Knowledge and Technology Transfer

School on transferable skills: managing, entrepreneurial and IPR

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Comments

- There would be no vaccine for Covid without startups and biotech companies. False simplification of "big pharmas.“

- Public universities doing cutting-edge basic research but also promoting innovation (patents, licensing, spin offs).

- Challenges→Solution:
  Basic Science → Technology → Patent→ StartUp/SpinOff → Corps

- Globalization of science and research… researchers from many countries moving between continents. This depends on people, entrepreneurs, and these are global.

Open questions

- Why is KTT important today?
- How does the KTT process take place?
- Why is KTT important for a researcher?

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The paper of universities along history

Universities at

Middle Age → education (1st mission)

SXIX-XX → research (2nd mission)

>1970 → innovation (3rd mission)

What is innovation

According to ISO 56000:2020

... a new or changed entity realizing or redistributing value

Innovation is about transforming ideas into something worthwhile for someone and thus generating results.

Kevin Kelly (2016). The Inevitable. Penguin Books.

What is innovation

THE HUMAN CURIOSITY AS DRIVER FOR INNOVATION !!

Innovation is about transforming **ideas** into something worthwhile for someone and thus generating results.

Kevin Kelly (2016). The Inevitable. Penguin Books.

Increasing technology in innovation

Technology: problem→ knowledge + other tecnologies →
→ solution + new concepts + effective exploitation ... →

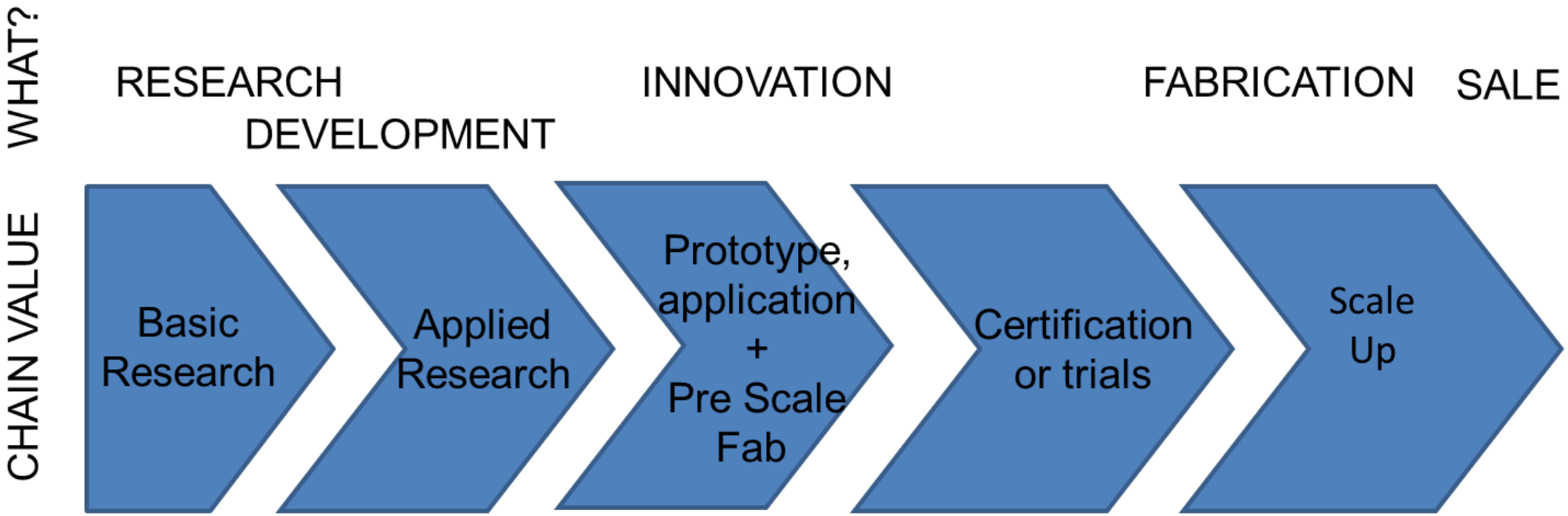
~ 3.500 BC | ~ 1000 | ~ 1920 | ~ 1980 | ~ 1990 | ~2000

~ parts:

2 | 20 | 100 | 30k | 3.5M | 10M

E. Autio, T. Laamanen (1995) International Journal of Technology Management, 19, 7, 643
B. Arthur (2009). The Nature of Technology: What is It and Hows it Evolves. Free press

The Innovation Value Chain



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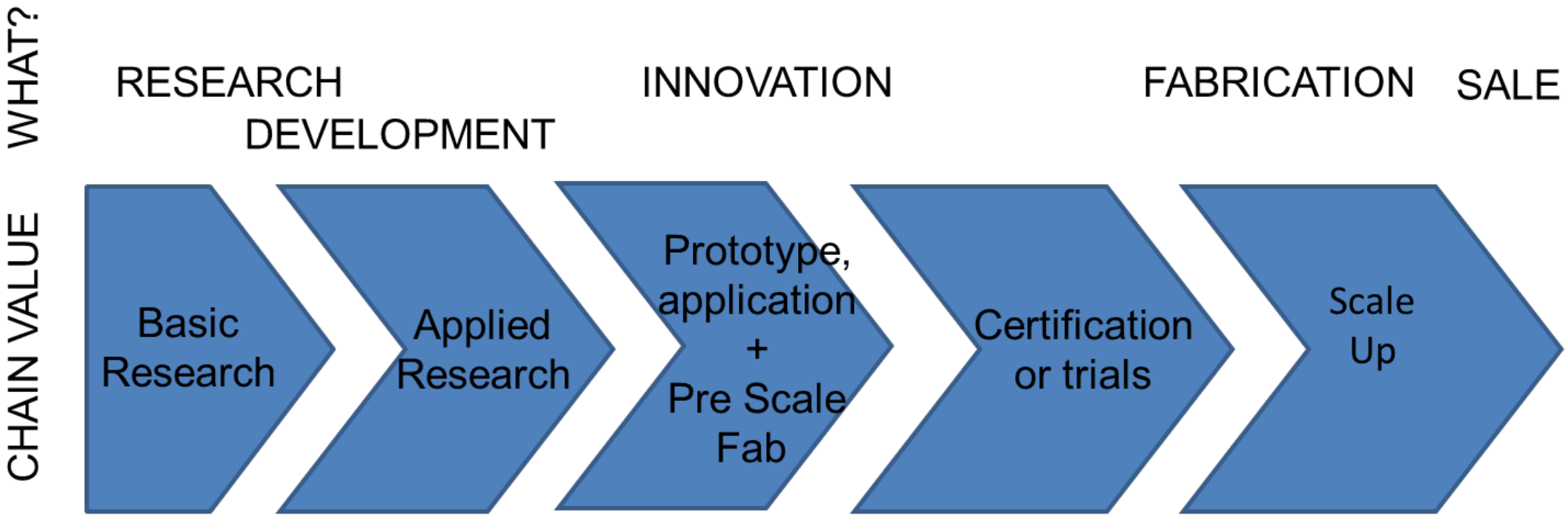
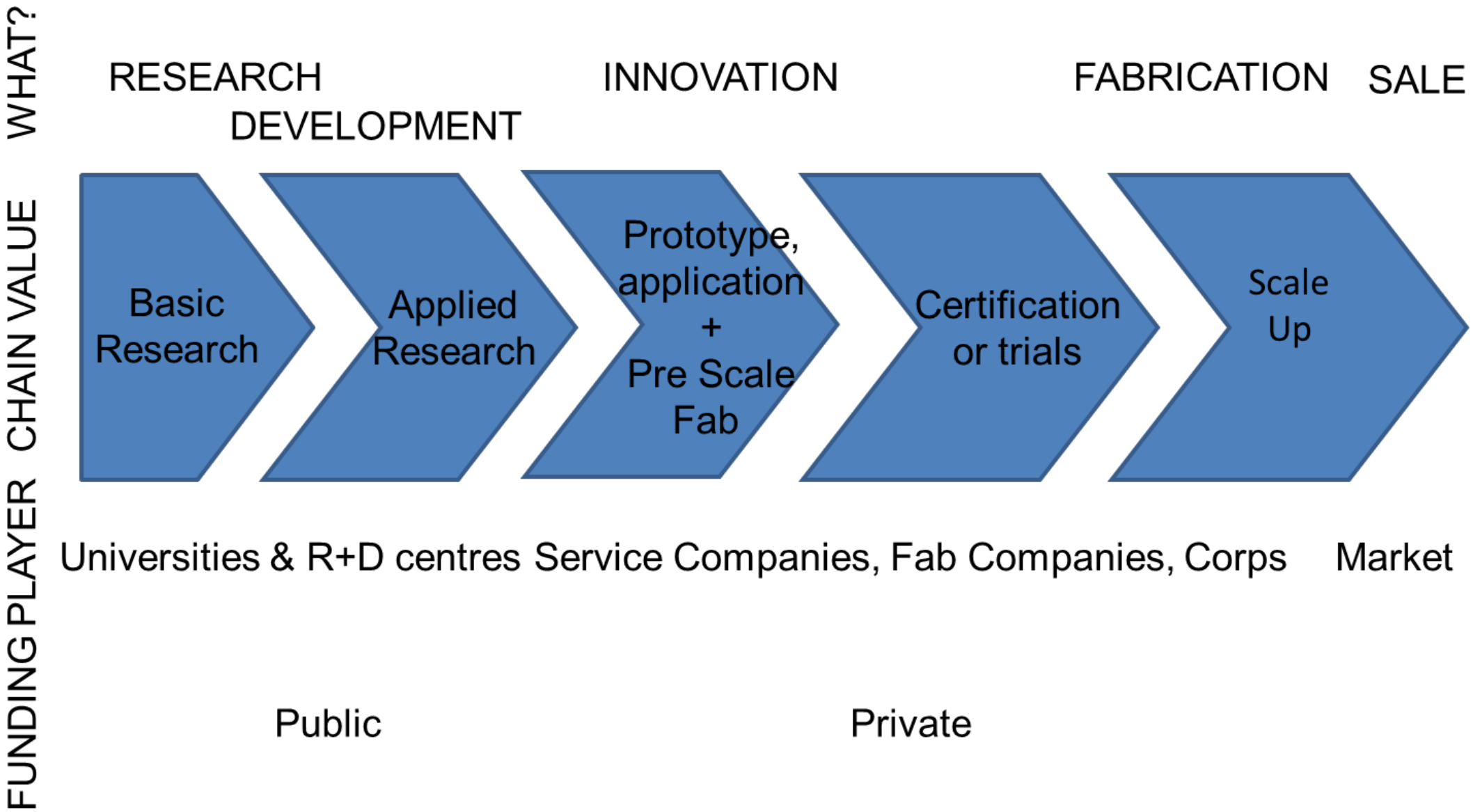


Innovation value chain of Autonomous Electric Vehicle

- Basic and applied research (Batteries, Artificial Vision, AI, Comms) @ MIT, Oxford U, Munich TU, Tsinghua U …
- Prototype of autonomous cars @ Waymo, Cruise, Zoox, Nuro … start ups founded by investors+students
- Certification @ Applus+IDIADA, TÜV, UL, SGS …
- Scale Up (Fabrication) @ Tesla, BYD, Google, GM, Amazon, Renault, Stellantis …

The Innovation Value Chain



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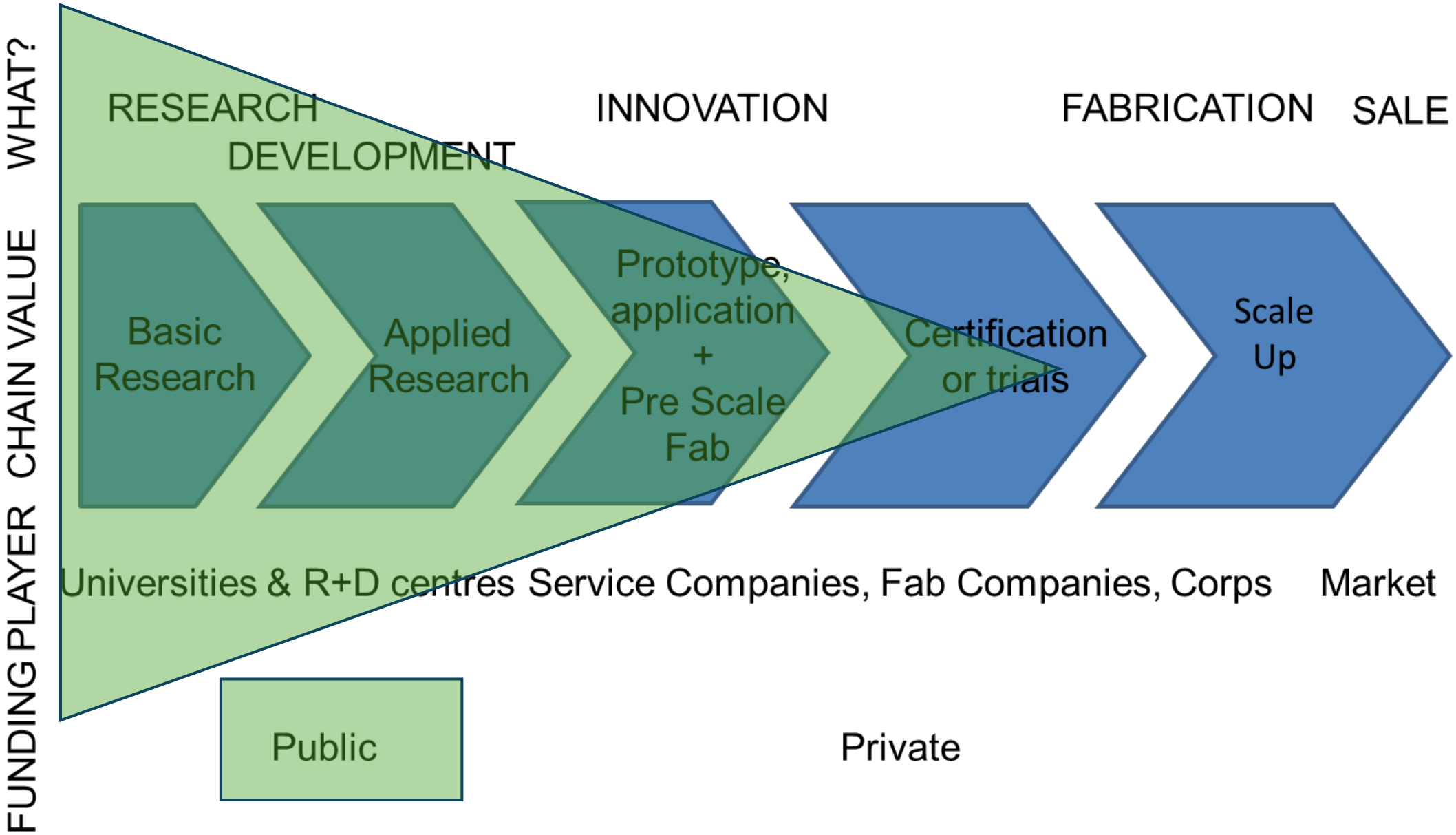

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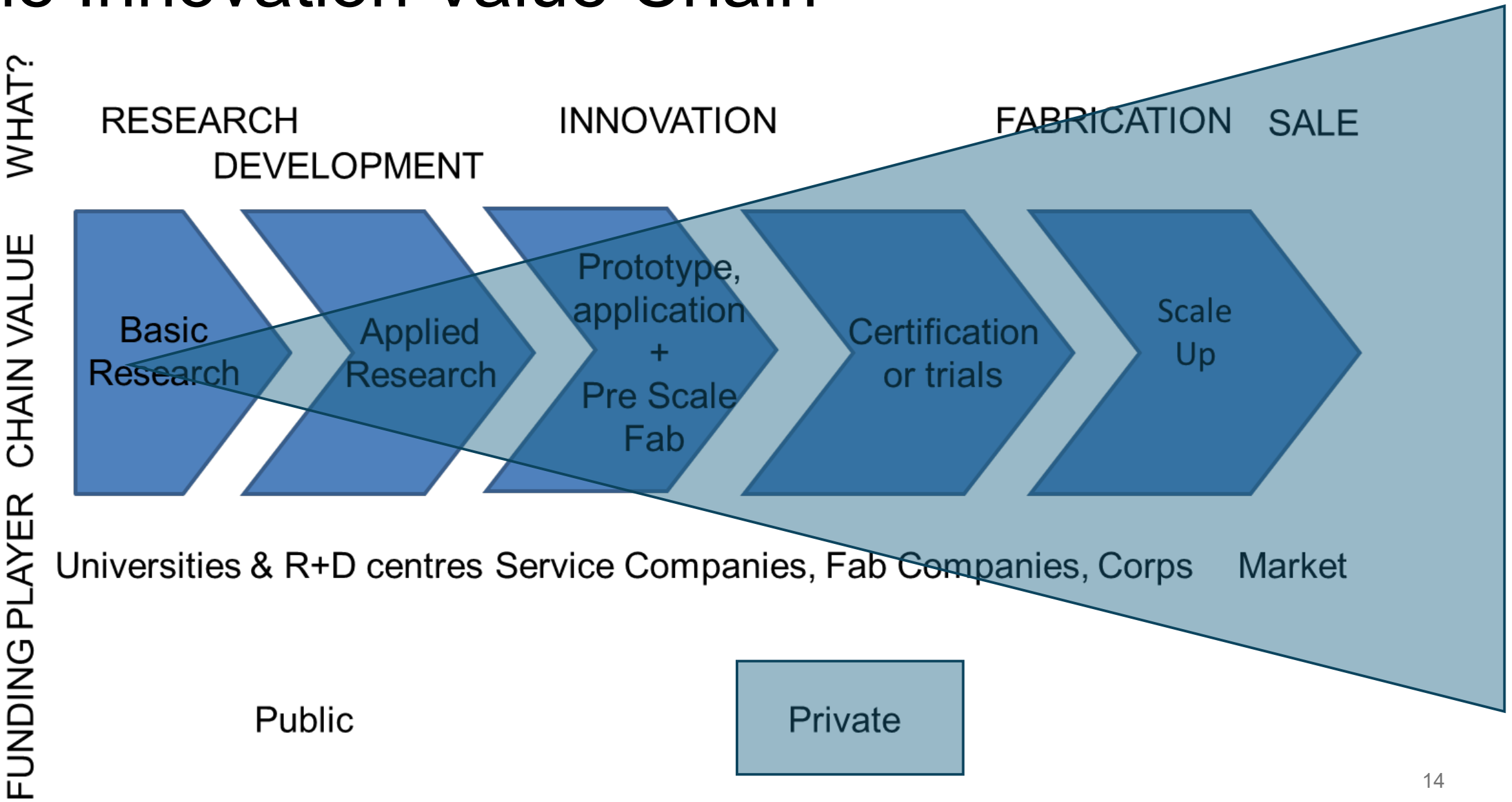

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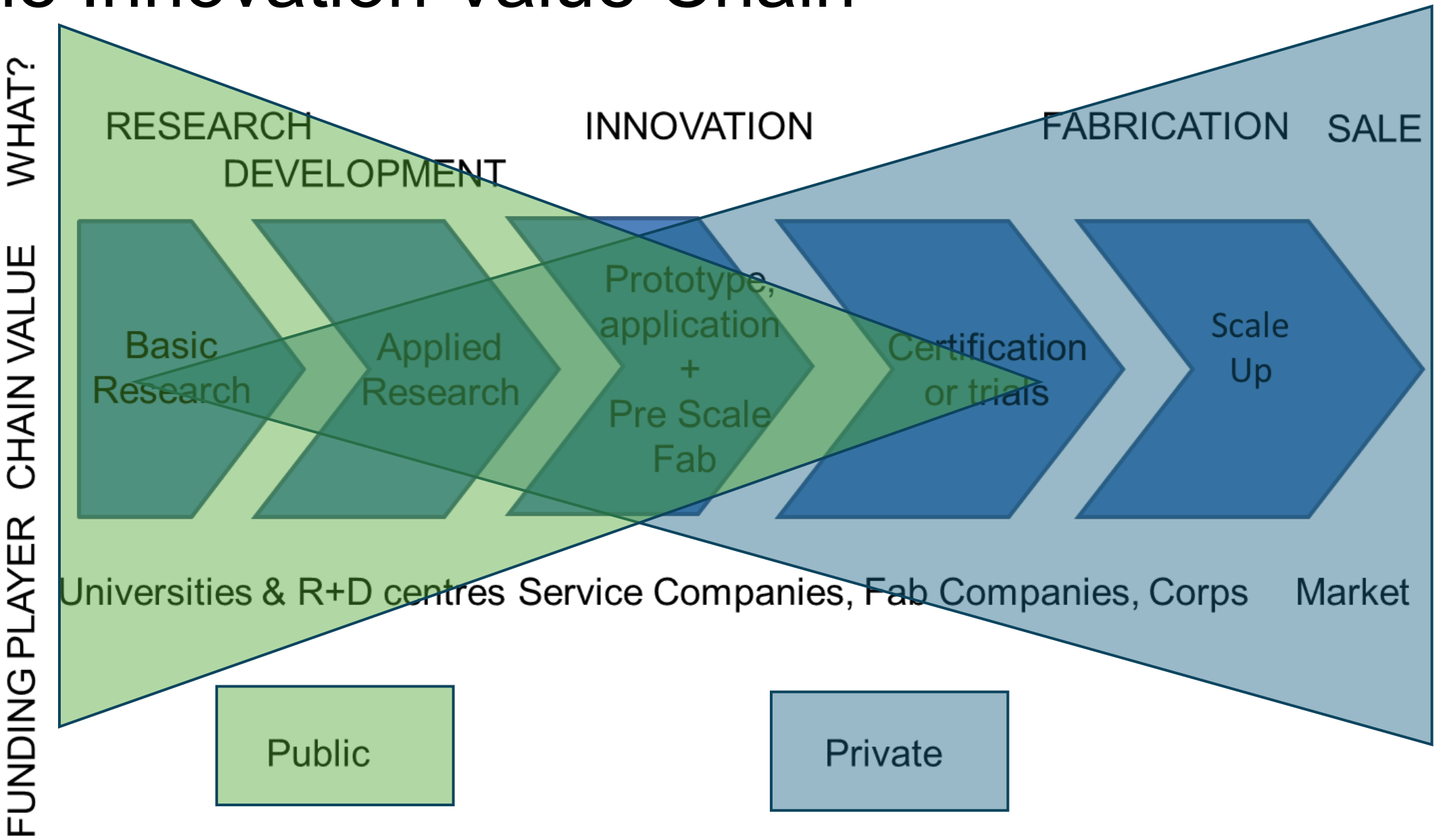
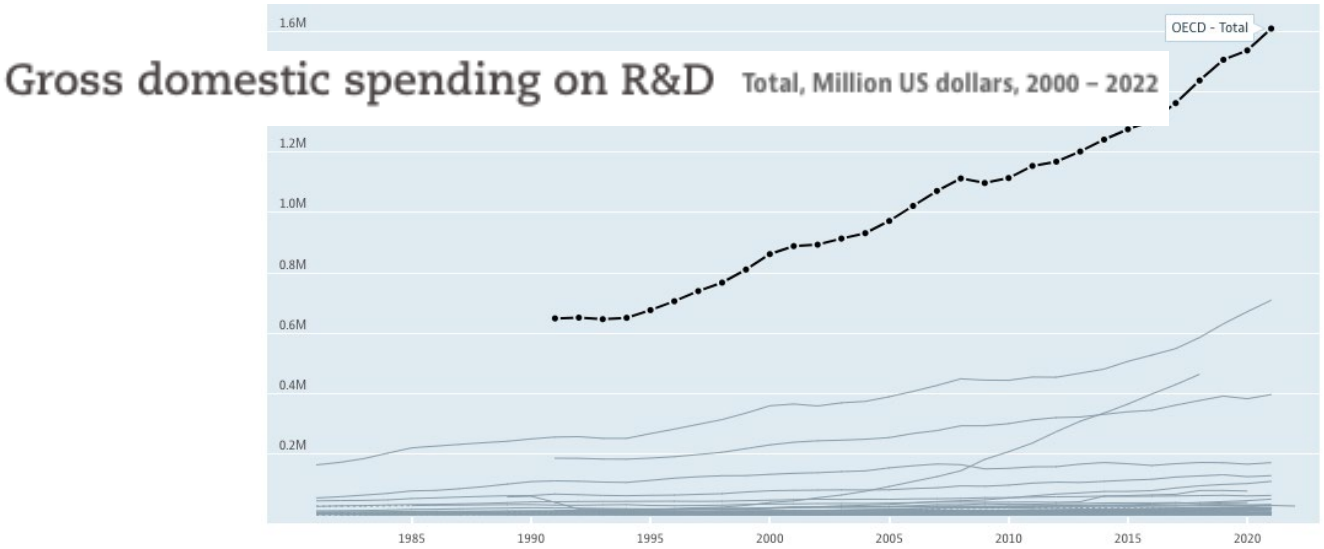
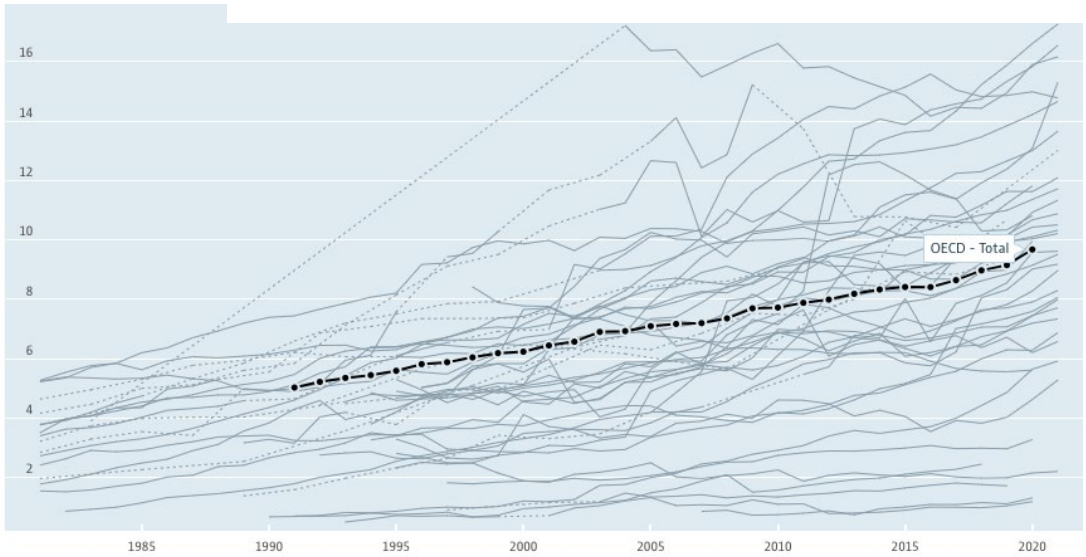
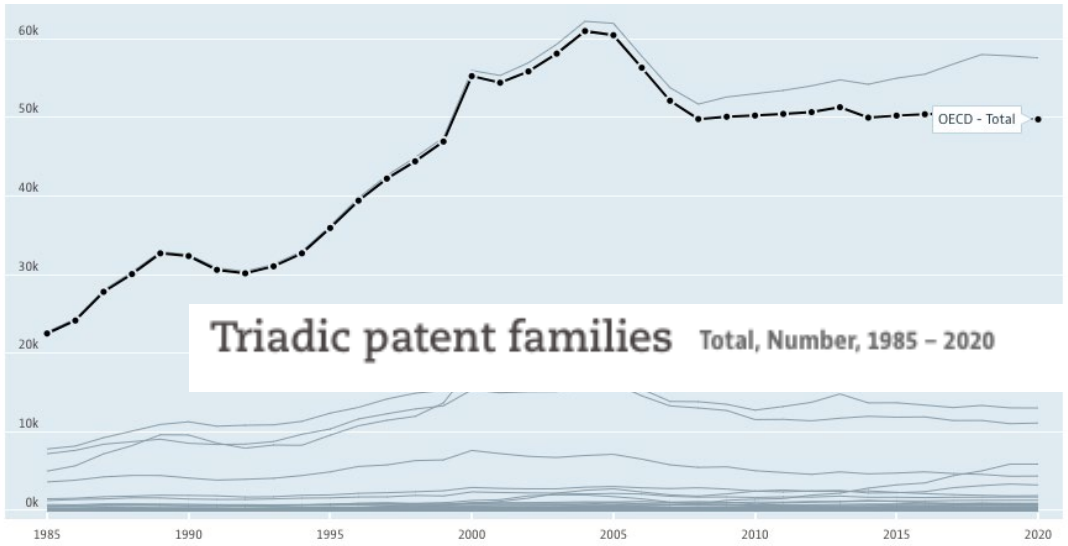
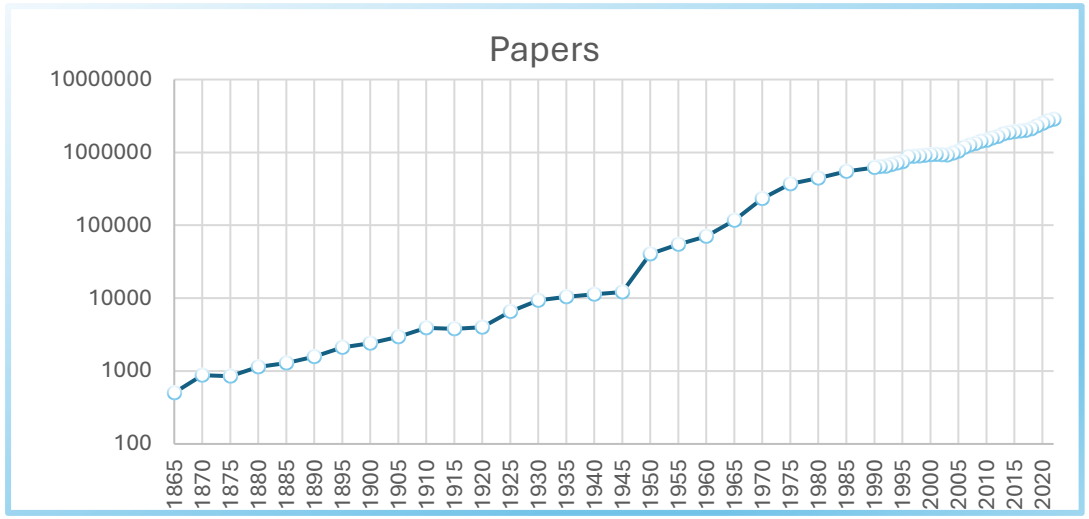


R&D policies









OECD Data (data.oeced.org) https://data.oecd.org/rd/researchers.htm#indicator-char

Scopus

R&D policies

Some data 2021-2022:

- 20,000 universities (1)
- laboratories ~ 2 billion m2 (2)
- More than 57,000 patents granted (3)
- More than 50,000 doctoral theses (4)
- 1% of OECD employees are researchers (3)
- Almost 3,000,000 scientific documents -*papers*- (5)

Search in September 2023:
(1) 15700 QS - 31000 webometrics.info
(2) 20.000 universities x 100.000 m2/univ
(3) OCDE – some contradiction with UNESCO https://www.unesco.org/reports/science/2021/en/report-series
(4) 44987 Open Access Theses and Diss. y 49965 en NDLTD, and many are not there!.
(5) Scopus, search limited to papers in 2022: 2.857.590

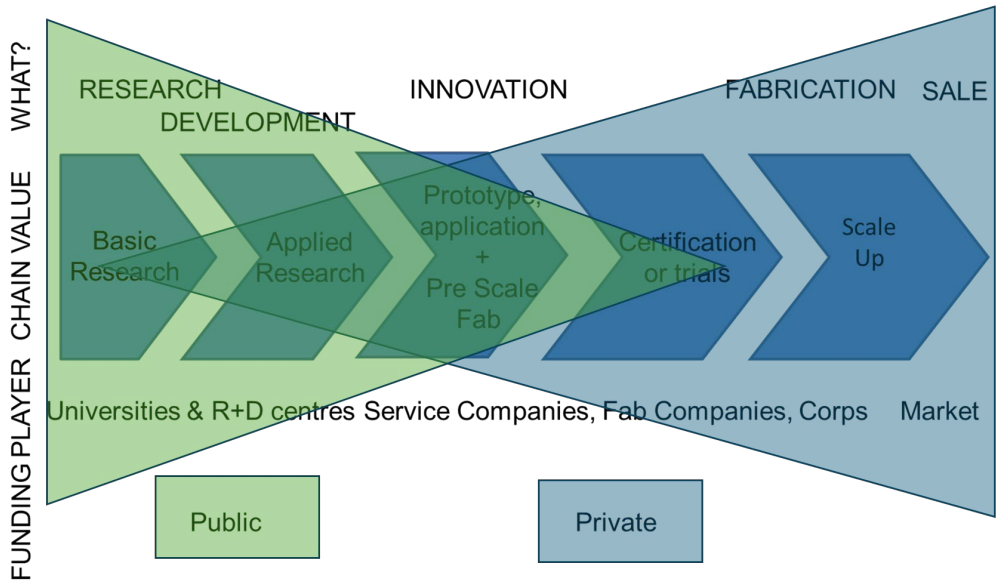
Public & Private players in innovation

Private sector (Fabs, companies, SMEs, Corps) invest on:

1) Market oriented innovation (currently not basic neither applied research)
2) Culture (Open Innovation)
3) Organizational structure of innovation (ISO)

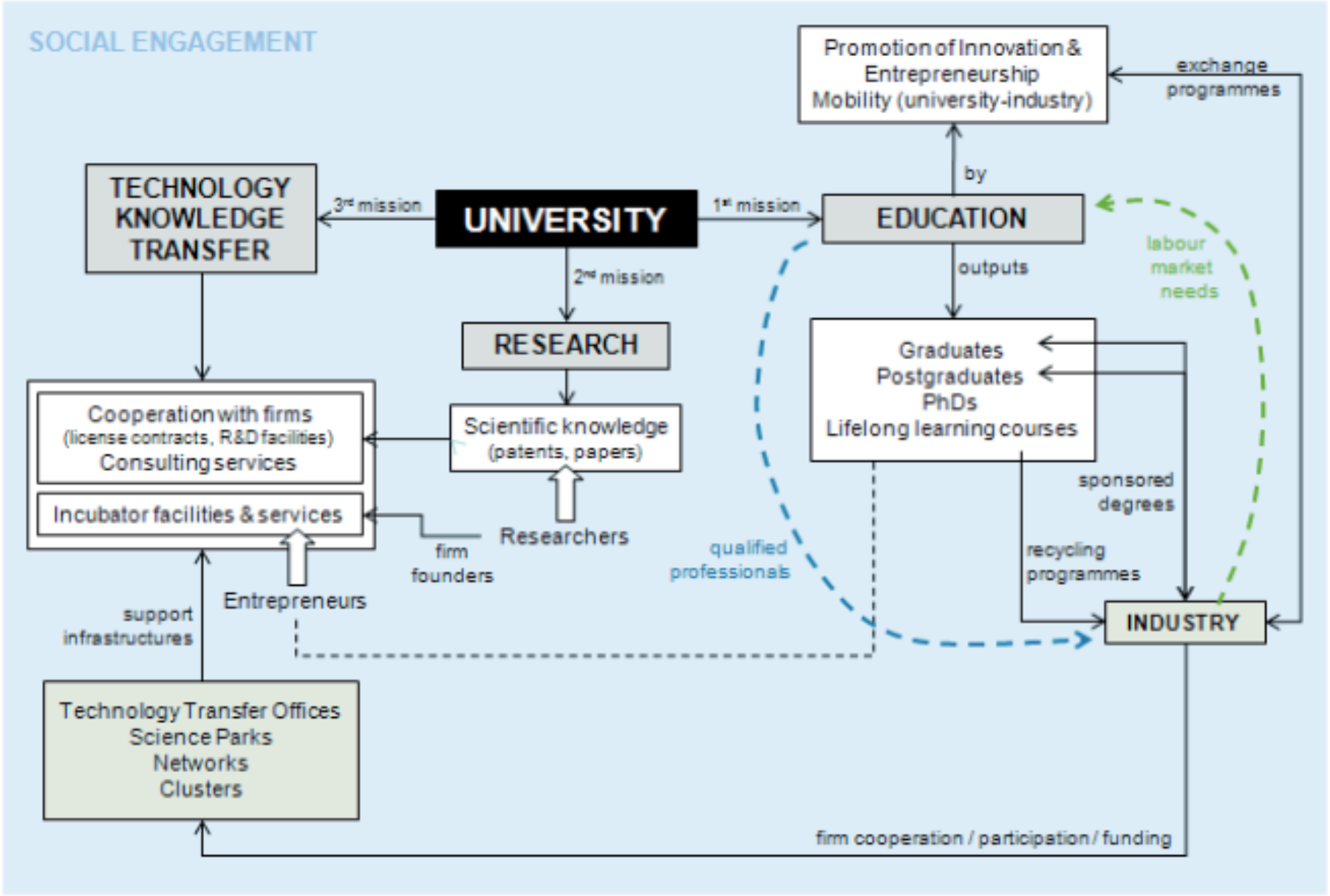
Public sector (countries, regions, states, UE) promotes firmly

1) Advanced Human Capital
2) Basic and Applied Research



Is there (still) any weak point in the innovation value chain?

Knowledge & Tech Transfer *matching Public&Private*



EU-Drivers report 2010.
J.M. Vilalta et al

Open questions

- **Why is KTT important today?**

→ Current challenges involve complex technologies
→ No single actor can play in innovation alone
→ Universities and R&D centers specialized in Basic and App Research
→ Companies specialized in production and complementary technologies
→ KTT: matching between Universities & Companies

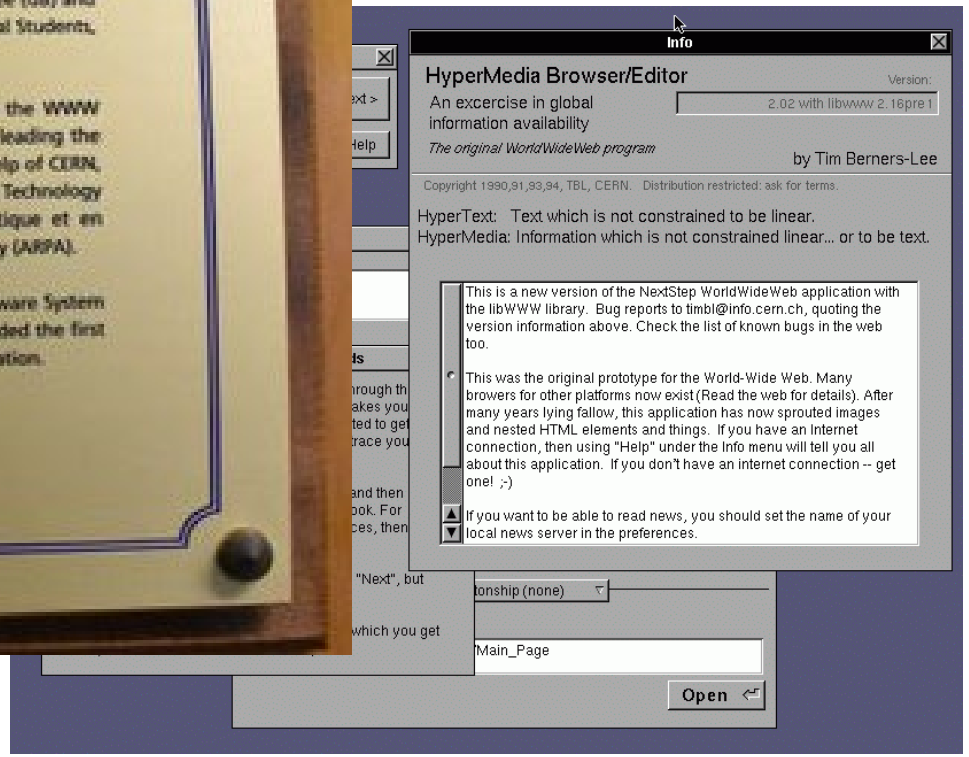
Open questions

- Why is KTT important today?

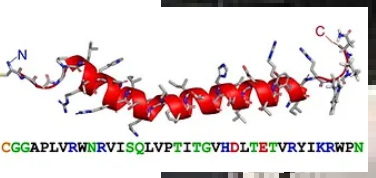
- How does the KTT process take place?

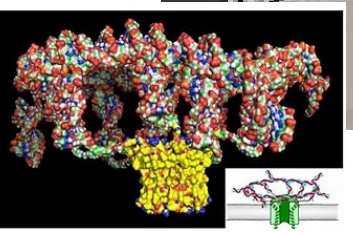
- Why is KTT important for a researcher?


French / Swiss border
SWITZERLAND
FRANCE
5km
Geneva

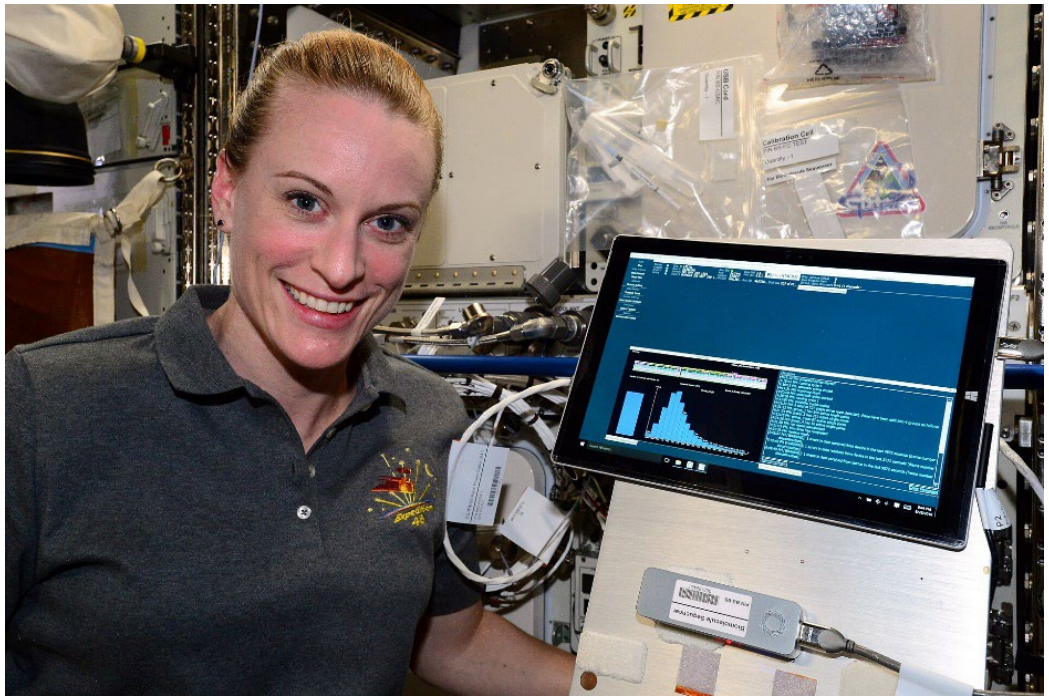


T. Berners-Lee et al (1990) WorldWideWeb: Proposal for a HyperText Project. https://www.w3.org/Proposal.html

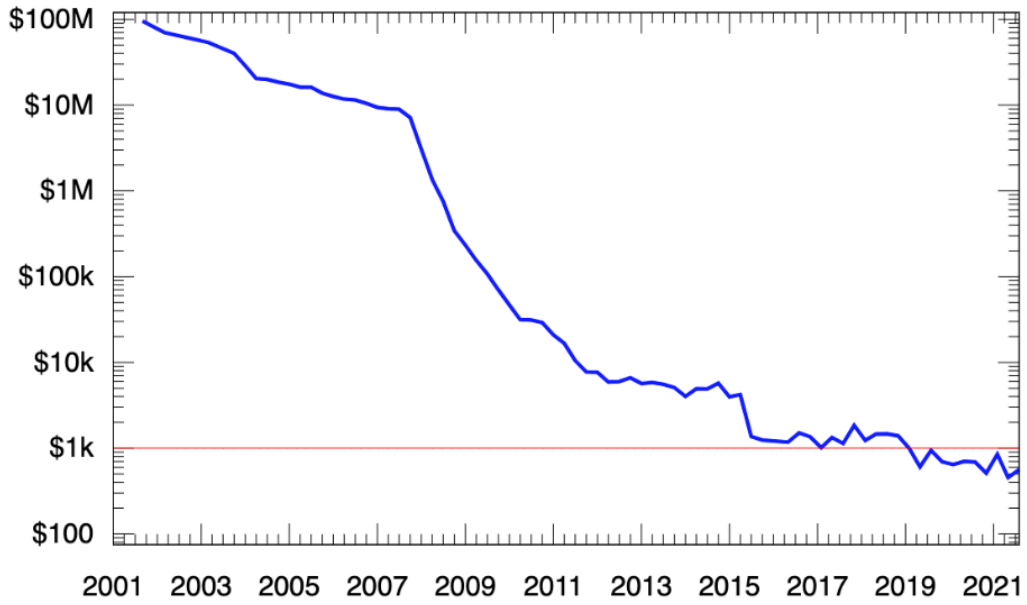




Hagan Bayley (2011) The Royal Society Mullard Award, https://royalsociety.org/people/hagan-bayley-11060/



Cost to sequence a human genome (USD)



Science Driven Innovation

Penicillin (Fleming)

Individual Genius

Chance

basic science

Not patent

War driven innovation

Slow innovation

(1928-1940)

Genoma (Bayley, Oxford Nanopore)

Middle team (15) international

working on World Challenge

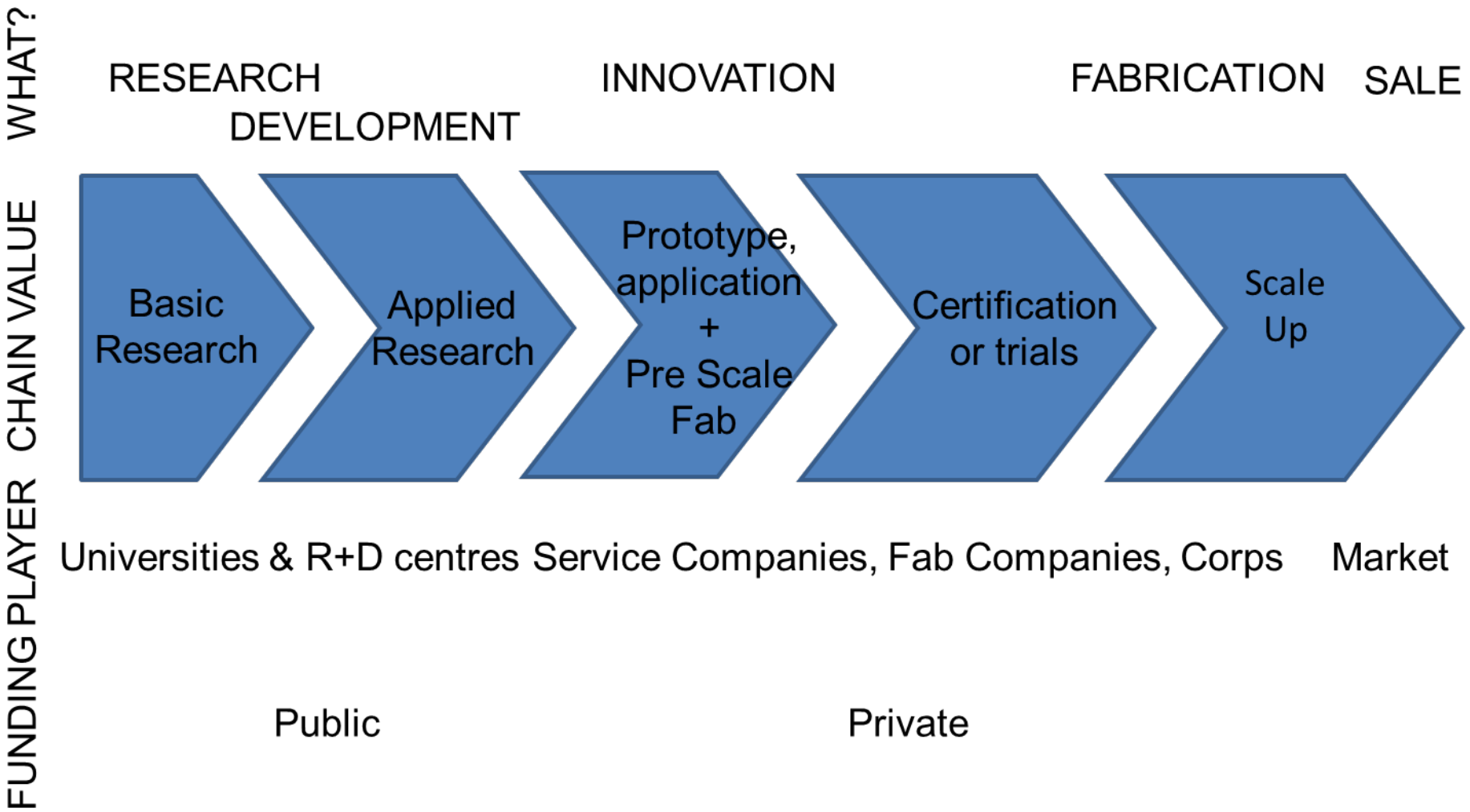
basic science

Patent → Spin off

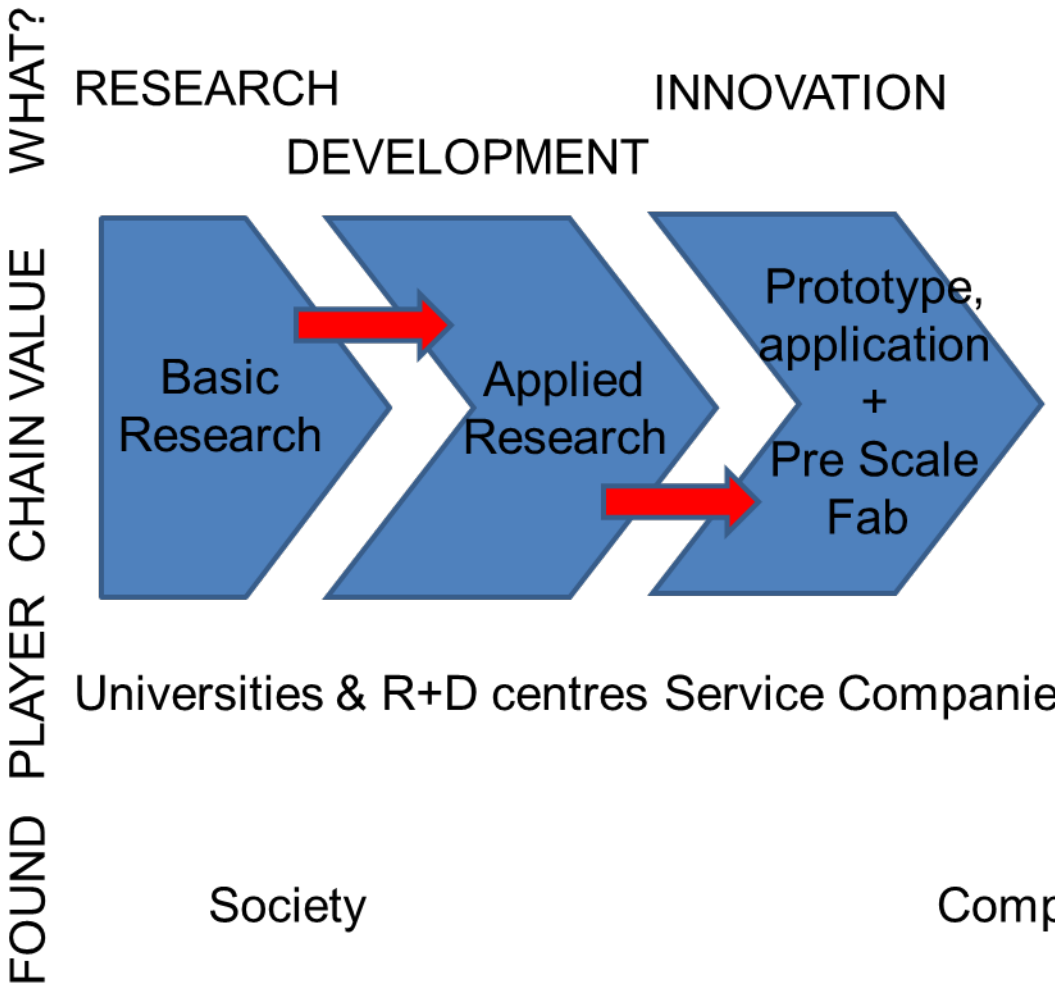
Very Rapid Innovation

(2001-2003)

KTT: the Public Push in Innovation



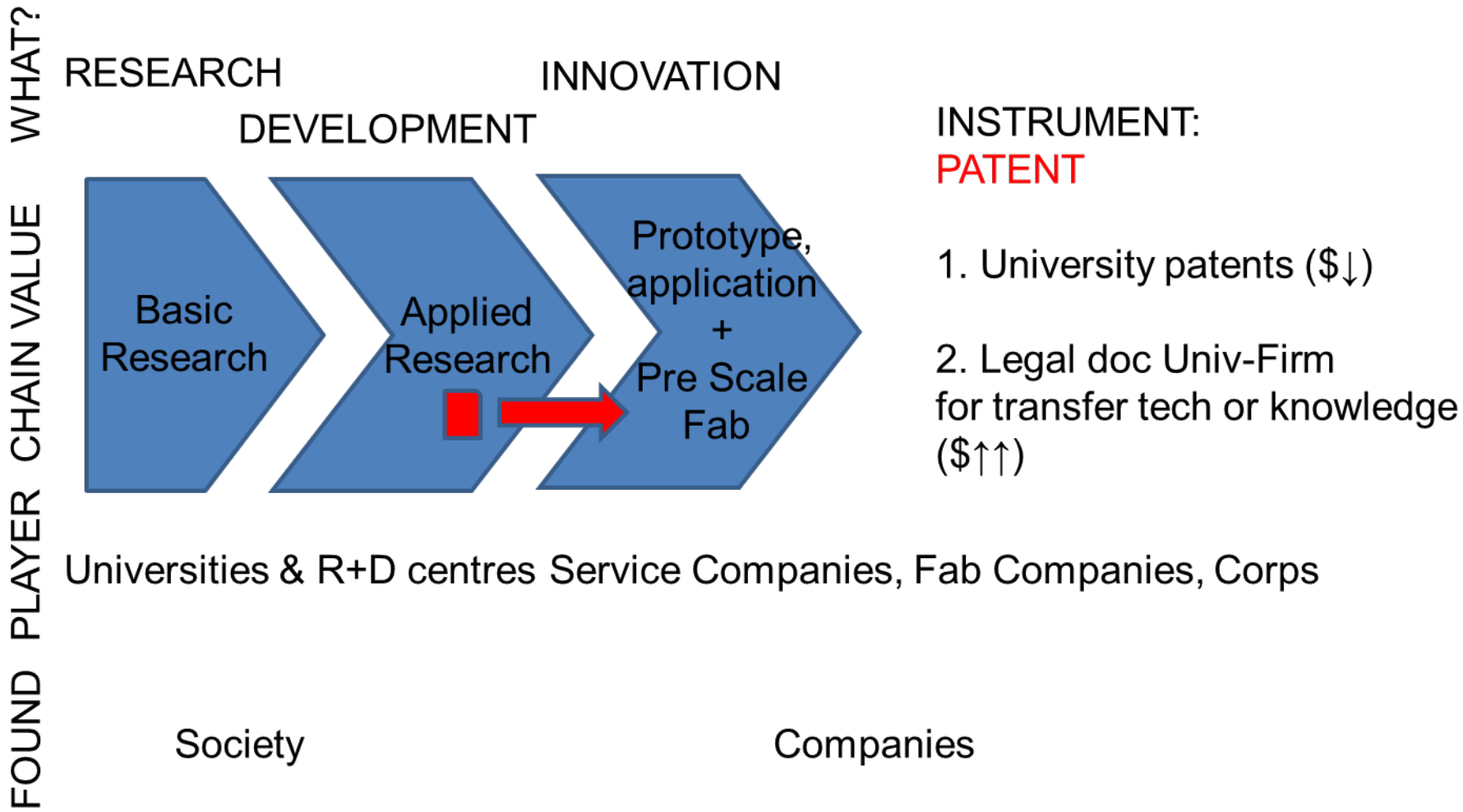
KTT: the Public Push in Innovation



INSTRUMENT:
AGREEMENT

1. Legal doc Univ-Firm
for transfer tech or knowledge ($↑)

KTT: the Public Push in Innovation



INSTRUMENT:
PATENT

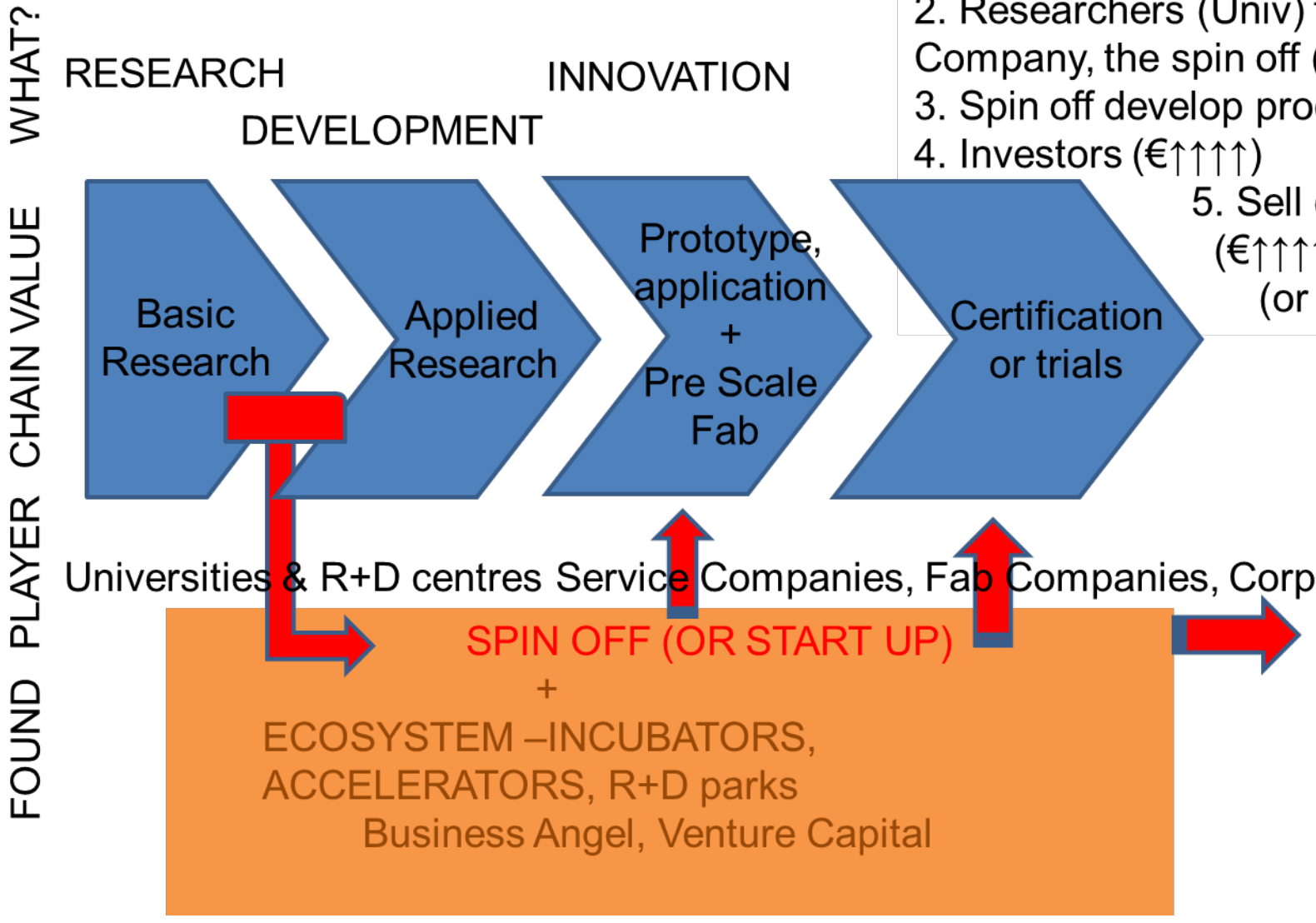
1. University patents ($↓)

2. Legal doc Univ-Firm
for transfer tech or knowledge
($↑↑)

KTT: Public Push in Innovation

INSTRUMENT:
SPIN OFF

1. Univ Patent and license to Researchers (€↓)
2. Researchers (Univ) found a Company, the spin off (€↓↓)
3. Spin off develop product (€↓↓↓↓)
4. Investors (€↑↑↑↑)
5. Sell of Spin off (€↑↑↑↑↑↑↑↑↑) (or production)

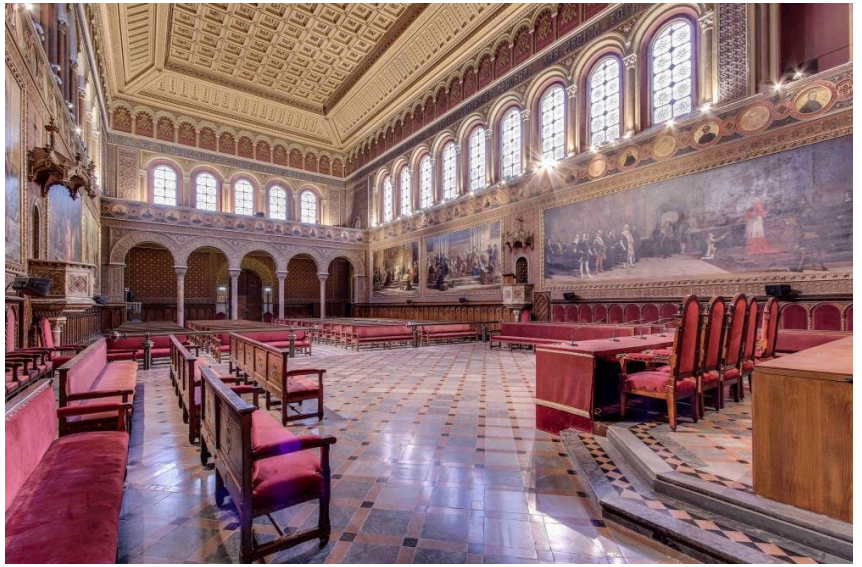


KTT: the Public Push in Innovation

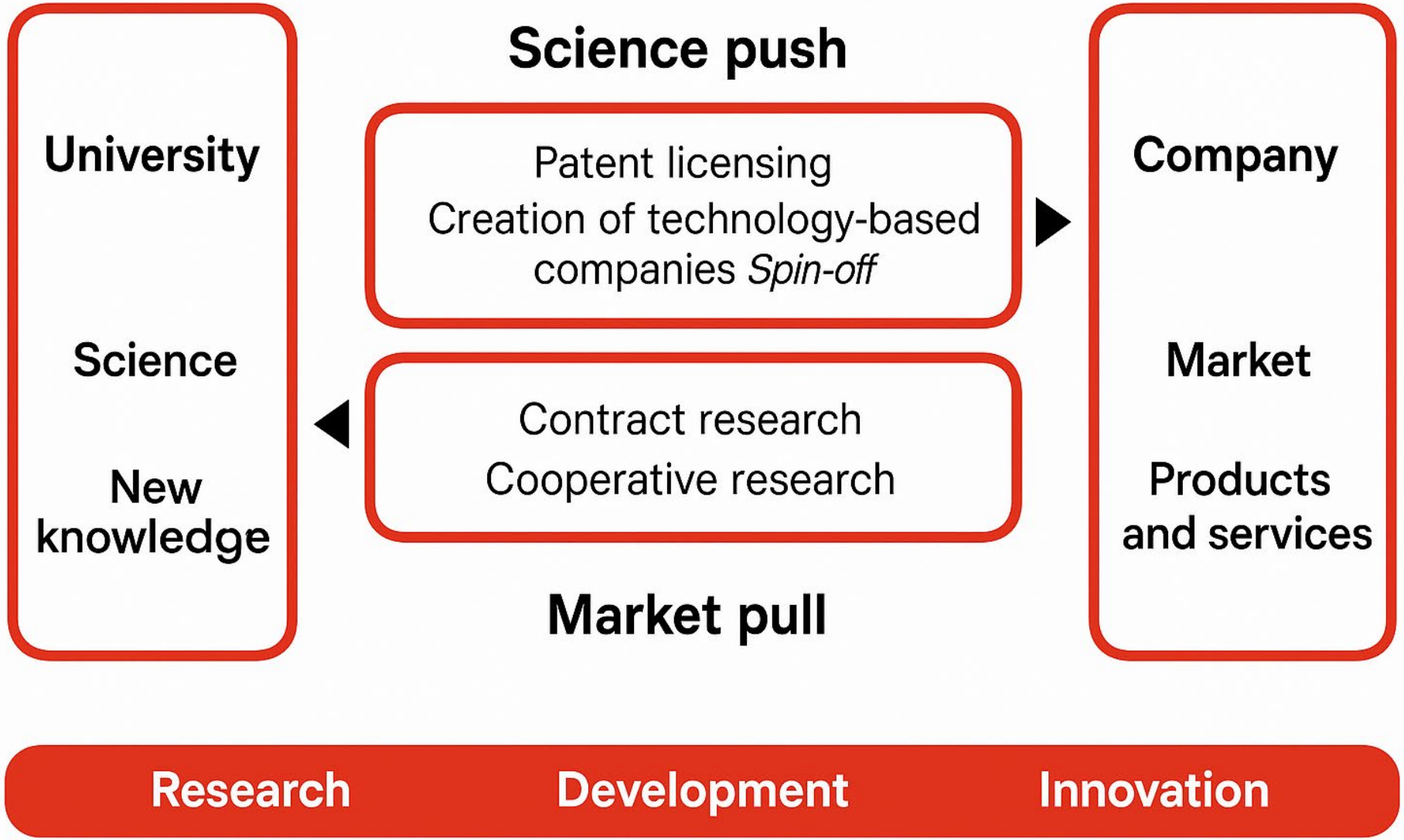
PROCESS	INVESTMENT OF UNIVERSITY	INVESTMENT OF RESEARCHERS	TIME TO RETURN	RETURN	RISK
AGREEMENT	0	0 ... but time	SHORT (MONTHS)	MEDIUM	LOW
PATENTS	MEDIUM (~20k$)	0	MEDIUM-LONG (FEW YEARS)	MEDIUM-HIGH	MODERATE-HIGH
SPIN OFF	MEDIUM	MEDIUM (~20k$) OR ... (~100k$)	LONG (YEARS)	**VERY HIGH (X1000)**	**VERY HIGH**

KTT at the University of Barcelona

UNIVERSITAT DE BARCELONA



KTT at the University of Barcelona



KTT at the University of Barcelona

Universitat de Barcelona

Bosch i Gimpera
UNIVERSITAT DE BARCELONA

Parc Científic de Barcelona
UNIVERSITAT DE BARCELONA

StartUB!
UNIVERSITAT DE BARCELONA

KTT at the University of Barcelona

Bosch i Gimpera Foundation – founded in 1983

Proactive promotion of innovation and management of contracts with companies or institutions

2023: +600 contracts, +€28 M, +700 people hired for contract work

Identification, management, and licensing of patents:

2023: 139 available patents, 153 patent applications, 11 licenses

Support and management of Spin-offs:

2023: 24 active participating spin-offs, 49 spin-offs created since 2001.

Return €187k/spin-off.

University of Barcelona Science Park – founded in 1997

An oriented ecosystem:

22,000 m2 laboratories, 11,000 m2 offices, 12 meeting rooms, 3 auditoriums, 2 restaurants

Services: common (clean rooms, centrifuges, histology, microscopes), radioactive facility, drosophila, animal house…

3453 professionals: 93 companies + 7 research centers + 7 UB groups + 11 non-profit entities

StartUB! – founded in 2019

Startup and student project incubator:

- 2019-23: 1600 students trained, 240 projects incubated, 42 start-ups.
- 2024: 600 students trained, 65 projects incubated, 17 new start-ups.

Open questions

- **How does the KTT process take place?**

→ Countries … innovation public push …€€€ in R&D … to promote Science Driven Innovation

→ Science Driven Innovation by

- Agreement (€, low risk)
- Patent licensing (€€, medium risk)
- Spin off (€€€, high risk)

→ Universities promote this by KTT offices & Sc. Parks

→ UB: Fundació Bosch i Gimpera, PCB & StartUB!

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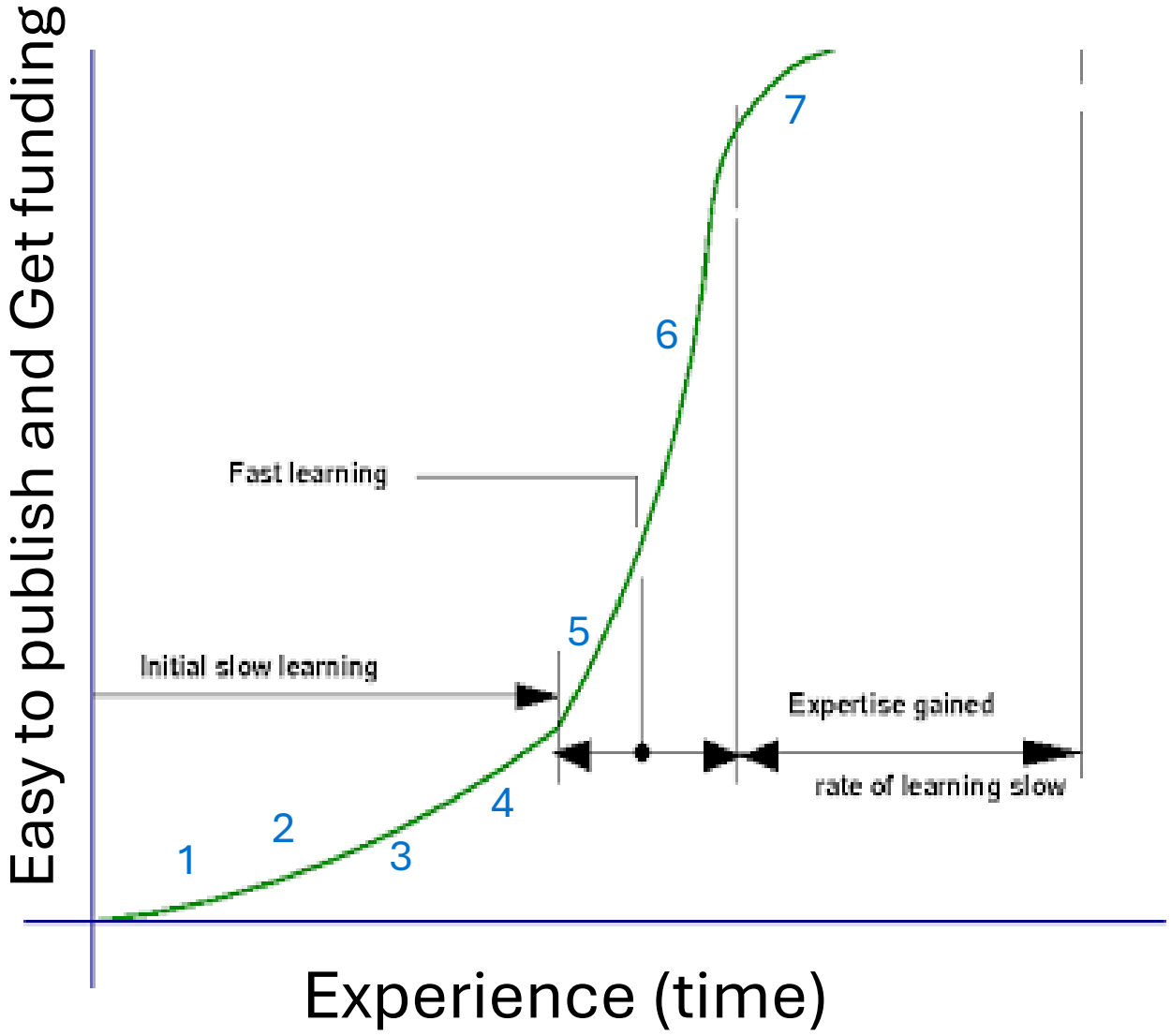
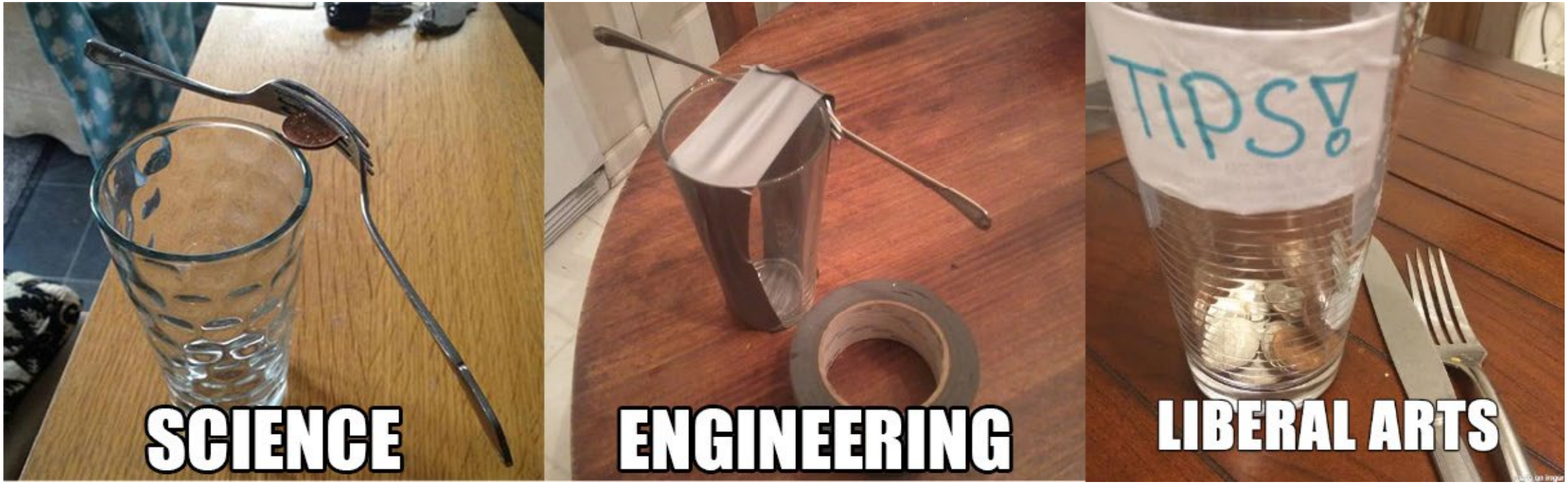
The academic carrier



1. Postdoc
2. Return: Juan de la Cierva, Beatriu de Pinos.
3. Responsible of WP, competitive grants.
4. Young Research Projects (JIN, ERC starting)
5. Projects with Foundations. Projects with companies
6. National Projects
7. 7. International Projects

The IP: funding the research



The Prestige

Modesto Orozco
Computational Chemistry
- 476 papers, 32.575 cites, h=89

Jose Ignacio Latorre
Theoretical Physics
- 144 papers, 13.624 cites, h=50

Nostrum Biodiscovery

Qilimanjaro Quantum Tech

The spin-off Nostrum Biodiscovery wins the 2019 Senén Vilaró Prize

The spin-off of the UB, Qilimanjaro Quantum Tech, recognized at the Mobile World Congress as the best digital start-up in the world

29-02-2024

The spin-off of the University of Barcelona, Qilimanjaro Quantum Tech, has been recognized at the **Mobile World Congress Barcelona 2024** as the **best digital start-up in the world**. The company was chosen as the winner of the 4YFN Awards, a global start-up competition aimed at finding the best emerging companies from around the planet that represents the highest recognition offered to start-ups at the MWC.

The influence of scientific prestige and peer effects on the intention to create university spin-offs
S. Houweling, S. Wolff, *The Journal of Technology Transfer* (2020) 45:1432–1450

Open questions

- **Why is KTT important for a researcher?**

→ Clear consolidation of his/her carrier ! (livelong!)
→ Complementary science funding
→ The prestige in the community and institution

Open questions

- Why is KTT important today?
  - → Current challenges involve complex techs, no single actor can play in innovation alone
  - → Universities Basic and App Research / Companies production and technologies
  - → KTT: matching between Universities & Companies
- How does the KTT process take place?
  - → Countries €€€ to promote Science Driven Innovation
  - → Science Driven Innovation by agreement, Patent, Spin Off
  - → Universities promote this by KTT offices & Sc. Parks
- Why is KTT important for a researcher?
  - → Clear consolidation of his/her carrier ! (livelong!)
  - → Complementary science funding
  - → The prestige in the community and institution

Knowledge and Technology Transfer

School on transferable skills: managing, entrepreneurial and IPR

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