

Research collaboration, IP protection and the basics of university technology transfer

How to create (commercial) value from university research?



Tamás Bene

Head, Center for Research Commercialization and Technology Transfer

University of Debrecen

Heart-Lung Machine

Bubble Gum

Hepatitis B Vaccine

Insulin

Penicillin

Ultrasound

Barcode

Drunk-O-Meter

Electron Microscope

Rocket Fuel

The @ sign in email address

LASER Cataract Surgery

Saccharin

Recombinant DNA
Technology

Color TV

Seat belt

Google

Plexi-glass

Blood Preservation

Fluoride

Toothpaste

Pacemaker

Vitamin D
Fortification



LCD

MRI Scanner
and Technology

Electronic Computer

HPV Vaccination



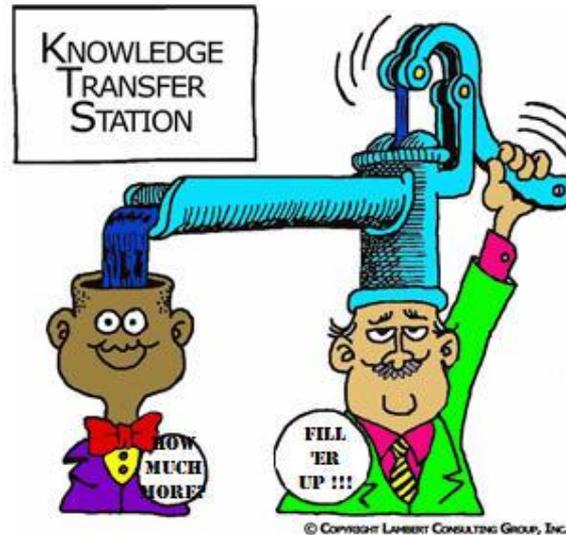
List of US university drugs licensed (part)

<u>Generic Name</u>	<u>Brand Name (Indication)</u>	<u>Assignee</u>	<u>Current Marketer</u>	<u>Type of Patent(s)</u>	<u>Type of Approval</u>
<u>Small Molecule Drugs (93)</u>					
abacavir sulfate	Ziagen	U. of Minnesota	GlaxoSmithKline	Sy, C	1P,3P
abacavir sulfate; lamivudine	Epzicom	Emory University/U. of Minnesota	GlaxoSmithKline	Sy, C, Tr	3S
abacavir sulfate; lamivudine; zidovudine	Trizivir	Emory University/U. of Minnesota	GlaxoSmithKline	Sy, C, Tr, F	3P
abarelix	Plenaxis	Indiana University	Specialty European Pharma	C, Tr	1P
adenocine	Adenocard	U. of Virginia	Astellas Pharma Inc.	Tr	1P
alitretonin topical	Panretin	Salk Institute/Baylor College of Medicine	Eisai	Tr	1P
amifostine	Ethyl	Southern Research Institute	AstraZeneca	C	1P
amphotericin B	Abelcet	U. of Texas	Enzon Pharmaceuticals	C, Tr	2P
arsenic trioxide	Trisenox	Sloan Kettering	Cephalon	Tr	1P
bexarotene	Targretin	SRI International/La Jolla Cancer Research Foundation/Salk Institute	Eisai	C	1P,3P
bortezomib	Velcade	National Institutes of Health	Takeda	Sy, C	1P
busulfan	Busulfex	U. of Texas/U. of Houston	Otsuka Pharmaceuticals	Sy, C, Tr	3P
butorphanol tartrate	Stadol	U. of Kentucky	Bristol-Myers Squibb	F	3S
calcefidol	Calderol	Wisconsin Alumni Research Foundation	Schering-Plough	C	1S
calcitriol	Calcijex	Wisconsin Alumni Research Foundation	Abbott	C	3S
calcitriol	Rocaltrol	Wisconsin Alumni Research Foundation	Fontus Pharmaceuticals	C	1P,3S
carboplatin	Paraplatin	Michigan State University	Bristol-Myers Squibb	C, Tr	1P,3S
carmustine	Gliadel	MIT	Eisai	Sy, C	3P
cinacalcet hydrochloride	Sensipar	Brigham & Women's	Amgen	S, C, Tr	1P
cisplatin	Platinol	Michigan State University	Bristol-Myers Squibb	Tr	1S
cladribine	Leustatin	Brigham Young/Scripps	J&J	Sy, C	1P
clofarabine	Clolar	Sloan-Kettering/Southern Research Institute	Genzyme	C, Tr	1P
colfosceril palmitate, cetyl alcohol, tyloxapol	Exosurf	U. of California	GlaxoSmithKline	C, Tr	1P
cyclosporine ophthalmic	Restasis	U. of Georgia	Allergan	Tr	3P, 3P

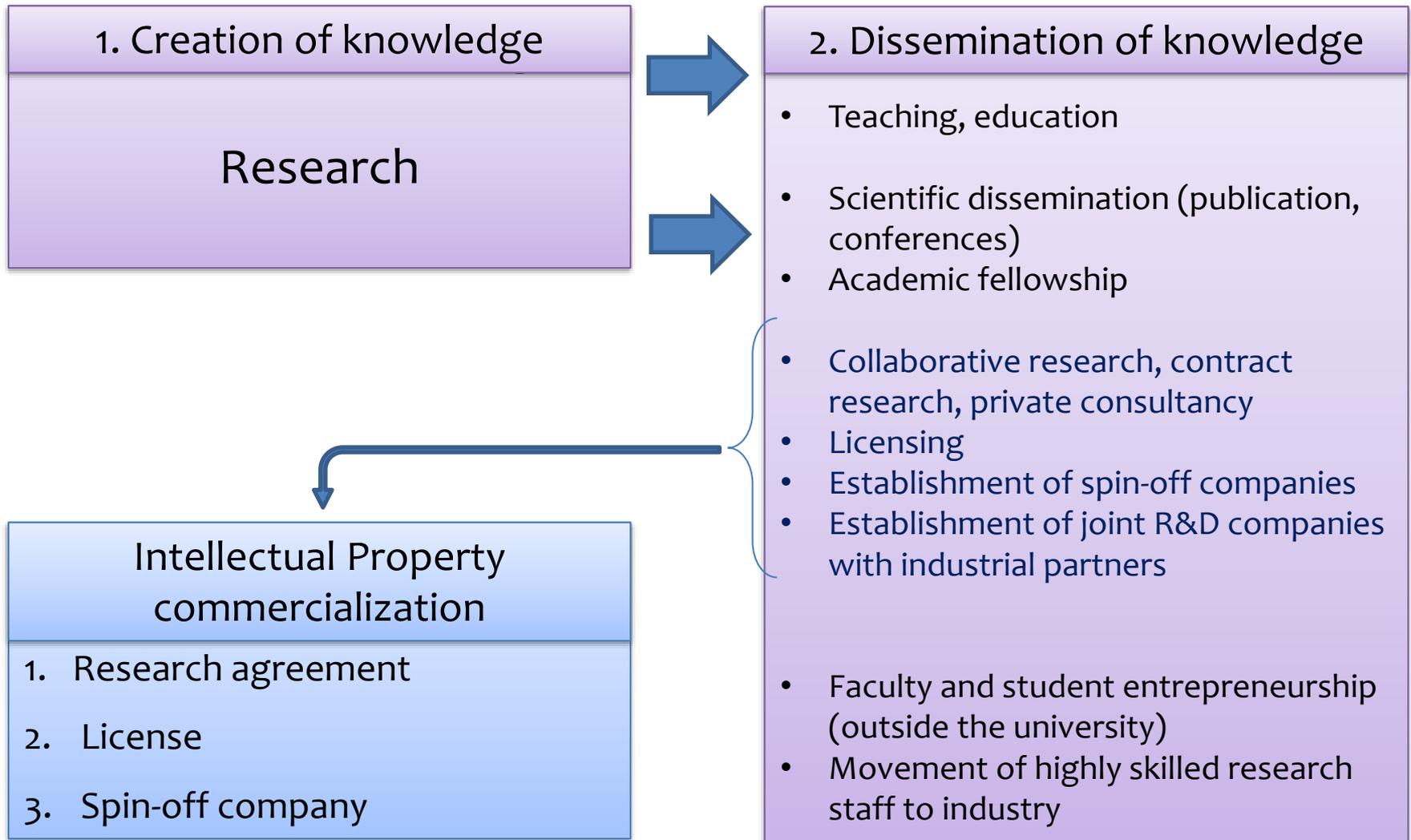


What is knowledge transfer?

Knowledge transfer is the **process of transferring** skill, knowledge, technologies, methods of manufacturing, samples of manufacturing and facilities **among public institutions and business entrepreneurs** to ensure that scientific and technological developments are **accessible** to a **wider range of users** who can then further develop and exploit the technology into new products, processes, applications, materials or services.



Knowledge transfer routes



What is intellectual property?

Intellectual property is a type of property that results from creations of the **human mind**, the **intellect**.



IP is protected in law by, for example, patents, copyright and trademarks, which enable people to **earn recognition** or **financial benefit** from what they invent or create.

Overview of IP protection

Type of protection

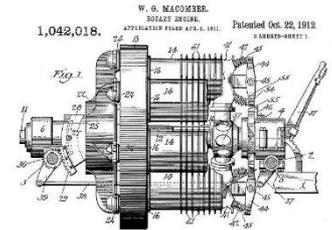
Subject of protection

How?

Patent

New inventions

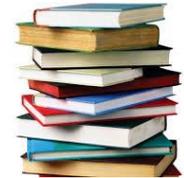
Application and examination



Copyright

Original creative or artistic form or expression

Exists automatically



Trademark

Distinctive identification of products or services

Use and/or registration



Design

External appearance

Registration



Know-how

Valuable information not known to the public

Reasonable efforts to keep secret



Principles of the early patent system

- The Crown granted a monopoly right for a limited term in return for a public benefit
- The monopoly period allowed time for the inventor to recover costs, further develop the invention and get some reward and recognition for their efforts
- Without a monopoly period the economic benefits mostly flow to imitators and followers thereby discouraging further invention and creativity
- At the end of the monopoly period the invention becomes freely and publicly available for use by anyone



The "social contract" implicit in the patent system

Reveal
invention...



...get
exclusivity...



... so that other can learn
from it and further
improve it.

Why to protect intellectual property?

Economical reasons: to ensure economic benefits for the creators and to facilitate the growth of industry and culture

Moral reasons: to give official recognition to the creators (e.g. the right to be mentioned in patent documents as an inventor)

Social interest: to create repositories of vital information (e.g. patented inventions will become public after the lapse of protection)

IP protection

- facilitates the development of technology and science
- strengthens creativity and inspires business attitude
- creates safe legal environment for creative activities.



Intellectual property protection

Industrial Property Rights

- Patent
- Plant variety
- Utility model
- Trademark
- Geographical indication
- Design

Know-how

Confidentially held (technical, economic, organizational or other type of) information, which has an economical value.

Also referred to as tacit knowledge or trade secret.

Copyright

Each production in the literary, scientific and artistic domain, whatever may be the mode or form of expression.

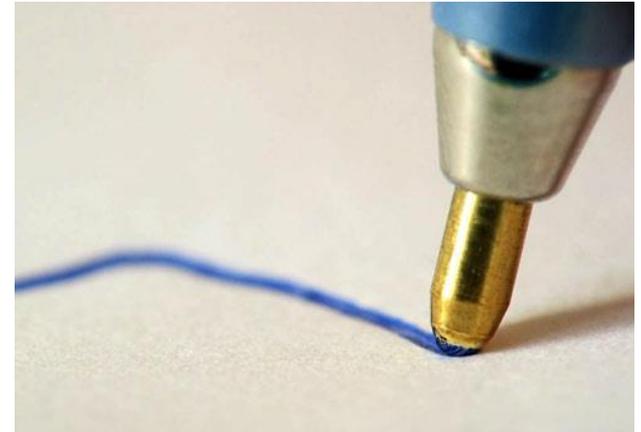
It protects the expression of thoughts, the works (products) of human intellectual creativity.

Patent protection

An **invention** must

- be new (novel),
- involve an inventive step,
- be capable of industrial application

in order to be **patentable**.



Exceptions:

- Discoveries (things that exist in the nature)
- Machines that defy the laws of nature
- Scientific theories or mathematical methods
- Schemes, rules or methods
- Business plans, principles of games, etc.
- Methods of medical treatment for humans or animals or diagnostics methods (but the products used in the diagnosis and the treatment could be patented)



Biotech inventions

- Product containing or consisting of biological material.
- Process by means of which biological material is produced, processed or used.



Biological material means any material containing genetic information which is capable of reproducing itself or being reproduced in a biological system.

Biological material which is isolated from its natural environment or produced by means of a technical process may be the subject of an invention even if it previously occurred in nature.

Exclusion:

- Methods of medical treatment for humans or animals or diagnostics methods (but the products used in the diagnosis could be patented)
- Plants and animals other than micro-organisms



Biotech inventions

Non-patentable:

- (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.



Inventorship and ownership

Inventor: the person who has created an invention

Moral rights, e.g.: the right to be mentioned as such in the patent documents.

Patent owner (patentee or holder of the patent): the person who has the right to patent. The owner has the economical rights of the patent, the exclusive right to exploit the invention.

The right to a patent shall belong to the inventor or his successor in title.

If two or more persons have created an invention independently of each other, the right to the patent shall belong to the inventor, or his successor in title, who filed the application with the **earliest date of priority**, provided that this first application is published or its subject matter is granted patent protection.



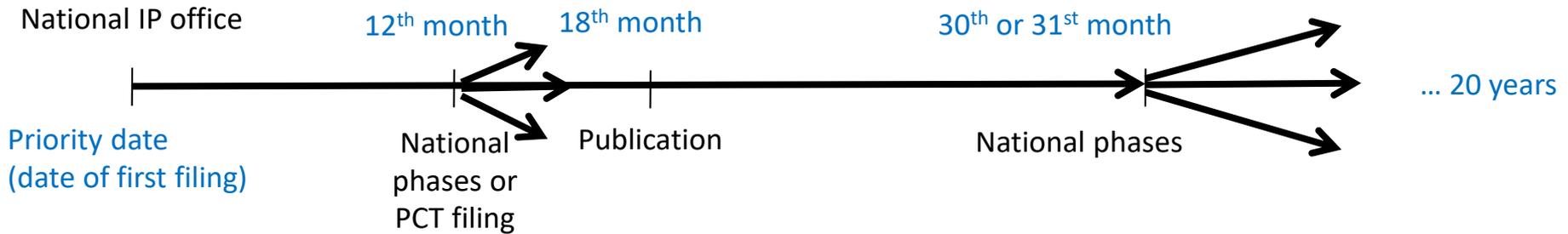
Inventorship and ownership

Service invention: is an invention made by a person who, by reason of his employment, is under the obligation to develop solutions in the field of the invention.

The right to a patent for a service invention shall belong to the employer as successor in title to the inventor! The inventor shall be entitled to remuneration.



Typical phases of an international patent application



Main characteristics of the patent prosecution:

- Shall be valid for **20 years from the filing date** of the patent application (only in those countries where the patent is granted – territorial right).
- Application fee, examination fee and annual fees (maintenance fee) have to be **paid**.
- Before the examination phase the patent office prepares a **search report** and discloses the documents which are considered to be prior art.
- During the examination phase the applicant has the obligation to **reply the office actions** and modify the claims in case of need.
- Often takes 3-7 years to obtain a **granted patent**.

Patenting – international agreements

Paris Convention (1883) - 177 member states:

- established the basics of the industrial property rights
- introduced the principle of equality
- provided for the right of priority (12 months).

Patent Cooperation Treaty (1970) - 152 member states:

- PCT will not grant patent
- it facilitates applying for and obtaining patent in a large number of countries
- international phase followed by national phase(s)

European Patent Convention (38 member states)

- A patent can be obtained through one procedure in the member states.
- Proper translations of the patent application must be filed after granting the European patent where it is required (London Agreement).



The scope of a patent

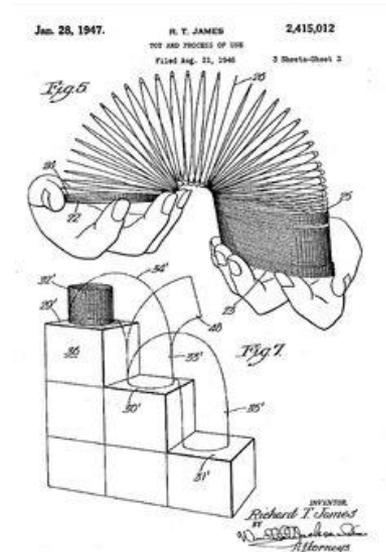


The scope of protection conferred by a patent is determined by the **claims**. The claims are interpreted on the basis of the description and the drawings.

- Patent protection shall cover any product or process in which **all the characteristics** of the claim are embodied.

Drafting a patent application

- Clear and detailed description
- Claims (at least one)
- Abstract
- Drawings



The description is sufficiently clear and detailed if a **person skilled in the art** is able to carry out the invention on the basis of the description and the drawings.

The patent system

In return for **public disclosure**, specifying the best mode of carrying out the invention, (public benefit)...

... you get the **right to exclude** others from practicing, commercially, the invention described in the claims (monopoly right)...

- including making, using, offering to sell, selling, or importing
- but only in the countries you have specified

... for a **period of 20 years** from filing date (limited term).

The exclusive right of exploitation **does not cover** a number of acts including:

- those done privately and for non-commercial purposes
- those done for experimental purposes.



The patent system

The patent ensures legal protection for the invention against competitors acting on the same field of technology and business.

The patent holder will have the right to license the patent and take infringement actions against infringers.



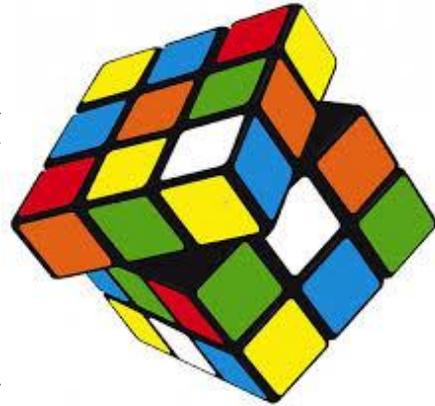
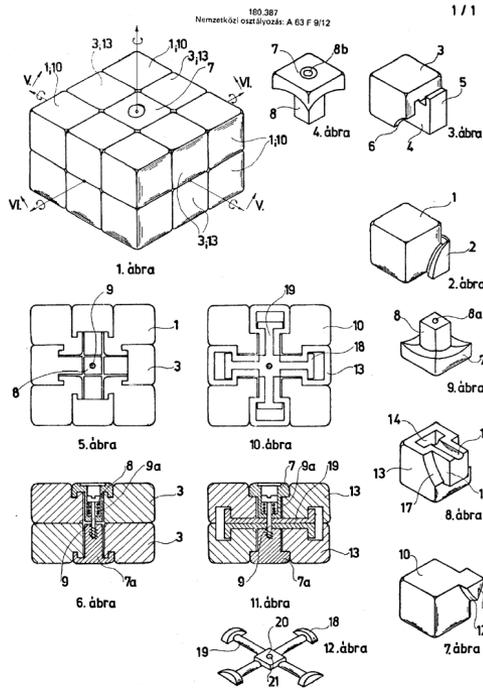
Patents in the economy

Patents can foster the economical development:

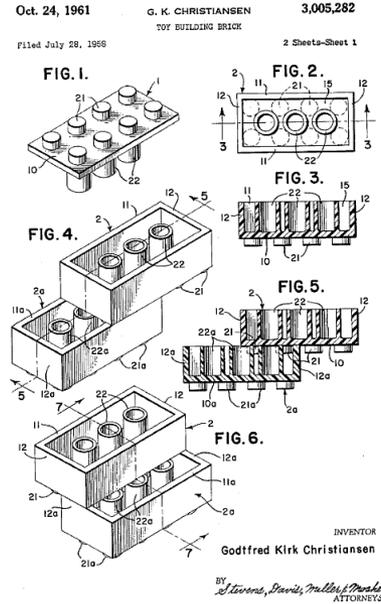
- public patent information facilitate technology transfer and investments
- patents may foster R&D activity at universities and research institutions
- patents may be catalysts of business development.



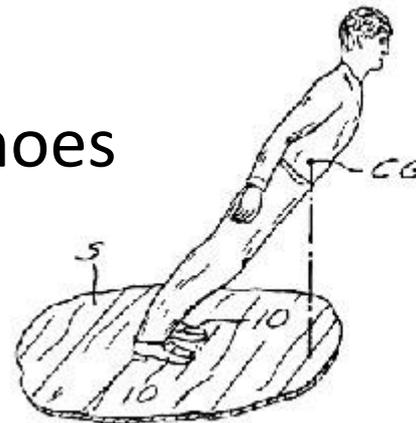
Rubik's cube



Lego



Magic shoes



**SZABADALMI
LEÍRÁS**

180387



ORSZÁGOS
TALÁLMÁNYI
HIVATAL

Nemzetközi osztályozás:
A 63 F 9/12



Bejelentés napja: 1980. X. 28. (2598/80.)

Elsőbbsége:

Közzététel napja: 1982. VI. 28.

Megjelent: 1986. X. 30.

Feltalálói(k): **Rubik Ernő, okl. építézmérnök, egyetemi adjunktus, Budapest**

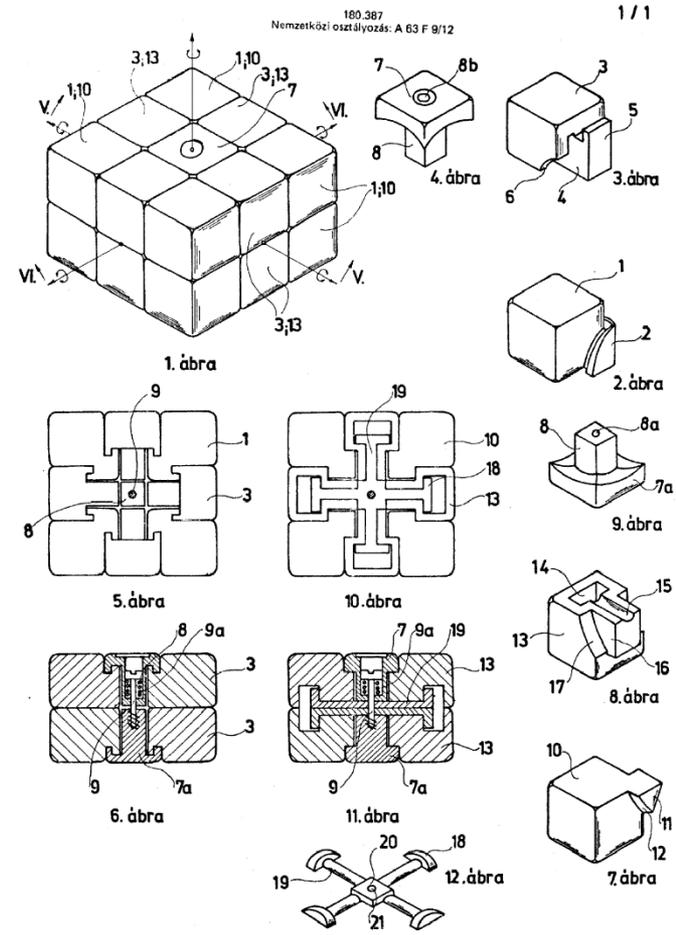
Szabadalmi:

Térbeli logikai játék

leírás

rajz

1. Térbeli logikai játék, amelynek adott számú játékeleme a logikai játék geometriai középpontjából kiinduló tértengelyek körül elforgatható módon van kialakítva, azzal jellemezve, hogy két, egyenként kilenc darab játékelemből /1, 3, 7, 10, 13/ álló sorban elhelyezkedő összesen tizennyolc játékeleme van, amelyeknek első és második csoportjába tartozó nyolc-nyolc játékelem /1, 3, 10, 13/, illetve a harmadik csoportba tartozó, kapcsolóelemként szolgáló két játékelem /7, 7a/ csoportként egymással azonos kialakítású idomtesttel van ellátva, továbbá hogy ezen idomtesteket egymással és a kapcsolóelemekkel összeillesztve, a játékelemek /1, 3, 7, 10, 13/ egységes egész, szabályos vagy szabálytalan testet alkotnak, amelynek rögzítésére egyetlen, rugóval /9a/ ellátott csavar /9/ szolgál.



A találmány tárgya térbeli logikai játék, amelynek adott számú játékeleme a logikai játék geometriai középpontjából kiinduló tértengelyek körül elforgatható módon van kialakítva.

Térbeli logikai játékok már ismertek. Így például a 170.062 lajstromszámú magyar szabadalmi leírás - a feltaláló azonos a jelen bejelentés feltalálójával - olyan térbeli logikai játékot ismertet, amelyet huszonhét téridom alkot, és ezek összeépítve kockát képeznek. A játékelemeket - kiskockákat - nagykocka geometriai középpontjában elhelyezkedő kapcsolóelemek segítségével lehet a nagykocka tértengelyei körül elforgatni. A nagykocka egy-egy felületét alkotó játékelemek külső lapfelületén számok, ábrák, színek vagy egyéb szimbólumok vannak, amelyeket a nagykocka egy-egy lapfelületét képező kilenc játékelem együttes, egyszerre történő forgatásával lehet előre meghatározott logikai sorrendbe rendezni.

Ismeretes az 55-3956 közrebocsátási számú japán szabadalmi leírásból olyan forgatható kiskockákból összeállított kocka-alaku játék, amelynél a nagykocka lapjain elhelyezkedő 9-9 darab kiskockalapot forgatással lehet úgy összerendezni, hogy egy-egy nagykockalap azonos színű kiskockalapot tartalmazzon. A játék elve tehát azonos az említett 170.062 sz. magyar szabadalomban leírt térbeli logikai játékéval, vagyis itt is a nagykocka bármelyik tértengelyére merőlegesen, kilenc kiskockából álló kockasor egyszerre, együtt forgatható el ezen tértengely körül, ugyanakkor a nagykocka lapjainak közepén lévő kiskockák - összesen hat darab - nem változtatják helyüket, csupán elfordulnak a tértengely körül.

4 lessons from the story of Rubik's cube:

- 1) Patent protection is only one possible tool amongst many for business successes.
- 2) Although, there are other tools to protect the intellectual capital, there is no real alternative to patent protection.
- 3) It is crucial how broad and effective protection can be obtained.
- 4) If we can obtain the protection at all, it is important how and where to obtain it.



Patent documents, databases:

- World Intellectual Property Organization: (PatentScope)
- European Patent Office: Espacenet
- USPTO database
- Google Patents



Protection of plant varieties

- It provides legal protection for breeding varieties (hybrids, lines, clones, etc.).
- Varieties of all botanical genera and species may form the object of plant variety protection.
- Plant variety protection shall confer on the holder of plant variety protection the exclusive right to exploit the variety, moreover, to grant permission to others.
- Plant variety protection shall have a term of 25 years or, in the case of vines and trees, a term of 30 years, from the date of the grant of the protection.
 - Community plant variety application is also possible.



The definition of trademark

- Trademark is basically a sign that is used to distinguish the goods or services offered by one undertaking from those offered by another.

Functions of a trademark

- Distinctive function (to distinguish goods and services from other goods and services),
- Linking function (between the goods and its manufacturer, and the service and its provider),
- Quality marking function (to maintain high quality trademarked goods),
- Advertising function (as a compressed, symbolic display of information about the goods),
- Function to transfer knowledge and know-how, in addition, trademark licensing

Trademark protection

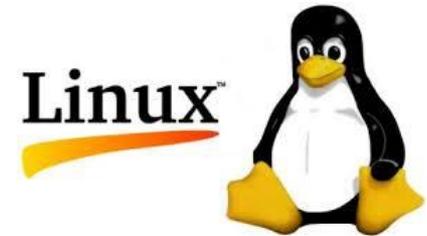
Trade mark protection shall be granted for any signs **capable of being represented graphically** provided that these are capable of distinguishing goods or services from those of other undertakings.

Especially:

- words, combination of words, including personal names and slogans,
- letters, numerals,
- figures, pictures,
- two- or three-dimensional forms, including the shape of goods or of their packaging,
- colors, combination of colors, light signals, holograms,
- sound signals,
- as well as the combination of the above.

Classifications:

- 45 Classes – The Nice Classification
- The trademark covers the goods or services from the list
- 1-34: products, 35-45: services



Trademark protection II.

- Any natural or legal person or a company without legal personality, irrespective of pursuing economic activities, may apply for trade mark protection.
- Term of trademark protection: **10 years**, can be renewed for further 10 years.
- Trade mark protection shall confer on its holder **the exclusive right** to use the trade mark or to grant permission to someone else (license).
- **International** protection: Through the European trademark application or under the Madrid Agreement.
- Any person who unlawfully uses a trade mark in contravention of the provisions of the Act, commits trade mark infringement. The holder may recourse civil remedies such as to request that the fact of infringement be declared by the court; or he may request an injunction that the infringer cease his infringement or any acts directly threatening with it.



Industrial design

Criteria: a **new** and **individual** design

Design: the appearance of the whole or part of a product resulting from the external characteristics or its decoration.

- It guarantees the legal protection of the external form of industrial products.
 - The protection can create or strengthen the market position of the owner.
-
- The term of protection is typically for **5 years** with the possibility of **renewal for four times**.
 - **Twenty-five years** after the date of filing, the protection can not be renewed.



Geographical indication

- An important method of indicating the origin of goods and services
- Duration of protection: unlimited

Types of it:

Geographical Indication:

- Indicates the landscape, country
- the product processed and produced there
- special quality or reputation
- **comes from the geographical origin**

Eg.: Tokaji wine, Szatmári plum, Makói onion, Kalocsa paprika, Cognac

Origin Designation:

- Indicates the landscape, country
- the product processed and produced there
- special quality or reputation
- **Consequence of natural and human factors**

Eg.: Herendi majolica, Hollóházi porcelain, Cuban cigars, Greek feta, Roquefort cheese, Mexican tequila

Geographical indications can be used as a strategic tool for advertising regional and national businesses.



Intellectual property

Industrial Property Rights

- **Patent**
- Plant variety
- Utility model
- Trademark
- Geographical indication
- Design

Know-how

Confidentially held (technical, economic, organizational or other type of) information, which has an economical value.

Also referred to as tacit knowledge or trade secret.

Copyright

Each production in the literary, scientific and artistic domain, whatever may be the mode or form of expression.

It protects the expression of thoughts, the works (products) of human intellectual creativity.

Copyright



Copyright works include:

- books
- lectures
- dramatic works
- musical compositions
- movies
- photos
- drawings, paintings
- architecture
- illustrations
- databases
- software.

Every production in the literary, scientific and artistic domain, whatever may be the mode or form of expression.

Copyright works are protected automatically from the time of their creation, no formal requirements are specified and no registration is needed.

Works are protected by the fact of their creation.



Copyright

The **author** of the concerned work shall be the **owner** of the copyright.

Copyright protection lasts for **70 years** (in the European economic area) from the end of the year in which the author died.

The owner of the copyright in a protected work may use the work as he wishes, and may **prevent others** from using it without his authorization.

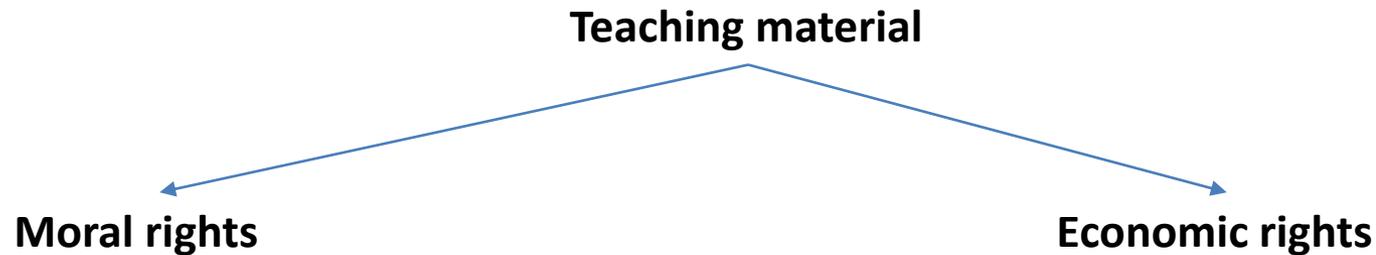
Moral rights allow the author to take certain actions to preserve the personal link between himself and the work.

Economic rights allow the owner to derive financial reward from the use of her/his works by others.

Copyright includes:

- the right of reproduction
- the right of performance, broadcasting and communication
- the right of adaptation and translation.

Example for the transfer of copyright



Cannot be transferred!

- The right to claim the status of author of the work and to have that authorship recognized.
- The right to have your name mentioned.
- Rights of respect, including the right to object to the work being distorted or used in a way which may destroy the reputation of the author.

- Full or partial assignment
- Rights for distribution, reproduction, translation, adaptation
- Assignment may be limited either by
 - territory
 - period
 - scope of use.

Software protection

What does copyright protect? – The expression modes derived from the author's creativity.

What copyright **does not** protect:

- the idea behind the software
- procedures, modes of operation, mathematical concepts
- algorithms
- the functionality of the program
- programming language
- the format of the data files

What **cannot** be patented in Europe? – The computer program itself.

What can be patented in Europe? - Computer-implemented inventions.

The implementation of these inventions involves the use of a computer, computer network or other programmable device. One or more features of them are realized through a computer program.

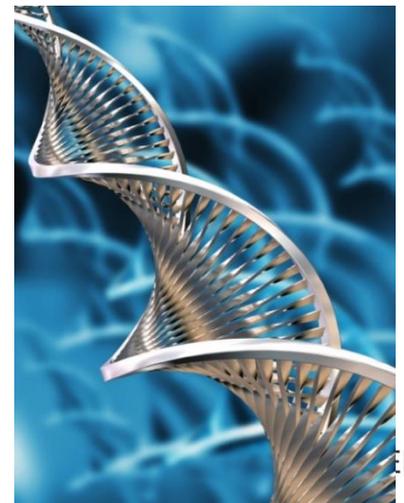
To keep it as a secret(know-how): through a closed source code or using a confidentiality contract.



Know-how

A know-how or trade-secret may be defined as:

- it is information
 - it is confidential
 - there is intent to keep it secret
 - it has industrial, financial or trade application
 - it has economic value.
-
- No registration or other administrative procedure is needed for the protection.
 - Confidentiality gives value to the know-how.
 - Tradable right.



The importance of intellectual property (IP) management at universities

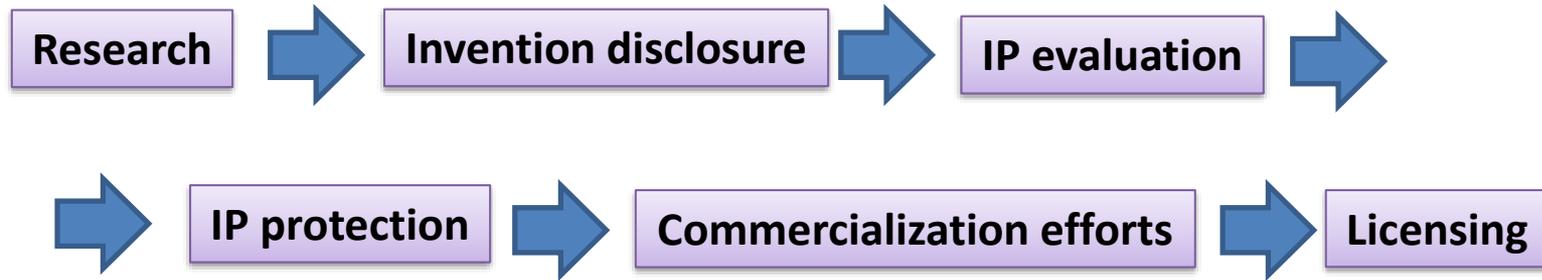


Essential goals of university technology transfer activity

- Getting results from public research **beneficial to the society**.
- Transfer research results to **industry**.
- **Improve funding opportunities** for the university and the researchers.
- Provide framework to the institution and the researchers for **carrying out research** with third parties.
- And maybe generate some **income** to the university and the researchers – however this is not the primary goal.



Main stages of IP management



This process has to be managed by technology transfer professionals.

How to avoid public disclosure before obtaining IP protection?

Early disclosure may compromise the protection and commercialization of Intellectual Property.

Examples for public disclosure:

- *Publishing anything - e.g. an abstract or scientific journal article*
- *Giving a talk or poster presentation at an “open” meeting outside the University*
- *Talking with external parties about the innovation (without having a Confidential Disclosure Agreement in place)*
- *Transferring scientific materials (without the use of a Material Transfer Agreement)*
- *Submitting grant progress reports, which are accessible to the public*
- *Posting or publishing a student thesis (under some circumstances), even if nobody ever actually reads it*
- *Conducting classroom presentations, including distributing handouts*
- *Presenting at department seminars*

Always consider the consequent impacts of any public disclosure!



How to avoid public disclosure before obtaining IP protection?

Activities which may be performed without jeopardizing the patenting:

- *Lab and faculty meetings attended by University employees only*
- *Confidential submissions for publications. These remain confidential prior to acceptance by publishers.*
- *Generally the submission of project proposals for grant applications (however it is advised to review the rules of submission).*

Confidentiality agreement

In a non-disclosure agreement two parties agree that they will not disclose each other's confidential information. In general, confidential information is defined as the information, owned by a party, which is not publicly accessible.

Material Transfer Agreement (MTA)

An MTA regulates on the exchange of research materials between laboratories. These agreements stipulate:

- who is liable when material is misused or damaged;
- which party will own the rights to the results obtained by the use of the material and/or which party will have the rights to commercially use such results.



Decision on whether to invest in the intellectual property

Launching protection and exploitation is basically a **business decision**, therefore proper scientific and economical **evaluation** is critical.

Main questions:

- **Is your idea protectable?**
- **Is the patent protection on your idea enforceable?**
- **Is your innovation commercially exploitable (licensable)?**

As an inventor you have to give **reasonable assistance** in evaluating, protecting and commercially exploiting the Intellectual Property by providing information, attending meetings and advising on further development.

The university might:

- Accept and approve the invention disclosure
- Release it back to the inventors
- Suggest to further develop to gain commercial value



Typical routes for exploitation

1. Research contract
2. Patent (know-how) assignment
3. License
4. Spin-off or start-up company
5. Consultancy agreement



License or spin-off strategy

- 1. License strategy:** license the technology to an existing business.
- 2. Spin-off strategy:** create a new company and contribute the technology to the spin-off in exchange for equity and royalty payments.



One-pagers

University of Debrecen

Methodology and bed-side kit for measuring the plasminogen activator activity in tear fluid to predict elevated risk for haze after photorefractive keratectomy

InnoTears Ltd., a spin-off company of the University of Debrecen, has developed a bed-side kit which can measure plasminogen activator activity in tear fluid to predict elevated risk for haze after photorefractive keratectomy. The University of Debrecen has acquired the owner rights of the patent application and now it is seeking for partners to utilize the invention.

Background

Some fraction of patients who have laser vision correction develop haze (cloudy vision) and may experience halos, glare and starbursts several months after the surgery: about 1% to 10% of both photorefractive keratectomy (PRK) patients and laser-assisted sub-epithelial keratectomy (LASEK) patients. Haze is a form of light scattering that occurs in the post-surgical wound healing region of the cornea.

At present there is no pre-surgical predictor for the potential formation of these visual aberrations, nor a preventative to eliminate the problem.

Both in rabbit and human eyes with normal wound healing, plasminogen activator activity (PAA) becomes elevated in tears above the preoperative level on the third postoperative day, and then returns to normal by the fifth postoperative day. In contrast, PAA activity remains low through the third postoperative day in all eyes in which haze developed after 3 to 6 months post-operatively. Thus the extended low levels of PAA through the third postoperative day correlate with the development of post-PRK haze.

Invention and technology

InnoTears Ltd, a spin-off of Debrecen University, has developed a bed-side kit which can measure PAA in the

tear fluids in less than 30 minutes, thus can identify:

- subjects who are at high risk during PRK, due to the low level of PAA.
- subjects with elevated risk for developing haze after PRK due to the low level of PAA on days 3 to 5 postoperatively.

The kit uses a chromogenic substrate of plasmin in the presence of plasminogen, and the observed yellowness in the sample spot is proportional with PAA.

Commercial opportunity

Measurement of PAA in tear fluids and the provision of semi-quantitative data provide a number of opportunities such as the ability to predict development of haze and to omit PRK in patients with low preoperative PAA level or to develop new eyedrops restoring normal PAA profile in the tears after PRK.

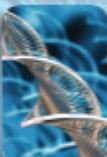
Next steps

A patent application has been filed over these findings and the University of Debrecen is now seeking partners to develop this invention.

Medical and Health Science Center

Knowledge & Technology Transfer Office

Contact: Prof. László Mátyus, Director of TTO • E-mail: gnd@dotc.hu • Tel.: +36 30 229 5890



University of Debrecen

New types and uses of plastic – The titanate-polymer nanocomposites

Researchers at University of Debrecen in collaboration with researchers from University of Szeged have developed a new plastic family (approximately forty plastic nanocomposites) that can be created by the use of nanopipes and nanothreads. These new materials have more advantageous attributes than the everyday used conventional plastic composites.

Background

Production of polymer nanocomposites by the use of titanate nanopipes and nanothreads. The invention is based on the new revelation, that $H_2Ti_2O_7$ nanopipes and nanothreads produced by hydrothermal synthesis have amphiphilic attributes depending on the applied technology in the production. In this manner they can be joined with different apolar and polar polymer matrixes by a simple technological process, forming all-round utilizable nanocomposites.

can be used for gasfillers and underfloor heating.

Title of the patent application: Titanate-polymer nanocomposites and process for their production (P0700484; shared patent application with University of Szeged).

The patent application is under process.

Commercial opportunity

- More advantageous attributes than the conventional plastic composites
- Potential of all-round utilization
- Exploitation in medical field

Invention and technology

By applying this technology, a new plastic family can be produced. Approximately forty plastic nanocomposites were created by the use of nanopipes and nanothreads. These new materials have more advantageous attributes than the conventional plastic composites: they have better tensile strength and gas-tight.

The new plastics are appropriate for several clinical targets with adequately equable nanothreads and nanopipes: with their use the average life of a hip prosthesis can be significantly elongated. Biocompatible dental prosthesis and filling materials can be prepared as well.

These favorable plastics made from titanate-polymer nanocomposites

Next steps

University of Debrecen is now seeking partners to license the technology or to discuss spin-off foundation.

Centre of Arts, Humanities and Sciences

Knowledge & Technology Transfer Office

Contact: Prof. László Mátyus, Director of TTO • E-mail: gnd@dotc.hu • Tel.: +36 30 229 5890



IP policy at the University of Debrecen

Rules & guidelines for managing research contracts, intellectual property and technology transfer activities



UD TECH TRANSFER at University of Debrecen

Main tasks of the technology transfer office:

- Dissemination of research capabilities of the university
- Build partnership with research partners and enterprises
- IP management
- Licensing, spin-off and start-up support
- Preparation of legal agreements taking part in business negotiations
- Training the students and faculty towards an innovation-based approach in research
- Support the development of the local economy



Who do we support?

- Management of the univ.
- Researchers
- Industrial partners
- Students
- Citizens



University of Debrecen
Center for Research Commercialization and
Technology Transfer

Contact:

Tel: + 36 70 7091486

tbene@unideb.hu

<http://techtransfer.unideb.hu>

