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

How to create (commercial) value from university research?

Tamás Bene
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University of Debrecen

UD TECH TRANSFER

Bubble Gum

Heart-Lung Machine

Hepatitis B Vaccine

Insulin

Ultrasound

Barcode

Penicillin

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

Vitamin D Fortification

Pacemaker

MRI Scanner and Technology

LCD

Electronic Computer

HPV Vaccinaton

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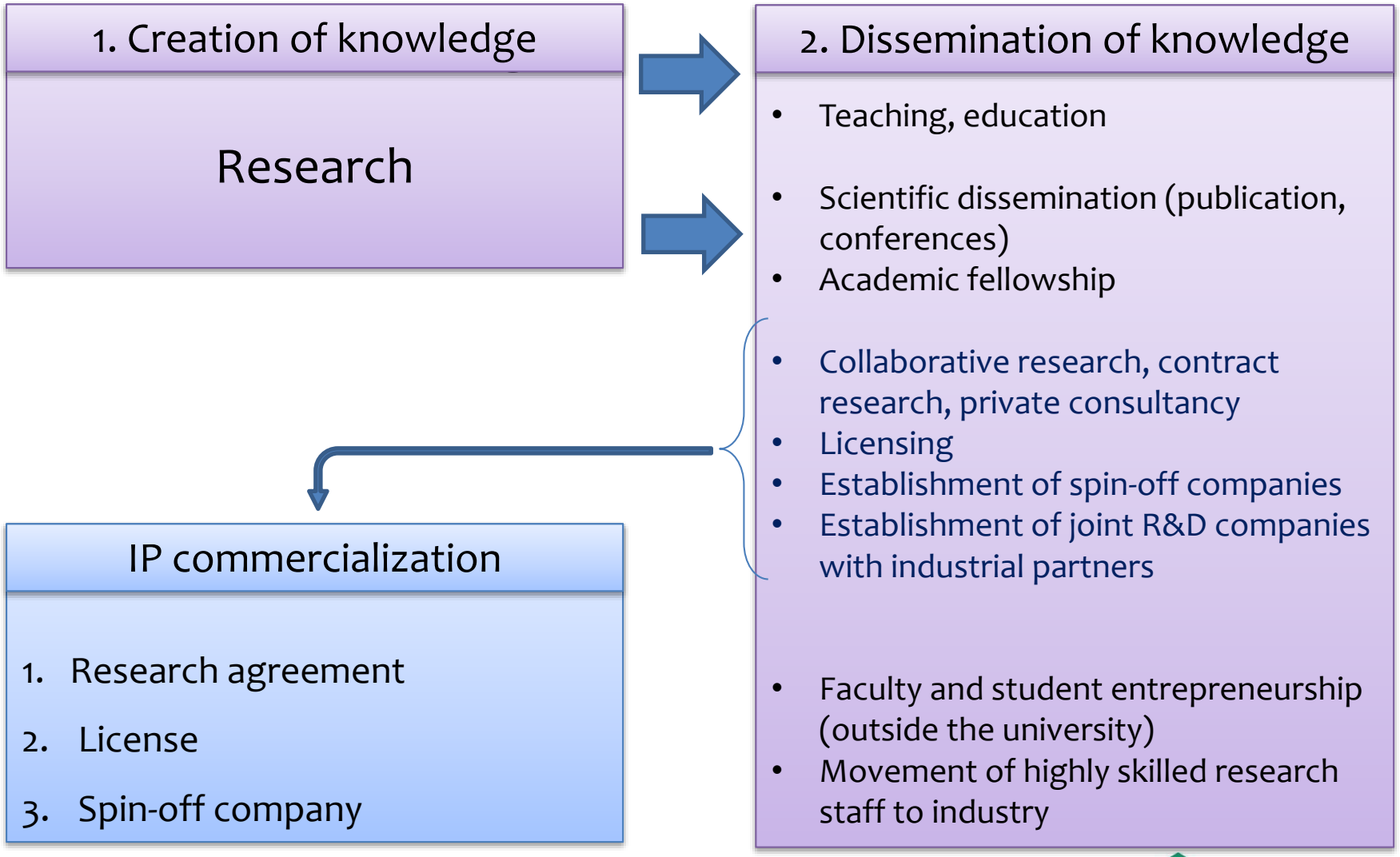
Knowledge transfer routes



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Non-licensing agreements

- Confidentiality Agreement
- Material Transfer Agreement
- (Sponsored) Research Agreement
- Cooperative Research and Development Agreement (CRADA)
- (Scientific) Service Agreement
- Consortium Agreement (and also Grant Agreement)
- Consultancy Agreement
- Memorandum of Understanding (MoU)
- Space or Facility Use Agreement
- + any other type of agreement concerning research activity between industry and academia.

Confidential Disclosure Agreement (CDA)

Non-Disclosure Agreement (NDA), Secrecy Agreement, Confidentiality Agreement, etc.

Protects confidential information from public disclosure and unwanted use.

- Limits use and dissemination of information
- Compatible with patent procedure: disclosed information will not qualify as prior art
- A CDA is often the first step towards another agreement
- Generally accepted worldwide

Key requirements:

- The disclosed information should be marked clearly as „Confidential" in written form, even if it was originally disclosed orally or by any other means
- The scope of use of the confidential information should be clearly laid down.
- The term of the agreement should be separated from the term of secrecy.

Types: In, Out, Mutual

Material Transfer Agreement (MTA)

It is used to lay down limits on the transfer of (biological) materials from one *organization* to another.

- Limits use and dissemination of the Material
- Inventions may be created using the Material
- License may follow the transfer, but it does not occur often
- Often it is made free of charge, however certain costs may arise

Key requirements:

- The Material should be defined precisely.
- The scope of use should be clearly defined.
- Modifications – Ownership, use and distribution
- Ownership of raw research data
- Requirements for publication

Types: In, Out

(Sponsored) Research Agreement (SRA)

Used to establish the terms and conditions of a research project.

- Aims the implementation of a well-defined research plan
- Inventions may arise during the research project
- Care of the data rights and confidential information exchanged during the research
- Often includes an MTA and a CDA

Key requirements:

- Description of research work/project
- Invention ownership
- Publication of research results
- Payment terms

Types: Collaborative or Joint, Sponsored, Clinical

Scientific Service Agreement

Used to provide a scientific service for a third party by using or making available existing knowledge, expertise and/or infrastructures.

- It may consist of tests, measures, routine analyses, expert opinions, consulting, or provision of specific scientific equipment.

- Reports and raw research data are typical outputs.

- Generally no invention or other IP arise from this activity.

Interinstitutional Agreements (IIA)

Controls how research institutions will carry out technology transfer activities associated with jointly-owned inventions.

- Institutional roles
- Patent prosecution and costs
- Sharing licensing revenues

Key requirements:

- Appointment of the lead institution
- Sharing of patent expenses and revenues

Non-licensing agreements in technology transfer

Researcher's general perception

- Administrative obstacle to research

However, it may have impact on:

- ownership and commercialization of Background and Foreground IP;
- patentability;
- publication;
- further research work.

Responsible management of research collaboration

- It is the responsibility of the Principal Investigator or the research group leader to ensure, that prior to beginning any research activity in collaboration with any third party, the terms and conditions of the cooperation are set out in a written agreement.

A collaborative agreement should include at least:

1. Precise and detailed research plan (with milestones and deadlines for reporting)
2. Obligation to keep precise written record of the research activity
3. Funding and pricing
4. Access rights to IP already existing prior to entering into the agreement (Background IP)
5. Ownership and management of IP arising from research activities set out in the agreement (Foregorund IP)
6. Confidentiality requirements and terms of scientific publication (maximum term for delay)
7. Restrictions of use (materials)
8. Option to license (in case of industrial partner) and share of revenue

Common points of negotiation

- Ownership of inventions
- Licenses, options, and other rights
- Ownership of data
- Publication of research results
- Patent prosecution
- Indemnification & liability issues

Research agreements in the IP policy of UD

It is the responsibility of the Principal Investigator or the research group leader to ensure, that **prior to beginning** any research activity in collaboration with any third party, the terms and conditions of the cooperation are set out in a written agreement.

Specific provisions for:

1. Research agreements
2. Scientific service agreements
3. Collaborative research agreements
4. Grant agreements
5. Other agreements (MTA, CDA, Use of research facilities, etc.)

Minimum requirement for the content, e.g. in Research agreements:

- Term, Payment, Termination, Publicity
- Precise definition of research projects with milestones
- Background IP (if exists)
- Foreground IP – Ownership, protection, exploitation, revenue
- Confidentiality
- Conditions for publications
- Sharing of research and business risks
- Liability and indemnification

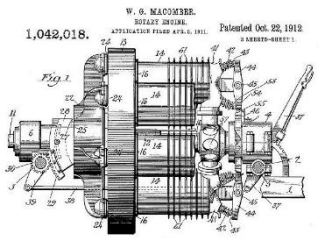
Intellectual property

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. By striking the right balance between the interests of innovators and the wider public interest, the IP system aims to foster an environment in which **creativity and innovation** can flourish.

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	

Origins of IP rights and patents

- In England from the 14th century the Crown granted indefinite monopolies for importing and manufacturing goods in return for payment to the Crown
- Italy, 15th century: Cooks' monopoly for the preparation of new foods
- Copyright: Gutenberg's printing press (15th century)
- 19th century – industrialization: basics of the modern IP law

Protection evolves as a result of economic pressure.

International system of IP protection:

- 1883 – Paris Convention for the Protection of Industrial Property
- 1886 – Berne Convention for the Protection of Literary and Artistic Works

Problem ➡ knowledge ➡ imagniation ➡ innovation ➡ intellectual property

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?

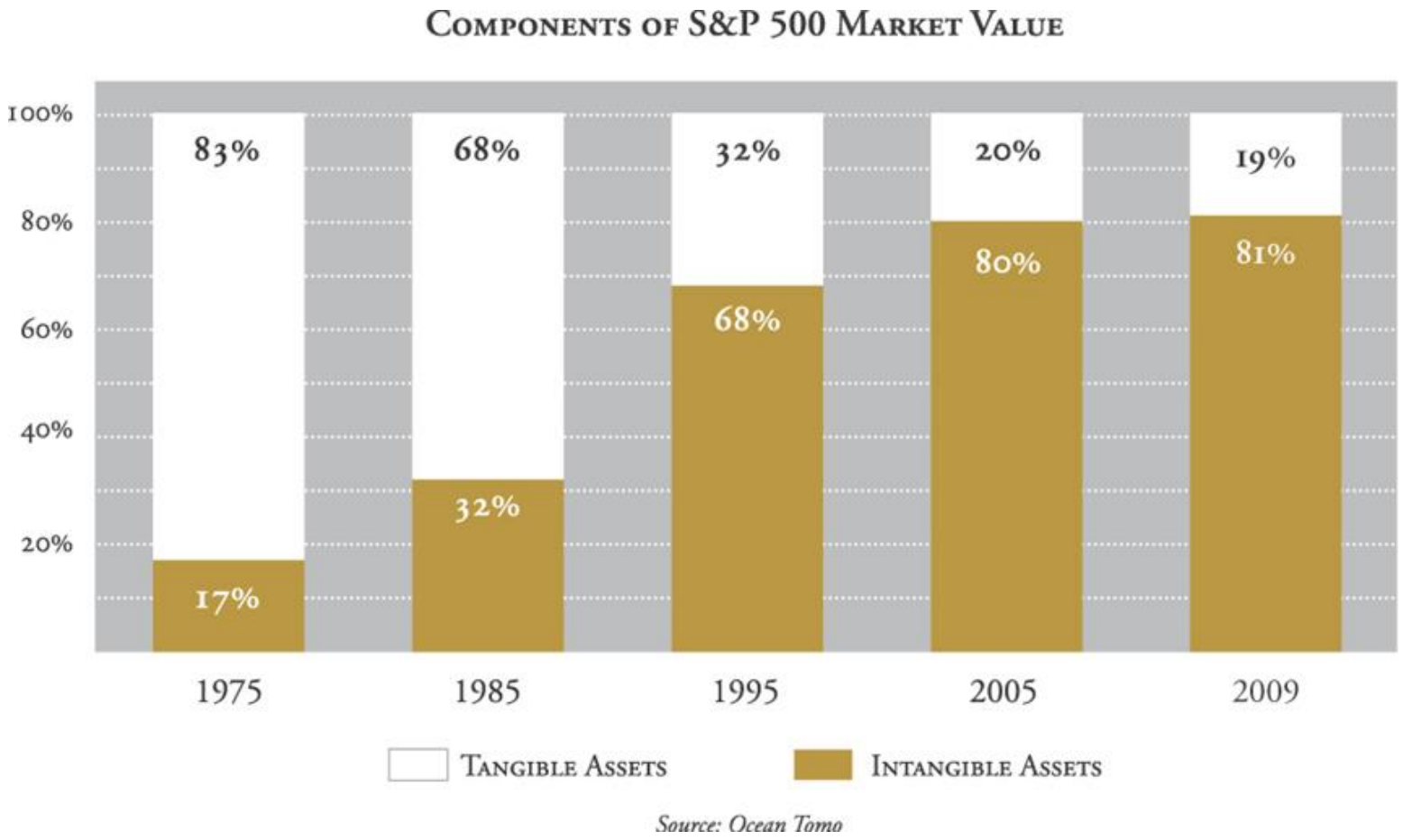
Economical reasons: to ensure economic benefits for the creators and to facilitate the growth of industry and culture

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

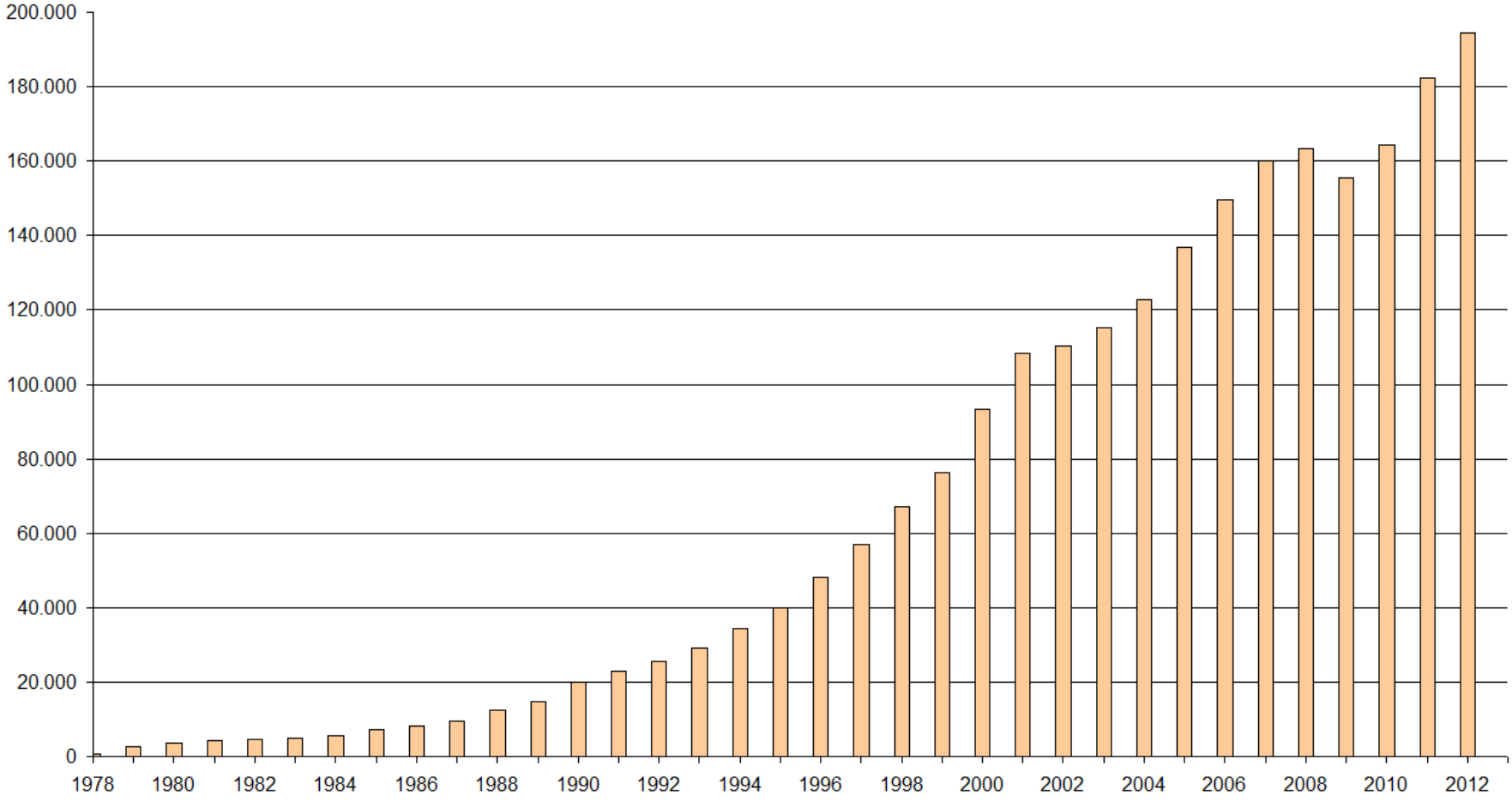
Social interest: to create repositories of vital information (e.g. patented inventions will become public after the lapse of protection)

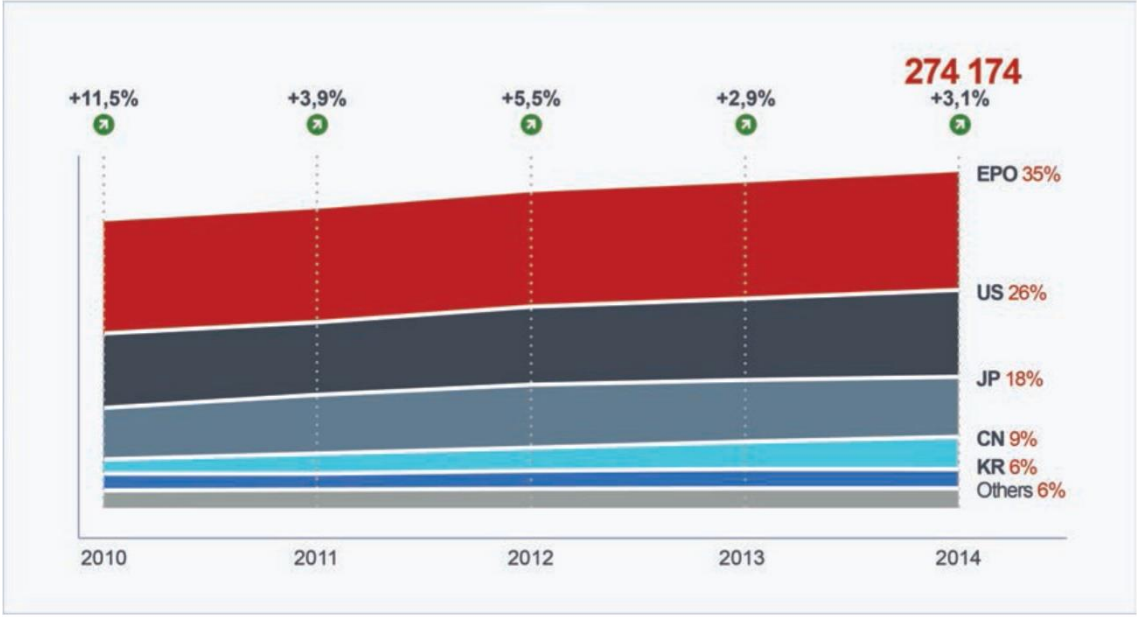
IP protection

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


Components of S&P 500 Market Value
100%
80%
60%
40%
20%
83%
68%
32%
20%
19%
17%
32%
68%
80%
81%
1975
1985
1995
2005
2009
Tangible Assets
Intangible Assets
Source: Ocean Tomo

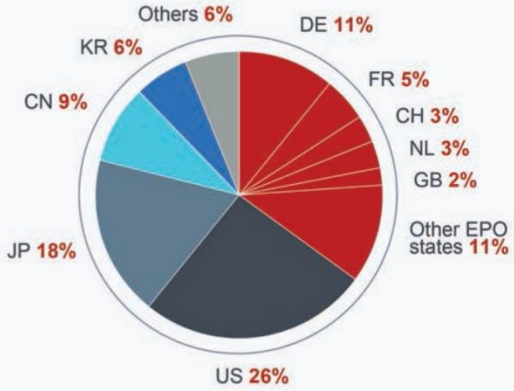
Number of PCT Filings per year





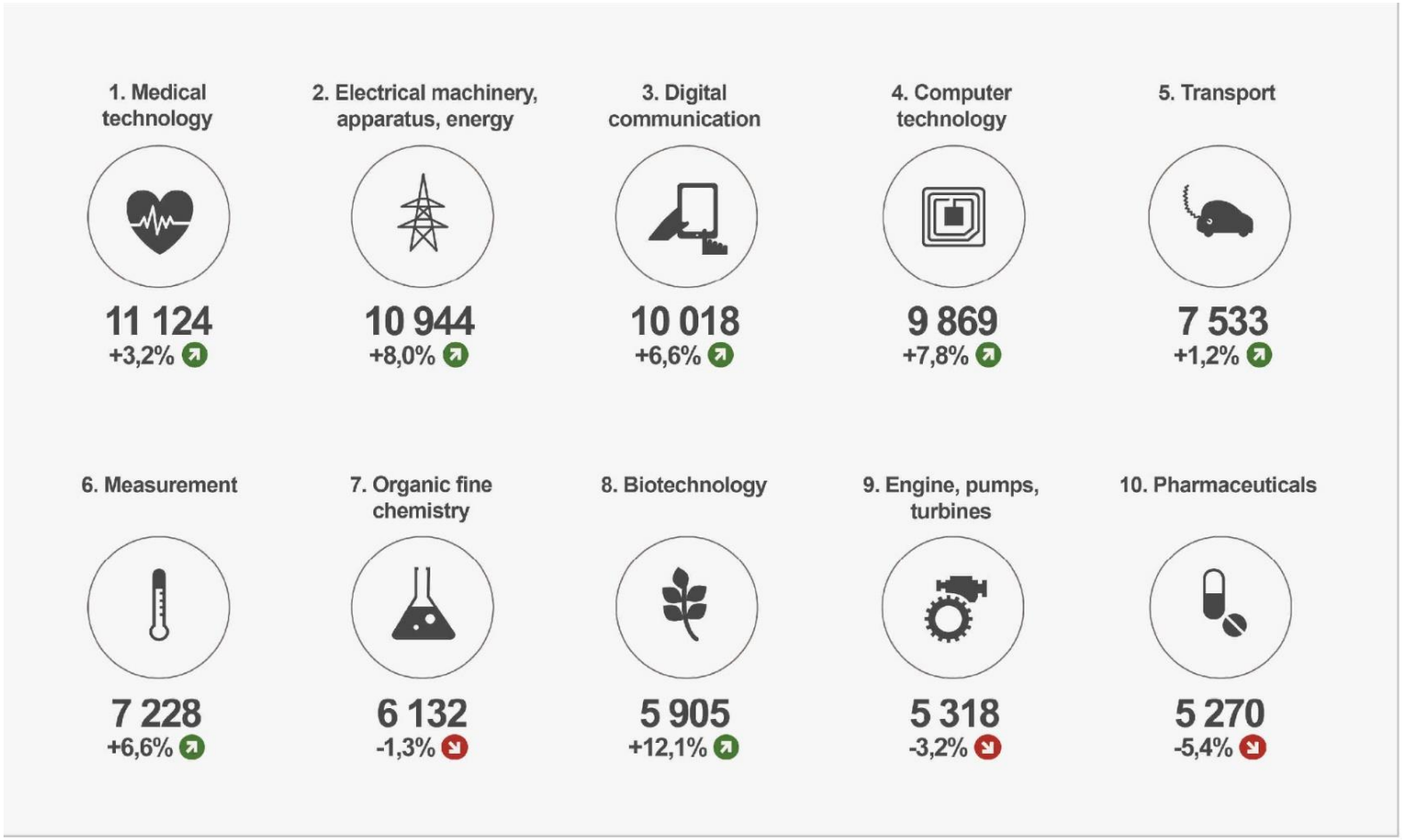
Number of patent applications filed to the EPO

Number of patent applications filed to the EPO (by country) 2014



Country	2014	2013	Change
US	71 745	67 153	6,8%
JP	48 657	50 871	-4,4%
DE	31 647	31 887	-0,8%
Other EPO states	27 819	27 641	0,6%
CN	26 472	22 396	18,2%
KR	16 358	15 993	2,3%
Others	15 786	15 520	1,7%
FR	12 873	12 378	4%
NL	8 104	7 430	9,1%
CH	7 890	8 139	-3,1%
GB	6 823	6 510	4,8%

Number of patent applications filed to the EPO (by technology fields, 2014)



Top 25 applicants
(patent applications filed to the EPO, 2014)

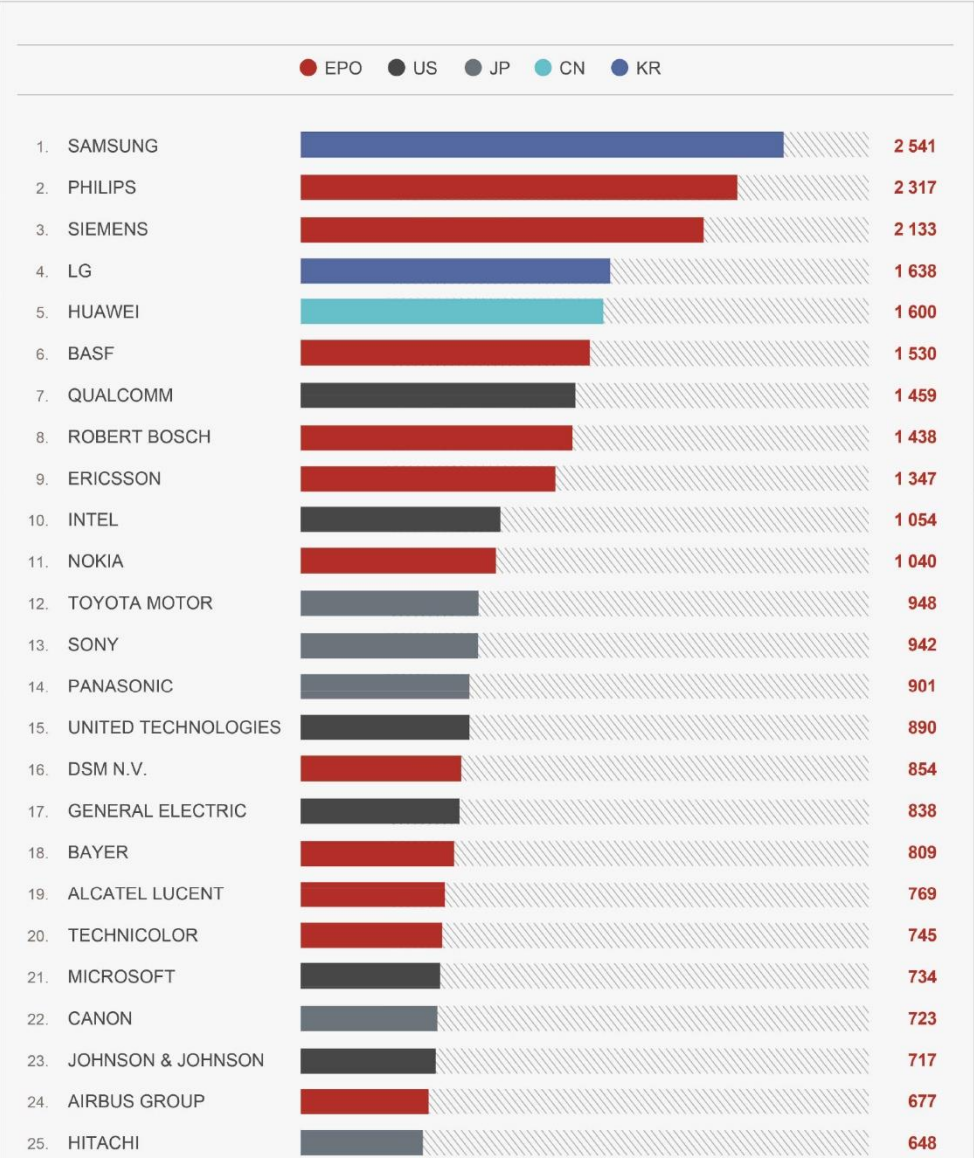


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Table A.3.3.2: Top 50 PCT applicants: universities, 2014

Overall rank	Changed position from 2013	Applicants	Origin	Applications	Change from 2013
47	-4	UNIVERSITY OF CALIFORNIA	United States of America	413	15
83	12	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	United States of America	234	15
132	38	UNIVERSITY OF TEXAS SYSTEM	United States of America	154	35
145	19	HARVARD UNIVERSITY	United States of America	147	26
163	14	JOHNS HOPKINS UNIVERSITY	United States of America	135	19
201	11	LELAND STANFORD JUNIOR UNIVERSITY	United States of America	113	12
206	-59	COLUMBIA UNIVERSITY	United States of America	112	-21
225	10	CALIFORNIA INSTITUTE OF TECHNOLOGY	United States of America	103	12
249	54	UNIVERSITY OF PENNSYLVANIA	United States of America	94	22
253	16	SEOUL NATIONAL UNIVERSITY	Republic of Korea	92	12
275	-51	CORNELL UNIVERSITY	United States of America	87	-8
290	-2	NANYANG TECHNOLOGICAL UNIVERSITY	Singapore	82	7
293	-50	UNIVERSITY OF FLORIDA	United States of America	81	-8
293	69	KYOTO UNIVERSITY	Japan	81	23
293	150	DANMARKS TEKNISKE UNIVERSITET	Denmark	81	33
304	-18	UNIVERSITY OF TOKYO	Japan	79	3
305	2	UNIVERSITY OF MICHIGAN	United States of America	78	7
312	54	KOREA UNIVERSITY	Republic of Korea	77	20
314	-33	PEKING UNIVERSITY	China	76	-1
325	77	UNIVERSITY OF WASHINGTON	United States of America	74	21
325	-39	ISIS INNOVATION LIMITED	United Kingdom	74	-2
332	79	KYUSHU UNIVERSITY	Japan	72	20
336	17	TSINGHUA UNIVERSITY	China	70	10
347	-143	KOREA ADVANCED INSTITUTE OF SCIENCE AND TECHNOLOGY	Republic of Korea	67	-37
378	33	OSAKA UNIVERSITY	Japan	62	10
395	143	UNIVERSITY OF NORTH CAROLINA	United States of America	59	21
411	-150	POSTECH FOUNDATION	Republic of Korea	57	-26
411	229	UNIVERSITY OF ILLINOIS	United States of America	57	25
418	-107	NATIONAL UNIVERSITY OF SINGAPORE	Singapore	56	-13
418	-56	YONSEI UNIVERSITY	Republic of Korea	56	-2

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.

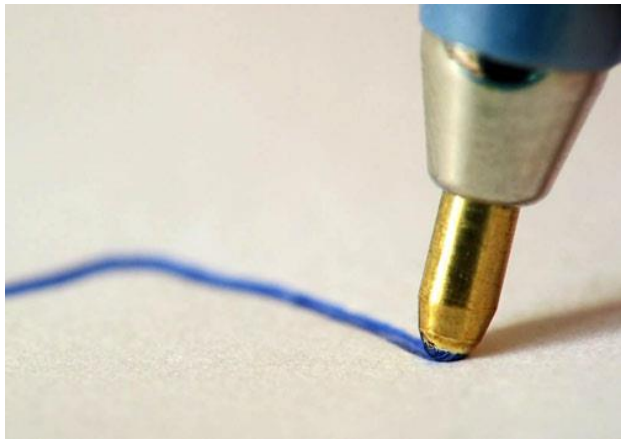
It protects the expression of thoughts, the works (products) of human intellectual creativity.

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

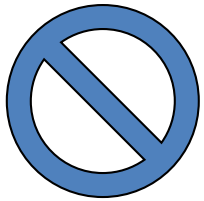
- Product containing or consisting of biological material.
- Process by means of which biological material is produced, processed or used.

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



Inventorship and ownership

Inventor: the person who has created an invention

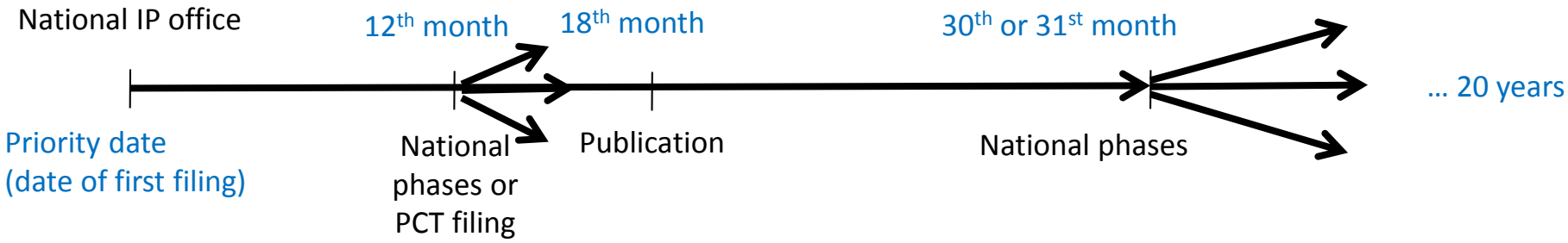
Moral rights, e.g.: the right to be mentioned as such in the patent documents.

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.

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) - 169 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) - 139 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 (36 member states)

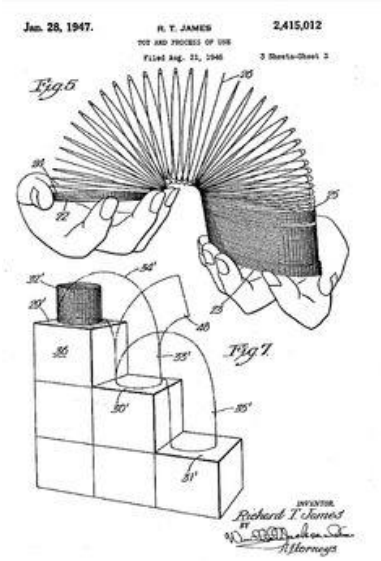
- A patent can be obtained through one procedure in the member states.
- Proper translations of the patent application must be filed after granting the European patent where it is required (London Agreement).

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

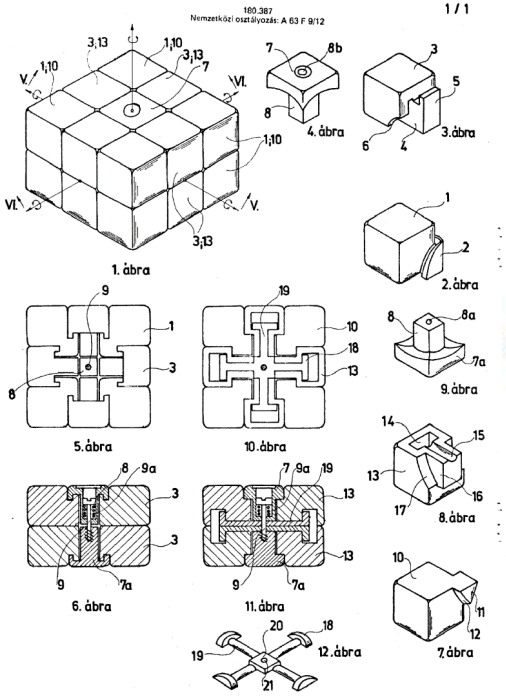
The patent holder will have the right to license the patent and take infringement actions against infringers.

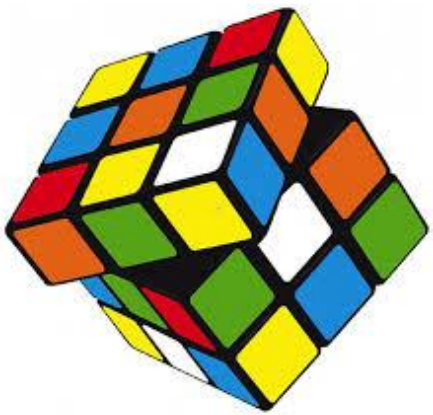
Patents in the economy

Patents can foster the economical development:

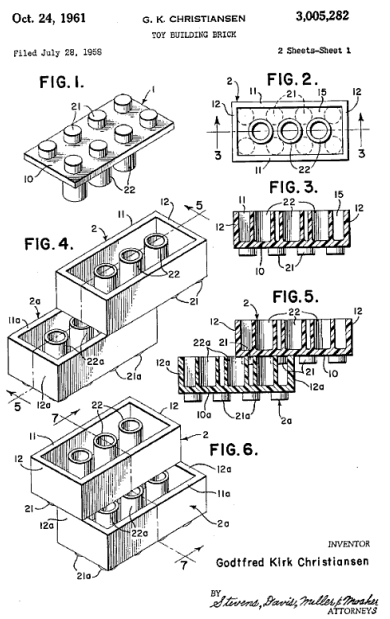
- public patent information facilitate technology transfer and investments
- patents may foster R&D activity at universities and research institutions
- patents may be catalysts of business development.

Rubik's cube

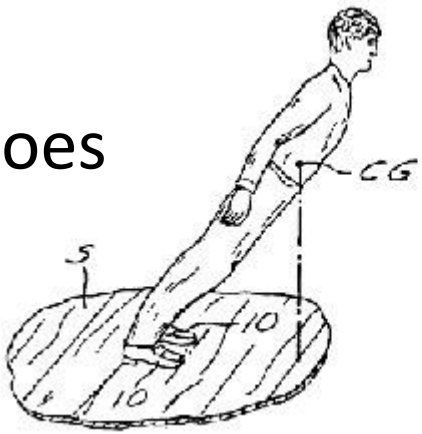




Lego



Magic shoes



MAGYAR NÉPKÖZTÁRSASÁG

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.

Feltaláló(k):

Rubik Ernő, okl. építészmérnök, egyetemi adjunktus, Budapest

Szabadalmas:

Térbeli logikai játék

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

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

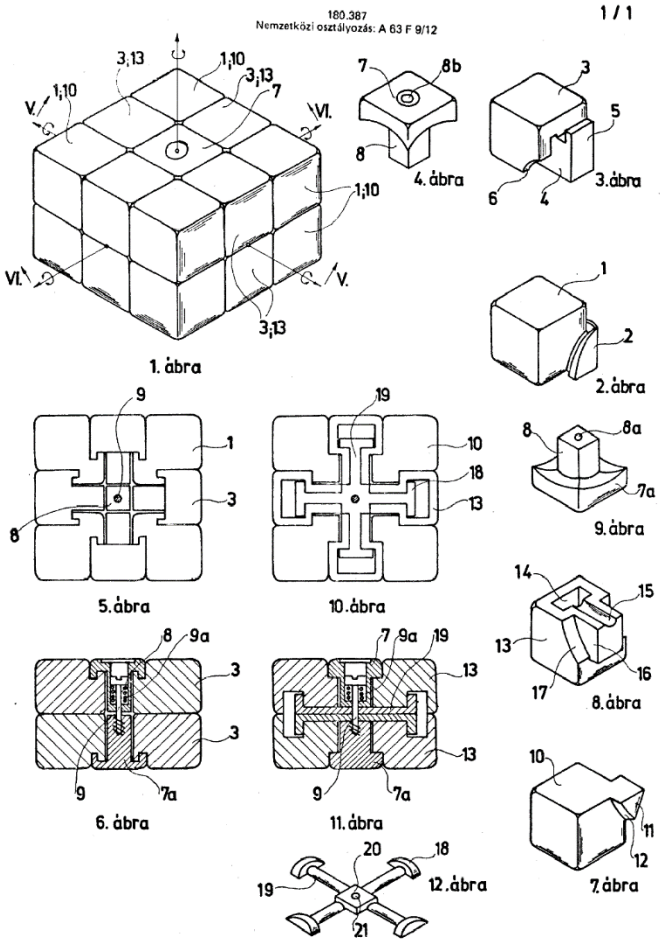
Ismeretes az 55-3956 közrebocsátási számu japán szabadalmi leirásból olyan forgatható kiskockákból összeállitott kockaalaku játék, amelynél a nagykocka lapjain elhelyezkedő 9-9 darab kiskockalapot forgatással lehet ugy összerendezni, hogy egy-egy nagykockalap azonos szinü kiskockalapot tartalmazzon. A játék elve tehát azonos az emlitett 170.062 lsz. magyar szabadalomban leirt térbeli logikai játékával, vagyis itt is a nagykocka bármelyik tértengelyére merőleges, 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.

leírás

Szabadalmi igénypontok

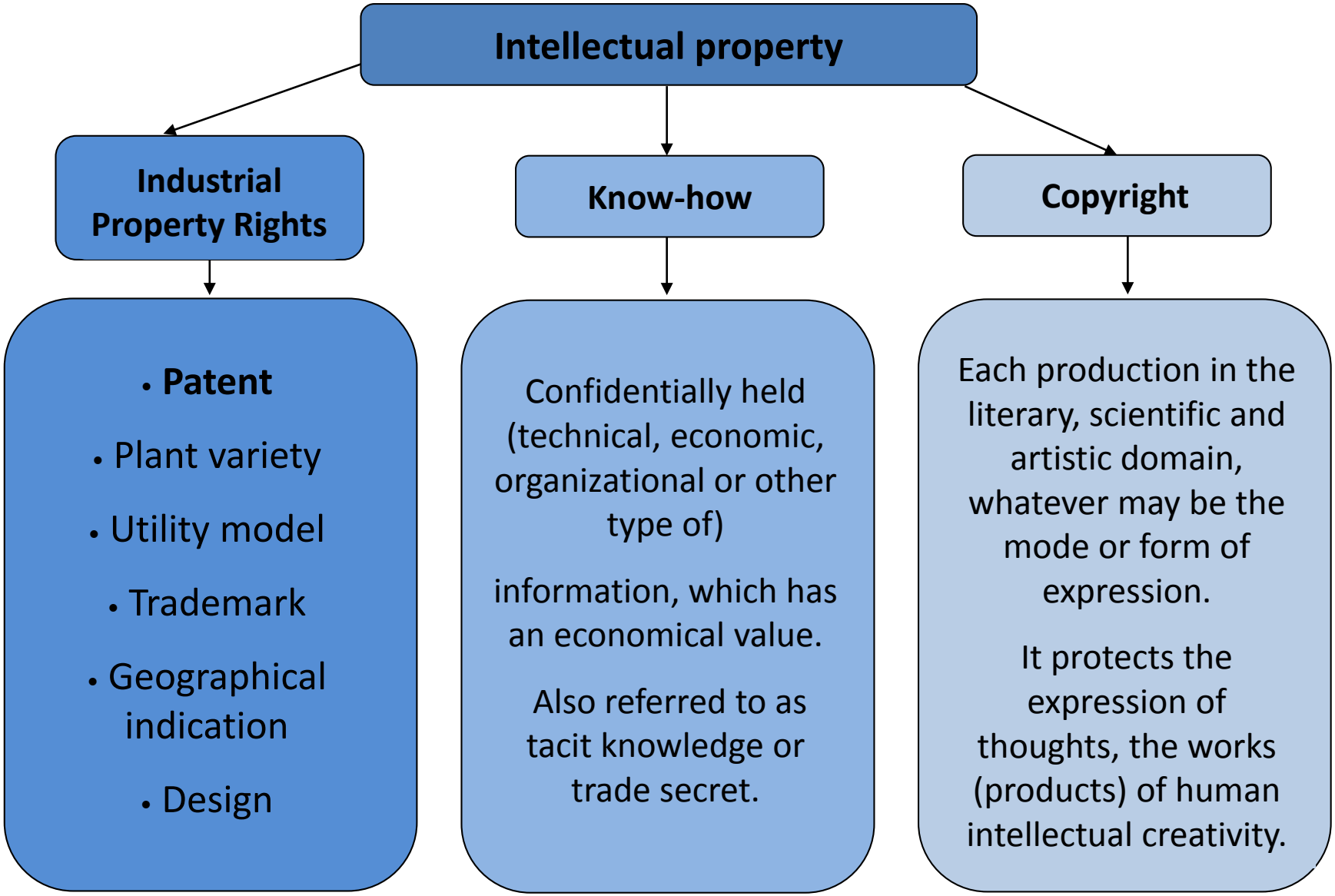
1. Térbeli logikai játék, amelynek adott számu játékeleme a logikai játék geometriai középpontjából kiinduló tértengelyek körül elforgatható módon van kialakitva, azzal jellemezve, hogy két, egyenként kilenc darab játékelemből /1, 3, 7, 10, 13/ álló sorban elhelyezkedő összesen tizennyolc játékeleme 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 kialakitásu 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 rögzitésére egyetlen, rugóval /9a/ ellátott csavar /9/ szolgál.

rajz

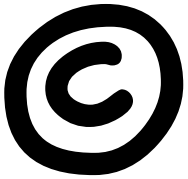


Patent documents, databases:

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


Intellectual property
Industrial Property Rights
Know-how
Copyright
• Patent
• Plant variety
• Utility model
• Trademark
• Geographical indication
• Design
Confidentially held (technical, economic, organizational or other type of)
information, which has an economical value.
Also referred to as tacit knowledge or trade secret.
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.

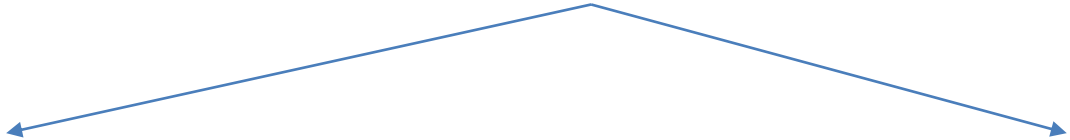
Economic rights allow the owner to derive financial reward from the use of her/his works by others.

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

Teaching material



Moral rights

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.

Economic rights

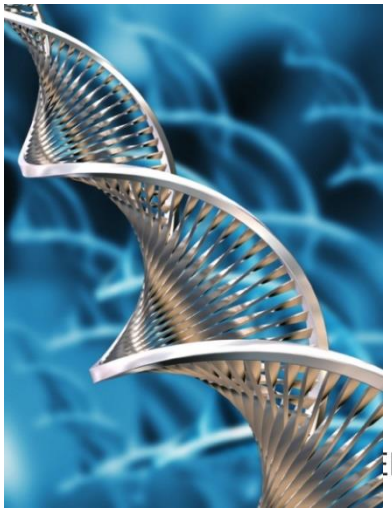
- Full or partial assignment
- Rights for distribution, reproduction, translation, adaptation
- Assignment may be limited either by
  - territory
  - period
  - scope of use.

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.

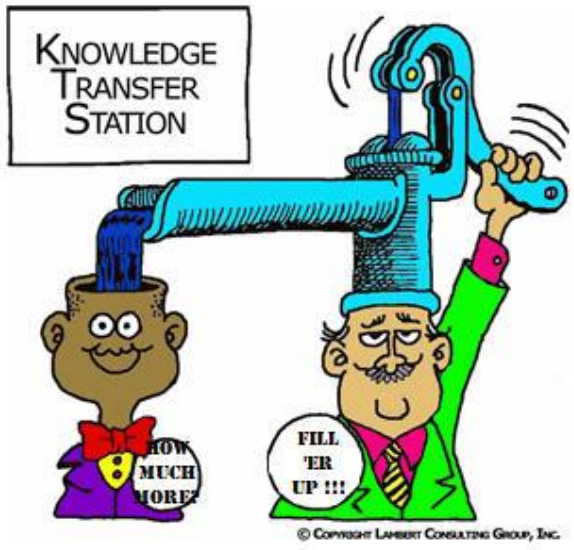
- No registration or other administrative procedure is needed for the protection.
- Confidentiality gives value to the know-how.
- Tradable right.



The importance of intellectual property (IP) management at universities

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.



- Education, training
- **Dissemination of research results (publication, conferences)**
- **Research collaboration**
- **Licensing**
- **Spin-off companies**
- **Establishment of joint companies with industrial partners**
- **Academic fellowship**
- Faculty and student entrepreneurship (outside the university)
- Movement of highly skilled research staff to industry

UD TECH TRANSFER

Technology transfer – bridging the gap

University:

- Social responsibilities
- Basic research
- Create new knowledge
- Pure curiosity driven research
- Publications
- Collaboration with other scientists
- Sharing of material

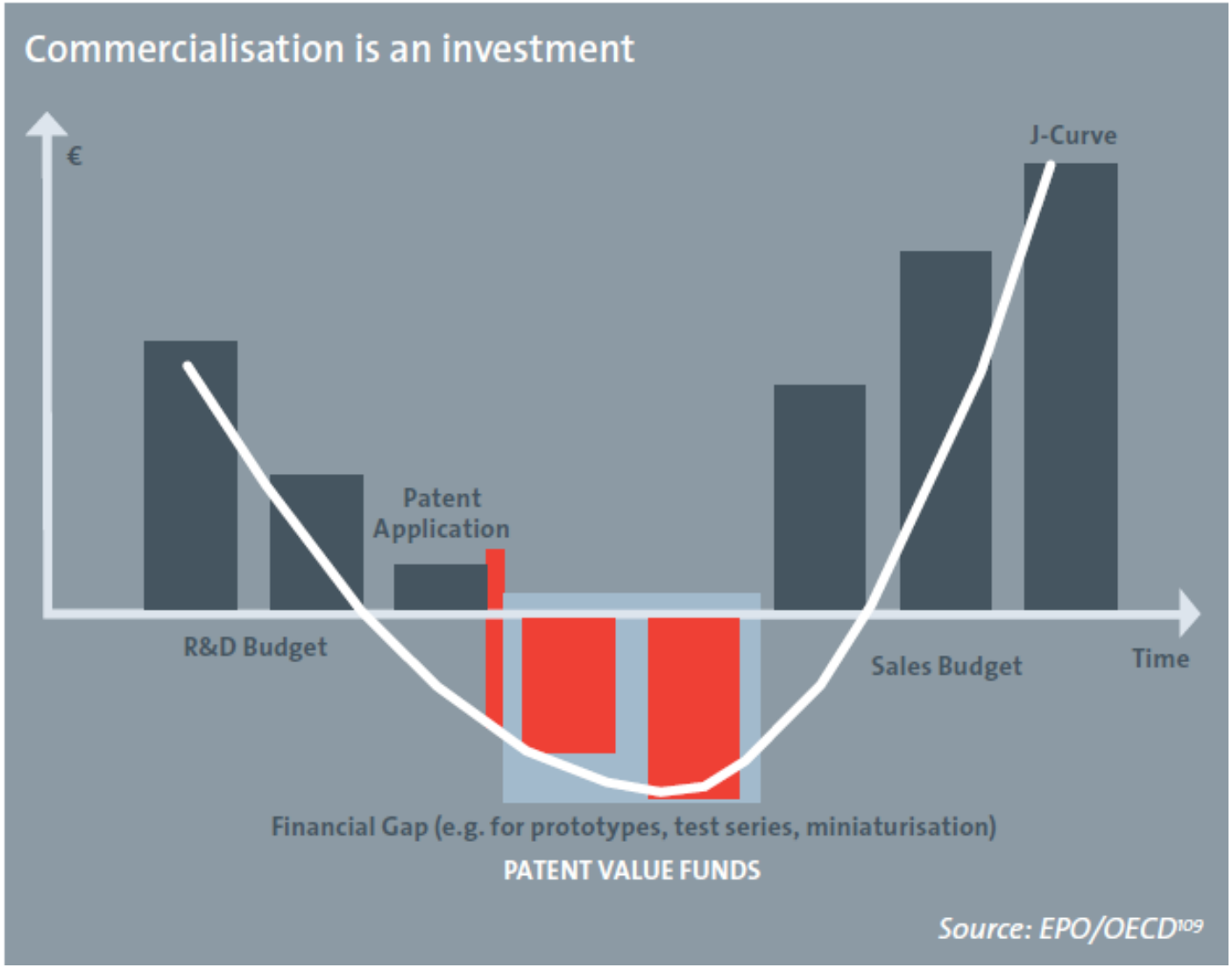
Industry:

- Shareholders responsibilities
- Applied research
- Develop new products
- Specific objectives, product focused
- Ownership and secrecy
- Control of material

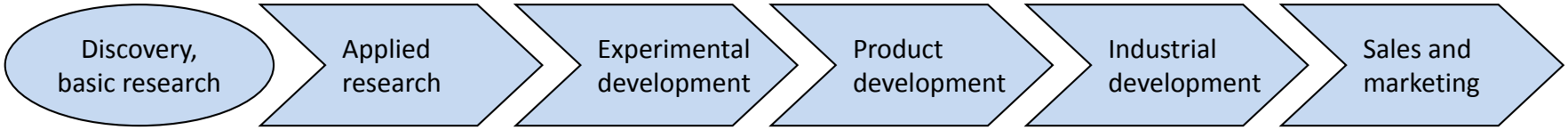
Science - „Development Gap" - Product

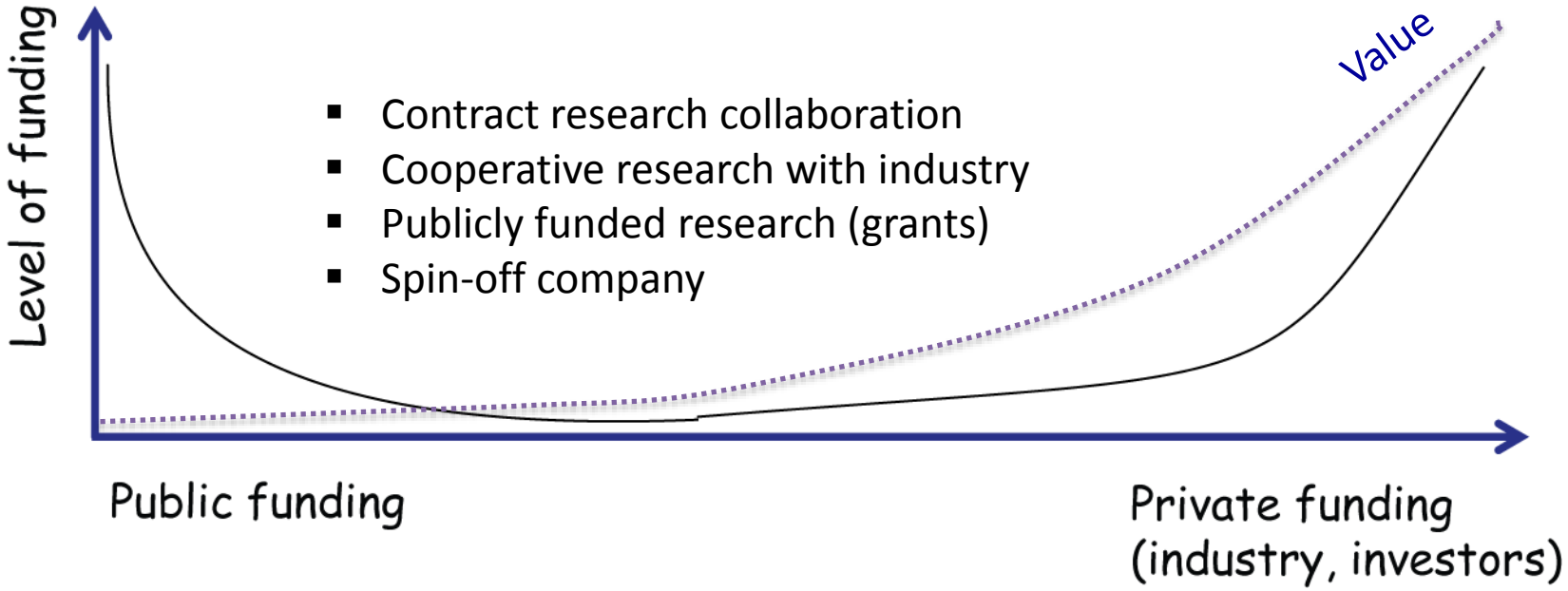
Source: Technology Transfer in Countries in Transition: Policy and Recommendations; Professor Hagit Messer-Yaron, 2011

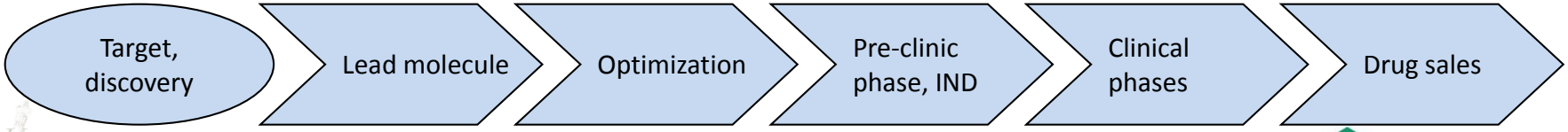
UD TECH TRANSFER


Commercialisation is an investment
€
J-Curve
Patent
Application
R&D Budget
Sales Budget
Time
Financial Gap (e.g. for prototypes, test series, miniaturisation)
PATENT VALUE FUNDS
Source: EPO/OECD[109]

Collaboration between research institutions and industry





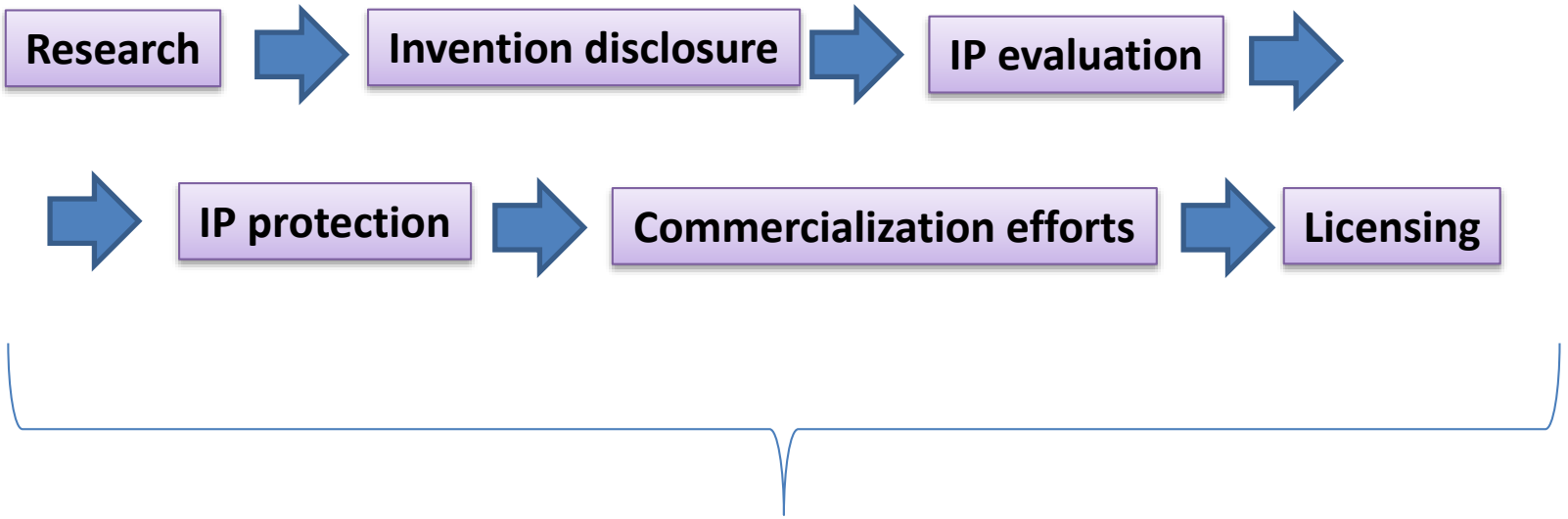


UD TECH TRANSFER

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.

Identification and disclosure of IP

Publishing vs. patenting - These options are not mutually exclusive!

You can publish and patent without losing any patent rights. However, the decision to pursue patent protection is largely a business decision, while the decision to publish is a scientific one.

Invention disclosure – Why do you have to disclose your invention?

Generally all rights in Intellectual Property created by **researchers** in the course of their duties and activities of employment **belongs automatically** to the employer (university or research institute).

If a **student** creates Intellectual Property with the significant use of Institute Resources in connection with his or her research activity, he or she might transfer the IP Rights in such intellectual property to the Institute as consideration for the use of Institute Resources.

Generally universities claim ownership of all Intellectual Property created in the course of **postgraduate (doctorate) students'** research activity.

Identification and disclosure of IP

The invention disclosure allows the University to determine whether it wishes to retain the ownership and control to pursue commercialization or to release the innovation back to the inventor.

When to disclose?

- As soon as you become aware of the commercial potential of the IP.
- Before publishing or disclosing the information to third party.
- If you are in doubt whether your innovation is commercially exploitable.

How to disclose?

The best way to do it through invention disclosure forms.

Where to address the invention disclosure?

To the technology transfer office or other equivalent department dealing with innovations.

Expected information on an invention disclosure

- Name and department of all innovators who have made **creative contributions** to the innovation
- **Dates** of research work and reduction to practice
- A statement detailing **how the innovation works** and how it is used
- A **description** of the innovation, along with a **comparison** to other potentially similar technologies and practices
- A summary of the **development status** of the innovation, including data obtained to support and verify its functionality (proof-of-concept)
- Future steps for **further development**
- A list of **third party partners** who collaborated in the research work or who provided funding
- Potential **commercial** partners
- A detailed description of any known **prior art** and its disadvantages or shortcomings

It is important to keep records of the events leading up to one's invention (e.g., laboratory notebooks), as such materials can become important in establishing: the true inventor(s) of an invention and the dates that conception and/or reduction to practice took place.

Inventorship

- Inventorship is the basis of ownership of inventions
- Therefore it is essential to identify the true inventor(s)
- Inventorship is a function exclusively of conception

- 'The formation, in the mind the inventor, of a definite and permanent idea of the complete and operative invention, as it is thereafter to be applied in practice'

  – an overall idea as to the desired results, and
  – an overall idea as to how to achieve the desired result

Joint inventorship

- Inventorship may be joint inventorship
- It is the contribution to the **conception** that counts
- Merely following the instructions of another and performing experiments to implement the invention is not sufficient to be classed as an inventor
- Clearly this is an important issue for supervisors and students

Would the invention have occurred without the contribution?

Proving inventorship

- Claims of inventorship have to be able to be verified
- Inventorship is a **matter of law** not policy
- The validity of a patent can be challenged on the basis of incorrectly nominated inventor

Even years after the event, you must be able to prove to the satisfaction of a court:

- WHAT work was done
- WHO did the work
- WHEN was it done
- Nothing has been added or deleted subsequently.

Manual record keeping

Use a proper lab book to record hypotheses, experimental design and objectives, results, failures, calculations, print outs, photographs.

Basic rules:

- hard bound books, numbered sequentially
- written in permanent ink not pencil, no erasures or white-out, no blank spaces, in chronological order, with an index
- pages numbered sequentially, dated, signed and witnessed by someone with an understanding of the work
- stored securely for the long term.

Ownership of IP developed in research collaboration

Some possible scenarios for a sponsored research collaboration:

1) The university shall own the IP.

2) The university shall grant a free non-exclusive license to the IP that results from the work.

3) The sponsor shall have an option to take an exclusive license (within certain fields) to IP resulting from the work - this option expiring six months after the end of the contract. Clearly, the sponsor may wish to define the terms of such a license up front (at least within a band) which may or may not be realistic depending on how well the resulting IP can be envisaged.

4) The sponsor should own the IP in return for upfront payment and license fee.

Decision on whether to invest in the intellectual property

Launching protection and exploitation is basically a **business decision**, therefor 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

Assessing transferability readiness

- Original
- Differentiated
- Supported by solid evidence
- Targeting an unmet or an active market
- Patented with freedom to operate

Best invention for commercialization

- Breakthrough innovation according to scientists
- New application targeting a mature known market
- Critical patent(s) with respect to Freedom to operate
- Invention highly cited by third parties
- Invention citing various fields as prior art
- Invention inducing process/manufacturing cost reduction
- Complementary patent

Key questions in the tech transfer office during evaluation

- Is the invention evolutionary or revolutionary?
- What is the stage of development?
- Is the invention patentable and could a patent be enforced?
- Is there a market for this invention?
- Can we find a business interested in licensing, developing and commercializing this technology?
- Can we start a new company?

- **Are there available resources to help further develop the inventive technology?**

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.

License

Patent licensing agreements are contracts in which the patent owner (the licensor) agrees to grant the licensee the right to make, use, sell, and/or import the claimed invention, usually in return for a royalty or other compensation.

Financial terms can include:

- Upfront payment
- Annual minimum payments
- Earned royalties
- Equity (if appropriate)
- Reimbursement of patent costs

Non-financial terms can include:

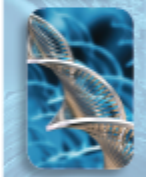
- Field of Use
- Non-exclusive or exclusive rights
- Development milestones and diligence provisions

One-pagers

University of Debrecen

Methodology and bed-side kit for measuring the plasminogen activator activity in tear fluid to predict relevated 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 then 30 minutes, thus can identify:

i) subjects who are at high risk during PRK, due to the low level of PAA
ii) 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@dote.hu • Tel.: +36 30 229 5890

University of Debrecen

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

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

Background

Production of polymer nanocomposits by the use of titanate nanopipes and nanothreads. The invention is based on the new revelation, that $H_2Ti_3O_7$ 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 nanocomposits.

Invention and technology

By applying this technology, a new plastic family can be produced. Approximately forty plastic nanocomposits were created by the use of nanopipes and nanothreads. These new materials have more advantageous attributes than the conventional plastic composits: 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 nanocomposits can be used for gasfillers and underfloor heating.

Title of the patent application: Titanate-polymer nanocomposits 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 composits
- Potential of all-round utilization
- Exploitation in medical field

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@dote.hu • Tel.: +36 30 229 5890

UD TECH TRANSFER

Challenges in licensing efforts

What technologies are companies looking for?

- Unique, disruptive innovation
- Solution to an existing problem
- Have big market potential
- Have competitive advantage
- Strong IP protection
- Easy to acquire
- Advanced stage of development
- Easy to implement
- Competitors are excluded
- Probability of success is big
- High potential in the return of investment

University spin-off entrepreneurship

Spin-off is a company whose prior mission is to commercialize technologies or services created at the university.

Three types based on their main goal:

1. Commercialization of a technology via licensing or assignment.
2. Sponsoring university research to develop a technology, which will be licensed by the spin-off company at a later stage.
3. Providing service, which was originally provided by a department of the university.

Key factors for spin-off establishment:

- Secured IP protection
- Business plan
- Management (scientific and business)
- Availability of financial resources

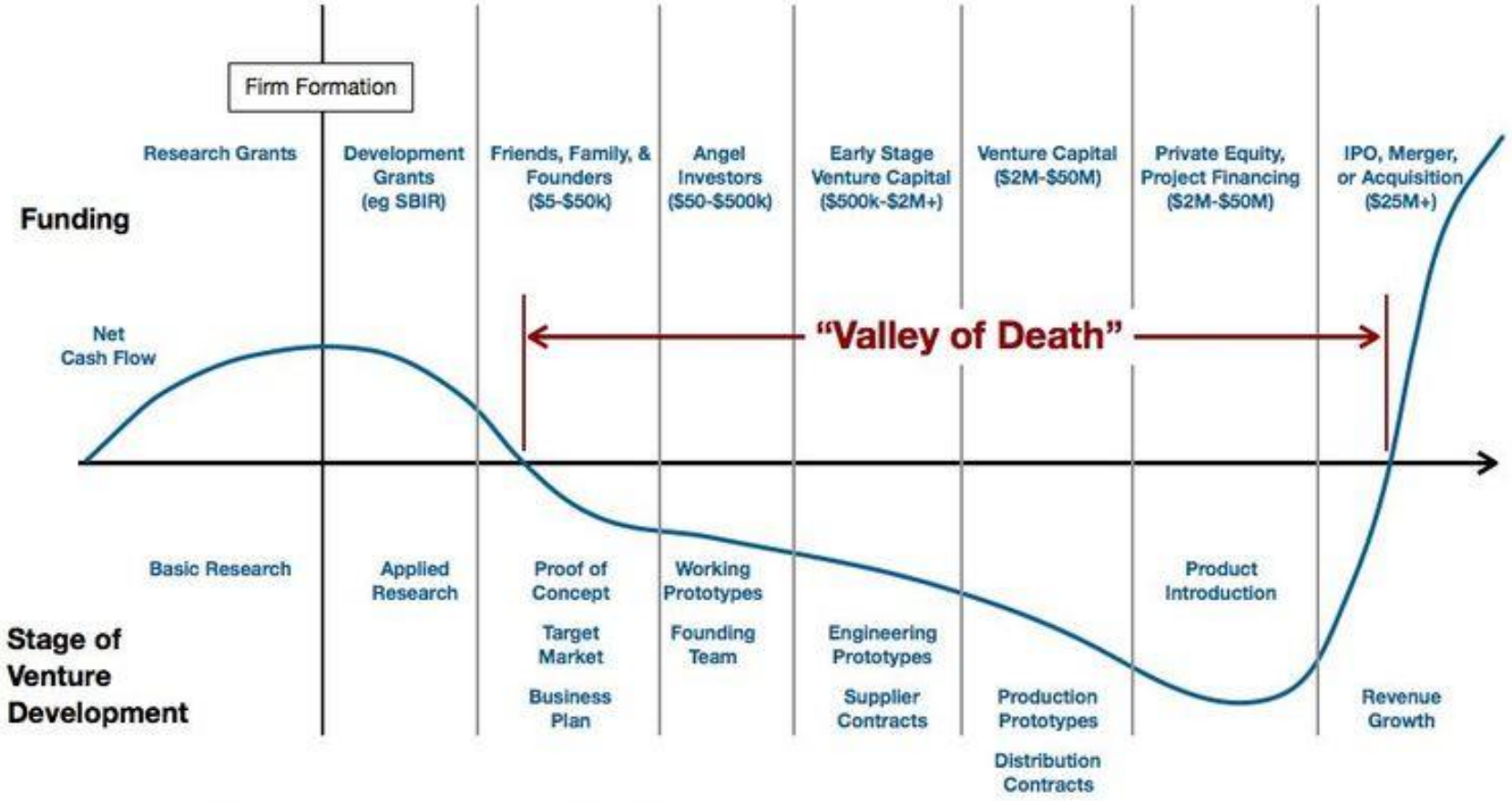
Simple business model of a university spin-off company

1. **Company formation**

2. **Transfer patent rights**: university transfers its patent rights to the newly-formed company — typically in exchange for equity and a license with royalty payments.

3. **University compensation**:
   a) Selling equity interest
   b) Royalty payments
   c) Dividend payments

Lifecycle of a venture



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

UD TECH TRANSFER

Role of the university technology transfer office

- Negotiating research agreements where IP issues are concerned
- Identification of IP, receiving invention disclosures
- Preparing opinions on patentability
- Evaluating the commercial potential of the invention or other IP
- Obtaining patent protection (if necessary)
- Seek exploitation of IP – find commercial development partners
- Managing the process of commercialization
- Distribute revenue between univerity and inventors

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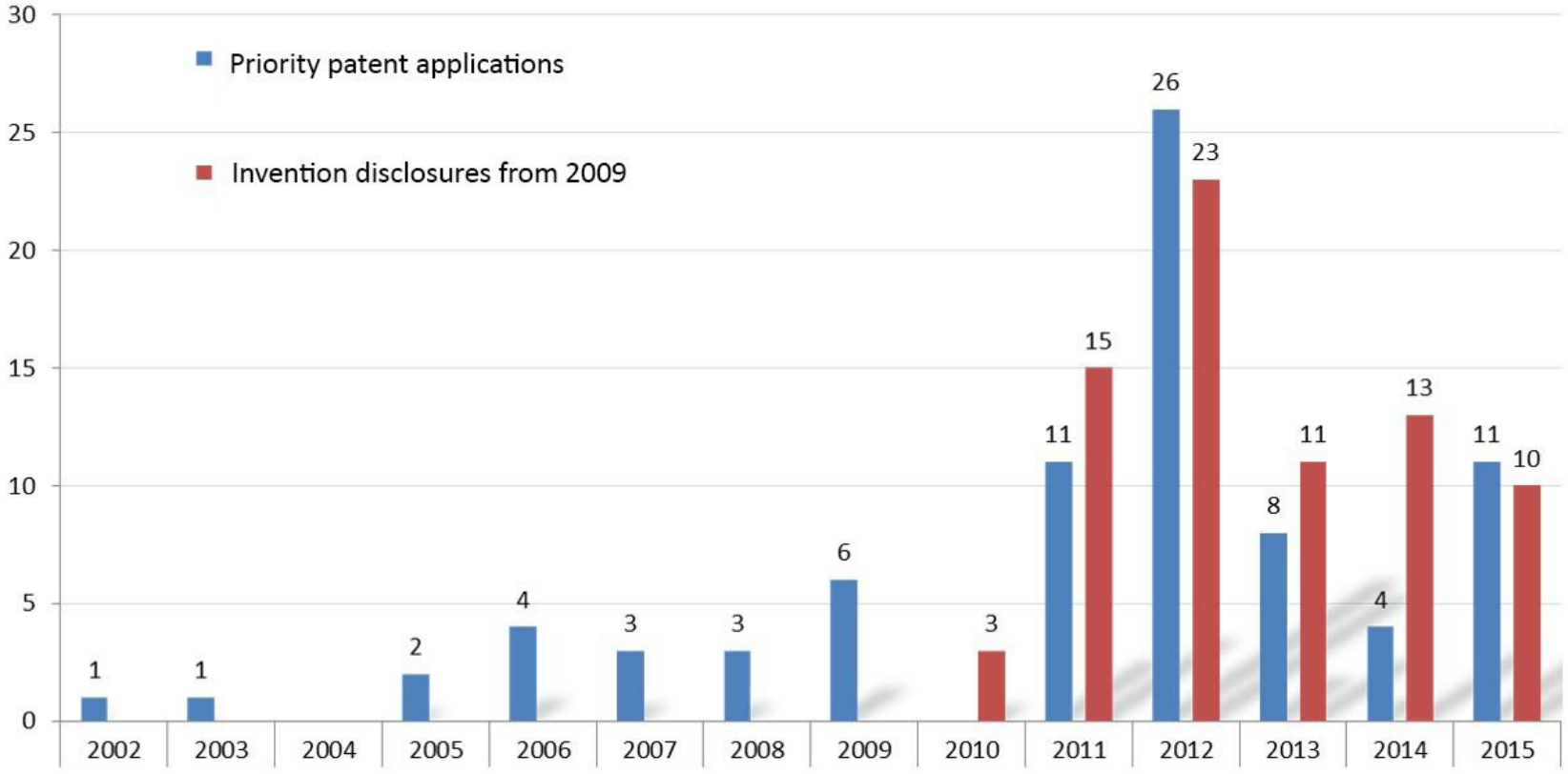
University of Debrecen patent statistics



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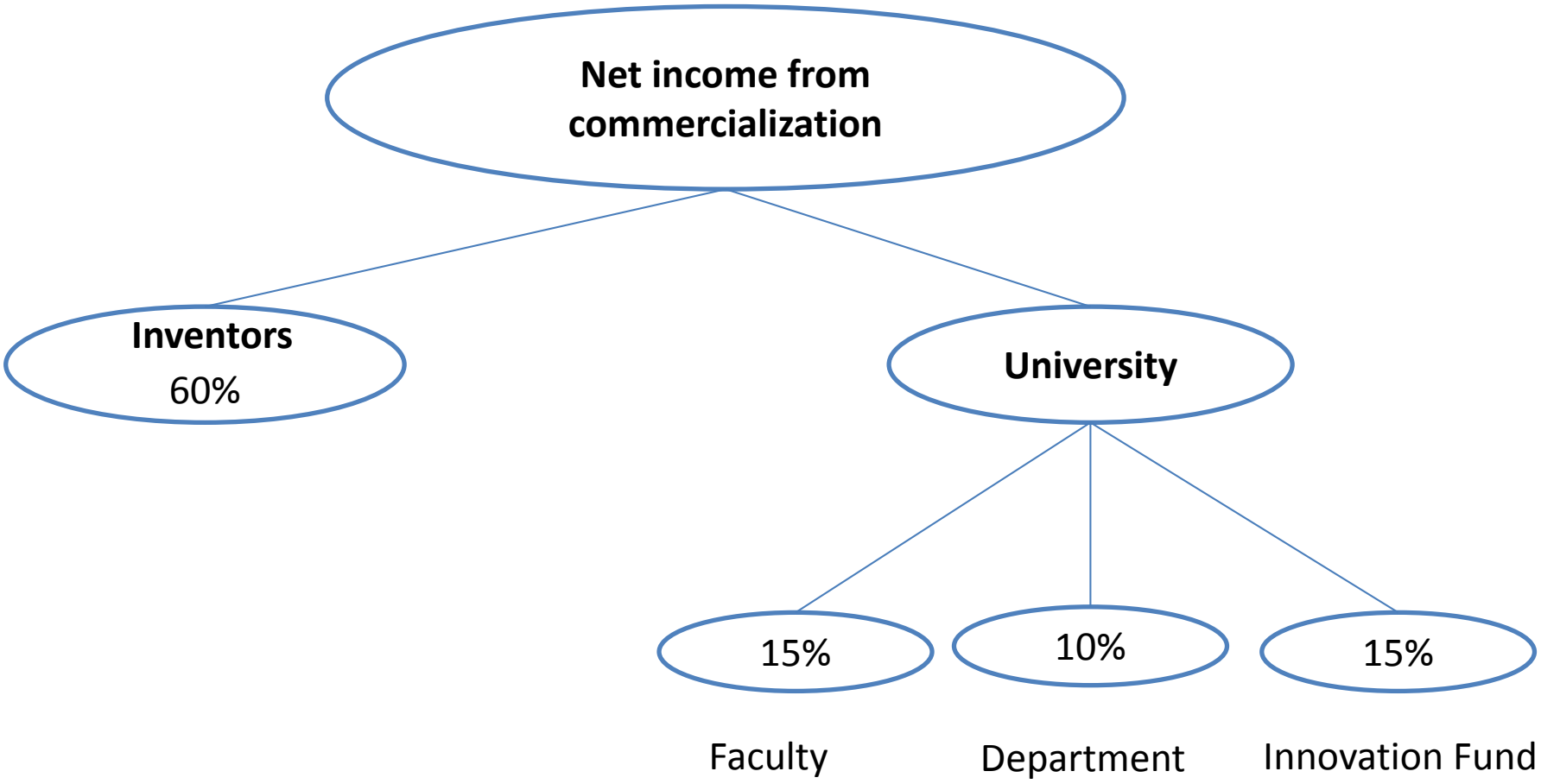
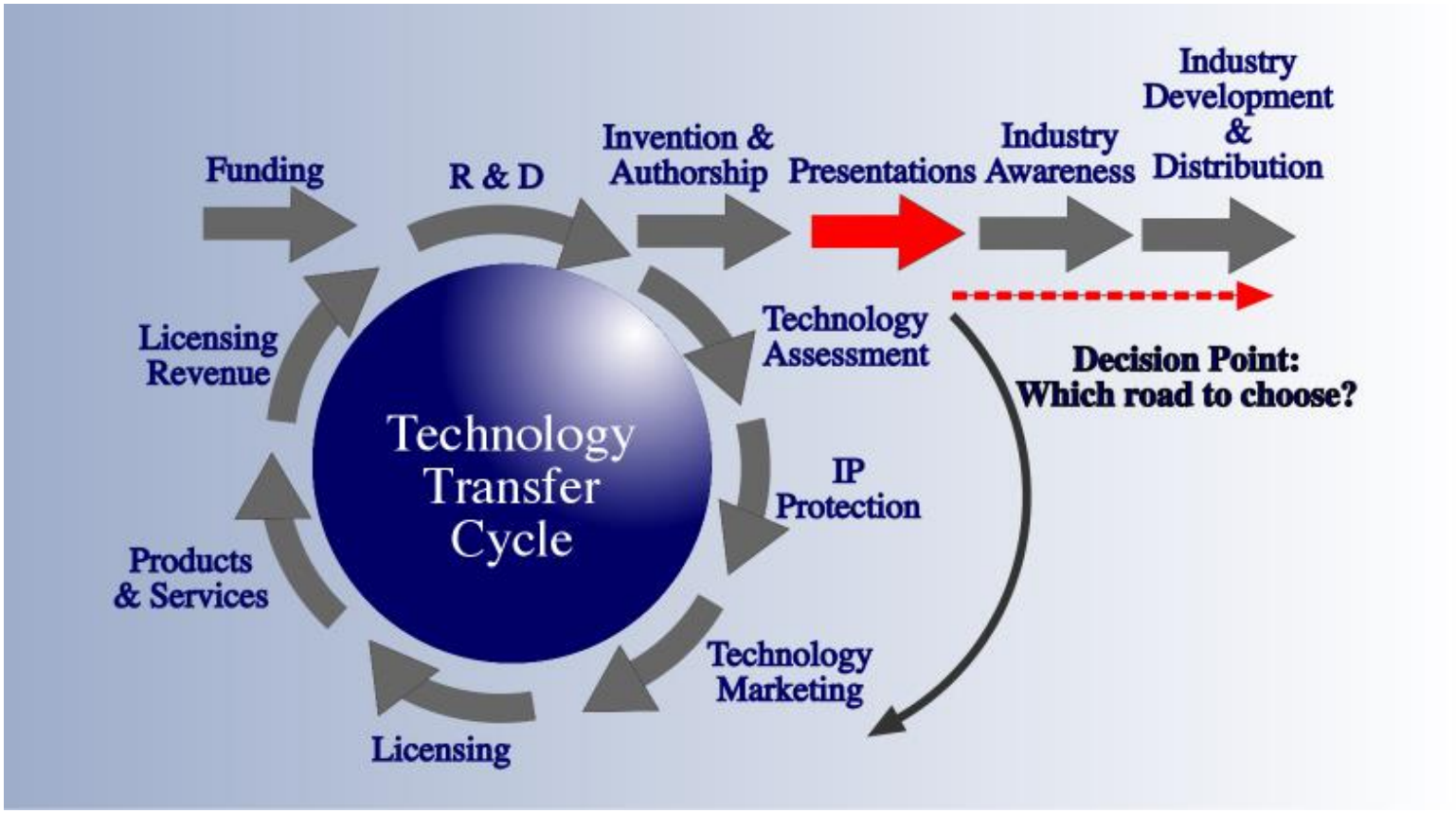
Revenue distribution at University of Debrecen



Net income: patent costs, external costs of commercialization are deducted.

Typical innovation cycle at universities



Source: Cedars-Sinai Medical Center, 2006

Google:
One Start-Up Company

University of Debrecen

Center for Research Commercialization and Technology Transfer

Contact:

Tel: + 36 70 7091486

tbene@unideb.hu

http://techtransfer.unideb.hu

UD TECH TRANSFER