



IUSS

Scuola Universitaria Superiore Pavia

Innovation and the “third mission” of public research organisations and biomedical research

The role of research to generate progress and impact on society

Riccardo Pietrabissa

www.iusspavia.it



Research based innovation:

- generality
- the role of research in the innovation processes
- tools and practices



UNITED STATES PATENT OFFICE.

LOUIS PASTEUR, OF PARIS, FRANCE.

IMPROVEMENT IN BREWING BEER AND ALE.

Specification forming part of Letters Patent No. 135,245, dated January 28, 1873.

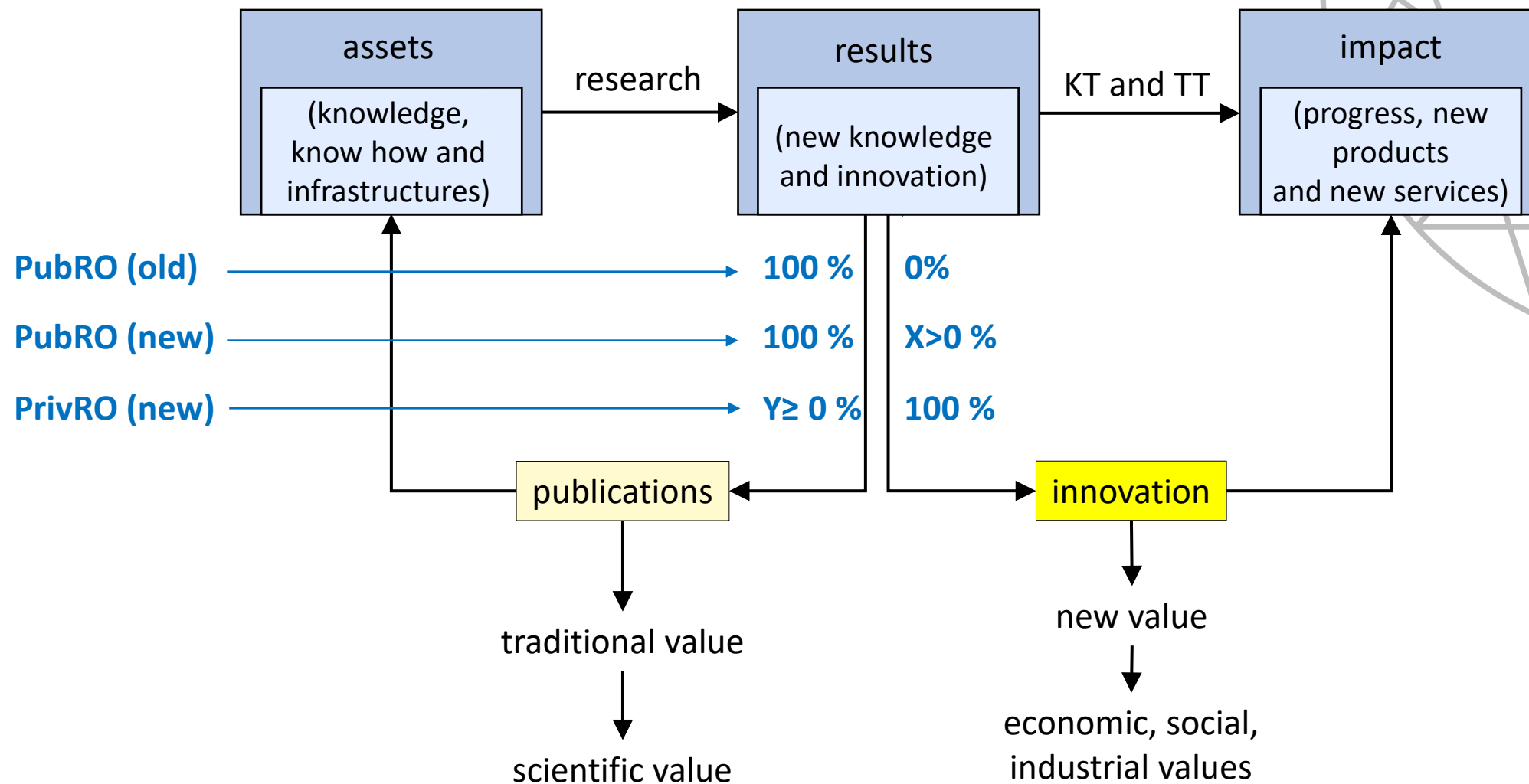
To all whom it may concern:

Be it known that I, LOUIS PASTEUR, of the city of Paris, France, have invented certain new and useful Improvements in the Process of Making Beer, for which Letters Patent were granted to me in France on the 28th day of June, 1871; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing making part of this specification and the letters of reference marked thereon.

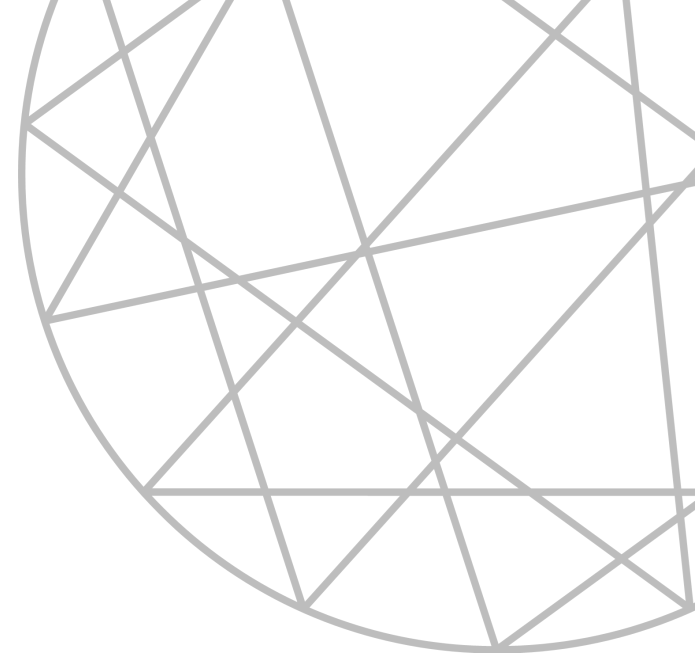
Previous to my invention in the process of making beer it has been customary to permit the exposure of the "wort"—that is, the boiled

having attached to their lower ends flexible tubes or hose s, which in turn carry at their lower extremities spray-nozzles P. Upon a suitable stand or shelf, T, is located an apparatus, M M, for the generation of carbonic-acid gas, which is to be supplied therefrom to the vessels A for purposes to be presently explained, and by means of tubes connected at w to the said vessels. The escape of the gas is permitted through exit or escape tubes at x, which extend siphon-like into water cups or chambers v from whence the gas may be collected in a gasometer.

I have shown the connection of the gas-



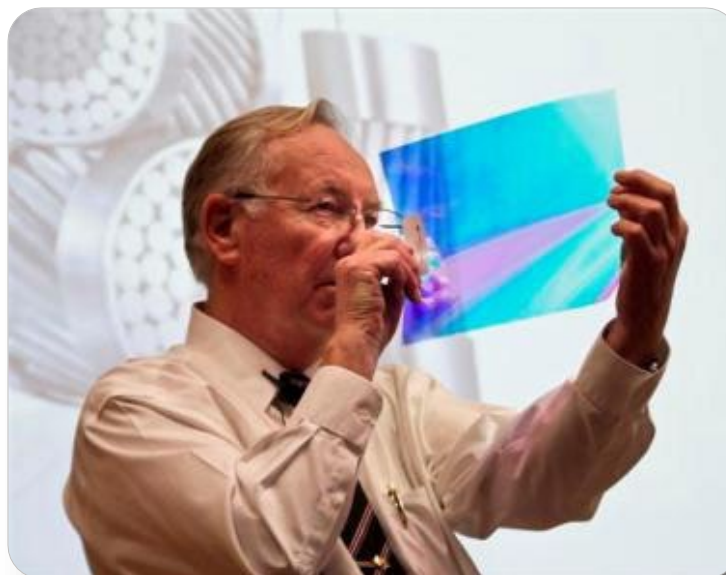
research
innovation
knowledge
impact
valorisation
market
money
company
technology transfer
start-up
spin-off
patent
public
private
progress
product/service/
technology/know how



research
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impact
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company

technology transfer

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product/service/
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Geoffrey C. Nicholson, Geoff, served as Vice President of Corporate Technical Planning and International Technical Operations of 3M Corporation. He served at 3M Corporation from 1963 to 2001. During his career at 3M, he was instrumental in the development of its "Post-it" Notes as well as oversaw 2500 3M employees internationally.



**Imperial College
London**

Department of Chemistry Centenary Lecture on Innovation,
22 February 2007
Innovation: A Survival Issue
Dr Geoff Nicholson

**“...research is the transformation of money into knowledge
and
innovation is the transformation of knowledge into money...”**

research
innovation
knowledge

impact
valorisation

market

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technology transfer

start-up

spin-off

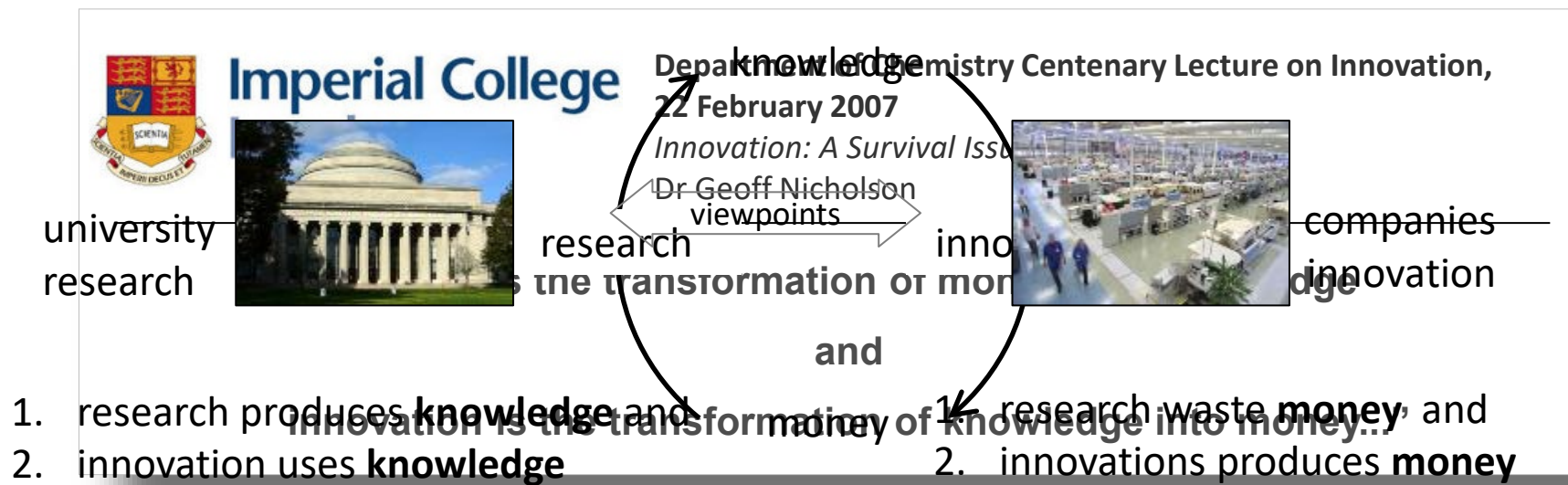
patent

public

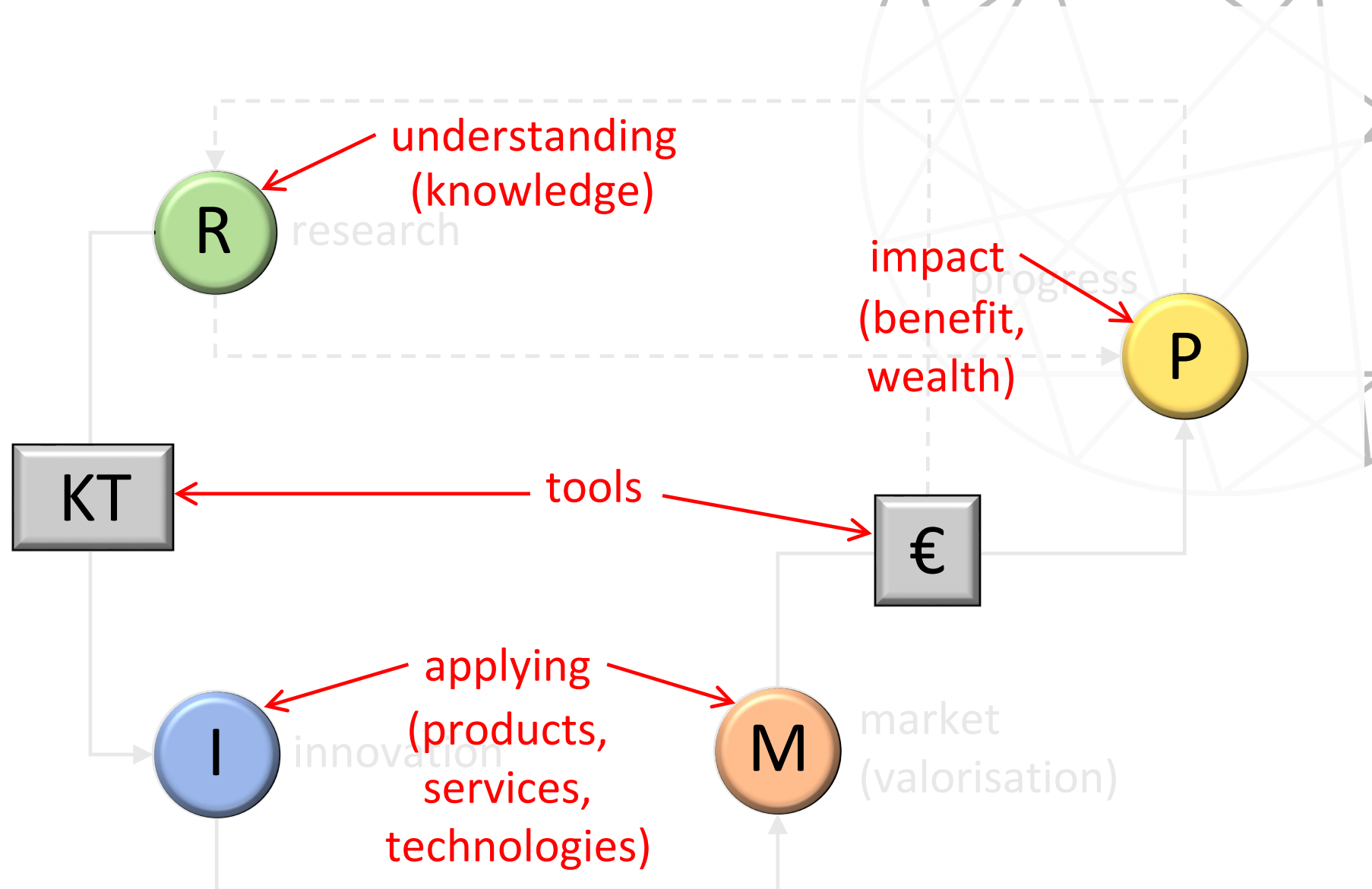
private

progress

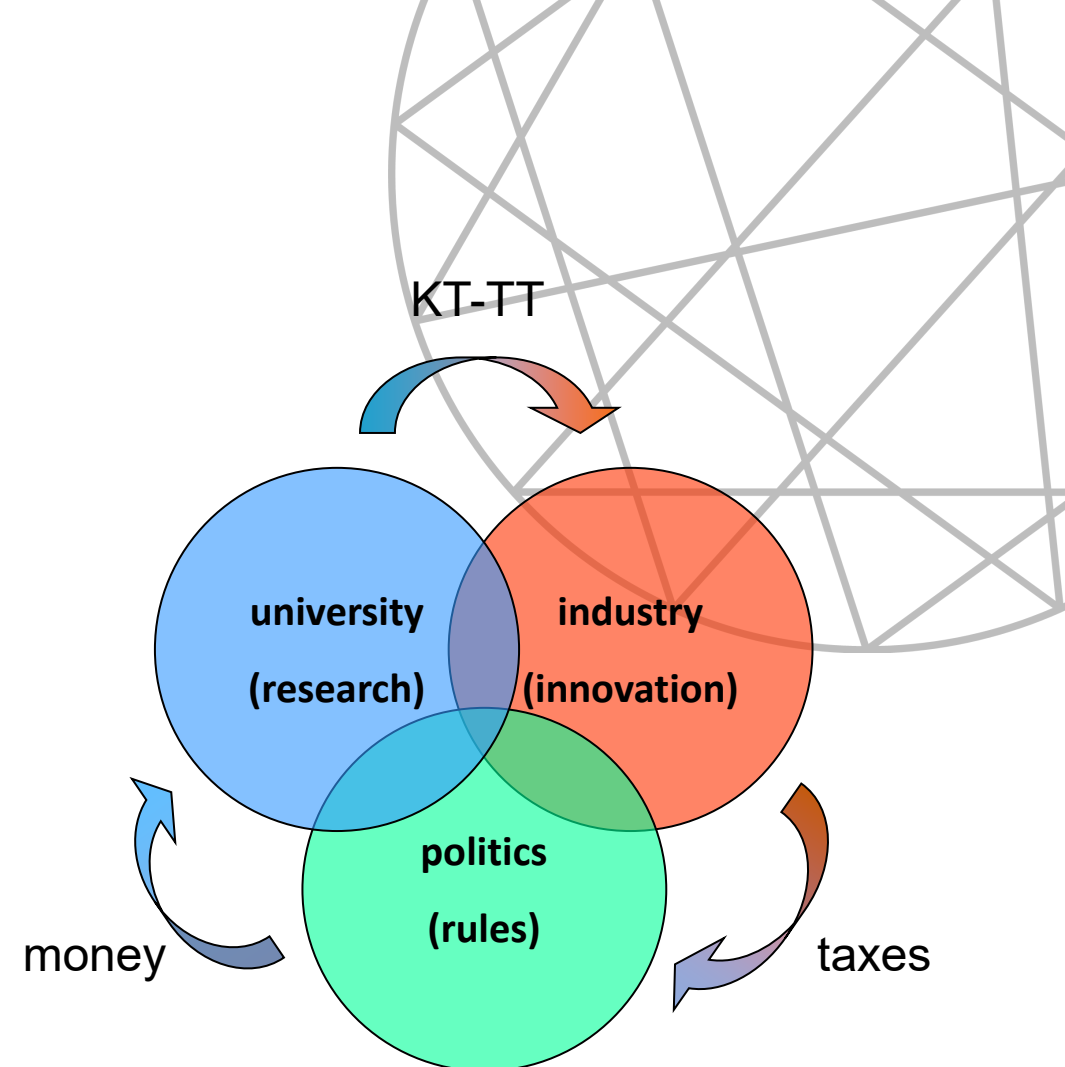
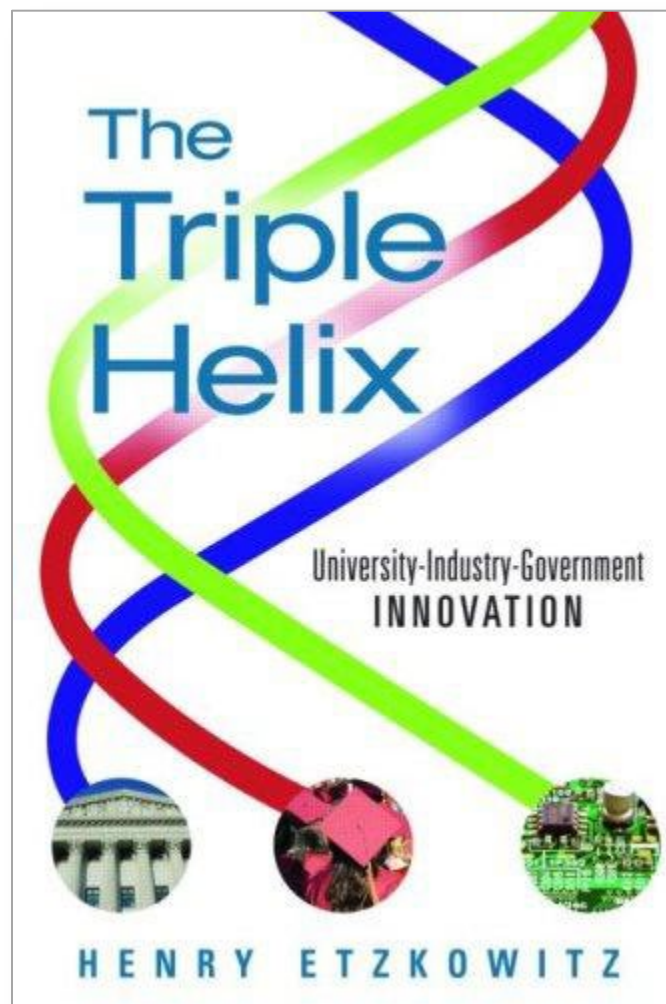
product/service/
technology/know how



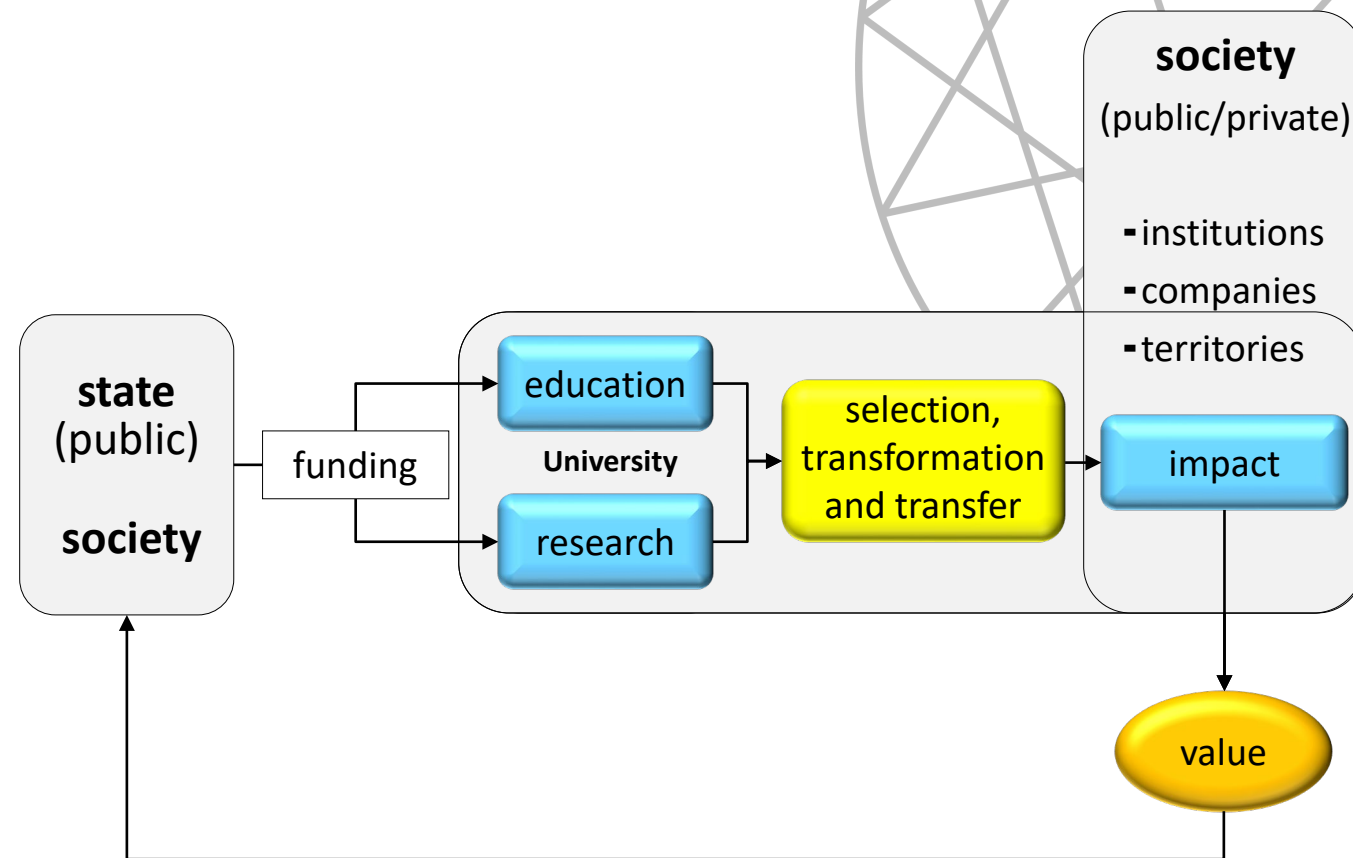
research
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spin-off
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public
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product/service/
technology/know how



research
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impact →
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spin-off
patent
public
private
progress →
product/service/
technology/know how →



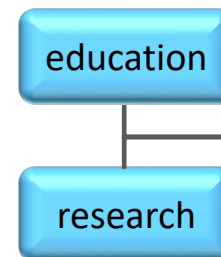
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product/service/
technology/know how

values
stakeholders

traditional:
first and second



tools

autonomy
freedom

students
researchers

missions

new:
third

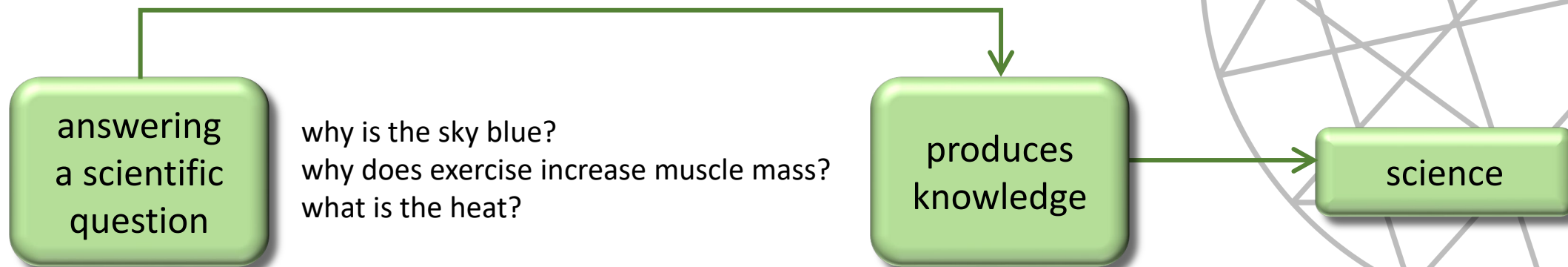


goal (true mission)

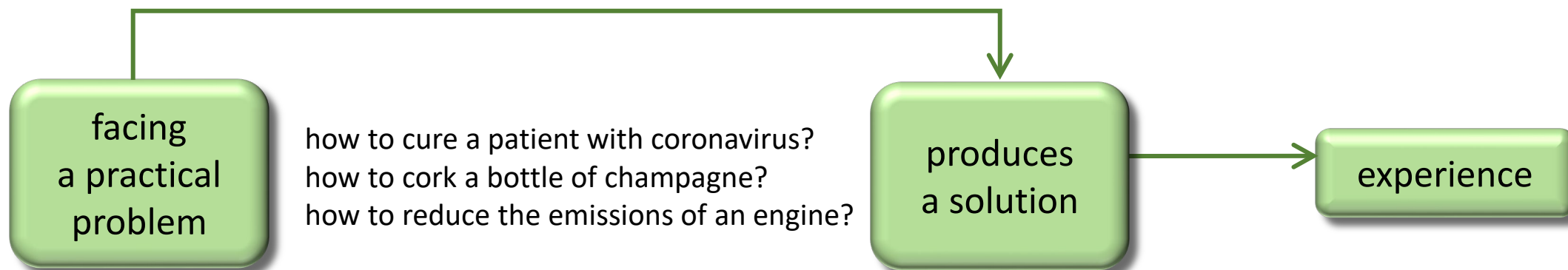
responsibility

society

research



development



research

answering
a scientific
question

why is the sky blue?
why does exercise increase muscle mass?
what is the heat?

produces
knowledge

science

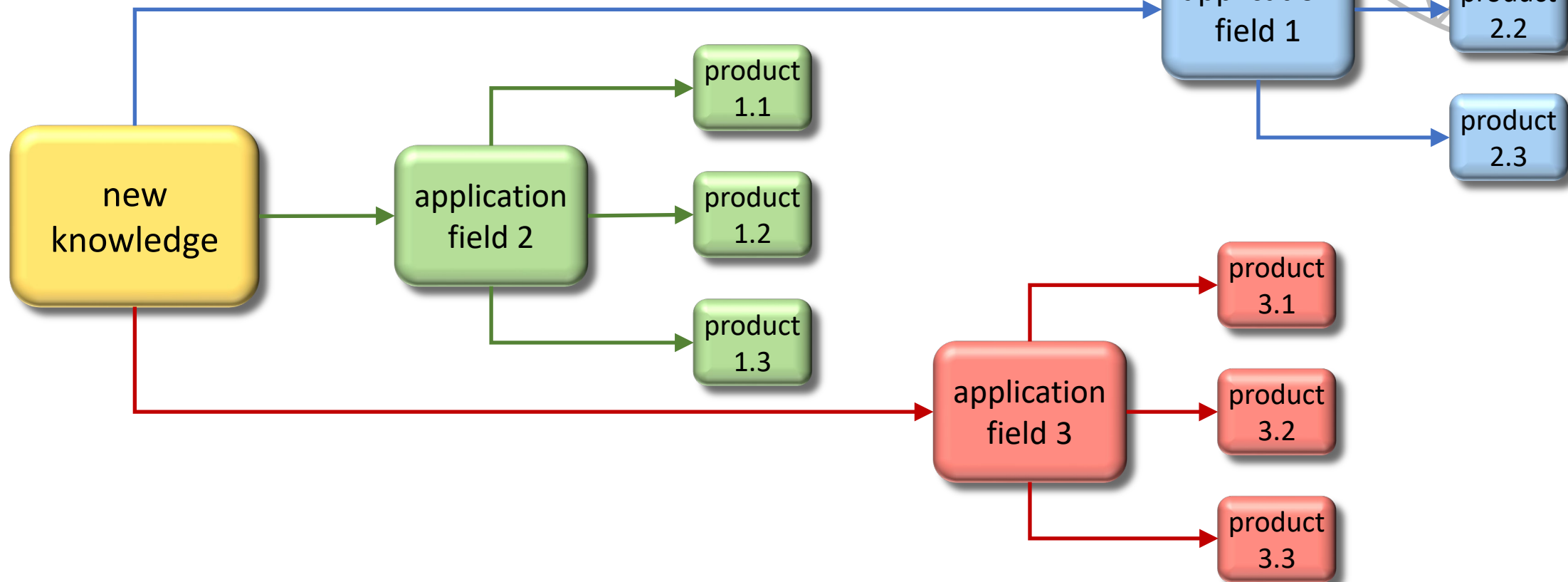
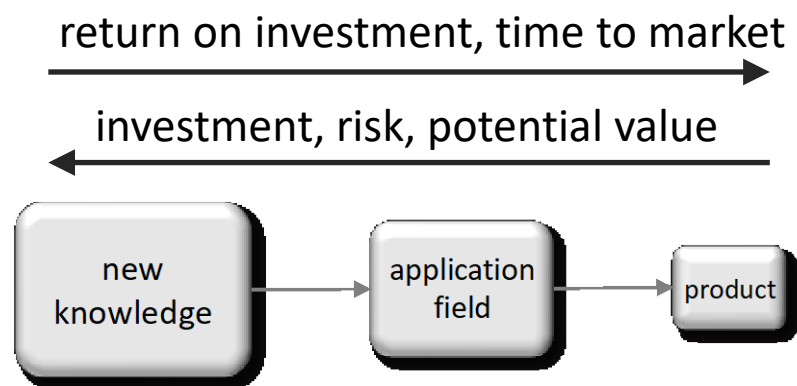
development

facing
a practical
problem

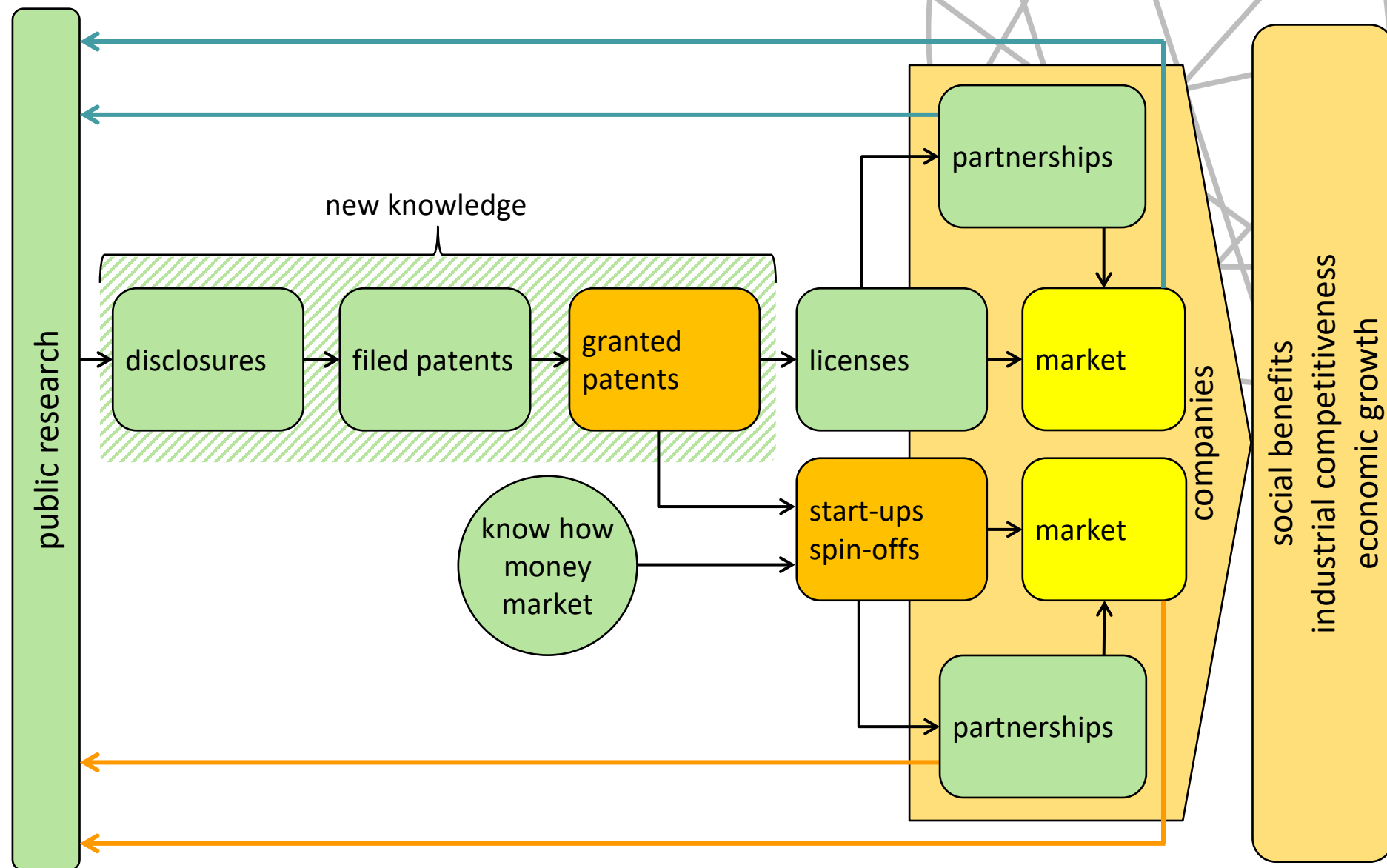
how to cure a patient with coronavirus?
how to cork a bottle of champagne?
how to reduce the emissions of an engine?

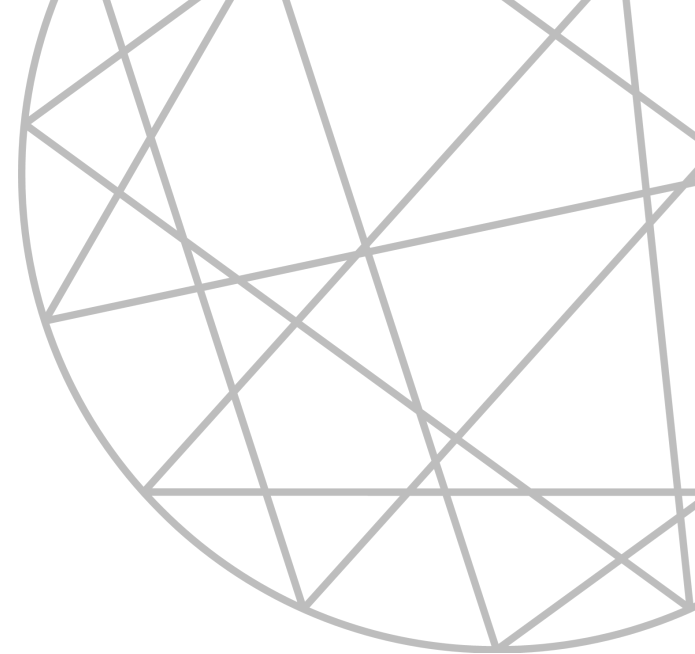
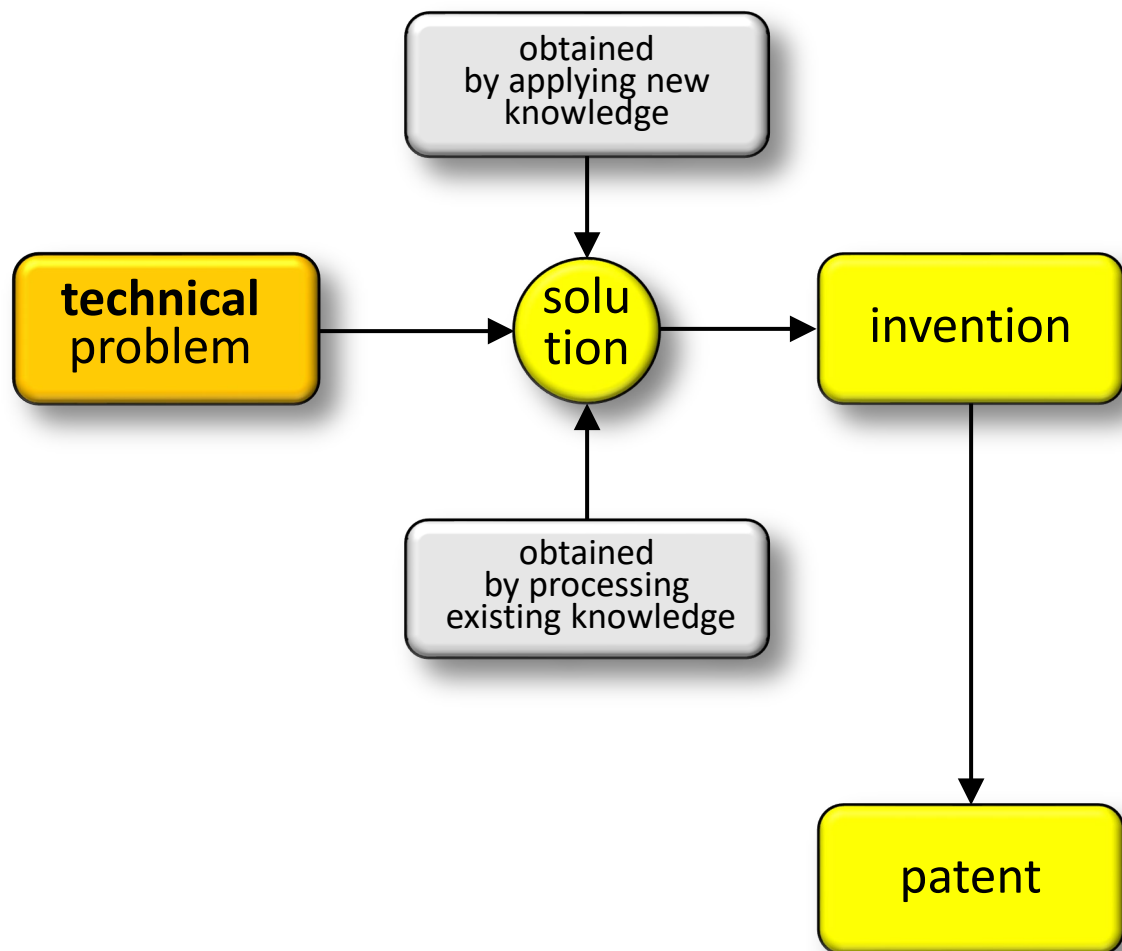
produces
a solution

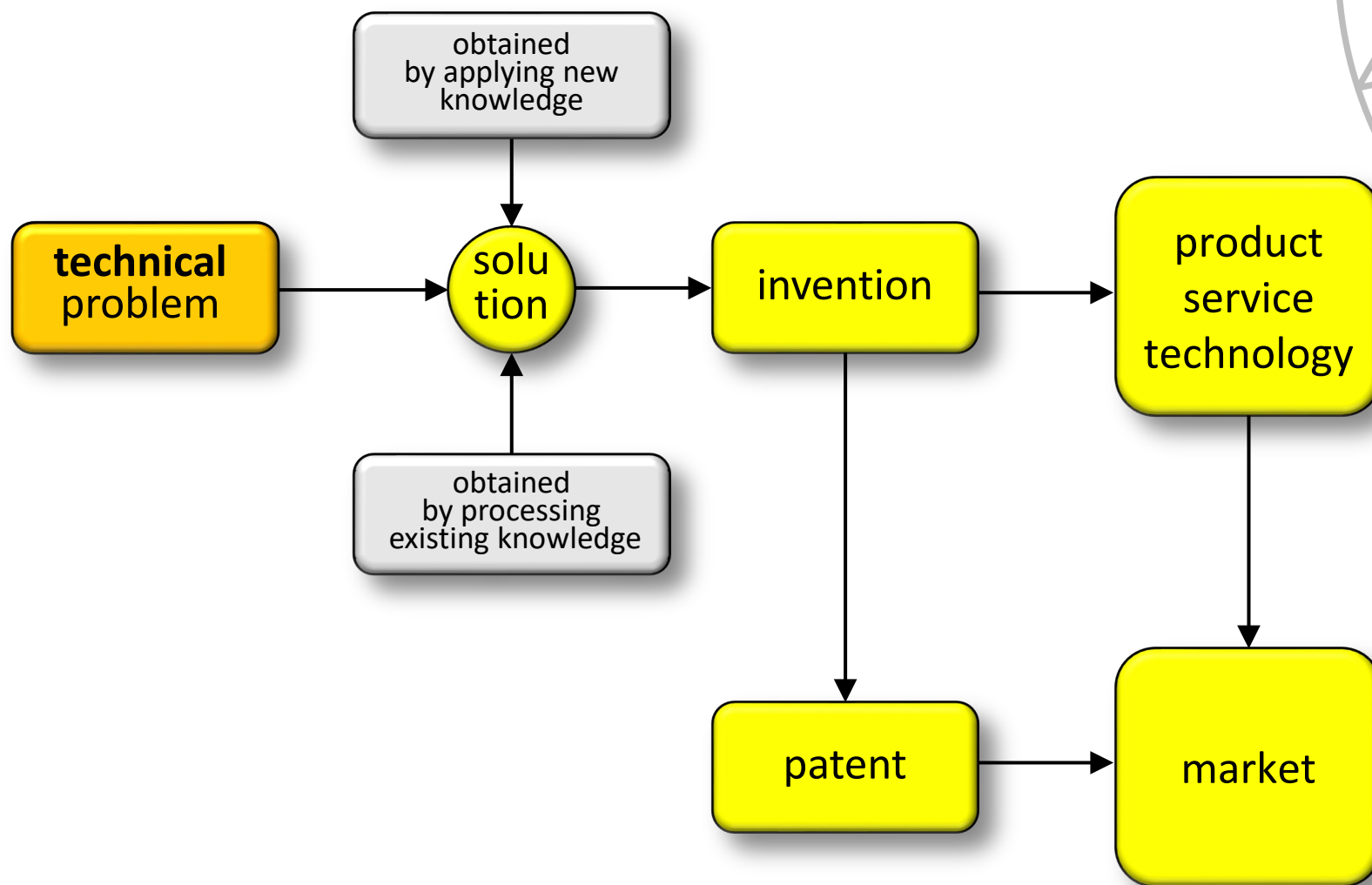
experience

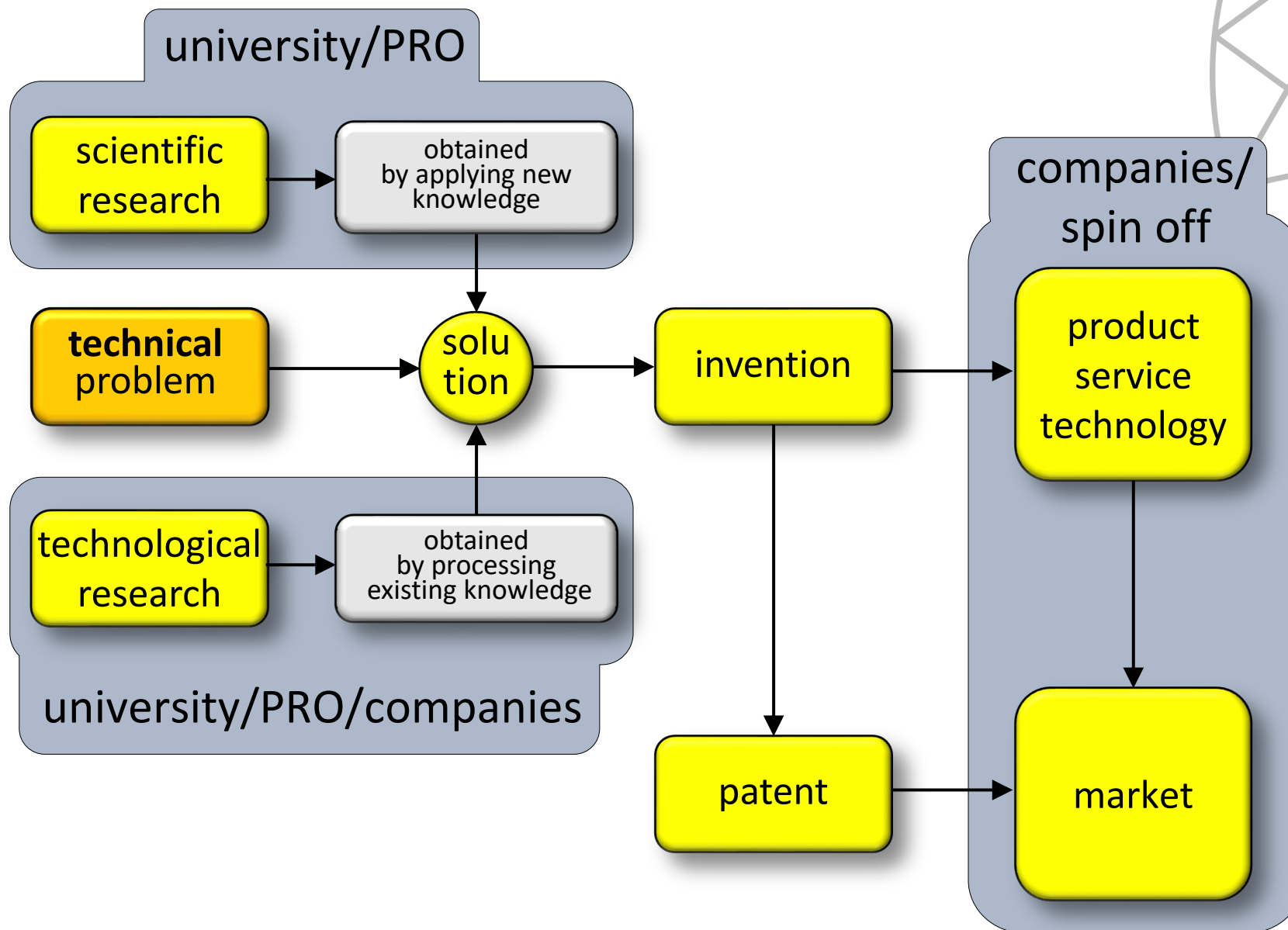


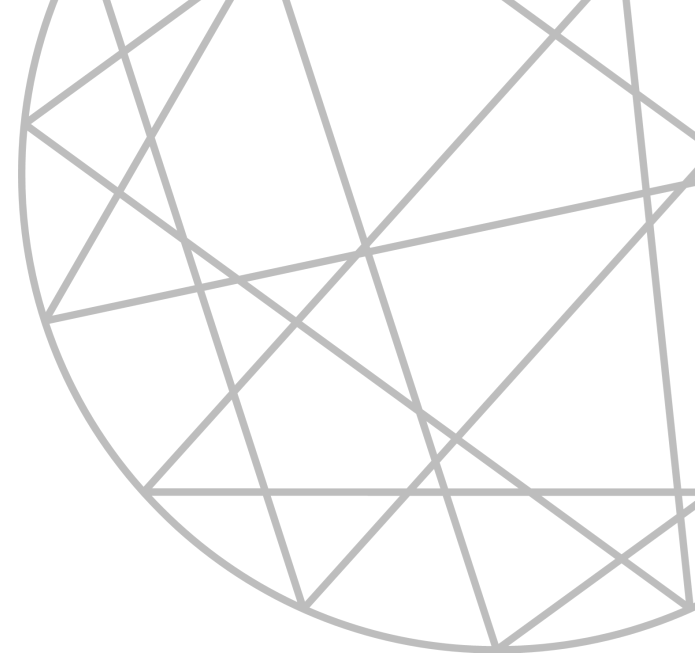
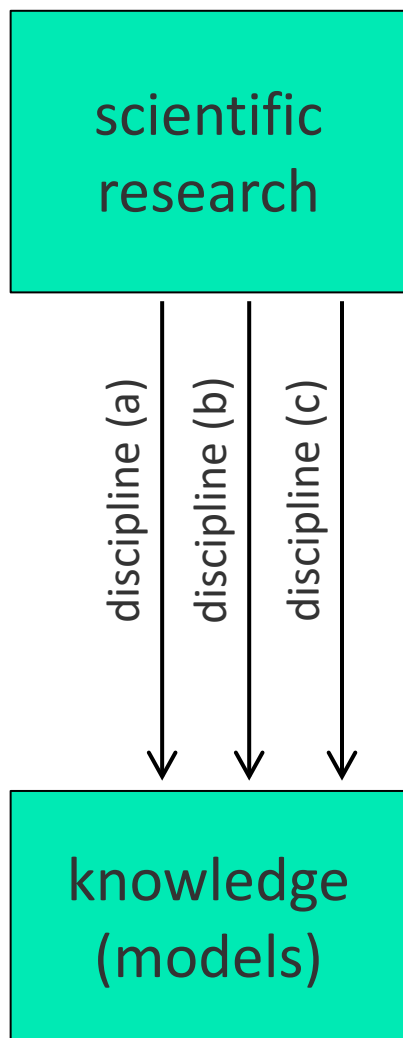
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technology transfer
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progress
product/service/
technology/know how











research:

blue sky research

curiosity driven research

fundamental research

basic research

applied research

finalized research

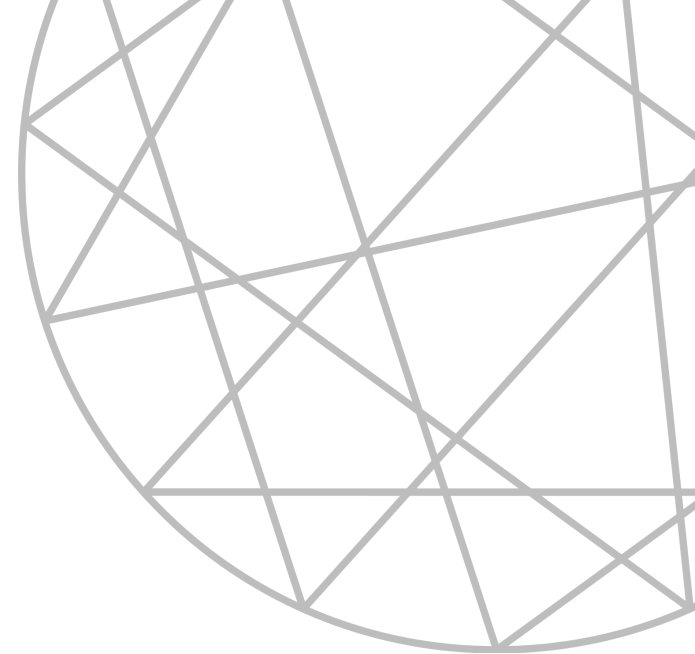
scientific research

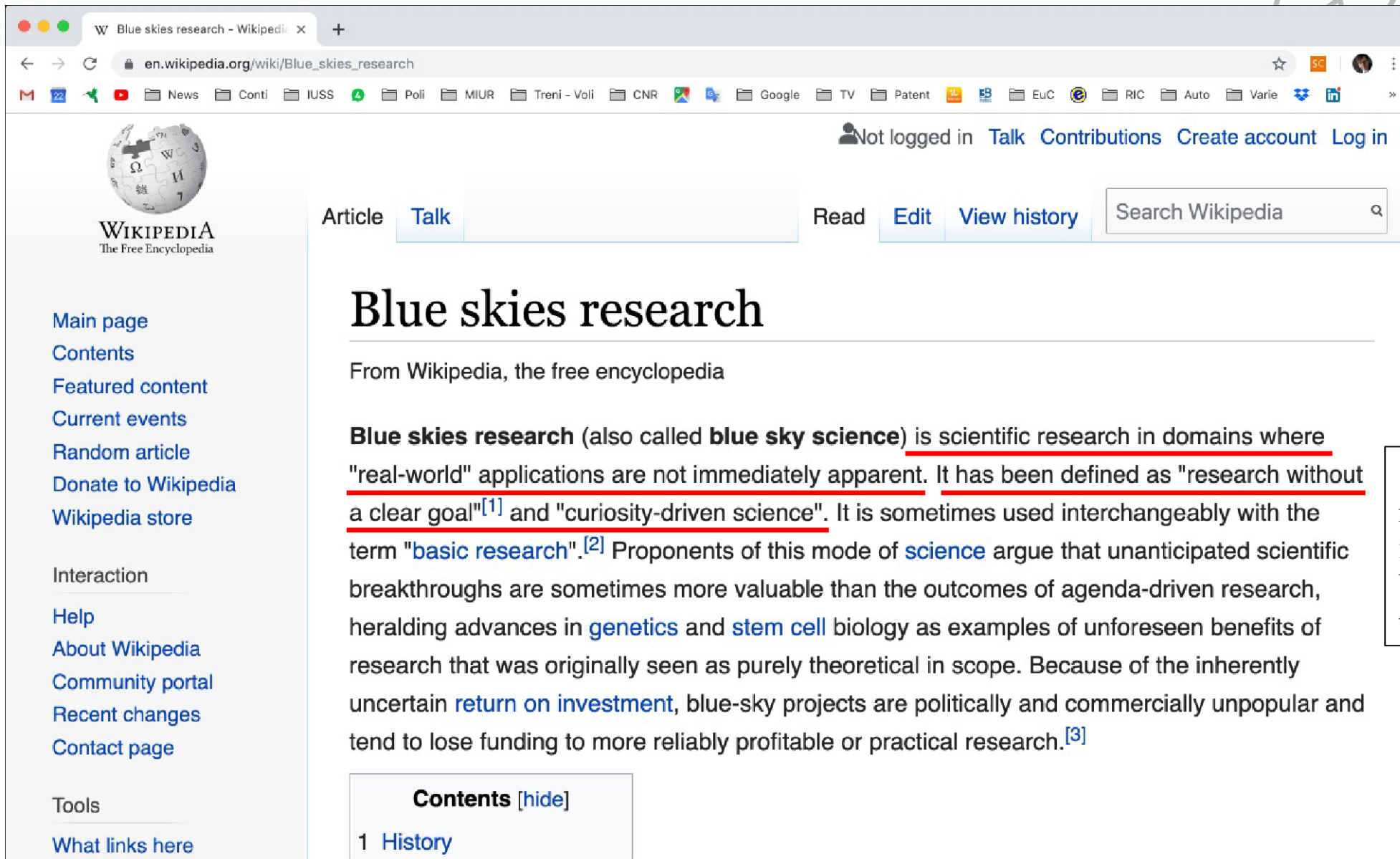
technological research

experimental research

theoretical research

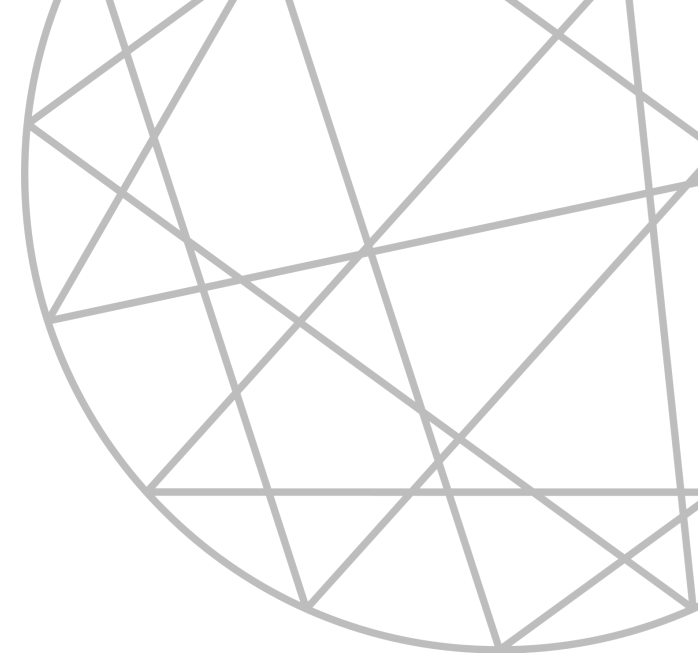
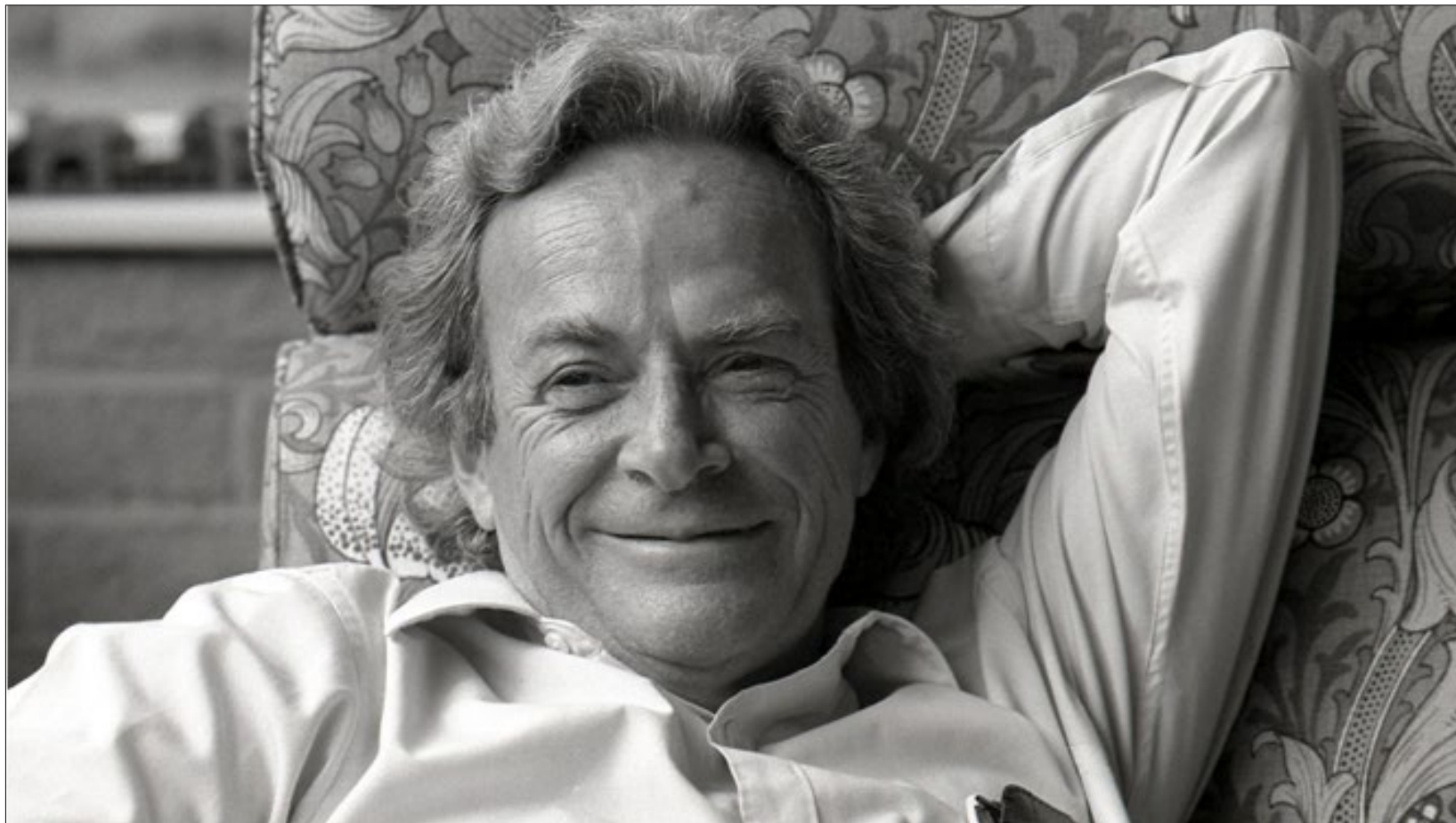
...





The screenshot shows the Wikipedia page for "Blue skies research". The browser's address bar displays "en.wikipedia.org/wiki/Blue_skies_research". The page header includes the Wikipedia logo, the text "WIKIPEDIA The Free Encyclopedia", and navigation links such as "Main page", "Contents", "Featured content", "Current events", "Random article", "Donate to Wikipedia", and "Wikipedia store". The article title "Blue skies research" is prominently displayed, followed by the subtitle "From Wikipedia, the free encyclopedia". The main text of the article begins with "Blue skies research (also called blue sky science) is scientific research in domains where 'real-world' applications are not immediately apparent. It has been defined as 'research without a clear goal'[1] and 'curiosity-driven science'. It is sometimes used interchangeably with the term 'basic research'.[2] Proponents of this mode of science argue that unanticipated scientific breakthroughs are sometimes more valuable than the outcomes of agenda-driven research, heralding advances in genetics and stem cell biology as examples of unforeseen benefits of research that was originally seen as purely theoretical in scope. Because of the inherently uncertain return on investment, blue-sky projects are politically and commercially unpopular and tend to lose funding to more reliably profitable or practical research.[3]". The page also features a "Contents" section with a link to "History".

...a p p l i c a t i o n is
not a motivation
for researchers,
but can be among
the consequences



Richard Feynman
Nobel Prize in Physics 1965

“Physics is like sex:
sure, it may give some
practical results,
but that’s not why we do it.”

Johann Carl Friedrich Gauss (1777 – 1855) has been a German mathematician, astronomist and physicist that gave fundamental contribution to manifold fields of science.



the problem

the solution

$$1 + 2 + 3 + \dots + 98 + 99 + 100 = 5050$$

$$+ \quad + \quad + \quad \quad + \quad + \quad +$$

$$100 \quad 99 \quad 98 \quad \dots \quad 3 \quad 2 \quad 1$$

$$= \quad = \quad = \quad \quad = \quad = \quad =$$

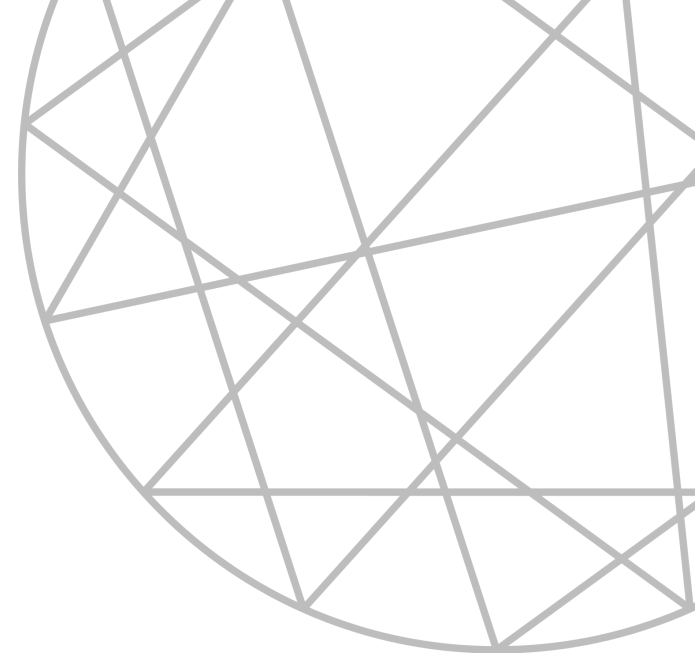
$$101 \quad 101 \quad 101 \quad \dots \quad 101 \quad 101 \quad 101 = (101 \times 100)/2 = 5050$$

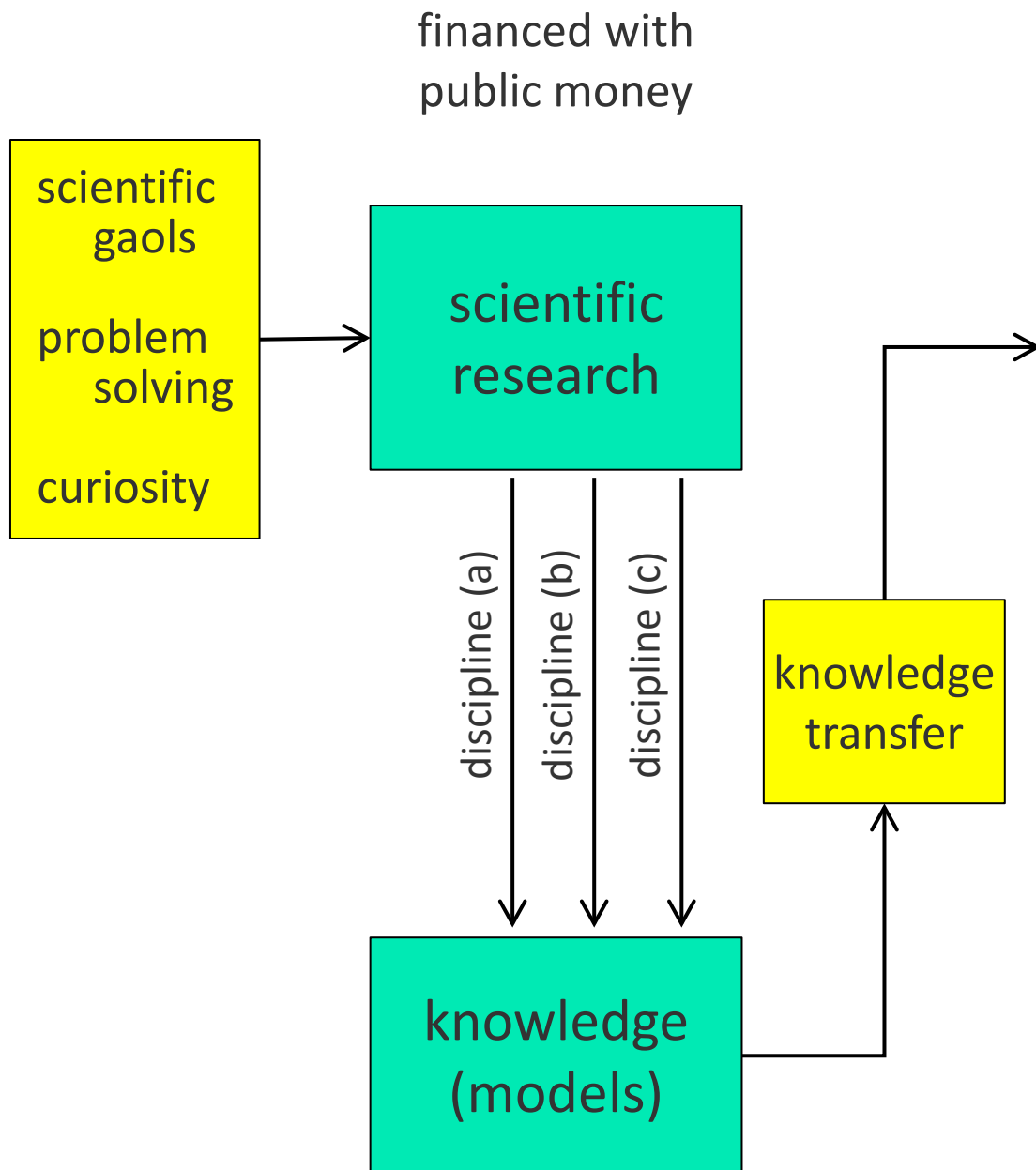
new method or new problem?

the generalisation – new knowledge

$$\sum_{n=1}^i n = \frac{(i+1) \times i}{2}$$

$$\sum_{n=a}^b n = (a+b) \times (b-a+1)/2$$

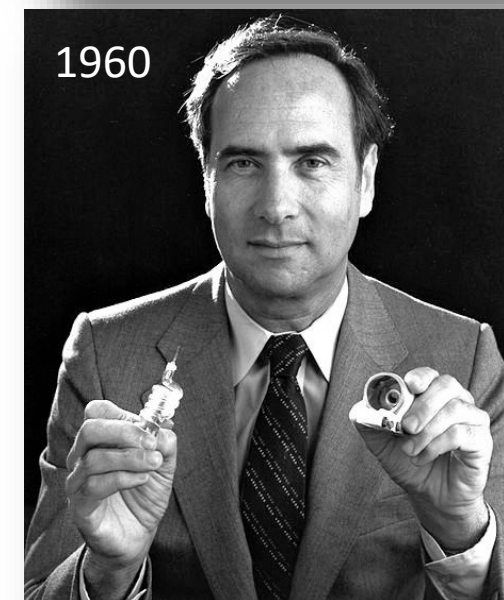
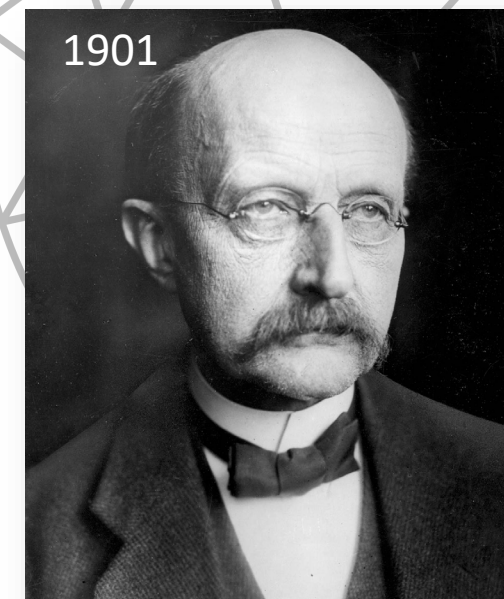


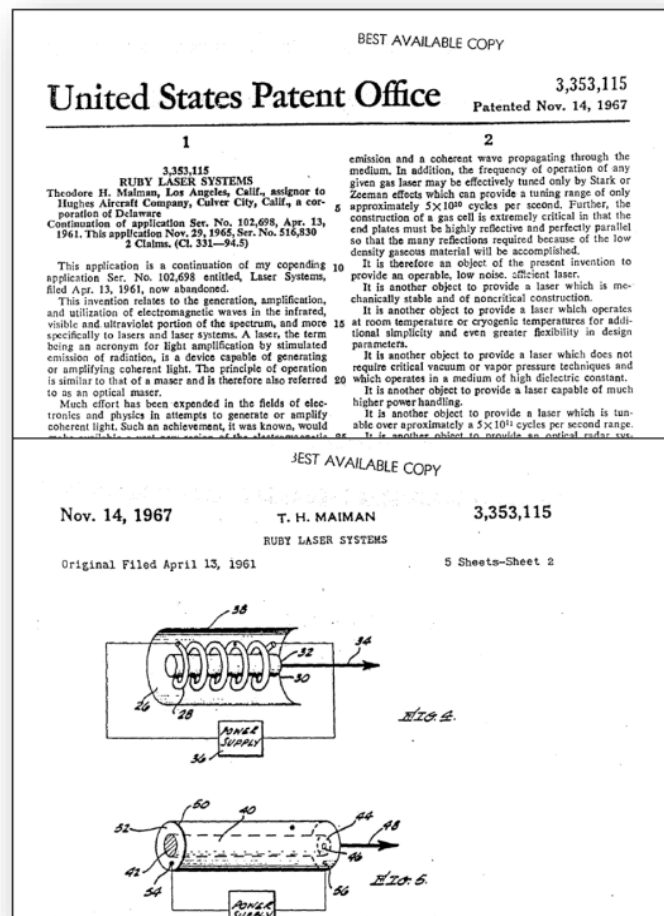


the scientific research is:
independent
disciplinary
financed with public money

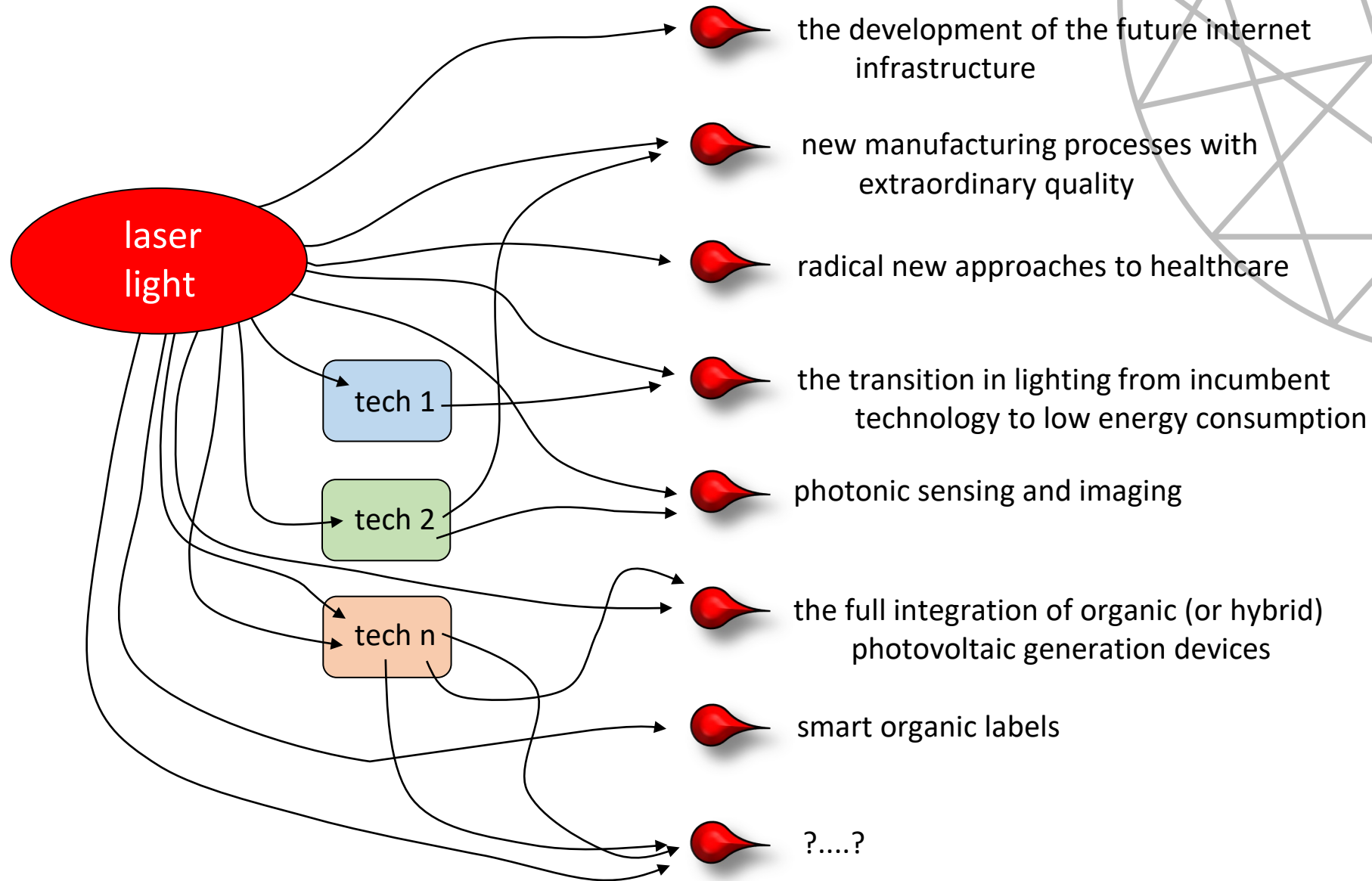
is the new knowledge:
useful?
when?
how?

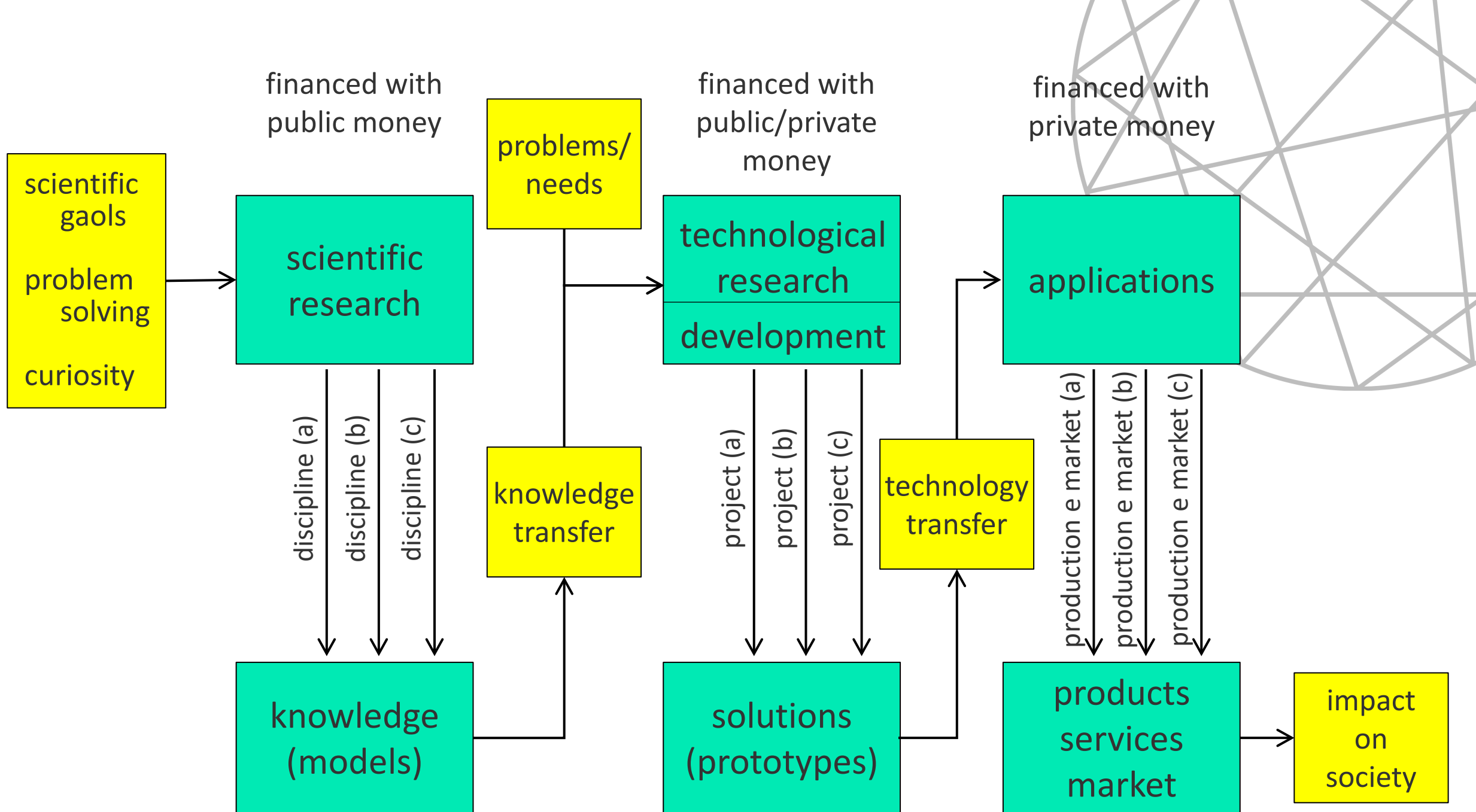
- 1901 [Max Planck](#)'s law of radiation was first proposed. →
- 1917 [Albert Einstein](#) established the theoretical foundations for the [laser](#) and the [maser](#) in the paper "*On the Quantum Theory of Radiation*".
- 1928 [Rudolf W. Ladenburg](#) confirmed the existence of the phenomena of stimulated emission and negative absorption.
- 1939 [Valentin A. Fabrikant](#) predicted the use of stimulated emission to amplify "short" waves.
- 1959 [Alfred Kastler](#) (Nobel Prize for Physics 1966) proposed the method of [optical pumping](#), experimentally confirmed, two years later, by Brossel, Kastler, and Winter
- 1953 [Charles Hard Townes](#) produced the first microwave amplifier operating on similar principles to the laser.
- 1959 Gordon Gould used the term LASER in the paper "*The LASER, Light Amplification by Stimulated Emission of Radiation*". Gould suggested possible applications for a laser, such as [spectrometry](#), [interferometry](#), [radar](#), and [nuclear fusion](#).
- 1960 [Theodore H. Maiman](#) operated the first functioning laser. The laser was born. →

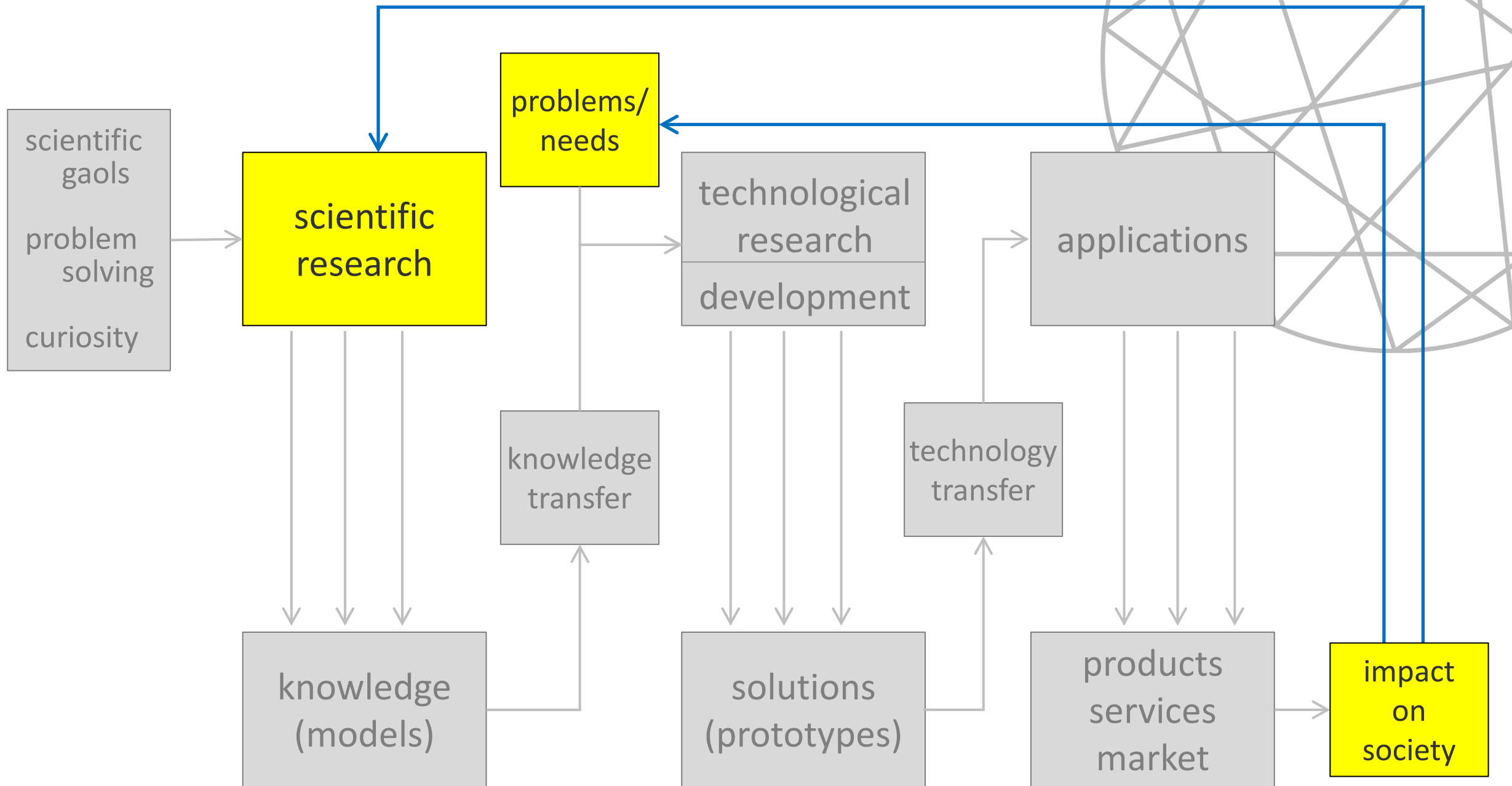




years	IP with "laser"
<'50	1
1950-59	5
1960-69	2894
1970-79	13910
1980-89	78955
1990-99	123817
2000-09	169759

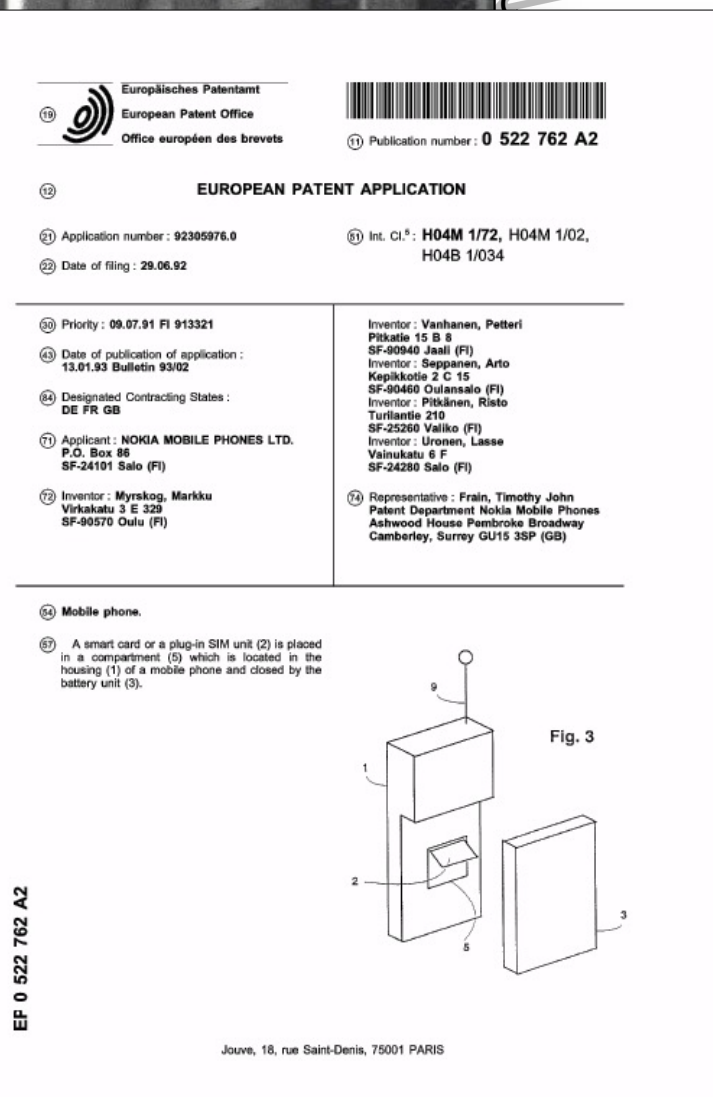
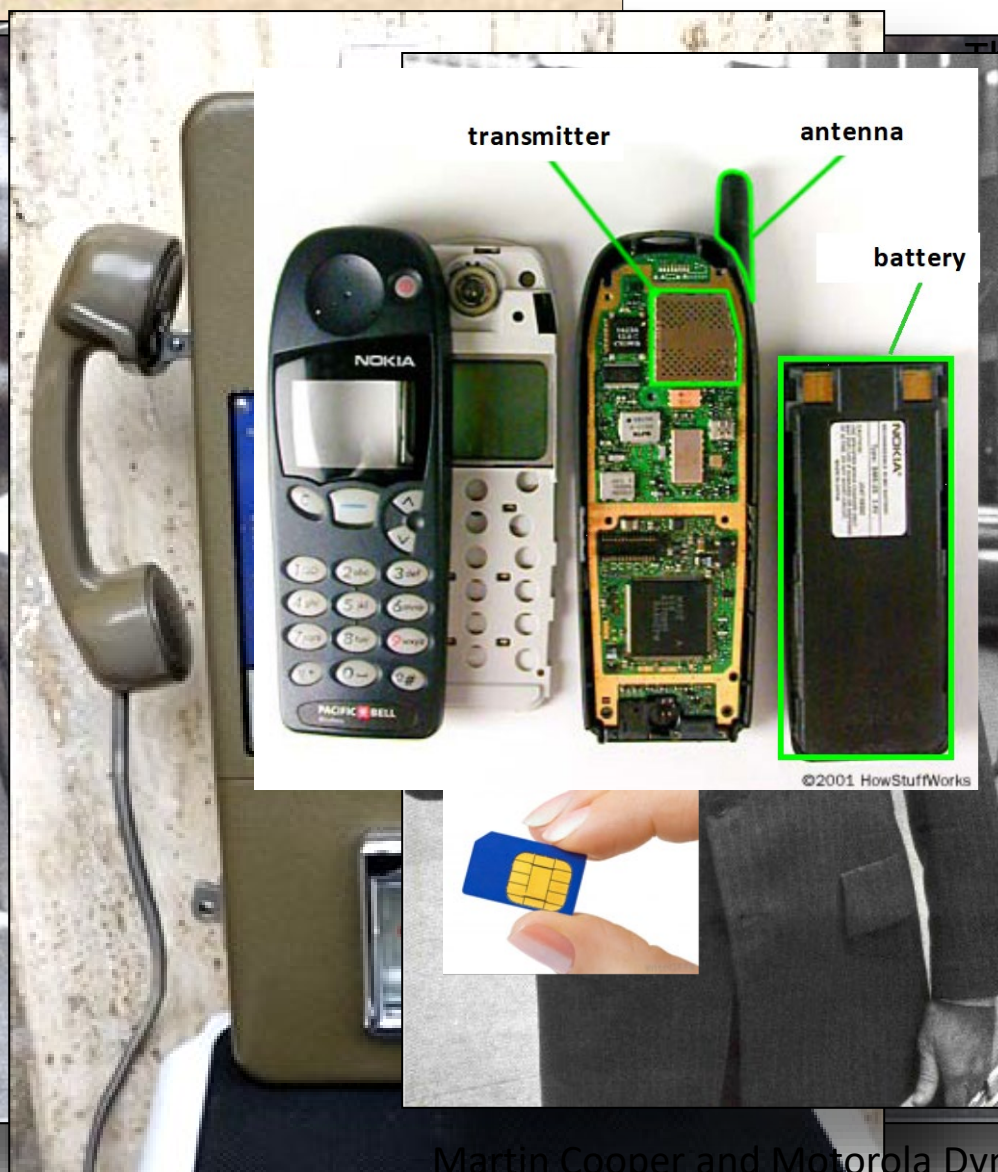






1857-1871 → 1899 → 1930 → 1952 → 1973 → 1991

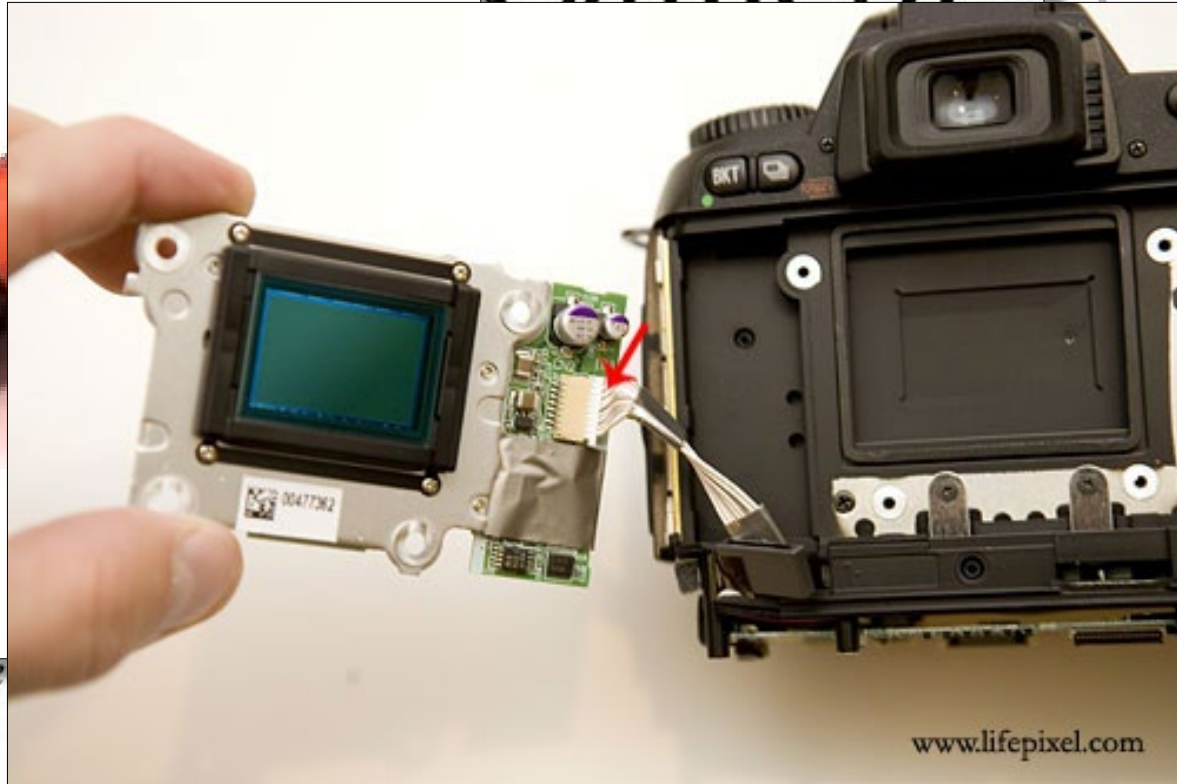
When
"Bea
"You
"Wh



Martin Cooper and Motorola DynaTAC, 1973

1837 → 1888 → 1930 → ...1980... → 1986

The Kodak Camera



www.lifepixel.com

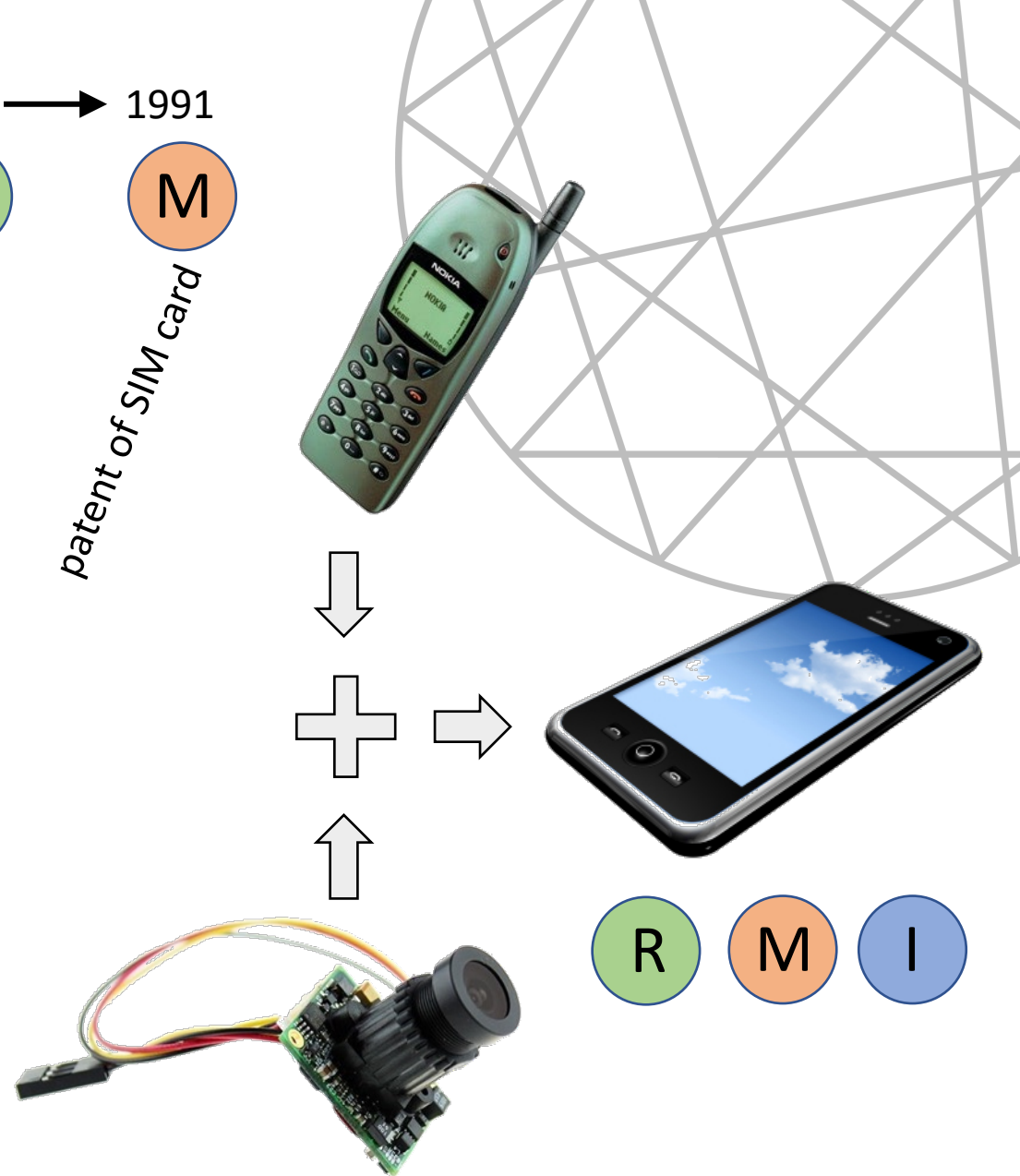
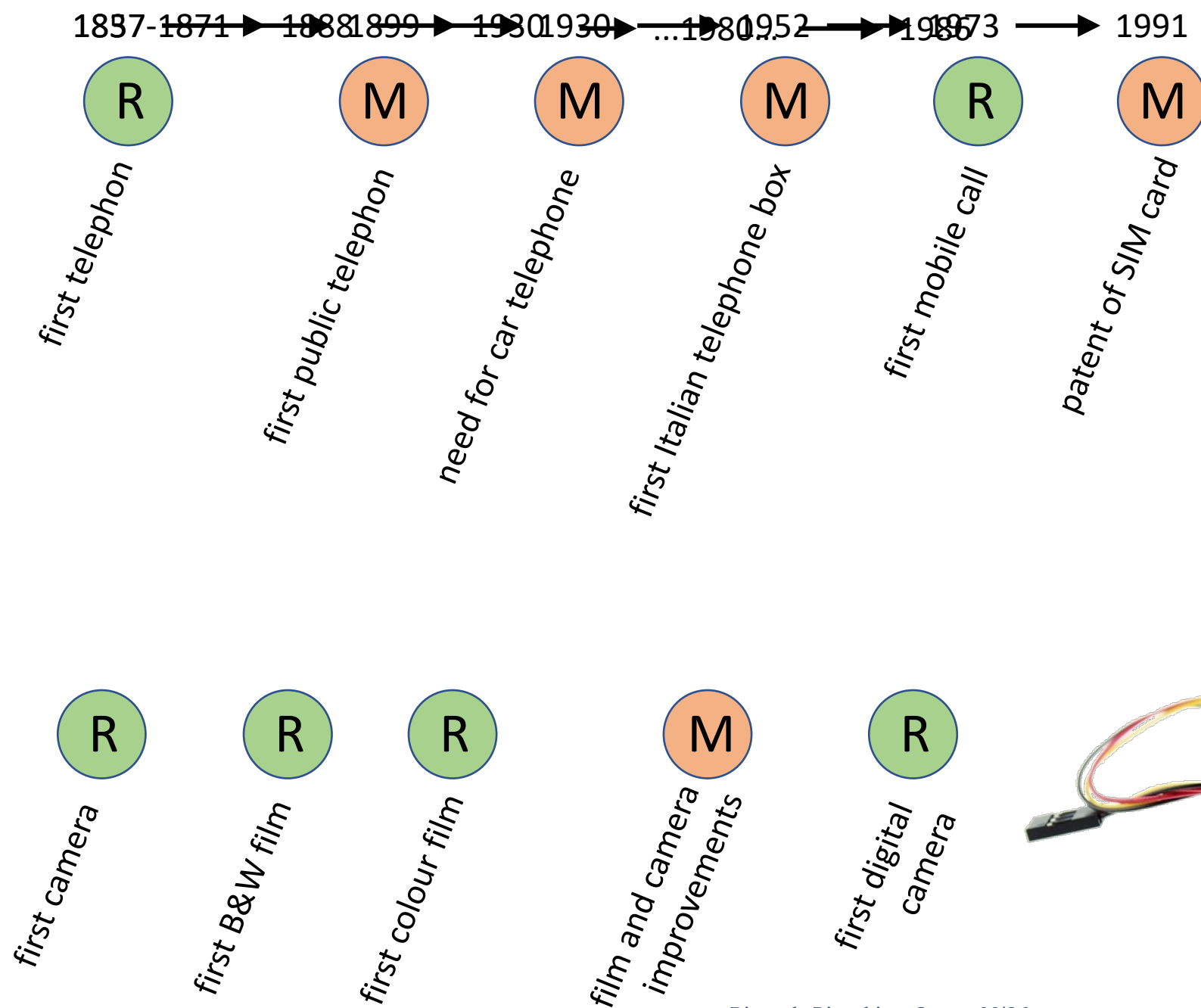
The Kodak

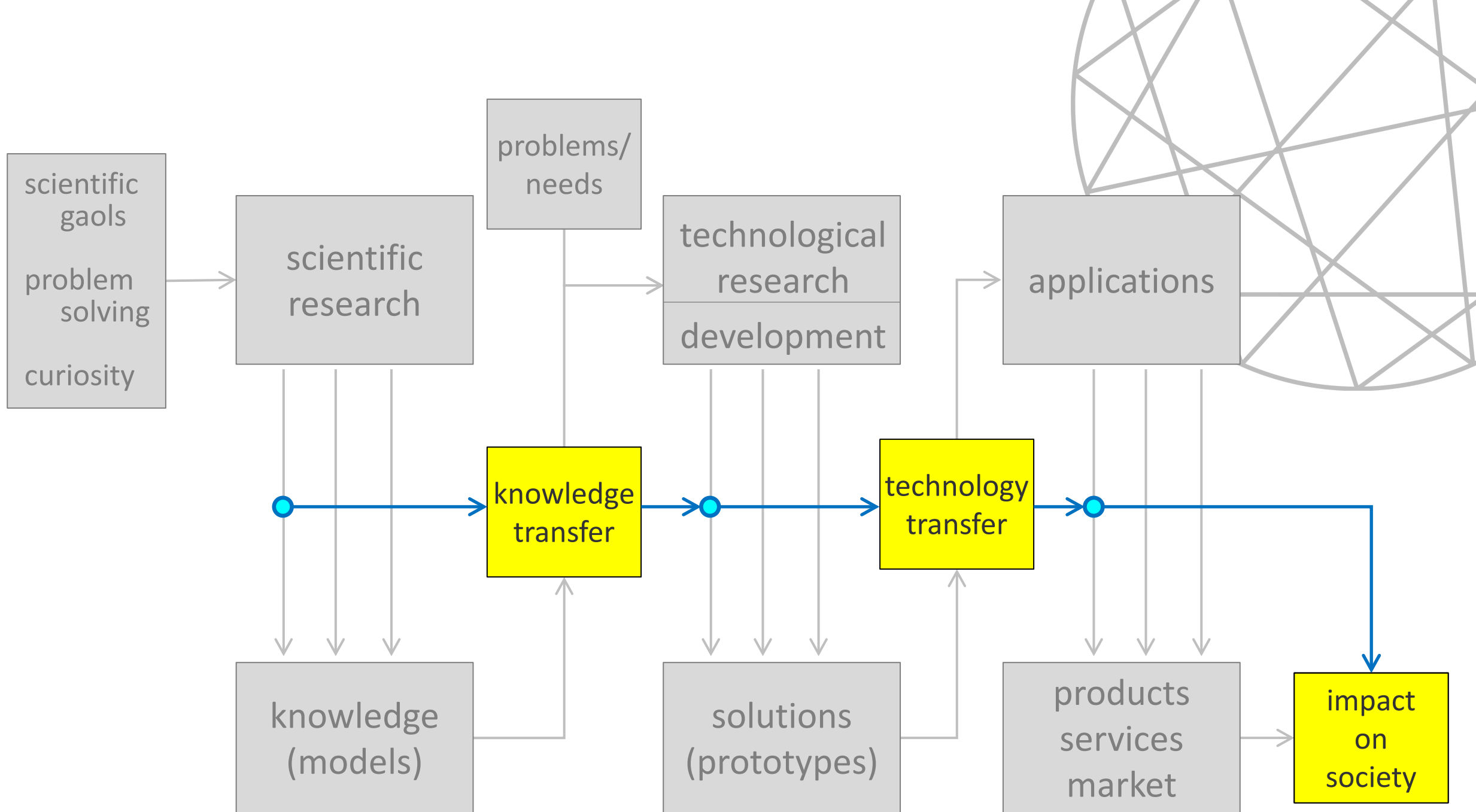
The Eastman Dry Plate & Film Co.

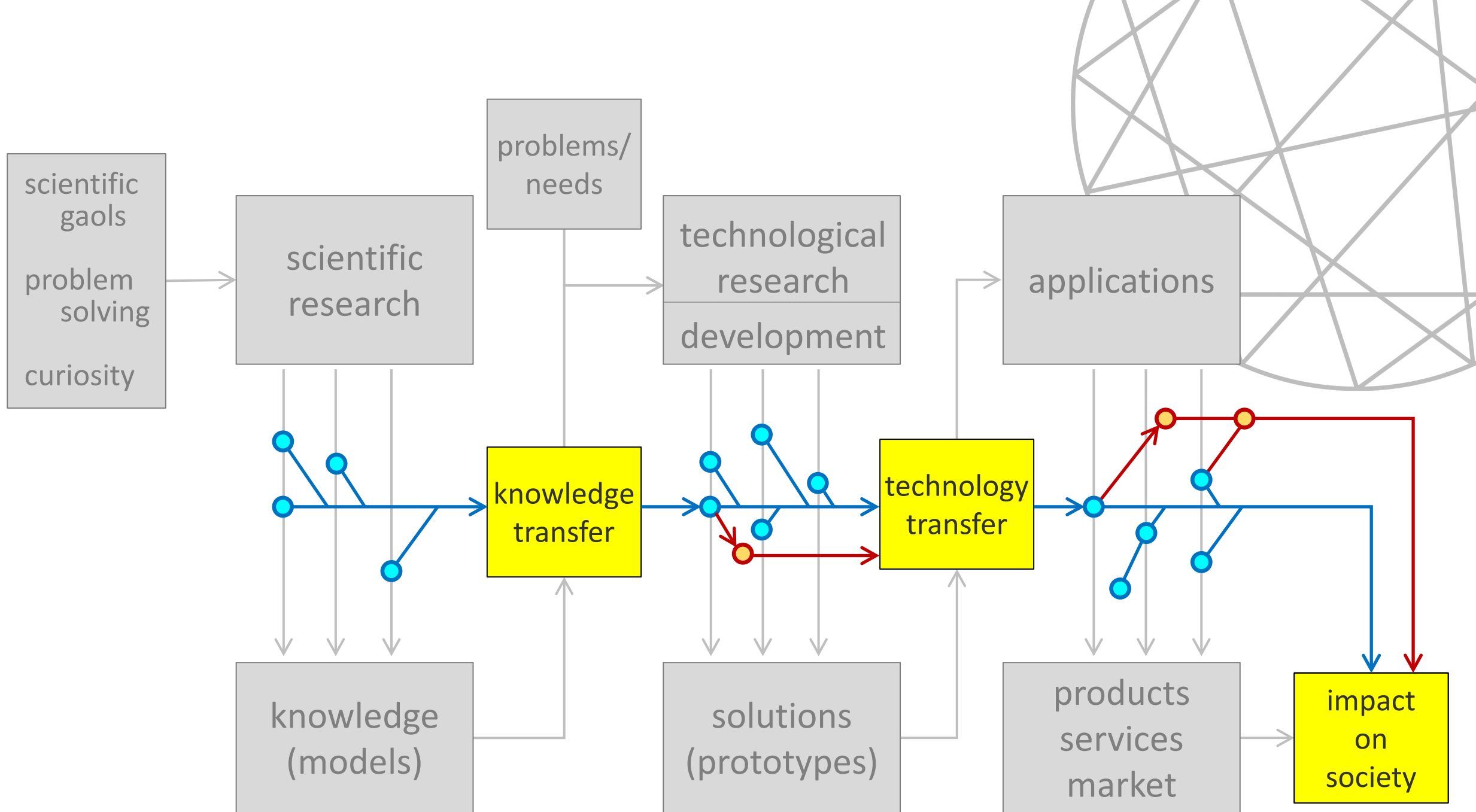
Price, \$25.00 — Loaded for 100 Pictures.

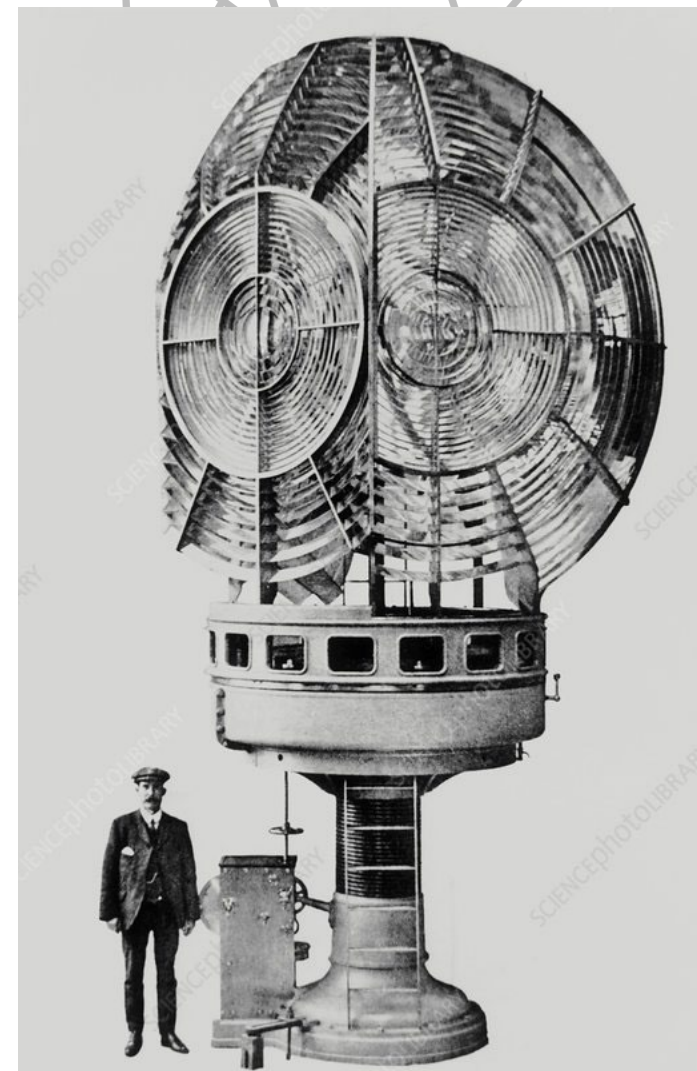
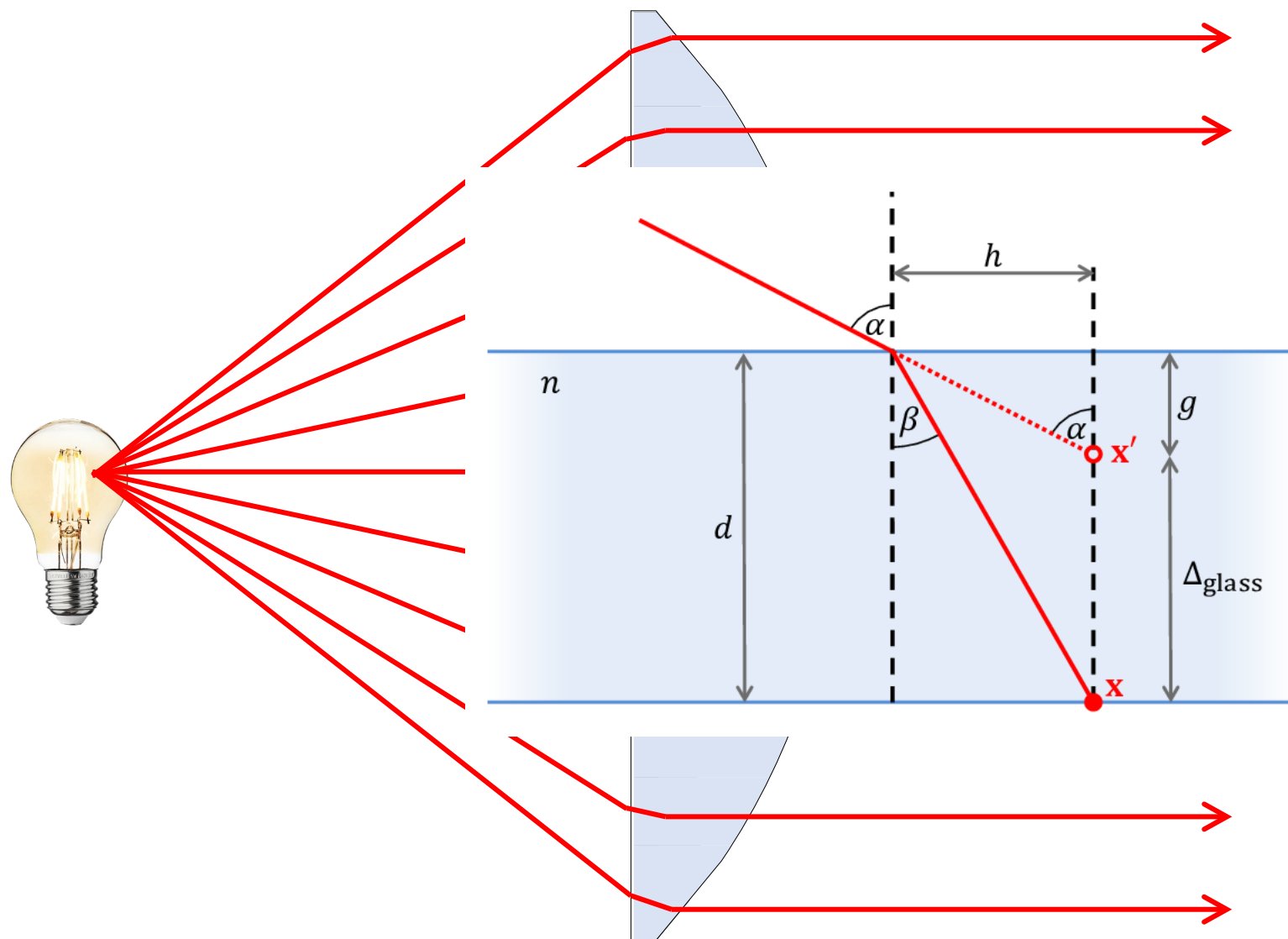
Re-loading, \$2.00.

ROCHESTER, N. Y.









lighthouse

Fresnel lens

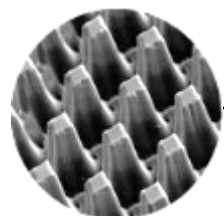


projection (from material to device):

1. microreplication
2. transparent film
3. projection
4. cold projection
5. digital projection



3M



fissaggio

connettori
elettrici

per CD ROM

floptical

magneto optical

elettricità e
elettronica

chiusure
meccaniche

superfici
strutturate sensibili

superfici
controllo fluidi

materiali

adesivi
riposizionabili

adesivi ad alte
prestazioni

biadesivi ad
alte prestazioni

adesivi

abrasivi micro
strutturati

prodotti abrasivi
performanti

abrasivo
Trizact

abrasivi

microprisma
riflettente

pell. catadiottrica
Diamond Grade

scotchlite
Diamond Grade

marker
(occhi di gatto)

pellicola
fluoro-rifrangente

rifrangenti

lente di
Fresnel

segnali interamente
illuminati

linea
di luce

candele
luminose

illuminaz.

lens
film

riflessione
interna totale

OLF (Optical
Lighting Film)

brightness
enhancement

pellicole per
decorazione

pellicole

concentratore
solare

fibre

fibre
ottiche

segnaletica
stradale

concentratore
solare radiale

lenti intraoculari
multifocali

lenti ad alte
prestazioni

display
tridimensionali

ottica

1964

1970

1980

1990

2000

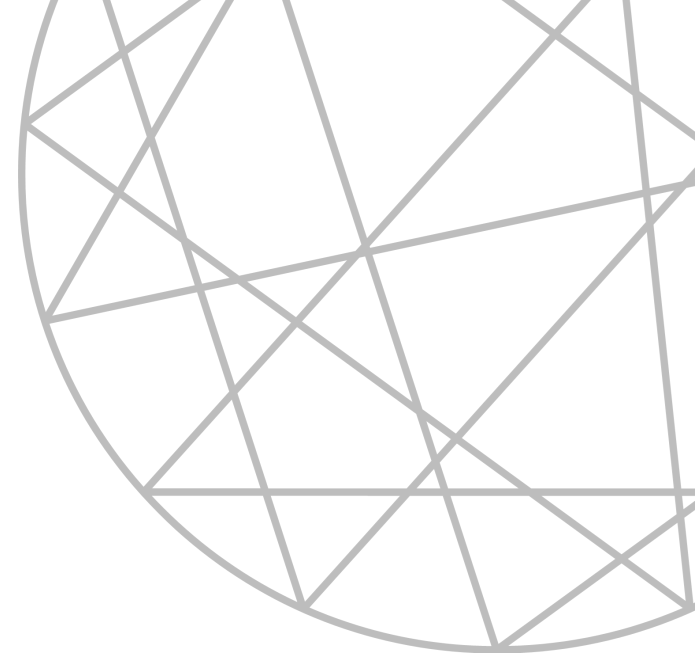
to select the results

to address the results toward the applications

to evaluate the cost-to-risk relation

to estimate the time-to-market

to estimate the value



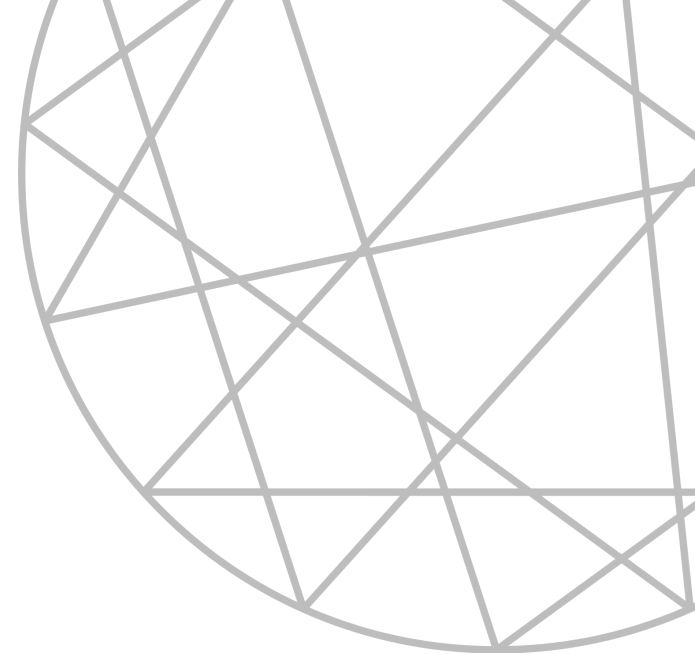
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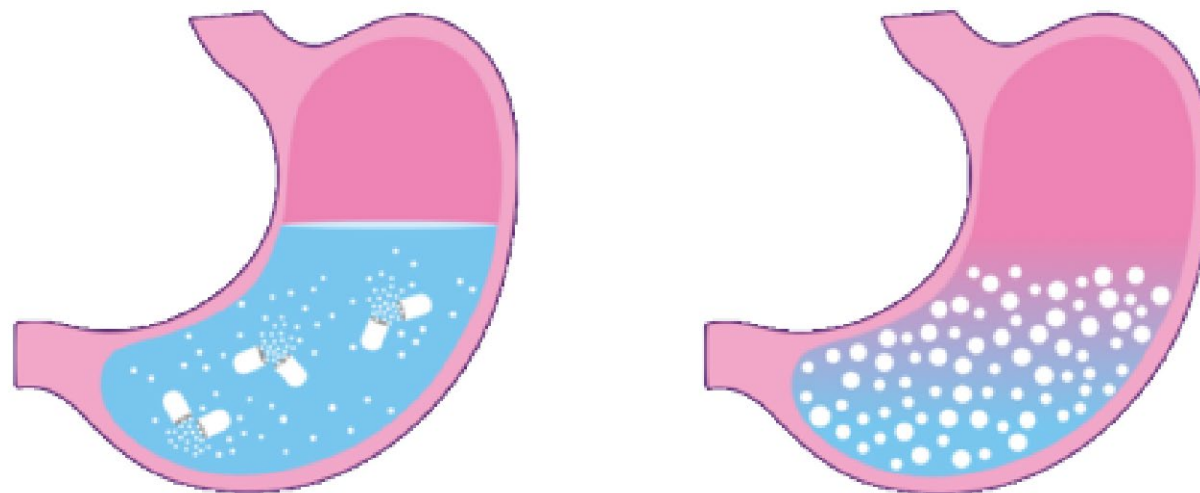
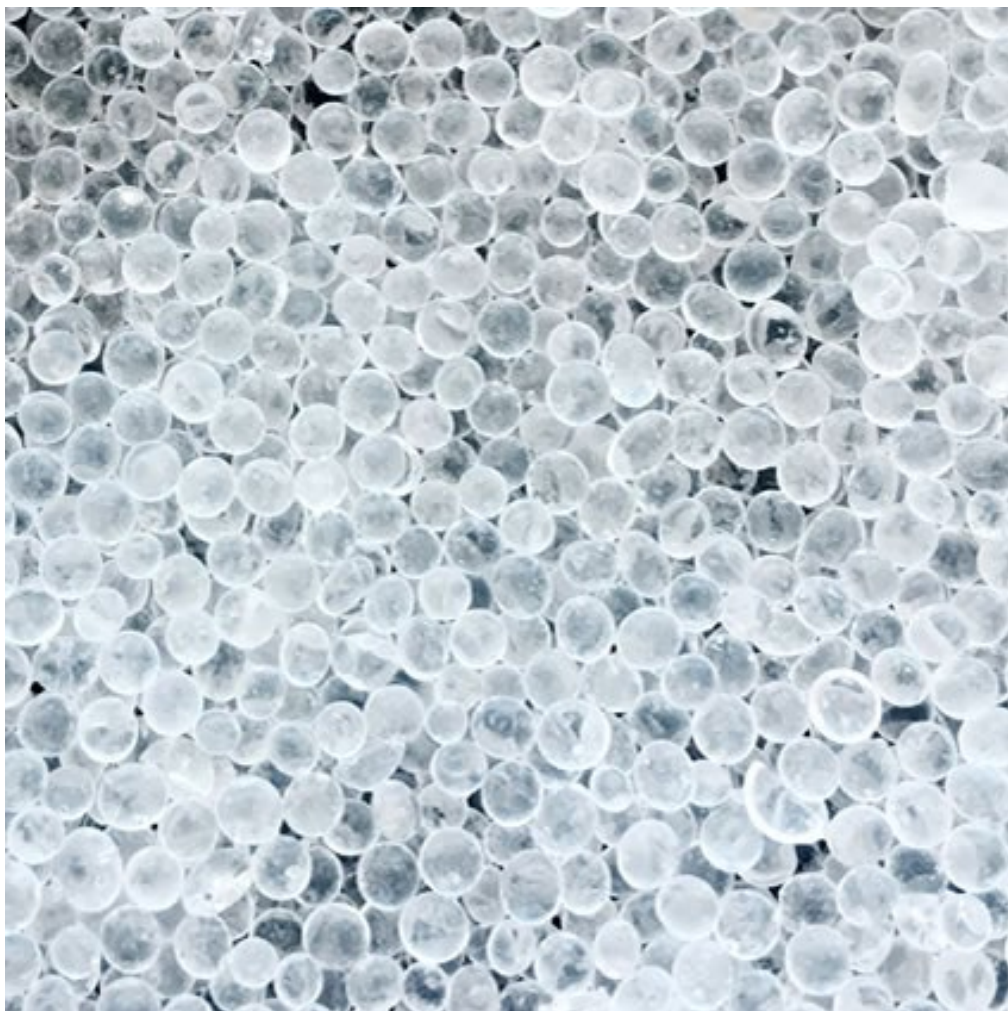
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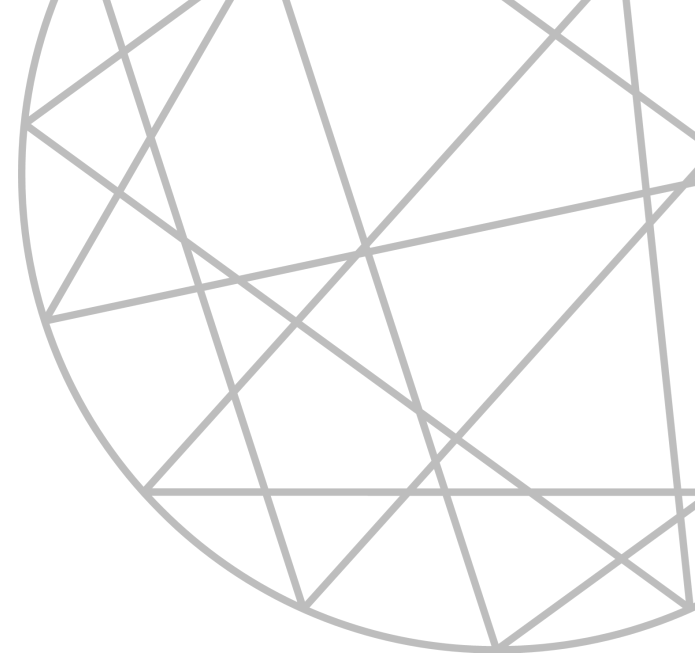
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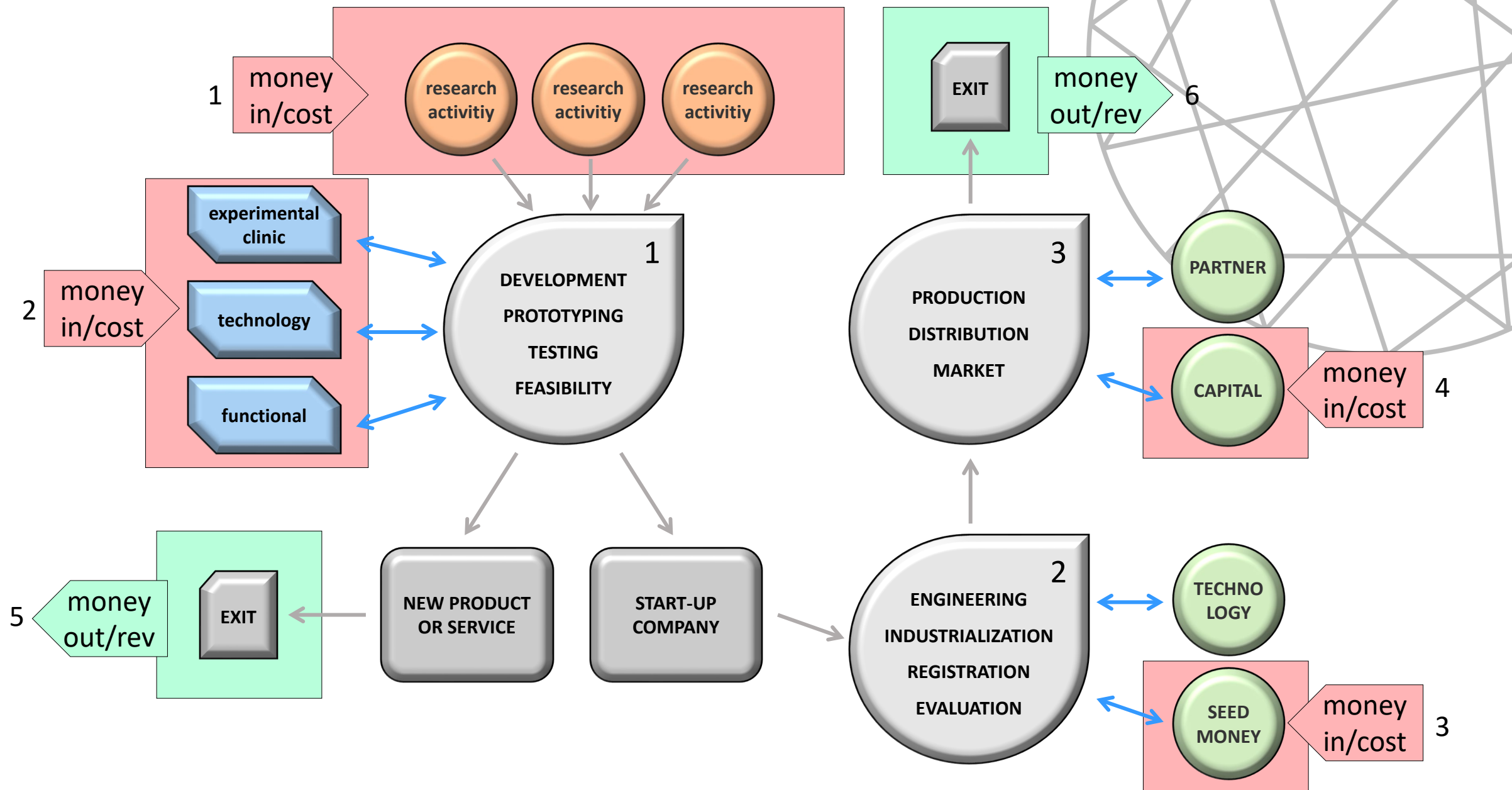
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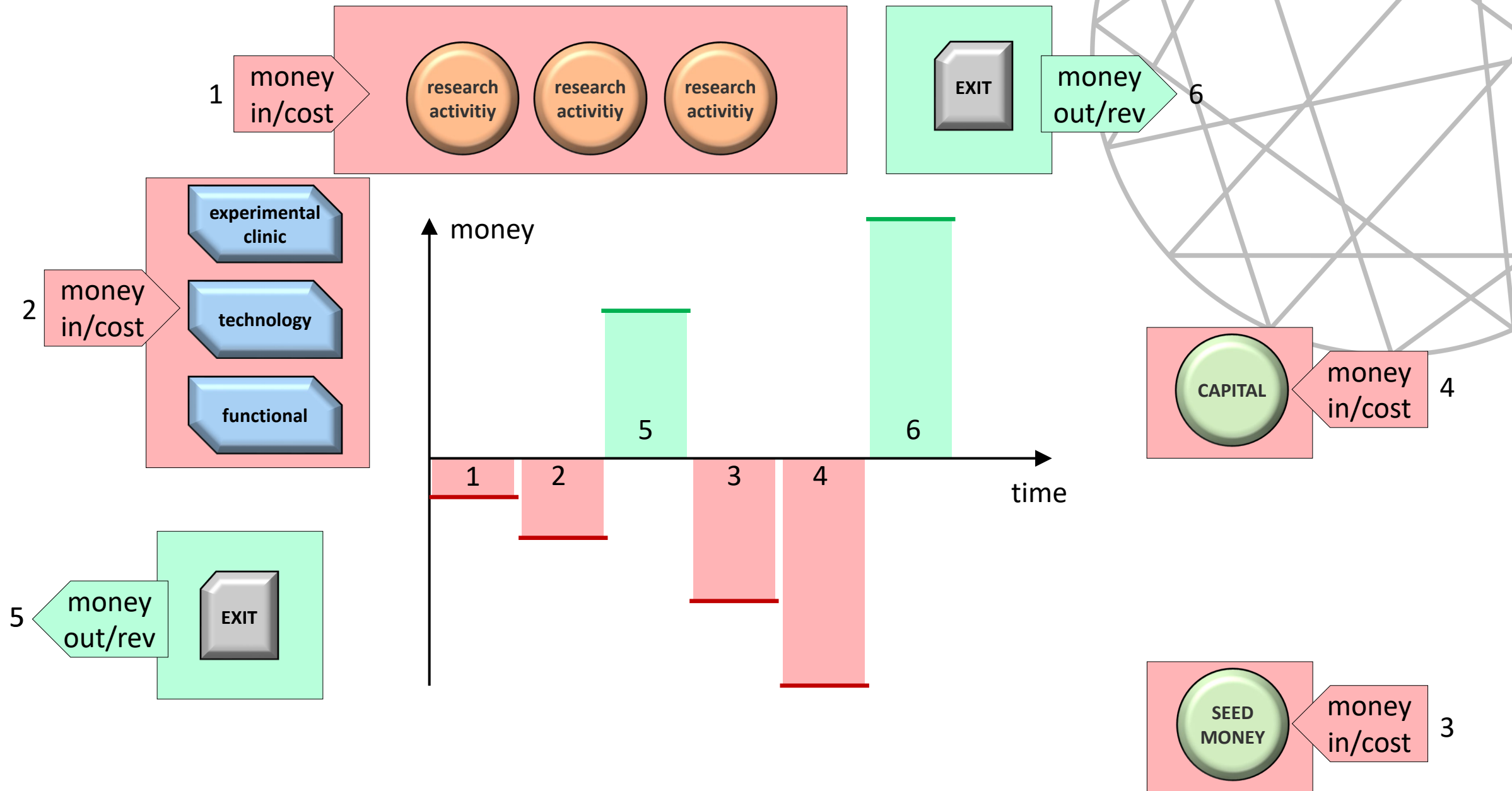
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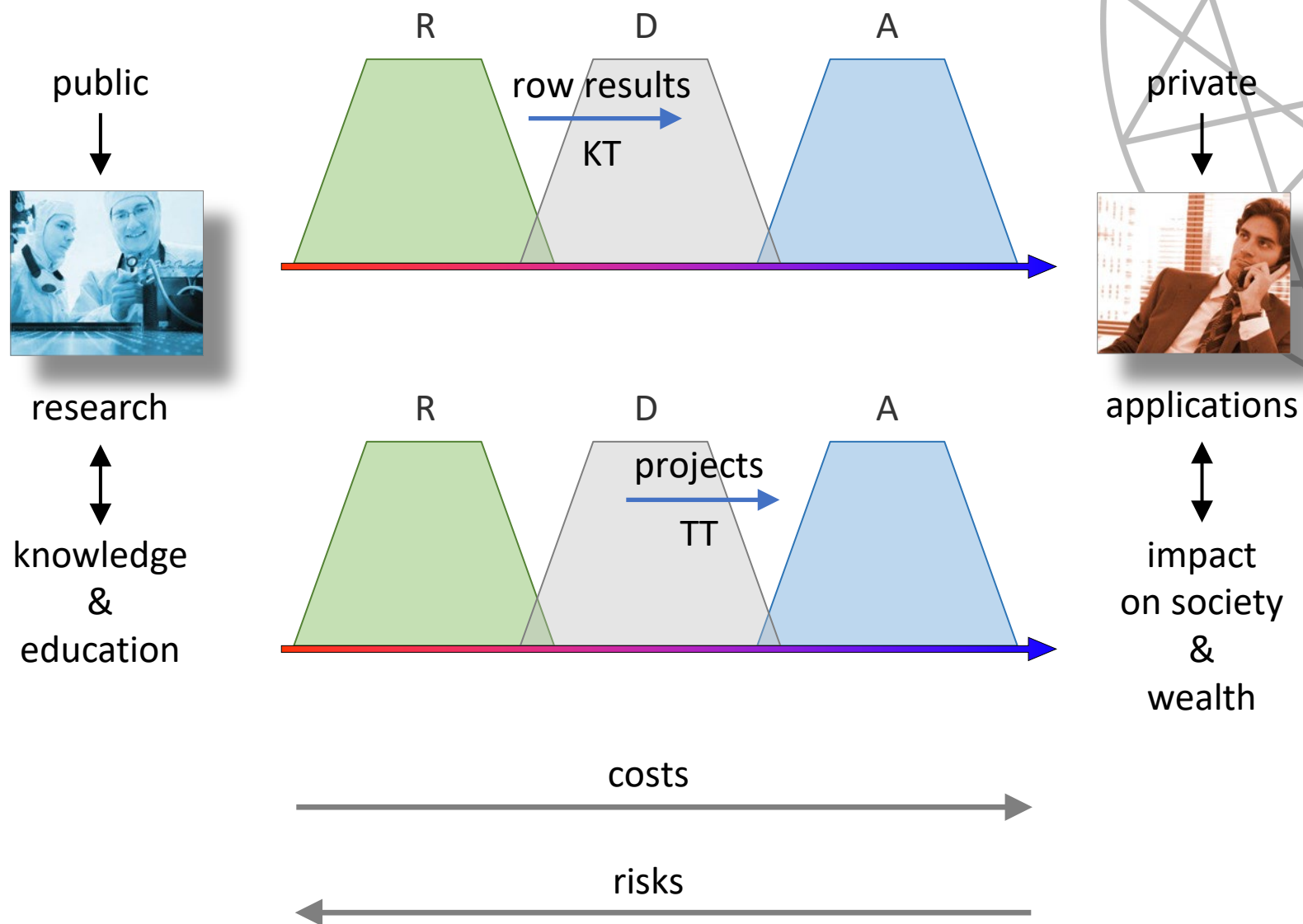
to estimate the time-to-market

to estimate the value

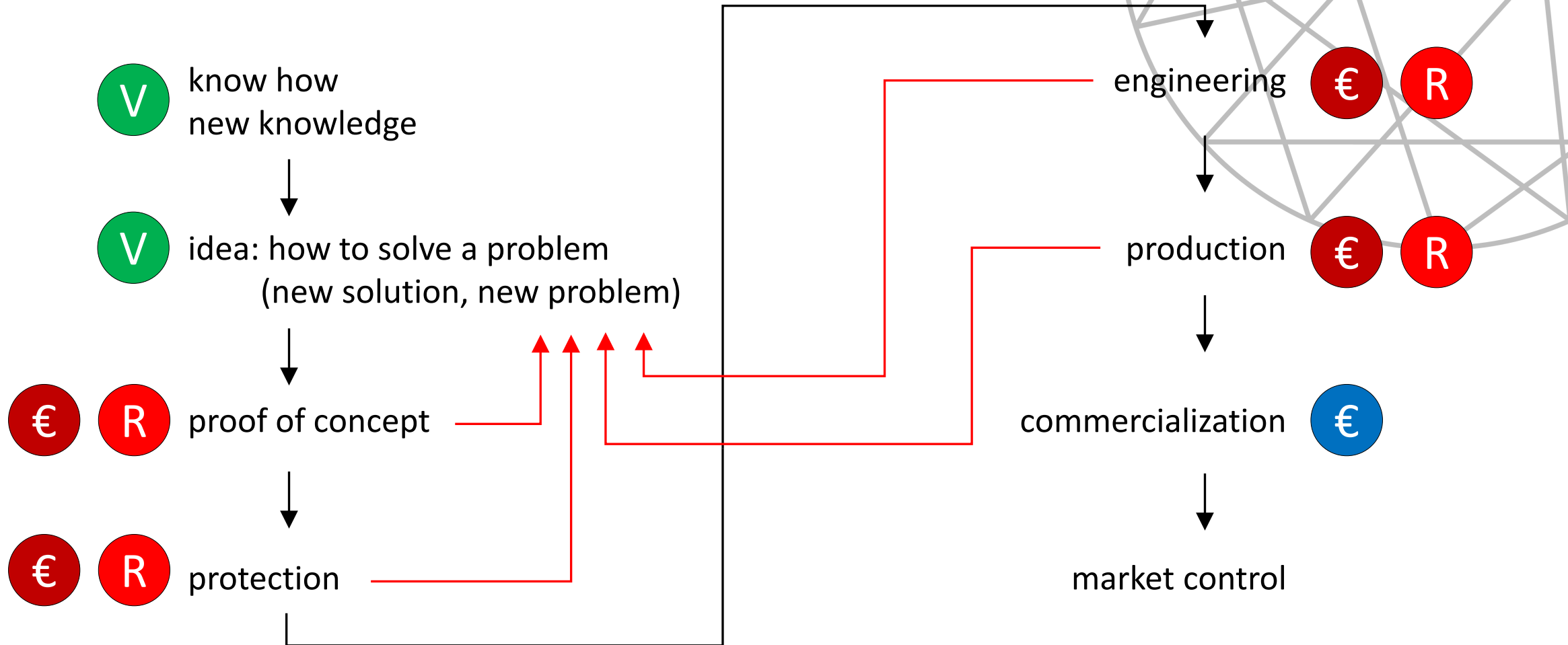








who pays the risk?



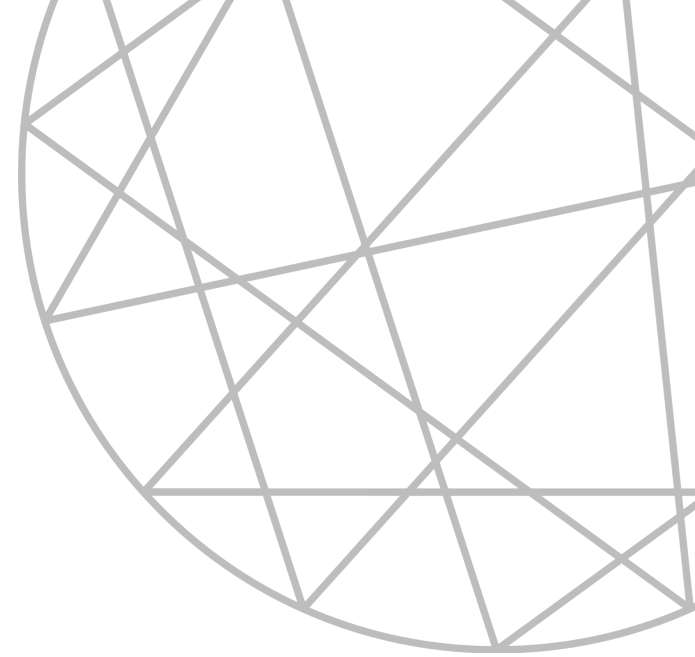
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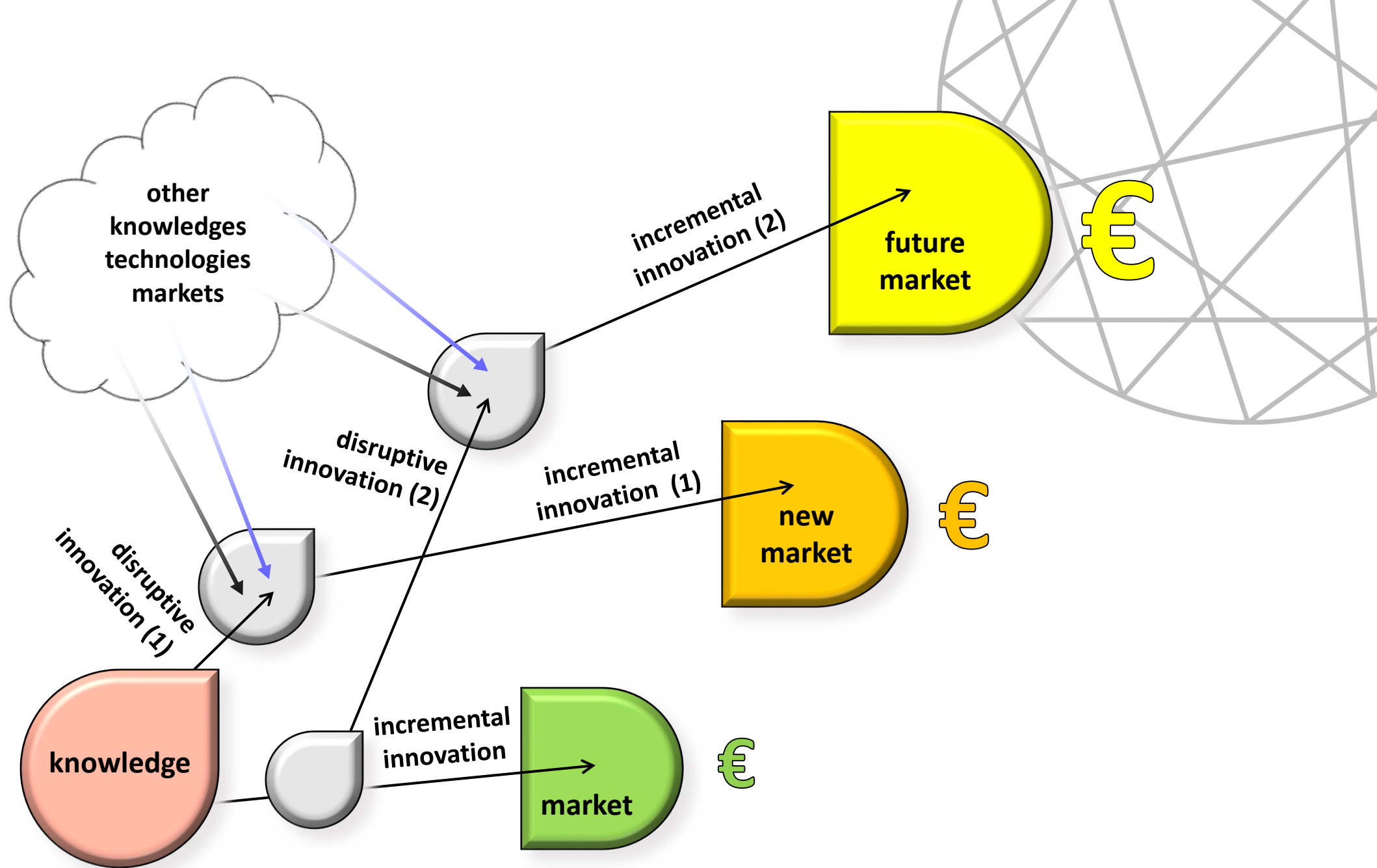
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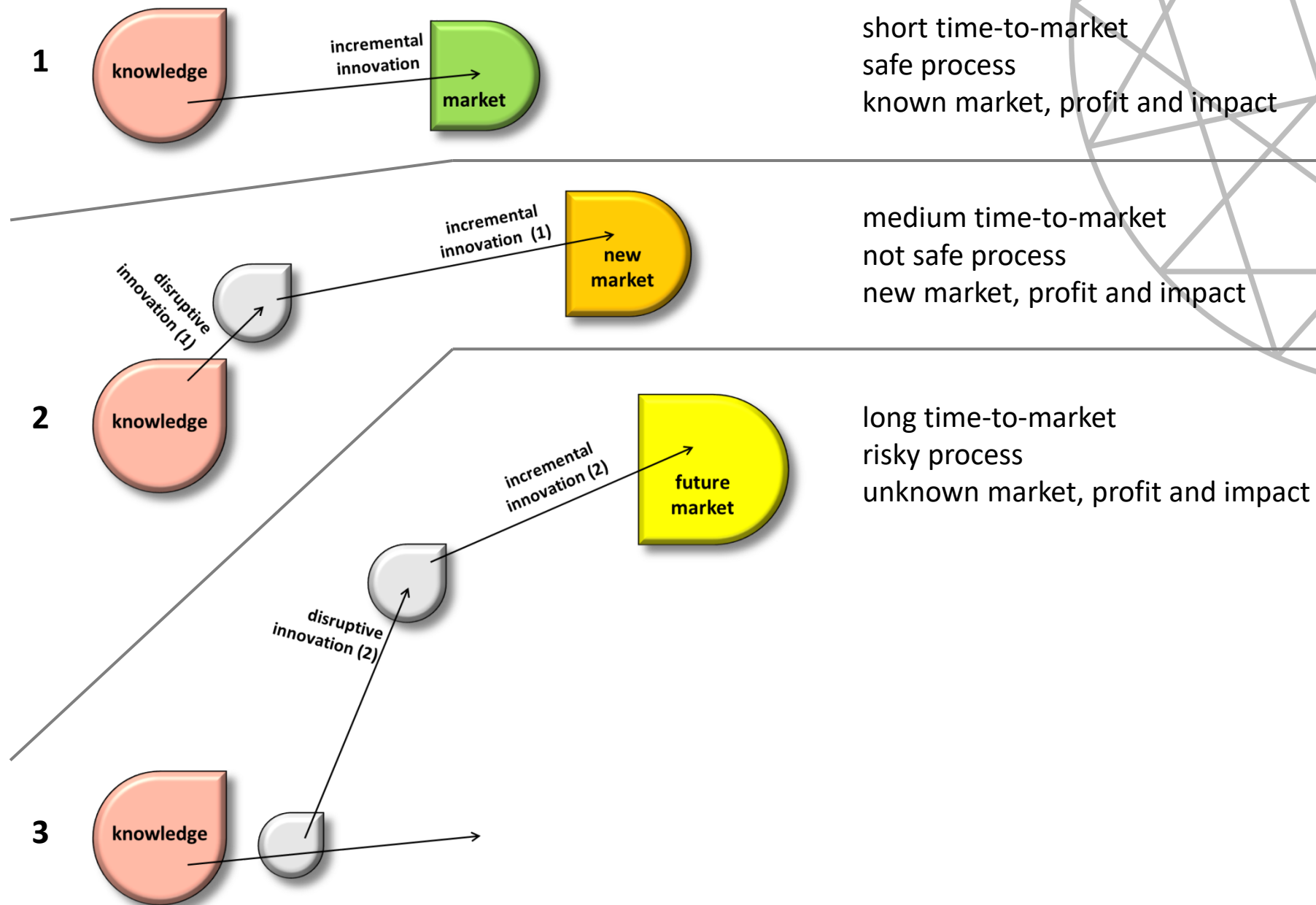
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to estimate the time-to-market

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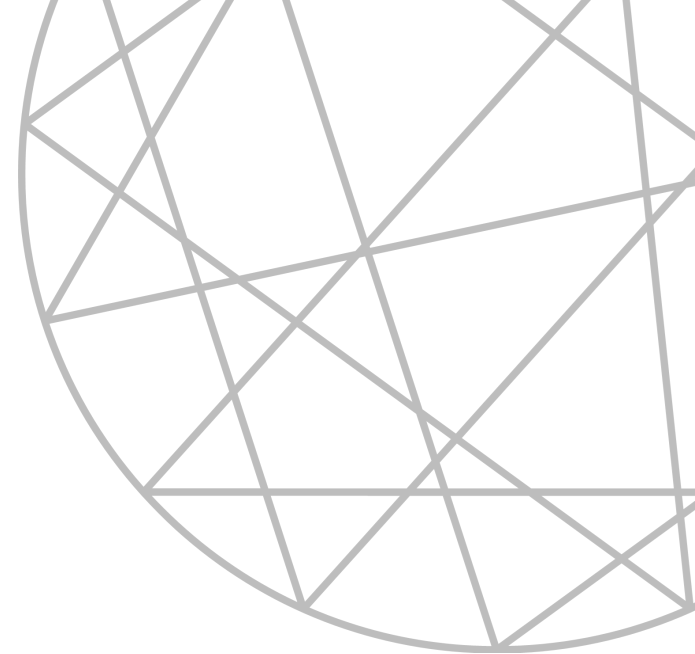
to select the results

to address the results toward the applications

to evaluate the cost-to-risk relation

to estimate the time-to-market

to estimate the value



increase in the cost/investment of R&D → increase in value

demonstrability/provability:

0. none
1. evidence
2. models and simulations
3. prototypes and experimental tests

associated know-how:

0. none
1. technological prototypes
2. engineering stage

the time-to-market:

0. not predictable
1. long
2. short

boundary conditions

the reference market:

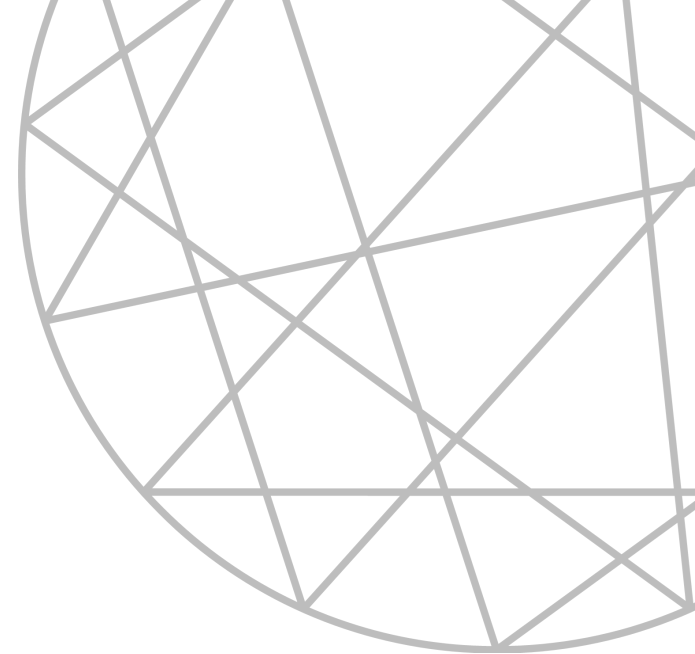
- competing products
- producers and distribution of market shares
- expectation of innovation by the market
- pricing policy

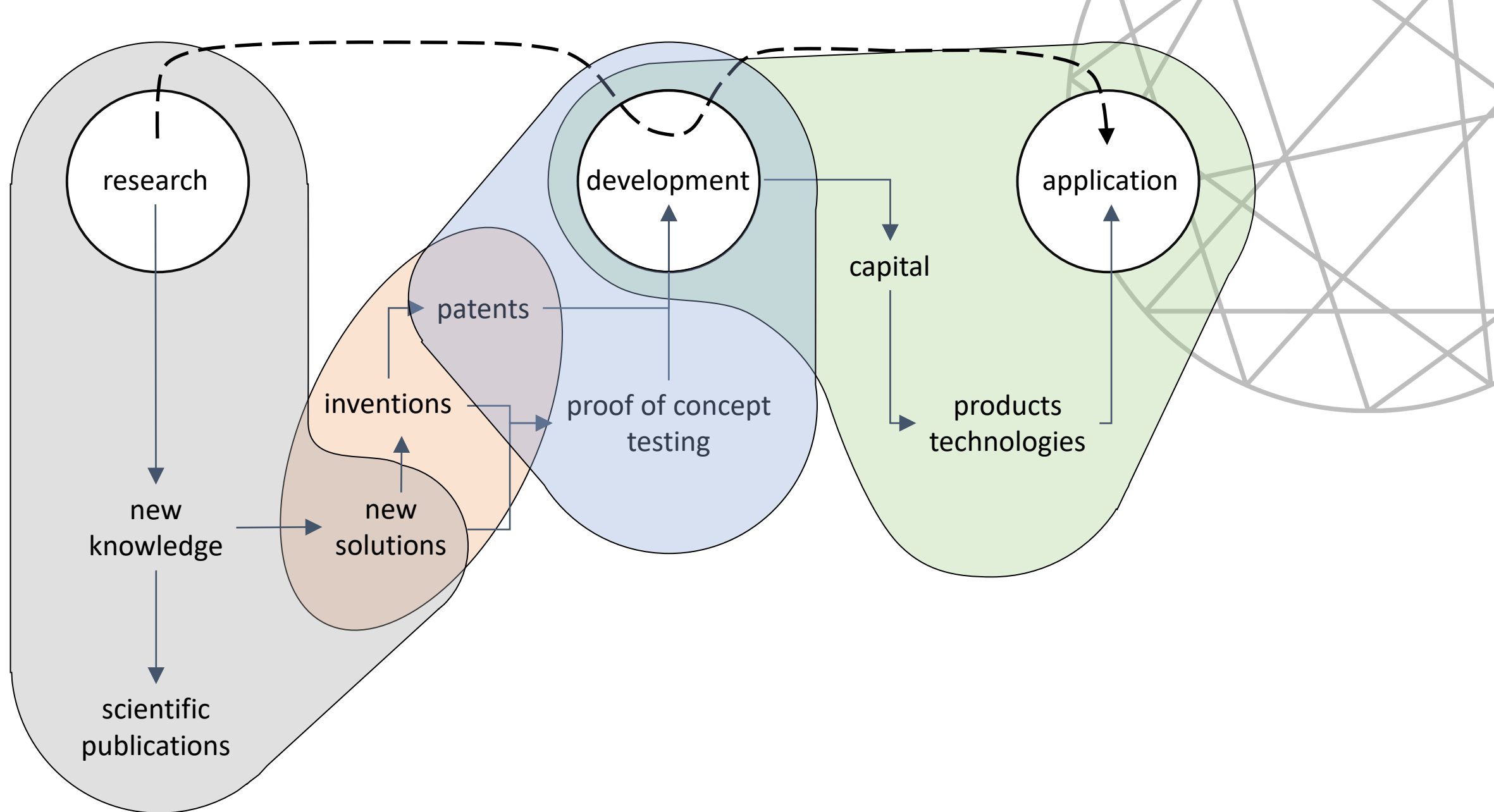
obsolescence:

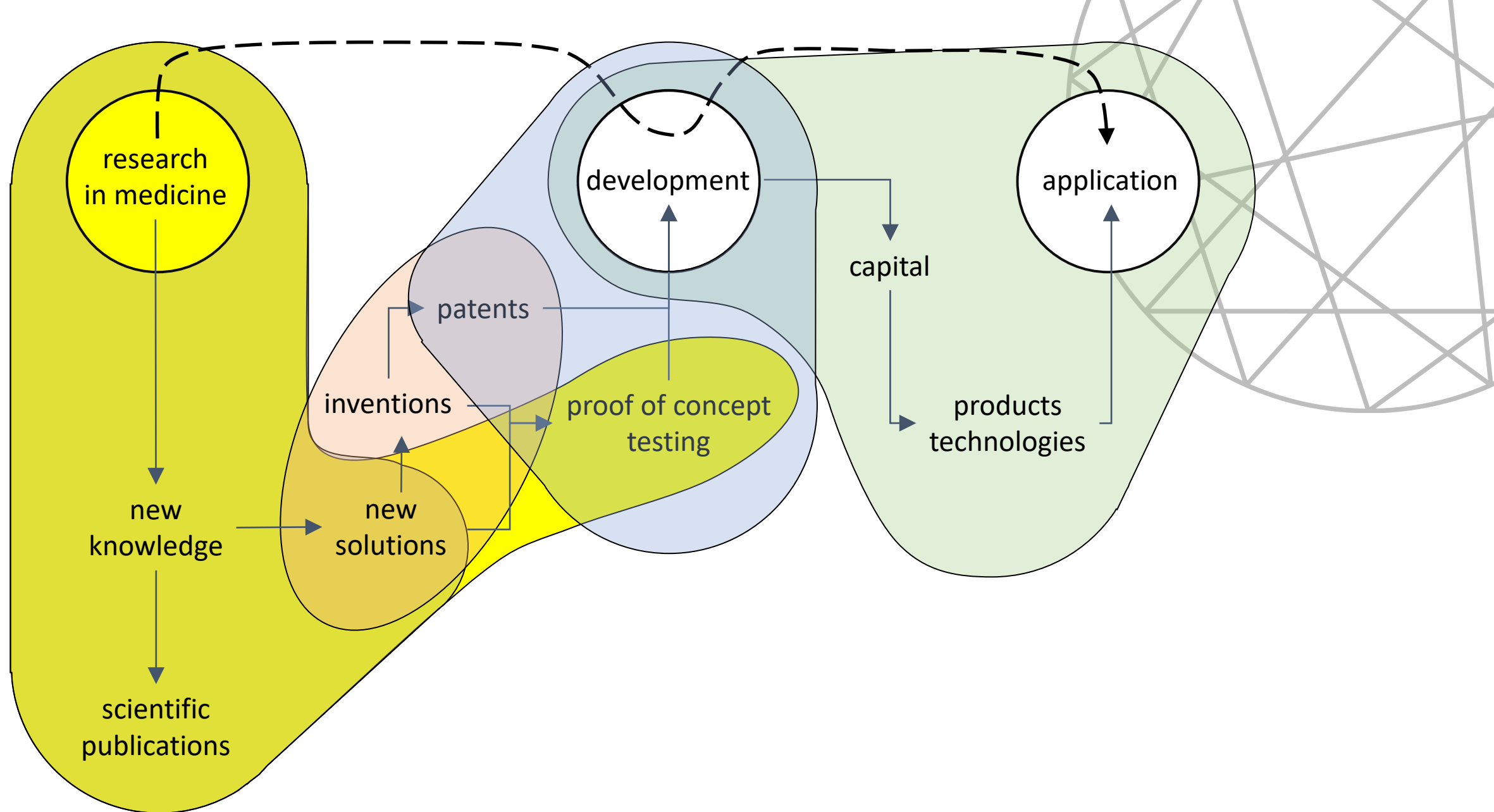
- the technologies on the market
- the innovative technology
- the type of product

patents:

- existing patents
- protection
- other derivative patents







1. Medical technology



14 295
+2.6% ↑

2. Digital communication



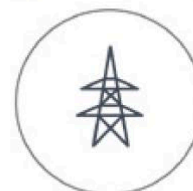
14 122
+1.0% ↑

3. Computer technology



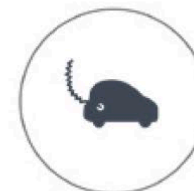
13 097
+1.9% ↑

4. Electrical machinery, apparatus, energy



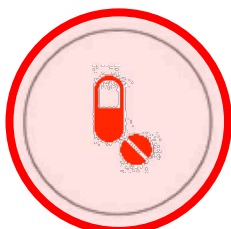
11 346
+0.4% ↑

5. Transport



9 020
-5.5% ↓

6. Pharmaceuticals



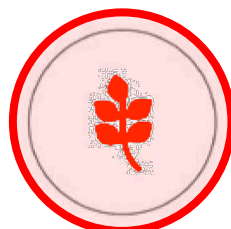
8 589
+10.2% ↑

7. Measurement



8 582
-5.2% ↓

8. Biotechnology



7 246
+6.3% ↑

9. Other special machines



6 261
-2.5% ↓

10. Organic fine chemistry



5 905
-1.5% ↓

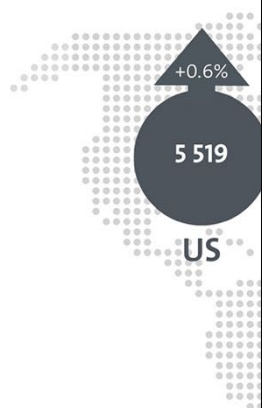


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2020 Medical back in

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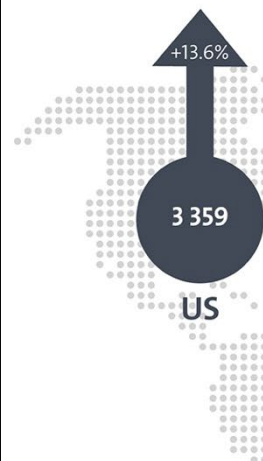
Countries of orig
applications



2020 Pharma over 10%

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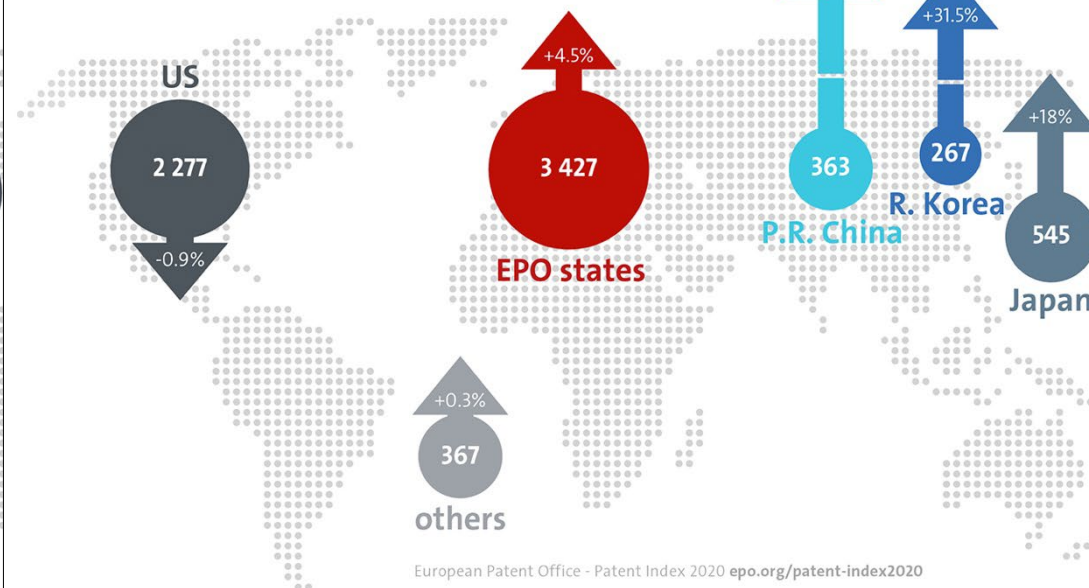
Countries of orig
applications



2020 Biotechnology filings up over 6%

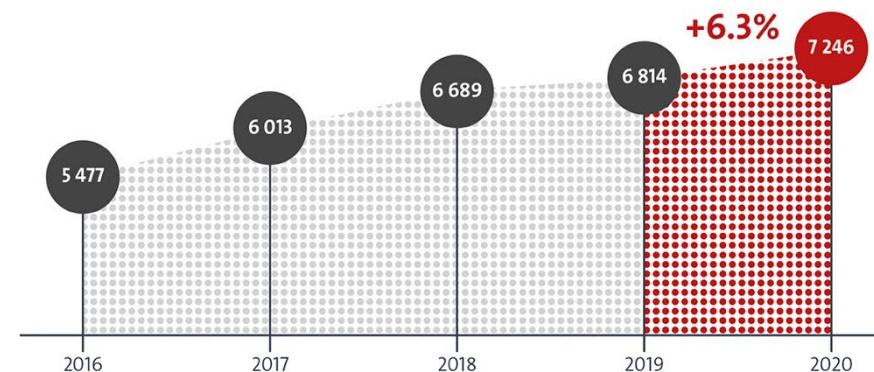
Boom in filings from companies
in Germany, Switzerland, UK
and Asia

Countries of origin for European patent
applications

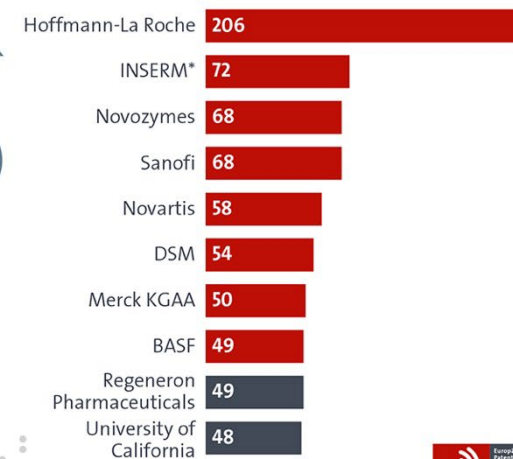


European Patent Office - Patent Index 2020 [epo.org/patent-index2020](https://www.epo.org/patent-index2020)

Total European patent applications in biotechnology



Top applicants 2020

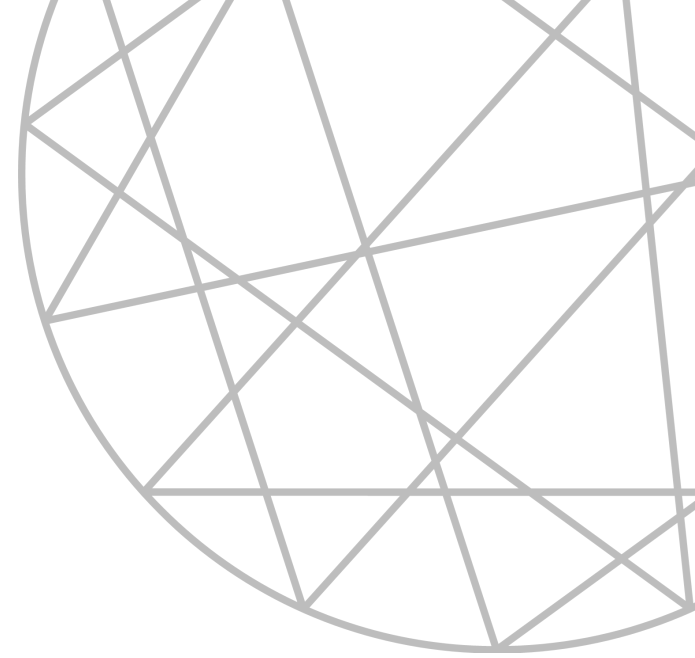


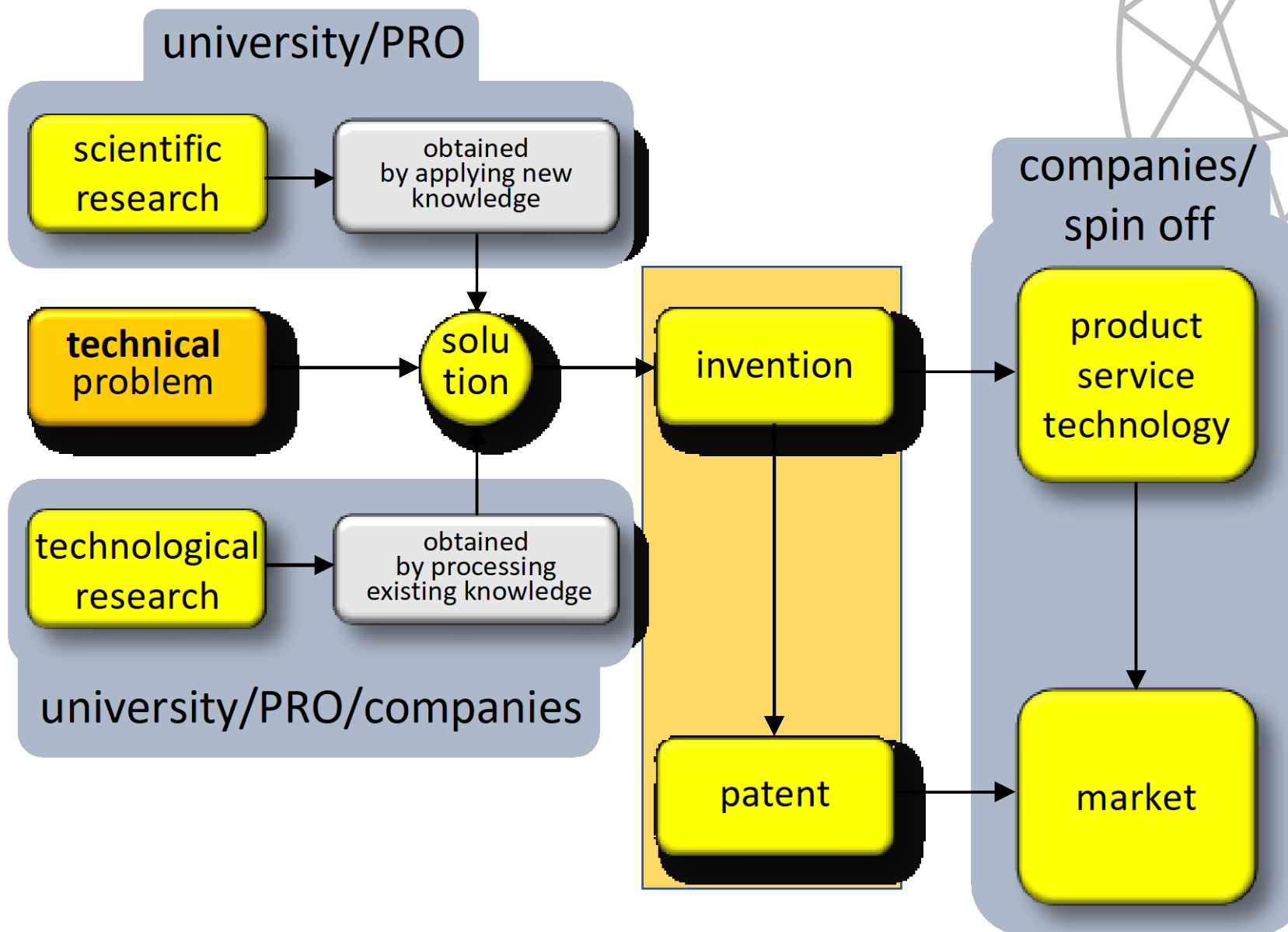
* Institut national de la santé et de la recherche médicale



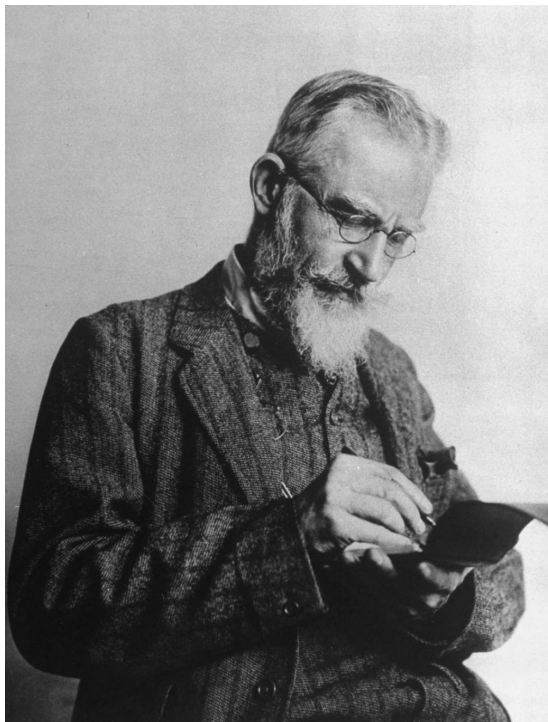
Intellectual property:

what is and how to use it in public research organizations (PRO)





- The property is a right characterized by the possibility
- to use the object of the property for every purpose that is not prohibited
 - to prevent other from using it
 - and to transfer the ownership to others.



George Bernard Shaw:

" If you have an apple and I have an apple and we exchange these apples then you and I will still have one apple each.

But if you have an idea and I have an idea and we exchange these ideas, then each of us will have two ideas"

tangible/material
goods

intangible/immaterial
goods

property
acquisition
use
value
rights

One product - many IP rights

Trade marks

- NOKIA
- Product "208"
- Start-up tone

Copyright

- Software
- User manuals
- Ringtones
- Start-up tone
- Images



© Nokia Corporation

Patents and utility models

- Data-processing methods
- Operating system
- Operation of user interface

Designs

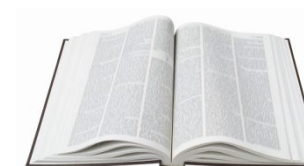
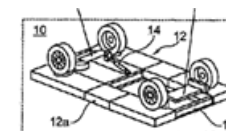
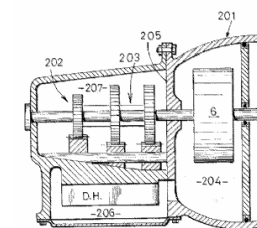
- Form of overall phone
- Arrangement and shape of buttons
- Position and shape of screen

Trade secrets

- Some technical know-how kept "in-house" and not published

The different types of IP (I)

Legal right	What for?	How?
Patents	New inventions	Application and examination
Utility models	New inventions	Application and registration
Copyright	Original creative or artistic forms	Exists automatically



Our reference: *[Elsevier reference number]*

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[Journal copyright owner name]
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The different types of IP (II)

Legal right	What for?	How?
Trade marks	Distinctive identification of products or services	Use and/or registration
Registered designs	External appearance	Registration
Trade secrets	Valuable information not known to the public	Reasonable efforts to keep secret



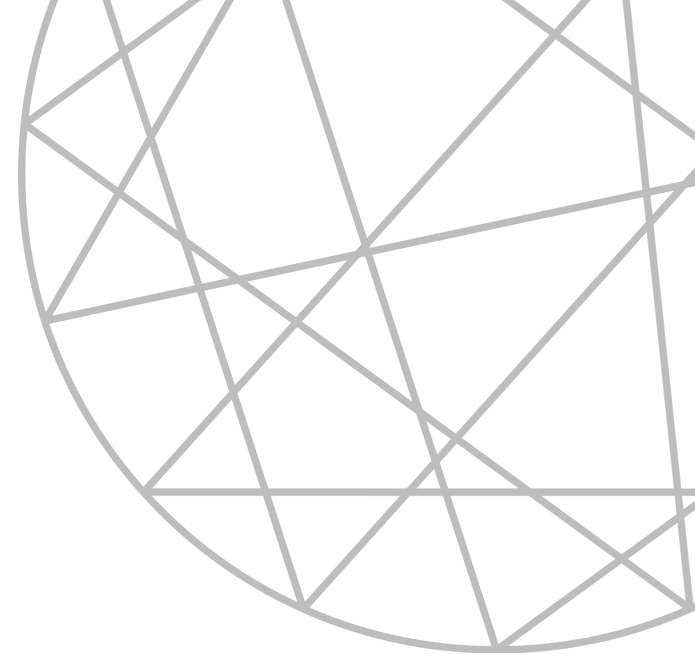
Industrial property

what is the object of property?

which is the legal right?

which are the requirements to obtain it?

how the legal right may be acted?



what is a patent?

The patent is a set of **exclusive rights**

the right to exclude others

granted by a **sovereign state**

given under a law

in the territory of a nation

to an **inventor or assignee**

who has the ownership of the patent

for a **limited period of time**

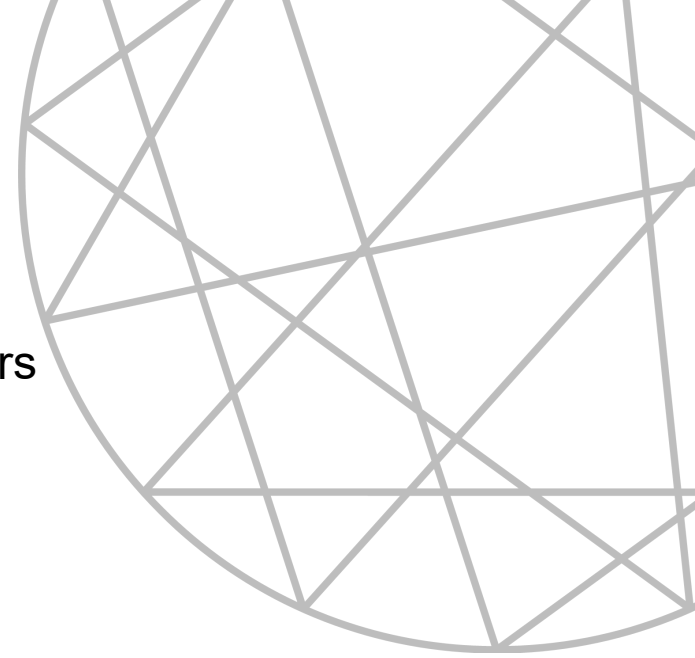
the term of the right is 20 years

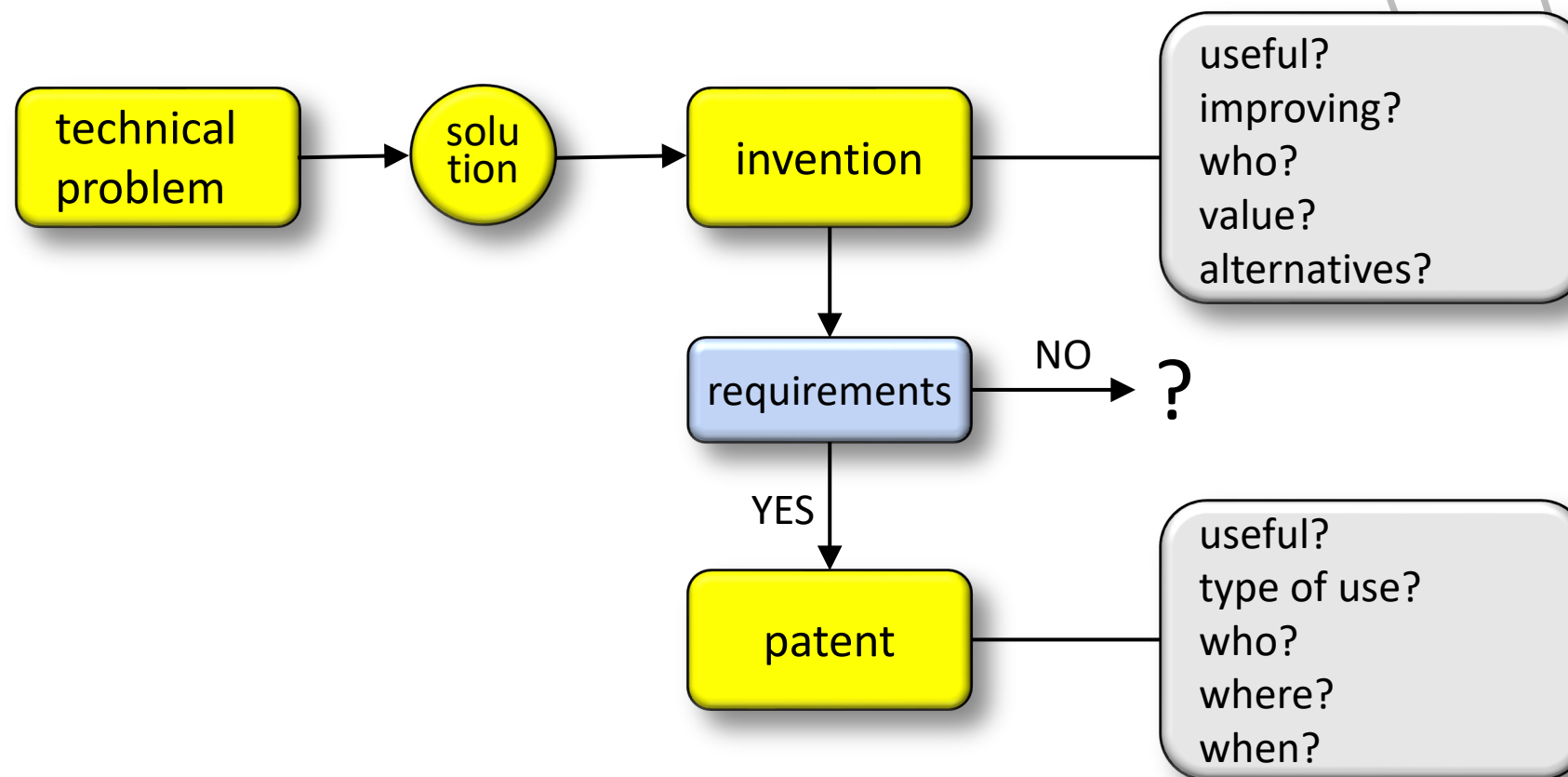
in exchange for **detailed public disclosure**

the publication is a teaching to reproduce
the invention for an expert

of an **invention**

the solution of a technical problem





EP 0 522 762 B1

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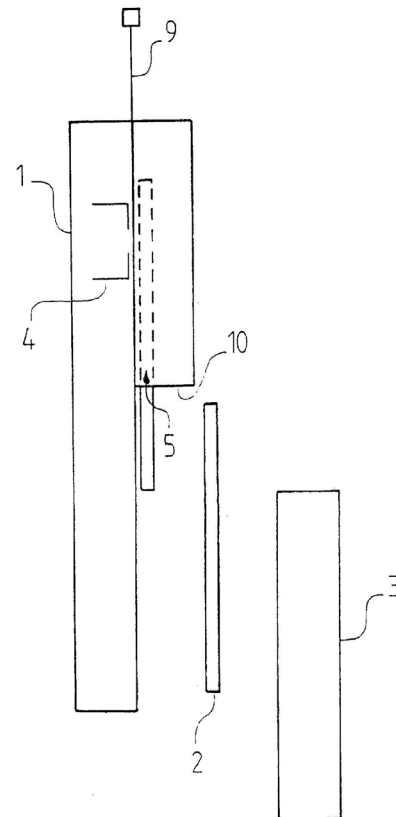


FIG. 4

front page (info)

background

description

claims

drawings

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EP0891734

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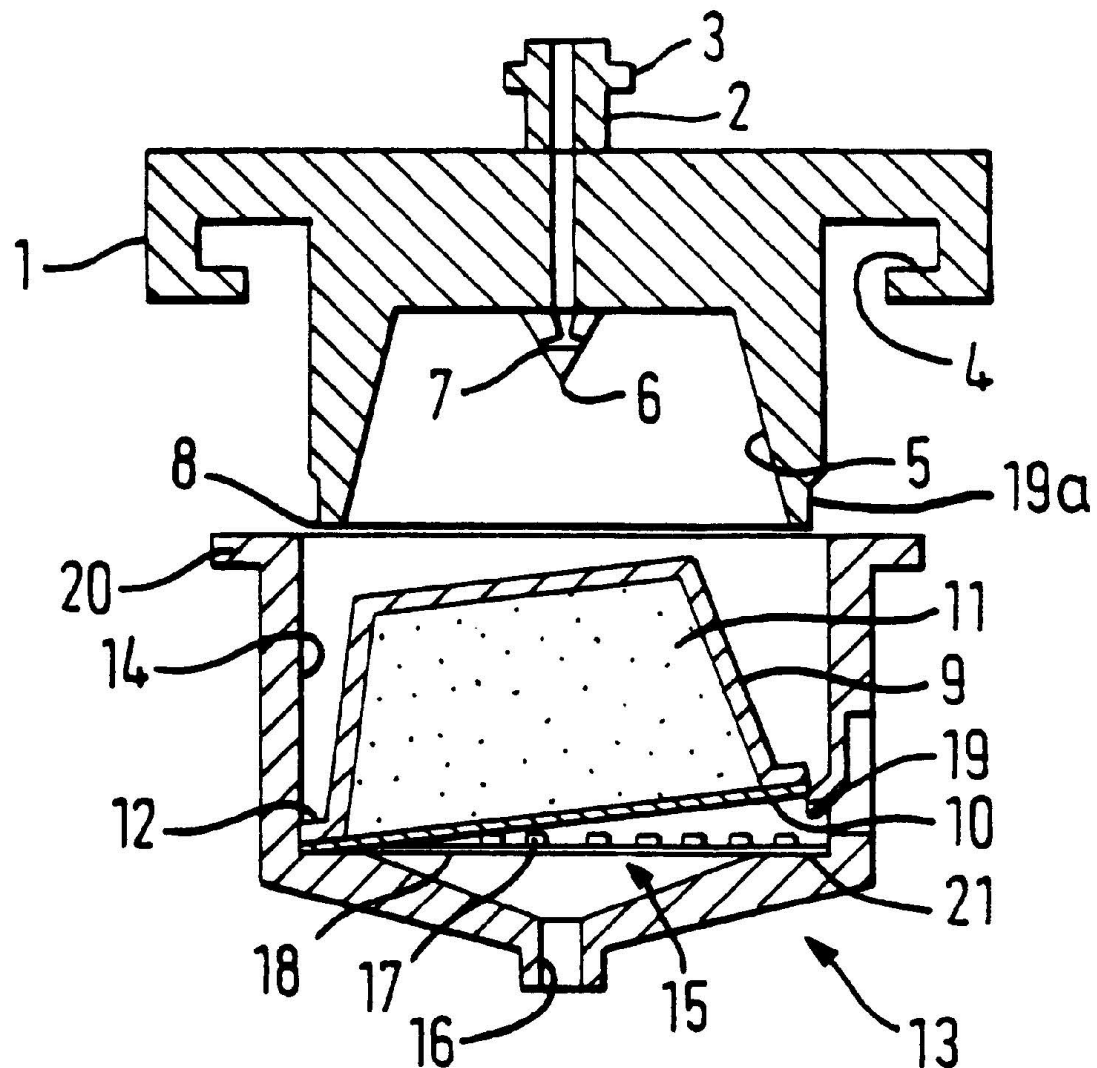
IT (from EP)

LI (from EP)

LU (from EP)

NL (from EP)

PT (from EP)



Rights conferred by patents

- Right to prevent others from making, using, offering for sale, selling or importing infringing products in the country where the patent was granted

Exception: non-commercial purposes (private use, academic research)

- Right to assign, sell or license these rights



These rights belong to the patent holder.



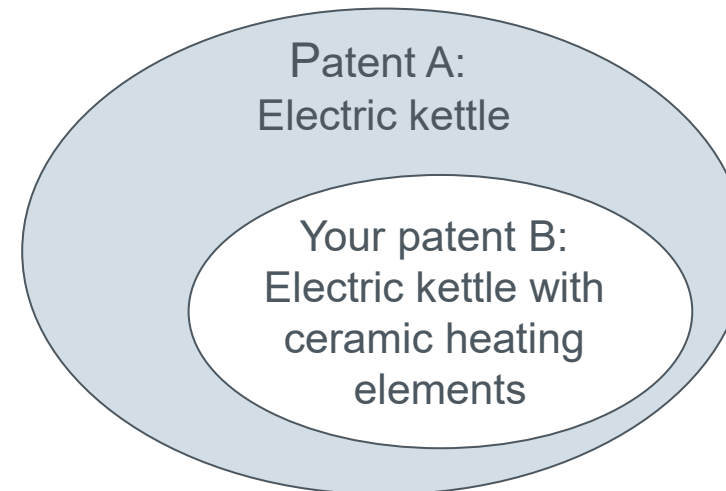
What is a patent?

- Does a patent give you the right to exploit an invention?

- NO!

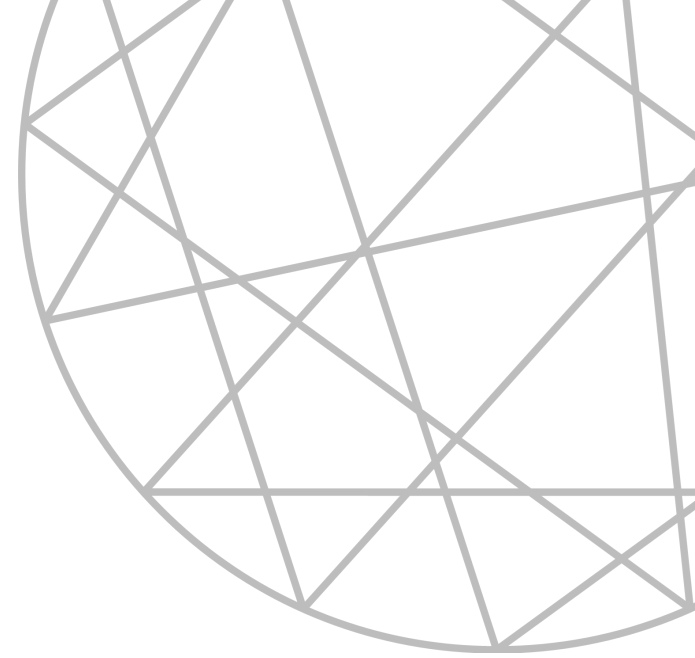
- A patent is a negative right.
It gives you the right to prevent others from exploiting the invention.
It is not an enabling right.
- Patents owned by others may overlap or encompass your own patent.
-> Seek a licence before commercialising

For example:



Requirements for a patentable invention

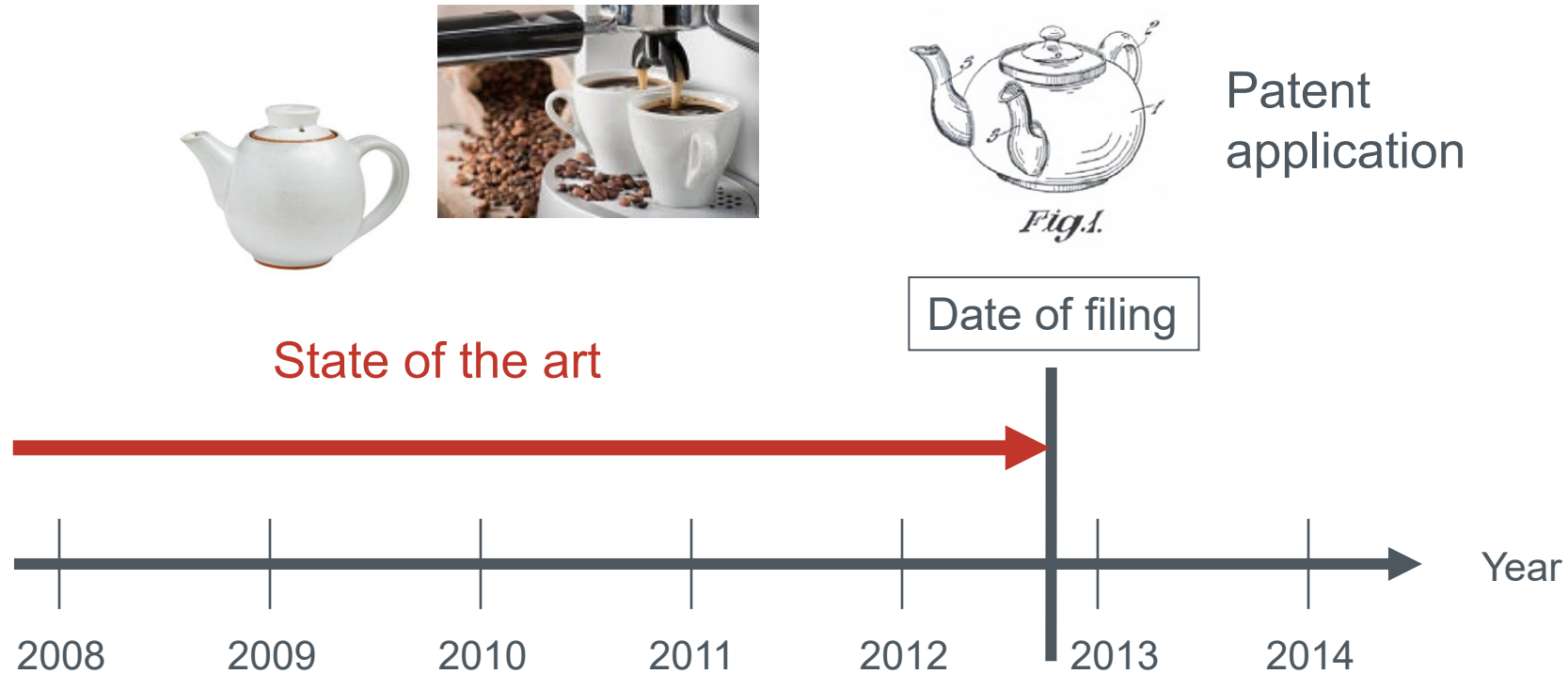
1. Novelty (demostration)
2. Inventive step (subjective)
3. Susceptible of industrial application
4. Sufficient written description (patent document)



When is an invention "new"?

- When it is not part of the state of the art
- State of the art = everything made available to the public before the date of filing

Keep your invention confidential until you have filed your application!



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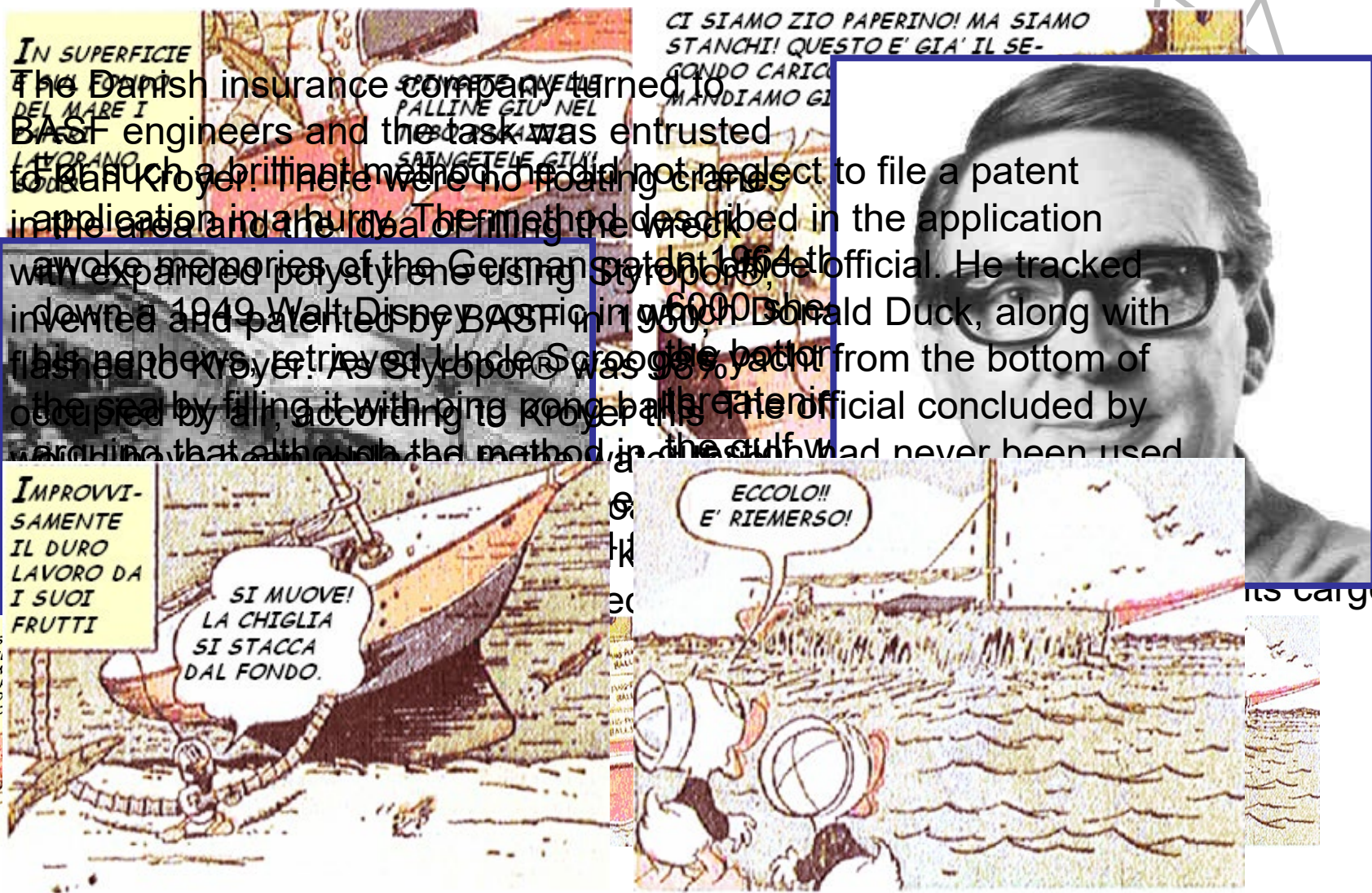
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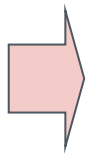
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Walt Disney 1949

When is an invention "inventive"?

- When it is not obvious to the person skilled in the art in view of the state of the art
- The person skilled in the art
 - is a skilled practitioner in the relevant technical field
 - has access to the entire state of the art
 - is aware of general technical knowledge
 - is capable of routine work



**He knows EVERYTHING,
but has ZERO imagination!**



Assessing novelty

Claim: A pouring vessel comprising
(a) a compartment for liquids (1),
(b) a handle (2),
(c) a lid, and
(d) two spouts (5) extending from the compartment (1),
(e) whereby the tops of the two spouts are arranged at the same height.

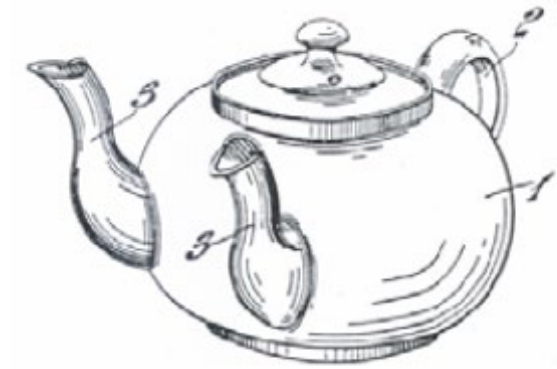


Fig. 1.

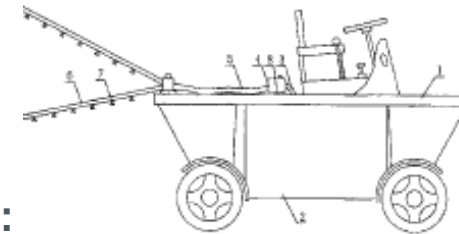
Stage 1: Prior art

The prior art search revealed the following documents:

Document D1:
A teapot with one spout.



Document D2:
High efficiency distributor for fertilizer. Each rod has several nozzles for spraying liquid.



Document D3:
A filter handle with two spouts to be used with a coffee-maker.



Document D4:
An oil and vinegar bottle which reveals a second bottle inside. The two spouts are cleverly arranged to ensure the second bottle never drips while the first one is in use.



Assessing inventive step (I)

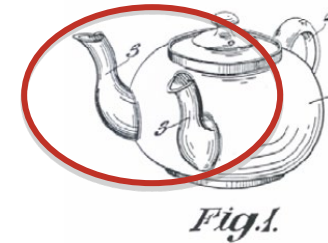
Stage 1

- Determine the closest prior art and common features:
 - (a) a compartment for liquids
 - (b) a handle
 - (c) a lid
 - (d) one spout



Stage 2: Problem

- Differences over D1:
 - two spouts instead of one
 - particular arrangement of the spouts
- Drawback of prior art:
 - time-consuming
- Advantage/effect of the invention:
 - the time needed to fill multiple cups is reduced
- Objective problem to solve:
 - how to modify the teapot of D1 to reduce the time needed to fill multiple cups



Assessing inventive step (II)

Stage 3: Solution

Is the claimed solution obvious in view of the prior art?



?

D1

+

D2



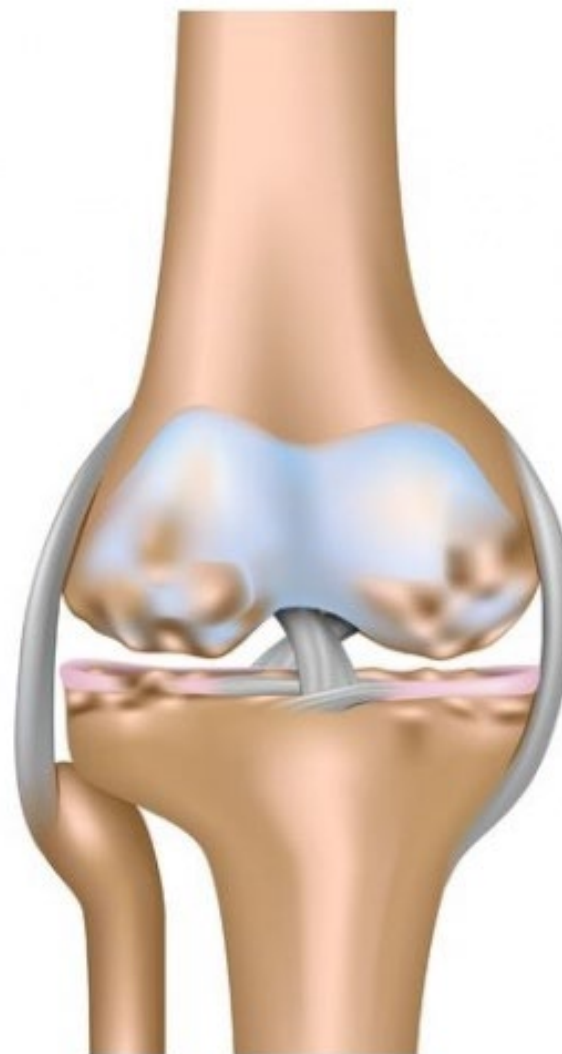
D3

Objective problem for the skilled person: How to modify the teapot of D1 in order to reduce the time needed to fill multiple cups





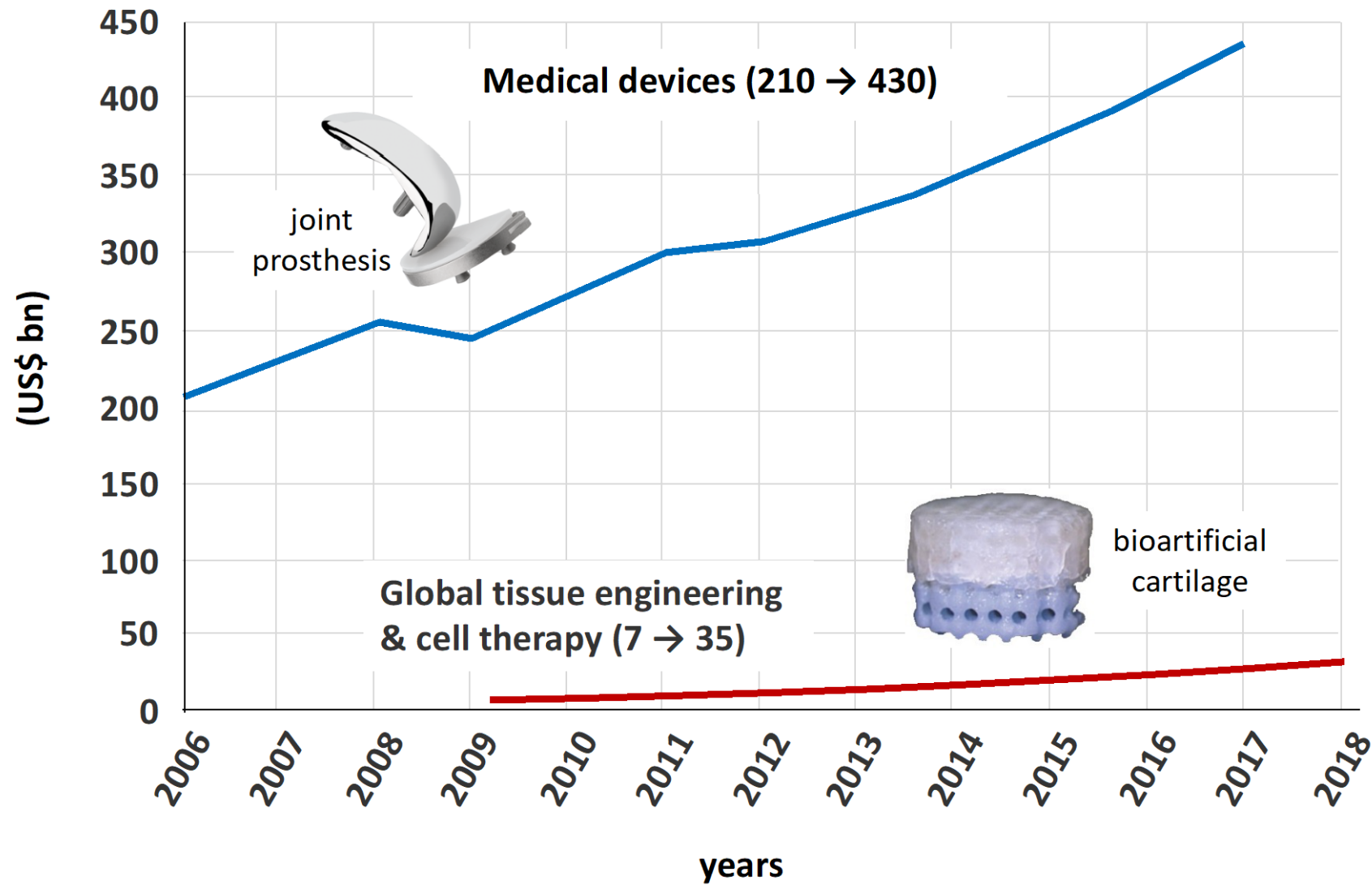
joint prosthesis
standard technology

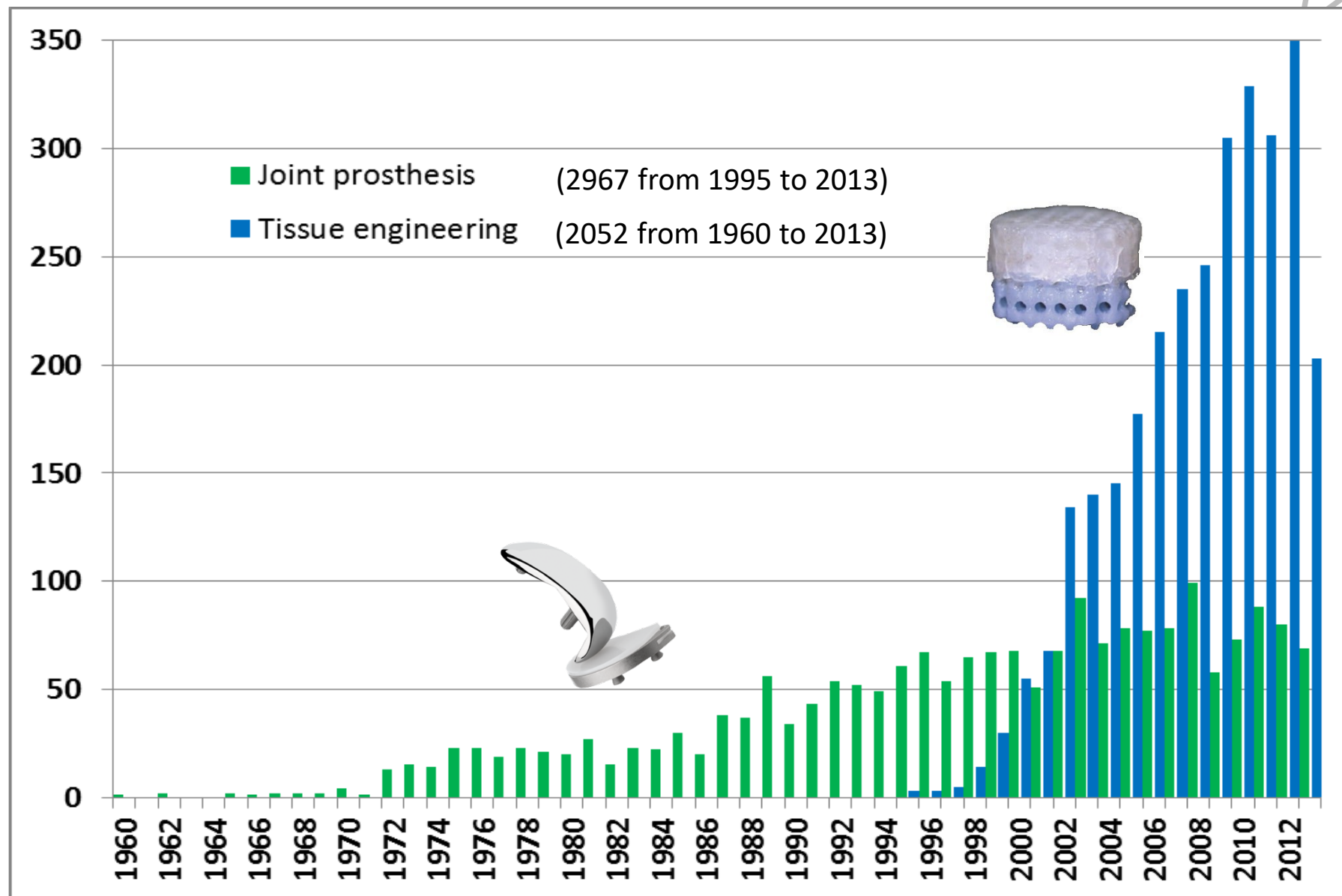


osteoarthritic knee

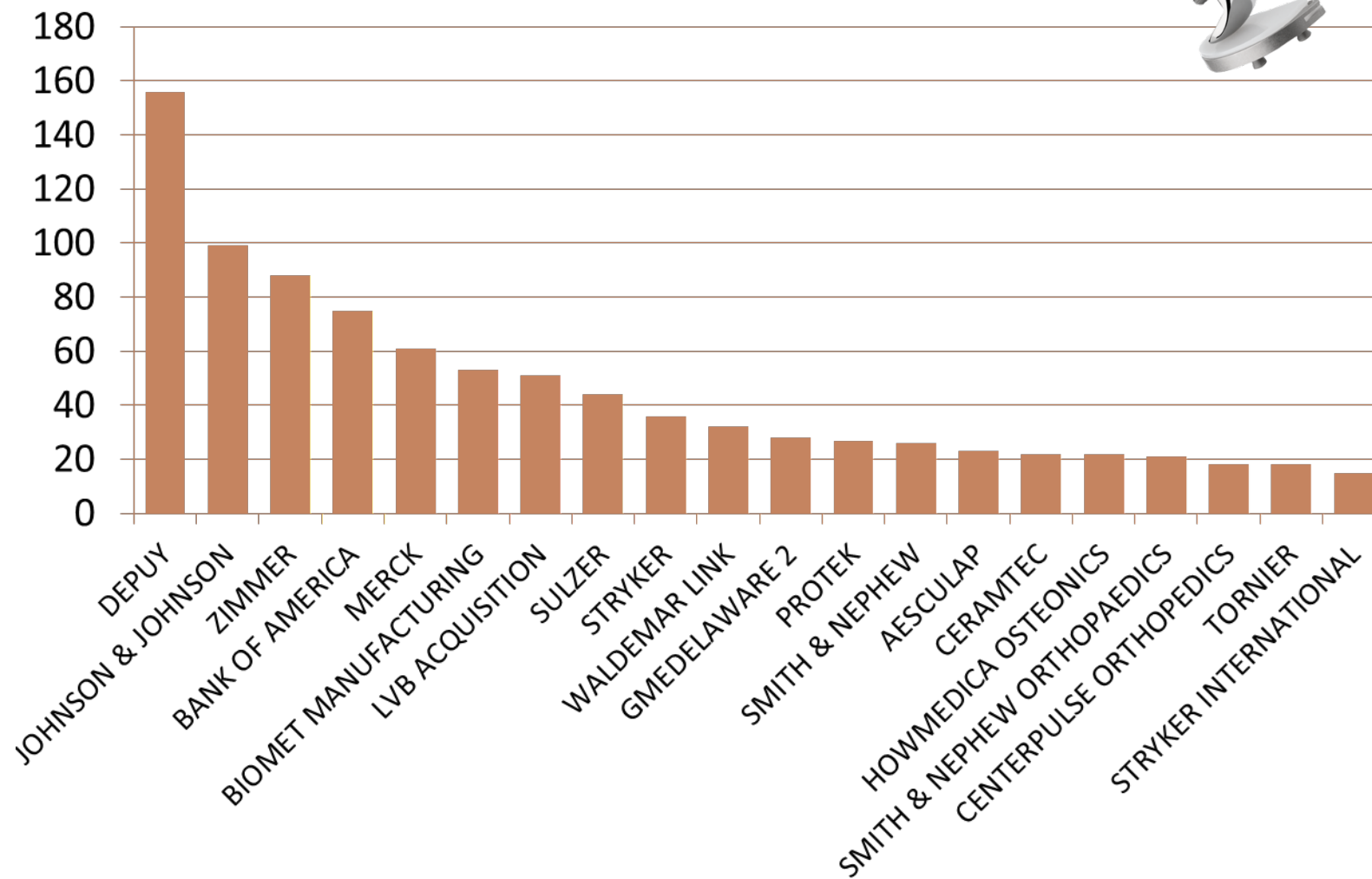


bioartificial cartilage
tissue engineering

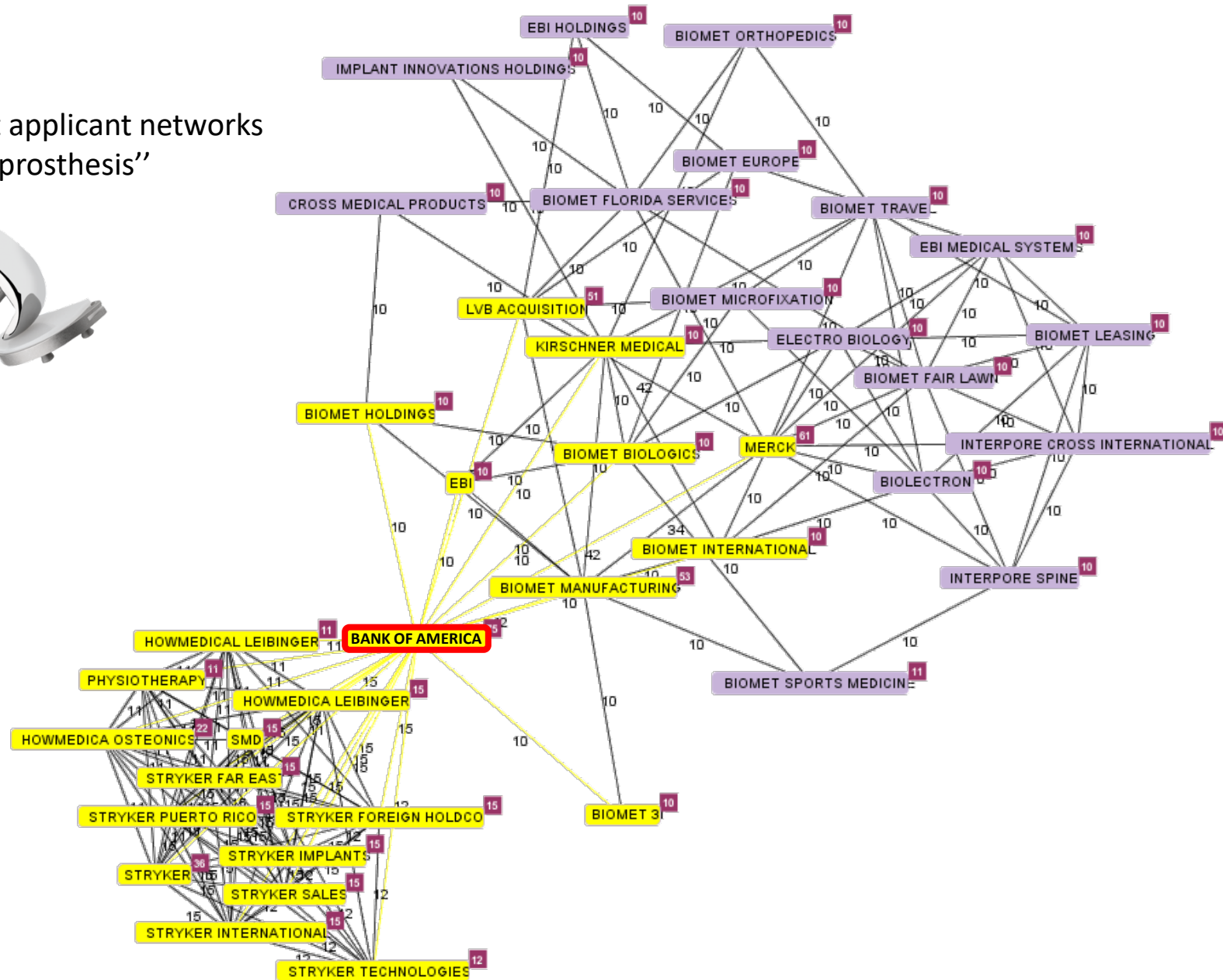




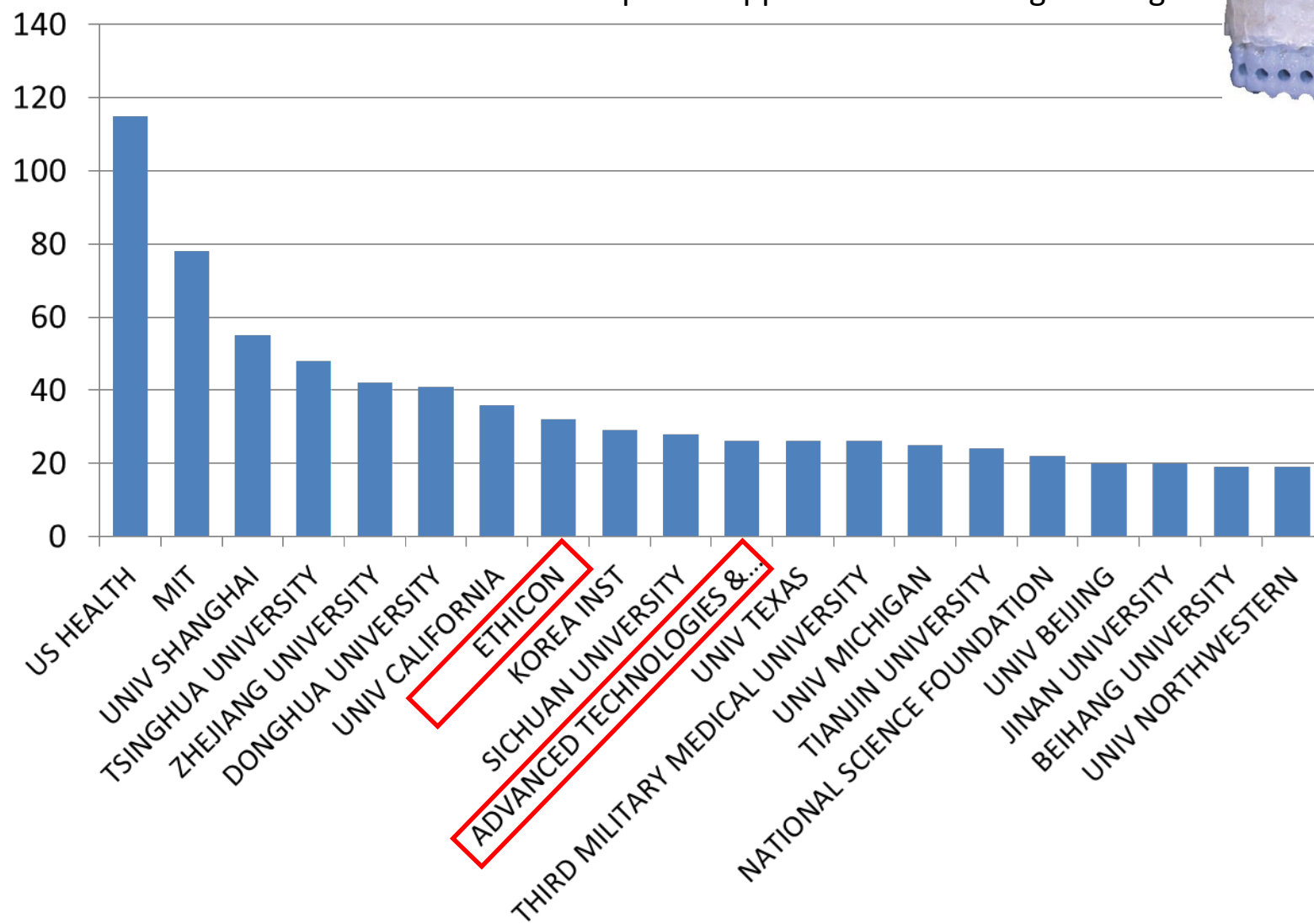
first 20 patent applicants "joint prosthesis"



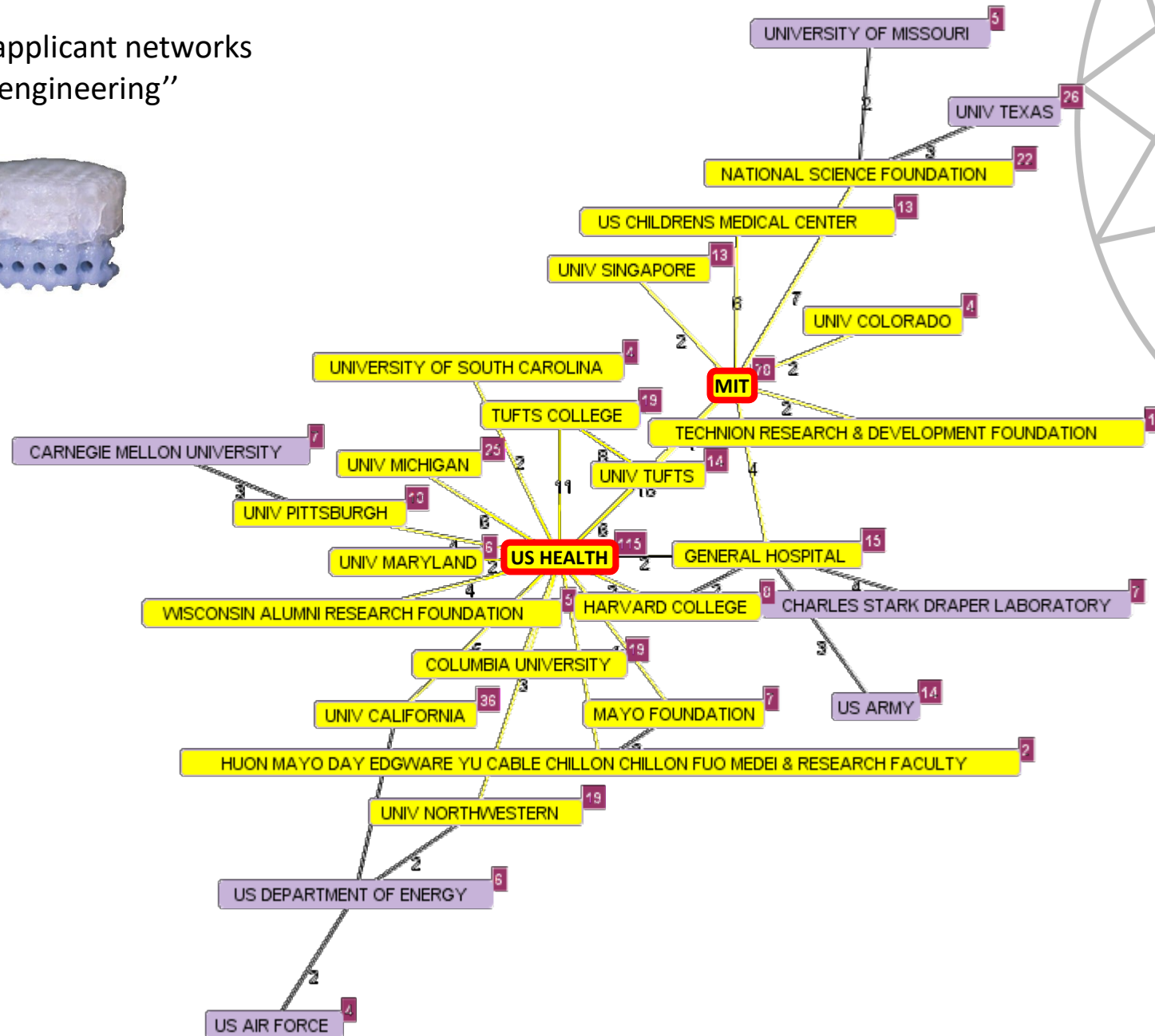
patent applicant networks "joint prosthesis"

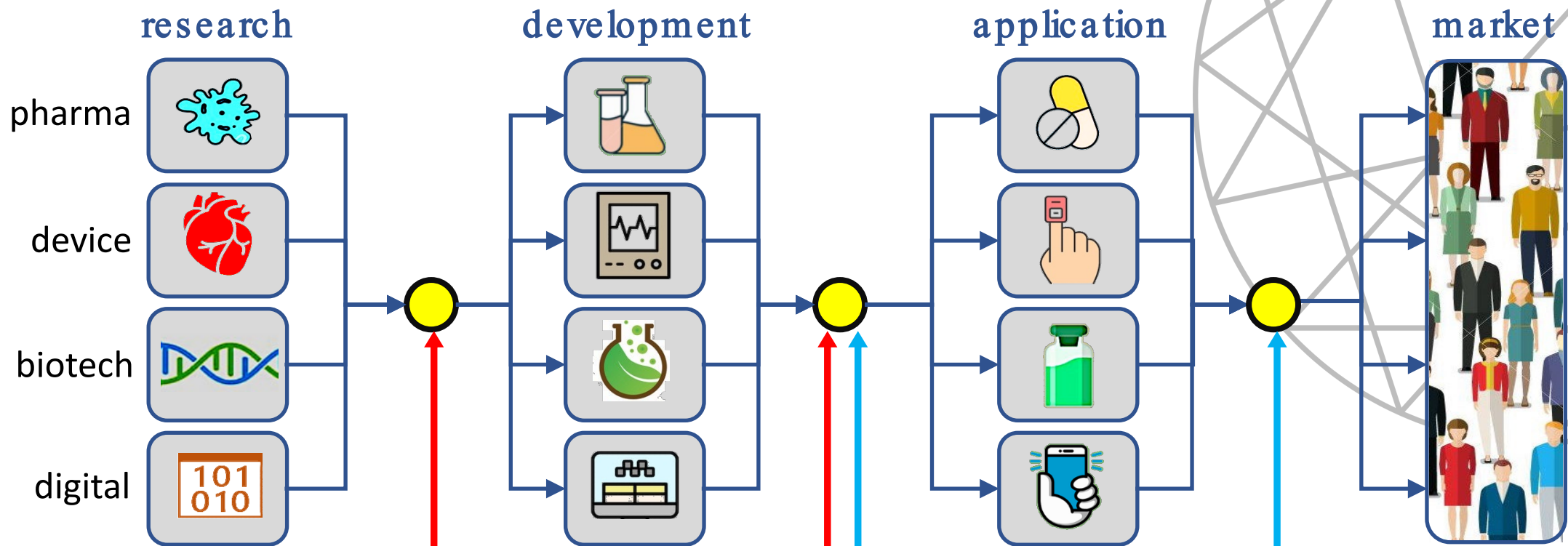


first 20 patent applicants "tissue engineering"



patent applicant networks “tissue engineering”





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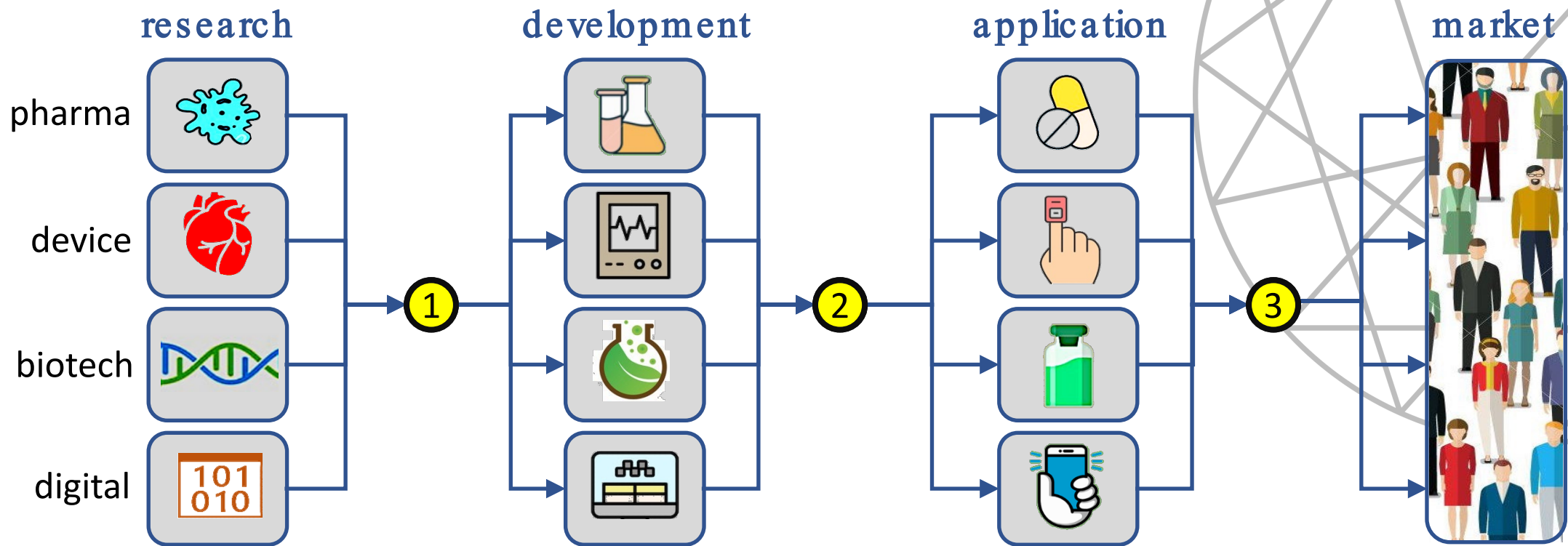
complexity

physics - chemistry
math - biology - infor - ...

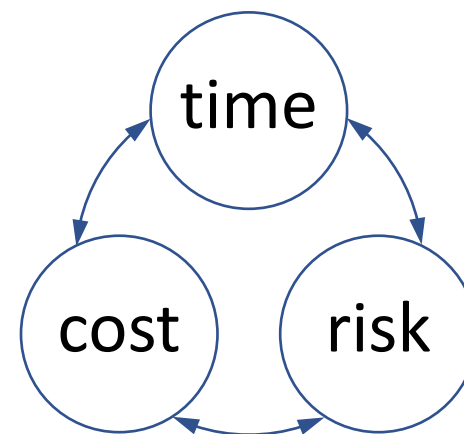
technology

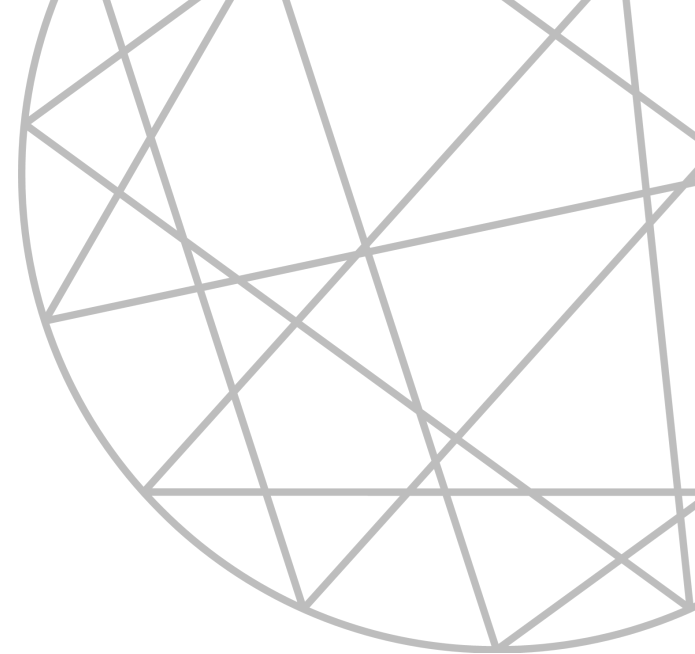
scaling - quality - protection
production - economy/mgm - law - ...

technologies



- 1** knowledge transfer (KT)
- 2** technology transfer (TT)
- 3** impact (I)





LivaNova
Health innovation that matters

OPTIFLOW
Arterial and Venous Cannulae

Highly physiological cannulae

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 453 566 B1

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent: **03.09.2008 Bulletin 2008/36**

(21) Application number: **02787624.2**

(22) Date of filing: **08.11.2002**

(51) Int Cl.: **A61M 25/00 (2006.01) A61M 27/00**

(86) International application number: **PCT/EP2002/012532**

(87) International publication number: **WO 2003/041782 (22.05.2003 Gaze)**

(54) **AORTIC CANNULA**
AORTAKANÜLE
CANULE AORTIQUE

(84) Designated Contracting States: **AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LU MC NL PT SE SK TR**

(30) Priority: **13.11.2001 IT MI20012395**

(43) Date of publication of application: **08.09.2004 Bulletin 2004/37**

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(56) References cited:
EP-A- 0 618 059 US-A-
US-A- 4 406 656 US-A-
US-A- 4 738 666 US-A-

EP 1 453 566 B1

FIG. 3A FIG. 3B

FIG. 3C FIG. 4

10

Patent/product: Aortic cannula

General estimate of the market

The world market for aortic cannulae has been estimated on some data obtained from sector studies:

3000 cardiac surgery centers in 80 countries

1,100,000 heart surgery per year

Average unit cost of a traditional aortic cannula

€ 50 / piece

World global turnover

€ 55,000,000

Companies on the market

company	% market EUROPA	% market USA	
Group X1	40	33	av 38%
Group X2	22	33	
Group X3	10	12	
Group X4	8	na	
Group X5	7	na	
Group X6	5	8	
Group X7	na	14	
Group X8	5	na	

Potential turnover

In the event of transferring the patent under license to the X1 Group, world leader in the sector (38% of the total), the potential turnover of the group relating to the aortic cannula product would be equal to:

€ 20,900,000 (38% di € 55.000.000)

Market penetration hypothesis: this is the weak part of the whole discussion because it is based not on objective data, but on forecasts conditioned by several factors:

- success of the proof of concept testing of the new product
- interest of the physician to accept the change and the related advantages
- marketing actions
- strategic actions to introduce innovation
- strategic action against potential competitors

By estimating an average penetration rate of 10% for a 5-year contract duration, the company's potential annual turnover is:

€ 2.090.000 (10% di € 20.900.000)

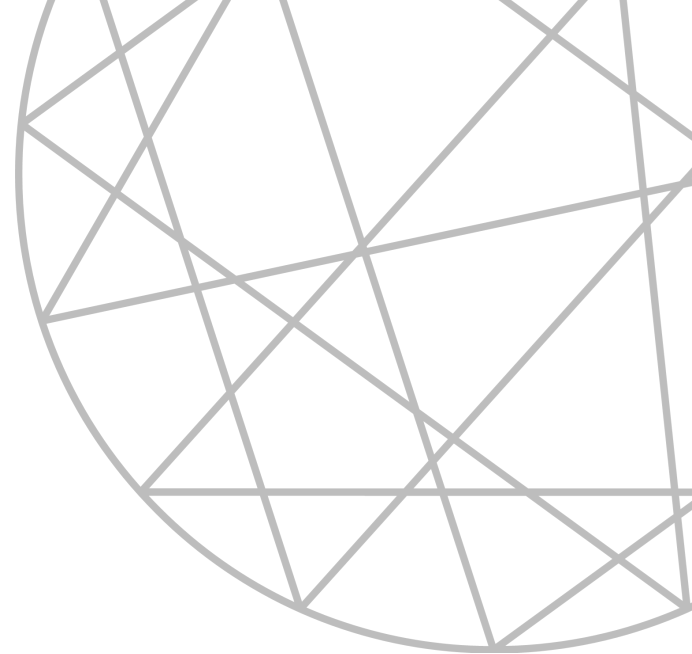
Calculating a 5% royalty rate for the use of the patent, the potential annual turnover from the licence would be:

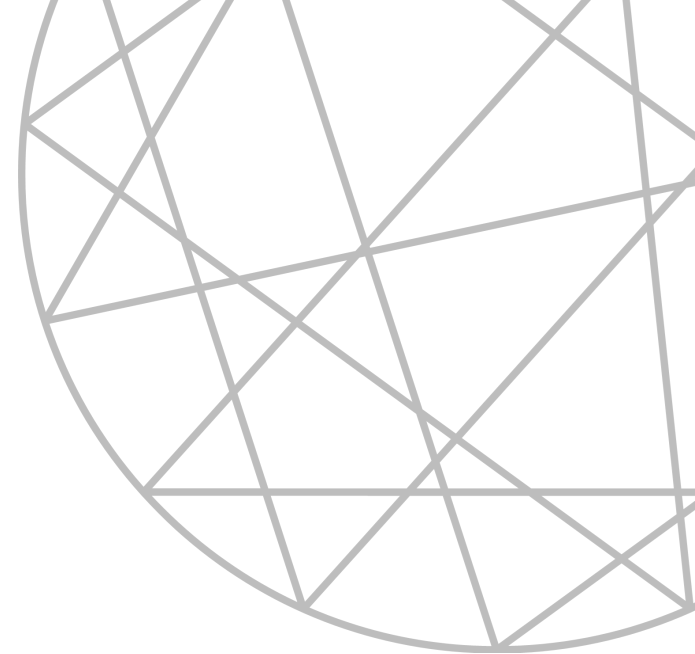
€ 104.500 (5% di € 2.090.000)

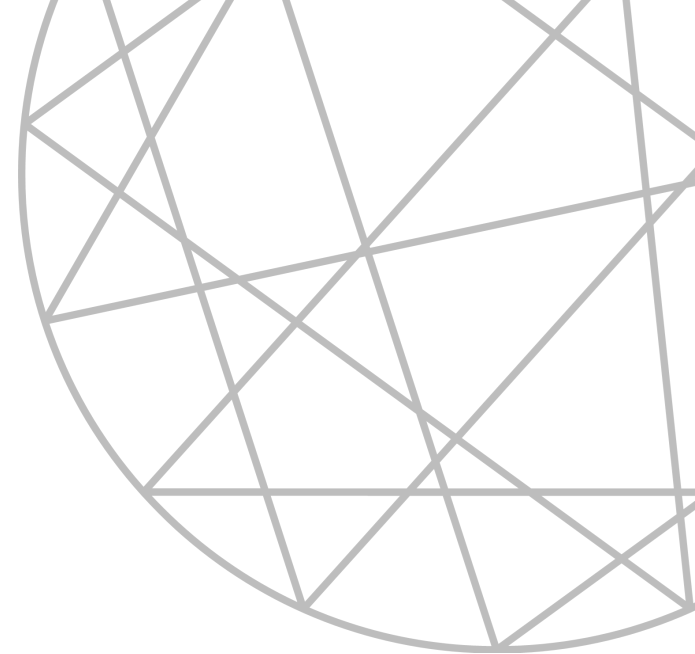
Comparison among companies on the market

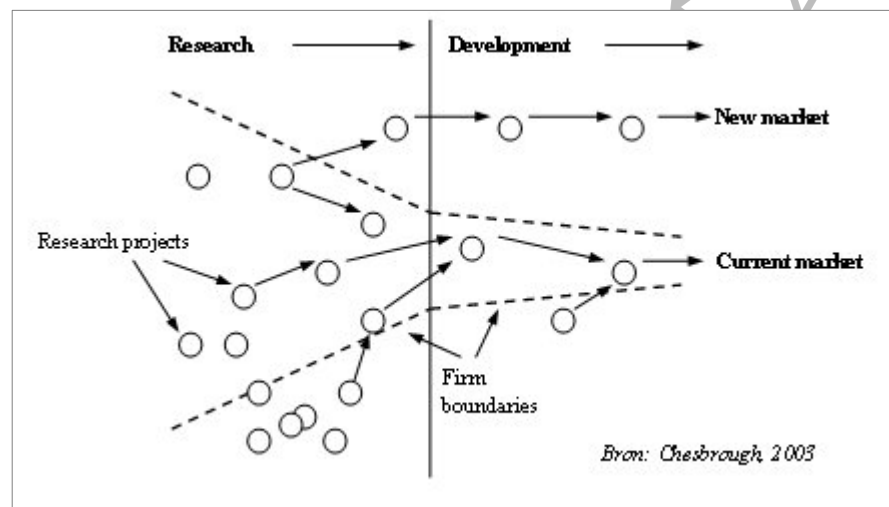
company	% market EUROPA	% market USA	
Group X1	40	33	av 38%
Group X2	22	33	
Group X3	10	12	↓ € 104.500 /y
Group X4	8	na	
Group X5	7	na	
Group X1	5	8	av 6.5%
Group X7	na	14	
Group X8	5	na	↓ € 17.875 /y

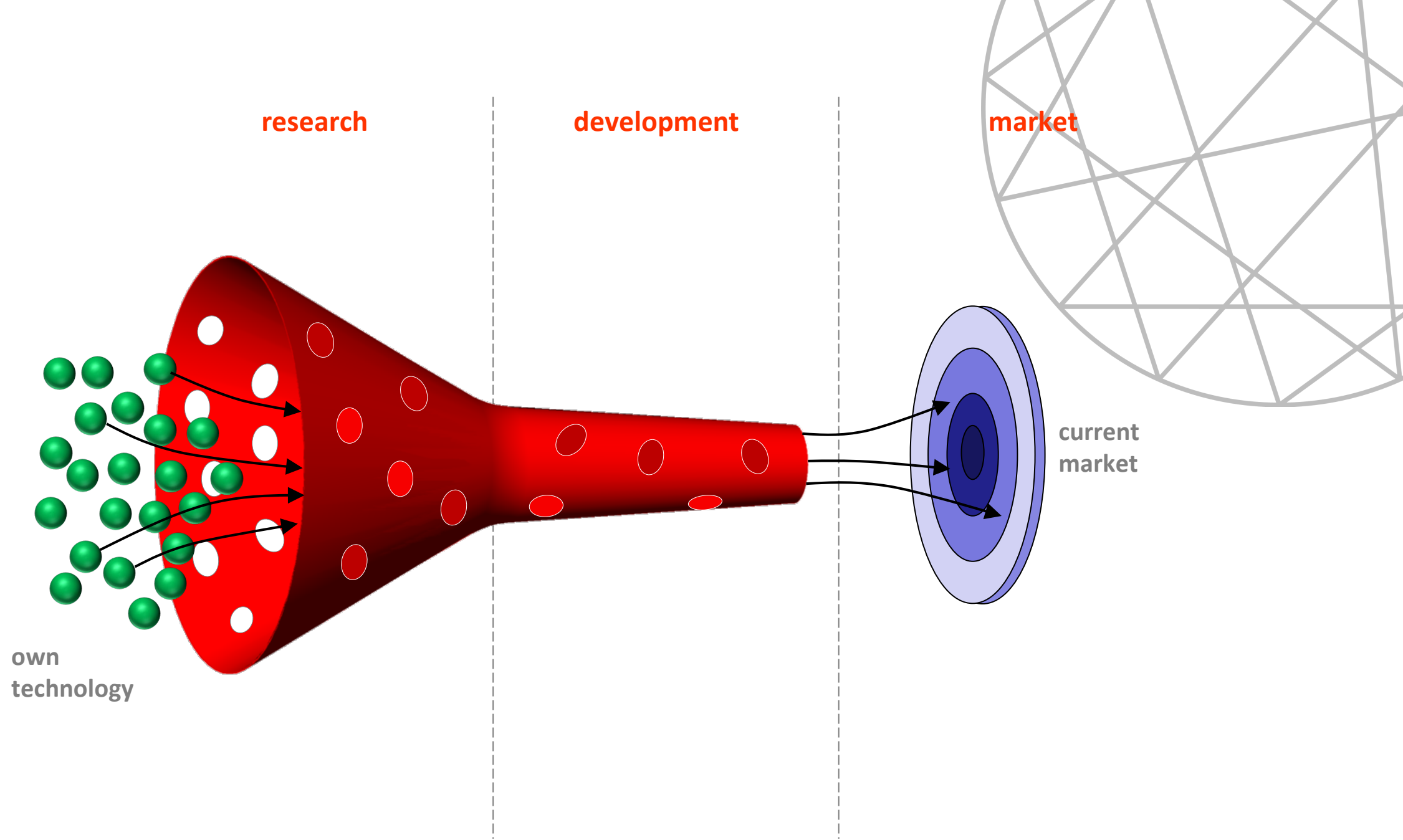


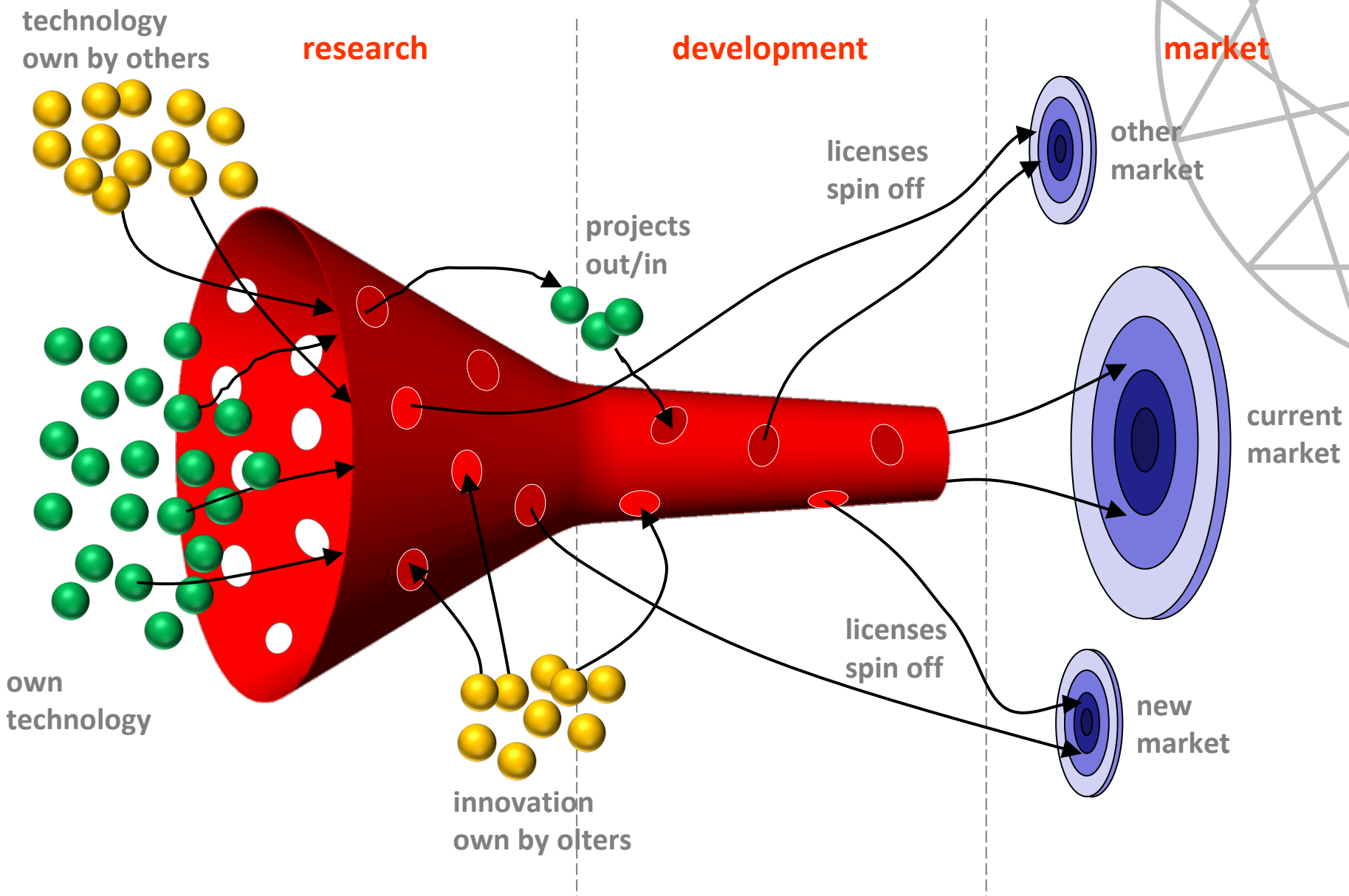


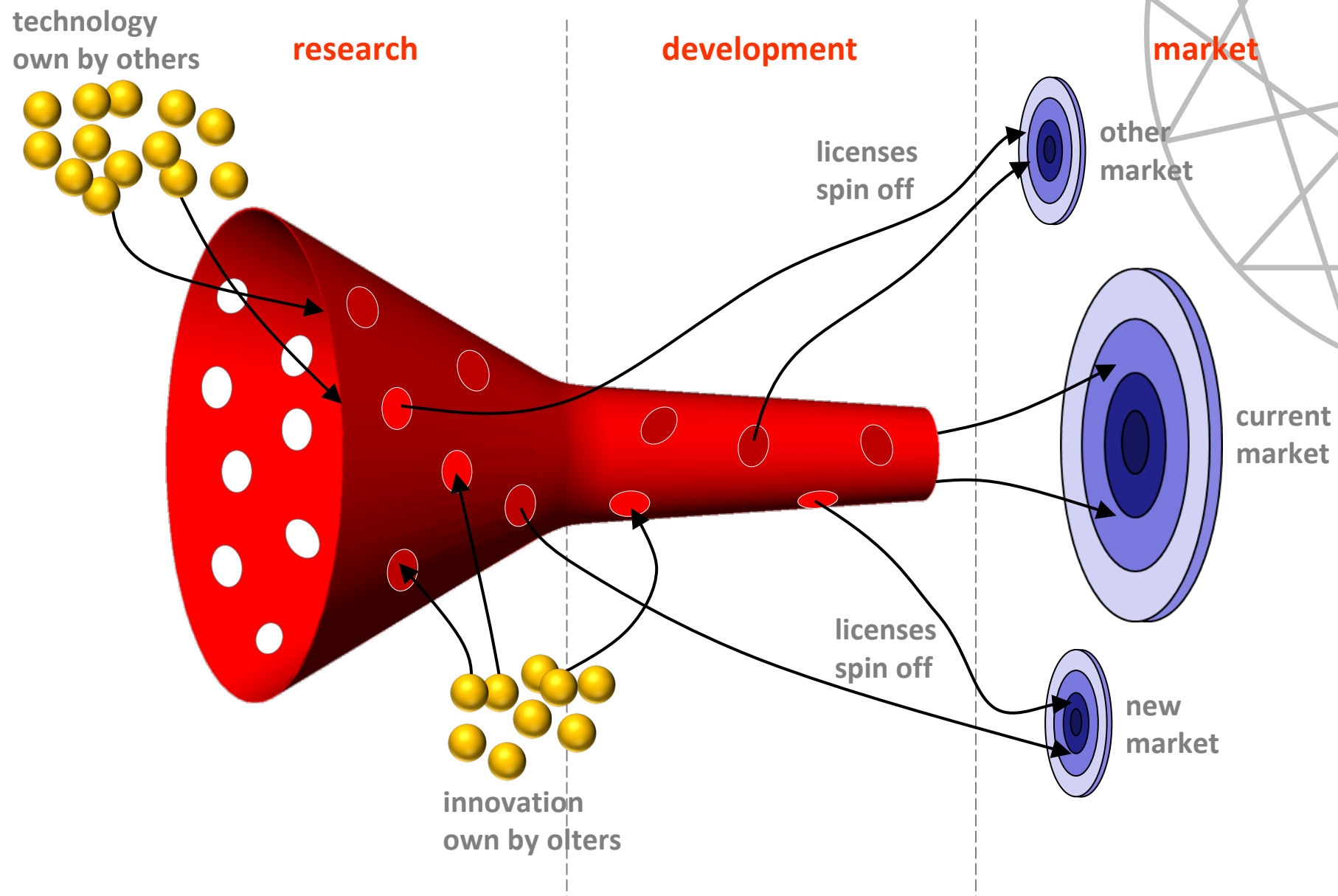


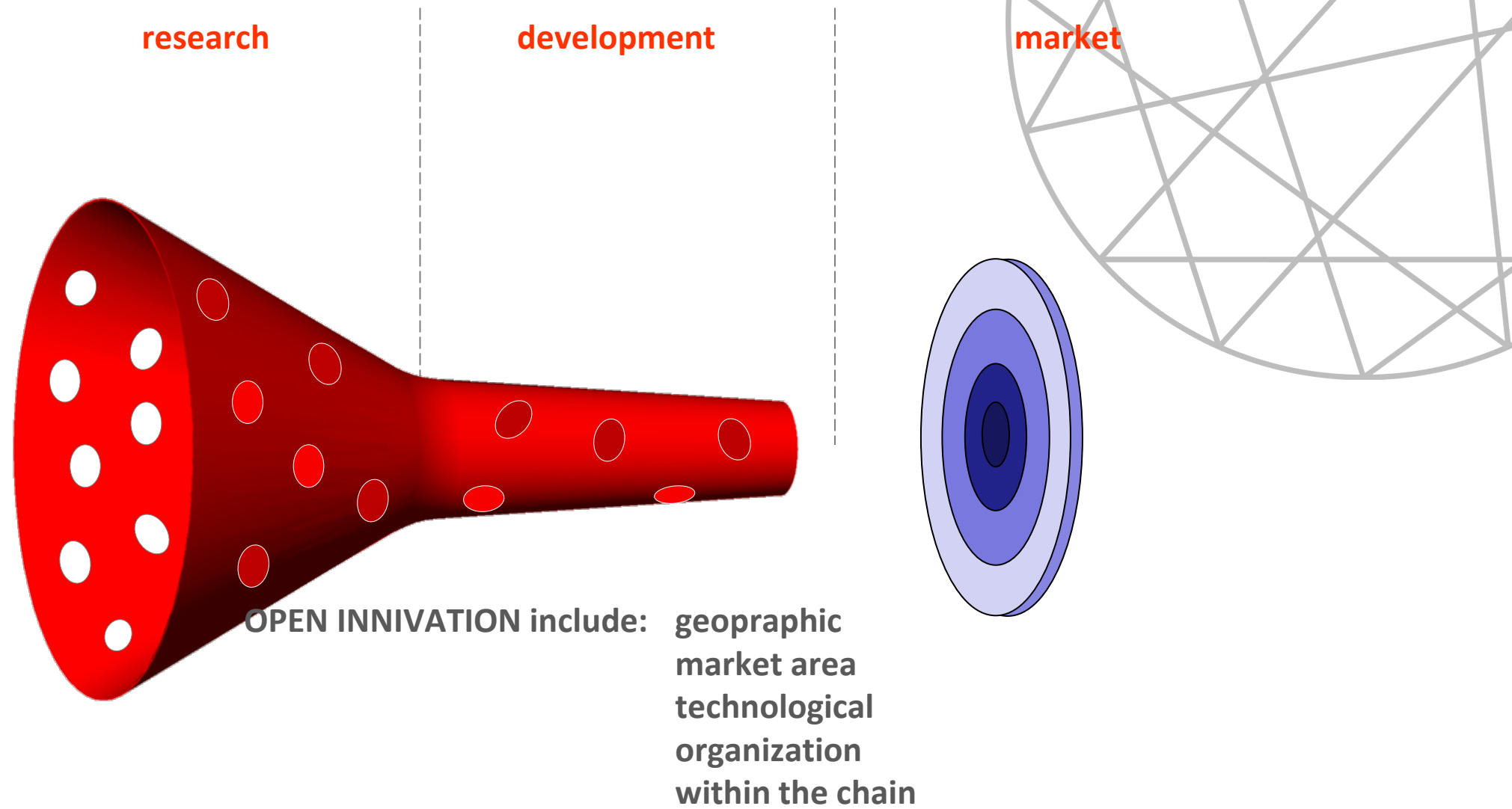












	Closed innovation	Open innovation
People	The smart people in our field work for us	Not all the smart people work for us so we must find and tap into the knowledge and expertise outside our company
R&D	To profit from R&D, we must discover, develop and ship it ourselves	External R&D can create significant value; internal R&D is needed to claim some portion of the value
Autonomy	If we discover it ourselves, we will get it to market	We don't have to originate the research in order to profit from it
Market	If we are the first to commercialize an innovation, we will win	Building a better business model is better than getting to market first
Creativity	If we create the most and best ideas in the industry, we will win	If we make the best use of internal and external ideas, we will win
Patents	We should control our intellectual property (IP) so that our competitors don't profit from our ideas	We should profit from others' IP; we should buy other's IP whenever it advances our own business model



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