyone about your invention (especially in writing) before you apply for a patent. However, you can tell qualified (registered) lawyers, solicitors and patent agents because anything you say to or show them is legally privileged. This means it is in confidence and they will not tell anyone else.

If you need to discuss your invention with someone before you apply for a patent, a non-disclosure agreement (NDA) can help. If possible, consult a qualified patent agent or lawyer if you are thinking about disclosing your invention to someone else. The UK Intellectual Property Office has prepared some further information on non-disclosure agreements (*http://www.ipo.gov.uk/patent/p-applying/p-should/p-should-otherprotect/p-should-otherprotect-cda.htm*).

Note
There are a few exceptions to the requirement that an invention cannot have been disclosed prior to the date the patent is filed. One is if the publication was due to an evident abuse in relation to the applicant.
See Article 55 EPC for details: *www.epo.org/epc*

Note for students who have already published/disclosed their invention
In some countries it is still possible to apply for a national patent after first publication, provided you do so within a certain time limit ("grace period", 1 year in the USA). In Europe, no such grace period exists and any publication or disclosure prior to filing the first application will destroy the novelty.



Remember the "social contract"? If you have already revealed your invention to the public, you will have nothing to "trade", so you won't get a patent. **It does not matter if it was you who made the invention public!**

There is no problem if you present/publishing/ sell your invention AFTER you have filed the patent application.

If you need to talk to potential customers or investors before filing a patent application, sign a **non-disclosure agreement** (NDA) with them first!

Slide 22
Where to apply for a patent

Patents must be obtained in each country where protection is sought – there is no such thing as an "international patent" There are several possibilities when filing a patent application, though: filing a national patent in the country of residence and/or any other country; filing a patent application at the EPO; filing an international patent application through the PCT. All of these options have their advantages, drawbacks and implications with regard to cost and time frame.

A European patent is mostly equivalent to national patents in those countries for which it is granted. The latter are chosen from the EPO's member states by the applicant and there are cost implications. European patents are granted by the EPO. However, when a European patent is granted, it has a legal effect similar to a bundle of national patents in all the countries where the patent owner has decided to protect his invention. The cost of a European patent depends on the number of countries that the patent owner has designated. On average, patent owners designate about six countries in which they wish to have protection. After the grant of a European patent, any legal proceedings that arise, such as infringement or invalidity actions, are not dealt with by the EPO but by the national courts of the country (or countries) where the actions arise.

A national or European patent application can serve as a basis for a later application for the same patent in other countries. For a period of 12 months after the date of filing of a national or European patent, the applicant can file for patents on the same invention at any other patent office and claim the first date of filing as the "priority date". This means that his patent application in that country will be considered as if it had been filed on that "priority date". This can be very important if in the meantime another inventor has applied for the same patent in that country or if somebody has published the same invention. The term "priority date" is used because if two persons apply for a patent on the same invention, the person that applied first (or invented first, in the USA) is given the priority, i.e. the person who can claim the earlier "priority date" will be entitled to be granted the patent in most jurisdictions.

If more than a year has passed before a further national, European or international patent application is filed in another country, this application will not be treated as having been submitted on the date of the first filing. This may mean that the invention disclosed in the later patent application is not regarded as novel any more (see Article 54(3) EPC). Furthermore, any publication made in the meantime will be considered to belong to the prior art. If more than 18 months have passed since the initial filing of the patent application, it will usually have been published and no further patent applications can be filed internationally for the same invention, because the invention is not new to the world anymore and it cannot claim an earlier priority.

Because patenting in multiple countries can be very costly and because often the prospects of the invention are not clear, 12 months is a very short time for many patent applicants. However this "thinking time" can be extended to up to 31 months through the PCT application system.

Although the PCT provides a central way to apply for a patent "internationally", the PCT application process will eventually lead to multiple national patent examination procedures – one for each country in which protection is sought (a PCT application can also lead to a European patent application).



Within one year of the first filing of a patent application, applicants may file an application for the same invention with other patent offices. Such inventions are treated as if they were filed on the date of the first application (for the purposes of examining novelty and inventive step).

PCT applications can be filed at a national patent office, the EPO or with the World International Property Organization direct.

The PCT procedure allows for a single application which is later split into many national patent applications. The EPO accepts patent applications filed under the PCT in its capacity as a receiving office, international searching authority, international preliminary examining authority and/or designated or elected office. However, it is important to stress that there is no such thing as an "international patent".

There is no international patent as such, but there is such a thing as an international patent application procedure!

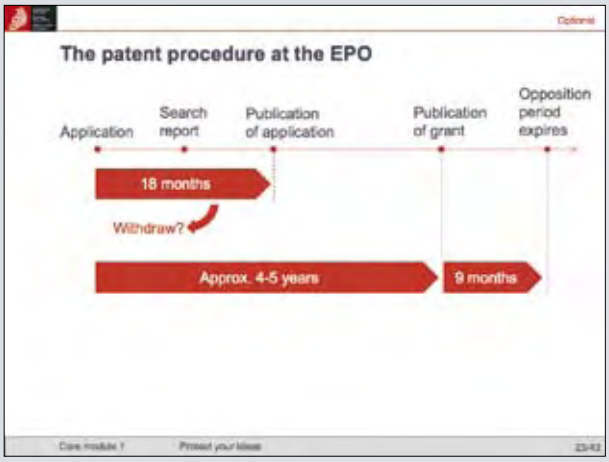
Slide 23 (optional)
The patent procedure at the EPO

After receiving a European patent application the patent examiner prepares a search report that is used to examine the novelty and the inventive step of the invention. In the search report the patent examiner reports any prior art that is related to the invention and provides an indication of whether or not this prior art conflicts with the claims of the application. The search report is usually (but not always – there is no legal requirement) created and sent to the patent applicant before the patent application is published. The patent application can be withdrawn at any time. A common reason for withdrawing a patent application is if the EPO search report finds substantial conflicting prior art. By withdrawing the patent application early enough the applicant can avoid its publication.

Patent applications are normally published 18 months after they are filed. The applicant can request that the application shall be published before the usual 18 months. (In the USA, if he does not want to apply for patents elsewhere, the applicant may request that his patent application not be published. As a result, many patents are granted in the US without the application being published first).

On average, the EPO will grant a patent 4 or 5 years after the application was first filed (2007 figures). This is mainly due to the long period of time applicants are given to respond to communications from the EPO (e.g. 4 months) and to make requests (e.g. request for examination) as well as to the large backlog of pending applications.

After the EPO has granted a patent, any person can file an opposition during the first nine months of its life and provide evidence that the patent should not have been granted (e.g. the invention had already been disclosed before, etc.). At the end of the opposition proceedings, which only take place if opposition is filed, the patent can be maintained in full or in amended form or it can be revoked. In general, the number of patents opposed is quite small.



The search report is usually created before the patent application is published.

Applicants can withdraw their application at any time, e.g. if conflicting prior art is found.

If applications are withdrawn early enough, then the application is not published.

During the opposition period, third parties can oppose the patent on the grounds that it should not have been granted (opposition grounds are limited).

The reasons for the long time taken to grant a patent (not just at the EPO, but at most other patent offices too):

- applicants have a long time to respond to communications from the patent office
- there is a substantial backlog of applications due to a surge in patenting activity and international patenting

A published patent application will provide some limited protection even before it is granted (see Art. 67 EPC).

Slide 24 (optional)
The PCT procedure

The **Patent Cooperation Treaty (PCT)** allows applicants to file patents in multiple countries by means of a single application which can split into several national patent applications after the international phase. The EPO accepts patent applications filed under the PCT in its capacity as receiving office, international searching authority, international preliminary examining authority and/or designated or elected office.

PCT applications do not lead to an "international patent"; rather they divide into individual national patents. Thus, after the initial PCT phase the cost of a PCT patent corresponds to the sum of the cost of all the individual patents in all the countries where the patent is filed. The total cost for worldwide protection can amount to as much as EUR 100 000 (Gassmann et al. (2007), Patentmanagement, p. 44).

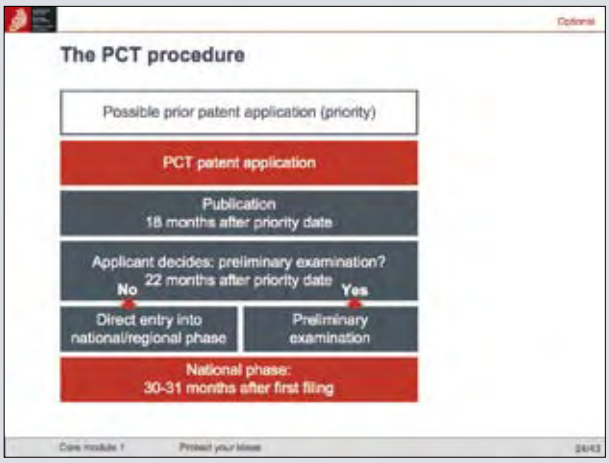
It is often said that the advantage of a PCT application is that the actual filing of the application in each of the countries in which protection is sought can be delayed until the PCT process is completed. The PCT application gives the applicant up to 30 months (instead of 12) to decide if the invention is worth the effort of international patenting and in which countries it will need protection. Given the very high cost of applying for patents in many countries, this gain of 18 months (or 19 months for European patents) can be important. PCT applications themselves cost around EUR 2 600 in patent office fees (plus the usual fees of the attorney), but the cost varies a lot depending on, for example, the number of pages and the designated countries in which protection is being sought.

For an introduction to the Euro-PCT procedure, see the EPO Guide for Applicants Part 2: How to get a European patent (Part 2) – PCT procedure before the EPO ("Euro-PCT"): *http://www.epo.org/guide-for-applicants-pct*

The PCT procedure also includes a search report. The report is usually communicated to the applicant around 4-5 months after the filing of the international application (in some cases much longer).

PCT applications can be filed with national patent offices, the European Patent Office or with WIPO direct.

A list of **frequently asked questions** (and their answers) is available on the WIPO website at *http://www.wipo.int/export/sites/www/pct/en/basic_facts/faqs_about_the_pct.pdf*



Main advantages

- One patent application for up to around 141 states.
- National fees and translation costs delayed; occur only if and when the national phase is entered.
- Entry into the national phase can be delayed by up to 30 months (EPO: 31 months) after filing.
- Compared with the 12-month priority period: **deferral of decisions and costs by up to 18 months!**

Priority date = date of filing of the first patent application for an invention.

Slide 25
Cost of a national patent application – Germany

The cheapest way to get patent protection in one country is to file a single national patent application. The actual cost varies from country to country. This slide illustrates the cost of getting a national patent in Europe's largest economy, Germany, by directly applying for a patent at the German Patent and Trademark Office.

Although you could theoretically file the application yourself, it is wise to seek advice from an experienced patent attorney. However, before you do so you might want to check up on existing patents. You will learn how to do that later in this lecture.

Depending on the complexity of the case, a patent attorney will charge approximately EUR 1 000 to 4 000 for preparing and filing a (national) patent application and handling correspondence with the patent office.

The German Patent Office charges EUR 60 for filing the patent application and EUR 350 when the applicant requests the examination of the patent. (The request for examination must be filed within 7 years from the date of filing of the application).

Furthermore, **renewal fees** have to be paid throughout the life of the patent (even before it is granted). If these fees are not paid, the patent becomes invalid. The fees start at EUR 70 for the third year and increase to EUR 350 for the tenth year, EUR 1 060 for the 15th year and almost EUR 2 000 for the 20th year (the maximum term of a patent). The cost estimate shown on the slide includes the renewal fees up to the time the patent is granted.

The cost estimate shown here is for a single patent application. However, many applicants choose to apply for multiple patents on what might appear to be a single invention. Their intention is to increase the effectiveness of patent protection. If such a strategy is sought, then the cost of patenting will obviously increase significantly.

The cost of the patent application is usually paid for by the company the inventor works for, because this company will usually be the owner of the patent.



The estimated cost shown is the total cost up to grant of the patent.

The German Patent Office takes approximately three to five years to grant a patent.

Most patent offices require the payment of patent renewal fees to keep the application/ patent valid. These fees are meant to eliminate worthless patents before the maximum term of 20 years.

Note

One patent on its own will often not be enough to effectively protect a whole new technology. This means that the total cost of patent protection might be substantially higher.

Slide 26
Cost of a European patent up to grant

European patents give almost the same rights as national patents in those countries for which they are granted (see Article 64 EPC). These rights may differ slightly from country to country. Once granted, a European patent can be regarded as equal to a bundle of national patents. There is no true European Community patent yet.

Until May 2008, patent applications had to be translated into the language of each state in which patent protection was sought. With the London Agreement of May 2008 some member states agreed to dispense with the translation requirements in full or in part, depending on the language in which the European patent application was written (see *http://www.epo.org/london-agreement*). However, in many cases there will still be translation costs (that depend on the complexity of the patent's claims). Furthermore, the fees of the patent attorney and the European Patent Office and the post-grant renewal fees will vary depending on the countries in which the patent is valid. Thus, the cost of a European patent depends on the specific countries in which protection is sought.

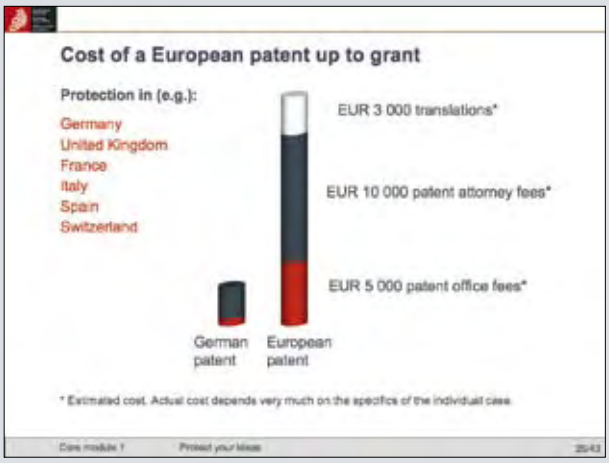
Here we present an example of a European patent valid in six countries. It is important to note that part of the cost (e.g. translations, some attorney fees) only accrues after the European Patent Office has granted the patent (which usually takes about three to five years).

Cost estimates for European patents were taken from a study commissioned by the EPO (*http://www.european-patent-office.org/epo/new/cost_analysis_2005_en.pdf*). The study's results have been updated to reflect the changes in translation requirements in 2008; translation costs have fallen from EUR 3 600 plus EUR 3 000 attorney fees for filing the translations to a total of EUR 3 000. The actual translation cost will depend on the patent applicant's choice of countries. In the case shown on the slide, only Italy and Spain have not yet (May 2009) ratified the London Agreement and the actual cost is probably less than the "representative" EUR 3 000 shown.

The renewal fees to maintain the patent in all six countries during years five to ten (i.e. approximately five years after grant) amount to EUR 4 700.

When it comes to choosing which countries to patent in and via which route, it is advisable to seek the services of a patent attorney, who will help you to draft an efficient patent strategy that fits in with your budget.

Cost of US patents
According to *http://www.ipwatchdog.com/patent/patent-cost/*, these amount to approximately EUR 1 000 in patent office fees and approximately EUR 3 000- 18 000 in attorney fees, depending on the complexity of the application.



Cost of a European patent compared with a German patent:

- Higher fees charged by patent attorney
- Higher fees charged by European Patent Office
- Translations required (depending on countries chosen)

Note

The costs shown are up to the date of grant of the patent. Renewal fees due after that date are not included.

Slide 27
Advantages and disadvantages of patenting

Patent owners can exclude others from using their inventions. If the invention relates to a product or process feature, this may mean competitors cannot make products with the same features without obtaining a licence from the patent holder. Hence, the patent holder will enjoy a competitive advantage that can be turned into profits.

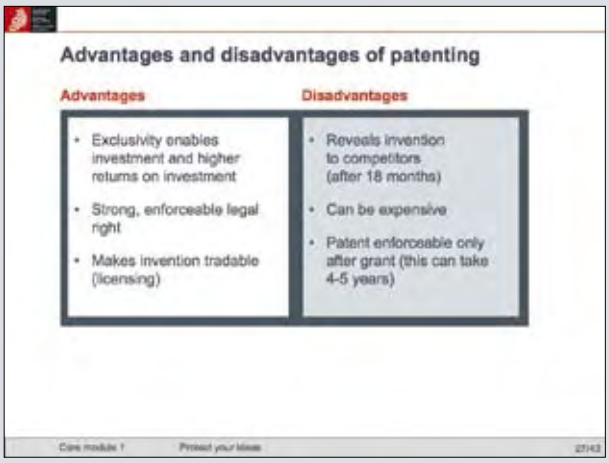
As European patents are examined by the European Patent Office rather than simply registered, patent rights are more certain than many other forms of legal protection available for inventions. Given a valid patent, innovators enjoy strong legal protection. For example, if a patent is infringed, the patent holder can sue for infringement or order customs to intercept imports of the patented products. However, it should be noted that patent enforcement costs can be substantial; see the extended teaching notes for slide 16, "Rights conferred by the patent", for more details.

Patents can be annulled after they have been granted, either by a competitor successfully challenging the patent immediately after grant in an opposition procedure or by invalidation or revocation proceedings at any time.

Another huge benefit of patents is that the invention becomes tradable. Because of the protection offered by the patent, the seller can tell prospective buyers the details of the invention without running the risk of the invention being stolen.

But patenting also has some drawbacks. First of all, patent applications are published after 18 months. This means that everybody (including competitors) can get a blueprint of your invention 18 months after the filing date. Furthermore, as shown in earlier slides, patents can be very expensive if broad international protection is sought.

Sometimes the long time lag of approximately 4-5 years from application to patent grant could mean that, by the time the patent is granted, the invention has already become obsolete. However, the published patent application does offer some limited protection, both factual (competitors have to fear that a patent grant will render their investments worthless) and legal. For details of the latter see Article 67 EPC (*www.epo.org/epc*).



Patent applications are always published 18 months after the date of filing, when they become available on free internet databases.

Patent applications may also offer a certain amount of protection, as competitors may well assume that the patent will be granted and might thus be discouraged from investing in commercialising a potentially infringing product.

Furthermore, some legal protection is also offered (see background notes).

Notes

– While patents are generally considered to be very strong and enforceable rights, even granted patents can be found to be invalid in court proceedings (i.e. although a patent office might have granted a patent in the first place, judges might later find that they should not have done so).

– Enforcing patent rights may mean going to court, and this can be costly.

Slide 28
Alternatives to patenting

Instead of patenting their invention, some inventors opt to keep it secret or simply to publish the it, while others do not care about intellectual property rights and do not do any of these.

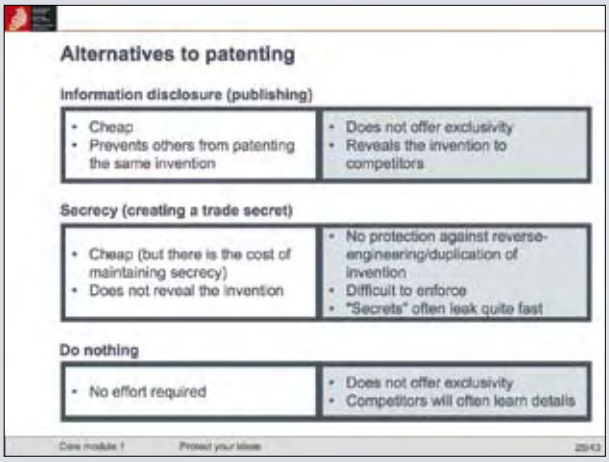
The most frequent reason for publishing an invention intentionally without patenting it is that publishing costs very little compared with patenting. The benefit of publishing the invention is that others cannot apply for a patent on it any more. Inventions must be new in order to be patentable and if the invention has been published before, then the "second inventor" cannot get a patent any more. In this way, the "first inventor" makes sure he will not be prevented from using the invention by a third party. The drawback of publishing the invention is that it can no longer be patented by the original inventor. Furthermore, publication will disclose the invention to competitors. Improvements might be patented by a third party and this might block the further development of the initial invention.

Keeping the invention secret is another option to avoid the cost of patenting but at the same time to avoid the invention being revealed to competitors. This is especially useful for manufacturing processes that are difficult to observe or reverse-engineer from the end product. In these cases it will be very difficult to find out and prove that a competitor is infringing the patent. Thus, a trade secret can offer the benefit of avoiding information disclosure while not sacrificing much (effective) patent protection. Keeping an invention secret will often also incur costs, at least the cost of signing non-disclosure agreements with employees and partners. Even though trade secret law offers some protection, it is difficult to enforce. You need to prove that competitors have used unlawful means to find out about your trade secret.

Keeping an invention secret can be risky because competitors can reverse-engineer the invention or independently develop the same invention. They could even file a patent on the invention and might then be able to stop you developing your invention further (although the original inventor cannot be stopped from using the invention in exactly the same way as before). Another drawback of keeping the invention secret is that it is often difficult to actually keep secrets. Back in 1985, even before computer security problems could be exploited for industrial espionage on a large scale, a survey found that information on new products and processes became available to competitors on average within a year (Mansfield, 1985: How rapidly does new industrial knowledge leak out?, Journal of Industrial Economics, December 1985).

The final option – to do nothing about IP – is obviously the cheapest way of handling an invention. However, it has no other benefits and presents substantial drawbacks: other people might patent your invention, preventing you from using it unless you can prove that you used it before. You will not enjoy exclusivity – everybody is allowed to copy the invention. And according to the above-mentioned study, it is very likely that it will not be long before others find out about your invention.

Other non-patenting options include lead-time advantages (being the first to introduce the product to the market), learning curve effects (starting to learn about the technology earlier and thus maintaining a technical advantage), network effects (creating a user base or a technical standard first) and customer relations. In surveys, these means have been found to be at least as important as patent protection and other legal instruments. However, they are not only employed as alternatives to patent protection, but are instead often used in conjunction with them.



Information disclosure

– the invention can be published in any newspaper, magazine, journal, book or public prior art database.

– publication prevents others from applying for a patent on the same invention and will thus keep the invention "patent-free" (however, other prior patents might effectively block its use).

Trade secrets

– frequently used, especially for inventions that do not qualify for patent protection and for production processes that cannot be reverse-engineered by analysing the end product. In the latter case, patent infringement would be very difficult to prove and thus patents might be ineffective.

– on average, detailed technological information leaks out within a year.

Additional, complementary means of protecting inventions: **lead-time advantages (time-to-market)**, learning curve effects, network effects (i.e. creating a user base), customer relations, etc. In surveys, these options are found to be **at least as important as patent protection and other legal instruments.**

Slide 29
How patents are used

Patents can be used for a variety of purposes. The most frequent one is to protect a company's products or processes from imitation. This is of obvious importance for the company's profits.

In the world of high-tech start-ups in particular, a company's expected economic success often critically depends on the IP rights owned by the company, because in many cases larger competitors already exist who could otherwise simply copy the invention and sell it more cheaply. Investors will often refuse to invest in a new high-tech company if it does not have strong patents protecting its technology. Thus, patents also play an important role in attracting funding for a new venture, as has been confirmed by empirical studies of high-tech companies.

Patents can serve other purposes beyond protecting the products of a company. For example, owners can license their patents to other companies or use them to block the research efforts of their competitors (i.e. efforts that might endanger their own technological lead). And certainly there are patents that are simply not used.

A large-scale empirical study financed by the European Commission collected information from the inventors of more than 7 000 European patents in a range of industries. The results give an insight into how patent owners actually use their patents:

"Internal use" means that the patent is used to protect aspects of products the company manufactures or aspects of their manufacturing process. "Licensing" means the patent owner allows another company to use the invention for royalty fees. "Cross-licensing" means that two or more companies exchange licences to their patents. "Blocking competitors" means that the patents are not used to protect their own products or processes, but 'just' to hinder competitors from using the invention. "Sleeping patents" are those currently not used for any purpose.

There are large differences in the use of patents depending on country, industry and size of the company. For example, the percentage of patents used for licensing is much higher in biotechnology.

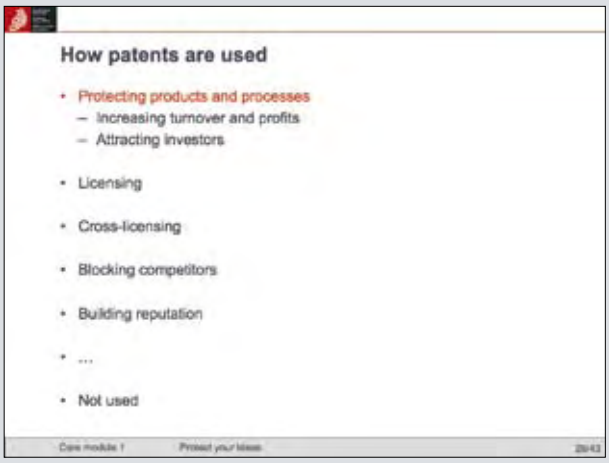
Licensing can be a means of benefiting from the invention without having to actually produce the products and/or set up a company. However, according to recent empirical research, collecting royalties is not the only focus of licensing activities (see below). In particular, giving licenses is often a means to gain access to the patents and knowledge of other companies. Getting access to third-party patents can be crucial. In industries where inventions build upon each other and many patents are needed to be able to make a product (such as in semiconductors and telecommunications) cross-licensing agreements are the norm. Cross-licensing is when two companies grant licences for (some of) their patents to each other.

Patent use

	Internal use (%)	Licensing (%)	Cross-licensing (%)	Licensing and use (%)	Blocking competitors (unused) (%)	Sleeping patents (unused) (%)	Total (%)
Electrical Engineering	49.2	3.9	6.1	3.6	18.3	18.9	100.0
Instruments	47.5	9.1	4.9	4.3	14.4	19.8	100.0
Chemicals and Pharm	37.9	6.5	2.6	2.5	28.2	22.3	100.0
Process Engineering	54.6	7.4	2.0	4.9	15.4	15.7	100.0
Mechanical Engineering	56.5	5.8	1.8	4.2	17.4	14.3	100.0
Total	50.5	6.4	3.0	4.0	18.7	17.4	100.0

Distribution by technological class. Number of observations = 7711.

Source: Giuri et. al. (2007): Inventors and invention processes in Europe: Results from the PatVal-EU survey, Research Policy, No. 36, pp. 1107–1127.



Most patents are worth less than EUR 300 000, but 1 out of every 100 is worth more than EUR 100 million (European PATVAL study).

Universities in the USA receive approximately USD 1 500 million – about 3% of their annual research budget – from patent licensing fees (AUTM US Licensing Survey 2004).

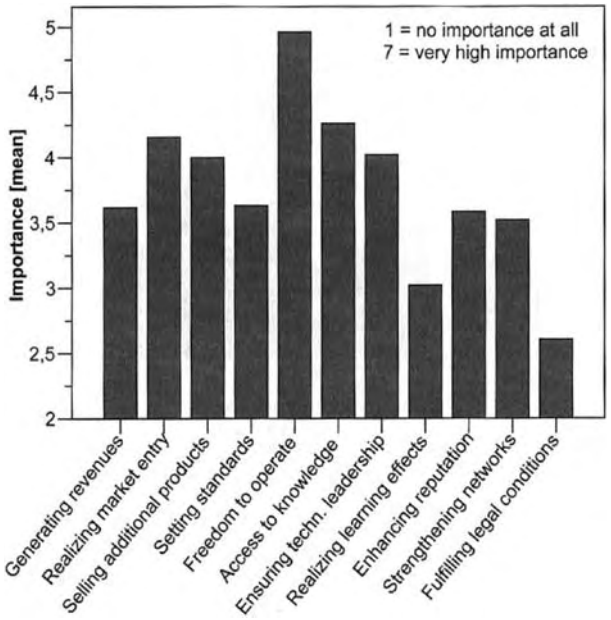
Results from a survey of more than 7 000 patents

	% of all patents
Protection of own products/processes	50%
Licensing only	6%
Licensing and use	4%
Cross-licensing	3%
Blocking competitors	19%
Not (yet) used	17%

(Substantial differences by country, industry sector and company size)
Source: Giuri et al., 2007.

Cross-licensing is very important for certain industries. Remember the mobile phone example: a common mobile phone has to use technology protected by so many patents that most mobile phone companies have made cross-licensing agreements to allow each other to use their respective patents.

Another important function of patent licences is to set standards (famous standards fostered through patent licences include CDs, DVDs, MP3, etc.). Furthermore, licensing to competitors may be required because customers may demand a second source of the products (for example in the automobile industry). The following chart shows the relative importance of different reasons why companies licence their patents to others.



Source: Lichtenthaler, U. (2006): Leveraging knowledge assets, DUV

In recent years a "new" use of patents has spawned controversy: the (mis)use of imperfections in the patent system, not to protect one's own innovations, but to extract large amounts of money from successful innovators. This disputed practice is predominantly (but not exclusively) observed in the USA and usually involves filing a patent infringement lawsuit and demanding the suspension of shipments of the products concerned, not for the purpose of protecting the exclusivity of one's own products, but simply to extract a large payment in out-of-court settlements or in a final court decision. Companies who behave in this way and who don't do R&D themselves, their only business being to extract licensing royalties and infringement damages, are known as "patent trolls".

The concentration of such activities in the USA has been attributed to particularities in the country's legal system. First of all, infringement damages to be paid by patent-infringing companies are often much higher in the USA than in other countries; secondly, in the USA a patent owner can often prevent the distribution of allegedly patent-infringing products even before a final court decision is made, and before the defendant has had chance to prove that the patent is actually invalid (the latter is true for many countries, including, for example, Germany); thirdly, the USA grants patents on more subject-matter than other countries (in particular: software and business methods) and in these areas it is especially difficult to assess prior art. As a result, an unknown number of invalid patents have been granted by the US Patent and Trademark Office and some of them are now used to put pressure on innovative companies. Finally, defending allegations of patent infringement is very expensive in the USA, where the cost can frequently exceed USD 1 million even if the defendant successfully proves that they have not infringed the patent.

This kind of behaviour can be observed not only in the field of patents, but also with other IP such as, for example, copyright (for an example, see the famous case of the SCO Group and the LINUX operating system at *http://en.wikipedia.org/wiki/SCO-Linux_controversies*).



Slide 30 (optional)
Licensing income of US universities

Patents are an important means of protecting innovations, not only for companies and individual inventors, but for universities too.

This chart shows the total licensing income of US universities from 1991 to 2004 (no comparable data exists for Europe). Not all universities participated in the study, so the real figure is higher than the amount shown here.

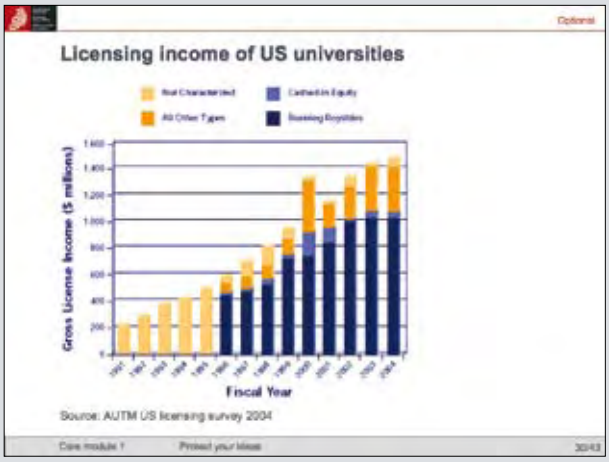
In 2004, US universities received approximately USD 1 400 million in licence fees. By patenting their inventions, universities received additional funds, companies learned about new technologies when screening patents, and start-up companies could be founded to commercialise patented technologies.

It is important to note that patenting an invention made at a university does not necessarily mean prohibiting other scientists from using the invention. Rather, it means that the university is free to choose who to charge for using the invention, and how much. For example, universities will often choose to let other universities use their inventions for free while charging companies a small licence fee. These licence fees can then be used to finance further research.

A frequent critique of university patenting is the fact that publicly-funded science, particularly projects funded by the National Institute of Health in US universities, has in some instances resulted in private ownership of associated intellectual property rights by pharmaceutical and biotech companies. This has been an unintended consequence of the US Bayh-Dole Act, arguably to the detriment of the public interest in the USA.

Supplementary data
According to a study by the Milken Institute, US universities earn an average of USD 27 825 in licensing income for every USD 1 million of research expenditures. For European universities the corresponding figure is USD 11 988. It must be assumed that this difference is not due to superior research in the US but to a more extensive and professional use of patents by universities in the US.

According to the US Department of Education, there were 3 million graduate students in 2004. Thus, licensing income was equivalent to USD 470 per graduate student.



On average US universities collect about 3% of their research budget from licensing royalties (compared with 1.1% in Europe).

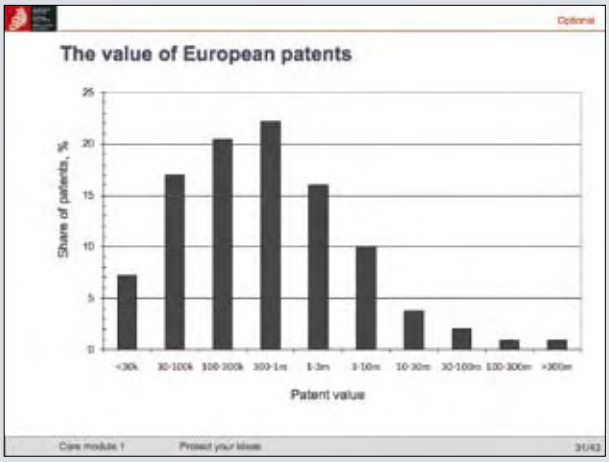
Slide 31 (optional)
The value of European patents

This chart illustrates the results of a large-scale empirical study carried out in 2004. The chart shows the distribution of the private value of patents applied for at the European Patent Office (note the approximate logarithmic scale on the horizontal axis that reports the value). According to these estimates, about 50% of all patents are worth up to EUR 300 000, about 20% are worth between EUR 300 000 and EUR 1 million, and 3% are worth EUR 100 million or more.

The distribution is skewed; many patents have a low value and very few patents have a high value. It is therefore not useful to consider the "average value" (approx. EUR 6 million according to this study) as the value of a "typical" patent. Rather, the "typical" patent value is EUR 300 000, the median of the distribution.

Background
A questionnaire was sent to the inventors of a random sample of patents applied for at the European Patent Office between 1993 and 1997. The questionnaire was returned by 9 600 inventors out of the 27 000 polled. In one of the questions, the inventors were asked, given all the information they had learned so far, to estimate the amount of money the patent owner could have sold the patent for to his strongest competitor on the day the patent was granted. Inventors responded by choosing one of the ten value categories shown here.

Data source
Ceccagnoli et al. (2005), Study on evaluating the knowledge economy – What are patents actually worth?; Final Report to the European Commission, Tender No. MARKT/2004/09/E; available online at *http://ec.europa.eu/internal_market/indprop/docs/patent/studies/patentstudy-report_en.pdf*, p. 27.



The figures shown here represent the responses from a survey of more than 9 000 inventors of patents applied for at the European Patent Office in the 1990s. Inventors were asked in 2004, long after the patents had been applied for.

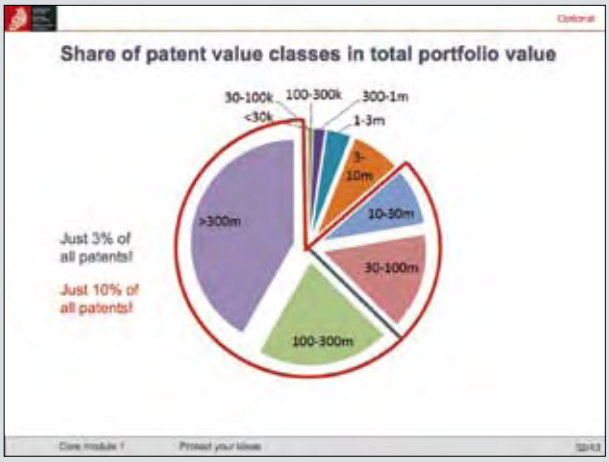
Average value: approximately EUR 6 million.
Median (50% worth less/more):
EUR 300 000 = **typical** value.

Source: Ceccagnoli et al., 2005.

Slide 32 (optional)
Share of patent classes in total portfolio value

This chart shows the same data set as the previous chart but it visualises the approximate share of each class of patents (value classes) in the total value of all patents investigated. This gives insights into the expected value distribution of a large portfolio of European patents.

It is immediately clear that all patents with a value of less than EUR 300 000 do not significantly contribute to the overall portfolio value. However, more than 50% of all patents pertain to this category of patents, with low relevance for overall value. More than 50% of the overall value of this large patent portfolio is derived from the 3% of high-value patents. More than 80% of the overall value is derived from less than 10% of all patents.



More than 50% of the overall value is derived from just 3% of all patents.

More than 80% of the overall value is derived from just 10% of all patents.

Thus, in large-scale patent portfolios, attention should be focused on the small number of high-value patents!

Source: Ceccagnoli et al., 2005.

Slide 33 (optional)
Patent management

In order to profit from the patent system, established companies and start-ups alike should draft a patent strategy for decisions in this area. This patent strategy should be dependent on the company's overall strategy.

It should reflect the company's main motivation for patenting: Is it to exclude competitors from making the same products? Is it to focus on research and development and license the technology to manufacturers? Or is it to achieve freedom to operate (to avoid being excluded from using essential technology)? Of course, many companies will pursue several goals simultaneously. However, knowing what the focus is, and why, will help in the decision-making processes of everyday business. The patent strategy should also include thoughts on whether these goals will be pursued in an offensive way (e.g. proactively searching for patent infringers and suing them), or in a defensive way (e.g. by publishing some inventions rather than patenting them). Finally, a company's business type, financial resources and business model will determine its international patent strategy (remember that patent rights are territorial in nature – there is no such thing as an international patent).

Patent information is an important topic in patent management. It is essential for staying abreast of science and technology (see slides 36 onwards). Furthermore, a company can only avoid infringing patents of other companies by actively searching for such patents. In today's complex technological (and patent) landscape, this is a difficult but essential task. Failing to discover patents that cover one's own products (in other words: infringing patents) can be very costly. Consider the famous RIM vs. NTP case in which the manufacturer RIM paid more than USD 600 million to patent-holding company NTP (see *http://en.wikipedia.org/wiki/NTP,_Inc.*).

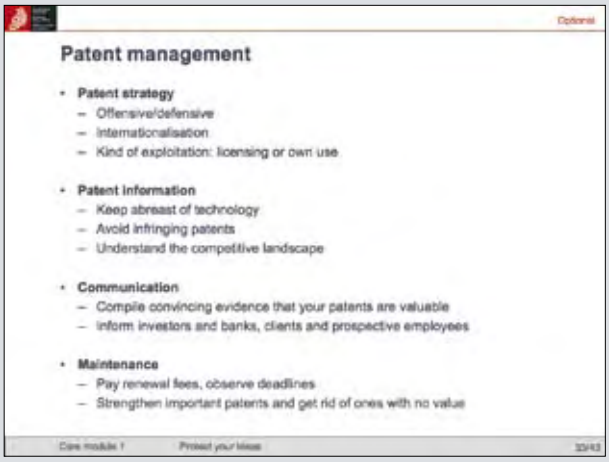
Patent information also allows innovators to discover who the main players are in a certain technology field and what their individual patent position and strategy is. It is therefore an invaluable source of information for use in developing a sound technology strategy.

Because patents are an important tool and a significant source of value for many high-tech companies, they can be employed to convince investors to invest or banks to give credit. Venture capital firms investing in high-tech start-ups usually require a strong patent position as a prerequisite for considering investment.

Some patents turn out to be important competitive tools. Using the advice of patent professionals, such patents should be strengthened, for example by supporting them with further patents and other IP.

In most countries a patent will lapse if the owner does not pay the regular patent maintenance fees, so keeping track of the deadlines is an important task (often performed as a service by patent attorneys)

Not all patents are valuable. In fact, many patent applications that seemed worthwhile at the time of the invention turn out to be irrelevant later, or simply become outdated. If such patents or patent applications are found in a patent portfolio review, they could be withdrawn or allowed to expire in order to save money.



Patent strategy should support a company's overall strategy.

Offensive

e.g. actively searching for companies infringing the patents.

Defensive

e.g. publishing instead of patenting.

Internationalisation

Patents are territorial rights. In countries where the company is not active, licensing opportunities might still exist.

Competitive landscape

Patent information holds detailed information on the technology of most competitors worldwide. If analysed correctly, it can give important insights into the industry in general and the strategy of competitors in particular.

Slide 34
15 – 25% of all research efforts in vain

Many researchers, scientists and engineers do not review what has already been invented before starting a new project. As a result, many research projects yield results that others have not only already published, but perhaps also even patented. In many cases, inventors only find out that "their" invention has already been patented when informed to this effect by the patent office examining their application.

The precise extent of duplicative R&D efforts is not known, as statistics are not available. But because patent offices search for prior inventions for each and every patent application they receive, they have some idea of the extent of the phenomenon. The Austrian Patent Office estimates that in Europe, EUR 60 000 million are wasted each year on inventing what has already been invented (*http://www.patentamt.at/geschaeftsbericht2006/de/srvverschenken.html*).

In 2005, the president of the Austrian Inventor Association noted that the extent of duplication in R&D means that "up to 10 000 of the 30 000 inventors active in Austria work to no avail" (see Mario Wally (2005): "Doppelt gemoppelt", profil extra, February 2005, p. 24-25).

ProVendis, the technology transfer agency of several German universities, estimates investments in duplicate R&D in Germany to be EUR 12 000 million per year, or 25% of total R&D spending (*http://www.lifesciencepatente-nrw.de/fileadmin/provendis/downloads/Mickeln%20Innovationsschutz%2007.09.2005.pdf*).

Lessons to be learned

- Search the journal literature and patents (and other information sources) before starting any project.
- Search again at project milestones; your project goal might have changed and other inventors might have been active too.



Replication of R&D results costs anything up to EUR 60 000 million a year in Europe alone.

The Austrian Patent Office estimates that EUR 60 000 million are wasted per year in Europe, including EUR 1 000 million in Austria.

The President of the Austrian Inventor Association estimates (2005) that up to 10 000 of the 30 000 inventors who are active in Austria work "to no avail".

The technology transfer agency ProVendis estimates that 25% all of German R&D investment is wasted by duplicating R&D already done.

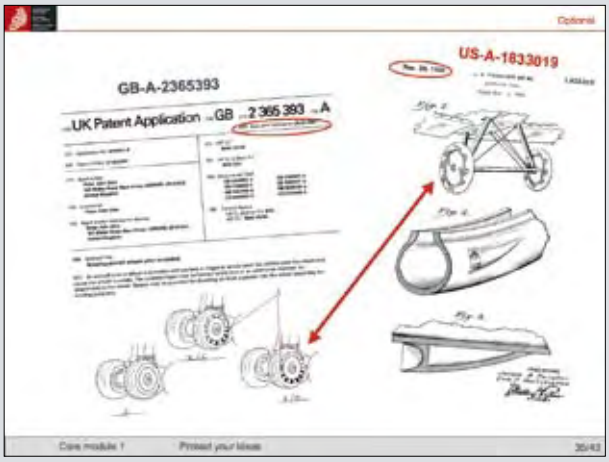
- Review the literature (including articles and patents) **before you start** your project.
- Search again at project **milestones**: your project might have changed and other inventors might have been active too.

Slide 35 (optional)
Re-inventing the wheel – literally

Reinventing aircraft wheels
Slide 34 gives estimates for the extent of the duplication of R&D efforts. This slide presents a practical example in which someone literally reinvented the wheel.

In 2000, a patent application was filed for an invention that solves the problem of excessive wear (or even explosion) of aircraft wheels due to high acceleration when touching the ground. It uses small pockets on the side of the tires that make the wheel spin in the wind without the need for an additional electrical motor. What the inventor did not know was that this invention had already been made in the early days of airplane technology: in 1929, a US patent application had been filed (and almost forgotten) that described the same invention.

This case highlights two important points
- Searching the patent literature is worth the effort.
- Many people have invented clever solutions (often a long time ago). The problem you are looking to solve might already have been solved, and the solution might even be free to use (the 1929 patent expired long ago).



Reinventing the wheel – literally

Problem

Excessive wear (or even explosion) of aircraft wheels due to high acceleration when touching the ground.

Proposed solution

Small pockets on the side of the tires that make the wheel spin in the wind without the need for an additional electrical motor.

Patent already applied for in 1929!

Slide 36
Much information only available in patents

Patents as a unique source of information
Empirical studies indicate that around 80% of all the information contained in patent documents cannot be found anywhere else (see references below).

The exact percentage depends on the technical domain and the value of the knowledge. The more valuable a piece of scientific or technical knowledge, the more likely it is that it will be published in a patent.

In a recent large-scale study in the field of chemistry (Bregonje, 2005, see below), a total of 34 000 new chemical compounds in various domains such as polymers, alloys etc. were traced in scientific journals and in the patent literature. It was found that, depending on the field, up to 77% of new compounds were published in patents only, and not in journals. In total, 10 300 compounds (30%) could only be found in patents. Only 1 200 compounds documented in patents (11% of what was found in patent documents) had also been published in journals.

In addition to the absence of many R&D results from journals, there is another important difference between the two information sources: research papers focus on the research findings (the contribution to science), while patents focus on how to actually make the invention work.

Reviewing the journal literature only would mean missing out on a large amount of valuable knowledge.

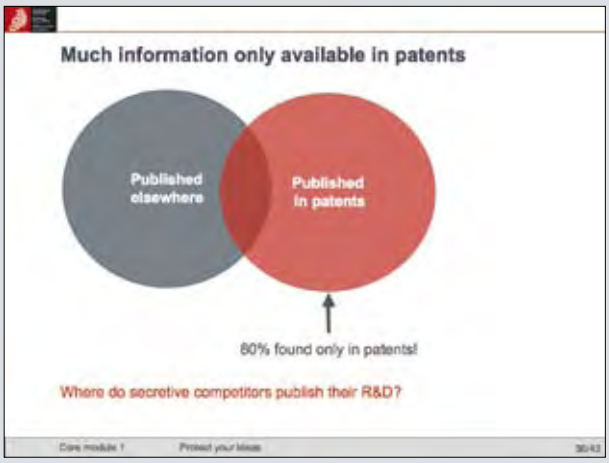
Furthermore, companies often do not want to disclose their new product development activities and do not publicly report such information. But very few companies intentionally forego patent protection for the sake of surprising competitors with new products. As all patent applications are published just 18 months after the priority date, patent data contains new information on a company's new product development activities which cannot be found elsewhere.

The time factor
Patent applications take 18 months to be published. This may seem like a long time. But publication in peer-review journals takes time too. In many cases, the patent application will be published before the corresponding academic paper. This issue has been empirically investigated in the above-mentioned study on chemical compounds (Bregonje, 2005). The authors found that in approximately 50% of the cases where both journals and patents contained the description of a new chemical compound, the patent was published earlier.

Additional benefits of patent information
- Patents have a uniform structure throughout the world.
- Almost all patents can be viewed free of charge. So access to them does not depend on your library's financial budget.

References

- Demidowicz, B. K., Oppenheim, C. (1981), The overlap of patent and journal literature on animal feedstuffs. World Patent Information, 3: 82-83.
- Eisenschlitz, T. S., Lazard, A. M., Willey, C. J. (1986), Patent groups and their relationship with journal literature. Journal of Information Science, 12: 53-58.
- Walker, R. D. (1995), Patents as Scientific and Technical Literature, Metuchen, N.J.: The Scarecrow Press.
- Bregonje, M. (2005): Patents: A unique source for scientific information in the chemical industry?, WPI, No. 27, pp. 309-315.



Approximately 80% of the information which can be found in patents is not available anywhere else in comparable detail.

Patents focus on **how to make things work,** while scientific articles focus on the scientific contribution.

-> Read patents as a complement
to the scientific literature!

Also note that your competitors will "announce" their new products in patents if they want to have patent protection!

Source: Empirical studies (see references in the background information).

Slide 37
Solutions found in patent documents

Most documents in patent databases concern inventions that are free to use by everyone. Depending on the patent office, the figure can be as high as 90%. This is due to several reasons:

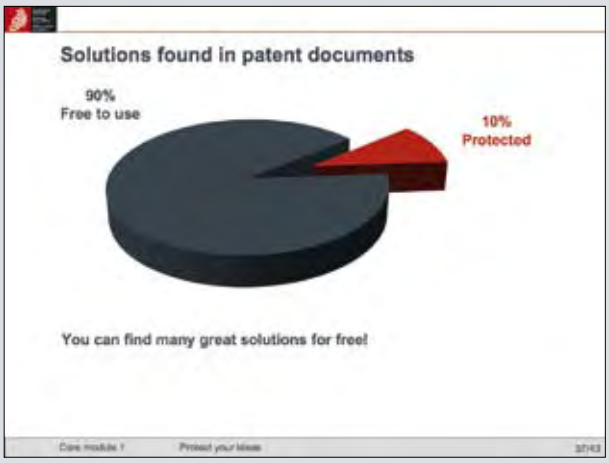
- A substantial number of all published patent applications are withdrawn by the applicant or rejected by the patent office. This means that these patent applications never became patents. Although an application might have been withdrawn, the published application document can still be retrieved (except if the application was withdrawn before the publication was made). Furthermore, some patents are found to be invalid in opposition proceedings or in the courts.

- To maintain a patent, the applicant or owner must pay renewal fees. If the patent does not appear economically attractive any more, the owner will discontinue payment of the renewal fees and the patent will lapse. From that point in time onwards, anybody can use the patent for free. This does not only apply to worthless inventions; patent holders may not have realised the full potential of a patent or they may have simply abandoned it because it did not relate to their core business.

- Even if renewal payments are made, a patent will last a maximum of 20 years from the date of filing (some exceptions apply). Thus, almost all patents filed more than 20 years ago are free to use. There are many examples of "old" inventions are not necessarily outdated, including pharmaceuticals, superconductors and the internet (invented in 1973!).

The figures shown on the slide are a conservative estimate based on a study carried out by Professor Helge B. Cohausz in 2004. He found that 94% of all patent documents represented patents or patent applications that had been withdrawn or rejected, or that had lapsed or were not in force for other reasons. According to his study, 2% of the documents represented patents that were in force but were actually invalid from a legal perspective, and the remaining 4% represented patents that were in force and valid.

The legal status of patents and patent infringement
The legal status of a patent can usually be ascertained with the help of the EPO's free patent databases (see next slide). But to be absolutely certain, it is better to consult the patent office or a patent attorney or other patent professional. Firstly, the patent or an equivalent patent in another country might still be valid. Secondly, even if the patent is valid it might not be as easy as it seems to know whether you are infringing that patent or not (it depends on the patent claims and these are difficult to interpret). Furthermore, you may not find all the relevant patents (ask a search professional for help). Additionally, the use of an invalid patent's technology might be blocked by other, valid patents. Thus, while the patent in question might be invalid, this does not necessarily mean that you can use the technology. Patent infringement should be checked by a patent attorney or other patent professional.



Reasons why most patent documents describe inventions that are free to use:

– **Application rejected/withdrawn** or patent invalidated
– **Payment of renewal fees discontinued** (owner sees no further value in the patent)
– **Patent has lapsed** (usually after 20 years)

"Old" solutions are not necessarily "outdated".

Examples: antibiotics, superconductors, the internet (**the internet was invented in 1973**).

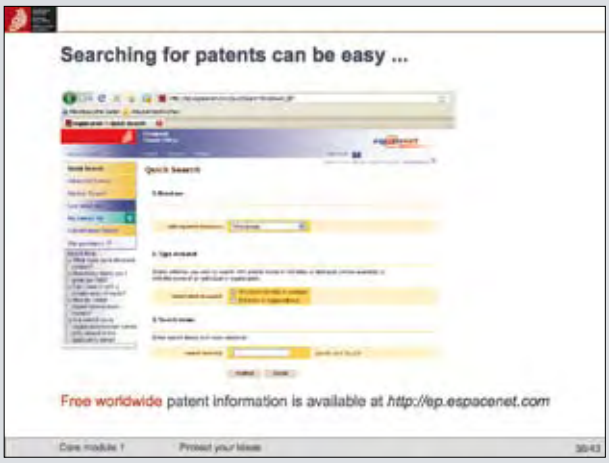
Slide 38
Searching for patents can be easy …

The European Patent Office and many other patent offices offer free patent databases. What is special about the EPO's free *esp@cenet* database is that it contains most worldwide patents in one database. At *www.espacenet.com* or *ep.espacenet.com* you will find not only the search interfaces, but also online help and many tools that make finding patents easier.

esp@cenet offers both a simple "quick search" and more advanced search options. To start with you could try using *esp@cenet*'s quick search function to search for the name of a well-known researcher (tick "persons or organisations" to the right of "select what to search").

When viewing a patent in *esp@cenet*, you get links to other patents cited in the prior art search report and to the patents that cite the patent that you are viewing. Furthermore, you will also find information about the countries in which protection is sought ("patent family") and links to the legal status information.

The worldwide coverage of *esp@cenet* (it includes documents from more than 80 patent offices) can be viewed online at *http://patentinfo.european-patent-office.org/_resources/data/pdf/global_patent_data_coverage.pdf*



- Easy to use
- Comprehensive (80+ countries, more than 60 million documents)
- Online assistance
- Free of charge

Hint

Try searching for a well-known researcher's name!

Slides 39–43
… but some basic knowledge is needed

Authors of research papers usually aim to use language that is easy to understand and precise. But authors of patents first of all try to get patent protection that is as broad as possible. Therefore, the language used in patents is often characterised by a very general description of concepts. Instead of using a common word for the concept, the inventor describes it with multiple words that allow for a broader interpretation. Furthermore, sometimes patent applicants do not want others to find their patent applications and so try to avoid using intuitive keywords. For example, an inventor might claim his invention to be related to a "writing instrument" instead of saying he has improved a pen. In this way, he ensures that others cannot circumvent the pen-related patent by selling other types of writing instruments that use the invention, and at the same time reduces the probability that a competitor will learn about his patent.

Thus, simple keyword-based searches are somewhat limited. They can be useful as a first step, but they won't necessarily find all relevant patents.

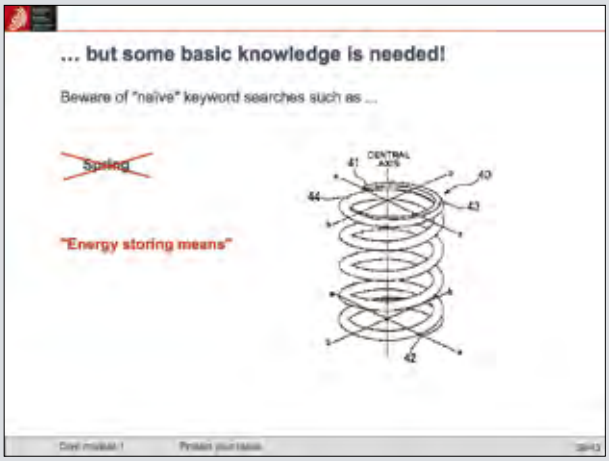
However, such difficulties can be overcome. One way of finding patents irrespective of the words used by their authors is to search for technology classes. Patent documents are classified by experts in the technical field into detailed technology classes. Although several different classification schemes exist, almost all patents are also classified using a common classification scheme, the International Patent Classification (IPC). At the European Patent Office, the European Patent Classification (ECLA) is used. The ECLA is very similar to the IPC.

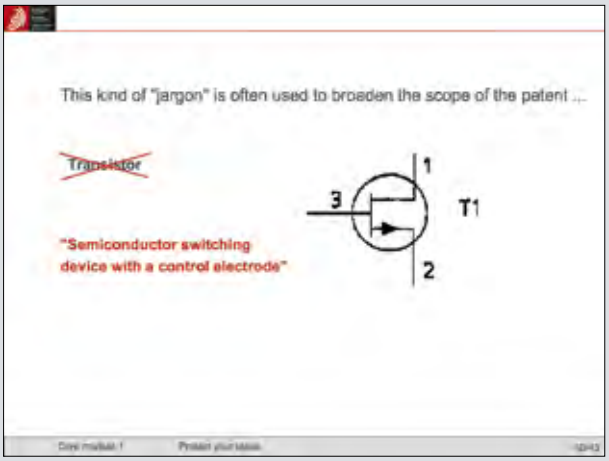
Both the ECLA and the IPC are hierarchical systems of technology classes that start with very broad technology domains at the highest level of the hierarchy: physics, chemistry, etc. Each further level of the IPC narrows down the technology contained in that class before reaching very specialised technology classes. You can explore the IPC at *http://www.wipo.int/classifications/ipc/ipc8/?lang=en and the ECLA at http://ep.espacenet.com*.

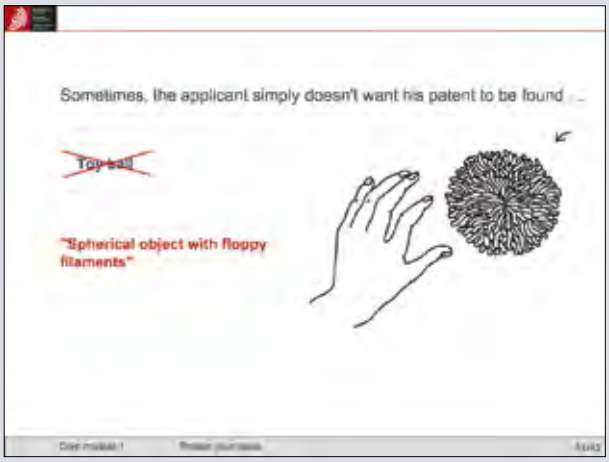
In principle, you just need to know which technology classes are of interest to you and you can then retrieve the majority of the relevant patents easily. You cannot expect to find all the patents relevant to your specific question within one class, though, because the definition of that technology class will not necessarily be an exact match with your personal definition of what you are interested in. Another reason for incomplete search results is that examiners cannot always know all the possible applications of an invention and thus might "forget" to assign a relevant class to an invention.

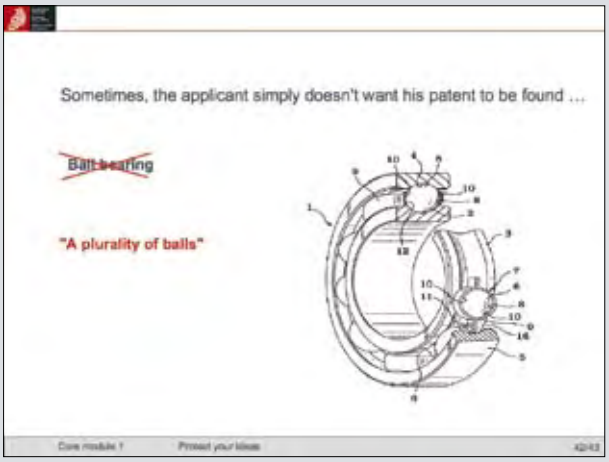
Despite its remaining imperfections, the technical classification of patent documents within the IPC or ECLA represents a key advantage of patent information. Journal articles are not classified in a comparable way. So it can be much easier to find most of the relevant patents than to find most of the relevant journal articles.

Note
More examples of patent jargon from several fields can be found in sub-module A, "Searching for patents", which contains an introduction to patent searching using the European Patent Classification system and the EPO's free *esp@cenet* service.









Simple, "naïve" keyword searches have very limited effectiveness. Applicants frequently use **broad concepts instead of intuitive keywords** to describe their inventions, either to broaden the scope of the patent or to deliberately make it harder to find.

This and the following examples of "patent jargon" are meant to provide an amusing conclusion to the lecture. You may like to introduce them with a humorous comment, along the lines of: "We engineers like to call a spring a spring. But that's not how patent attorneys see it. Let's have a look at the language they use."



One way of circumventing the problems with keywords is to use the **European Patent Classification** (ECLA) or International Patent Classification (IPC) instead.

Patent examiners classify each patent document into one or more technology classes, which can be searched for in databases. ECLA is a hierarchical system that allows both very broad and also very detailed searches.

To find out more about searching with ECLA and other methods of effective patent searching, visit these websites. They contain e-learning modules designed for everyone, from the absolute beginner to the expert searcher.

The **Patent Information Tour** is a good place to start.

Core module 2

How patents work

An introduction
for law students

Table of contents
Core module 2

Introduction to intellectual property rights	Slide 1 – 5	101
Patentability requirements	Slide 6 – 12	112
Issues of ownership	Slide 13 – 15	130
Disclosure requirement	Slide 16	136
Trade secrets	Slide 17	138
The patent application procedure	Slide 18 – 23	140
Infringement and litigation	Slide 24 – 29	156
Commercialising patents	Slide 30	168
Summary	Slide 31	170

Overview

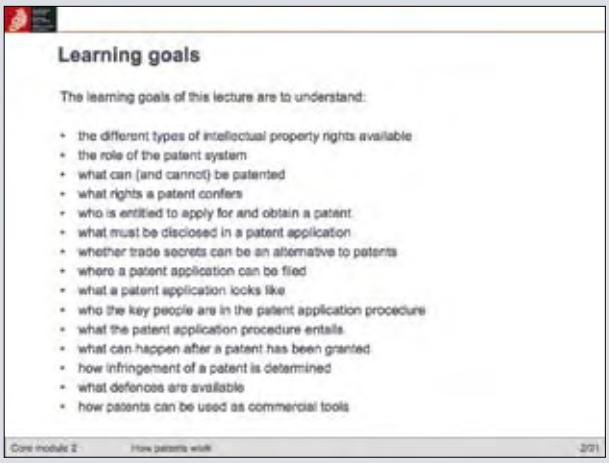
Slide 2	Learning goals
Slide 3	What are intellectual property rights?
Slide 4	Some intellectual property rights in a mobile phone
Slide 5	What is the role of the patent system?
Slide 6	What can be patented?
Slide 7	What is a "new" invention?
Slide 8	So keep it confidential!
Slide 9	What cannot be patented? (1)
Slide 10	What cannot be patented? (2)
Slide 11 (optional)	Programs for computers
Slide 12	What cannot be patented? (3)
Slide 13	What rights does a patent confer?
Slide 14	Who is entitled to apply for and obtain a patent? (1)
Slide 15	Who is entitled to apply for and obtain a patent? (2)
Slide 16	What must be disclosed in a patent application?
Slide 17	Can trade secrets be an alternative to patents?
Slide 18	Where can a patent application be filed?
Slide 19	What does a patent application look like?
Slide 20 (optional)	Front page of a published European patent application
Slide 21	Who are the key people in the patent application procedure?
Slide 22	What happens in the patent granting procedure?
Slide 23	What can happen after a patent has been granted?
Slide 24	How is infringement of a patent determined? (1)
Slide 25	How is infringement of a patent determined? (2)
Slide 26 (optional)	Which jurisdiction will apply in patent litigation?
Slide 27	What defences are available?
Slide 28 (optional)	What are unjustified threats?
Slide 29 (optional)	What remedies are available?
Slide 30	How can patents be used as commercial tools?
Slide 31	Summing up this lecture


How patents work
An introduction for law students

Slide 2
Learning goals

This slide is intended to orientate students so that they can tailor their expectations of this lecture. In this way, they can put each slide into the perspective of the whole lecture when it is presented.

It is important to stress to them that the module is intended to provide only an initial overview of the basics of intellectual property in general, and patents in particular.



The slides and accompanying notes for this lecture are structured around a set of learning goals, listed on this slide.

These are intended learning outcomes – i.e. by the end of the lecture students should have acquired the basic knowledge necessary to understand the core concepts of intellectual property, with particular reference to patents.

Begin the lecture by introducing these learning goals to the students and explain to them that you intend to address each topic in turn on subsequent slides. Explain to the students that, by addressing each of these topics in turn, the aim of the lecture is to help them to build up a sound basic understanding of the different types of intellectual property rights and some more detailed knowledge of patents in particular. However, reassure the students that the aim of the lecture is not to make them intellectual property experts. The introductory lecture is only intended to provide an overview and basic level of understanding that will help them with other law subjects where intellectual property issues are relevant, for example when undertaking due diligence work for clients in mergers and acquisitions cases.

Slide 3
What are intellectual property rights?

Using the information on the slide and the notes below, introduce students to the different types of intellectual property rights that are available.

The term "intellectual property rights" refers to the specific legal rights that inventors, creators and other right holders may hold and exercise. Intellectual property rights include patents, copyright, trade marks, design rights and trade secrets.

Patents are exclusive rights granted for the protection of an invention that offers a new and inventive technical solution or way of doing something. Later on, the lecture will explain the patenting process in greater detail and how a patent can be obtained, commercialised and enforced. In general terms, however, it can be said that patents must be applied for and are then examined by patent office examiners. After a lengthy process of patent examination, the application will either result in the refusal or, more commonly, the grant of the patent.

Note, however, that a patent might not always be the best option for protecting an invention. Trade secrets offer an alternative approach and this will be dealt with later in the lecture.

In some jurisdictions a special, less powerful kind of a patent called the 'utility model' (or 'petty patent') is also available. It usually offers a less effective protection for a shorter period of time. Most jurisdictions require that an invention must be new to receive utility model protection. Some jurisdictions, for example Germany, also require an inventive step. But most countries examine neither novelty nor inventive step of the utility model and will register any utility model that complies with the formalities (whether or not the utility model meets the legal requirements must then be later decided in the courts, if there is a legal dispute). For a list of countries offering utility model protection, see: *http://www.iprheldesk.org/documentos/docsPublicacion/html_xml/8_invencionesTecnicasBP%5B0000001055_00%5D.html*

Trade marks are distinctive signs identifying and distinguishing the commercial source of goods and services. Such signs can consist of words, logos, names, colours as well as any other means to identify commercial origin, such as the shape of products and their packaging.

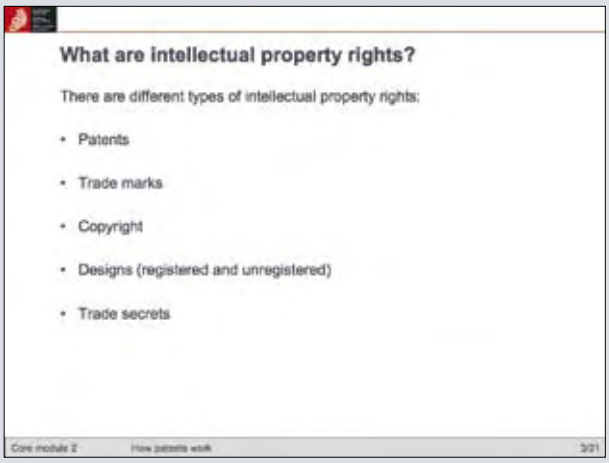
In the European Union, trade marks are protected at the national level by the trade marks laws that have been harmonised on the basis of the Trade Mark Directive (89/104/EEC, consolidated version enacted as 2008/95/EC). In addition to that, the Community Trade Mark Regulation (Council Regulation (EC) No. 40/94) has established a uniform regime for protection operating at Community level.

The main requirement for the registration of trade marks under the Community Trade Mark Regulation is that the trade mark must not be devoid of any distinctive character (Article 7 of Council Regulation (EC) No. 40/94): *http://oami.europa.eu/EN/mark/aspects/pdf/4094enCV.pdf*

Upon opposition by the proprietor of an earlier trade mark, the later trade mark applied for will not be registered, if it is identical with the earlier trade mark and the goods or services for which registration is applied for are identical with the goods or services for which the earlier trade mark is protected or if, because of its identity with or similarity to the earlier trade mark and the identity or similarity of the goods or services covered by the trade marks, there exists a likelihood of confusion on the part of the public in the territory in which the earlier trade mark is protected (Article 8 of Council Regulation (EC) No. 40/49): *http://oami.europa.eu/EN/mark/aspects/pdf/4094enCV.pdf*

Infringement of a trade mark occurs if an identical mark is used for identical goods or services, or if use of an identical or similar mark for identical or similar goods or services gives rise to a likelihood of confusion, or if use of a mark without due cause takes unfair advantage of, or is detrimental to, the reputation or the distinctive character of that mark. The proprietor of an earlier mark is also entitled to oppose the application for, or cancel the registration of, another mark which would be infringing.

Copyright works are different from patented inventions. They do not need to be registered and are automatically created when the work is created. Any original creative, intellectual or artistic expression is protected by copyright. Examples of copyright works are novels, scientific literature, theatre plays, software, photos and paintings, music, sculptures, and television broadcasts.



Using the information on the slide and the notes below, introduce students to the different types of intellectual property rights that are available.

The term "intellectual property rights" refers to the specific legal rights that inventors, creators and other right holders may hold and exercise. Intellectual property rights include patents, copyright, trade marks and design rights.

Patents

– protect technical inventions.
– must be applied for and are then examined by patent offices and either granted or rejected.

Trade marks

– protect their owner's products or services to distinguish them from products or services provided by competitors, including distinctive names, logos, colours or any other suitable way of identifying the source of products or services.
– do not need to be officially registered but registration makes it easier to prevent competitors from copying or from damaging the reputation of trade marks.

Copyright

– protects literary or artistic works, including literature, art, drama, music, photographs, recordings, broadcasts.
– is available automatically, so does not need to be registered.

Designs

– Registered designs protect the external appearance and impact on the eye of original designs provided they are "new" and of "individual character", e.g. new patterns, ornaments and shapes applied to objects which can be produced commercially.
– Unregistered designs do not require any formalities for subsistence of protection.

A **design** may be protected in different ways: (1) by Community designs (either registered or unregistered); (2) by national design rights (either registered or unregistered); and (3) by artistic copyright.

Given the Europe-wide focus of the teaching kit, the paragraphs below will only provide further details about Community registered designs. Nevertheless, it should be acknowledged that there is a range of overlapping rights with important differences in scope and terms of protection depending on whether Community design rights, national design rights or artistic copyright are being discussed.

Community designs (both registered and unregistered) are provided for under Council Regulation 6/2002/EC: *http://oami.europa.eu/EN/design/pdf/6-02-CV-en.pdf*

A **Community registered design** may be obtained by deposit (no substantive examination is undertaken) at OHIM – the Trade Marks and Designs Registration Office of the EU. The requirements are absolute novelty and individual character. The duration of protection for a Community registered design is a maximum of 25 years from the date of application to register, granted in five-year terms, which are renewable.

A **Community unregistered design** requires no formalities for subsistence. Like the Community Registered design, the requirements for a Community unregistered design are absolute novelty and individual character. The duration of protection for a Community unregistered design is for a maximum of three years following publication of the design in the European Union.

Trade secrets are ideas or undisclosed information that a person seeks to prevent others from using or disclosing.

Although the national law on trade secrets will be different in each country, certain minimum standards apply. These are set out in Article 39(2) of the World Trade Organization (WTO) Agreement on Trade-Related Intellectual Property Rights (the TRIPS agreement):

"Natural and legal persons shall have the possibility of preventing information lawfully within their control from being disclosed to, acquired by, or used by others without their consent in a manner contrary to honest commercial practices as long as such information:

- is secret in the sense that it is not, as a body or in the precise configuration and assembly of its components, generally known among or readily accessible to persons within the circles that normally deal with the kind of information in question;
- has commercial value because it is secret; and
- has been subject to reasonable steps under the circumstances, by the persons lawfully in control of the information, to keep it secret."

"For the purpose of this provision, 'a manner contrary to honest commercial practices' shall mean at least practices such as breach of contract, breach of confidence and inducement to breach, and includes the acquisition of undisclosed information by third parties who knew, or were grossly negligent in failing to know, that such practices were involved in the acquisition." (Note 10)

Note
There are also other kinds of intellectual property rights not shown on this slide, for **instance plant variety rights** or **database protection rights**, but these are not dealt with in this introductory lecture.

All of these intellectual property rights can help an inventor or creator protect their idea. For example, an inventor might use a patent to remain the sole manufacturer of equipment that contains a certain feature and might use a trade mark to communicate the special features of the product to consumers.

Trade secrets

- are ideas or undisclosed information that a natural or legal person seeks to prevent being disclosed to, acquired by, or used by others without their consent, in a manner contrary to honest commercial practices as long as such information:
  (a) is secret in the sense that it is not generally known;
  (b) has commercial value because it is secret;
  (c) has been subject to reasonable steps, by the person lawfully in control of that information, to keep it secret (e.g. this may include signing non-disclosure agreements with employees, contractors and partners).
- may offer a viable alternative to patenting (i.e. patents are granted for a limited period of time, while trade secrets can continue to subsist for a longer duration).
- However, trade secrets offer no protection against others reverse-engineering an invention or against others generating the same ideas or information, or making the same invention, independently.

Note

Slide 17 looks in greater detail at whether trade secrets can be an alternative to patents, so we will return to this topic later.

Slide 4
Some intellectual property rights in a mobile phone

Use this slide to show students how different types of intellectual property rights might be found in an everyday item – in this case a mobile phone.

The remainder of the lecture will focus on one type of intellectual property right – European patents – but should you require further information on trade marks, copyright, registered and unregistered designs (or on utility models and plant variety rights) this can be obtained from the national IP offices of the EPO member states.

In addition, more information on trade marks and designs in the European Union can be obtained from the Office for Harmonization in the Internal Market (OHIM): *www.oami.europa.eu*

An interactive explanation of intellectual property in a mobile phone can be found at: *http://www.ipo.gov.uk/whatis.htm*

Some IP found in a mobile phone

Trade marks:
- Made by "Nokia"
- Product "N95"
- Software "Symbian", "Java"



Patents:
- Data-processing methods
- Semiconductor circuits
- Chemical compounds
- ...

Trade secrets:
?

Copyrights:
- Software code
- Instruction manual
- Ringtone
- ...

Designs (some of them registered):
- Form of overall phone enclosure
- Arrangement of buttons in this oval shape
- Three-dimensional wave form of buttons
- ...

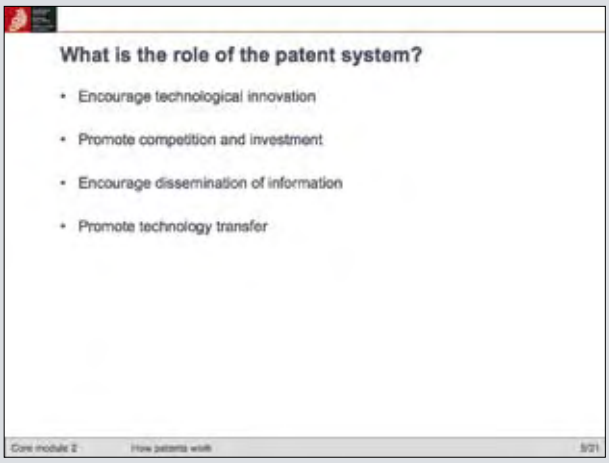
Slide 5
What is the role of the patent system?

The role of the patent system is to **encourage technological innovation** by rewarding intellectual creativity. In providing protection for the invention to the patent owner, patents provide incentives to individuals by offering them recognition for their creativity and the possibility of obtaining financial rewards if they commercialise or exploit their inventions. The different ways that a patent owner might benefit financially from a patent will be discussed at the end of this lecture.

The patent system is also important as a way to **promote dynamic competition** by encouraging investment in developing new or improved products or processes and by encouraging research and development – investors are more likely to provide financial backing if there is the potential for a return on their investment from inventions that can be patented, then commercialised and exploited.

The patent system can also **encourage dissemination of information** about new inventions that may be of benefit to society because information disclosed in patents is published. The invention described in the patent document will ultimately be available for anyone to use after the patent has expired.

Patents provide a good source of information about new technologies and, as the last slide of the lecture will show, it is even possible to search online databases free of charge to find out what inventions have been patented. In this way, patent databases can also **promote technology transfer** because anyone can find patented technologies that they may want to get access to and use themselves, for example by negotiating a licensing agreement with the patent owner.



The role of the patent system can be summarised as follows:

– It can **encourage technological innovation** by rewarding intellectual creativity. In providing protection for the invention to the patent owner, patents provide incentives to individuals by offering them recognition for their creativity and the possibility of obtaining financial rewards if they commercialise or exploit their inventions.
– It can **promote competition and investment** in developing new or improved products or processes by encouraging research and development – investors are more likely to provide financial backing if there is the potential for a return on their investment from inventions that can be patented.
– It can **encourage dissemination of information** that may be of benefit to society because information disclosed in patents is published.
– It can **promote technology transfer** through publicly available information in patent databases, because anyone can find patented technologies that they may want to get access to and use themselves.

Slide 6
What can be patented?

There is no uniform international law of patents so the situation varies depending on the law applicable in the country concerned. Patent law in the United States, for instance, takes a different approach to the European Patent Convention (EPC) in a number of important respects, but there is not sufficient time to cover all these differences in this introductory lecture. Instead, explain to students that the lecture will focus only on the situation under the EPC but that they should bear in mind that different approaches to patent law exist elsewhere depending on the country concerned. A list of contracting states to the EPC is available on the European Patent Office (EPO) website: *http://www.epo.org/about-us/epo/member-states.html*

The full text of the European Patent Convention (EPC) is available from the EPO website: *http://www.epo.org/patents/law/legal-texts/html/epc/1973/e/ma1.html*

Article 52(1) EPC refers to granting patents for inventions "in all fields of technology" and, although the EPC does not expressly define what an invention is, it has been part of the European legal tradition that patent protection should be reserved for technical creations.

Articles 54 (novelty), 56 (inventive step) and 57 (susceptible of industrial application) of the EPC set out the criteria for patentability. What can be considered a "new" (i.e. novel) invention is discussed in greater detail on the next slide. Before looking in more detail at what should be considered "new", further information is provided on this page about what should be understood by "inventive step" and "susceptible of industrial application".

The next slide will look in detail at novelty (i.e. what is a "new" invention?) under Article 54 EPC. Before doing so, the paragraphs below provide further information about the other criteria for patentability: inventive step and susceptible of industrial application.

An invention is considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art (Article 56, first sentence, EPC). The case law on inventive step (Article 56 EPC) can be found in the Case Law of the Boards of Appeal of the European Patent Office, section I.D.1 to 9, pages 120-168: *http://documents.epo.org/projects/babylon/eponet.nsf/0/F7944E5E0AD5958DC12572BC004B2CB6/$File/clr_2006_en.pdf*

Details on inventive step can be found in the Guidelines for Examination in the European Patent Office, Part C, Chapter IV, 11.1-11.13: www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_11.htm*

Article 57 of the EPC provides that "An invention shall be considered as susceptible of industrial application if it can be made or used in any kind of industry, including agriculture."

The case law on industrial application can be found in the Case Law of the Boards of Appeal of the European Patent Office, section I.E.2, pages 168-172: *http://documents.epo.org/projects/babylon/eponet.nsf/0/F7944E5E0AD5958DC12572BC004B2CB6/$File/clr_2006_en.pdf*

Information about industrial application can be found in the Guidelines for Examination in the European Patent Office, Part C, Chapter IV, 5: www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_5.htm*

When considering whether to grant a patent, the EPO examiners examine whether the patentability criteria as laid down in Article 52(1) EPC have been met. In addition, after a patent has been granted, the criteria of patentability continue to be important because it is also possible that a national court will find a European (or national) patent to be invalid if there is enough evidence that the patentability criteria were not, in fact, met when the patent was originally granted.

We will come back to what can happen after the patent has been granted – and the possibility of the patent being found to be invalid – later in this lecture.

For further information about how the patentability criteria are applied by EPO examiners, see the Guidelines for Examination in the European Patent Office, C-IV and the EPO Guide for Applicants, Part 1, How to get a European patent: Patentability. See www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiapp1/e/ga_b.htm*



The lecture will now focus on patenting issues under the European Patent Convention (EPC). The remainder of the lecture provides references to the various provisions of the EPC. The full text of the EPC is freely available online from the European Patent Office (EPO) website.

Introduce this slide by explaining to students that the EPC stipulates what can and cannot be patented.

Patents are granted for any inventions (whether the invention is a product or a process, e.g. process of manufacturing something) in "all fields of technology" (Article 52(1) EPC).

Provided that they meet the patentability criteria, namely that an invention is

– new (i.e. does not form part of the "state of the art" – this principle is explained in greater detail on the next slide);
– involve an inventive step (i.e. is not obvious to someone who is skilled in the particular technology of the invention in the light of everything that was publicly known before the date on which the patent application was filed); and
– susceptible of industrial application (i.e. is useful in some way).

Slide 7
What is a "new" invention?

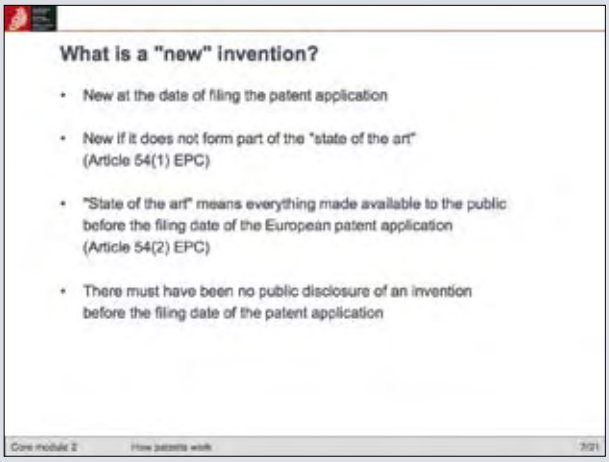
An invention can be patented only if it is new. An invention shall be considered to be new if it does not form part of the state of the art. The purpose of Article 54(1) EPC is to prevent the state of the art being patented again.

The first step in deciding whether an invention is new is to define the prior art, the relevant part of that art, and the content of that relevant art. The next step is to compare the invention with the prior art thus defined, and see whether the invention differs from it. If it does, the invention is new.

The case law on the definition of novelty and state of the art can be found in the Case Law of the Boards of Appeal of the European Patent Office, I.C, pages 46-120: *http://documents.epo.org/projects/babylon/eponet.nsf/o/F7944E5E0AD5958DC12572BC004B2CB6/$File/clr_2006_en.pdf*

Novelty and state of the art under the EPC are discussed in the Guidelines for Examination in the European Patent Office, Part C, Chapter IV, sections 6 to 9: www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv.htm*

Note
Article 55 of the EPC deals with certain very limited exceptions in terms of non-prejudicial disclosures. There are two instances in which a prior disclosure of the invention is not to be taken into consideration as part of the state of the art under Article 54 of the EPC: if the disclosure was due to, or in consequence of, (a) an evident abuse in relation to the applicant or his legal predecessor, or (b) the fact that the applicant or his legal predecessor had displayed the invention at an official, or officially recognised, international exhibition falling within the terms of the Convention on International Exhibitions signed at Paris on 22 November 1928 and last revised on 30 November 1972. The case law on non-prejudicial disclosures can be found in the Case Law of the Boards of Appeal of the European Patent Office, I.C.1.7, pages 50-51: *http://documents.epo.org/projects/babylon/eponet.nsf/o/F7944E5E0AD5958DC12572BC004B2CB6/$File/clr_2006_en.pdf*



For a European patent to be granted by the EPO, an invention must be **new at the date of filing the patent application**.

Under the EPC an invention shall be considered **"new" if it does not form part of the "state of the art"** (this principle is set out in Article 54(1) EPC).

The **"state of the art"** comprises "everything made available to the public by means of a written or oral description, by use, or in any other way, before the date of filing the European patent application" (this principle is set out in Article 54(2) EPC).

So "new" means that there must have been **no public disclosure of an invention before the filing date of the patent application**.

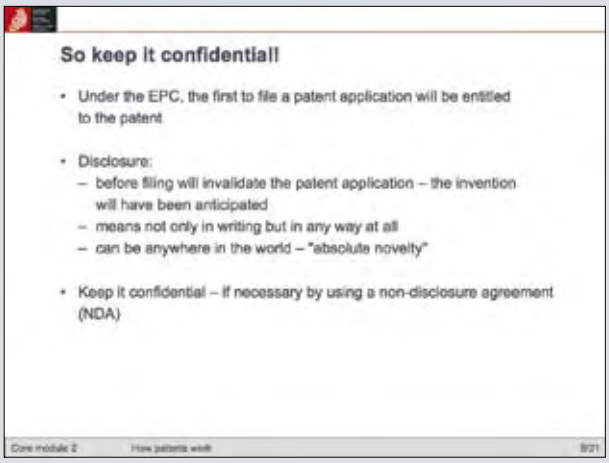
Note

The key message for students to take from this slide is that it is important to keep an invention confidential before filing a patent application, because any public disclosure prior to filing a patent application will be fatal. This message is stressed on the next slide.

Slide 8
So keep it confidential!

If an inventor needs to discuss his invention with someone, for example a potential customer or a contractor, before applying for a patent, a non-disclosure agreement (NDA) can help. If possible, consult a qualified lawyer or patent agent if you are thinking about disclosing your invention to someone else. The UK Intellectual Property Office (UK-IPO) has prepared useful further information on non-disclosure agreements: *http://www.ipo.gov.uk/patent/p-applying/p-should/p-should-otherprotect/p-should-otherprotect-cda.htm*

Note that the "first to file" principle operates in most patent systems worldwide, but that patent law in the United States takes a different approach, called "first to invent". The US is one of the few nations that decide inventorship on a first to invent basis rather than first to file. Whereas with first to file, priority is given to the invention with the earliest filing date, the United States Patent and Trademark Office (USPTO) currently gives priority to the first to invent, where evidence supporting conception of the claimed invention prior to the filing date of the application may be considered to determine the first inventor of the invention. Further information is available on the USPTO website: *http://www.uspto.gov/web/offices/com/iip/transcriptsf_m.htm*



This slide explains to students that prior disclosure of their invention before the date of filing a patent application can invalidate the patent application.

The general principle under the EPC is that the first to file the patent application will be entitled to the grant of a patent on a particular invention, but there must have been no public disclosure of the invention before the date of filing the patent application.

Disclosure

– before filing will invalidate the patent application. The invention will have been anticipated, i.e. the invention will no longer be considered "new".
– means not only in writing but also in any way at all, including: in written form (even in a publication that no-one might have read), oral disclosure (such as in a presentation or lecture), actual use or sale.
– can be anywhere in the world – "absolute novelty" applies under the EPC, i.e. all material made available to the public anywhere in the world forms part of the state of the art, so disclosure in any form anywhere in the world can be novelty-destroying.

So the key message is: do not disclose the invention to anyone, even orally, prior to filing the patent application. **Keep it confidential – if necessary by using a non-disclosure agreement (NDA)** to ensure confidentiality, particularly if approaching potential customers prior to patenting the invention.

Slide 9
What cannot be patented? (1)

Article 52(2) EPC provides a list of items that are not to be considered inventions for the purposes of granting European patents. These items are as follows.

Article 52(2)(a) EPC

Discoveries: if a new property of a known material or article is found, that is a mere discovery and unpatentable because discovery as such has no technical effect and is therefore not an invention within the meaning of Article 52(1) EPC. If, however, that property is put to practical use, then this constitutes an invention which may be patentable. For example, the discovery that a particular known material is able to withstand mechanical shock would not be patentable, but a railway sleeper made from that material could well be patentable: Guidelines for Examination in the European Patent Office, Part C, Chapter IV, 2.2 (Examination practice), 2.3 (List of exclusions), 2.3.1 (Discoveries): www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_2.htm*

Scientific theories: these are a more generalised form of discovery and the same principle set out for discoveries applies. For example, the physical theory of semiconductivity would not be patentable. However, new semiconductor devices and processes for manufacturing these may be patentable: Guidelines for Examination in the European Patent Office, Part C, Chapter IV, 2.3 (List of exclusions) and 2.3.2 (Scientific theories): www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_2_3.htm*

Mathematical methods: these are a particular example of the principle that purely abstract or intellectual methods are not patentable. For example, a shortcut method of division would not be patentable but a calculating machine constructed to operate accordingly may well be patentable: Guidelines for Examination in the European Patent Office, Part C, Chapter IV, 2.3 (List of exclusions) and 2.3.3 (Mathematical methods): www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_2_3.htm*

Article 52(2)(b) EPC

Aesthetic creations: an aesthetic creation relates by definition to an article (e.g. a painting or sculpture) having aspects which are other than technical and the appreciation of which is essentially subjective. If, however, the article happens also to have technical features, it might be patentable, a tyre tread being an example of this: Guidelines for Examination in the European Patent Office, Part C, Chapter IV, 2.3 (List of exclusions) and 2.3.4 (Aesthetic creations): www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_2_3.htm*

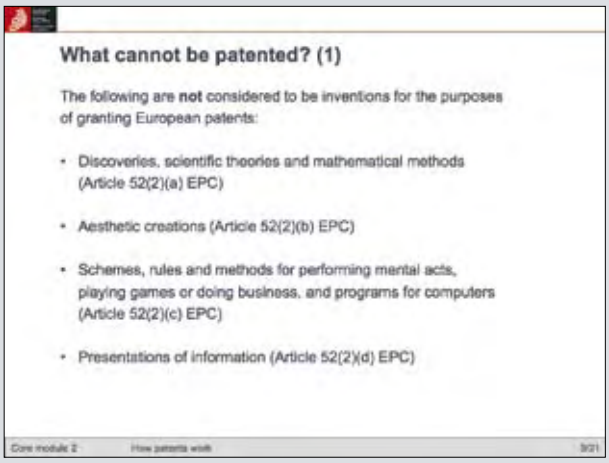
Article 52(2)(c) EPC

Schemes, rules and methods for performing mental acts, playing games or doing business: these are further examples of items of an abstract or intellectual character. In particular, a scheme for learning a language, a method of solving crossword puzzles, a game (as an abstract entity defined by its rules) or a scheme for organising a commercial operation would not be patentable. However, if the claimed subject-matter specifies an apparatus or technical process for carrying out at least some part of the scheme, that scheme and the apparatus or process have to be examined as a whole: Guidelines for Examination in the European Patent Office, Part C, Chapter IV, 2.2 (Examination practice) and 2.3.5 (Schemes, rules and methods for performing mental acts, playing games or doing business). See: www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_2.htm*

Programs for computers are dealt with separately on the next slide, which is optional for this introductory lecture.

Article 52(2)(d) EPC

Presentations of information: a representation of information defined solely by the content of the information is not patentable. This applies whether the claim is directed to the presentation of the information per se (e.g. by acoustical signals, spoken words, visual



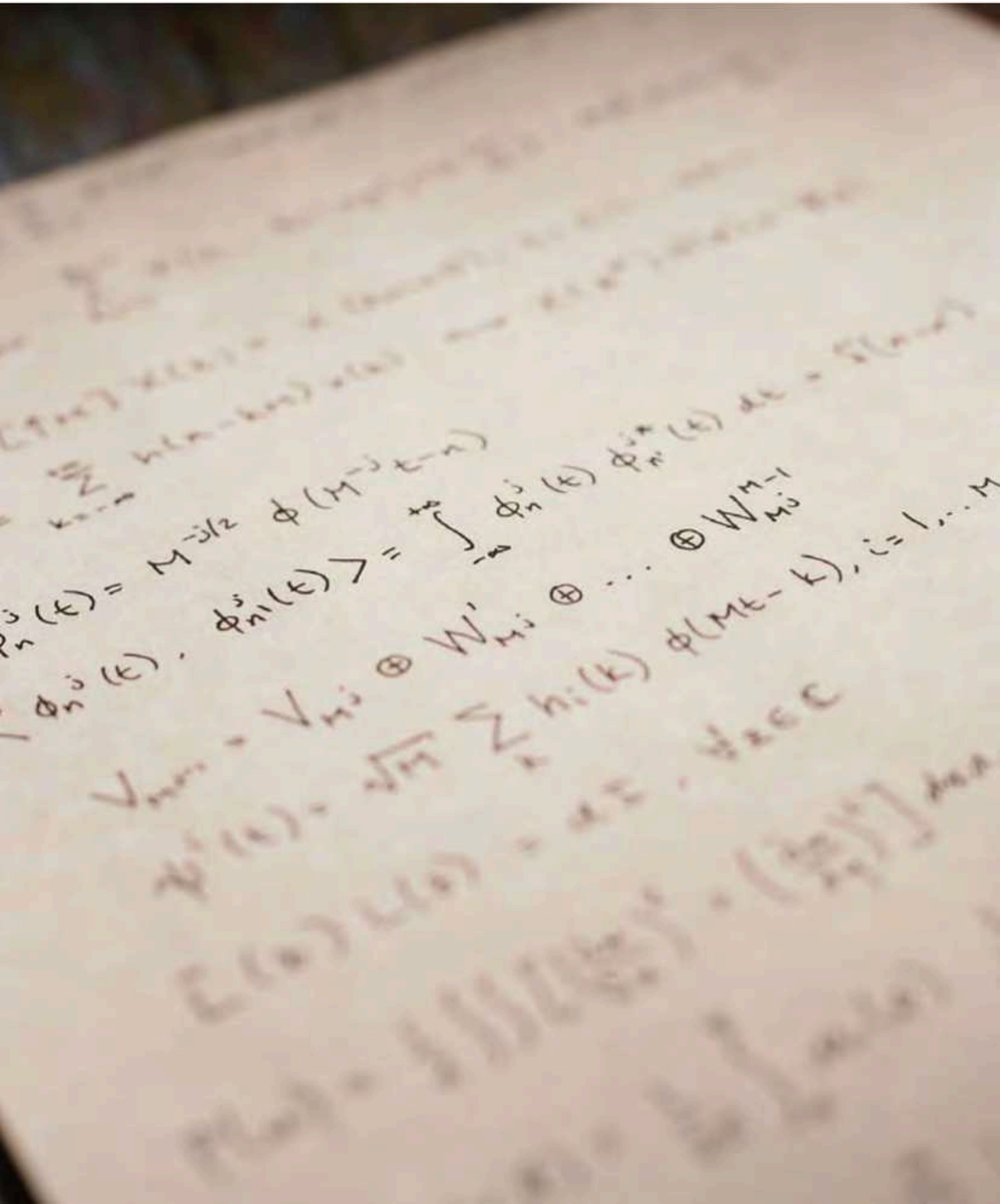
The EPC does not provide a definition of "invention", but it does provide a non-exhaustive list of subject-matter and activities that are not considered inventions for the purposes of granting European patents, i.e. the items listed on this slide are expressly excluded from patentability.

However, in practice, as the next slide demonstrates, the list of things that can't be patented may not be as restrictive as it first appears.

Examples of the different subject-matter and activities that are not considered inventions are given in the background information.

- displays, books defined by their subject, gramophone records defined by the musical piece recorded, traffic signs defined by the warning thereon) or to processes and apparatus for presenting information (e.g. indicators or recorders defined solely by the information indicated or recorded). If, however, the presentation of information has new technical features, there could be patentable subject-matter in the information carrier or in the process or apparatus for presenting the information: Guidelines for Examination in the European Patent Office, Part C, Chapter IV, 2.2 (Examination practice) and 2.3.7 (Presentations of information). See: www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_2.htm*

The items on this list are all either abstract (e.g. discoveries, scientific theories, etc.) and/or non-technical (e.g. aesthetic creations or presentations of information). In contrast to this, an "invention" within the meaning of Article 52(1) must be of both a concrete and a technical character. It may be in any field of technology. Further information about exclusions from patentability under the EPC is available in the Guidelines for Examination in the European Patent Office, Chapter IV, 2.1 (Exclusions). See: www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_2_1.htm*

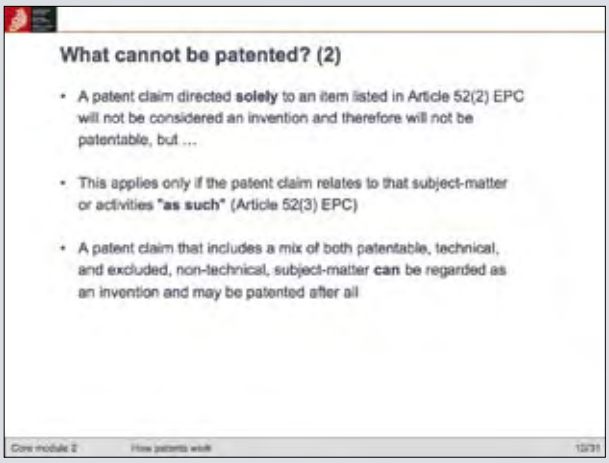


Slide 10
What cannot be patented? (2)

It will be recalled from the notes in this document for slide 6 that it has been part of the European legal tradition that patent protection should be reserved for technical creations. This is the basis for the EPO approach to assessing patentable subject-matter, which allows for the granting of patents for inventions that have "technical character", involve "technical teaching" or can be said to provide "technical solutions" to "technical problems". The case law on the technical nature of the invention can be found in the Case Law of the Boards of Appeal of the European Patent Office, I.A.1, pages 1-20: *http://documents.epo.org/projects/babylon/eponet.nsf/0/F7944E5E0AD5958DC12572BC004B2CB6/$File/clr_2006_en.pdf*

The case law on exclusions to patentable subject-matter can be found in the Case Law of the Boards of Appeal of the European Patent Office, I-A-1.1 to 1.5, pages 1-19: *http://documents.epo.org/projects/babylon/eponet.nsf/0/F7944E5E0AD5958DC12572BC004B2CB6/$File/clr_2006_en.pdf*

For further information see: Guidelines for Examination in the European Patent Office, Part C, Chapter IV, 2 (Inventions). See: www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_2.htm*



The list of things that can't be patented may not be as restrictive as it first appears because:

– A patent claim directed solely to an item listed in Article 52(2) EPC will not be considered an invention and therefore will not be patentable, but ...
– The above exclusions to patentable subject-matter apply only if the patent claim relates to that subject-matter or activities "as such" (see Article 52(3) EPC), meaning that ...
– A patent claim that includes a mix of both patentable, technical, and excluded, non-technical, subject-matter can be regarded as an invention and may be patentable after all. Any exclusion from patentability under Article 52(2) EPC applies only to the extent to which the application relates to the excluded subject-matter "as such".

Note

A good example of how this "as such" test is applied to determine whether a patent claim is patentable after all is programs for computers; this example is explained further on the next slide. This is an optional slide for this introductory lecture.

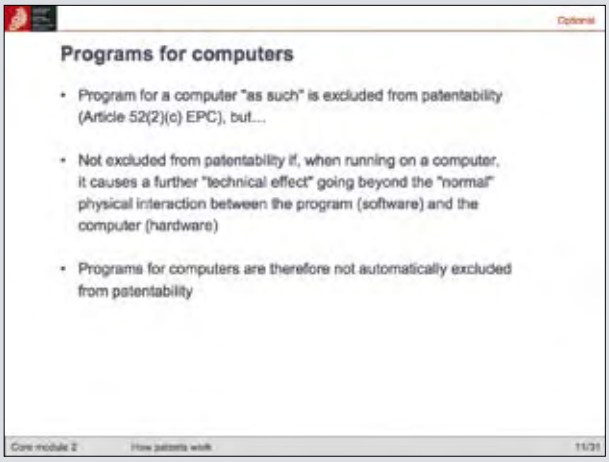
Side 11 (optional)
Programs for computers

The lecture slides have already explained how, under the EPC, programs for computers are not regarded as inventions if claimed "as such" in a patent application. However, this exclusion is not as restrictive as it first appears because a computer program is not excluded from patentability under Article 52 of the EPC if, when running on a computer, it causes a further technical effect going beyond the "normal" physical interaction between the program (software) and the computer (hardware). An example of a further technical effect is where the program serves to control a technical process or governs the operation of a technical device. The internal functioning of the computer itself under the influence of the program could also bring about such an effect.

If the computer program itself is not excluded, it is immaterial whether the program is claimed by itself, as a data medium storing the program, as a method or as part of a computer system.

So computer programs are not automatically excluded from patentability. More information about the patentability of computer-implemented inventions is available from the EPO Guide for Applicants, Part 1, How to get a European patent: Patentability, Invention: http://www.epo.org/patents/law/legal-texts/html/guiapp1/e/ga_b_i.htm and the Guidelines for Examination in the European Patent Office, Part C, Chapter IV, 2.3.6 (Programs for computers): www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_2_3_6.htm*

Note
On 22 October 2008 the President of the EPO referred to the Enlarged Board of Appeal (Case G 3/08) a number of questions concerning fundamental aspects of the patentability of computer programs. It is hoped that the referral of these questions to the Enlarged Board of Appeal will lead to more clarity concerning the limits of patentability in this field, facilitating the application of the law by examiners and enabling both applicants and the wider public to understand the law regarding the patentability of computer programs in accordance with the EPC. The full text of the referral is available from the EPO website: *http://documents.epo.org/projects/babylon/eponet.nsf/0/B89D95BB305AAA8DC12574EC002C7CF6/$File/G308_en.pdf*



Applying the principles set out on the previous slide, explain to students that:

– A program for a computer "as such" is excluded from patentability under Article 52(2)(c) EPC. But ...
– A computer program is not excluded from patentability if, when running on a computer, it causes a further "technical effect" going beyond the "normal" physical interaction between the program (software) and the computer (hardware).
– Programs for computers are therefore not automatically excluded from patentability.

Note 1

An example of a further technical effect is where the program serves to control a technical process or governs the operation of a technical device. The internal functioning of the computer itself under the influence of the program could also bring about such an effect – if the computer program itself is not excluded, it is immaterial whether the program is claimed by itself, as a data medium storing the program, as a method or as part of a computer system.

Note 2

The patentability of computer programs is explained in greater detail in the background information.

Slide 12
What cannot be patented? (3)

Inventions excluded from patentability because their commercial exploitation would be contrary to **"ordre public" or morality** are particularly relevant in the field of biotechnology, since patents are not granted in respect of processes for cloning human beings, processes for modifying the germ line genetic identity of human beings, uses of human embryos for industrial or commercial purposes, or processes for modifying the genetic identity of animals that are likely to cause them suffering without any substantial medical benefit to man or animal, and also animals resulting from such processes.
See: EPO Guide for Applicants, Part 1, How to get a European patent: Patentability, Invention: *http://www.epo.org/patents/law/legal-texts/html/guiapp1/e/ga_b_i.htm.*
See also Guidelines for Examination in the European Patent Office, Part C, Chapter IV, 4.8: www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_4_8.htm*
The case law on these exceptions to patentability is set out in Case Law of the Boards of Appeal of the European Patent Office, I-B-1 to 6, pages 37-45: *http://documents.epo.org/projects/babylon/eponet.nsf/0/F7944E5E0AD5958DC12572BC004B2CB6/$File/clr_2006_en.pdf*

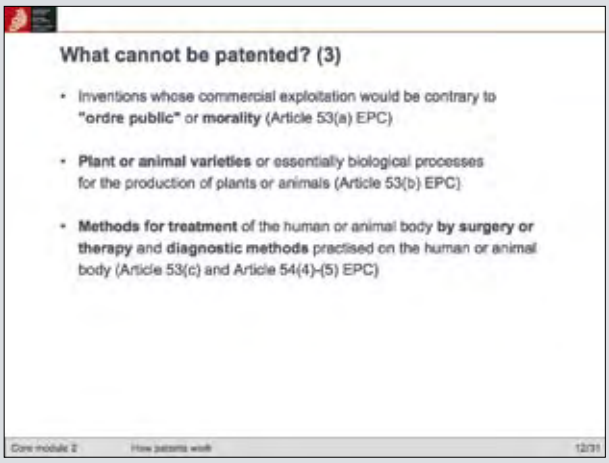
Note
Rule 28 (previously Rule 23d) of the Implementing Regulations to the EPC provides that:
Under Article 53(a), European patents shall not be granted in respect of biotechnological inventions which, in particular, concern the following:
(a) processes for cloning human beings;
(b) processes for modifying 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.

The text of Rule 28 is available online on the EPO website: *http://www.epo.org/patents/law/legal-texts/html/epc/2000/e/r28.html*

The question of whether or not Rule 28 forbids the patenting of claims directed to products which at the filing date could be prepared exclusively by a method which necessarily involved the destruction of human embryos – in this instance for stem cell research – was referred to the Enlarged Board of Appeal of the EPO in case G2/06. The Decision of the Enlarged Board of Appeal of 25 November 2008 in case G2/06 confirmed that European patent law prohibits the patenting of human stem cell cultures whose preparation necessarily involves the destruction of human embryos: *http://documents.epo.org/projects/babylon/eponet.nsf/0/428862B3DA9649A9C125750E002E8E94/$FILE/G0002_06_en.pdf*

Plant and animal varieties and essentially biological processes for the production of plants or animals are expressly excluded from patentability (Article 53(b) EPC). In the case of plant varieties, a separate form of protection is available in most contracting states and under EU law. A process for the production of plants or animals is essentially biological if it consists entirely of natural phenomena such as crossing or selection. The exclusion does not apply to microbiological processes or the products of such processes. In general, biotechnological inventions are also patentable if they concern biological material that is isolated from its natural environment or produced by means of a technical process, even if it previously occurred in nature. See: EPO Guide for Applicants, Part 1, How to get a European patent: Patentability, Invention: *http://www.epo.org/patents/law/legal-texts/html/guiapp1/e/ga_b_i.htm.*
For further information see Guidelines for Examination in the European Patent Office, Part C, Chapter IV, 4.6: www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_iv_4_6.htm*

Note
It is important to make the distinction between plants and animals which are to be considered patentable and plant and animal varieties which are not patentable. In case T 315/03, the EPO Technical Board of Appeal confirmed the principle that exceptions to patentability must be construed narrowly and that the exclusion of animal varieties did not exclude the patentability



In addition to the list of subject-matter or activities "as such" that are not considered to be inventions for the purposes of granting European patents under Article 52 EPC, inventions falling into any of the following categories are excluded from patentability:

Inventions whose commercial exploitation would be contrary to **"ordre public" or morality** (including, for example, processes for cloning human beings or the use of human embryos for commercial or industrial purposes of Rule 28 EPC) – this is set out in Article 53(a) EPC.

Plant or animal varieties or essentially biological processes for producing plants or animals (although "microbiological processes and products thereof" are not excluded) – this is set out in Article 53(b) of the EPC.

Methods for treatment of the human or animal body **by surgery or therapy and diagnostic methods** practised on the human or animal body (although products, in particular substances or compositions for use in such methods, e.g. medicaments or surgical instruments, are not excluded) – this is set out in Article 53(c) and Article 54(4)-(5) EPC.

of animals in general. The full text of the decision is available online: *http://legal.european-patent-office.org/dg3/biblio/t030315ex1.htm*

Note
The scope of the exception to patentability for essentially biological processes has been referred to the Enlarged Board of Appeal of the EPO in case G1/08 (in October 2008) and is currently pending: *http://www.epo.org/patents/appeals/eba-decisions/referrals/pending.html*

Methods for treatment of the human or animal body **by surgery or therapy, and diagnostic method**s practised on the human or animal body are excluded from patentability but the exclusion does not apply to products, substances and compositions for use in such methods, e.g. medicaments or surgical instruments. Substances and compositions are in fact singled out for special treatment in the EPC as regards the novelty requirement: even a known substance or composition may be patented for further medical or veterinary uses, provided that such use is novel and inventive. See: EPO Guide for Applicants, Part 1, How to get a European patent: Patentability, Invention: *http://www.epo.org/patents/law/legal-texts/html/guiapp1/e/ga_b_i.htm*

Note
The scope of the exception to patentability for methods of treatment by surgery has been referred to the Enlarged Board of Appeal of the EPO in case G1/07 and, at the time of writing (in October 2008), is currently pending, while the applicability of the exception to patentability in relation to dosage regimen has also been referred to the Enlarged Board of Appeal of the EPO in case G2/08: *http://www.epo.org/patents/appeals/eba-decisions/referrals/pending.html*



Slide 13
What rights does a patent confer?

For more information about what rights a patent confers see: *http://www.epo.org/patents/Grant-procedure/About-patents.html*

The term of the European patent shall be 20 years from the date of filing of the application (Article 63(1) EPC. However, nothing in Article 63(1) EPC shall limit the right of a contracting state to extend the term of a European patent, or to grant corresponding protection which follows immediately on expiry of the term of the patent, under the same conditions as those applying to national patents: (a) in order to take account of a state of war or similar emergency conditions affecting that State; (b) if the subject-matter of the European patent is a product or a process for manufacturing a product or a use of a product which has to undergo an administrative authorisation procedure required by law before it can be put on the market in that State (Article 63(2) EPC).

The full text of Article 63 of the EPC is available from the EPO website: *http://www.epo.org/patents/law/legal-texts/html/epc/1973/e/ar63.html*

The full text of Article 64 EPC is available from the EPO website: *http://www.epo.org/patents/law/legal-texts/html/epc/1973/e/ar64.html*

For **medicinal products and plant protection products** the possibility exists to extend the period of protection for the invention beyond 20 years, by a maximum of 5 years, to take account of the amount of time taken for the regulatory authority to authorise a product, where the patent owner needs to go through a lengthy approval procedure to ensure the product is safe before it is released onto the market. This extra period of protection is provided by supplementary protection certificates which are provided for under EC regulations and can be applied for at the national IP offices in the EPC contracting states where patent protection is in place.

Council Regulation (EEC) No 1768/92 of 18 June 1992 concerning the creation of a supplementary protection certificate for medicinal products: *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992R1768:EN:NOT*

Regulation (EC) No 1610/96 of the European Parliament and of the Council of 23 July 1996 concerning the creation of a supplementary protection certificate for plant protection products: *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996R1610:EN:NOT*



A patent is a legal title granting its holder the **right to prevent third parties from commercially exploiting an invention without authorisation**. So a patent is not a right to use; instead a patent protects an invention by giving the owner of the patent the right to stop anyone from making or using the invention without the owner's consent. A patent owner has exclusive rights to prevent others who do not have his consent from doing certain things (e.g. making the patented product, using a patented process, offering for sale, selling or importing).

The rights conferred by a European patent are set out in Article 64 of the EPC, which states that: "(1) A European patent shall ... confer on its proprietor from the date on which the mention of its grant is published in the European Patent Bulletin, in each contracting state in respect of which it is granted, **the same rights as would be conferred by a national patent granted in that State**; and (3) Any infringement of a European patent shall be dealt with by national law."

Note

Infringement arising under point (3) will be discussed at the end of the lecture.

A patent owner also has **the right to assign or transfer the ownership of a patent and to conclude licensing agreements**. As we shall see later in this lecture, these rights are important because they reward the inventor and, in doing so, create the incentives to encourage innovation – these rights are set out in Articles 71-73 of the EPC.

The protection granted by a patent is for a limited time. **The maximum term of patent protection is 20 years** starting from the date of filing the patent application and after that anyone is free to copy the invention disclosed in the patent. The term of a European patent is set out in Article 63 EPC.

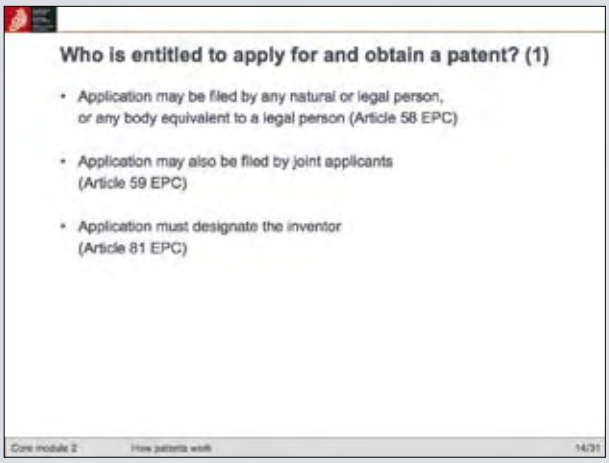
Slide 14
Who is entitled to apply for and obtain a patent? (1)

For further information about who is entitled to apply for and obtain a European patent (Article 58-61 EPC) see EPO Guide for Applicants, Part 1, How to get a European patent: Who is entitled to file a European patent application: *http://www.epo.org/patents/law/legal-texts/html/guiapp1/e/ga_c_i_1.htm*

See also Guidelines for Examination in the European Patent Office, Part A, Chapter II, 2 (Persons entitled to file an application): www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/a_ii_2.htm*

If an application for a patent is filed by more than one applicant (Article 59 EPC) and the request for a European patent does not name a common representative, Rule 151, paragraph 1, of the Implementing Regulations of the EPC provides that "the applicant first named in the request shall be deemed to be the common representative. However, if one of the applicants is obliged to appoint a professional representative, this representative shall be deemed to be the common representative, unless the applicant first named has appointed a professional representative. The same shall apply to third parties acting in common in filing a notice of opposition or intervention and to joint proprietors of a European patent." See Rule 151 of the Implementing Regulations of the EPC: *http://www.epo.org/patents/law/legal-texts/html/epc/2000/e/r151.html*

The case law on the right to a European patent is set out in the Case Law of the Boards of Appeal of the European Patent Office, V, page 309: *http://documents.epo.org/projects/babylon/eponet.nsf/0/F7944E5E0AD5958DC12572BC004B2CB6/$File/clr_2006_en.pdf*



A European patent **application may be filed by any natural or legal person**, or any body equivalent to a legal person, irrespective of nationality and place of residence or business. This is set out in Article 58 EPC.

A European patent **application may also be filed by joint applicants** or by two or more applicants designating different EPC contracting states. This is set out in Article 59 EPC. Note: Where there are different applicants for different contracting states, they are regarded as joint applicants for the purposes of proceedings before the EPO. This is set out in Article 118 EPC.

The application for a European Patent must **designate the inventor** (i.e. even if it is the inventor's employer who is actually applying for the grant of a patent). This is set out in Article 81 EPC.

What happens under the EPC when an inventor is an employee is discussed in greater detail on the next slide.

Slide 15
Who is entitled to apply for and obtain a patent? (2)

Note
The Protocol on Jurisdiction and the Recognition of Decisions in respect of the Right to the Grant of a European Patent (Protocol on Recognition) determines where entitlement proceedings can be brought when a European patent application is alleged to have been filed by a person who is not entitled to it: *http://www.epo.org/patents/law/legal-texts/html/epc/2000/e/ma4.html*



Whether or not an inventor is the applicant for and, if a patent is granted, the holder of a patent, will depend on the following:

– The right to a European patent will belong to the inventor or his successor in title. This is set out in Article 60(1) EPC. But the situation is more difficult if the inventor is an employee ...
– If the inventor is an employee the right to the European patent will be determined in accordance with the law of the EPC contracting state in which the employee is mainly employed. However, if the contracting state in which the employee is mainly employed cannot be determined, the law to be applied shall be that of the state in which the employer has his place of business to which the employee is attached. This is also set out in Article 60(1) EPC.
– Generally, an invention relevant to the employee's normal field of employment will be owned by their employer, but the employee may receive an additional financial reward (depending on the law of the EPC contracting state concerned).
– But even when they are not the applicant for or proprietor of a European patent, the inventor still has the right to be mentioned as such before the EPO. This is set out in Article 62 EPC.

Slide 16
What must be disclosed in a patent application?

The requirements for the content of the description are set out in Rule 42 of the Implementing Regulations to the EPC:

Rule 42
Content of the description

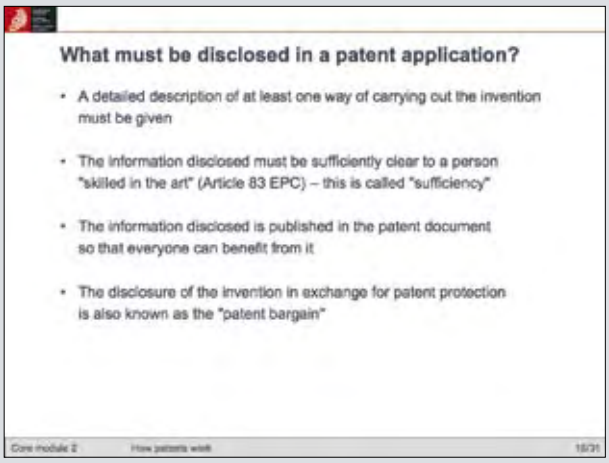
(1) The description shall:
  (a) specify the technical field to which the invention relates;
  (b) indicate the background art which, as far as is known to the applicant, can be regarded as useful to understand the invention, draw up the European search report and examine the European patent application, and, preferably, cite the documents reflecting such art;
  (c) disclose the invention, as claimed, in such terms that the technical problem, even if not expressly stated as such, and its solution can be understood, and state any advantageous effects of the invention with reference to the background art;
  (d) briefly describe the figures in the drawings, if any;
  (e) describe in detail at least one way of carrying out the invention claimed, using examples where appropriate and referring to the drawings, if any;
  (f) indicate explicitly, when it is not obvious from the description or nature of the invention, the way in which the invention is industrially applicable.

(2) The description shall be presented in the manner and order specified in paragraph 1, unless, owing to the nature of the invention, a different presentation would afford a better understanding or be more concise.

Source:
http://www.epo.org/patents/law/legal-texts/html/epc/2000/e/r42.html

For further information see Guidelines for Examination in the European Patent Office, Part C, Chapter II, 4.9: www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_ii_4_9.htm*

The case law on the sufficiency of the disclosure are set out in the Case Law of the Boards of Appeal of the EPO, II.A.1 to 7, pages 173-185: *http://documents.epo.org/projects/babylon/eponet.nsf/0/F7944E5E0AD5958DC12572BC004B2CB6/$File/clr_2006_en.pdf*



A detailed description of at least one way of carrying out the invention must be given.

The information disclosed in the patent application must disclose the invention in a manner sufficiently clear for the steps described to be carried out by a person who is **"skilled in the art"** (Article 83 EPC) i.e. a person skilled in that particular area of technology, so that the inventive concept can be disseminated widely and repeated by others once the patent has expired. The patent examiner will therefore look closely at whether the information disclosed in the application is sufficiently clear to do this. **This is called "sufficiency"**.

In return for patent protection, the holder has to disclose the details of the invention so that the inventive concept can be widely disseminated and repeated once the patent has expired.

The information disclosed is published in the patent document so that everyone can benefit from it.

The purpose of this information disclosure is often expressed as follows:
The disclosure of the invention in exchange for patent protection is also known as the "patent bargain", i.e. a bargain between the applicant for the patent, who will be the holder of patent rights if the patent is granted, and society more widely, which will benefit from the disclosure of hitherto unknown information.

Slide 17
Can trade secrets be an alternative to patents?

Instead of patenting an invention, some inventors opt to keep the invention secret.

Keeping the invention secret is an option to avoid the cost of patenting and also to avoid the situation whereby the invention is revealed to competitors. This is especially useful for manufacturing processes that are difficult for competitors to observe or to reverse engineer from the end product. Thus, a trade secret can offer the benefit of avoiding information disclosure or the limited term of protection afforded by patent protection.

Appropriate efforts will need to be made in order to enjoy the legal protection afforded by a trade secret, so keeping an invention secret will often also involve some cost – at least the cost of signing non-disclosure agreements. Even though trade secret law offers some protection, it is difficult to enforce – it is necessary to prove that a competitor behaved improperly when obtaining information about the trade secret.

Keeping an invention secret can be risky, because competitors can reverse engineer the invention or independently develop the same invention. Competitors could even file for a patent on the invention and might then be able to stop further development for the inventor relying on trade secrets.

Another important drawback of keeping the invention secret is that it is often very difficult to actually keep things secret. In 1985, before the internet enabled rapid information diffusion and before computer security problems were used for industrial espionage, a survey found that detailed information on new products or processes is available to competitors **within a year**, on average (Mansfield, 1985: "How rapidly does new industrial knowledge leak out?", Journal of Industrial Economics, December 1985).



If the invention is a product, there may be no alternative but to patent it, because anyone could reverse engineer the product and find out what the invention is. However ...

If the invention is a process (e.g. a process of manufacturing), trade secrets may be a viable alternative. This is because the inventor could decide to keep it secret rather than patent it, since it might not be possible for anyone to discover the process of manufacture simply by examining the end product sold.

But there is a risk with trade secrets – **trade secrets can leak out and, if they do, there is no protection** available in law.

In addition, **once the invention has been disclosed, it cannot be patented**. It will be too late to patent the invention because it will by then have been disclosed.

Apart from relying on trade secrets, in other cases, it may be preferable to simply rely on the speed of the innovation process to keep ahead of competitors, i.e. it may be preferable to keep inventing without patenting – simply keeping ahead of competitors by bringing new products onto the market faster.

Slide 18
Where can a patent application be filed?

Patents must be obtained in each country where protection is sought. For a period of 12 months after the date of first filing of the national patent, the applicant has a "right of priority", which means he can file for patents on the same invention at any other patent office around the world. However, if more than a year has passed, his own initial patent application is considered prior art that destroys the novelty of his invention. There are a number of factors to bear in mind when deciding where to apply for a patent – when deciding where to patent, applicants will usually want to obtain protection in: (1) the countries where they manufacture; (2) the countries where they sell their products; and (3) the countries where the people manufacturing infringing products are based.

Patent applications can be filed at:

National patent offices

If patent protection is sought in just a few European countries, it is possible to choose the national route and file applications at the IP offices in those countries. The Guide for Applicants summarises the chief legal and economic factors that are likely to influence the applicant's choice between the European and national procedures: EPO Guide for Applicants, Part 1, How to get a European patent: A-IV (Choosing a route: national, European or international). See: www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiapp1/e/ga_a_iv.htm.htm*.

Patent law in the EPO member states has been extensively harmonised with the EPC in terms of patentability requirements. However, the national route generally leads to national rights which confer protection of differing extent. See: www.epo.org > Patents> Grant procedure> National applications: *http://www.epo.org/patents/Grant-procedure/Filing-an-application/national-applications.html*

The Paris Convention for the Protection of Industrial Property establishes the principle of national treatment (Article 2) so that non-nationals of the country in which patent protection is sought can apply for a patent provided they are nationals of another Paris Union contracting party. The Paris Convention also provides for a 12-month right of priority for a patent application (Article 4C(1)) starting from the date of filing of the first application (Article 4C(2)): *http://www.wipo.int/treaties/en/ip/paris/trtdocs_wo020.html#P77_5133UU*
There are 173 contracting parties to the Paris Convention (as at 8 February 2009): *http://www.wipo.int/treaties/en/ShowResults.jsp?country_id=ALL&start_year=ANY&end_year=ANY&search_what=C&treaty_id=2*

European Patent Office

European patents can be granted for the 36 contracting states to the EPC and, at the applicant's request, can be extended to Albania, Bosnia and Herzegovina, and Serbia (status: July 2009). See: www.epo.org > Patents> Grant procedure> European applications: *http://www.epo.org/patents/Grant-procedure/Filing-an-application/European-applications.html*

The EPC has established a single European procedure for the grant of patents on the basis of a single application and created a single body of substantive patent law designed to provide easier, cheaper and stronger protection for inventions in the contracting states. Further information about the nature and purpose of the EPC is given in the EPO Guide for Applicants, Part 1, How to get a European patent, A-II (Nature and purpose of the European Patent Convention): *http://www.epo.org/patents/law/legal-texts/html/guiapp1/e/ga_a_ii.htm*

For a full list of contracting states to the EPC see: *http://www.epo.org/about-us/epo/member-states.html*

A European patent is granted by the EPO but, once it has been granted, it becomes a bundle of European patents with national designations in all the countries in which the patent owner has decided to protect his invention. The cost of this depends on the number of countries that the patent owner has designated. Patent owners will designate the countries in which they wish to have the protection of a European patent. After the grant of a European patent, opposition to the grant may arise and limitation/revocation may be requested by the patent proprietor. Opposition and limitation/revocation are discussed later in this lecture. Infringement and invalidity proceedings are not dealt with by the EPO, but by the national court of the country (or countries) where the action arises. Infringement and invalidity proceedings are also discussed later in this lecture.



There are different routes to patent protection and the best route to take will depend on the invention and the markets it might be sold in, with the following options available:

National IP offices

- If patent protection for an invention is sought in just a few European countries, it may be best to choose the national route and file an application directly at each of the IP offices in the countries where protection is sought;
- The right of non-nationals to apply for a patent is set out in Article 2 of the Paris Convention for the Protection of Industrial Property Rights;
- The 12-month right of "priority" for international applications is set out in Article 4C of the Paris Convention for the Protection of Industrial Property Rights.

European Patent Office (EPO)

- The EPO accepts applications for European patents that can be granted for the 36 contracting states to the EPC and, at the applicant's request, can be extended to Albania, Bosnia and Herzegovina and Serbia (as at July 2009).

Patent Cooperation Treaty (PCT)

- The PCT procedure allows for a single application, which is later split into many national patent applications after the initial phase.
- One advantage of the PCT route is that costly patenting decisions can be delayed in most countries: at 30 months from the filing date of the international application or from the earliest priority date of the application if a priority is claimed, the international phase ends and the international application enters the national and regional phase.

The **Patent Cooperation Treaty (PCT)** allows for a single application to later split into many national patent applications. There are 141 Contracting Parties to the PCT (as at 22 May 2009): *http://www.wipo.int/treaties/en/ShowResults.*jsp?lang=en&treaty_id=6

The EPO accepts patent applications filed under the PCT in its capacity as: a receiving office, an international searching authority, an international preliminary examining authority, a designated or elected office. The PCT application does not yield an "international patent" but rather is divided into individual national patents. Thus, after the initial PCT phase the cost of a PCT application is simply the sum of the cost of all individual patents in all countries in which the patent is filed. The total cost for worldwide protection can amount to as much as EUR 100 000. It is often said that the advantage of a PCT application is that the actual patent filings in each of the countries protection is sought in can be delayed until the PCT process is completed. The PCT application itself costs around EUR 2 600 in patent office fees (plus patent attorney fees), but the cost varies considerably depending, for example, on the number of pages and the designated countries. The World Intellectual Property Organization (WIPO) has prepared a document containing frequently asked questions about the PCT (and their answers), available at: *http://www.wipo.int/export/sites/www/pct/en/basic_facts/faqs_about_the_pct.pdf*

For an introduction to the Euro-PCT procedure, see EPO Guide for Applicants, Part 2, How to get a European patent – PCT procedure before the EPO ("Euro-PCT"): *http://www.epo.org/patents/Grant-procedure/Filing-an-application/international-applications/guide-for-applicants.html*

Note
It is important for students to understand that patents must be obtained in each country where protection is sought. There is no such thing as an "international patent".

- However, any national law may fix time limits which expire later than 30 months. For instance, it is possible to enter the European regional phase at 31 months from the filing date of the international application or from the earliest priority date of the application if a priority is claimed. National and regional phases can also be started earlier on the express request of the applicant.
- It is important to stress that there is no such thing as an "international patent". However there is an international patent application procedure (the PCT).
- A PCT application can be filed at a national patent office, the EPO or the World International Property Organization (WIPO) direct.
- The EPO accepts patent applications filed under the PCT in its capacity as: a receiving office, an international searching authority, an international preliminary examining authority, a designated or elected office (Rule 19 PCT).

Slide 19
What does a patent application look like?

For further information about the requirements of a European patent application see: Guide for Applicants, Part 1, How to get a European patent: Items making up a European patent application: *http://www.epo.org/patents/law/legal-texts/html/guiapp1/e/ga_c_i_5.htm*

Patent applications can be filed at the EPO in any language. However, the official languages of the EPO are English, French and German. If the application is not filed in one of these languages, a translation has to be submitted. Although the services of a professional representative are mandatory only for applicants who have their residence or place of business not within the territory of one of the contracting states of the EPC, the EPO advises all applicants to seek legal advice. Source: www.epo.org > Patents> How to apply for a European patent, A step-by-step guide to the grant procedure, 2 Application: *http://www.epo.org/patents/One-Stop-Page.html*

Note
Arguably the most important part of the patent document is the claims, which define the extent of the patented technology, so there will be more to say about claims in the lecture than the other bullet points on this slide. If a competitor's product or process falls within the scope of the claims then it may be an infringement and the patent owner can stop the competitor's activity by an action brought in the courts. Damages and other remedies may be awarded by the courts if an infringement of the patent is found to have occurred. The claims will normally change in the course of the application being examined by the patent office, and often the claims will be narrowed because some of the invention claimed in the application is found not to be new (i.e. as a result of invalidating prior art) or because the examiner considers that what is being claimed by the patent applicant is much broader than disclosed in the applicant's explanation of how to repeat the inventive process. This second issue is called "insufficiency".

More information about the content of a European patent application is given in the Guidelines for Examination in the European Patent Office, Part C, Chapter II, 1-7: www.epo.org > Quick access > Law > Guidelines for Examination: *http://www.epo.org/patents/law/legal-texts/html/guiex/e/c_ii.htm*



Article 78(1) of the EPC sets out the basic components of a European patent application. These are

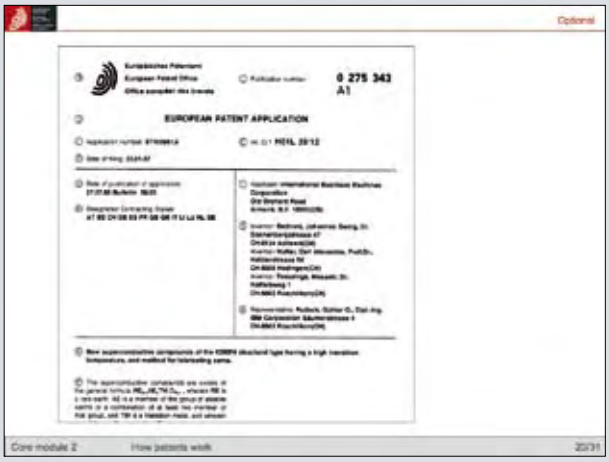
– A request for grant of a patent.
– A description of the invention – a summary of prior art (i.e. the technology known to already exist), an explanation (disclosure) of the invention and what problem it is supposed to solve.
– One or more claims: these determine the extent of protection conferred by a European patent. This is set out in Article 69 EPC: *http://www.epo.org/patents/law/legal-texts/html/epc/2000/e/ar69.html*.
– Any drawings referred to in the description or the claims – the description and drawings are used to interpret the claims.
– An abstract – around 150 words that can be used as a search tool for other patent applications.

Slide 20 (optional)
Front page of a published European patent application

This slide shows the front page of a sample published European patent application.

The patent was applied for in 1987 by IBM, the employer of inventors Bednorz et al., who had invented a high-temperature superconductor and a corresponding production method. The inventors received the Nobel Prize in Physics in 1987 for their discovery of such superconductors.

The main claim of the shown patent is (not shown on slide): "*Superconductive compound of the RE2TM.O4 type having a transition temperature above 26 K, wherein the rare earth (RE) is partially substituted by one or more members of the alkaline earth groups of elements (AE), and wherein the oxygen content is adjusted such that the resulting crystal structure is distorted and comprises a phase of the general composition RE2-xAExTM.O4-y , wherein TM represents a transition metal, and x < 0.3 and y < 0.5*."



This slide shows the front page of a published patent application.

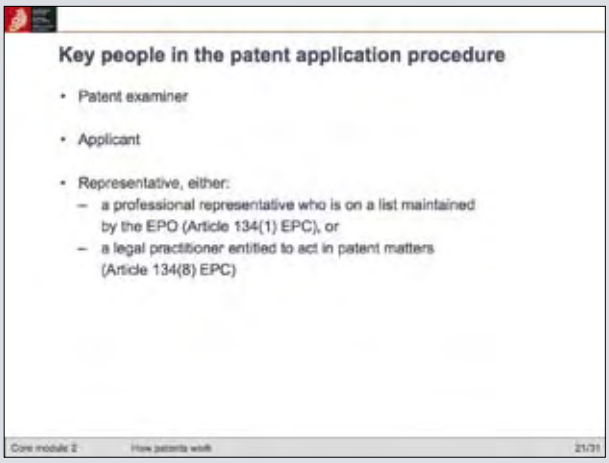
The patent has been applied for by IBM, the employer of inventors Bednorz et al., who have invented a high-temperature superconductor and a corresponding production method.

The inventors received the Nobel Prize in Physics in 1987 for their discovery of such superconductors.

Slide 21
Who are the key people in the patent application procedure?

If the applicant for a patent has his residence or place of business within the territory of one of the contracting states of the EPC, that applicant is not obliged to be represented by a professional representative (e.g. a European patent attorney). If the applicant is a non-resident, he may file a European patent application on his own behalf but must appoint a professional representative and act through that person afterwards (Article 133 EPC). This does not apply to fee payments, since these may be made by anybody. However, patent grant procedures are extremely complex, so for applicants who lack the requisite experience, the EPO's advice is to consult a professional representative before the EPO. In practice, the task of drafting a patent application and communicating with the patent examiner on behalf of the client is normally done by professional representatives (Article 134(1) EPC), but an applicant for a patent may also be represented by any legal practitioner qualified in one of the contracting states and having his place of business within that state, provided that he is entitled in that state to act as a professional representative in patent matters (Article 134(8) EPC). See EPO Frequently Asked Questions: *http://www.epo.org/help/faq.html*

Information on how to find a qualified European patent attorney is available on the EPO website: www.epo.org > Grant procedure > find a professional representative: *http://www.epo.org/patents/Grant-procedure/representatives.html*



In addition to the patent applicant, the other key people in the patent application procedure are:

– **Patent examiner:** Graduates in science, engineering and other technical subjets are employed as examiners and trained in pre-grant patent law. Only such technical people can understand the subject-matter of incoming applications, which need to be searched and later examined according to national and European patent law. Examiners work in patent offices run by national governments or at the European Patent Office, which is the executive body for the European Patent Organisation, which currently (as of 1 July 2009) has 36 member states (*http://www.epo.org/about-us/epo.html*).

– **Representative:** In practice, the task of drafting a patent application and communicating with the patent examiner on behalf of the client is normally done by professional representatives whose names appear on a list of professional representatives (Article 134(1) EPC), but an applicant for a patent may also be represented by any legal practitioner qualified in one of the contracting states and having his place of business within that state, provided that he is entitled in that state to act as a professional representative in patent matters (Article 134(8) EPC).

Slide 22
What happens in the patent grantimng procedure?

The first step in the European patent granting procedure is the examination on filing. This involves checking whether all the necessary information and documentation has been provided, so that the application can be accorded a filing date.

The following are required for the accordance of a date of filing (Article 80, Rule 40 EPC):
- an indication that a European patent is being sought;
- particulars identifying the applicant;
- a description of the invention or
- a reference to a previously filed application.

If no claims are filed, they need to be submitted within two months upon invitation under Rule 58 EPC.

This is followed by a **formalities examination** relating to certain formal aspects of the application, including the form and content of the request for grant, drawings and abstract, the designation of the inventor, the appointment of a professional representative, the necessary translations and the fees due. Source: www.epo.org > Patents> How to apply for a European patent, A step-by-step guide to the grant procedure, 3 Filing and formalities examination: *http://www.epo.org/patents/One-Stop-Page.html*

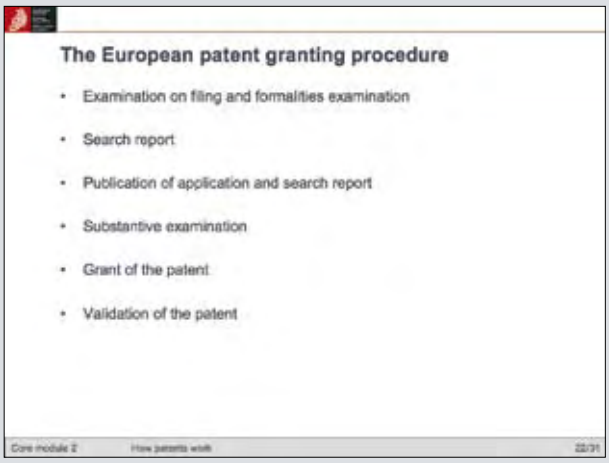
The search report is based on the patent claims but also takes into account the description and any drawings. Immediately after it has been drawn up, the search report is sent to the applicant together with a copy of any cited documents and an initial opinion as to whether the claimed invention and the application meet the requirements of the European Patent Convention. Source: www.epo.org > Patents > How to apply for a European patent, A step-by-step guide to the grant procedure, 4 Search: *http://www.epo.org/patents/One-Stop-Page.html*

The **search report** is usually created and sent to the patent applicant before the patent application is published. The patent application can be withdrawn at any time. A common motive to withdraw a patent application is if the search report of the patent office finds substantial conflicting prior art. By withdrawing the patent application early enough the applicant can avoid its publication. In practice, more patents are withdrawn by the applicants than actually rejected by the patent office. The search fee is EUR 1 050 (based on 2008 figures). See EPO Frequently Asked Questions: *http://www.epo.org/help/faq.html*

After the **application is published**, applicants then have six months to decide whether or not to pursue their application by requesting substantive examination. Alternatively, an applicant who has requested examination already will be invited to confirm whether the application should proceed. Within the same time limit the applicant must decide in which states protection is needed and confirm this by paying the appropriate designation fees and, if applicable, the extension fees. From the date of publication, a European patent application confers provisional protection on the invention in the states designated in the application. However, depending on the relevant national law, it may be necessary to file a translation of the claims with the patent office in question and have this translation published. Source: www.epo.org > Patents> How to apply for a European patent, A step-by-step guide to the grant procedure, 5 Publication of the application: *http://www.epo.org/patents/One-Stop-Page.html*

In terms of translation costs, the patent's claims must be translated into the national language of the respective country. Prior to May 2008, the full patent had to be translated into the language of each state in which patent protection was sought. Following the coming into force of the London Agreement, this has now changed. See: *http://www.epo.org/topics/issues/london-agreement.html*

So there are translation costs (that depend on the complexity of the patent's claims). Furthermore, there are the fees of the patent attorney and of the European Patent Office (and the renewal fees, which are discussed on the next slide) that may depend on the number of countries the patent is valid in. Following publication of a European patent application, anyone can submit written observations to the European Patent Office, drawing attention to facts that they believe have a material bearing on whether the patent should be granted. There is no specific EPO form for this purpose, and no fee is payable. These observations are then communicated to the applicant for the patent, who may comment on them. The patent examiner then decides how to take any observations into account. See EPO Frequently Asked Questions: *http://www.epo.org/help/faq.html*



The patent grant procedure in the EPO consists of the following stages:

– **Examination on filing and formalities examination:** The first step in the European patent grant procedure is the examination on filing. The examination on filing involves checking whether all the necessary information and documentation has been provided, so that the application can be accorded a date of filing (Article 80, Rule 40 EPC).

– **Search report:** Prepared by the search division. While the formalities examination is being carried out, a European search report is drawn up, listing all the documents available to the Office that may be relevant to assessing novelty and inventive step.

– **Publication of application and search report:** The application is published – normally together with the search report – 18 months after the date of first filing the patent application or, if priority was claimed, the earliest priority date.

– **Substantive examination:** After the request for examination has been made, the European Patent Office examines whether the European patent application and the invention meet the requirements of the European Patent Convention and whether a patent can be granted.

– **Grant of a patent:** If the examining division decides that a patent can be granted, it issues a decision to that effect.

– **Validation of the patent:** Once the mention of the grant is published, the patent has to be validated in each of the designated states within a specific time limit to retain its protective effect and be enforceable against infringers.

The **substantive examination** is carried out by an examining division normally consisting of three examiners, one of whom maintains contact with the applicant or representative. The decision on the application is taken by the examining division as a whole in order to ensure maximum objectivity. Source: www.epo.org > Patents> How to apply for a European patent, A step-by-step guide to the grant procedure, 6 Substantive examination: *http://www.epo.org/patents/One-Stop-Page.html*

A mention of the **grant of a patent** is published in the European Patent Bulletin once the translations of the claims have been filed and the fee for grant and publication have been paid (Rule 71(3) EPC). The decision to grant takes effect at the date of publication. The granted European patent is a "bundle" of individual national patents. See: www.epo.org > Patents> How to apply for a European patent, A step-by-step guide to the grant procedure, 7 The grant of a patent: *http://www.epo.org/patents/One-Stop-Page.html*

On average, the European Patent Office will grant a patent 4 or 5 years after it is applied for (based on 2007 figures). In a number of contracting states, the patent owner may have to file a translation of the specification in an official language of the national patent office. Depending on the relevant national law, the applicant may also have to pay fees by a certain date (Article 65 EPC). See: www.epo.org > Patents> How to apply for a European patent, A step-by-step guide to the grant procedure, 8 Validation: *http://www.epo.org/patents/One-Stop-Page.html*

For further information about the European patent grant procedure, see www.epo.org > Patents> How to apply for a European patent, A step-by-step guide to the grant procedure, 3 Filing and formalities examination: *http://www.epo.org/patents/One-Stop-Page.html*

The **filing fee** is EUR 180 (based on 2008 figures). See EPO Frequently Asked Questions: *http://www.epo.org/help/faq.html*

Note
As of 1 April 2009, the filing fee payable depends on the number of pages.



Slide 23
What can happen after a patent has been granted?

Under Articles 99 and 100 EPC, within nine months from the publication of the mention of the grant of a European patent in the European Patent Bulletin, any person may give notice to the EPO of **opposition** to the European patent granted, invoking lack of patentability, e.g. lack of novelty or inventive step (Articles 52-57 EPC), or lack of a sufficiently clear and complete disclosure of the invention (Article 83 EPC), or that the granted patent extends beyond the application as filed (Article 123(2) EPC). See: EPO Glossary: *http://www.epo.org/help/glossary.html*

Oppositions are dealt with by opposition divisions, which are normally made up of three examiners. See www.epo.org > Patents> How to apply for a European patent, A step-by-step guide to the grant procedure, 9 Opposition: *http://www.epo.org/patents/One-Stop-Page.html*. It is advisable to use the official EPO opposition form, which is available free of charge from the EPO and the IP offices of the contracting states. Notice of opposition is not deemed to have been filed until the opposition fee of EUR 670 (based on 2008 figures) has been paid.
See EPO Frequently Asked Questions:
http://www.epo.org/help/faq.html
In practice, opposition proceedings at the EPO and legal proceedings before national courts are rare.

The decision to **limit** or to **revoke** a European patent takes effect on the date on which it is published in the European Patent Bulletin and applies ab initio to all contracting states in respect of which the patent was granted (Article 105b EPC). See www.epo.org > Patents> How to apply for a European patent, A step-by-step guide to the grant procedure, 10 Limitation/revocation: *http://www.epo.org/patents/One-Stop-Page.html*

Renewal fees can be expensive, but amounts differ in different contracting states: *http://www.epo.org/patents/law/legal-texts/html/natlaw/index.html*
If the annual renewal fees are not duly paid or if the patentee revokes his patent or the patent is revoked, the patent might lapse earlier.

Bringing **invalidity proceedings** in each country where a European patent has taken effect can be extremely expensive. The fact that a patent has been examined and granted by a patent office is no guarantee that it is valid and national courts may well find that a patent is invalid even though the patent office had earlier been satisfied of patent validity when it examined the same aspects of the application and granted the patent.

Infringement proceedings can be lengthy, expensive and the outcome of the case can be uncertain. In fact, a common defence for a competitor accused of infringing a patent is to argue that the patent is invalid and should never have been granted in the first place. As with invalidity proceedings, infringement proceedings must be brought before the national courts in each country where a European patent has effect.



Opposition: After the European patent has been granted, it may be opposed by third parties – usually the applicant's commercial competitors – if they believe that it should not have been granted. Third parties must do so within nine months from the publication of the mention of the grant of a European patent in the European Patent Bulletin.

Limitation/revocation: This stage may also include revocation or limitation proceedings initiated by the patent proprietor himself. At any time after the grant of the patent the patent proprietor may request the revocation or limitation of his patent.

Renewal fees: After the patent has been granted, annual renewal fees must be paid to national patent offices to prevent lapse of the patent. These are paid to national patent offices rather than a single renewal fee being paid to EPO.

Invalidity proceedings: After a period of nine months has elapsed, there is no longer an opportunity to bring opposition proceedings before the EPO and, in order to get the patent revoked, anyone who wants to challenge a patent (i.e. on grounds that it does not meet the criteria for grant of a patent) must instead initiate separate court proceedings in each country where the European patent has effect.

Infringement proceedings: When a patent owner starts legal proceedings against a third party in order to enforce their patent rights, these are called infringement proceedings. Remember that the lecture described earlier how the rights conferred by a patent are that the owner of a patent has exclusive rights to prevent others who do not have the owner's consent from doing certain things (e.g. making, using, offering for sale, selling or importing a product). To enforce these rights, infringement proceedings can be initiated to stop a third party from any of these acts. As with invalidity, infringement proceedings must be brought before the national courts in each country where a European patent has effect. How an infringement of a patent is determined is dealt with in more detail on the next two slides.

Slide 24
How is infringement of a patent determined? (1)

What constitutes "infringement" of a patent will be determined by the courts in each (or any) jurisdiction in which the patent is valid with reference to the applicable national law, but the general principle is that a person not having the patent proprietor's consent is prohibited from certain acts – and breach of those prohibitions will constitute a patent infringement.

Although the rights conferred by a patent are not harmonised in different jurisdictions, international minimum standards that must be applied in each jurisdiction are set out in Article 28(1) of the TRIPS Agreement, which provides that:
"A patent shall confer on its owner the following exclusive rights:

(a) where the subject-matter of a patent is a product, to prevent third parties not having the owner's consent from acts of: making, using, offering to sell, selling or importing for these purposes that product;
(b) where the subject-matter is a process, to prevent third parties not having the owner's consent from the act of using the process, and from the acts of: using, offering for sale, selling, or importing for these purposes at least the product obtained directly by that process."

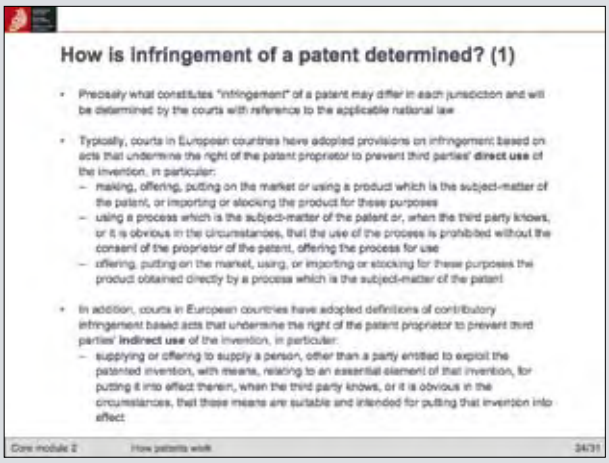
Source:
http://www.wto.org/english/docs_e/legal_e/27-trips.pdf

In addition to the international minimum standards set out in TRIPS, many European countries have adopted definitions of "direct" and "contributory" infringement based on the Community Patent Convention (CPC), which, although signed in December 1975, never entered into force since it was not ratified by a sufficient number of member states, and which contains in its 1989 version the provisions on the prohibition of direct or indirect use of the patented invention (Article 25 CPC and Article 26 CPC).

Fourteen years later, the "Agreement relating to Community patents", done at Luxembourg on 15 December 1989, was an attempt to revive the project. This agreement consisted of an amended version of the original Community Patent Convention, but this attempt failed. Twelve states signed the agreement: Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain and the United Kingdom. However only seven states ratified the CPC: Denmark, France, Germany, Greece, Luxembourg, the Netherlands, and the United Kingdom. All contracting states would need to ratify the agreement for it to enter into force.

Nevertheless, many of the member states of the EEC at that time introduced some harmonisation into their national patent laws in anticipation of the entry in force of the CPC.

The full text of the CPC is available at
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:41989A0695(01):EN:HTML



This slide – and the next slide – outline what types of act constitute infringement of a patent.

Recall that the notes to slide 6 explained that patents are granted for any inventions (whether the invention is a product or a process, e.g. a process of manufacturing something) in "all fields of technology" (Article 52(1) EPC). So the general principle is that **a product which is subject to a patent claim will infringe a patent with such a claim**. Similarly, **a process subject to a process claim will infringe a patent with such a claim**.

What constitutes "infringement" of a patent will be determined by the courts in each jurisdiction, with reference to the applicable national law (see Article 64(3) EPC).

The general principle is that a person not having the patent proprietor's consent is prohibited from certain acts – and breach of those prohibitions will constitute a patent infringement.

Many European countries have adopted definitions of "direct" and "contributory" (or "indirect") infringement based on the Community Patent Convention (CPC), which, although signed in December 1975, never entered into force since it was not ratified by a sufficient number of member states.

The typical provisions on infringement adopted by European countries and shown on this slide are therefore derived from Article 25 CPC (Prohibition of direct use of the invention) and Article 26 CPC (Prohibition of indirect use of the invention) respectively.

Slide 25
How is infringement of a patent determined? (2)

In addition to determining whether an act constitutes something prohibited without the consent of the patent proprietor, whether or not infringement has occurred depends on an analysis of whether the features of the alleged infringing item are covered by the claims of the patent.

Although the EPC is not primarily concerned with matters of infringement, this being left to national courts, the EPC establishes the principle by which the scope of protection conferred by patents in the EPC states is to be determined by the claims, with the description and drawings used to interpret the claims.

Article 69(1) EPC

"The extent of the protection conferred by a European patent or a European patent application shall be determined by the claims. Nevertheless, the description and drawings shall be used to interpret the claims."

Source: *http://www.epo.org/patents/law/legal-texts/html/epc/2000/e/ar69.html*

Furthermore, the Protocol on the Interpretation of Article 69 EPC provides further guidance and is an integral part of the Convention.

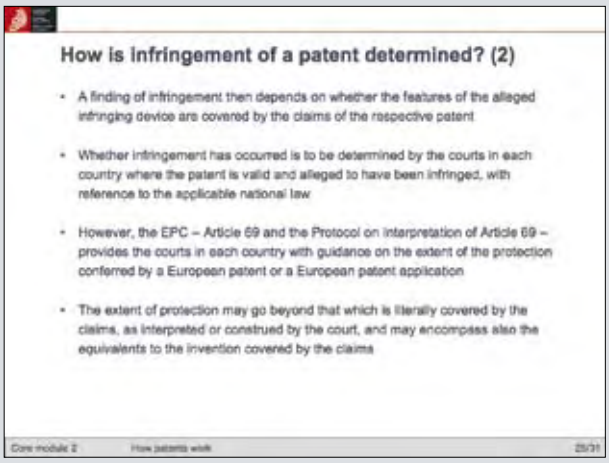
Article 1 of the Protocol on Interpretation of Article 69 EPC

"Article 69 should not be interpreted as meaning that the extent of the protection conferred by a European patent is to be understood as that defined by the strict, literal meaning of the wording used in the claims, the description and drawings being employed only for the purpose of resolving an ambiguity found in the claims. Nor should it be taken to mean that the claims serve only as a guideline and that the actual protection conferred may extend to what, from a consideration of the description and drawings by a person skilled in the art, the patent proprietor has contemplated. On the contrary, it is to be interpreted as defining a position between these extremes which combines a fair protection for the patent proprietor with a reasonable degree of legal certainty for third parties."

Article 2 of the Protocol on Interpretation of Article 69 EPC

"For the purpose of determining the extent of protection conferred by a European patent, due account shall be taken of any element which is equivalent to an element specified in the claims."

Source: www.epo.org > Patents > Legal texts > European Patent Convention (EPC) > Protocol on the Interpretation of Article 69 EPC: *http://www.epo.org/patents/law/legal-texts/html/epc/2000/e/ma2a.html*



The patent proprietor can take legal action and claim damages from persons considered to be infringing their patent.

This slide deals with the often complex question of whether acts done by a defendant fall within the scope of any claims a patent.

It will be recalled from slide 23 that infringement proceedings must be brought before the national courts in each country where a European patent has effect. Different case law approaches have been adopted in the UK, Germany and other European countries.

Although the EPC is not primarily concerned with matters of infringement, the EPC – Article 69 and the Protocol on Interpretation of Article 69 – sets out the principle that the extent of protection conferred by European patents in the EPC states may go beyond that which is literally covered by the claims, as interpreted or construed by the court, and may encompass also the equivalents to the invention covered by the claims.

Slide 26 (optional)
Which jurisdiction will apply in patent litigation?

Under EU law, Article 2 of the Brussels Regulation on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters provides that a person's domicile in a Member State, whatever their nationality, will determine that they will be sued in the courts of that Member State.

However, by way of derogation from this rule, Article 22 of the Brussels Regulation provides that:
"The following courts shall have exclusive jurisdiction, regardless of domicile:
...(4): in proceedings concerned with the registration or validity of patents, trade marks, designs, or other similar rights required to be deposited or registered, the courts of the Member State in which the deposit or registration has been applied for, has taken place or is under the terms of a Community instrument or an international convention deemed to have taken place."

Regardless of nationality, therefore, a person will be sued in the courts where the registration or validity of a patent is in suit.

Source: Council Regulation (EC) No. 44/2001 of 22 December 2000 on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters: *http://europa.eu/scadplus/leg/en/lvb/l33054.htm*



The full text of Article 22(4) of the Brussels Regulation summarised on this slide is set out in the background information.

Slide 27
What defences are available?

Although there are no harmonised provisions on defences, many European countries have adopted definitions of exceptions to acts constituting patent infringement based on Article 27 CPC (Limitation of the effects of the Community patent):

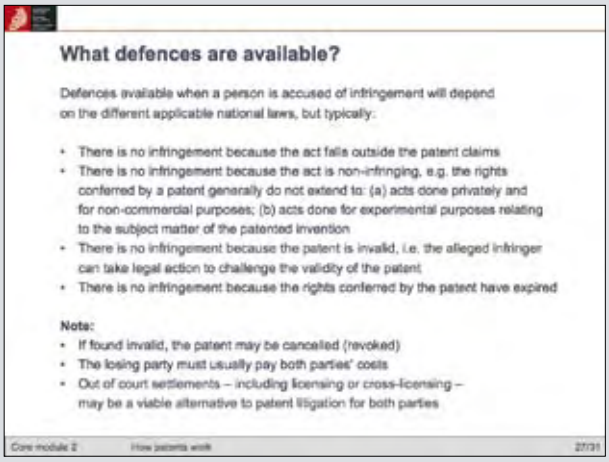
"The rights conferred by a Community patent shall not extend to:

(a) acts done privately and for non-commercial purposes;
(b) acts done for experimental purposes relating to the subject-matter of the patented invention;
(c) the extemporaneous preparation for individual cases in a pharmacy of a medicine in accordance with a medical prescription nor acts concerning the medicine so prepared;
(d) the use on board vessels of the countries of the Union of Paris for the Protection of Industrial Property, other than the contracting states, of the patented invention, in the body of the vessel, in the machinery, tackle, gear and other accessories, when such vessels temporarily or accidentally enter the waters of contracting states, provided that the invention is used there exclusively for the needs of the vessel;
(e) the use of the patented invention in the construction or operation of aircraft or land vehicles of countries of the Union of Paris for the Protection of Industrial Property, other than the contracting states, or of accessories to such aircraft or land vehicles, when these temporarily or accidentally enter the territory of contracting states;
(f) the acts specified in Article 27 of the Convention on International Civil Aviation of 7 December 1944, where these acts concern the aircraft of a State, other than the contracting states, benefiting from the provisions of that Article."

Similarly, Article 28 CPC deals with exhaustion of the rights conferred by a Community patent:

"The rights conferred by a Community patent shall not extend to acts concerning a product covered by that patent which are done within the territories of the contracting states after that product has been put on the market in one of these States by the proprietor of the patent or with his express consent, unless there are grounds which, under Community law, would justify the extension to such acts of the rights conferred by the patent."

The full text of the CPC is available at *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:41989A0695(01):EN:HTML*

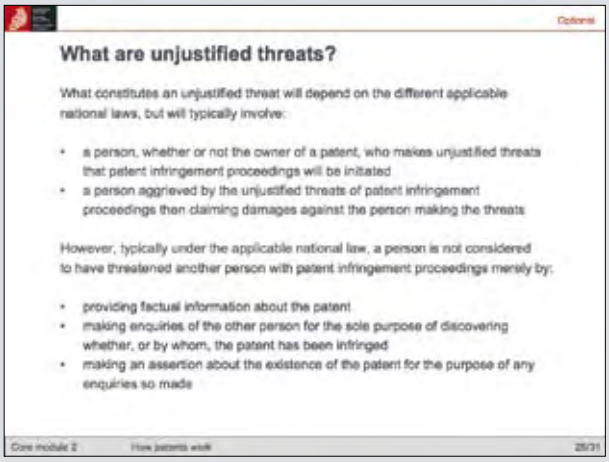


Certain acts, even if they fall within the scope of the claims of a valid patent, are not considered an infringement.

Although the precise defences available when a person is accused of infringement will depend on the different applicable national laws of the country concerned, the defences described on this slide are indicative of acts not normally found to be infringing. The acts described under bullet point 2 on this slide are derived from Articles 27 and 28 of the CPC. The full text of these provisions is set out in the background information.

Slide 28 (optional)
What are unjustified threats?

There are no harmonised provisions on what constitutes unjustified threats of an intention to bring a patent infringement action against another person. The content of slide 28 is for illustrative purposes only. Users of this document are therefore asked to consult national law for clarification.



Parties alleging infringement of their patent rights need to be careful to avoid making unjustified threats that they intend to bring an infringement action because, if those threats are unjustified, the aggrieved person may be entitled to a number of different forms of relief, including:

(1) a declaration that the threats are unjustified;
(2) an injunction against the continuance of the threats; or
(3) damages for losses suffered as a result of those threats.

What constitutes an unjustified threat will depend on the different applicable national laws but, typically, a person will not be considered to have threatened another person with patent infringement proceedings merely by providing information in the way set out on the last three bullet points of this slide.

Slide 29 (optional)
What remedies are available?

Although there are no harmonised provisions on remedies for patent infringement, Articles 44-46 of the TRIPS Agreement mandate the availability as remedies of injunctions, damages and disposal outside channels of commerce. The full text of Articles 44-46 of the TRIPS agreement is set out below.

Article 44 (Injunctions)

"1. The judicial authorities shall have the authority to order a party to desist from an infringement, inter alia to prevent the entry into the channels of commerce in their jurisdiction of imported goods that involve the infringement of an intellectual property right, immediately after customs clearance of such goods. Members are not obliged to accord such authority in respect of protected subject-matter acquired or ordered by a person prior to knowing or having reasonable grounds to know that dealing in such subject-matter would entail the infringement of an intellectual property right.
2. Notwithstanding the other provisions of this Part and provided that the provisions of Part II specifically addressing use by governments, or by third parties authorized by a government, without the authorization of the right holder are complied with, Members may limit the remedies available against such use to payment of remuneration in accordance with subparagraph (h) of Article 31. In other cases, the remedies under this Part shall apply or, where these remedies are inconsistent with a Member's law, declaratory judgments and adequate compensation shall be available."

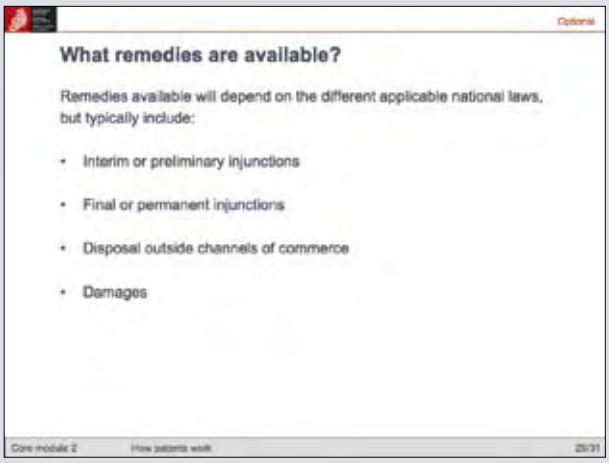
Article 45 (Damages)

"1. The judicial authorities shall have the authority to order the infringer to pay the right holder damages adequate to compensate for the injury the right holder has suffered because of an infringement of that person's intellectual property right by an infringer who knowingly, or with reasonable grounds to know, engaged in infringing activity.
2. The judicial authorities shall also have the authority to order the infringer to pay the right holder expenses, which may include appropriate attorney's fees. In appropriate cases, Members may authorize the judicial authorities to order recovery of profits and/or payment of pre-established damages even where the infringer did not knowingly, or with reasonable grounds to know, engage in infringing activity."

Article 46 (Other Remedies)

"In order to create an effective deterrent to infringement, the judicial authorities shall have the authority to order that goods that they have found to be infringing be, without compensation of any sort, disposed of outside the channels of commerce in such a manner as to avoid any harm caused to the right holder, or, unless this would be contrary to existing constitutional requirements, destroyed. The judicial authorities shall also have the authority to order that materials and implements the predominant use of which has been in the creation of the infringing goods be, without compensation of any sort, disposed of outside the channels of commerce in such a manner as to minimize the risks of further infringements. In considering such requests, the need for proportionality between the seriousness of the infringement and the remedies ordered as well as the interests of third parties shall be taken into account. In regard to counterfeit trademark goods, the simple removal of the trademark unlawfully affixed shall not be sufficient, other than in exceptional cases, to permit release of the goods into the channels of commerce."

The full text of the TRIPS Agreement is available at *http://www.wto.org/english/docs_e/legal_e/27-trips_01_e.htm*



Patent rights are only as good as the procedures and remedies by which they are enforced.

However, as with other post-grant issues, the remedies available will depend on the different applicable national laws and may well vary depending on the country concerned.

Articles 44-46 of the World Trade Organization (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (the TRIPS agreement) mandate the availability of remedies for injunctions, damages and disposal outside channels of commerce and the full text is set out in the background information.

In addition to **interim or preliminary injunctions** the most common form of **final or permanent injunctions** is an injunction not to infringe the patent which is the subject of the infringement action.

An order for **delivery up or destruction** aims to ensure that a person infringing a patent is not tempted to put the infringing copies into circulation in breach of an injunction. Delivery up may be to the right holder or some other person so that they can destroy the infringing copies.

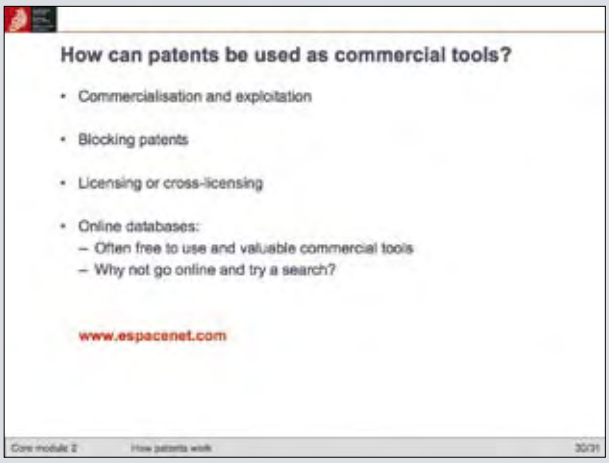
A successful patentee in an infringement action can usually seek **damages or account of the defendant's profits**, although the availability of these mechanisms will depend on the applicable national law in the country concerned. The purpose of damages is to determine what loss the patentee has suffered – the defendant then has to compensate the patent owner for damage suffered.

Slide 30
How can patents be used as commercial tools?

A patented invention will only be of real value if it is **commercialised and exploited**. For example, the patent owner may decide to sell a product containing the patented invention or to use a patented process to make products to sell. Alternatively, the patent owner might try to find someone who wants to buy the patented invention or take a licence and is prepared to pay royalties to the patent owner in return.

In addition to the commercial value of patents in terms of commercialisation and exploitation, **online databases** such as *http://www.espacenet.com* are free to use and can be valuable commercial tools through which information in published patents can be accessed free of charge so that anyone can monitor developments in particular technological fields. *esp@cenet* offers free access to more than 60 million patent documents from all over the world dating back to 1863. For more information on searching for patents see sub-module A.

Above all, the lecture should conclude by stressing to students the importance of seeking professional advice from a qualified patent attorney or a legal practitioner entitled to act in patent matters.



This is the last slide of the lecture. It explains that patents can be used as commercial tools in the following ways:

– **Commercialisation and exploitation:** The grant of a patent is no guarantee that it will be of any commercial value. It will only be of commercial value if there is a market for it.

– **Blocking patents:** In some industries, such as semiconductors and telecommunications, industry players block each other's patents and no one could sell a product without getting licences from their competitors.

– **Licensing or cross-licensing:** In industries where blocking patents occur, licensing – or even cross-licensing – agreements are common so that competitors are able to ensure that they do not infringe each other's patents and so that they can get access to and use each other's inventions.

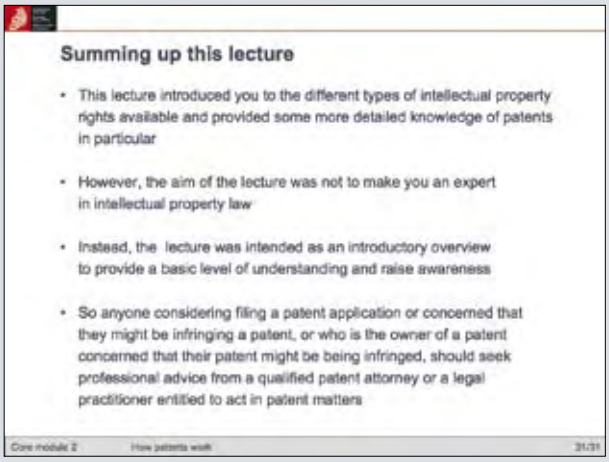
– **Online databases:** Online databases such as **www.espacenet.com** are free to use and can be valuable commercial tools through which information in published patents can be accessed free of charge so that anyone can monitor developments in particular technological fields. For more information on searching for patents see sub-module A.

Note

Why not conclude the lecture by using the last bullet point as a suggested activity for students? Ask them to go online and search for well-known inventions on *www.espacenet.com* and to report back at the next class on what they have found.

Slide 31
Summing up this lecture

This slide is to be used for summing up the lecture and provides a "health warning" to remind the audience that the lecture is intended only as an introductory overview to provide a basic level of understanding and raise awareness of intellectual property rights in general and patents in particular.


Summing up this lecture
• This lecture introduced you to the different types of intellectual property rights available and provided some more detailed knowledge of patents in particular
• However, the aim of the lecture was not to make you an expert in intellectual property law
• Instead, the lecture was intended as an introductory overview to provide a basic level of understanding and raise awareness
• So anyone considering filing a patent application or concerned that they might be infringing a patent, or who is the owner of a patent concerned that their patent might be being infringed, should seek professional advice from a qualified patent attorney or a legal practitioner entitled to act in patent matters
Core module 2
How patents work
31/31

Sub-module A

Searching for patents

How to use
the *esp@cenet* database

Overview

Slide 2	*esp@cenet* is... (1)
Slide 3	*esp@cenet* is... (2)
Slide 4	Keyword searches or technology class searches?
Slide 5 (optional)	Patent jargon
Slide 6 (optional)	Patent jargon in electronics (1)
Slide 7 (optional)	Patent jargon in electronics (2)
Slide 8 (optional)	Patent jargon in general technology (1)
Slide 9 (optional)	Patent jargon in general technology (2)
Slide 10 (optional)	Patent jargon in general technology (3)
Slide 11 (optional)	Patent jargon in chemistry (1)
Slide 12 (optional)	Patent jargon in chemistry (2)
Slide 13 (optional)	Patent jargon in chemistry/pharmaceuticals
Slide 14 (optional)	Patent jargon in pharmaceuticals (1)
Slide 15 (optional)	Patent jargon in pharmaceuticals (2)
Slide 16	Classification search
Slide 17	Wanted: Air conditioning technology for buses
Slide 18	Our search results: relevant ECLA classes
Slide 19	Detailed view of a technology class
Slide 20	Searching for patents in the relevant classes
Slide 21	Adding further criteria to your search
Slide 22	*esp@cenet* result list (1)
Slide 23	*esp@cenet* result list (2)
Slide 24	View list of citing documents
Slide 25	View or print original document
Slide 26:	Machine translation of description and claims
Slide 27	INPADOC legal status
Slide 28	Detailed information on European Patent Applications
Slide 29	Context-sensitive help and interactive assistant

Core module 1 ends with examples illustrating some of the difficulties involved in searching for patents using keywords. An additional difficulty not mentioned in core module 1 is that a large number of patents in the free databases have no English text available to be searched. So there are various limits to keyword-based searches in patent data.

Sub-module A describes one way of solving this problem, which is to use the official patent classification to find relevant patents. The patent classification best supported by *esp@cenet* is the ECLA, or European Patent Classification System.

This presentation also contains some interesting examples of patent jargon as optional slides. Taken from the fields of electronics, general technology, mechanical engineering, chemistry and pharmaceuticals, they illustrate why keyword searches can be difficult.

The remaining slides focus on a sample search for patents relating to air-conditioning for buses. After explaining how to get a list of results containing the relevant patents, the presentation outlines the information about patent documents available on *esp@cenet*.

The slides contain notes on *esp@cenet* in general and the screenshots in particular. For further information on using patent information, see the European Patent Office website, which offers complementary online and offline training: *http://www.epo.org/patents/learning/pi-training.html*

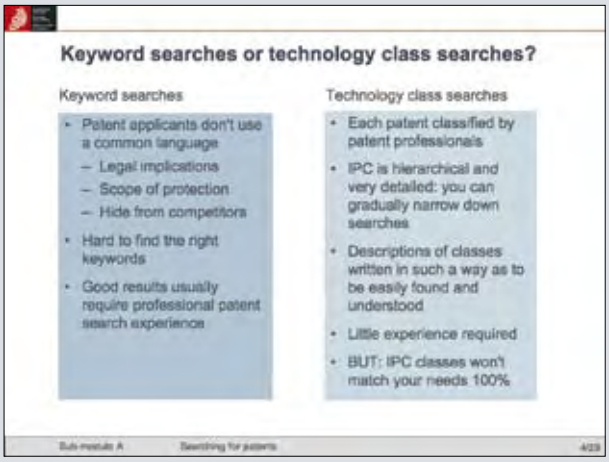
- Boolean operators: use "AND", "OR" or "NOT" within search fields
- Truncations: *(any number of characters), ? (0 or 1 character), # (exactly 1 character)
- Phrase search: "word1 word2"
- Nested parentheses: e.g. ((diode OR excimer) AND laser)
- Maximum four search terms per field
- Maximum 21 search terms and 20 operators in total
- Different search fields are always combined by Boolean "AND"

Please note that searches such as the one illustrated in this presentation cannot replace a professional patent search.


Searching for patents
How to use the esp@cenet database


esp@cenet is ...
• a database of 60 million records
– containing patent data with almost worldwide coverage
• a source of technical information
• designed for scientists and engineers
• also used by patent experts
www.espacenet.com





esp@cenet offers the following search options:

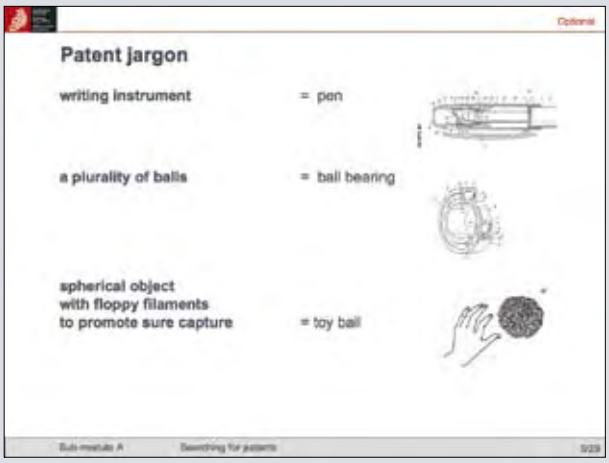
– **Quick search** – for words in the title or abstract or for persons/companies
– **Advanced search** – complex search queries in multiple data fields and with BOOLEAN operators (see background information for details)
– **Number search** – to look up a document using a known official patent number
– **Classification search** – search by browsing technology classes:
  With classification searches no knowledge of the terminology used in patents is required, so the associated pitfalls can be avoided. Furthermore, many documents in free databases do not have an English title or abstract to search using keywords.

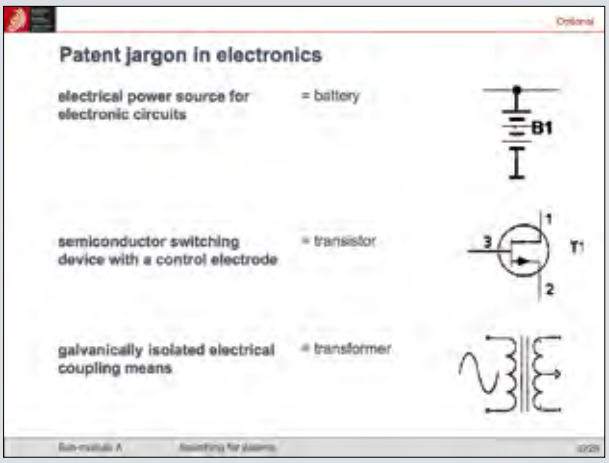
More information about searching in *esp@cenet* is available in the online help and online forum, and in brochures printed by the EPO (see last slide).

IPC = International Patent Classification

Because beginners will usually achieve better results using technology class searches rather than keyword searches, this presentation will focus on the former.

The following optional slides illustrate some of the difficulties connected with keyword searches.





Here are some interesting examples of patent jargon.

They give you an idea of what to expect when searching for and reading patents. They also help to illustrate the kind of difficulties you might encounter when performing keyword searches.

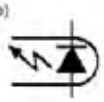
This and the following optional slides provide examples from the fields of

– electronics
– general technology
– mechanical engineering
– chemistry
– pharmaceuticals

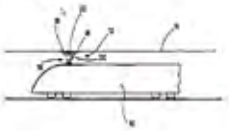
Optional

Patent jargon in electronics

photo-transmitting device = LED (light-emitting diode)



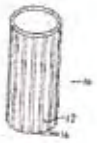
arrangement for tapping power from an electrical cable = current collector



Optional

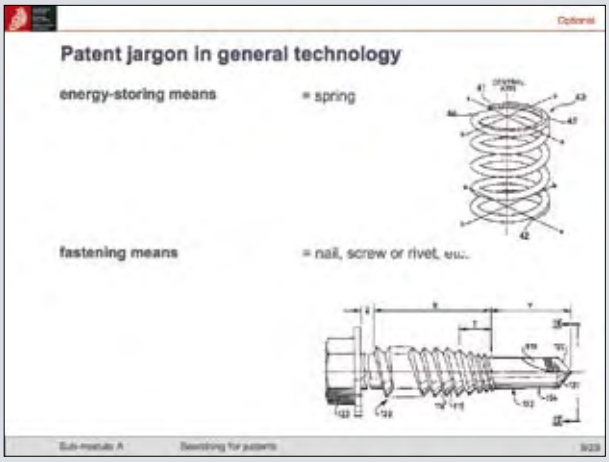
Patent jargon in general technology

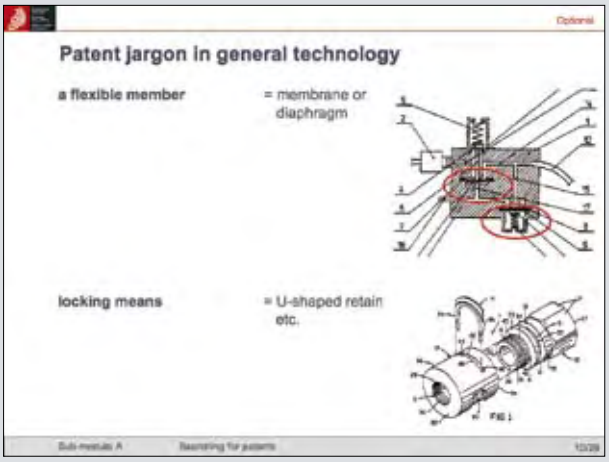
elongate member = pipe, riser, cable or optical fibre

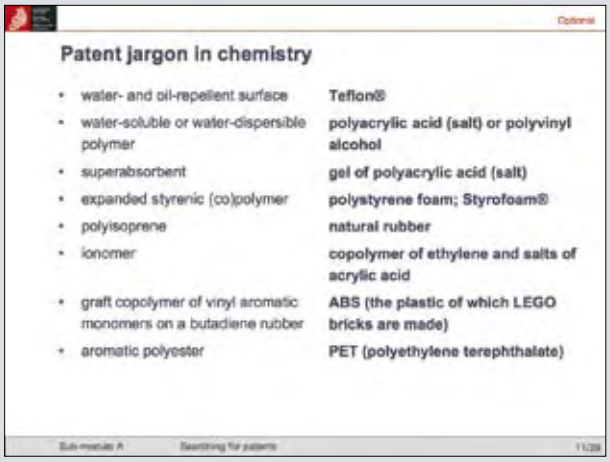


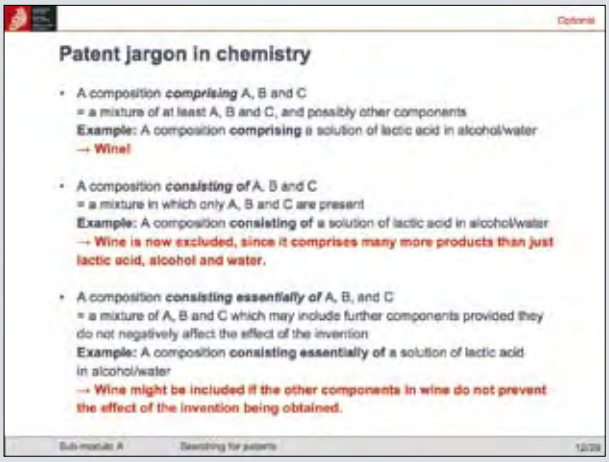
wing = door or window

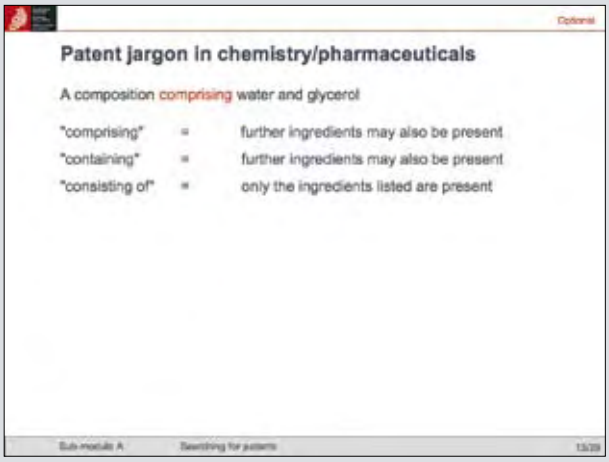


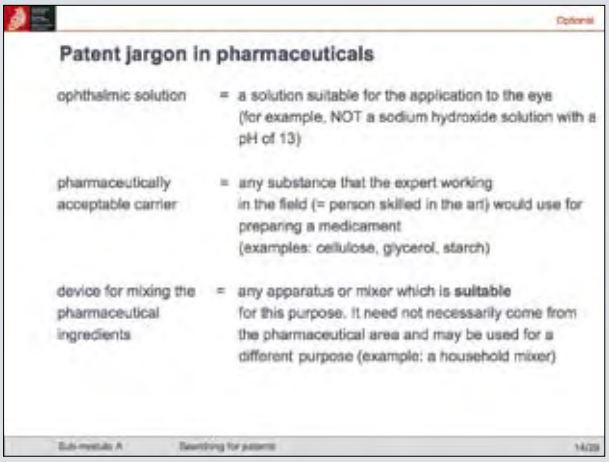

Optional
Patent jargon in general technology
energy-storing means
= spring
fastening means
= nail, screw or rivet, etc.
Sub-module A
Searching for patents


Optional
Patent jargon in general technology
a flexible member
= membrane or diaphragm
locking means
= U-shaped retain
etc.
Sub-module A
Searching for patents

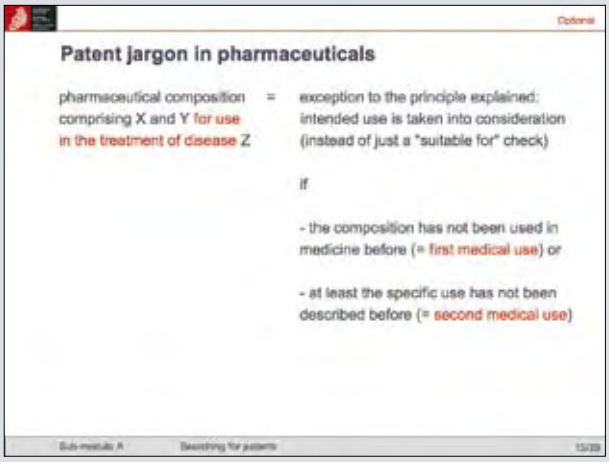

Optional
Patent jargon in chemistry
water- and oil-repellent surface
Teflon®
water-soluble or water-dispersible polymer
polyacrylic acid (salt) or polyvinyl alcohol
superabsorbent
gel of polyacrylic acid (salt)
expanded styrenic (co)polymer
polystyrene foam; Styrofoam®
polyisoprene
natural rubber
ionomer
copolymer of ethylene and salts of acrylic acid
graft copolymer of vinyl aromatic monomers on a butadiene rubber
ABS (the plastic of which LEGO bricks are made)
aromatic polyester
PET (polyethylene terephthalate)
Sub-module A
Searching for patents
11/39

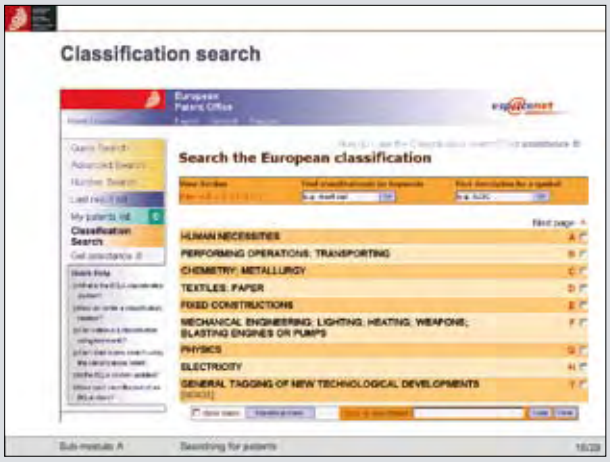

Optional
Patent jargon in chemistry
A composition comprising A, B and C
= a mixture of at least A, B and C, and possibly other components
Example: A composition comprising a solution of lactic acid in alcohol/water
→ Wine!
A composition consisting of A, B and C
= a mixture in which only A, B and C are present
Example: A composition consisting of a solution of lactic acid in alcohol/water
→ Wine is now excluded, since it comprises many more products than just lactic acid, alcohol and water.
A composition consisting essentially of A, B, and C
= a mixture of A, B and C which may include further components provided they do not negatively affect the effect of the invention
Example: A composition consisting essentially of a solution of lactic acid in alcohol/water
→ Wine might be included if the other components in wine do not prevent the effect of the invention being obtained.
Sub-module A
Searching for patents
12/39





These terms are used to determine whether or not other ingredients may be present in the composition. It is essential that they are used correctly.





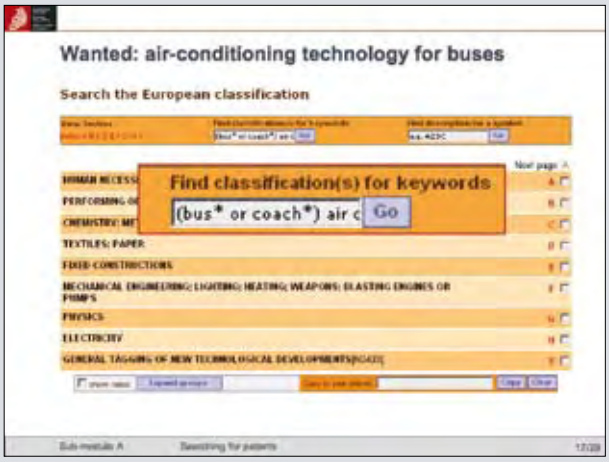
The ECLA European Classification System is a hierarchical system of technology classes. It is structured like a tree with nine branches.
This slide shows the highest hierarchical level of the ECLA system.

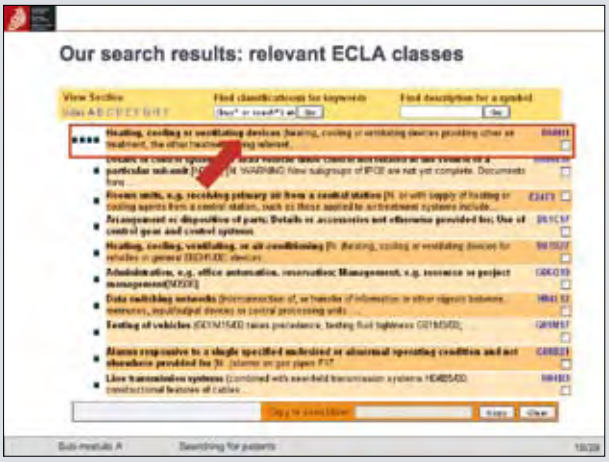
Two options in classification search

– Click through the hierarchy to find a relevant class.
– Find classifications with keywords: search for words in the technology class description.

A keyword search in the technology class descriptions is very different to a keyword search in the patents themselves. Instead of searching in the unique text of each patent, you are now searching the descriptions of the technology classes that have been written by patent office experts.

In the following slides we will use a search for air-conditioning systems for buses as an example.





In our example, we are interested in air-conditioning systems for buses. Another word for bus is "coach". So we will search for a technology class that includes the following words in its description:

(bus* or coach*) air condition*

The search accepts a maximum of four terms. Once you enter the search terms the relevant sub-groups will be displayed.

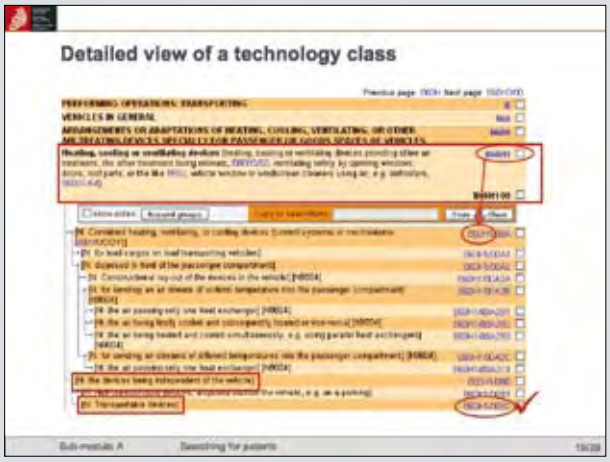
Note

Check the "show notes" option located at the bottom of the page for information about classes being renamed, updated, and so on.

The list of classes is sorted by relevance. The degree of relevance is indicated by the black squares to the left of the class title.

We see here that the ECLA class most relevant to air-conditioning technology in buses is B60H1: "Heating, cooling or ventilating devices".

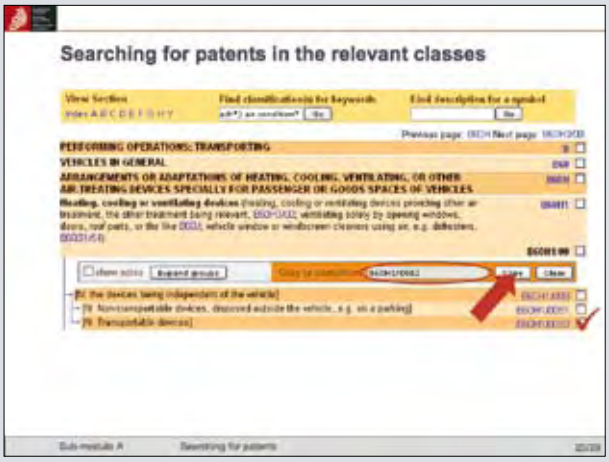
To see a full description of a technology class and its parent and child classes click on the title of the class.



This slide illustrates the hierarchical nature of the ECLA classification system. Our class B60H1 is a class within the field of "PERFORMING OPERATIONS; TRANSPORTING" > "VEHICLES IN GENERAL" > "ARRANGEMENTS OR ADAPTATIONS OF HEATING, COOLING, ..."

Class B60H1 has further subclasses that provide an even greater level of detail. Each subclass contains fewer patents than the parent class. If we were only interested in air-conditioning devices that work independently of the vehicle and that can be transported (i.e. that are not permanently fixed to the bus), then we could choose sub-class /00B2 only.

Check the box to the right of the title to copy the symbol(s) to the text-box marked "Copy to search form".

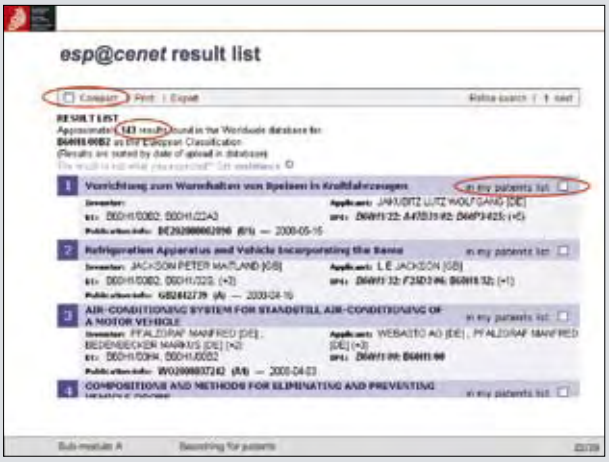


Click "Copy" to copy the selected ECLA classes into the "Advanced Search" mask.



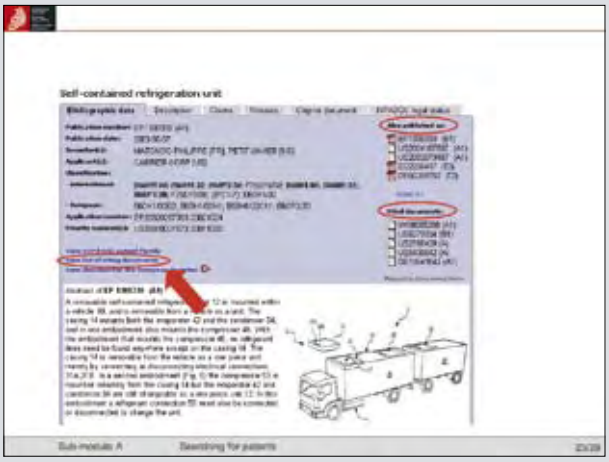
In the "Advanced Search" mask, you can limit the scope of your search still further. For example, you can choose to display patent applications by a particular applicant or inventor only.

Click "Search" to display all documents classified under B60H1/00B2.



Our search has found 143 patent documents. Click "Compact" to show just the titles and dates of the patents for faster reading.
Click a title to open a page with more detailed information.

Note the "in my patents list" checkbox.
As you can see, the search found documents in both German and English. **The fact that they make it easy to find patent documents written in any language is an important advantage of classification-based searches.**



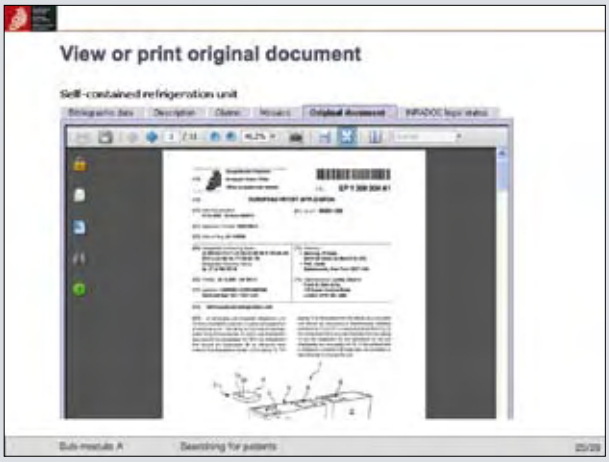
This is an example of the first page you will see if you click a document title.
Note that in this example the drawing doesn't show a bus but a lorry. However, the technology is probably also applicable to buses.

"Also published as" lists other patents on the same invention.
"Cited documents" lists prior patents that have been found to be related or identical to the present one.
"Citing documents" lists later patents that refer to this one.



Important inventions such as, for example, the Nobel Prize-winning "polymerase chain reaction" used to copy DNA are frequently cited by later patents that use and adapt the technology.

These citations can be very useful in tracking the development of a technology.



esp@cenet allows you to view or print the document in its original format.

Not all patents are available in all languages – in fact, many patents aren't even available in English.



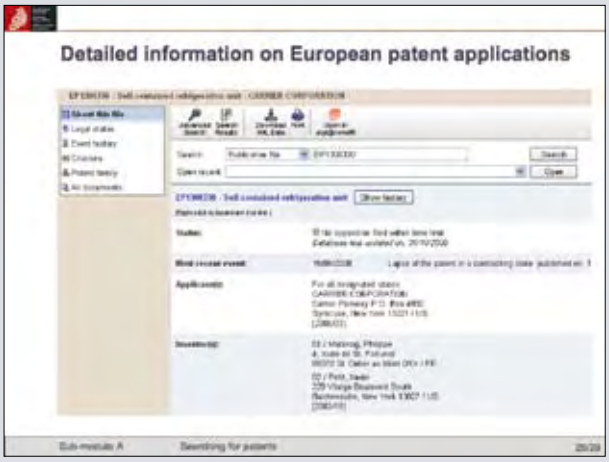
esp@cenet has a free online machine translation service which translates between the most frequently used European languages: English-German-French-Spanish-Italian.



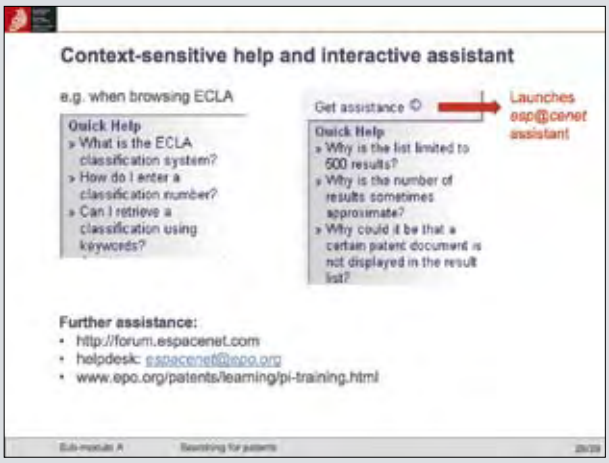
The INPADOC legal status view provides information about the history of this patent application and whether or not it is (still) valid.

The EPO does not guarantee the accuracy of any of the data in *esp@cenet*.

You should consult a patent professional or the relevant patent office for definitive information.



The initial *esp@cenet* page (bibliographic data page) for European patent documents contains a link to the European Patent Register ("View document in the European Register"). Here you will find detailed legal and other information on the patent or patent application concerned.



esp@cenet offers several ways of getting further assistance:

– online context-sensitive help
– online help index
– Online Forum at *http://forum.espacenet.com/*
– "*esp@cenet* assistant", a basic interactive training program
– helpdesk at *espacenet@epo.org*
– brochures (order from *infowien@epo.org* or download at *http://www.epo.org/about-us/publications/user-guides.html*)

When starting your next project or thesis, remember to search the patent literature first!

Sub-module B

The use of patents by a university spin-off

Overview

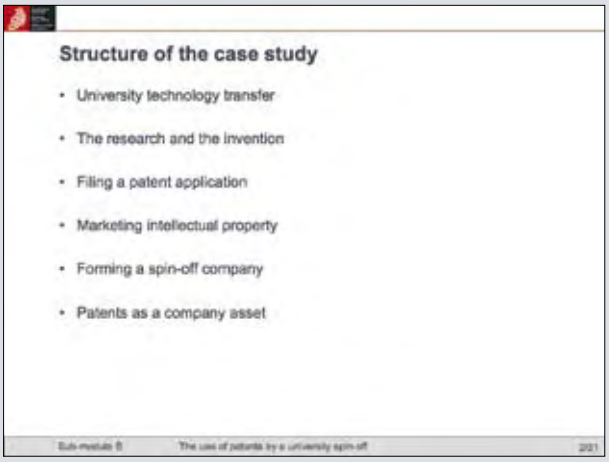
Slide 2	Structure of the case study
Slide 3	Technology transfer offices
Slide 4	The research
Slide 5 (optional)	What is a catalyst?
Slide 6	The invention
Slide 7	Helping to reduce CO_2 emissions
Slide 8	Could a patent application be filed?
Slide 9	Did it make sense to file a patent application?
Slide 10	Priority patent application filed
Slide 11	Decision to progress to PCT stage
Slide 12	Costs continue to accumulate
Slide 13	European and national phase patents
Slide 14	Some key patent decisions
Slide 15	Marketing intellectual property
Slide 16	Route to market – license or spin-off?
Slide 17	Forming a spin-off company
Slide 18	Using patents to help with fund-raising
Slide 19	Oxford Catalysts now
Slide 20	Patents have been a key asset for the company
Slide 21	Further information

This is a case study based upon the experience of Oxford Catalysts, a spin-off company of Oxford University. Each slide describes part of the commercialisation story, using real-life examples to illustrate key points. There are descriptions of some of the decisions made, with a particular focus on those related to patents. Background information and examples of other projects are given where useful. The presentation should take around 20-30 minutes. It is primarily intended for Ph.D. students.

The focus of this presentation is on the IP aspects of the story. References are made to core module 1 for background on patenting and IP aspects.

An important point to keep in mind is that the primary objective of the "technology transfer" operation at Oxford University is to move new ideas out of the laboratory for them to be used by industry to deliver benefits to society. Isis Innovation wants to deliver financial returns to the University at the same time, but the number one priority is the transfer of knowledge and new ideas.





This slide gives an overview of the lecture.

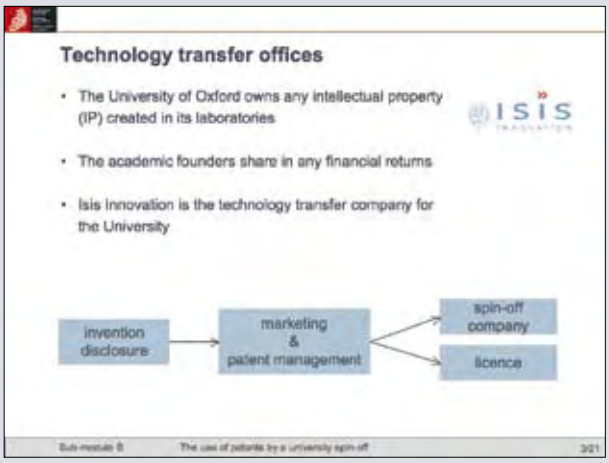
Slide 3
Technology transfer offices

Talk to your technology transfer support organisation (or another professional, maybe a patent agent) to get advice on what to do first. Remember that if you publish your idea in a paper then you cannot patent it later (an exception being the USA, but it is generally a good idea not rely on this, and to think about filing a patent application as soon as possible).

Remember, do not tell all your friends, as this may mean you cannot file a patent application later.
Refer to core module 1, slide 21.

A "disclosure" means that an invention is released into the wider community. This could be a paper, a presentation, or a conversation with a friend on a train that is overheard. Even if it is not the inventor that discloses the idea, the idea is still disclosed.

When talking to companies about your idea, it is a good idea to put a confidentiality agreement in place. These can sometimes take a while to negotiate, but it is worth the effort if you need to discuss your invention in detail. Another important aspect to confirm early in the process is that all the inventors are keen to move forward with commercialisation. The process will take up some of everyone's time, even if the technology is quickly sold to a company, as they will want advice on how to use the invention. If the decision is made to start a new company, this is likely to take up a lot of everyone's time.



The University of Oxford owns the intellectual property (IP) created in its laboratories (this is in the statutes of the university).

In exchange the university created Isis Innovation Ltd, a company that has the funds to file patent applications and is resourced with experienced project managers to commercialise new technologies. Isis Innovation was formed in 1987. Note that Isis only works with those academics who wish to commercialise their research.

The academic founders share in any financial returns from commercialising new ideas (again, how returns are shared is laid down in the university statutes). These might include:

- payments when companies sell products based upon these ideas (these are called royalties, paid when a company is using licensed technology)
- a share in new companies (i.e. an equity stake)
- income from personal consultancy (whether an existing company or a spin-off company, the academic is often asked to provide advice as a consultant).

This flow diagram illustrates some of the main steps:

- Invention disclosure (the first time the idea is captured in writing)
- The patenting and marketing activities
- Negotiating either to
  - license the technology (sell the rights to use) to an existing company, resulting in licensing revenue (i.e. a share of future profits based on the technology), or to
  - create a new company (known as a "spin-off" company), resulting in an equity stake in the company (also royalty revenues, as the technology is licensed to the new company).

Slide 4
The research

The ideas discussed in Malcolm's paper from 1990 are now used in many areas of the petrochemical industry. If a patent application had been filed in 1990 this might have been very valuable!

There is real value in looking at patents early in the research process: you do not want to invent something that is already known.

Many catalysts are found by combining different materials together in a large number of different combinations, and then testing the results. This approach is known as combinatorial chemistry. The approach adopted by Malcolm and Tiancun was to try to understand more about catalyst theory first – why certain catalysts work better than others – and then to target their catalyst development into investigating certain areas.



The story really starts back in 1963 when Professor Malcolm Green first moved to Oxford (by 1989 Malcolm was a Professor of inorganic chemistry and the head of the Inorganic Laboratory at Oxford).

In 1990 Malcolm published a paper on fundamental advances in partial oxidation catalysis in Nature.

Unfortunately this was before the University had started to file many patents – a patent might have been very valuable.

In 1999 Malcolm was joined by Dr Tiancun Xiao. Tiancun travelled to Oxford from China where he had a background in industrial catalysis.

Together they worked to apply Malcolm's theory on how metal carbide catalysts work, to develop a range of new and improved catalysts. Through industrially funded research, they were able to focus their work on the needs of industry.

A catalyst is a material that allows a chemical reaction to take place using less energy (so saves money), but at the end the catalyst is left unchanged and can be used again.

Some reactions **only** take place if a catalyst is present (so they allow valuable new products to be manufactured).

Most chemical manufacturing processes use catalysts, and there are large companies making a lot of money from selling catalysts.

Slide 5 (optional)
What is a catalyst?

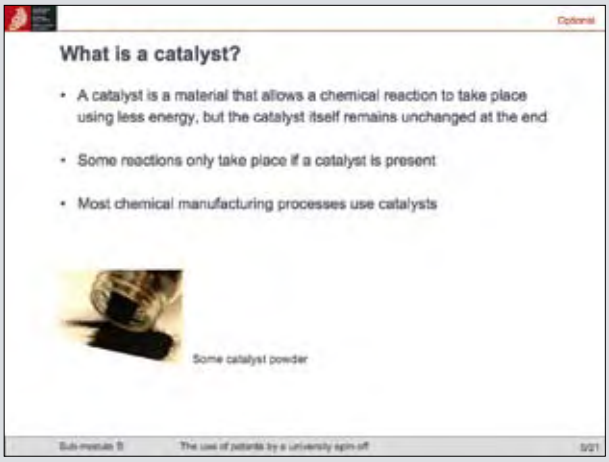
How catalysts work and how to produce better catalysts is often not fully understood. It is a little like cooking: even if you have all the right ingredients, you need skill and experience to produce a high-quality product, and one mistake during the preparation and the dish is ruined. It can be thought to be somewhat similar when developing and manufacturing industrial catalysts.

The "heterogeneous inorganic catalysts" developed by Oxford Catalysts allow chemical reactions to take place on their surface. This is why fine powders (and materials with a high surface area – known as supports) are often used, as they maximise the surface area available.

A good introduction to catalysts can be found here: *http://www.chemguide.co.uk/physical/catalysis/introduction.html*

The catalysts being developed by Oxford Catalysts are in the solid phase, and they are heterogeneous (i.e. solid catalysts are used to help liquids or gases react).

You will see that platinum is quoted on the webpage above as a good catalyst. The problem is that platinum is expensive. Oxford Catalysts are able to take less expensive metals, such as cobalt, and for certain applications deliver similar levels of performance. This is one of the key advantages of the patented approach.



A catalyst is a material that allows a chemical reaction to take place using less energy (so saves money), but at the end the catalyst is left unchanged and can be used again.

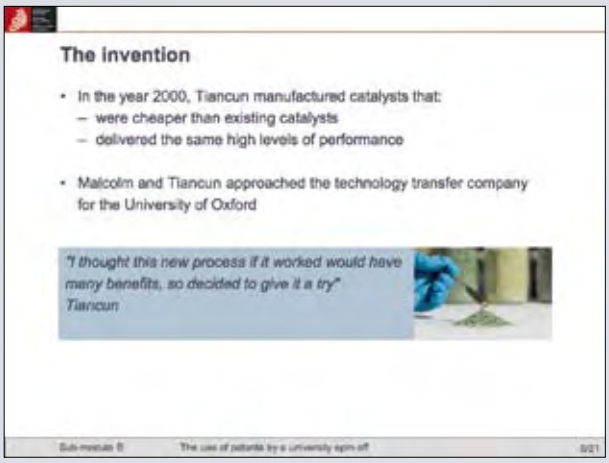
Some reactions **only** take place if a catalyst is present (so they allow valuable new products to be manufactured).

Most chemical manufacturing processes use catalysts and there are large companies making a lot of money from selling catalysts.

Slide 6
The invention

A key message is: When you make an invention be careful who you talk to!

Note that the first invention that started all this off and eventually led to a new company was made in a "base-ment" laboratory in the inorganic chemistry department at the University of Oxford.



It was towards the end of the year 2000 that Tiancun manufactured catalysts using a new method. These catalysts:

– were cheaper than existing catalysts (they used cobalt instead of ruthenium)
– delivered the same high levels of performance (when compared to the best in the literature, for a specific process)

A quote from Tiancun about where the invention came from.

It was now that Malcolm and Tiancun approached the technology transfer company for the University of Oxford.

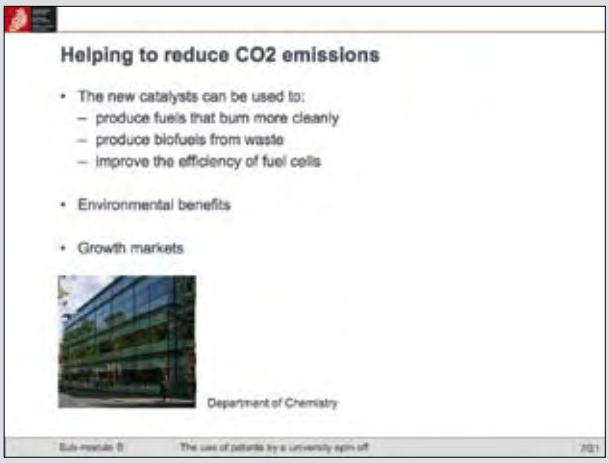
Slide 7
Helping to reduce CO_2 emissions

By improving the efficiency of chemical processes costs are reduced. This has always been the main driver for the chemical industry, but another benefit is that less energy is used, which in turn delivers CO_2 reductions and helps to combat global warming.

Also many of the products, such as low-sulphur fuels, are produced in response to environmental legislation and have other environmental benefits as well.

Biofuels produced from waste (whether biomass or flare gas) do not have the same disadvantages as biofuels produced from food crops. Known as "second-generation biofuels", they do not have the same unwanted impact on food prices or availability and should also deliver a greater CO_2 saving.

This is a controversial topic so it would be worth reviewing some of the current press coverage to judge current opinions in relation to biofuels.



The first question, is why is this invention important/exciting?

The company's technology is used during processes to:

– produce low-sulphur fuels (by both removing sulphur from oil, and also by allowing the manufacture of zero-sulphur fuels from natural gas).
– produce the next generation of biofuels from waste products (fuels can be produced from both carbon-containing waste and biomass).
– improve the efficiency of fuel cell systems (fuel processing is an essential part of the process when using fuel cells. If you have a fuel cell, where does the hydrogen come from? Hydrogen itself is difficult to transport, so it can make more sense to use methane or liquid hydrocarbons as the fuel, and then convert them to hydrogen in a fuel processor when they are needed by the fuel cell. Better catalysts in the fuel processor make the whole process cheaper, and hence will hopefully help to speed up the uptake of fuel cell technology).

These products all **deliver environmental benefits and are financially attractive growth markets.**

The company builds upon research in the chemistry department in Oxford (the picture opposite is of the newest chemistry building in Oxford).

Slide 8
Could a patent application be filed?

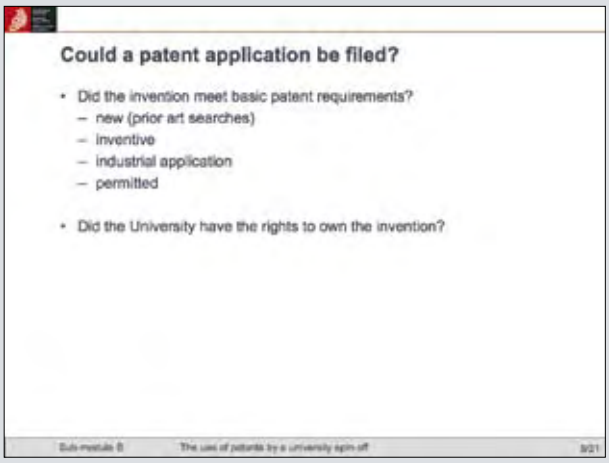
One of the first priorities is actually to try to find out if there are reasons not to file a patent application. If the work has been done before or the invention does not meet the basic requirements for what can be patented, it is best to find this out early before you have expended time and money.

Refer to core module 1, slide 20, for more details about patentability requirements.

Refer to core module 1, slides 38 to 43, and sub-module A for information on searching patent databases.

Searching for patents and published patent applications is easy (once you have spent some time getting used to using the different websites available). As well as keyword searches, it is useful to look at how patents are classified, to find those that have been hidden on purpose. Companies can make patents difficult to find in an attempt to hide their ideas from their competitors, but also so that they can reveal the patent once you are selling a product, and demand a royalty on your sales.

Sometimes you will find that your idea is covered by an existing patent, even if the main idea in that patent is different. Patent agents write the claims in a patent to cover as large a scope as possible.



The next question that needs to ask is does the invention meet basic requirements to be patented?

– Was the invention novel (i.e. new to the world)?
– Was the invention actually inventive (i.e. not obvious to an expert)?
– Does the invention have industrial application?
– Is the invention permitted? (There are certain exceptions in some countries, i.e. does the invention fall under the exceptions to patentability as set out, for example, in Art. 53 EPC?)

Another question that Isis needed to ask was, did the university have the rights to own the invention? If the work was sponsored by industry, others may have a claim on the IP. It is important that research contracts are checked.

It is also important to do an extensive prior art search of both academic and patent literature. The *esp@cenet* website is a good place to start. Try searching using keywords (like Google) as well as within the classification structure.

Slide 9
Did it make sense to file a patent application?

Although Isis could file a patent application, the question remained whether this would be a good idea. For most potential patents, the question to ask is whether it will deliver a financial return, given the chances of future success.

(If a patent has a small chance of making it to market, and the potential revenues are small, it is probably not worth pursuing. If a patent has a small chance of success, but the potential revenues are very large, it may be worth taking this risk. Applications can be dropped at later stages if it turns out that the idea does not work as anticipated.)

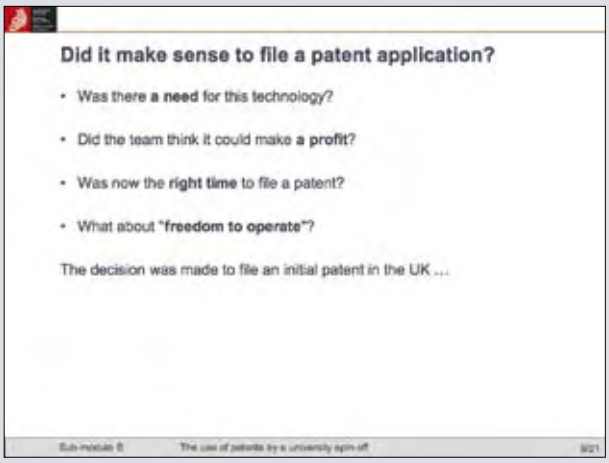
See core module 1, slides 27 and 28, for more on the advantages and disadvantages of filing patent applications.
See core module 1, slide 33, for more information on freedom to operate

Freedom to operate is an important issue which is often overlooked. Just because you have a patent, it does not mean that you can use it without needing to license in other IP. A patent gives you the opportunity to take legal action to stop someone using your idea, but this is all. It should also be remembered that taking legal action is expensive.

Another benefit of looking at the prior art, and identifying who else is filing patent applications in this area, is that it gives you the names of companies that might be interested in licensing your technology from you.

There can be other reasons for filing patent applications in addition to those that are purely financial. If an invention promises to deliver benefits to society, a university may decide to file a patent application so that it can control what happens to the patent and make sure it is used responsibly.

Another example that might be informative about why filing a patent can be important:
In the life sciences area Oxford has recently licensed patents for a new vaccine for tuberculosis (TB) to a joint venture company. Because there are patents, a drugs company is willing to invest the large amount of money needed to take this drug to the next stage in clinical trials. They can invest knowing that other companies cannot copy them whilst the patents are valid. The university is also able to have a say in how the drug is developed, and is able to make sure that charities are involved so that any treatment can be made available in the developing world
.
http://www.isis-innovation.com/news/news/IsisInnovationlicensestuberculosisvaccine.html



The invention from Malcolm and Tiancun passed all the tests to apply for a patent, but would this make financial sense?

The next stage was to conduct some initial market due diligence:

– Was there a need for this technology? Do companies in the chemical industry license in new technology (market structure)?
– Do we think we can make a profit, taking into account the costs of bringing a patent to grant compared with possible revenues if we license the patent to a company?

Also, was it the right time to file a patent? Should we wait until more research has been completed?

Although the prior art search showed that this invention was new, would a licensee have "freedom to operate"? In other words, how much other IP would be needed for a licensee to use this patent?

One challenge is that, at this early stage, it is not possible to know the answers to all these questions. At this stage Isis forms an initial opinion and then continues to improve its understanding over time.

The decision was made that it did make commercial sense to file an initial patent application. Remember the situation can be reviewed at each stage in the patent process and the application dropped if the situation changes.

Slide 10
Priority patent application filed (28 June 2001)

Using a patent agent can seem to be an expensive option, but if a patent is to be valuable in the long term it needs to be drafted properly in the beginning.

Filing a priority patent application (in the UK in this case) is a relatively inexpensive option. If after 12 months the invention is not looking as good as first thought, then the application can be dropped without it being published (so the idea is still not disclosed). For this reason it is a good idea to keep the idea confidential during the first 12 months. It is possible to "drop and refile" the application to give you more time to advance the technology, although the risk is that someone will have filed an application relating to the same idea during the last 12 months and you will not be aware of it until it is published. Even if you had the idea first, in most countries (apart from the USA) it is the person who files the patent first who has the rights to the invention.

The first search report is very useful, as it may provide details of patents missed during your prior art search. These can impact on how the patent application is drafted, or indeed whether you wish to continue prosecuting the patent application.

A patent agent will draft a patent application to cover a wider scope than just the precise invention. Because of this, it should be expected that similar patents (marked with an X on the search report) will be listed. You need to determine if this prior art really relates to the invention you want to protect.



Patent application filed 28 June 2001: Application No. GB0115850; Applicant: Isis Innovation Ltd; Inventors: Malcolm Green, Tiancun Xiao

The decision was made to file a provisional patent application in the UK.

The technology transfer project manager worked with Malcolm and Tiancun to provide a patent agent with the information needed to draft a patent application.

A patent agent will draft the claims in the application to allow them to include as much as is reasonable given the research results.

Once filed (in the UK) there is a 12-month time window when further experimental details can be added to support the patent claims.

After three months the UK search report is returned from the patent office. The search report is useful, but you do not need to modify your patent in response until later. At this stage it is used to make sure there are no obvious problems, such as another patent with exactly the same idea that you missed during your prior art search.

The first patent application protecting this work was filed in 2001.

How much do patents really cost, if you include patent agent charges, etc? Typical cummulative costs for a single patent by this point: GBP 3 000 = EUR 3 800

Slide 11
Decision to progress to PCT stage

As a rule of thumb around 75% of university patents at Oxford continue after 12 months, and the vast majority will continue into the PCT stage. The remainder are dropped. This is planned as there is value in filing a patent application early and giving yourself 12 months to find out more, if it is likely that others could file a patent application before you if you wait too long.

Refer to core module 1, slide 24, for more information on progressing a patent via the PCT route.

One objective of going down the PCT route is to move patent costs into the future, to give you more time to find a company to take on the costs involved. The total costs will be somewhat higher as the PCT is an additional stage. Also, the time taken before a patent is granted is longer and there may be commercial reasons for getting a patent granted sooner (it can be easier to sell once granted). For this reason, Isis will sometimes continue with the initial UK patent filing in parallel with the PCT patent applications, so that there is a granted UK patent sooner.

The PCT route also leaves the option of filing in many different countries - you can postpone choosing national phase countries until later. Although this route covers 141 states as of 2009, if you want patent protection in other countries you need to file directly at this time. Countries not signed up to the PCT include Saudi Arabia, South Korea and Taiwan.

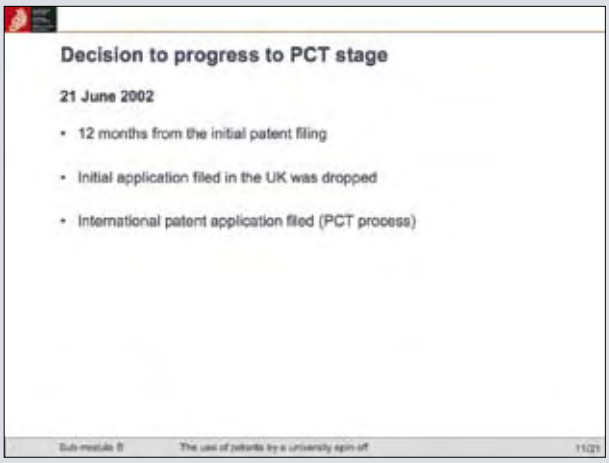
The international search report is usually received six months after filing the PCT application.

The search report can highlight a large number of patents as potential prior art. However due to the way a patent is drafted, it claims more than just the core invention, so this is to be expected.

Often the patents contain the same keywords, or have the same classification, but the actual invention is quite different.

It should be noted that it would be very unusual for a patent application not to need some modification of its claims before it is granted.

(Note that the first two applications filed for this technology have now been granted in several territories, including Europe and the USA.)



Within 12 months of the initial patent filing a decision needs to be made about whether to proceed or to drop the patent.

In this case the initial patent application filed in the UK was dropped and an international patent application filed (note that this new application keeps the original filing/priority date: it is quite normal to drop the "priority" application at this stage).

This approach allows patent costs to be moved further into the future.

Typical cummulative costs for a single patent by this point: GBP 8 500 = EUR 10 500

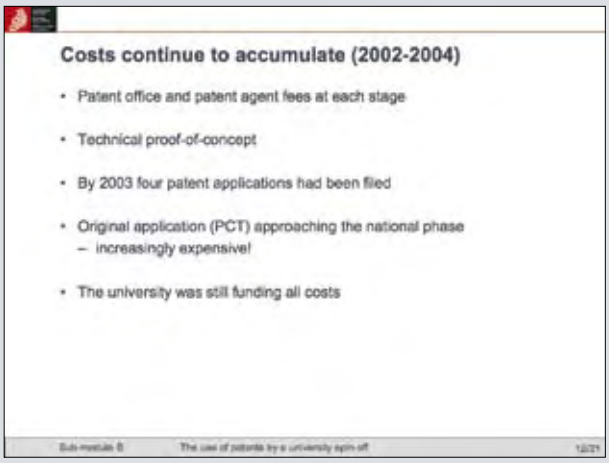
Slide 12
Costs continue to accumulate

Filing patent applications and commercialising technology can be expensive, in terms of both time and money.

You need to evaluate the risk/reward balance regularly, especially when you have to decide if you want to spend a large amount on the next stage in the patenting process.

Note that as well as patent costs, there will be other costs for developing the technology, maybe commissioning designers to produce prototype devices, or the expenses involved in attending industry conferences to find potential licensees.

This stage is often a challenge, as companies and investors want to see something that looks like a product and not early-stage research. If proof-of-concept type funding is available, this can be useful to illustrating commercial concepts.



Once a patent application is filed, there are patent office and patent agent fees at each stage in the patenting process.

In this case funding was also needed for Tiancun, who was now heavily involved in developing this technology as opposed to university research. The team were fortunately able to access proof-of-concept and seed funds to allow Tiancun's work to be funded and the technology to be developed further.

By 2003 four patent applications had been filed and were at different stages in the patenting process.

The original patent application was approaching the national phase, which is when the patenting process becomes increasingly expensive.

The university was still funding all patent costs.

Slide 13
European and national phase patents

At this time we were still not certain that the patents would be successfully licensed and the patent costs were continuing to add up. A commercial decision was needed for continuing with the applications at this stage, whilst Isis was still covering the costs involved.

It is during this phase that the comments made in the international search report (and associated written opinion) will need to be addressed. There is no such thing as an "international patent", so after the PCT phase, discussions move to taking place with the patent authorities in each country nominated at the national phase (or the EPO for the EPO member states), before a patent can be granted. If there are a lot of discussions this can be expensive and may require visits to the different countries to present your case. The input needed by the patent agents can also be a significant cost.

A European patent allows you to obtain patent rights in inter alia Germany, the UK, France, Italy, Spain and Switzerland. Note that a granted European patent sometimes needs to be translated into the relevant language for each country, which is an additional cost. See the EPO's brochure "National law relating to the EPC" at *http://www.epo.org* for details.

Much more information on European patents is given in core module 1, slide 20.



During this time several of the patents reached the national phase. A patent enters the national phase 30 months after the initial filing (when following the PCT route).

At this time none of the patents had been licensed. They had produced no revenues. Usually we hope that by this point a licensee is covering the patent costs. A commercial decision was taken to continue with the patents when they reached this stage.

Patent applications were filed in territories such as China and South Africa, due to large catalyst markets or the presence of catalyst manufacturing companies. This was in addition to Europe and the USA, which would be expected.

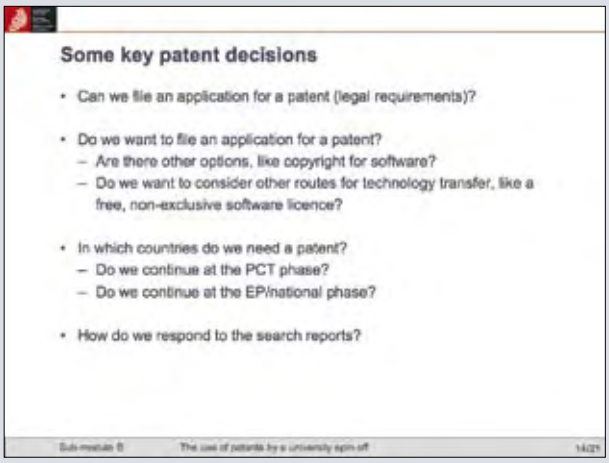
Typical cummulative costs for a single patent by this point: GBP 16 000 = EUR 20 000 (filing patents in a selection of countries)

Slide 14
Some key patent decisions

These are the key patent decision points, and you can see from this presentation how they fit with the overall commercialisation process. It always takes a long time to commercialise a new technology, so patent decisions often need to be made before you really have enough information and before the patents have been licensed and a company can be expected to pay the patent bills.

At each stage in the patenting process the situation is reassessed, and there needs to be a willingness to drop an application when either the technical situation or the commercial constraints turn out to be less favourable than first thought.

There is also often a balance to be struck in deciding when to file an application. In academic environments the need to publish papers can mean that applications are filed earlier than they would be by a company, which is able to keep its research results secret for longer.



In summary, key patent decision points are:

– Can we file a patent application?
– Do we want to file a patent application?
– Are there other options, like copyright for software?
– Do we want to consider other routes for technology transfer, like a free, non-exclusive software licence?
– Do we continue at the PCT phase?
– Do we continue at the EP/national phase, and in which countries do we file?
– How do we respond to the search reports? (This generally takes place later, during examination before a patent is granted.)

We can conclude that patents can have a significant impact on the success of this technology commercialisation project, and having a well-thought-out patent management strategy is essential to being successful.

Slide 15
Marketing intellectual property

For some industries where companies have large research activities, a challenge is the "not-invented-here" hurdle. Convincing a company that your university work has produced a better result than their own efforts can be difficult, and convincing them to divert their own research resources to investigate your idea can be even more of a challenge. It is useful to be aware of this when deciding how successful you are likely to be at licensing your technology to an existing company.



Now the idea is protected, you can start talking to people about it:

– First you need to build an understanding of the market.
  • The technology transfer project manager worked with the academics to understand the market, talking to potential partners and customers.
  • Conversations were held under confidentiality agreements when the details of the patent were being discussed.

– Trying to sell early-stage technology is not easy.

– Try to take advantage of free marketing opportunities where possible. Articles picked up by the press and posted on websites can be useful to find sales leads. Also company publications can be useful for letting more people know that your technology is available for licensing.

– A demonstrator is very useful for explaining new technology.

Slide 16
Route to market – licence or spin-off?

The lowest risk approach is often to license a technology to an existing company, as hopefully the company has a functioning management team and the resources to develop the technology. There are potentially higher returns if you start a company and it is successful, as you will probably have an equity stake in the company.

Licensing technology to an existing company is a popular option in the pharmaceutical and biotech industry. In-licensing technology is more common in the life sciences, and indeed many large companies source a significant proportion of their ideas from outside of their own research laboratories.

Another route to market is to provide a free licence. This is sometimes used in the software industry.

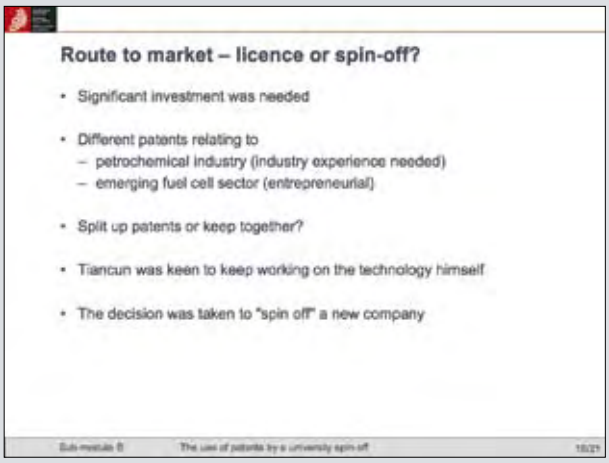
Another example:
Medical imaging technology developed in the engineering department.

This technology was licensed to a spin-off company in the early stages to be developed into a product. The company was then purchased (known as a trade sale) and the technology is now being used by Siemens.

This Oxford-originated software is used to detect the early signs of cancer using advanced image analysis software. Note that it was a combination of patents and software that was licensed into the spin-off company – both methods used to protect the intellectual property (IP).

In this case it was only after the original research had been developed into a product that larger companies became interested. The lead academic involved can now see his technology making a real difference to the health of patients.

It is interesting to ask if this technology could have been licensed earlier to an existing company. As it was, it needed to be developed by the spin-off company before a larger company was willing to take it on. This is not unusual: larger companies with a lower risk profile are often happy for an early-stage company to develop a technology past the risky early stages, even if it means they will need to pay more for the technology in the future. Work continues at the university and the research group involved has close links to several companies developing new technologies in this area. They continue to enhance the accuracy of medical imaging technology.



A decision needed to be made in early 2004 about the best route to bring this technology to market. The choice was to continue trying to license the technology to an existing company, or to form a spin-off company.

Two of the patents related to the petrochemical industry, but the other two related to the emerging fuel cell sector. Significant investment was needed to bring these technologies to market.

An entrepreneurial approach was needed for the fuel cell sector. Chemical industry experience was needed for the petrochemical sector.

There was a potential loss of value if the IP was split up, but a potential loss of focus if it was kept together. Tiancun was also keen to keep working on the technology. The decision was taken to start a new company.

Slide 17
Forming a spin-off company

It was a challenge to find one person with both chemical industry experience and experience of successfully growing and selling start-up companies. The company resolved this by employing two experienced professionals to work with the academics to start the company.

A priority when starting a company is putting together a good group of advisors. Technical advice is provided by a Scientific Advisory Board, but it is also important to have experienced business people involved. Finding someone with the right experience to be the chairman of the company is essential, as their role is to help the CEO maintain the strategic focus of the company and to ensure that the interests of the shareholders are protected.

In this case Oxford Catalysts secured the services of Dr Pierre Jungels, CBE, previously Managing Director of Exploration and Production at British Gas and Chief Executive of Enterprise Oil plc (then Europe's largest independent exploration and production group). He had also twice been President of the Institute of Petroleum.



There are many challenges when starting a new company. First a management team needs to be brought together. In this case Tiancun and Malcolm were joined first by Will Barton (30+ years experience in the chemical industry) as Chief Operating Officer, and later by Roy Lipski (a successful entrepreneur) as CEO.

The business plan needs to be continuously refined in response to feedback from potential investors and industry experts.

There are many questions about the patents, the prior art etc. The inventors need to work with the management team to help answer these questions.

The academics need to be involved in explaining the science to investors and in helping to paint a vision for the future (this means lots of meetings).

The academic inventors, along with Isis and the management team as they joined the venture, spent many months talking to investors and refining the business plan.

Slide 18
Using patents to help with fund-raising

It is undoubtedly the case that without the patents this company would not exist!

Note that the company raised funding before the patents had been granted (they have now been granted in many countries), although the applications were well progressed and the investors did a large amount of due diligence around the patents and the company business plan.

The patents had been licensed to the company at this time, which when combined with the business plan outlining future commercial prospects and the team of people involved was all part of the package that justified the valuation of the company.



The intellectual property protected by the patent applications filed by the university was an asset for the company.

In December 2005 Oxford Catalysts successfully raised approximately EUR 640 000 of first-stage funding. The company would not have been able to raise this funding if patents had not been there to support the technology.
It is often a long process to raise funding for a new company.

However only four months later, in April 2006 ... Oxford Catalysts successfully raised approximately EUR 20 million by floating on the London AIM stock market.

Typical cummulative costs for a single patent by this point: GBP 21 000 = EUR 26 500
The company had used the patents as an important part of raising funding for the company.

Slide 19
Oxford Catalysts now

For the latest information on Oxford Catalysts look at their website *http://www.oxfordcatalysts.com*

At the end of this process the academic inventors and the university have an equity stake in this AIM-listed company. They will also benefit from future sales, when the company pays a share of the royalties it receives back to Isis in return for the use of the patents.

The company paid all past patent costs, and is now responsible for managing the patents in the future. This allows the university to reinvest in future patents.



Oxford Catalysts Plc is now a publicly listed company with a value (as of October 2008) of **EUR 90 million.** The company has raised **EUR 25 million** in funding.

The company is continuing to grow. Tiancun is employed as the Chief Scientific Officer. As of October 2008 there were 25 staff of 7 different nationalities and the company had recently doubled its laboratory and office space to accommodate the latest in multi-channel test reactors for catalyst development. The inventors and the university hold shares, the previous patent costs have been paid back to the university, and the company is building its patent portfolio into the future.

For the latest information, check out their website: *www.oxfordcatalysts.com*

Slide 20
Patents have been a key asset for the company

Core module 1, slide 6, discusses the commercial value of patents.

Patent costs need to be funded, ideally by revenues from product sales based on the patents.

One patent is not enough. Companies will take a "head patent" (which protects the core idea), like those filed by a university, and file other patents around it to produce a cluster of IP to protect their position. This strategic filing of IP is possible with the resources of a company, but is rarely possible at an academic institution with limits on the funds available for patenting.



Looking to the future, for a technology company like Oxford Catalysts management of intellectual property is essential. Hiring the right people and having the funds available to invest in new equipment is essential in this competitive industry.

The company will continue to develop its IP whilst working with partners in industry to manufacture catalysts in commercial quantities.

The company is adopting a licensing model, allowing other companies that have catalyst manufacturing facilities to make and sell its catalysts in return for a percentage of sales (royalties).

Note that patent costs continue for the full 20 years that a patent is valid, another reason patents need to deliver a financial return:

- Examination costs (discussions with a patent examiner, who determines if your patent can be granted).
- Renewal fees once a patent is granted.
- Legal fees if you need to enforce your patent in court (although with potential financial returns if you are successful).

Slide 21
Further information

This is the end of the presentation.

To find out more about the Oxford model for commercialisation there is a presentation that can be downloaded from the Isis Innovation website, or the author, Terry Pollard, can be contacted by e-mail. Please do not contact Oxford Catalysts direct.



Note for speakers:

Please do not contact Oxford Catalysts direct.

Sub-module C

Understanding patent claims

Overview

(a) Toy ball

Slide 1 Understanding patent claims – toy ball
Slide 2 The invention
Slide 3 How to patent this invention: claim it!
Slide 4 Result of the prior art search
Slide 5 Comparison of the two inventions
Slide 6 Claim to protect the invention
Slide 7 Patent claims
Slide 8 Application filed with the EPO
Slide 9 Additional prior art found by the EPO
Slide 10 The opinion of the EPO
Slide 11 Further analysis
Slide 12 Comparison of the invention with the prior art
Slide 13 Result of the analysis
Slide 14 The original description filed with the EPO supports the amendments to the claims
Slide 15 The patent is finally granted

(b) Heating element for a washing machine

Slide 1 Understanding patent claims – heating element for a washing machine
Slide 2 The invention (1)
Slide 3 The invention (2)
Slide 4 How to patent this invention: claim it! (1)
Slide 5 How to patent this invention: claim it! (2)
Slide 6 Result of the prior art search
Slide 7 Comparison of the two inventions
Slide 8 Claim to protect the invention
Slide 9 Use of dependent claims to improve protection
Slide 10 Application filed with the EPO
Slide 11 Additional prior art found by the EPO
Slide 12 The opinion of the EPO
Slide 13 Further analysis
Slide 14 Comparison of the invention with the prior art
Slide 15 Result of the analysis
Slide 16 New claim
Slide 17 The original description filed with the EPO supports the amendments to the claims
Slide 18 The patent is finally granted

(c) Material for a synthetic lawn

Slide 1 Understanding patent claims – material for a synthetic lawn
Slide 2 Compaction material for a synthetic lawn
Slide 3 The invention
Slide 4 How to patent this invention: claim it!
Slide 5 Result of the prior art search
Slide 6 Comparison of the two inventions
Slide 7 Claim to protect the invention
Slide 8 Use of dependent claims to improve protection
Slide 9 Application filed with the EPO
Slide 10 Additional prior art found by the EPO
Slide 11 The opinion of the EPO
Slide 12 Further analysis
Slide 13 Comparison of the invention with the prior art
Slide 14 Result of the analysis
Slide 15 The original description filed with the EPO supports the amendments to the claims
Slide 16 The patent is finally granted

(d) Double pipe

Slide 1 Understanding patent claims – double pipe
Slide 2 The invention (1)
Slide 3 The invention (2)
Slide 4 The invention (3)
Slide 5 How to patent this invention: claim it!
Slide 6 Result of the prior art search
Slide 7 Comparison of the two inventions
Slide 8 Delimiting the invention over the prior art
Slide 9 Claims filed with the EPO
Slide 10 Introductory part of the description filed
Slide 11 Additional prior art found by the EPO (1)
Slide 12 Additional prior art found by the EPO (2)
Slide 13 The opinion of the EPO
Slide 14 Further analysis
Slide 15 Comparison of the invention with the prior art
Slide 16 Result of the analysis (1)
Slide 17 Result of the analysis (2)
Slide 18 Result of the analysis (3)
Slide 19 The original description filed with the EPO supports the amendments to the claims
Slide 20 The patent is finally granted on the basis of the amended claim

(e) Electrical power converter

Slide 1 Understanding patent claims – electrical power converter
Slide 2 The invention
Slide 3 How to patent this invention: claim it!
Slide 4 Result of the prior art search
Slide 5 Comparison of the two inventions
Slide 6 Claim to protect the invention
Slide 7 Use of dependent claims to improve protection
Slide 8 Application filed with the EPO
Slide 9 Additional prior art found by the EPO
Slide 10 The opinion of the EPO
Slide 11 Renewed analysis
Slide 12 Comparison of the invention with the prior art
Slide 13 Result of the analysis
Slide 14 The original description filed with the EPO supports the amendments to the claims
Slide 15 The patent is finally granted

(f) Drug for the treatment of cancer

Slide 1 Understanding patent claims – drug for the treatment of cancer
Slide 2 Treatment of cancer
Slide 3 The invention
Slide 4 How to patent this invention: claim it!
Slide 5 Result of the prior art search
Slide 6 Comparison of the two inventions
Slide 7 Claim to protect the invention
Slide 8 Use of dependent claims to improve protection
Slide 9 Application filed with the EPO
Slide 10 Additional prior art found by the EPO
Slide 11 The opinion of the EPO
Slide 12 Further analysis
Slide 13 Comparison of the invention with the prior art
Slide 14 Result of the analysis (1)
Slide 15 Result of the analysis (2)
Slide 16 The original description filed with the EPO supports the amendments to the claims
Slide 17 The patent is finally granted

(g) Automatic power switch for hearing aid

Slide 1 Understanding patent claims – automatic power switch for hearing aid
Slide 2 Hearing aids
Slide 3 The invention
Slide 4 How to patent this invention: claim it! (1)
Slide 5 How to patent this invention: claim it! (2)
Slide 6 How to patent this invention: claim it! (3)
Slide 7 Use of dependent claims to improve protection
Slide 8 Application filed with the EPO
Slide 9 Result of the prior art search (1)
Slide 10 Result of the prior art search (2)
Slide 11 Comparison of the two inventions (1)
Slide 12 Further analysis
Slide 13 Comparison of the two inventions (2)
Slide 14 Result of the analysis
Slide 15 Amended claim
Slide 16 The original description filed with the EPO supports the amendments to the claims
Slide 17 The patent is finally granted

Understanding patent claims

Patent claims – those statements that define what is actually protected by a patent – can be very complex and difficult to understand. This is because patent attorneys try to get maximum protection for their clients by taking into account not only the existing prior art, but also any potential prior art that they and the inventor did not know of when the claims were drafted.

Despite the difficulties involved, it is important to have a basic understanding of patent claims in order to be able to:

- understand how patents are created and how the patent system works.
- make full use of the information found in patent searches, including being able to make an educated guess as to whether a particular technology would infringe a certain patent. It is also much easier to avoid using a patented invention if you understand exactly what it is that has been patented.
- interact with patent professionals during the patent application process.

The case studies in sub-module C have been designed to give students an understanding of patent claims. Because of the complexity of the subject-matter, they are not suitable for use as introductory modules and we recommend that the teacher or lecturer should have a prior knowledge of patents.

Based on real patents, each case study describes how claims work by providing a step-by-step illustration of how they are drafted.

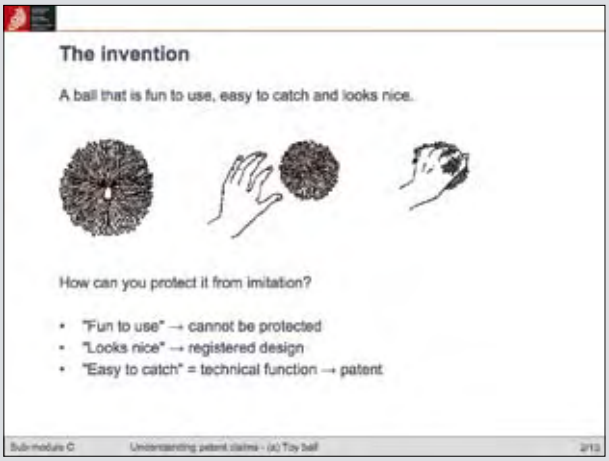
The examples used have been taken from a variety of technical fields, so you can choose the case that best matches the interests of your students:

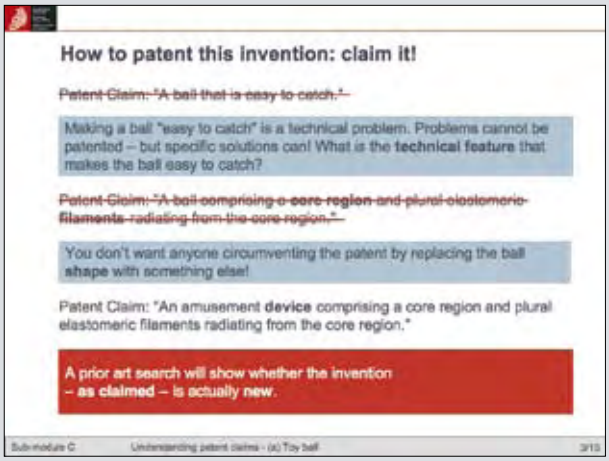
- Toy ball
- Heating element for a washing machine
- Material for a synthetic lawn
- Double pipe
- Electrical power converter
- Drug for the treatment of cancer
- Automatic power switch for hearing aid

Sub-module C

Understanding patent claims

(a) Toy ball



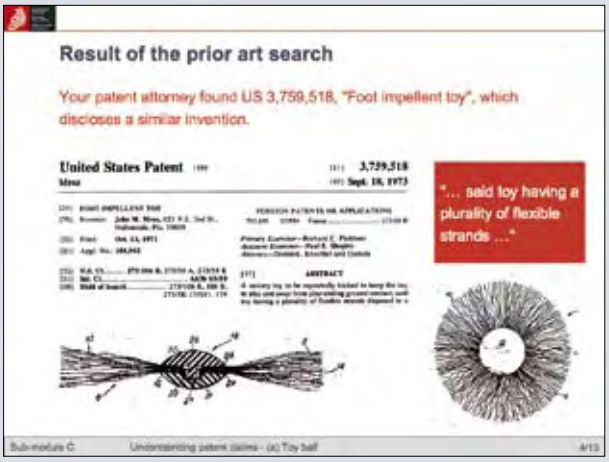


While real patents have been used in this case study, the various steps in the procedure followed by the applicant/attorney have been adapted for the purpose of this presentation. In this presentation the invention that we are using as an example is a toy ball. Imagine that you have invented this ball and that it is new. It consists of many plastic fibres bundled together to form the ball. This makes it fun to use, and you think it would sell well on the market. In order to protect your future investments, you need to protect the invention first. How would you go about this?

To start with you should ask yourself what the distinguishing attributes of your invention are. You might find that it is "fun to use", "looks nice", and is "easy to catch". The appearance of a product can be protected by a registered design (USA: design patent). Only technical functions such as "easy to catch" can be patented (USA: utility patent). As you know, in order to get a patent, you need to claim the invention. Let's see how that works.

1. A first, naïve, approach would be to write a claim for "a ball that is easy to catch". However, this is overly broad (is it really the first ever ball that is easy to catch?) and even more importantly, it tries to protect the outcome of the invention, not the invention itself. Patents are granted for new technical solutions – problems themselves cannot be patented.

2. A simple description of the technical solution is shown on the slide. This claim describes HOW you achieve the goal, i.e. what exactly is new in your technical solution. However, explicitly naming the "ball" in the patent is dangerous: What if somebody gave it the shape of, for example, a car, or an apple, or a telephone? This might circumvent the patent but could well provide the consumer with exactly the same function: A thing that can be thrown, is easy to catch and looks nice. So you want to replace the word "ball" with something more general.

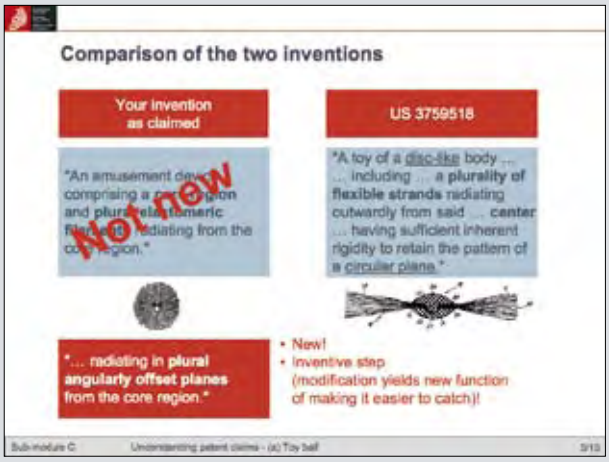


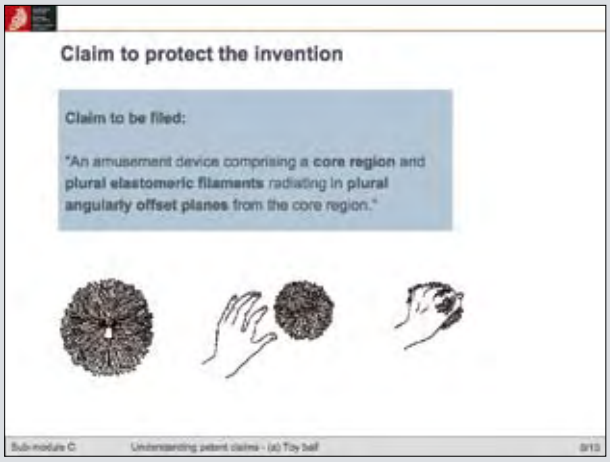
3. You could, for example, replace it with the very general concept of an "amusement device". Remember our examples of patent jargon? You have now joined the ranks of people who call their inventions "a plurality of balls" or "a writing instrument".

To make sure you really know what is new about your invention (only what is new can be protected by a patent), you have to carry out what is called a "prior art search".

In our example, a prior art search carried out by a patent attorney found a similar, earlier patent. It also relates to a toy and has many flexible strands fixed on a core.

Now you have to carefully analyse what is contained in that patent so that you can determine what might be new about your invention.





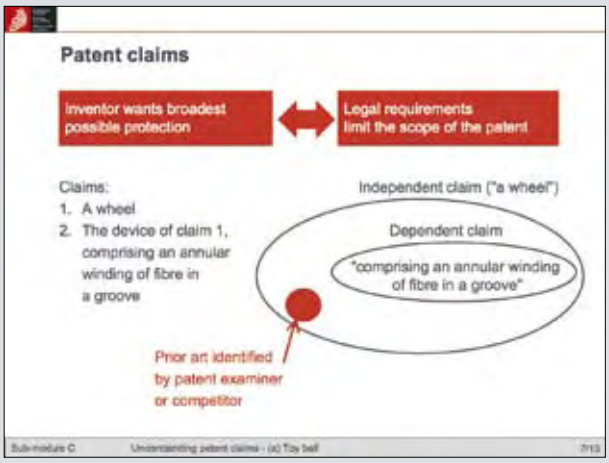
You find that the earlier patent actually only describes a disc-like shape, i.e. the fibres are explicitly stated to radiate in a circular plane around the core. The earlier patent also reveals that the function of these strands is to make the toy fly better and be easier to kick around. The function (the problem solved) is not that it can be caught easily. So the explicitly different configuration of the flexible strands in that patent yielded an explicitly stated different function. In other words:

Your invention is new because you changed the orientation of the strands from a two-dimensional plane to a three-dimensional globe and you achieved a new function with that: it is easier to catch.

Furthermore, it was not obvious to a skilled person to modify the closest prior art in the way your invention does to achieve this result. So if you change your claims accordingly, you can still get a patent.

This is the claim you might finally decide to use in your patent application.

For maximum protection against competitors attempting to circumvent your patent, you would normally file more than one claim (see next slide).

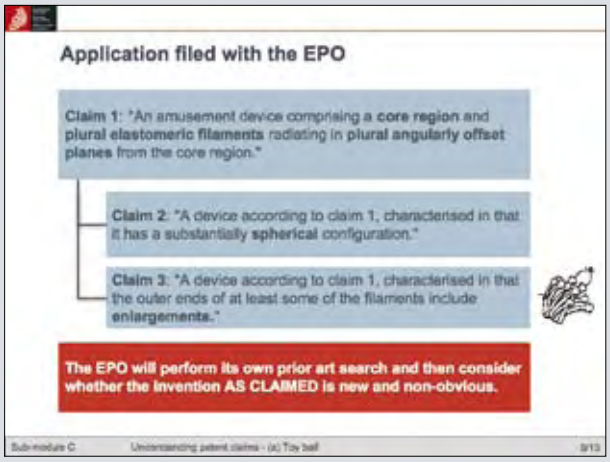


Inventors want their inventions patented in such a way that the resulting patents are difficult to circumvent. However, making very broad patent claims is risky, as there might be related prior art not known to the inventor. If a patent has only one broad claim and that claim is destroyed by existing prior art, then there is no patent protection left at all. Therefore, in practice, most patent applications have both one or more broader, independent claims and multiple narrower, dependent claims.
The independent claim usually describes the invention in very general terms, to allow a broad interpretation in infringement lawsuits.
The dependent claims usually describe specific ways of realising the invention that the inventor regards as economically attractive.
The dependent claims refer to the independent claim and specify some further parameters that narrow down the scope of the claim.

If a broad independent claim is later found to be invalid, for example because there is prior art, then the narrower dependent claims might still be valid.

For example, an inventor might claim:
"1. A battery made out of iron and sulphur", and then
"2. The battery of claim 1 in which the sulphur is deposited as small particles on a graphite electrode."

Even though the patent examiner, or later the courts, might find that a battery made out of iron and sulphur had been published before (i.e. that claim 1 is not valid), the inventor might still be the first to have used small sulphur particles on graphite for such a battery.



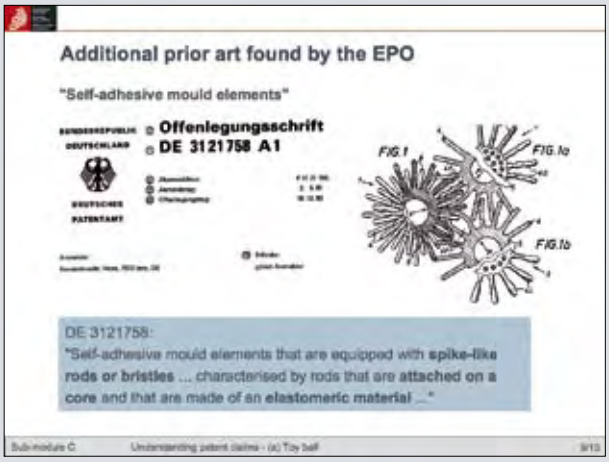
This is an example of the final claims that you might use in your patent application.

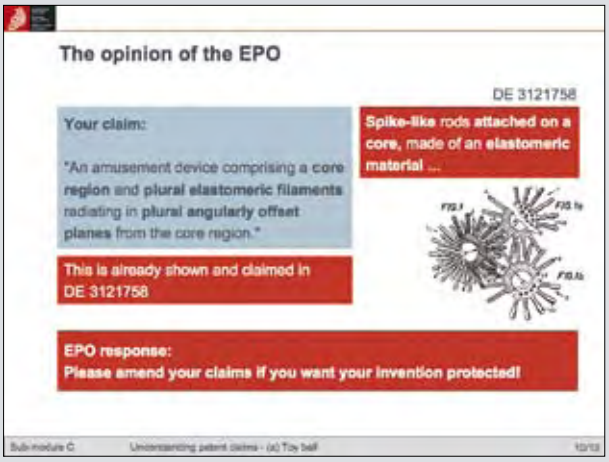
The main claim covers your invention in general terms. The dependent claims describe how you think the invention will be specifically realised: as a ball and possibly with some enlargements on the outer ends of the filaments. The enlargements improve the grip of the ball when it slides over a person's hand as they attempt to catch it.

Note: Although the enlargements are part of the original invention, they are not described in the independent claim but only as one of many protected ways of putting the invention into practice. As the inventor you know that the invention also works without these enlargements and you do not want competitors to circumvent your patent simply by omitting them. So you protect them in a dependent claim.

Apart from the claims, you also have to file bibliographic data (personal details etc.), a title, an abstract, a description and drawings.

Now we will have a look at what happens when the patent office examines the patent application and its claims.



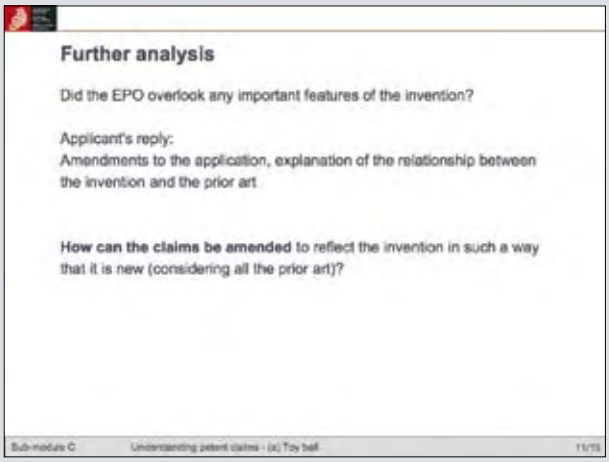


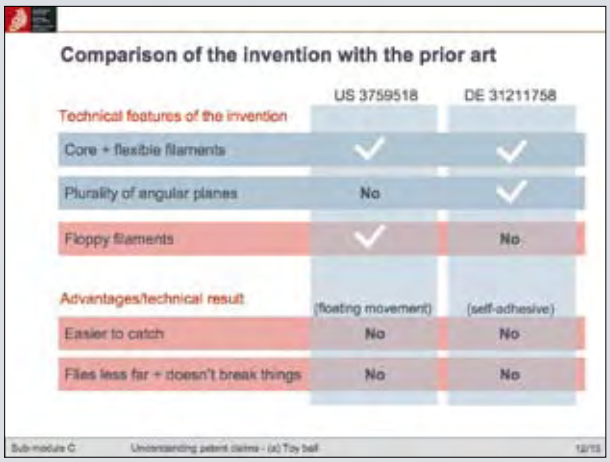
Patent examiners are trained to find the relevant prior art and they have a lot of experience in their technical field. So they will frequently find prior art not considered by the inventor or his patent attorney.

In our example, the examiner found the patent application shown. The claims relate to a core with elastic rods or strands attached to it. The drawings show a three-dimensional, globe-like shape (see next slide).

Remember that your invention was claimed as "comprising a core region and plural elastomeric filaments radiating in plural angularly offset planes from the core region." This is already shown in the prior patent applied for in 1982.

So the EPO will write you a letter, send you the search report and inform you that your patent application as filed would be rejected. This does not mean that your application has actually been rejected, but it does mean that if you do not amend the application or provide convincing arguments, then it most probably will be.





The patent claims, as the EPO understood them, do not constitute a new invention.

So either you have to demonstrate that the claims must be interpreted differently, or you have to change them.

You are not allowed to change the invention that your application is about, but you are allowed to make the wording of the claims fit more precisely to your invention. Your invention is what you described in the description and drawings.

Check the documents found in the prior art searches:

- Does your invention have any feature **not** disclosed in the prior art?
- What are the advantages of your invention compared with the prior art?

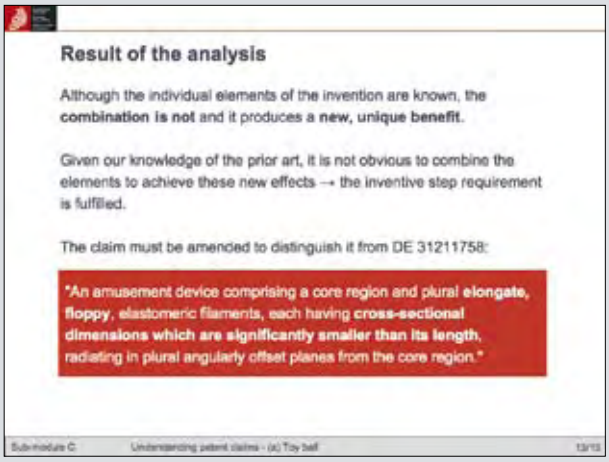
A structured analysis of your invention compared with the two documents that have been identified as relevant prior art could look like this.

To do this analysis, you need to look at the features of the inventions (how the problem is solved) and at the technical results, i.e. what problem is solved.

The following text is also written on the next slide:

- Although the individual elements of the invention are known, the **combination is not known.**
- The new combination of the technical features produces a **new, unique benefit.**

Given our knowledge of the prior art it is not obvious to combine the elements of the different documents to achieve these new effects -> the inventive step requirement is fulfilled!



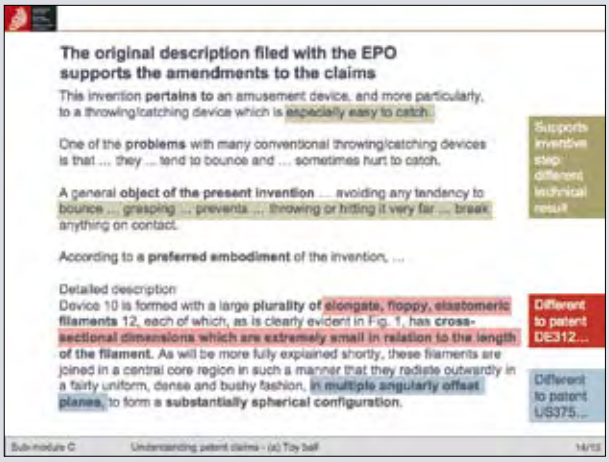
Based on our analysis of the relationship between the invention and the prior art, we can reformulate our claim in such a way that the invention as claimed is new and a patent can be granted. Look how complicated the claim for this simple invention has become!

You now know why patent claims are often very complicated in practice. And you have also learnt how to understand them much better. It is often helpful to consider the claim as a bundle of features that together represent the invention as it is protected.

You have now substantially changed your claim compared with what you originally filed. Of course, once you have filed a patent application you cannot simply change it as you like. For example, you cannot introduce completely new elements. Rather, any change has to be supported by the document that you originally filed. In our case, we described our invention very well in the description section.

Our text described all the features we have now added to the claims.

An important function of the description and the drawings during the patent application process is to support possible amendments to the patent claims (see next slide).





Those parts of the description (the original description that was filed with the original patent application) which support the changes to the claims are highlighted.

In red: This is what distinguishes the invention from the prior art found by the examiner. We are allowed to introduce this element (floppy) into the claims because we had described this in the original description.

In grey: This is what distinguishes our invention from the prior art the patent attorney had already found. We accounted for this in the original claims filed.

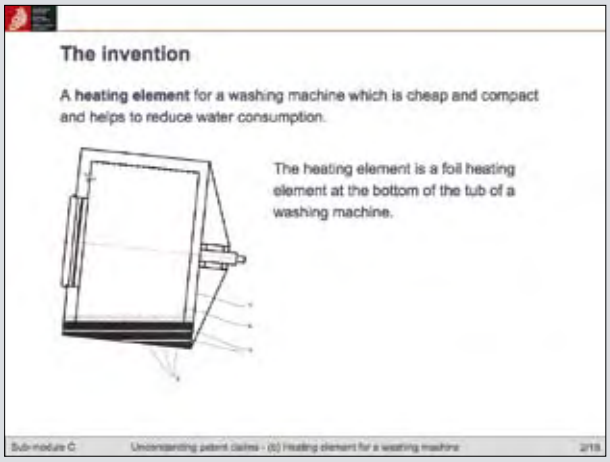
In green: These parts of the text can be used to support our argument that by combining the two functions which were known individually before ("floppy" and "three-dimensional globe configuration") we achieve a new technical function not achieved by the prior art.

This patent was actually granted with the claims we just developed. You can look it up in *esp@cenet* by entering patent publication number EP0295114.

Sub-module C

Understanding patent claims

(b) Heating element for a washing machine



Note

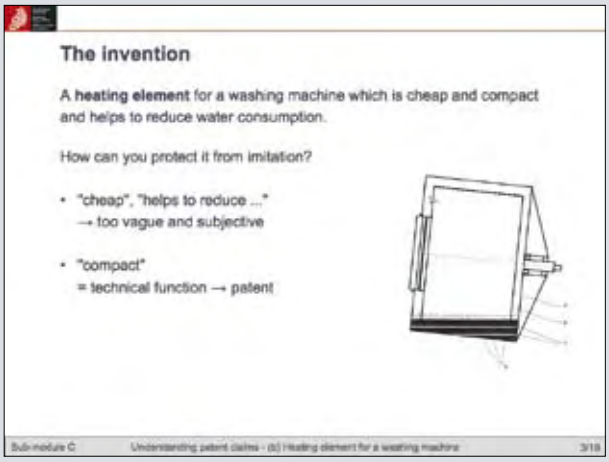
While real patents have been used in this case study, the various steps in the procedure followed by the applicant/attorney have been adapted for the purpose of this presentation.

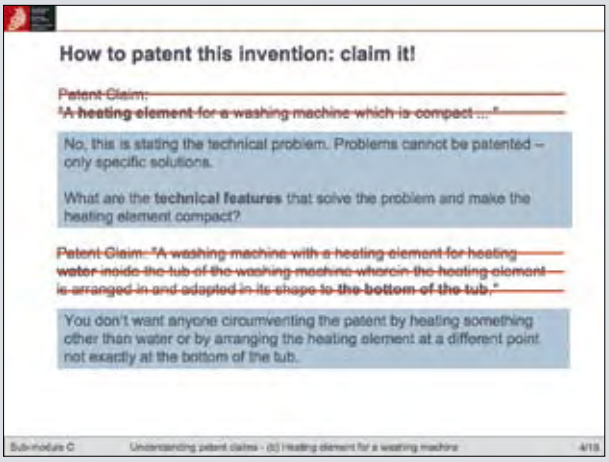
The example used in this case study is from the field of "Mechanics – Handling and Processing – Laundry treatment" and relates to a washing machine with a particular heating element.

It is based on European patent application EP 03 005 120, but is a simplified version translated from the original language (German). As a result, there are some differences between the claims shown here and the "real" claims.

The relevant ECLA and IPC classification is D06F39/04 (details of washing machines: heating arrangements) from the field D06F (domestic laundry treatment).

The figure shows a cross-section of the tub and the drum of a washing machine. The tub (1) is the receptacle that contains the water and washing powder or liquid inside the washing machine. The drum (4) rotates inside the tub around an axis, which in this example is slightly inclined. The foil heating element (2) is attached (e.g. glued) to or integrated into the lower part of the tub. Thus, the foil heating element is also "adapted in its shape" to the bottom of the tub. Insulating strips (3) may be used for dividing the foil heating element into different sections.





The aim is to find a way of describing the invention in technical terms (see also next slide). Subjective, vague or aesthetic features should therefore be avoided.

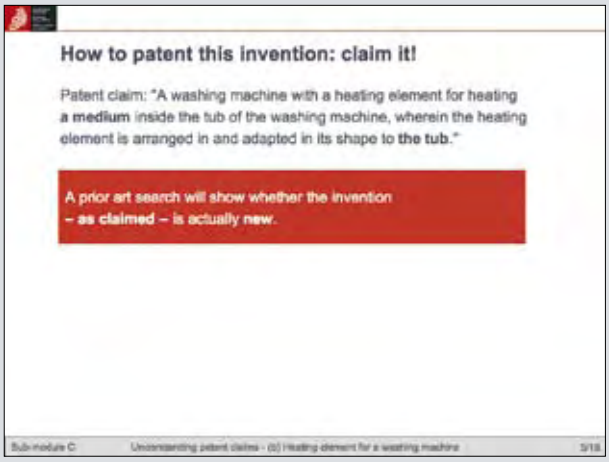
The invention may well of course have technical features which cause the washing machine to require fewer parts or contain parts which may well be less complex than the ones already known, in which case the washing machine could indeed also be "cheaper".

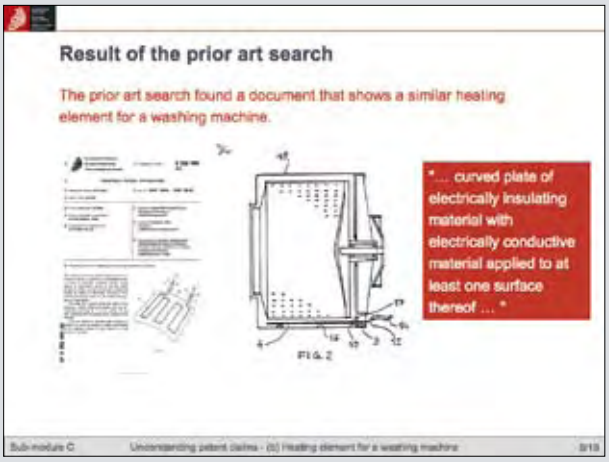
It is important to note that the claim relates to "a washing machine with a heating element" and not just "a heating element for a washing machine".

The reason is that the heating element is defined by its relation to the washing machine and its tub ("... arranged and adapted in its shape ..."). Hence, the washing machine is an integral part of the definition of the claimed "subject-matter". A claim relating to a "heating device for a washing machine" (or "in a washing machine"), however, claims only the heating device per se. Therefore, the claim must relate to the washing machine with a heating element in order to meet the requirements of the European Patent Convention (EPC), which states that a claim must clearly define the matter for which protection is sought (Article 84 EPC).

Note

A claim relating to "a tub with a heating element" would be possible.



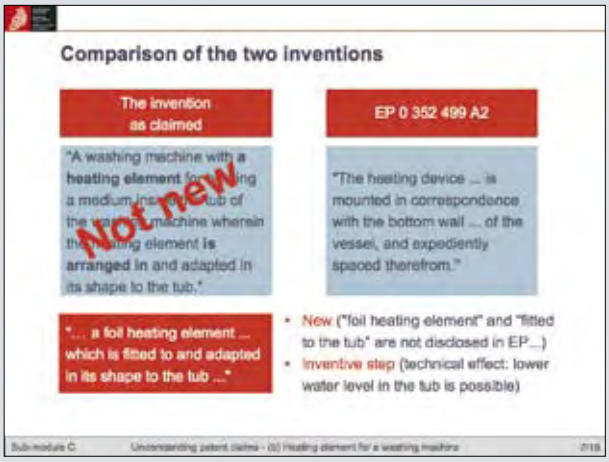


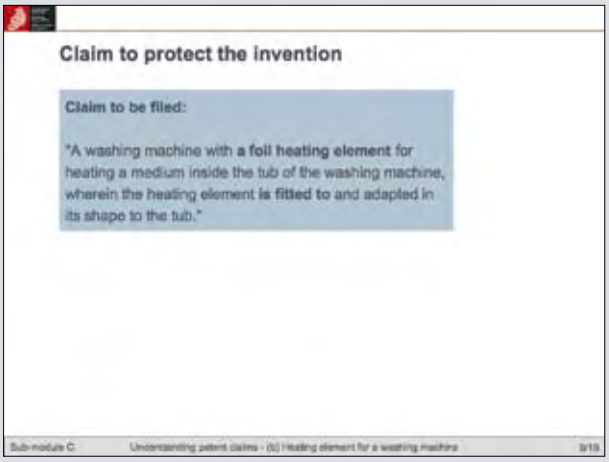
The aim is to prevent anyone from circumventing the patent by heating something other than water or by arranging the heating element at a different point not exactly at the bottom of the tub. Hence, the term "water" is replaced by the much wider term "medium", which encompasses "things" other than just water (e.g. air, suds, liquid chemicals). Furthermore, although the bottom of the tub is the most logical and beneficial location, the foil heating element may be located elsewhere.

Consequently, the scope of protection of this claim is wider than that of the original claim. This will make it more difficult to circumvent the patent.

Figure 2 of the prior art document shows the "washing vessel (15) of a washing machine" (i.e. the tub) and the bottom wall (16) of the tub. It also shows the parts (9, 12, 14, 17, 19) required for mounting the heating element.

For more information, see EP 0 352 499 A2 (claim 1, Figure 2, and column 3, lines 5-12).

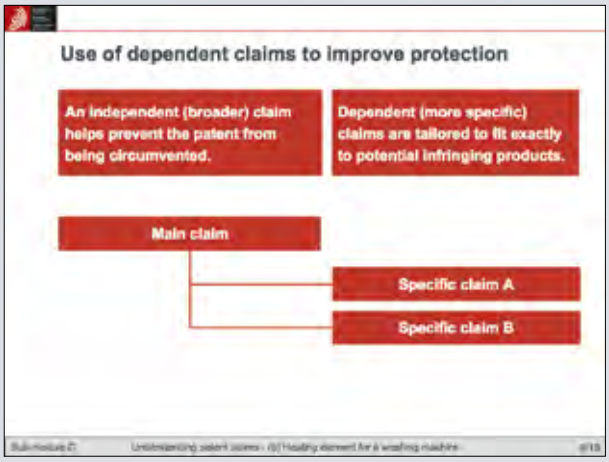


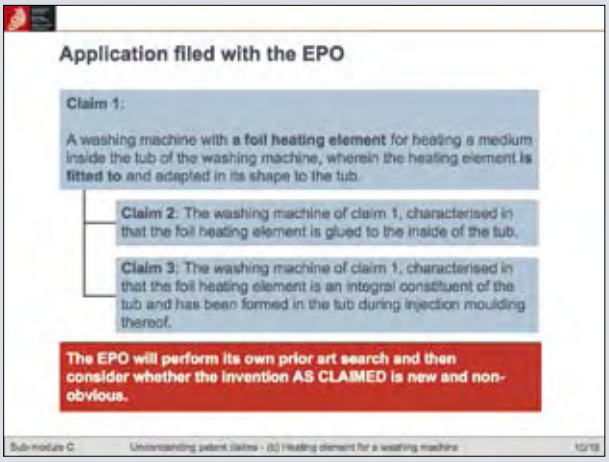


Inventive step (technical effect: lower water level in the tub is possible):
The technical effect of the difference between the invention as claimed and the prior art has to be evaluated. In the prior art document EP 0 352 499, the heating device is mounted "expediently spaced" from the bottom wall of the tub. Hence, in order to heat water inside this tub, the water level must reach at least the heating element.

The invention as claimed allows a much lower minimum water level than is possible with the washing machine shown in EP0352499, because the foil heating element is directly fitted onto the wall of the tub.

A further technical effect and advantage of the invention as claimed lies in the fact that, in the case of drum-type washing machines, the diameter of the drum inside the tub can be made larger (since there is no heating element which is spaced from the tub).



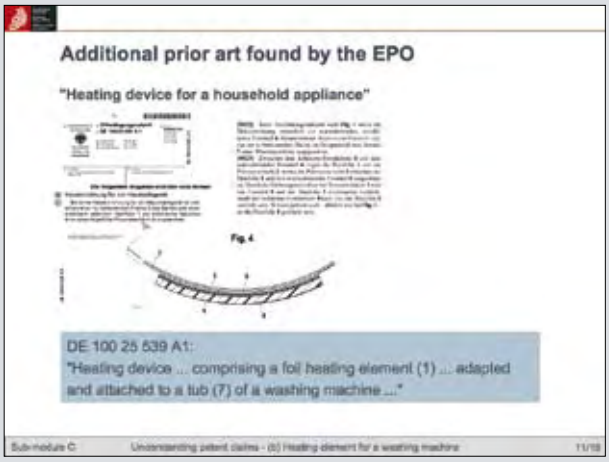


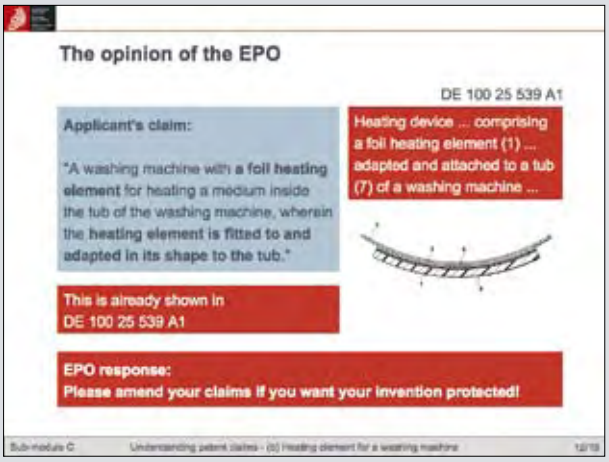
Claims are usually divided into broader, independent claims and narrower, dependent claims. The independent claim usually describes the invention in very general terms, to allow a broad interpretation in infringement lawsuits. The dependent claims usually describe specific ways of realising the invention that the inventor regards as economically attractive. The dependent claims are often tailored to fit exactly how you would expect competitors to realise the product.

For example, an independent claim could read: "A writing instrument comprising units a and b." A dependent claim could read: "The writing instrument of claim 1, characterised in that its length is between 10 and 15 centimetres."

The dependent claims indicate the alternative ways in which the foil heating element can be fitted to the tub.

In claim 3, the foil heating element is effectively integrated into the wall of the tub. The features of this claim limit the scope of protection quite significantly, because they refer to the method of producing the tub and integrating the foil heating element into it.

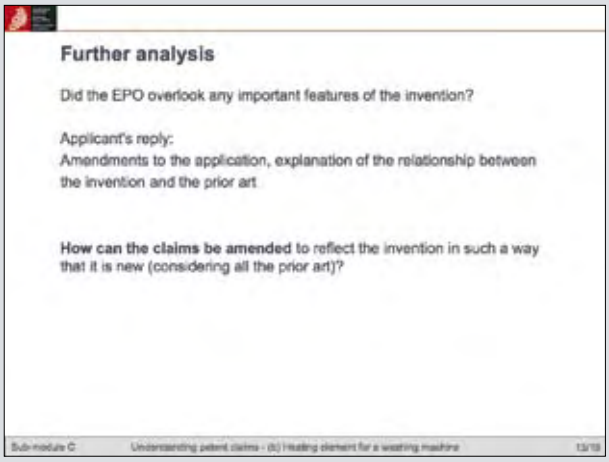


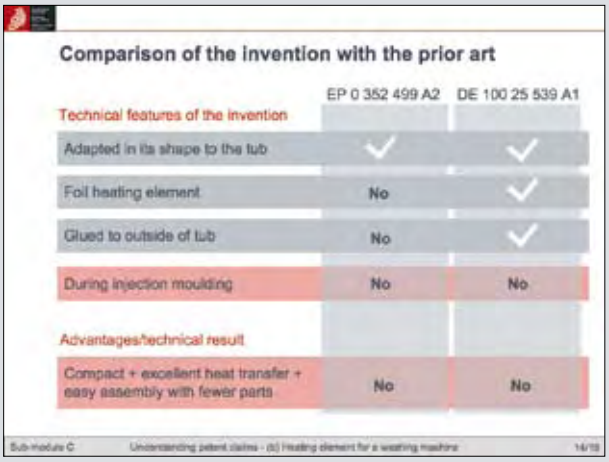


In Fig. 4 you can see that the "foil heating element" disclosed in this prior art document comprises a heating foil (1) with its supporting polymer layer (3) and heat-conducting material (6). Also shown are the tub (7) and an additional insulating material (4).

Of course, there could be some argument as to whether the "foil heating element" is the heating foil (1) only and whether this heating foil is "fitted to the tub". However, there is at least one interpretation of the prior art which is conclusive and logical that shows all the features of the claim of our invention, i.e. **"a foil heating element** for heating a medium inside the tub of the washing machine, wherein the **heating element is fitted to and adapted in its shape to the tub".**

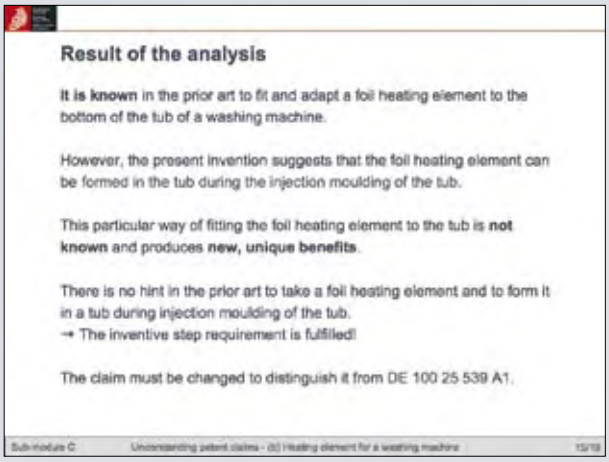
Note that the "foil heating element" of DE10025539 is glued to the tub. This document therefore also shows all the additional features of claim 2 of our invention.

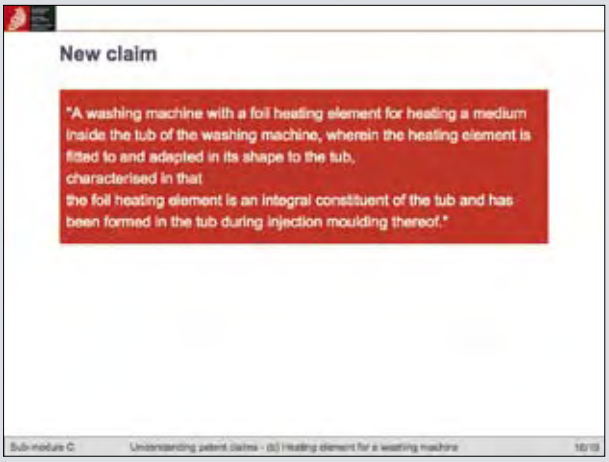




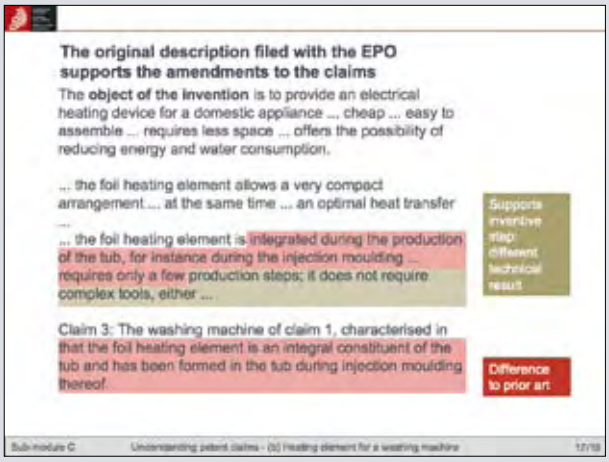
Check the material revealed in the prior art search:

– Does the invention have any feature not disclosed in the prior art?
– What are the advantages of the invention compared with the prior art?





This claim is a combination of claims 1 and 3 of our example as filed.





This slide shows the original description and claims. The changes made to the claims must be supported by the original description. Article 123(2) EPC stipulates that "The European patent application ... may not be amended in a way that it contains subject-matter which extends beyond the content of the application as filed." Therefore, it is important that the original description and claims disclose and support some "fallback positions".

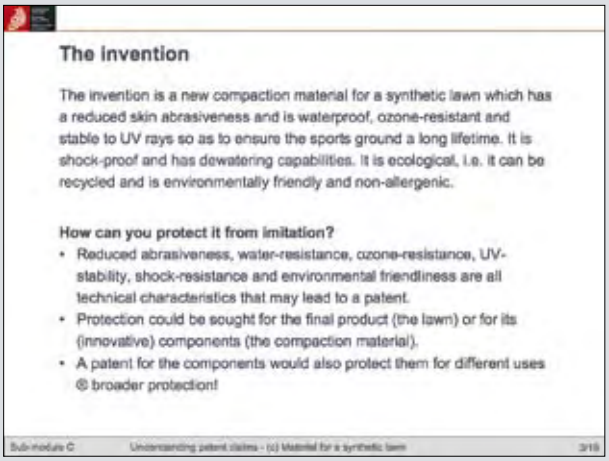
Once the claims have been amended, the description must also be amended so that the claims and description concur again.

Sub-module C

Understanding patent claims

(c) Material for a synthetic lawn



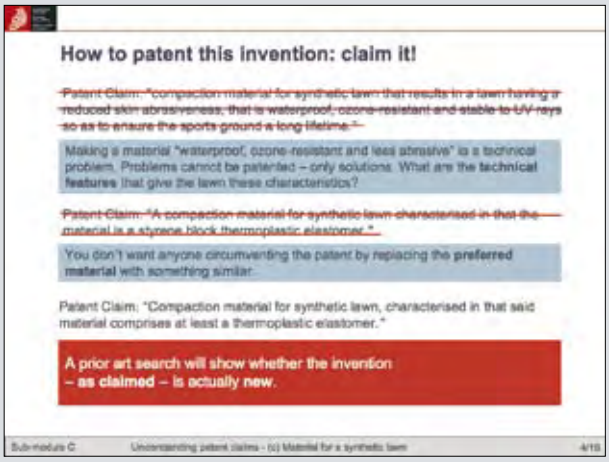


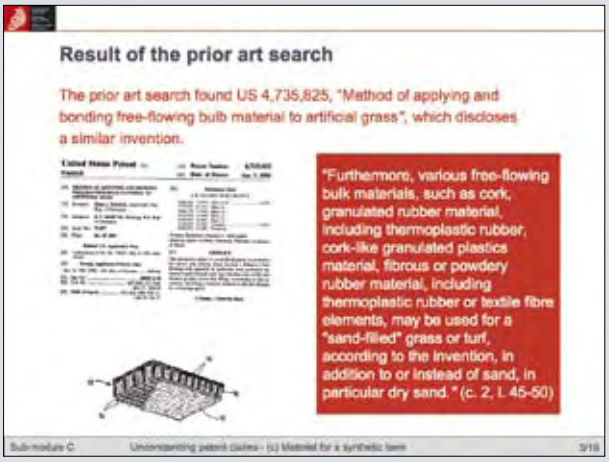
Note

While real patents have been used in this case study, the various steps in the procedure followed by the applicant/attorney have been adapted for the purpose of this presentation.

Synthetic turf for sport fields is normally made out of a mat onto which a plurality of plastic (usually polypropylene) fibres are mounted to simulate grass. The fibres are compacted with a layer of sand and rubber. The rubber may be mixed with the sand or added as a separate layer on a layer of sand. The most commonly used rubber is made of reclaimed tyres.

The invention relates to the use of a new rubber as compaction material for the synthetic lawn, all other elements of the synthetic lawn (mat, fibres and sand) being conventional.

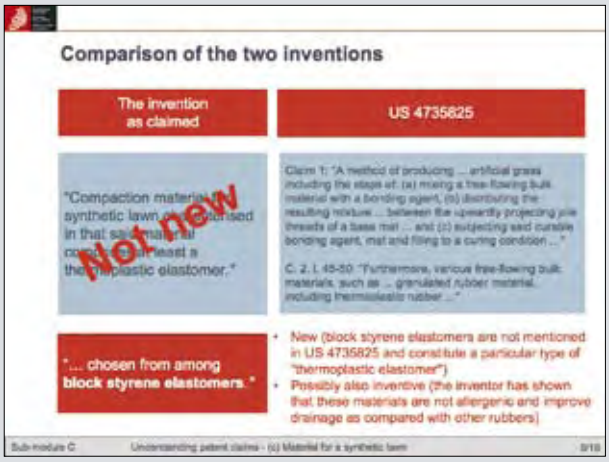




All these technical features are achieved by replacing the conventional reclaimed rubber from old tyres by a thermoplastic block elastomer based on styrene and a diene.

It is conceivable that other thermoplastic elastomers would also work, not just styrene-diene block copolymers. The claims should also leave open the possibility of adding certain further components to the compaction material. The verb "is" would be read restrictively in a patent claim to mean that the compaction material is made of this copolymer only. An expression such as "comprises" is preferable.

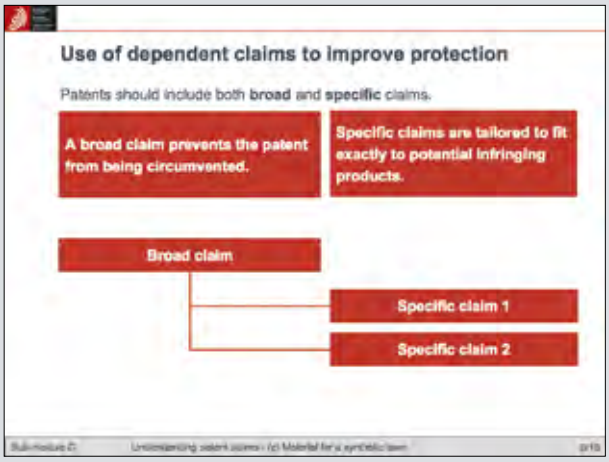
US 4735825 does not actually mention thermoplastic rubber. This has been "added" to the content of the prior art document for the purposes of this case study only.

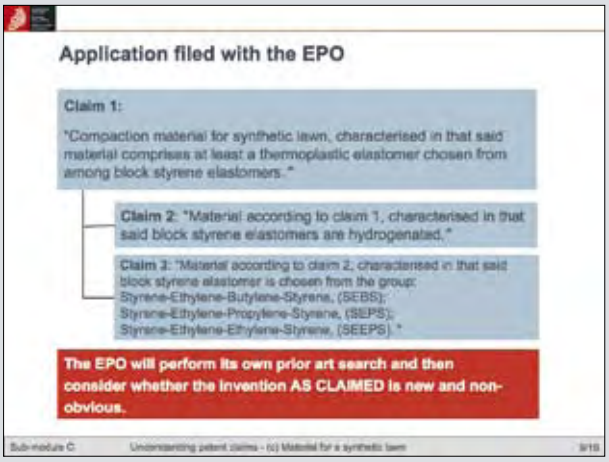




The selection of a particular type of material out of a generic class of materials constitutes new subject-matter if the prior art did not specifically mention that particular embodiment.

The particular effects linked to the selection of this new material can also be considered to involve an inventive activity. This will be considered in the following slides.

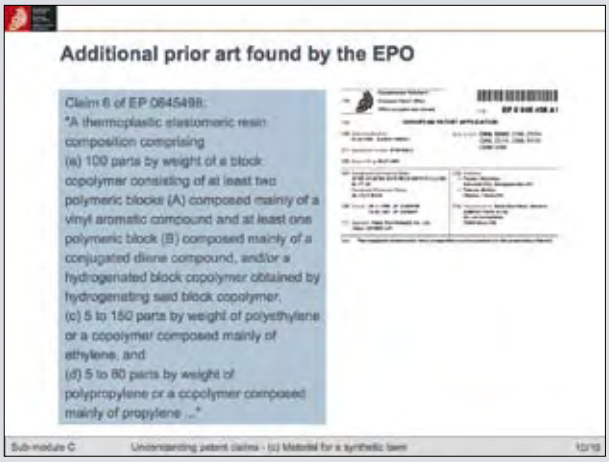


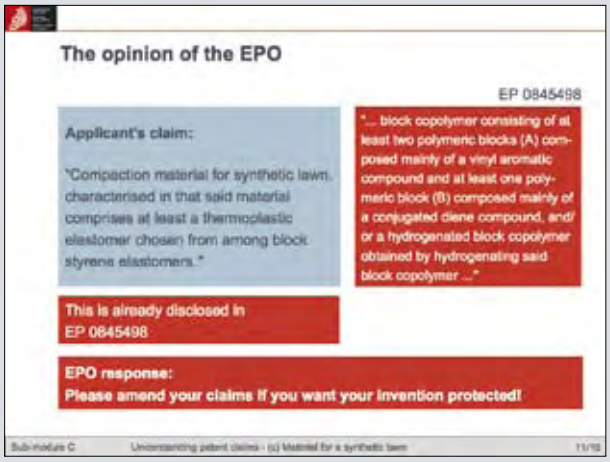


Claims are usually structured to include both broader, or "independent", claims and more specific, or "dependent", claims. An independent claim usually describes the invention in very general terms to allow a broad interpretation in infringement lawsuits. The dependent claims usually describe specific ways of realising the invention that the inventor regards as economically attractive. The dependent claims are often tailored to fit exactly how you would expect competitors to realise the invention.

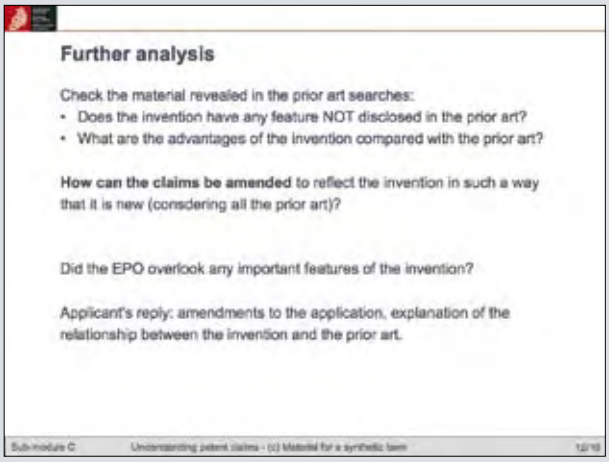
For example an independent claim could read: "A writing instrument comprising units a and b." A dependent claim could read: "The writing instrument of claim 1 characterised in that its length is between 10 and 15 centimetres."

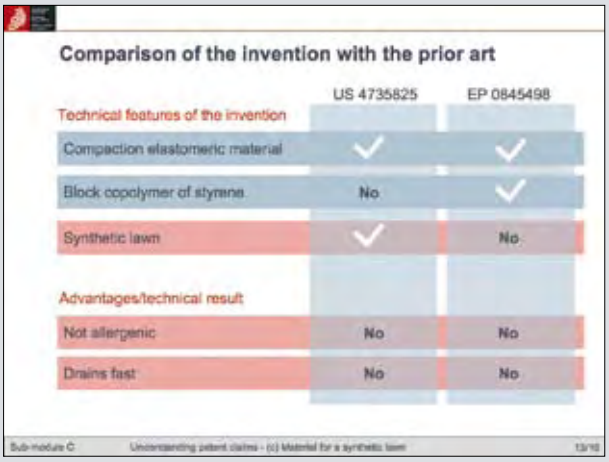
A further independent claim for the synthetic lawn as such should also be included. This claim could read something like: "Surface for sports activities comprising a synthetic lawn, characterised in that said surface comprises among the fibres constituting the synthetic lawn a compaction material according to one or more of claims 1 to 3 so as to form a layer."
It is also possible to claim the use of the compaction material in the fabrication of synthetic lawns and/or a method to improve the characteristics of a synthetic lawn which comprises the use of the specific compaction material: "Use of a compaction material according to one or more of claims 1 to 3 for compacting a synthetic lawn."
"Method for giving elasticity to a surface for sports activities comprising a synthetic lawn, characterised in that said method provides for the introduction among the fibres constituting the synthetic lawn of a compaction material according to one or more of claims 1 to 3 so as to form a layer."





The claim of the application is directed to a "material". As such, it refers to any composition comprising a thermoplastic block copolymer of styrene. The indication of use "for synthetic lawn" is only limiting in so far as the claimed material must be **suitable** for being used as a compaction material for synthetic lawn. The material of EP 0845498 seems suitable for this purpose.

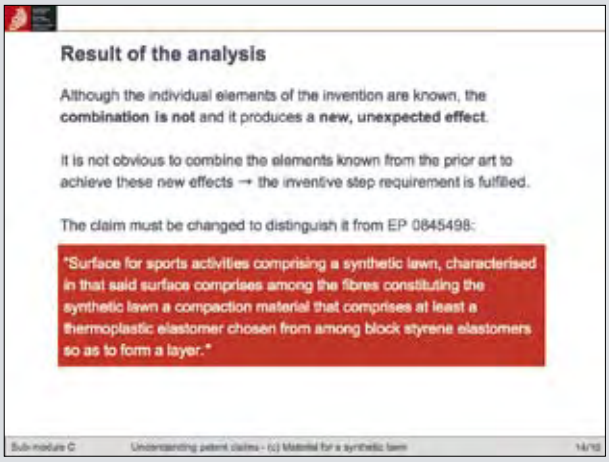


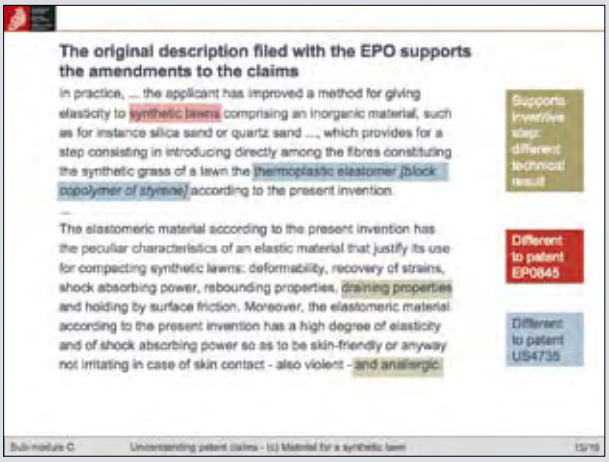


The invention must be compared in detail with all the available prior art (US 4735825 and EP 0845498), and any differences identified.
Are these differences responsible for a particular technical effect?
This technical effect would then indicate the technical problem that the invention sets out to solve. This technical problem should have been mentioned in the original application as filed or at least be related to the effects mentioned in the original application as filed.
Are there indications in the prior art that the technical problem could be solved by implementing the differences? If not, a claim including those differences could be considered novel **and** inventive.

Now, a new claim can be drafted that includes the differences over the prior art that have been identified as responsible for a particular, not foreseeable, technical effect. All the features of such a new claim need to have been disclosed in the application as originally filed.

The advantages were mentioned in slide 4. They have been recited in the description. They may be used to present arguments in favour of inventive step.


Result of the analysis
Although the individual elements of the invention are known, the combination is not and it produces a new, unexpected effect.
It is not obvious to combine the elements known from the prior art to achieve these new effects → the inventive step requirement is fulfilled.
The claim must be changed to distinguish it from EP 0845498:
"Surface for sports activities comprising a synthetic lawn, characterised in that said surface comprises among the fibres constituting the synthetic lawn a compaction material that comprises at least a thermoplastic elastomer chosen from among block styrene elastomers so as to form a layer."
Sub-module C
14/19

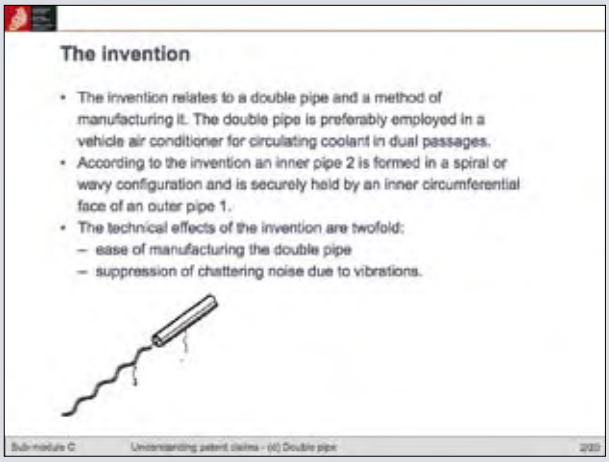

The original description filed with the EPO supports the amendments to the claims
In practice, ... the applicant has improved a method for giving elasticity to synthetic lawns comprising an inorganic material, such as for instance silica sand or quartz sand ..., which provides for a step consisting in introducing directly among the fibres constituting the synthetic grass of a lawn the thermoplastic elastomer (block copolymer of styrene) according to the present invention.
...
The elastomeric material according to the present invention has the peculiar characteristics of an elastic material that justify its use for compacting synthetic lawns: deformability, recovery of strains, shock absorbing power, rebounding properties, draining properties and holding by surface friction. Moreover, the elastomeric material according to the present invention has a high degree of elasticity and of shock absorbing power so as to be skin-friendly or anyway not irritating in case of skin contact - also violent - and anallergic.
Supports inventive step: different technical result
Different to patent EP0845
Different to patent US4735
Sub-module C
15/19

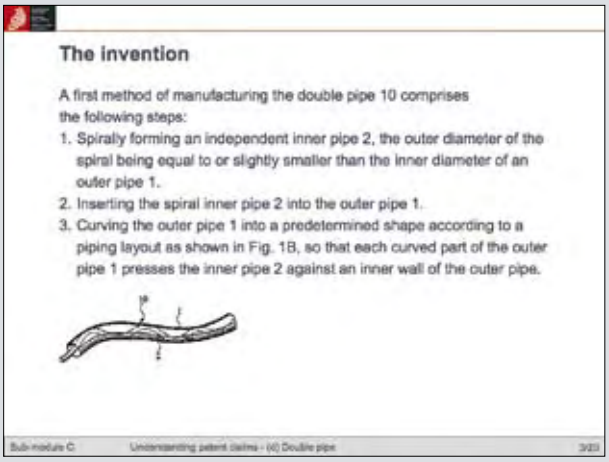

The patent is finally granted
Response from EPO: granted!
Europäisches Patentamt
European Patent Office
Office européen des brevets
EP 1 386 944 B1
EUROPEAN PATENT SPECIFICATION
Compaction material for synthetic lawn, process for its production and use
Verdichtungsmaterial für künstlichen Rasen, Herstellungsverfahren und Verwendung
Matériel de compactage pour gazon artificiel, sa production et son utilisation

Sub-module C

Understanding patent claims

(d) Double pipe





Note

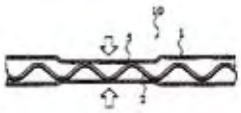
While real patents have been used in this case study, the various steps in the procedure followed by the applicant/attorney have been adapted for the purpose of this presentation.

Using the double pipe makes piping layout simpler and more compact, which is particularly important due to packaging reasons in the vehicle structure.

The invention

A second method of manufacturing the double pipe 10 comprises the following steps:

1. Spirally forming an independent inner pipe 2, the outer diameter of the spiral being equal to or slightly smaller than the inner diameter of an outer pipe 1.
2. Inserting the spiral inner pipe 2 into the outer pipe 1.
3. Crushing a part of the wall of the outer pipe 1 to form a flattened cross-section 5, thus fixing the outer pipe 1 and inner pipe 2 to each other.



How to patent this invention: claim it!

1. Try: "A double pipe that is easy to manufacture."

Making a double pipe "easy to manufacture" is a technical problem. Problems cannot be patented - only solutions.

2. Try: "An air-conditioner double pipe comprising an outer pipe and an inner pipe arranged inside the outer pipe."

You don't want anyone circumventing the patent by employing the double pipe in a technical field different from air conditioners.

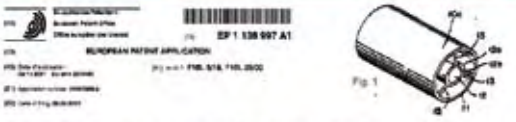
3. Try: "A double pipe comprising an outer pipe and an inner pipe, the inner pipe being securely fixed within the outer pipe."

This patent claim is as broad as possible and adequately defines the invention for the time being.

A prior art search will show whether the invention – as claimed – is actually new.

Result of the prior art search

The prior art search revealed European patent application No. 1 138 997 A, which discloses a similar invention.

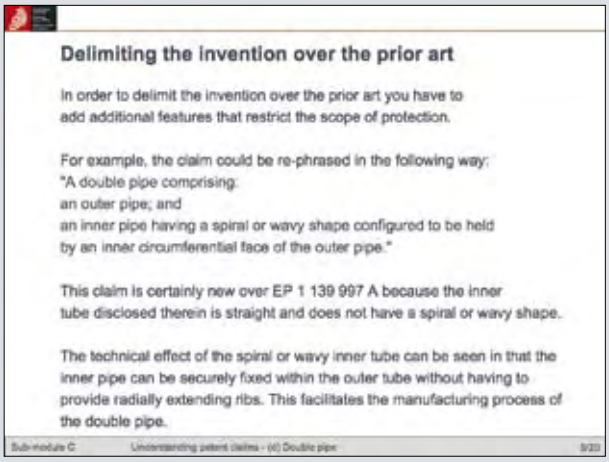


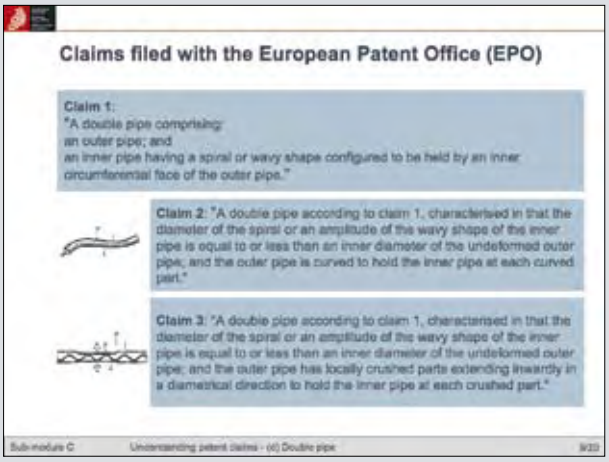
As shown in Fig. 1, a duplex pipe 10 to be used as a work is formed in such a manner that an outer pipe 11, an inner pipe 12 and connecting ribs 13 for connecting together the outer and inner pipes 11 and 12 are moulded of aluminium material by extrusion working or by drawing working into an integrated body. Preferably, the duplex pipe 10 is used as a refrigerant pipe in the cooling cycle of an air conditioner for a car.

Comparison of the two inventions

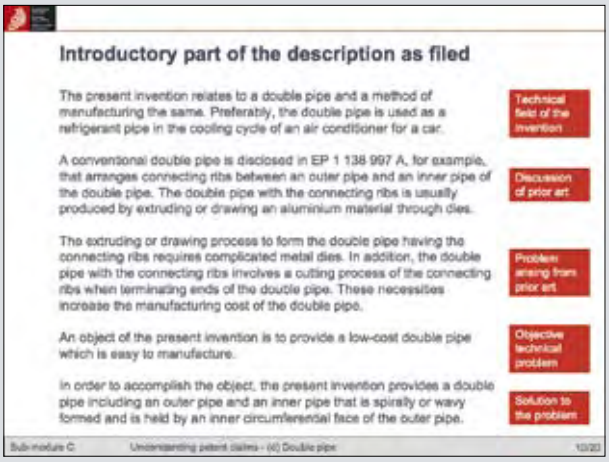
The invention as claimed	EP 1 138 997 A as prior art
"A double pipe comprising an outer pipe and an inner pipe, the inner pipe being securely fixed within the outer pipe."	"A duplex pipe 10 ... [with] an outer pipe 11, an inner pipe 12 and connecting ribs 13 for connecting together the outer and inner pipes 11 and 12."
	

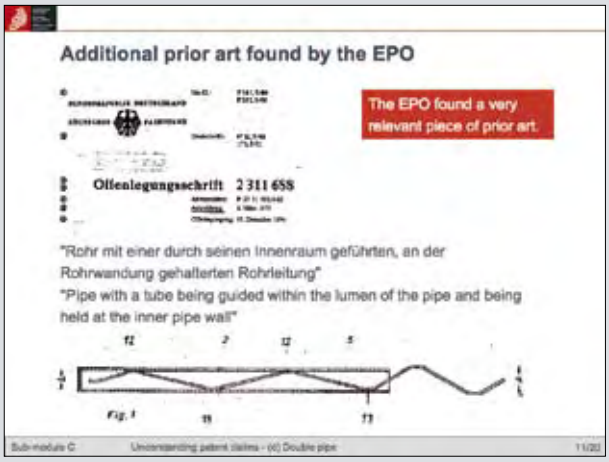
Since all of the claimed features are anticipated by the prior art, the claimed subject-matter is not new!





The dependent claims are based on the two embodiments of the double pipe and represent fall-back positions in the granting procedure.





All European patent applications must include a set of claims and a description.

A set of drawings may also be included.

Additional prior art found by the EPO

Claim 1 of DE 2 311 686 translated into English reads as follows:

"Pipe 2 with a tube 5 being guided within the lumen of the pipe 2 and being held at the inner pipe wall ...,
characterised in that the tube 5 is provided with periodic bends along at least a part of its length whose amplitude A is greater than the inner diameter L of the pipe 2,
such that the tube 5 is deformed when being introduced into the pipe 2 and contacts the pipe wall 2 under pressure due to the tube's restoring force."

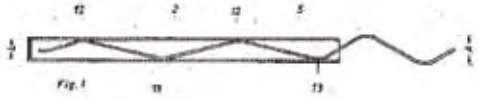


Fig. 1

The opinion of the EPO

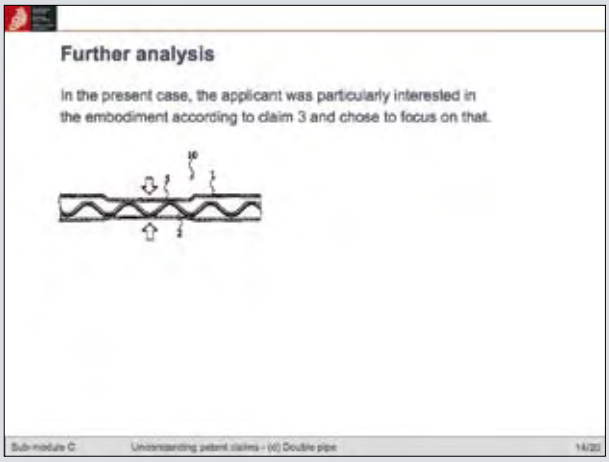
Applicant's claim:
"A double pipe comprising:
an outer pipe; and
an inner pipe having a spiral or wavy shape configured to be held by an inner circumferential face of the outer pipe."

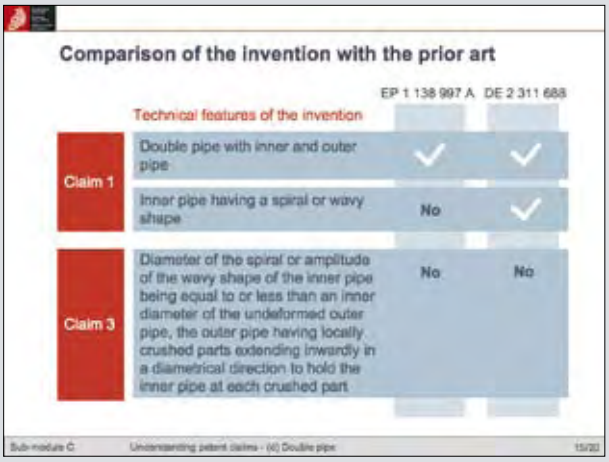
CLAIM of DE 2 311 688:
"Pipe 2 with a tube 5 being guided within the lumen of the pipe 2 and being held at the inner pipe wall ..., characterised in that the tube 5 is provided with periodic bends along at least a part of its length ..."



All of the features of the applicant's claim are fully anticipated by the disclosure of DE 2 311 688.

EPO response:
Please amend your claims if you want your invention protected!



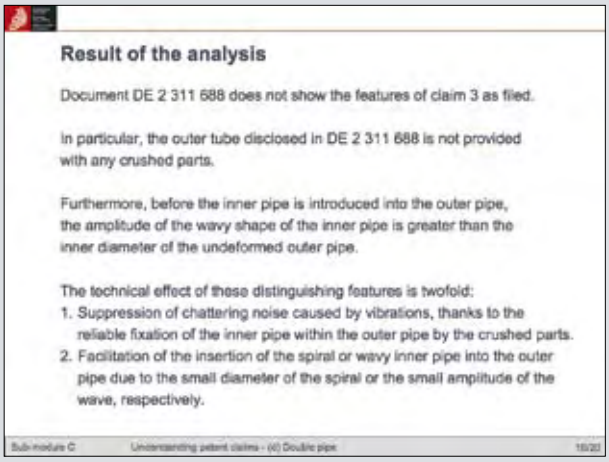


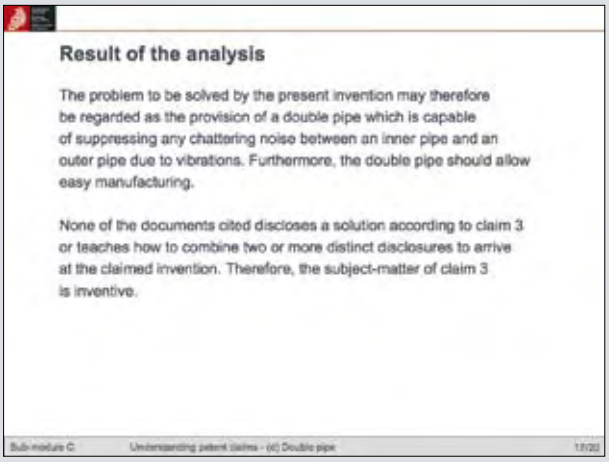
A structured analysis of your invention compared with the two documents that have been identified as relevant prior art could look like this.

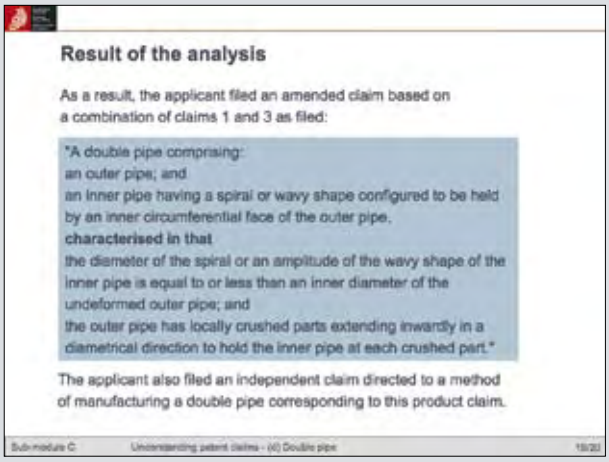
To do this analysis, you need to look at the features of the inventions (how the problem is solved) and at the technical results, i.e. what problem is solved.

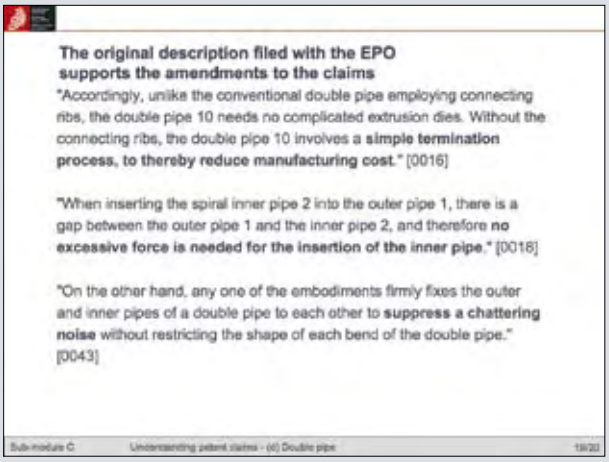
The following text is also written on the next slide:

- Although the individual elements of the invention are known, the **combination is not known.**
- The new combination of the technical features produces a **new, unique benefit.**
- Given our knowledge of the prior art it is not obvious to combine the elements of the different documents to achieve these new effects -> the inventive step requirement is fulfilled!


Result of the analysis
Document DE 2 311 688 does not show the features of claim 3 as filed.
In particular, the outer tube disclosed in DE 2 311 688 is not provided with any crushed parts.
Furthermore, before the inner pipe is introduced into the outer pipe, the amplitude of the wavy shape of the inner pipe is greater than the inner diameter of the undeformed outer pipe.
The technical effect of these distinguishing features is twofold:
1. Suppression of chattering noise caused by vibrations, thanks to the reliable fixation of the inner pipe within the outer pipe by the crushed parts.
2. Facilitation of the insertion of the spiral or wavy inner pipe into the outer pipe due to the small diameter of the spiral or the small amplitude of the wave, respectively.
Sub-module C
Understanding patent claims - (e) Double pipe
16/20


Result of the analysis
The problem to be solved by the present invention may therefore be regarded as the provision of a double pipe which is capable of suppressing any chattering noise between an inner pipe and an outer pipe due to vibrations. Furthermore, the double pipe should allow easy manufacturing.
None of the documents cited discloses a solution according to claim 3 or teaches how to combine two or more distinct disclosures to arrive at the claimed invention. Therefore, the subject-matter of claim 3 is inventive.
Sub-module C
Understanding patent claims - (e) Double pipe
17/20





Where appropriate, claims contain a preamble, which contains the features known from the prior art, and a characterising portion, beginning with the expression "characterised in that", which specifies the features for which protection is sought (Rule 43(1) EPC).

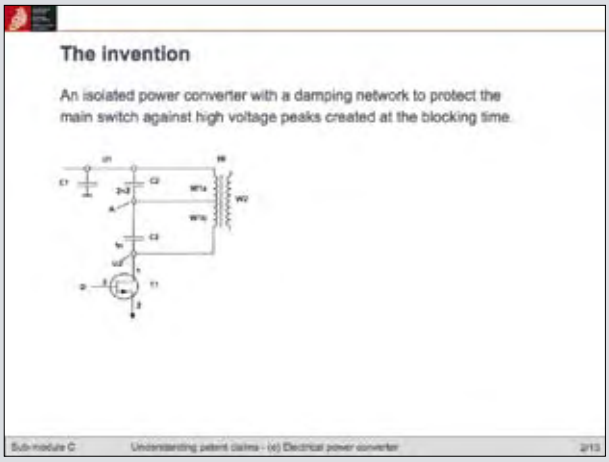
The application as filed has been published as EP 1 447 606 A1. The paragraphs quoted are taken from this publication.


The patent is finally granted on the basis of the amended claim
EP 1 447 606 B1
EUROPEAN PATENT SPECIFICATION
Claims
1. A double pipe comprising:
characterized in that
Sub-module C
Understanding patent claims - (e) Double pipe

Sub-module C

Understanding patent claims

(e) Electrical power converter



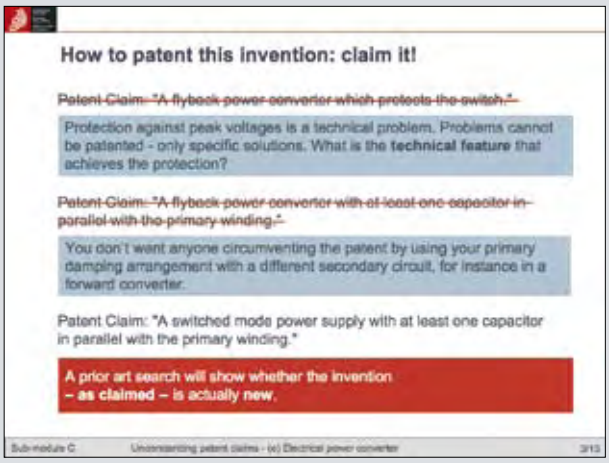
Note

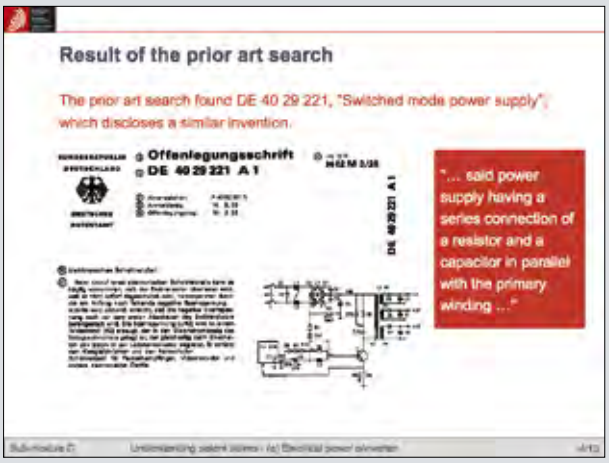
While real patents have been used in this case study, the various steps in the procedure followed by the applicant/attorney have been adapted for the purpose of this presentation.

The invention is based on a switched-mode power supply as depicted. This type of power supply is used in particular as a flyback converter in entertainment electronics equipment, for example in television sets and video recorders, to provide a regulated DC output voltage. Note that the secondary circuit is not pictured here .

Outline of the problem addressed by the invention:
At the instant when the transistor blocks the current interruption causes a high di/dt, which, due to the inductance of the transformer, produces high-voltage peaks. For example, if the power supply is operated from a 230V AC system, voltage peaks of up to 1 000 V may occur, presenting a risk for the switching transistor or difficulties when designing it.

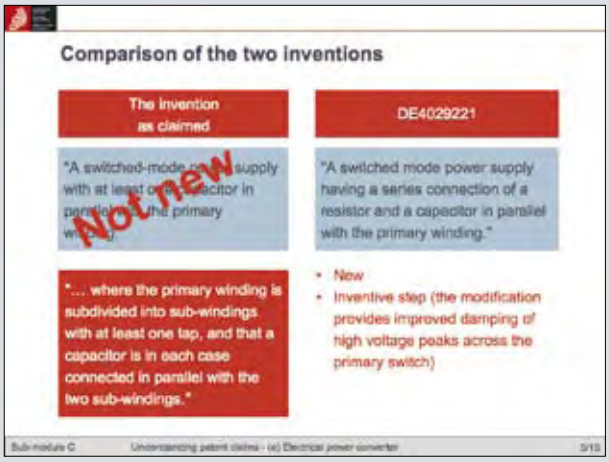
The invention therefore aims to provide an efficient damping network with few components and low losses.

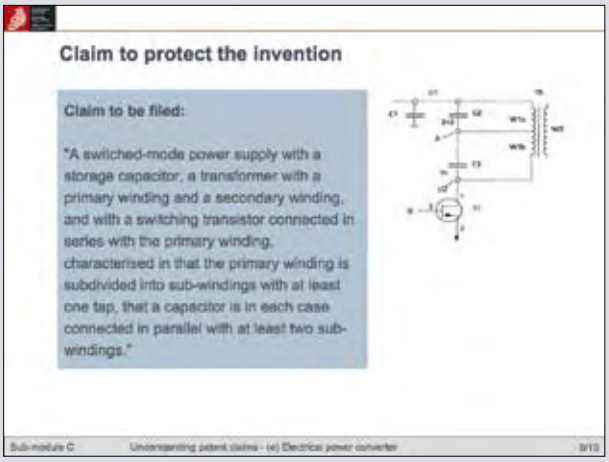




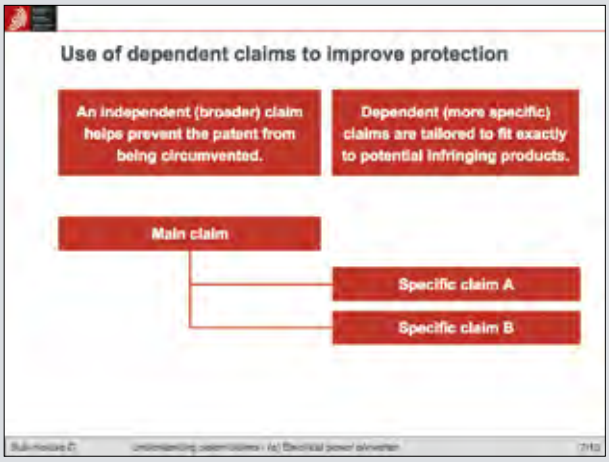
Flyback and forward converters are different topologies of isolated (i.e. transformer-coupled) DC-DC converters. They share a similar configuration on the primary side of their transformers but have different secondary circuits.

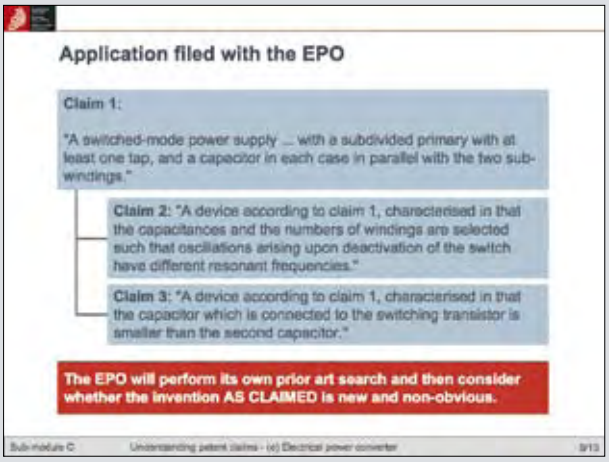
Restricting the scope of the claim to the flyback topology would be too limited as it would deprive the applicant of a deserved reward for the disclosure of his invention.
A fair generalisation, given the contribution over the art, would be a broader wording such as "switched mode power supply", which covers both alternatives.

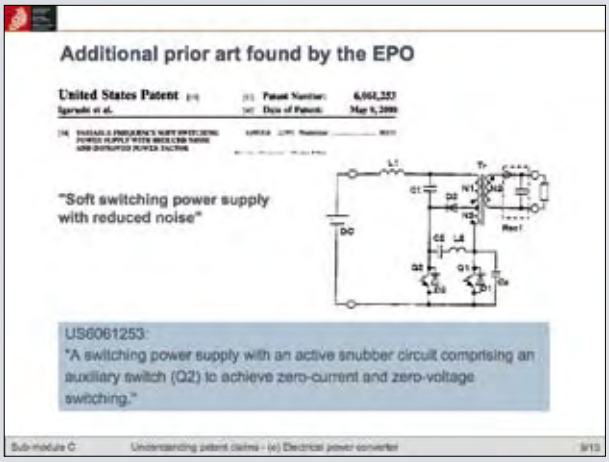




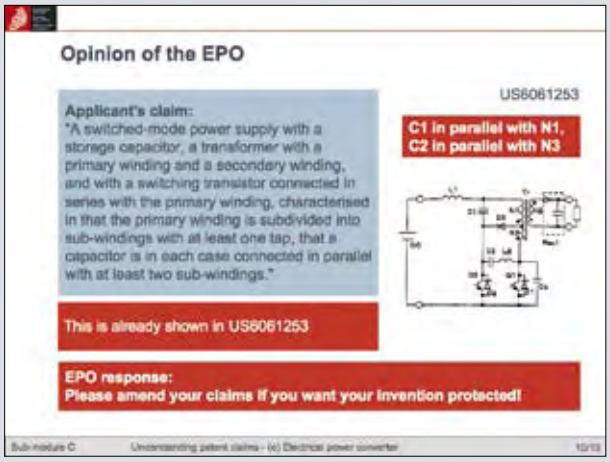
A parallel connection can be interpreted in a broad sense as also covering cases where the elements are combined with others (like R6), as long as the elements referred to as "in parallel" are in parallel branches. The branch R+C, i.e. C , is in parallel with the primary winding.


Use of dependent claims to improve protection
An independent (broader) claim helps prevent the patent from being circumvented.
Dependent (more specific) claims are tailored to fit exactly to potential infringing products.
Main claim
Specific claim A
Specific claim B

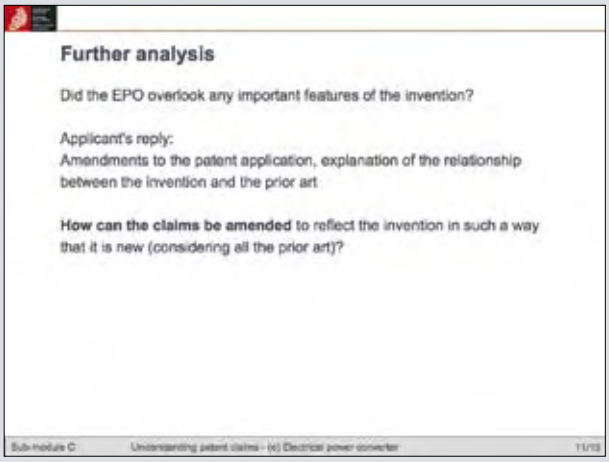

Application filed with the EPO
Claim 1:
"A switched-mode power supply ... with a subdivided primary with at least one tap, and a capacitor in each case in parallel with the two sub-windings."
Claim 2: "A device according to claim 1, characterised in that the capacitances and the numbers of windings are selected such that oscillations arising upon deactivation of the switch have different resonant frequencies."
Claim 3: "A device according to claim 1, characterised in that the capacitor which is connected to the switching transistor is smaller than the second capacitor."
The EPO will perform its own prior art search and then consider whether the invention AS CLAIMED is new and non-obvious.

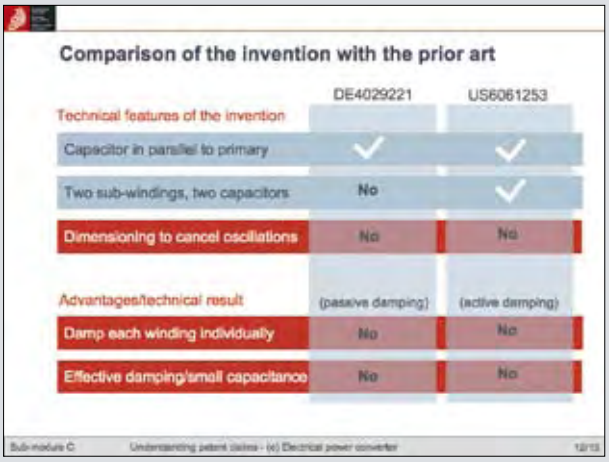


"Snubber" is a synonym for "damping circuit" or "clamping circuit".



US6061253 shows all the features of claim 1 (although only by accident). The subject-matter of the applicant's claim therefore does not meet the novelty requirements of the European Patent Convention. To get a patent, the applicant must amend the wording of the claim, describe the invention more precisely, and differentiate it from the prior art.





Check the material revealed in the prior art searches:

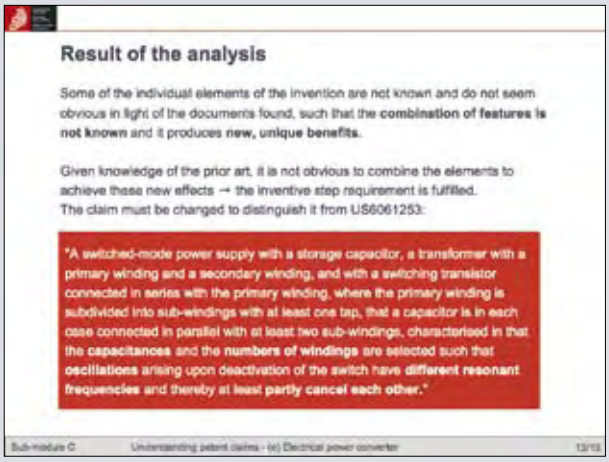
– Does the invention have any feature not disclosed in the prior art?
– What are the advantages of the invention compared to the prior art?

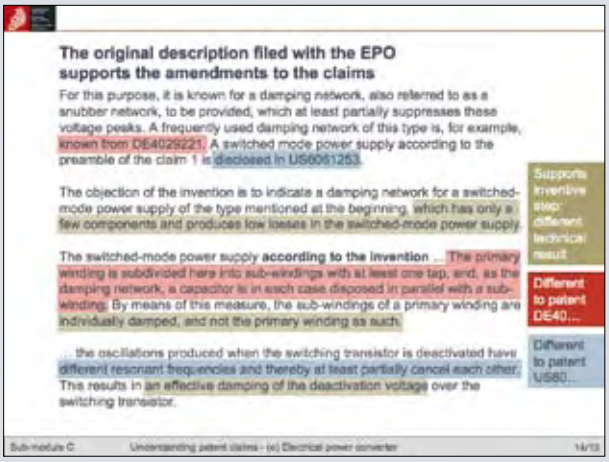
It is clear, for instance, that the actual functionality of the circuit of the US document (based on an auxiliary switch and active snubber) is different from that of the invention. This suggests that there must be some room for amendment to restore the novelty.

The subject-matter of the dependent claims and the content of the description must be assessed in that light.

Due to the subdivided windings and capacitors in parallel, the sub-windings of the primary are individually damped, and not the primary as a whole.

As a result of the specific dimensioning of the invention, the oscillations produced when the switch is deactivated have different resonant frequencies and partially cancel each other. This results in a more effective damping and at the same time keeps the total capacitance small (capacitors in series), meaning that the discharge current is quite low at the time of activation of the switch.


Result of the analysis
Some of the individual elements of the invention are not known and do not seem obvious in light of the documents found, such that the combination of features is not known and it produces new, unique benefits.
Given knowledge of the prior art, it is not obvious to combine the elements to achieve these new effects → the inventive step requirement is fulfilled.
The claim must be changed to distinguish it from US6061253:
"A switched-mode power supply with a storage capacitor, a transformer with a primary winding and a secondary winding, and with a switching transistor connected in series with the primary winding, where the primary winding is subdivided into sub-windings with at least one tap, that a capacitor is in each case connected in parallel with at least two sub-windings, characterised in that the capacitances and the numbers of windings are selected such that oscillations arising upon deactivation of the switch have different resonant frequencies and thereby at least partly cancel each other."
Sub-module C
Understanding patent claims - (e) Electrical power converter
13/13

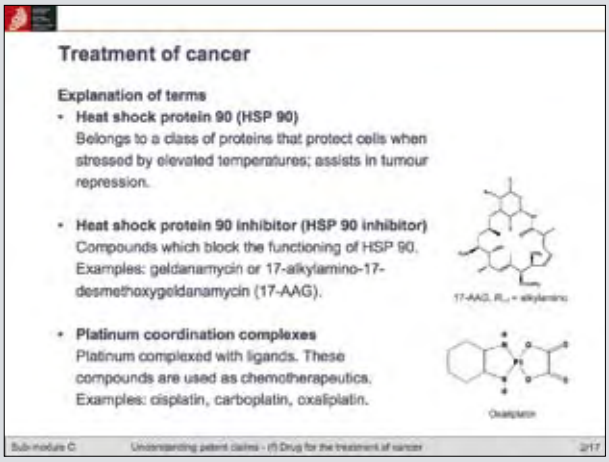

The original description filed with the EPO supports the amendments to the claims
For this purpose, it is known for a damping network, also referred to as a snubber network, to be provided, which at least partially suppresses these voltage peaks. A frequently used damping network of this type is, for example, known from DE4029221. A switched mode power supply according to the preamble of the claim 1 is disclosed in US6061253.
The objection of the invention is to indicate a damping network for a switched-mode power supply of the type mentioned at the beginning, which has only a few components and produces low losses in the switched-mode power supply.
The switched-mode power supply according to the invention ... The primary winding is subdivided here into sub-windings with at least one tap, and, as the damping network, a capacitor is in each case disposed in parallel with a sub-winding. By means of this measure, the sub-windings of a primary winding are individually damped, and not the primary winding as such.
... the oscillations produced when the switching transistor is deactivated have different resonant frequencies and thereby at least partially cancel each other. This results in an effective damping of the deactivation voltage over the switching transistor.
Supports inventive step: different technical result
Different to patent DE40...
Different to patent US60...
Sub-module C
Understanding patent claims - (e) Electrical power converter
14/13

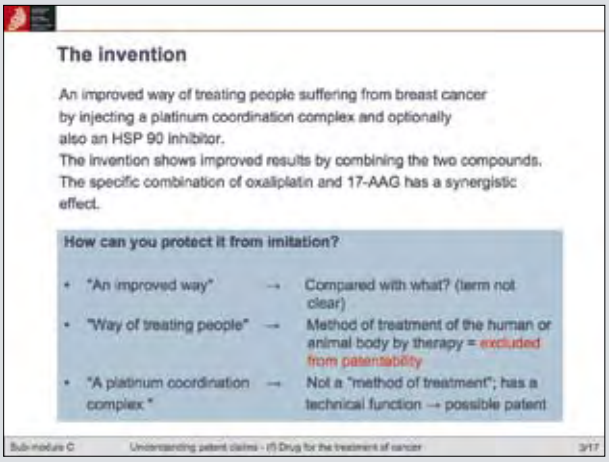

The patent is finally granted
Response from EPO: granted!
EP 1 184 964 B1
EUROPEAN PATENT SPECIFICATION
H02M 3/24

Sub-module C

Understanding patent claims

(f) Drug for the treatment of cancer





Definition of the terms used in the example.

Note

While real patents have been used in this case study, the various steps in the procedure followed by the applicant/attorney have been adapted for the purpose of this presentation.

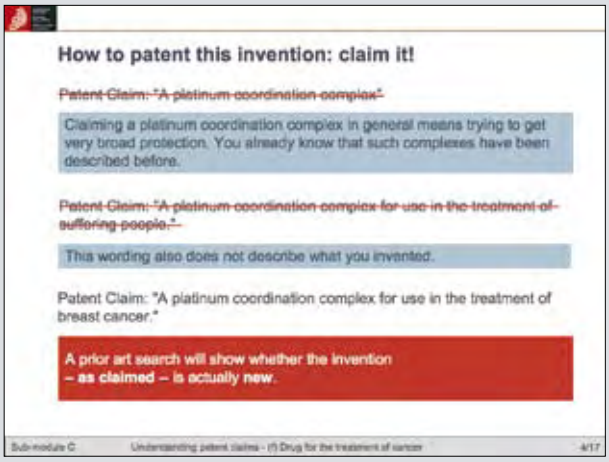
You have two options for defining your invention:

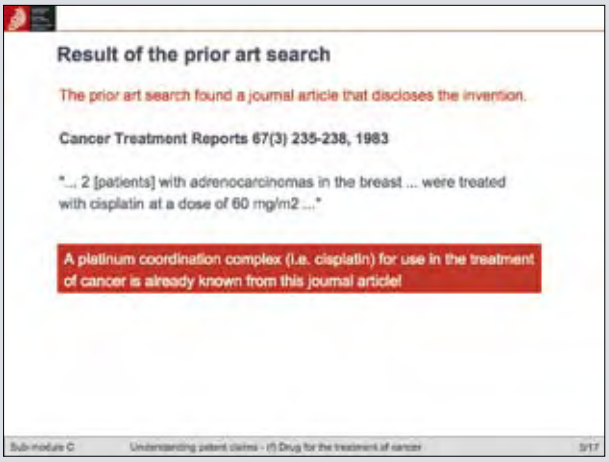
1. Pt coordination complex only = normal chemotherapeutic agent
2. Combination of Pt coordination complex with HSP 90 inhibitor

How can you protect it from imitation?

– Three ways of defining claims, with an explanation as to why these ways are suitable/unsuitable.

– Exceptions to patentability: No patents shall be granted in respect of methods for the treatment of the human or animal body by surgery or therapy and diagnostic methods practised on the human or animal body (Article 53(c) EPC).



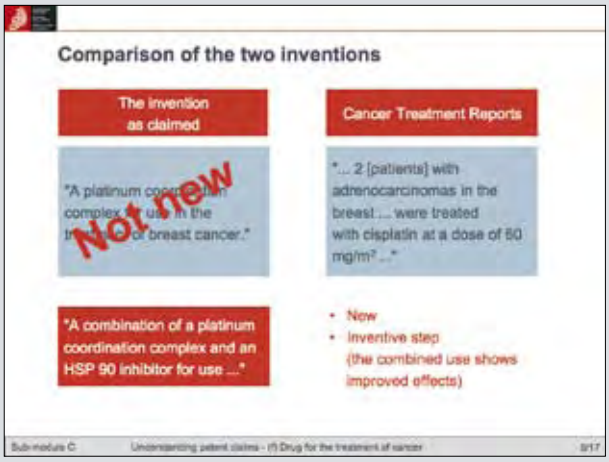


Note

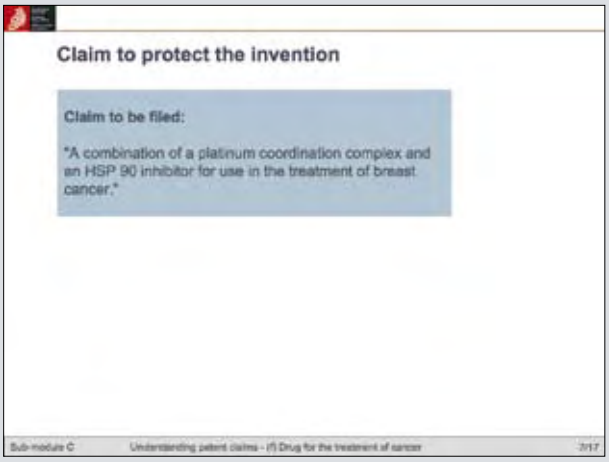
The product claim is formulated as a second medical use (EPC 2000), but this aspect will not be covered in this presentation.

You should carry out a prior art search **before** you start researching or drafting your claims.

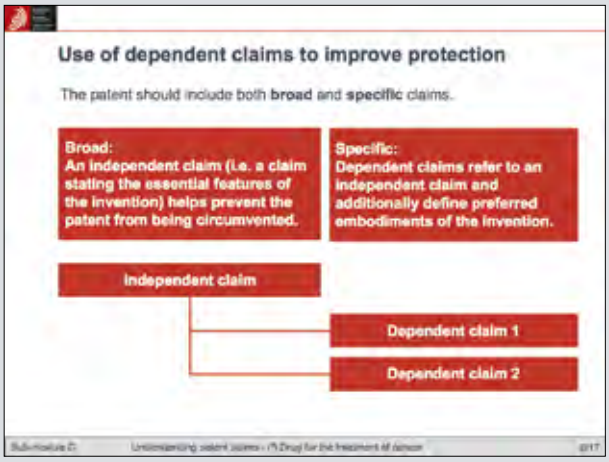
Cisplatin is used as a chemotherapeutic agent, so this document is novelty-destroying.

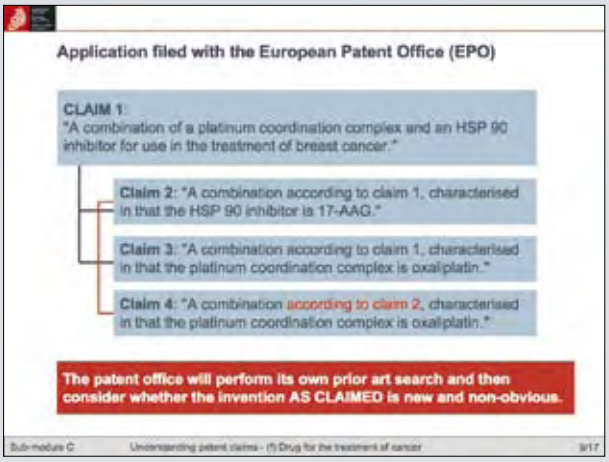


Analysis of features and comparison with the prior art: the combination of a Pt coordination complex and an HSP 90 inhibitor was not disclosed in Cancer Treatment Reports.



This is the first draft of an independent claim relating to the invention.





Applications are normally structured to include both independent and dependent claims.

The independent claim describes your invention in very general terms, to allow a broad interpretation in any infringement lawsuits.

The dependent claims describe specific ways to put the invention into practice. They often describe the most commercially successful embodiments of the invention.

For example an independent claim 1 could read: "A writing instrument comprising two chambers which are linked by a hole." A dependent claim could read: "The writing instrument of claim 1, characterised in that its length is between 10 and 15 centimetres."

This slide looks in more detail at the two kinds of claims referred to in the previous slide (Rule 43(3) EPC):

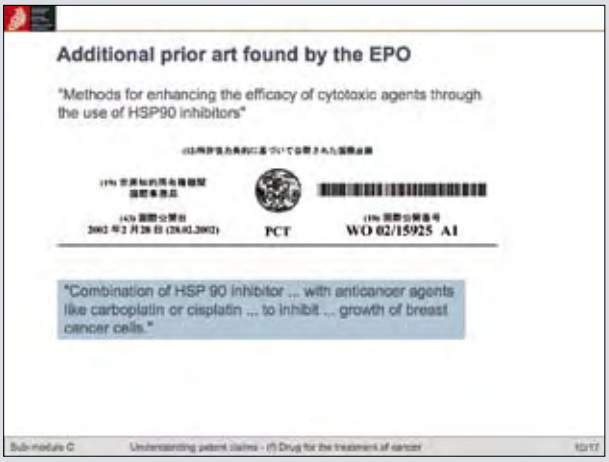
Claim 1 = independent claim

An independent claim states the essential features of the invention. In our example this means:

- a combination of a first compound (= platinum coordination complex) with
- a second compound (= HSP 90 inhibitor) and
- the use of this medicament (= treatment of breast cancer)

Claims 2-4 = dependent claims

Dependent claims define particular embodiments of the invention, i.e. since they refer to other claims, they relate to a combination of the essential features of the invention (of the independent claim) together with one or more further features.



e.g. claim 2 refers to claim 1 and therefore relates to the features of claim 1 in combination with a further feature, which is that the HSP 90 inhibitor is 17-AAG.

The same applies to claim 3, since this claim also refers to claim 1. It therefore relates to a combination of the features of claim 1 with a further feature, which is that the platinum coordination complex is oxaliplatin.

Note

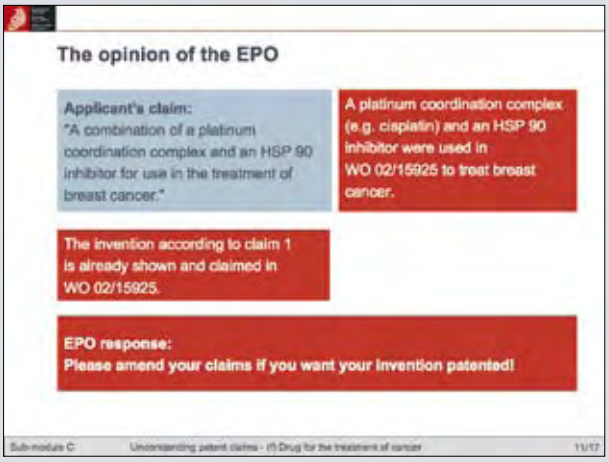
Claim 4 has the same wording as claim 3, but refers to claim 2! This means that claim 4 relates to a combination of the features of claims 1 and 2 and additionally states that the platinum coordination complex is oxaliplatin.

The prior art found by the EPO is in Chinese. Does this matter?

No, because the state of the art comprises everything made available to the public by means of written or oral description, by use or any other way before the filing date of the European patent application (Art.54(2) EPC). The language itself is not relevant.

Examples of prior art disclosure (provided they were made available to the public prior to the filing date of the European patent application):

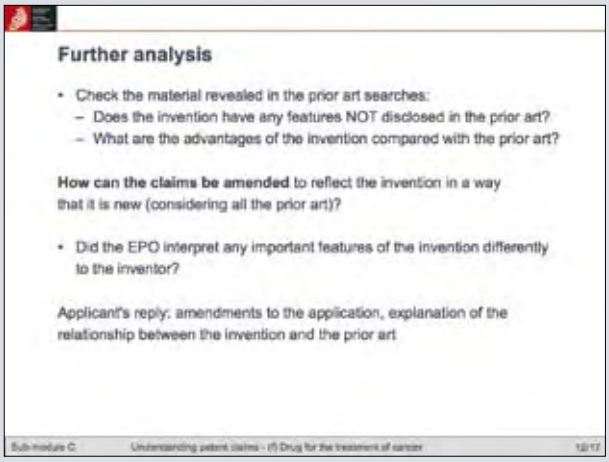
- a journal article written in Hindi
- a lecture to students at a university
- a presentation at a congress
- the marketing of a product
- a disclosure on the internet (provided the publication date can be proven beyond any doubt)
- a book



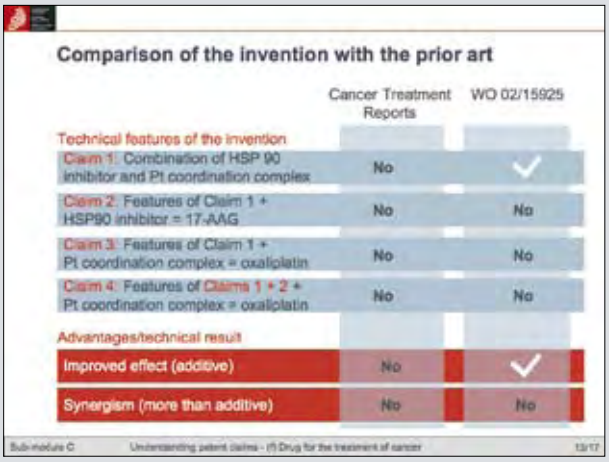
Examples which do not constitute prior art disclosure:

– a presentation given to a group bound by a confidentiality agreement (not public!)
– a journal article published four years after the filing date of the European patent application (not published before the filing date)

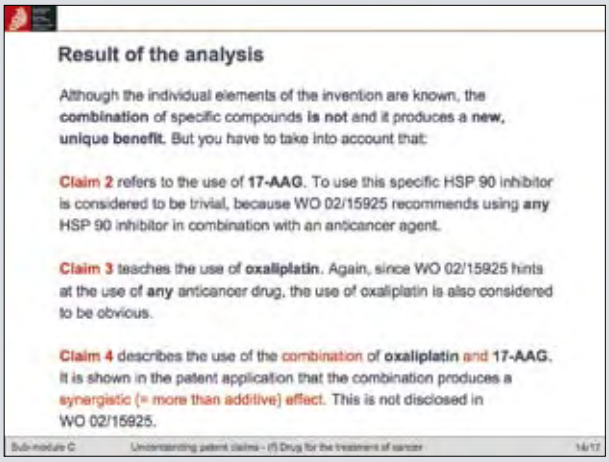
Comparison of the disclosure of the prior art document with the proposed claim(s).



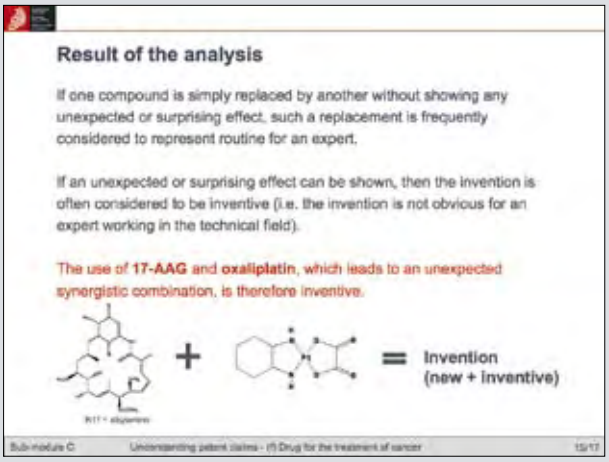
Questions to be asked by the applicant prior to filing an amended set of claims.



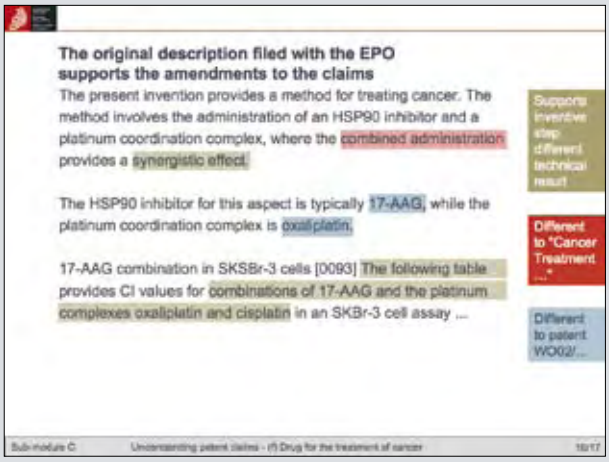
Although the subject-matter of claims 2-4 is novel, no inventive step can be found in claims 2 and 3.

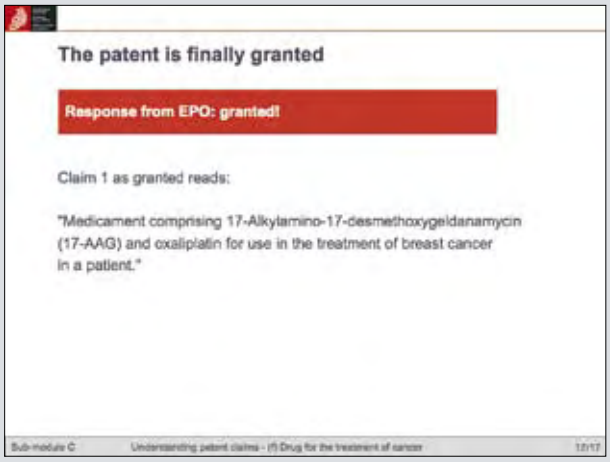


Comparison of the effects achieved by the subject-matter claimed with those of the available prior art.



Explanation of the inventive step.





Green: The European patent application must not be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC). In other words, all amendments must be based on the content as disclosed right from the filing of the patent application.
Example: Where a patent application relates on the date of filing exclusively to a composition for use in the treatment of breast cancer, it will not be possible during the examination procedure for this application to claim the composition for use in the treatment of headache.

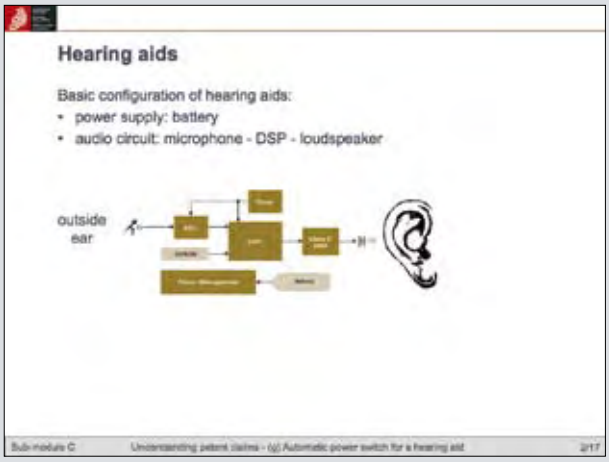
Final version of claim 1.

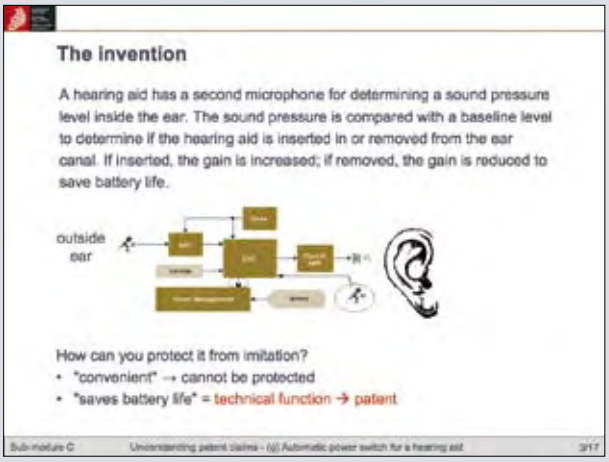
Red: Differences between the prior art document found by the patent attorney and the present patent application.

Yellow: Differences between the prior art document found by the EPO and the present patent application

Sub-module C
Understanding patent claims

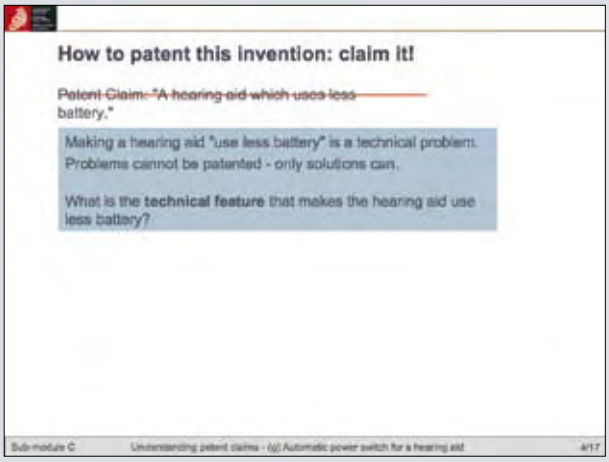
(g) Automatic power switch for hearing aid



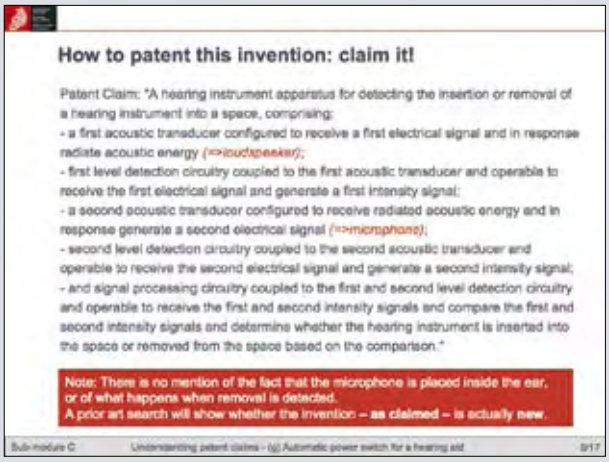


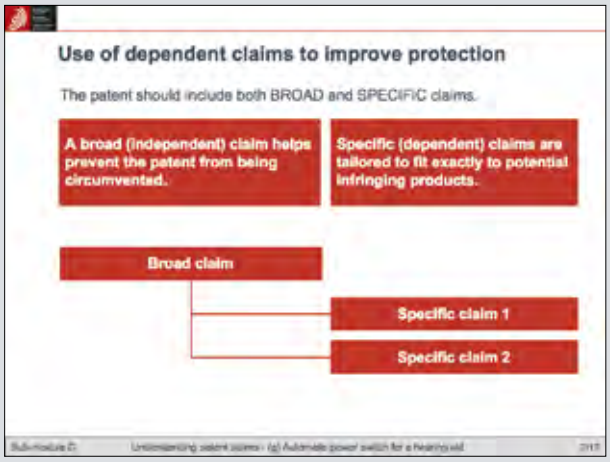
Note

While real patents have been used in this case study, the various steps in the procedure followed by the applicant/attorney have been adapted for the purpose of this presentation.


How to patent this invention: claim it!
Patent Claim: "A hearing aid which uses less battery."
Making a hearing aid "use less battery" is a technical problem. Problems cannot be patented - only solutions can.
What is the technical feature that makes the hearing aid use less battery?
Sub-module C
Understanding patent claims - (g) Automatic power switch for a hearing aid
4/17


How to patent this invention: claim it!
Patent Claim: "A hearing aid which detects the insertion or removal of the hearing aid into the ear, comprising:
- a loudspeaker;
- a level detection circuitry consisting of a bandpass filter and a level detector which receives the electrical signal input into the loudspeaker and generates an intensity signal;
- a microphone;
- another level detection circuitry consisting of a bandpass filter and a level detector which receives the electrical signal output from the microphone and generates another intensity signal;
- and digital signal processing circuitry coupled to both the level detection circuitries and operable to receive the two intensity signals and compare them and determine whether the hearing instrument is inserted or not into the ear."
Advantage: claim is precise and easy to understand.
Disadvantage: claim is so precise that the patent would be easy to circumvent, for example by replacing the bandpass filter and level detector by some other level-detection means.
Sub-module C
Understanding patent claims - (g) Automatic power switch for a hearing aid
5/17





Instead of defining the loudspeaker, microphone and corresponding circuits as such, patent jargon often defines features by giving them a number: **first** acoustic transducer, **first** signal, **second** detection circuit. This is a broad but clear way of describing the features, since they can be easily referred to without having to name each one precisely.

Claims are usually structured to include both broader, independent claims and more specific, dependent claims. The independent claim usually describes the invention in very general terms to allow a broad interpretation in infringement lawsuits. The dependent claims usually describe specific ways of realising the invention that the inventor regards as economically attractive. The dependent claims are often tailored to fit exactly how you would expect competitors to realise the product.

For example, an independent claim might read as follows: "A writing instrument comprising units a and b." A dependent claim could read: "The writing instrument of claim 1, characterised in that its length is between 10 and 15 centimetres."

Application filed with the EPO

CLAIM 1: As above.

CLAIM 2: "The hearing instrument system of claim 1, wherein the signal processing circuitry is further operable to **reduce a gain** associated with the first acoustic transducer upon detection that the hearing instrument is **removed** from the space."

CLAIM 3: "The hearing instrument system of claim 2, wherein the signal processing circuitry is further operable to **increase the gain** associated with the first acoustic transducer upon detection that the hearing instrument is **inserted** into the space."

The EPO will perform its own prior art search and then consider whether the invention AS CLAIMED is new and non-obvious.

Result of the prior art search

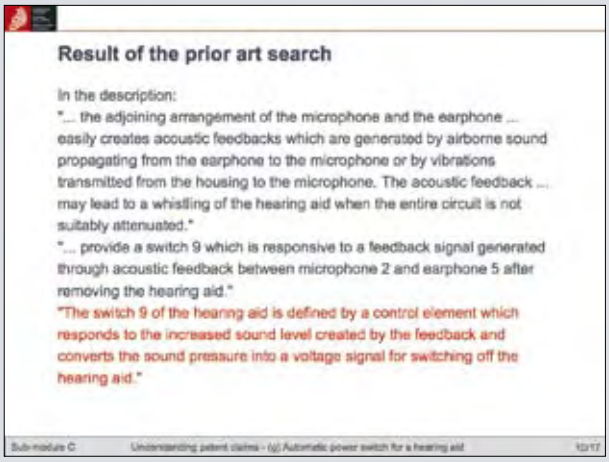
The search revealed US 4955729, "Hearing aid which cuts on/off during removal and attachment to the user", which discloses a similar invention.



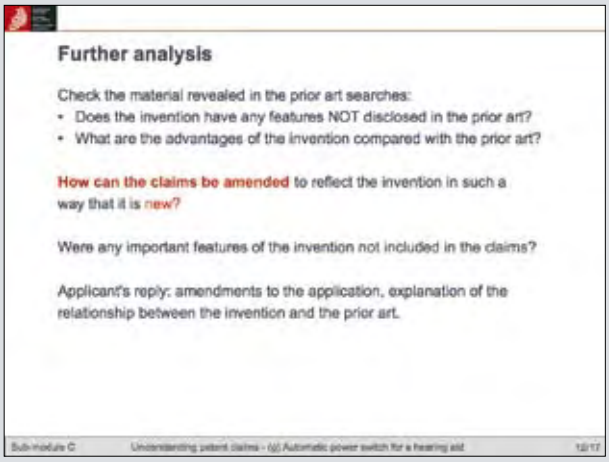
"The switch [is] responsive to switching criterion defined by a change of state."

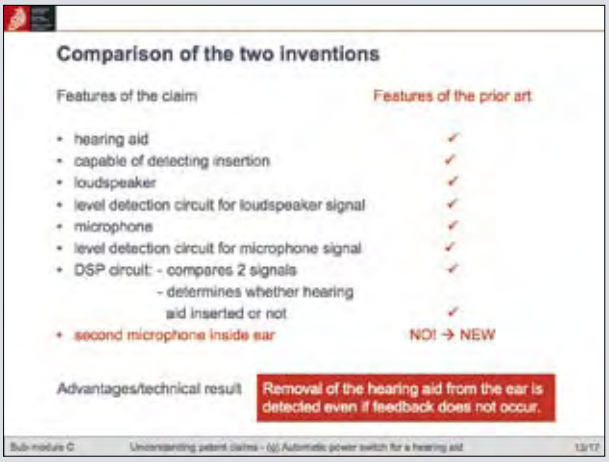


2: microphone; 5: earphone; 8 switch; 3: amplifier


Result of the prior art search
In the description:
"... the adjoining arrangement of the microphone and the earphone ... easily creates acoustic feedbacks which are generated by airborne sound propagating from the earphone to the microphone or by vibrations transmitted from the housing to the microphone. The acoustic feedback ... may lead to a whistling of the hearing aid when the entire circuit is not suitably attenuated."
"... provide a switch 9 which is responsive to a feedback signal generated through acoustic feedback between microphone 2 and earphone 5 after removing the hearing aid."
"The switch 9 of the hearing aid is defined by a control element which responds to the increased sound level created by the feedback and converts the sound pressure into a voltage signal for switching off the hearing aid."
Sub-module C
10/17


Comparison of the two inventions
Features of the claim
Features of the prior art
• hearing aid ✓
• capable of detecting insertion ✓
• loudspeaker ✓
• level detection circuit for loudspeaker signal ✓
• microphone ✓
• level detection circuit for microphone signal ✓
• DSP circuit: - compares 2 signals ✓
- determines whether hearing aid inserted or not ✓
EPO response:
All the features are present in the prior art. The patent as claimed is NOT new.
Please amend your claims if you want your invention protected!
Sub-module C
11/17

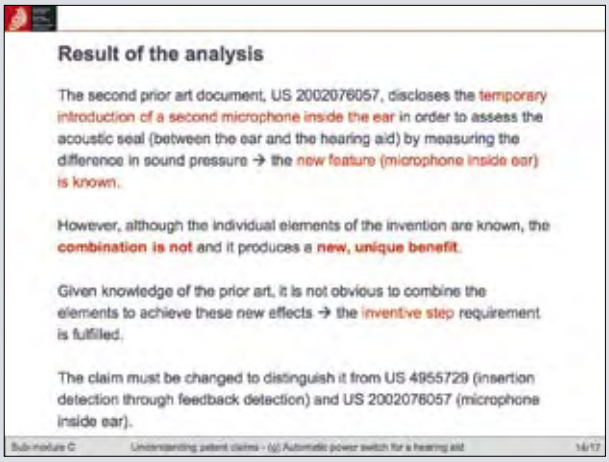


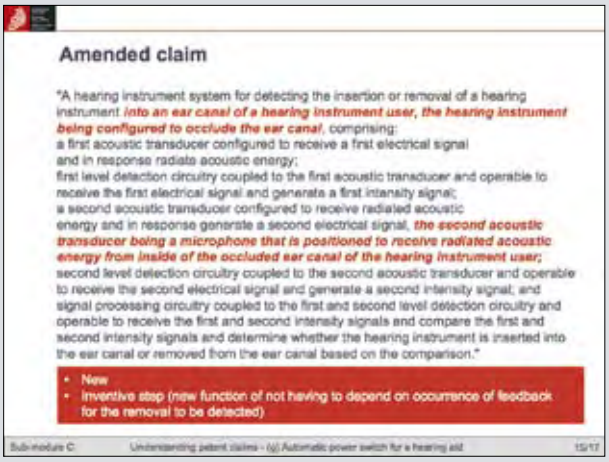


Note that the new problem (detection of the removal of the hearing aid from the ear without relying on the unpleasant occurrence of feedback) is different from the initial problem we wanted to solve ("use less battery").

This initial problem has already been solved by prior art document US 4955729.

Now the assessment of the non-obviousness (=inventive step) of the application is based on solving the above-mentioned new problem (removal detected without relying on feedback).

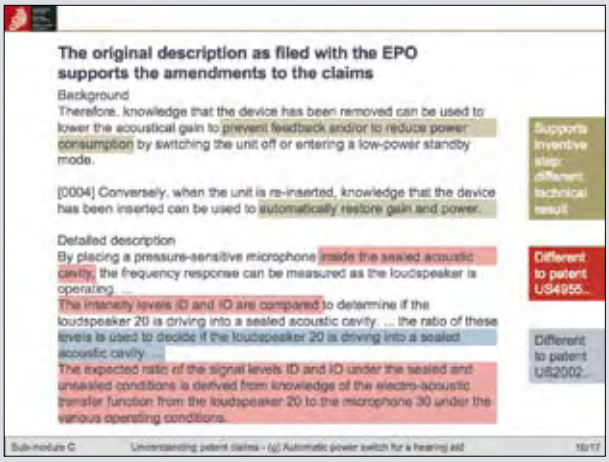




Note that there is no mention of what happens when insertion or removal is detected, except in the dependent claims.

The invention as newly claimed is novel with respect to the prior art, and is not obvious vis-à-vis the prior art, in that it solves the new problem (detect removal without relying on feedback) in a non-obvious way.

The addition of the feature of reducing the gain when removal is detected would restrict the claim too much, and the inventor would not have protection for all aspects of his invention.


The original description as filed with the EPO supports the amendments to the claims
Background
Therefore, knowledge that the device has been removed can be used to lower the acoustical gain to prevent feedback and/or to reduce power consumption by switching the unit off or entering a low-power standby mode.
[0004] Conversely, when the unit is re-inserted, knowledge that the device has been inserted can be used to automatically restore gain and power.
Detailed description
By placing a pressure-sensitive microphone inside the sealed acoustic cavity, the frequency response can be measured as the loudspeaker is operating. ...
The intensity levels ID and IO are compared to determine if the loudspeaker 20 is driving into a sealed acoustic cavity. ... the ratio of these levels is used to decide if the loudspeaker 20 is driving into a sealed acoustic cavity. ...
The expected ratio of the signal levels ID and IO under the sealed and unsealed conditions is derived from knowledge of the electro-acoustic transfer function from the loudspeaker 20 to the microphone 30 under the various operating conditions.
Supports inventive step: different technical result
Different to patent US4955...
Different to patent US2002...
Sub-module C
Understanding patent claims - (g) Automatic power switch for a hearing aid
16/17


The patent is finally granted
Response from EPO: granted!
EP 1 465 454 A2
EUROPEAN PATENT APPLICATION
H04R 25/00
Sub-module C
Understanding patent claims - (g) Automatic power switch for a hearing aid
17/17

Impressum

Published and edited by
European Patent Office
Munich
© EPO 2009

Responsible for content
European Patent Academy – Academia & IP Research unit
External authors:
Duncan Matthews (Core module 2)
Nils Omland (Core module 1, Sub-module A, Sub-module C/a)
Terry Pollard (Sub-module B)
EPO authors:
Ernst Bendl (Sub-module C/f)
Isabelle Brandt (Sub-module C/g)
Roland Feinäugle (Sub-module A)
Lisa Imbernon (Sub-module C/e)
Luis Rodríguez (Sub-module C/c)
Nils Untermann (Sub-module C/d)
Ekkehard Weinberg (Sub-module C/b)

Concept and co-ordination
European Patent Academy – Academia & IP Research unit

Design
EPO Graphic Design Munich

Photos
Cover: Getty Images
All other: EPO or Getty Images

Printing
Mediahaus Biering GmbH
München

CD production
CMS Compact Media Service GmbH
Bamberg

The patent teaching kit is a product of the European Patent Academy.
You can obtain a copy of the kit by
– downloading it from the European Patent Office website at
  www.epo.org/teaching-kit
  or
– ordering a hard copy from ProTon Europe – the European knowledge transfer association at
  44 rue des Palais
  1030 Brussels
  Belgium
  Tel. +32 (0) 2211–34 32
  sg@protoneurope.org
  www.protoneurope.org