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Innovation management

Innovation management tools in HBP and the EBRAINS context

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PROGRAM DAY 1

- Introduction
  - ✓ What is innovation?
  - ✓ Innovation taxonomies
  - ✓ Open and closed innovation
- Exploitation in the context of H2020 and Horizon Europe
  - ✓ Evolution from Horizon 2020 to Horizon Europe
  - ✓ The European Innovation Council
- IMTs used in HBP and the EBRAINS context

PROGRAM DAY 2

- Business intelligence
  - ✓ Technology and market watch
  - ✓ Risk assessment
  - ✓ Foresight and technology roadmapping
- IP strategies
  - ✓ Licensing strategies
  - ✓ Co-ownership and co-exploitation
- Practical examples of IMT application to the HBP results

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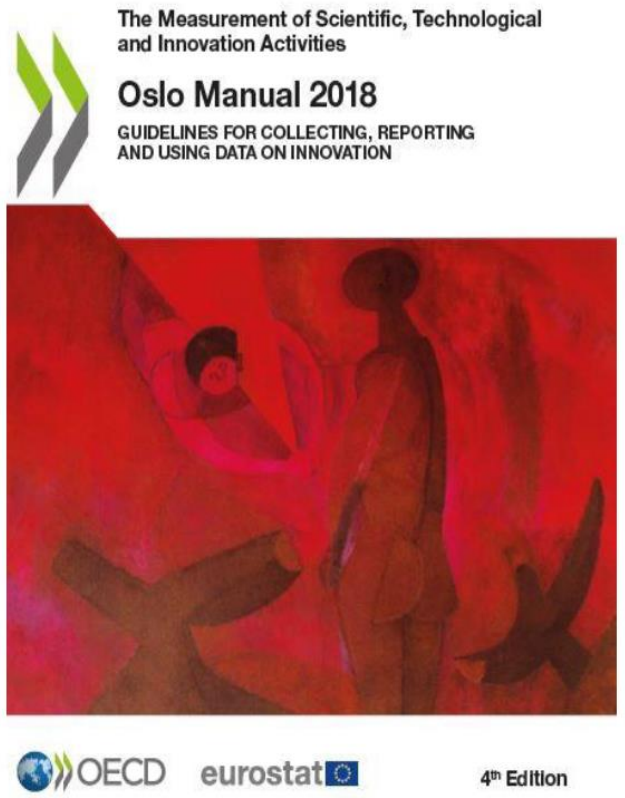
Definition? (I)

Not a single definition for innovation

The process of translating an idea or invention into a good or service that created a value for which customers/citizens will pay/demand

- "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)"

Oslo Manual OECD, 2018)



https://www.oecd.org/sti/inno/oslo-manual-2018-info.pdf

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Definition? (II)

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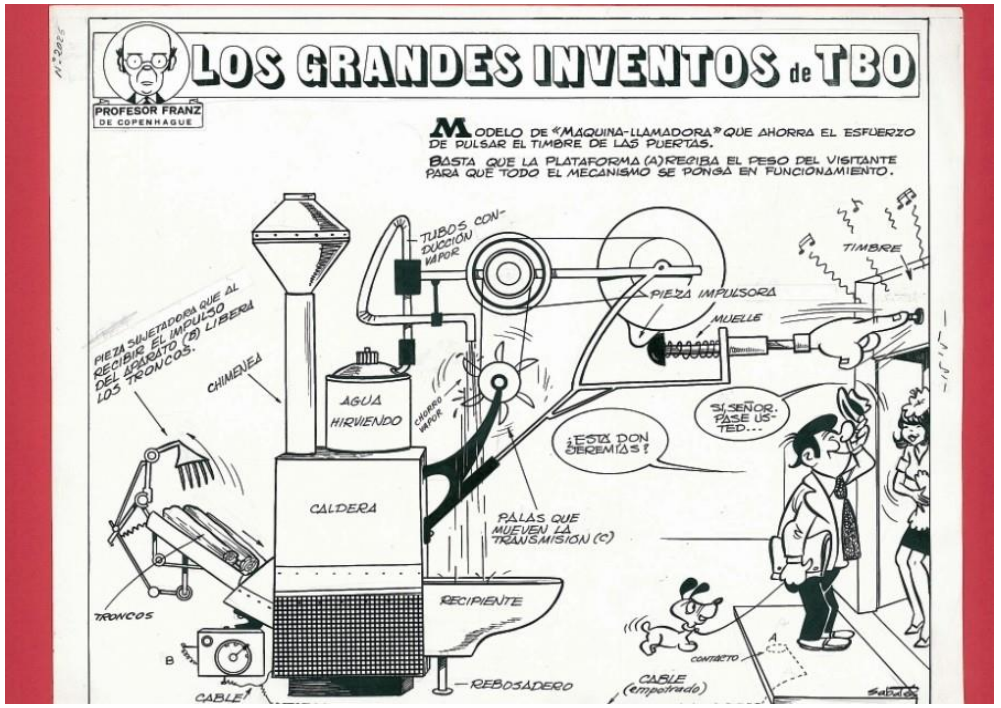
- ✓ To be called an innovation, an idea must be **replicable at an economical cost and must satisfy a specific need**.

Is there an actual need?



Even if technology is ready, users cannot see a need to pay for it… or yes?

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From inventions to innovations

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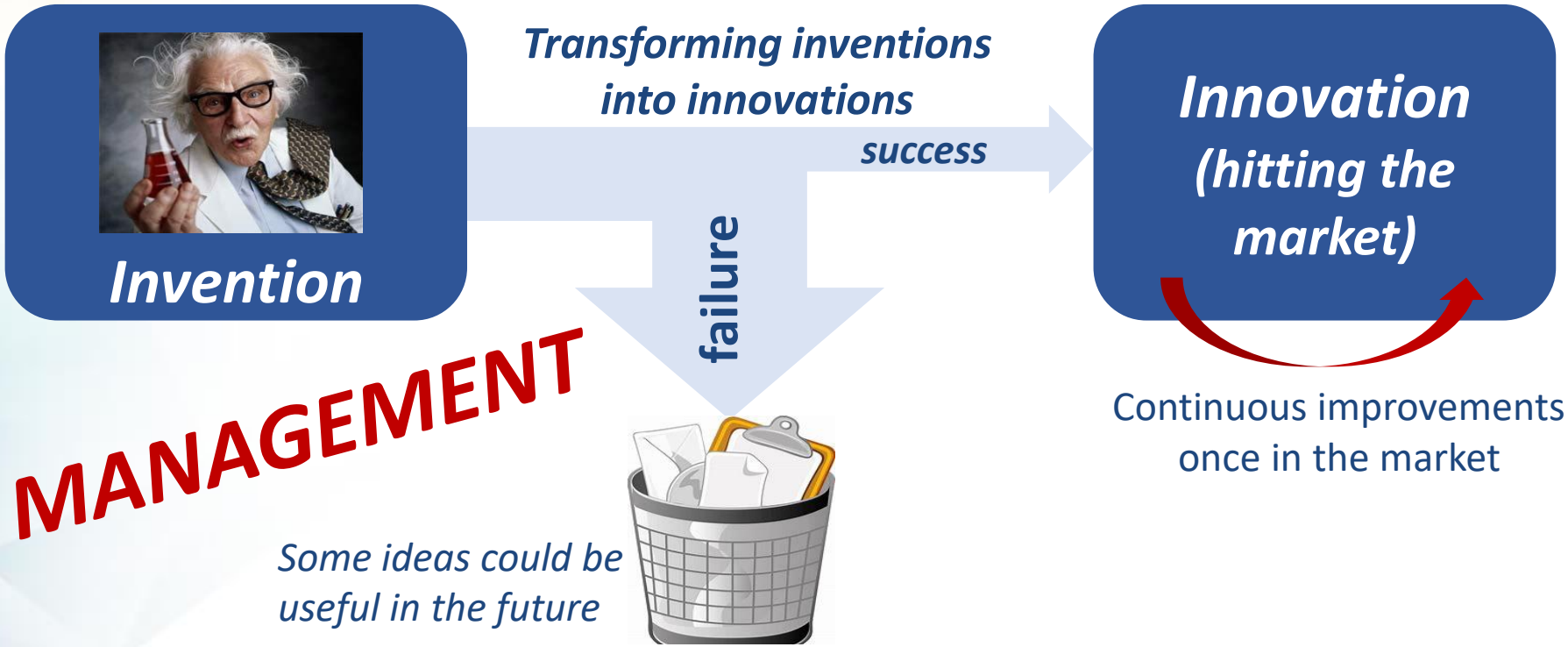
- An **invention** is a unique or novel device, method, composition or process.
  - ✓ But an invention could never reach the market if it is not ***transformed into an innovation***



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Evolution of innovations (I)

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- **The “wheel” has been “invented” many years ago**

A depiction of an onager-drawn cart on the Sumerian "battle standard of Ur" (c. 2500 BC) (Wikipedia)

- …but new applications could appear over time… and continuously evolve

No wheels

150 years

Two wheels

20 years

Four rotating wheels

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Evolution of innovations (II)

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- Not necessarily the **"wheels-based luggage"** was the waited final solution **for all types of users**

Hands-free solution or back-protected solution?

What do you (users) prefer (will to pay) to address your need?

Do you know the (future) users' wishes and behaviour ?

Deep **knowledge of markets** is an essential ingredient for successful innovation in families of products (roadmapping)

Children

Women

Business

Sports

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Combining/integrating innovations

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Why not to combine previous Innovations to create a new one?

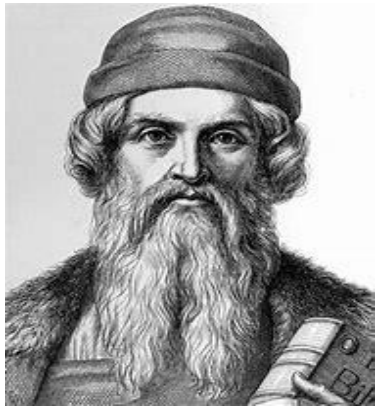
The case of Guttenberg press

Early modern wine press. Such screw presses were applied in Europe to a wide range of uses and provided Gutenberg with the model for his printing press.

Introduced in the 1st century AD by the Romans, it was commonly employed in agricultural production for pressing wine grapes and (olive) oil fruit, The device was also in urban contexts as a cloth press for printing patterns

Movable type sorted in a letter case and loaded in composing stick on top.

The concept of movable type was not new in the 15th century; movable type printing had been invented in China during the Song dynasty, and was later used in Korea during the Goryeo Dynasty, where metal movable-type printing technology was developed in 1234



1398-1468

Recreated Gutenberg press at the International Printing Museum, Carson, California

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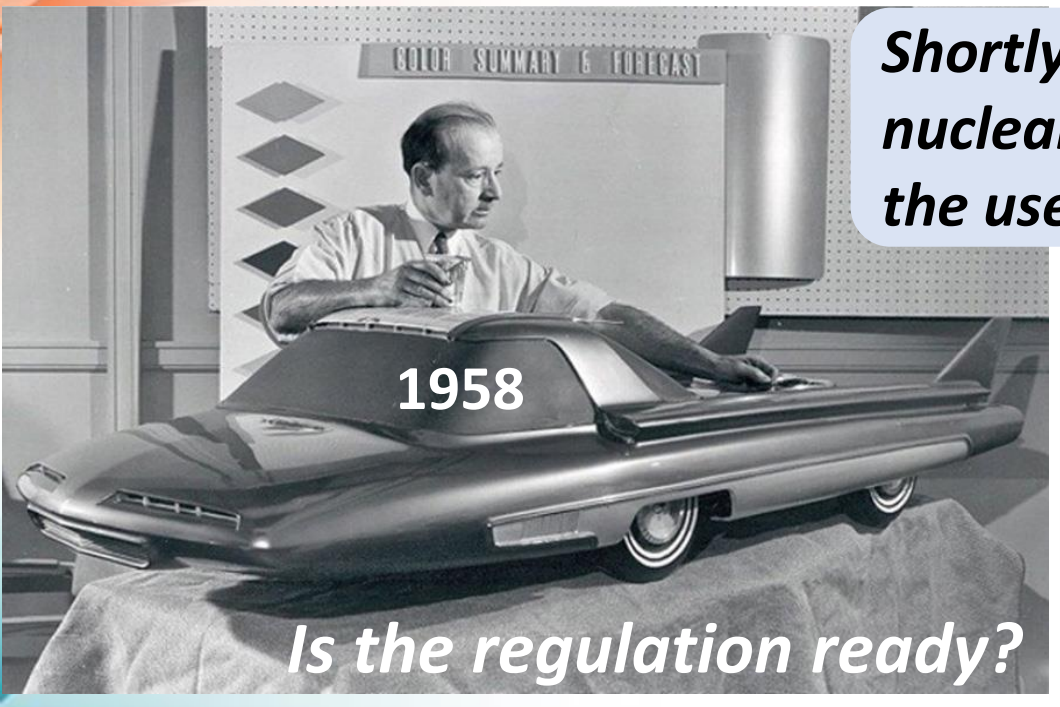
Usefulness!!!

(cost-benefit analysis)

The case of the nuclear powered car: Ford Nucleon



Is the regulation ready?

Shortly after physicists had managed to build the first nuclear fission reactor and echoes of World War II and the use of atomic bombs were still echoing.

The future in energy technology seemed nuclear and at Ford they asked themselves, why not make an atomic car?

Ford engineers and designers outlined futuristic ideas in the Ford Nucleon, ahead of their time in many ways.

Ford Nucleon was, luckily or unfortunately, just a concept. A vehicle that never came to reality beyond scale models (3/8 scale model). The nuclear reactor would fission Uranium pellets, heat up water and produce steam. This high-pressure steam would then turn turbines to provide electrical power.

https://auto.howstuffworks.com/fuel-efficiency/alternative-fuels/nuclear-powered-car.htm
https://thenextweb.com/shift/2020/04/10/remembering-the-nucleon-fords-1958-nuclear-powered-concept-car-that-never-was/

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Diffusion of Innovations (I)

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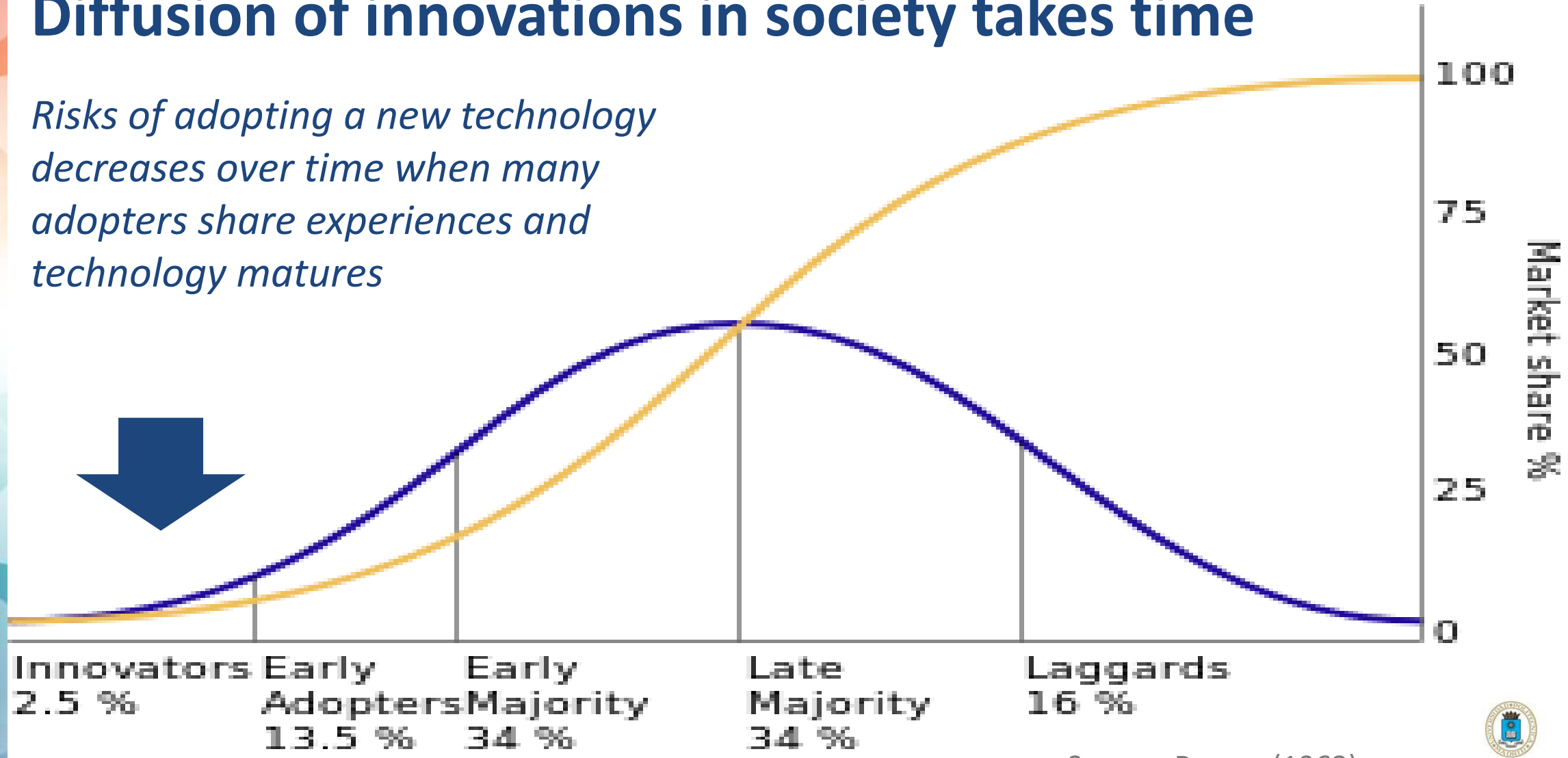
Diffusion of innovations in society takes time

Risks of adopting a new technology decreases over time when many adopters share experiences and technology matures



Source: Rogers (1962)

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Diffusion of Innovations (II)

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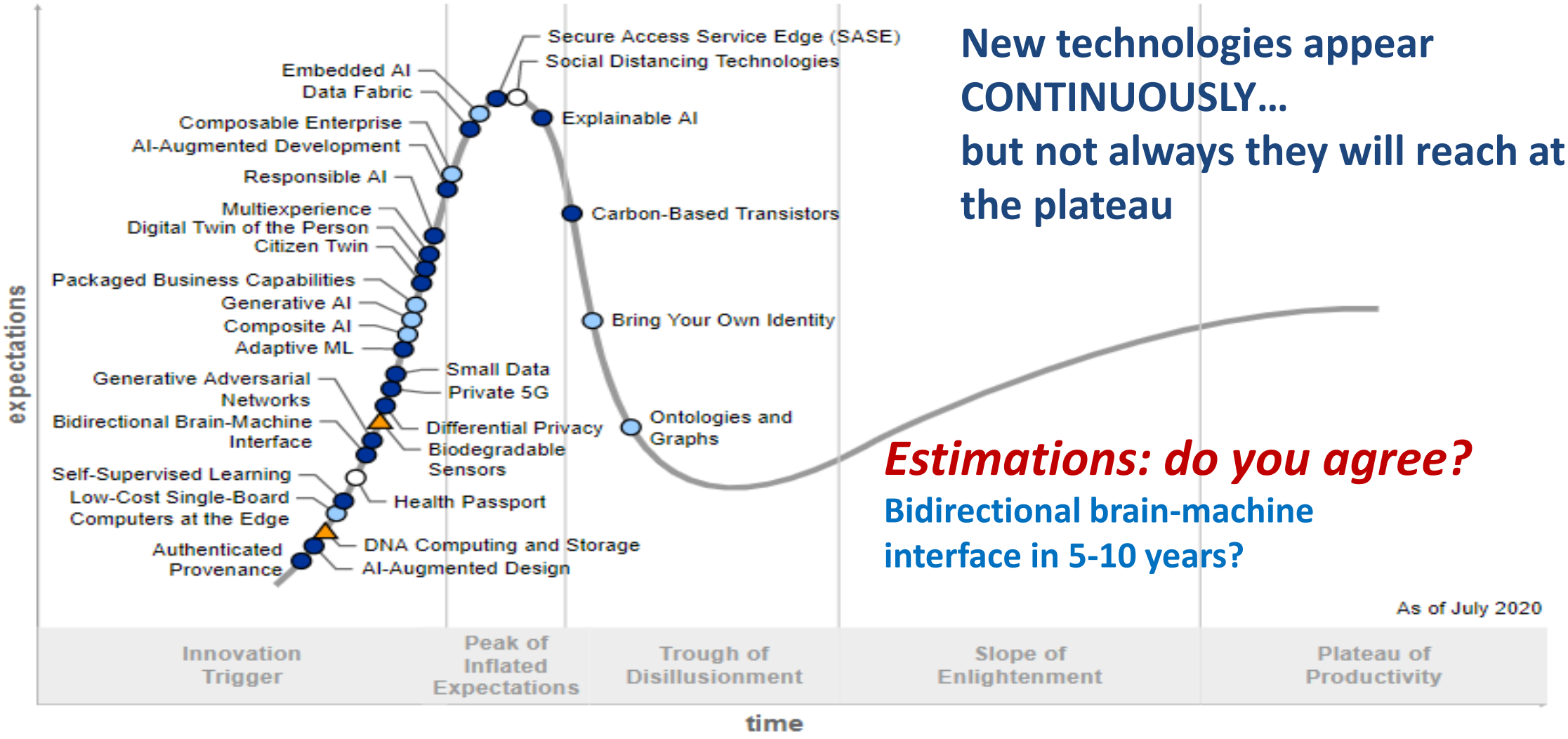

New technologies appear CONTINUOUSLY…
but not always they will reach at the plateau

Estimations: do you agree?

Bidirectional brain-machine interface in 5-10 years?

Source: Gartner

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Concepts to take away

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- **Innovation implies to move solutions to users**
  - ✓ Any “invention” in the lab does not constitute any “innovation” unless it were successfully delivered to users to address some needs
  - ✓ Is there still a need?
- **Innovations can be obtained by combining previous innovations**
  - ✓ Smart reuse of existing solutions in new fields (multidisciplinary settings)
- **Innovations evolve over time**
  - ✓ To address new needs for segments of users
- **Innovation process is risky and only a small percentage will become a success**
  - ✓ Risk management is closely coupled with innovation
  - ✓ Market understanding, funding, protection, cost-benefit, regulations,…
  - ✓ Is the market ready for accepting your innovation?
- **Innovation diffusion takes time**
  - Predictions are not easy to make

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Innovation taxonomies (I)

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- **Innovations could be classified according to many criteria**
  - ✓ Not a single taxonomy serves for all purposes
  - ✓ Classifications are useful depending on the objectives

Complex products can combine multiple individual innovations

robotic assisted surgery could be classified from many perspectives

- **Main criteria**
  - ✓ Target of the innovation
  - ✓ Impact on the business organisation or society
  - ✓ Interaction with business processes
  - ✓ Relationship to technology maturation
  - ✓ Participation or not of a number of entities
  - ✓ … and many others

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Innovation taxonomies (II)

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Three broad categories from the target perspective:

- **Product innovation**
  - ✓ Introduction of a new or improved product into the market
  - ✓ **Examples of ICT product innovation**
    - Pen drive
    - Virtual reality glass
- **Process innovation**
  - ✓ Use of a new procedure to do something (e.g. manufacturing)
  - ✓ **Examples of ICT process innovation**
    - Agile software development
    - 5 nm microprocessor manufacturing technology
- **Service innovation**
  - ✓ Introduction of a new or improved service into the market or inside organisations
  - ✓ **Examples of ICT service innovation**
    - Streaming music service
    - Cloud services

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Innovation taxonomies (III)

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Three broad categories from the target perspective:

- **Product innovation**
  - ✓ Introduction of a new or improved product into the market
  - ✓ **Examples of ICT product innovation**
    - Pen drive
    - Virtual reality glass

Neuromorphic chip (Spinnaker 2)?

- **Process innovation**
  - ✓ Use of a new procedure to do something (e.g., manufacturing)
  - ✓ **Examples of ICT process innovation**
    - Agile software development
    - 5 nm microprocessor manufacturing technology

Epilepsy surgery planning (VEP workflow)?

- **Service innovation**
  - ✓ Introduction of a new or improved service into the market or inside organisations
  - ✓ **Examples of ICT service innovation**
    - Streaming music service
    - Cloud services

Use of HPC simulation (NEST)

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Innovation taxonomies (IV)

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Two broad categories from the **impact perspective** on pre-existent way of thinking:

- ✓ **Evolutionary innovations** (also called incremental, continuous or dynamic innovation)
  - that are brought about by many incremental advances in technology or processes
  - **Examples**:
    - New models of the same smartphone
    - More energy efficient ion-lithium battery
- ✓ **Revolutionary innovations** (also called "discontinuous" or "disruptive" innovations)
  - which are often disruptive and new
  - they could also create new sectors and markets
  - **Examples:**
    - Fully automated vehicle (level 5)
    - mRNA vaccines ??

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Innovation taxonomies (IV)

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  - **Examples**:
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    - More energy efficient ion-lithium battery

New brain data for Brain Atlases

- ✓ **Revolutionary innovations** (also called "discontinuous" or "disruptive" innovations)
  - which are often disruptive and new
  - they could also create new sectors and markets
  - **Examples:**
    - Fully automated vehicle (level 5)
    - mRNA vaccines ??

Neuromorphic computer (BrainScale)?

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Innovation taxonomies (IV)

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Innovations could be classified depending on the role played by technology

Is the technology a key issue for the success of the product/process/service?

Two main types

- **Technology-based innovation**
  - ✓ Innovations where the users/market perceive the role of technology as the basis for new product/process/services
- **Organisational-based innovation**
  - ✓ Innovations where technologies do not play any key role

Organisational innovations

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Two examples:

- **From traditional groceries to supermarkets**
  - ✓ The shopping char was not an invention but an innovation by adapting chars to the supermarket field
  - ✓ The role of customers changed: much more active
  - ✓ Product placement is key to stimulate shopping
- **From assisted to non-assisted petrol stations**
  - ✓ Conventional support technologies
    - e.g. video-camera or automatic barriers
  - ✓ The role of customers changed too: they become much more active
    - e.g., shopping in the petrol station
  - ✓ Lower prices could compensate users for the lack of service

Shopping at airport

Airport operators are heavily investing today in improving shopping areas to become more attractive for passengers waiting their flights … even if they take more time to go to the gates

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Innovation taxonomies (V)

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Innovation processes could be conducted inside an organization or through the involvement of several organisations which the organisation cooperate with

Two main types

- **Closed innovation**
  - ✓ Ideas and their development came from the original organisation until reaching the market
- **Open innovation**
  - ✓ Ideas also come from external sources and their development could be done cooperatively or simply incorporated to the organisation after developed outside
  - ✓ This issue will be addressed later in another lesson

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Rationale

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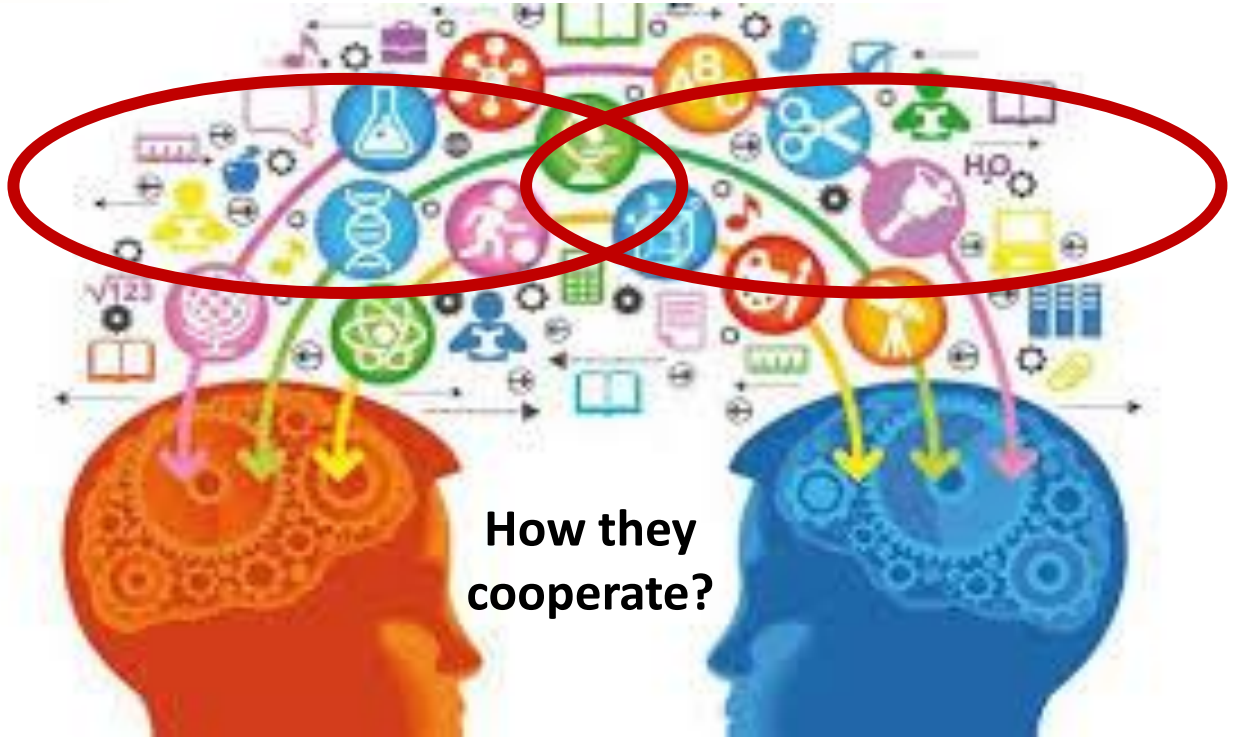
Individuals or institutions cannot have all the knowledge needed to keep its competitiveness over years when technologies evolve so fast

More clever people and useful ideas
are outside any organisation than inside



How to protect my own ideas?

How they cooperate?

How to access to external ideas?

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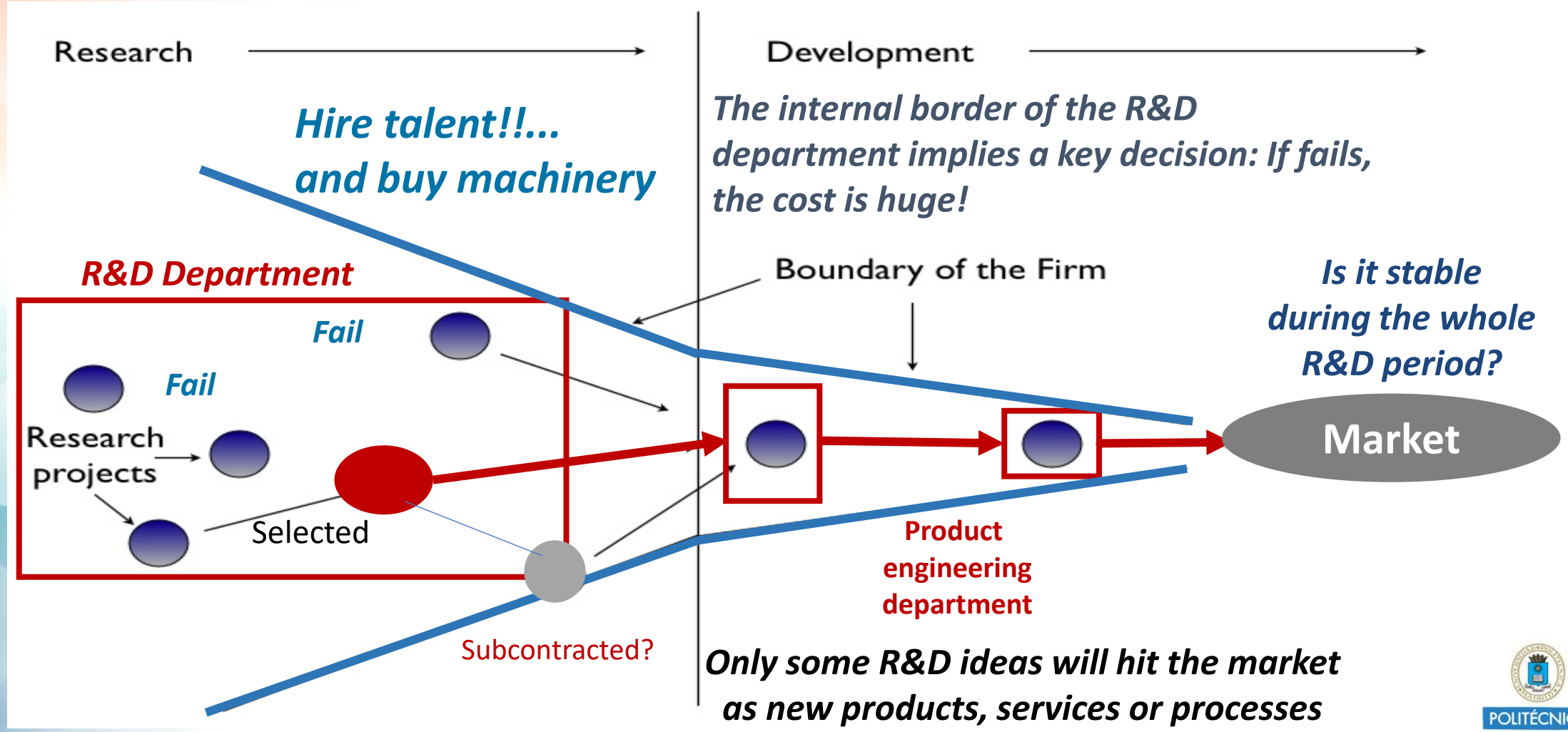
Closed innovation

Closed innovation model was historically used to protect the firm's knowledge and to obtain full profit



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Closed innovation

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Key factors of the conventional (closed) approach

Hire and train skilled people at international level	*Continuous selection process to ensure the highest level of skills in the staff*
Anticipate technology needs and pave the way in corporate labs	*Technology watch to know how key technologies will evolve in the future*
Protect knowledge and base the products/services portfolio on proprietary IP	*Internal effort in the internal technology transfer unit to protect R&D results for internal use*
Use subcontracts for well-defined and controlled tasks	*Externalize some activities which are not essential as core knowledge*

Open innovation (I)

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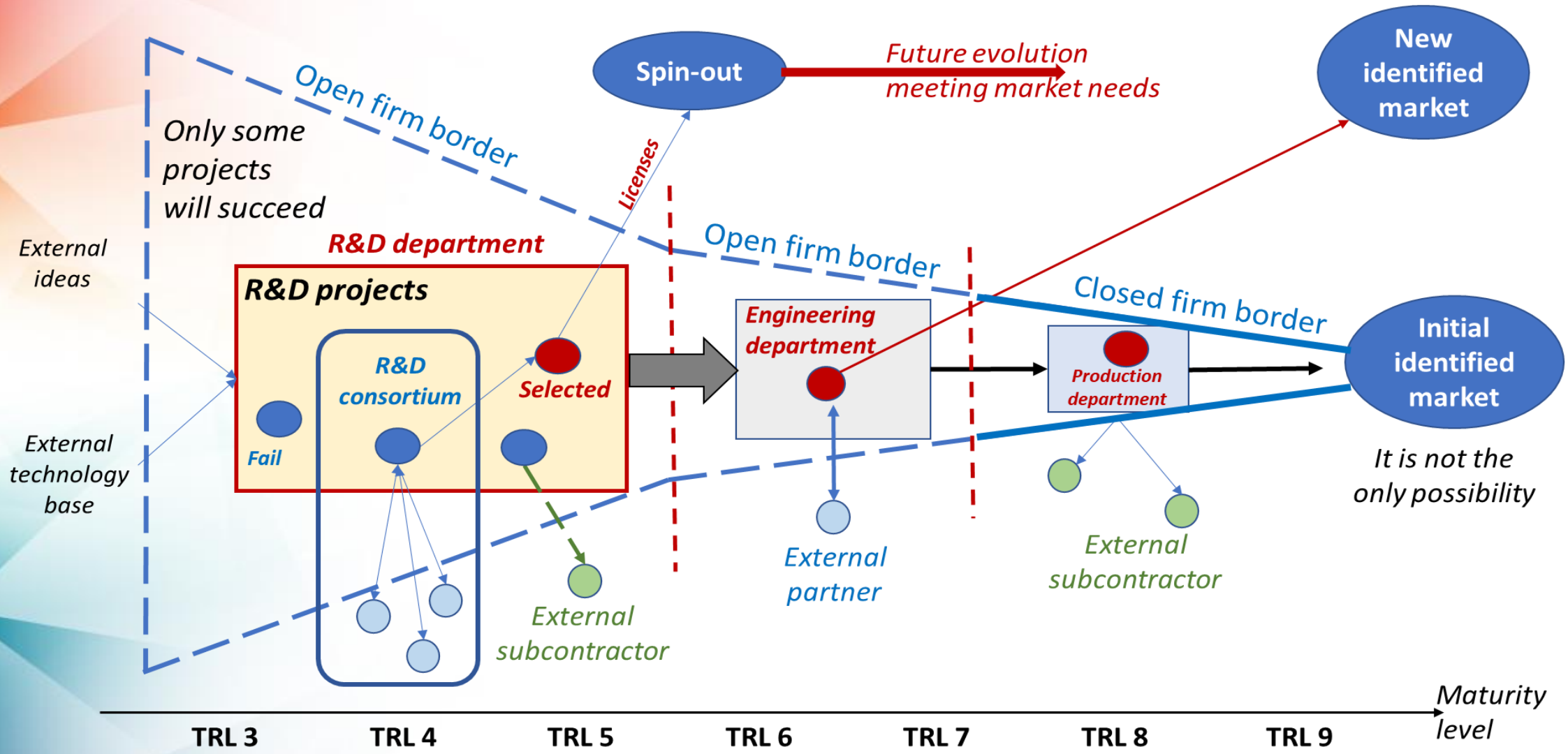

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Open innovation (II)

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Conventional (closed) approach

- *Hire and train skilled people at international level*
- *Anticipate technology needs and pave the way in corporate labs*
- *Protect knowledge and base the products/services portfolio on proprietary IP*
- *Use subcontracts for well-defined and controlled tasks*

Open innovation approach

- *Take advantage of skilled people working in other entities by cooperating with them*
- *Launch exploratory projects to assess new research avenues*
- *Share IP with other partners to obtain access to a broader knowledge base*
- *Set-up new corporate procedures, metrics, follow-up tools and enforce a cultural change*

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Opportunities for increasing revenues (I)

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Open models were also motivated by the need **to reduce internal development costs and to increase revenues**; even if these additional revenues come from sharing technological knowledge with other potential competitors (now, converted into "allies")

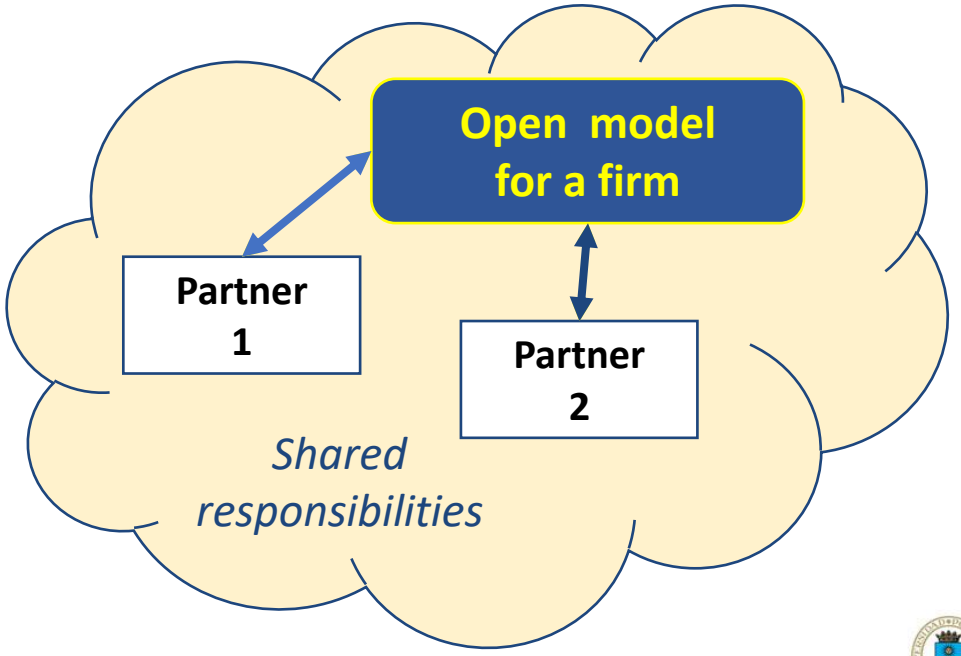
No "partners", but "providers"

Closed model for a firm

Subcontracts for components

Pros and cons

Comparison between two models as a firm's strategy to increase competitiveness



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Opportunities for increasing revenues (II)

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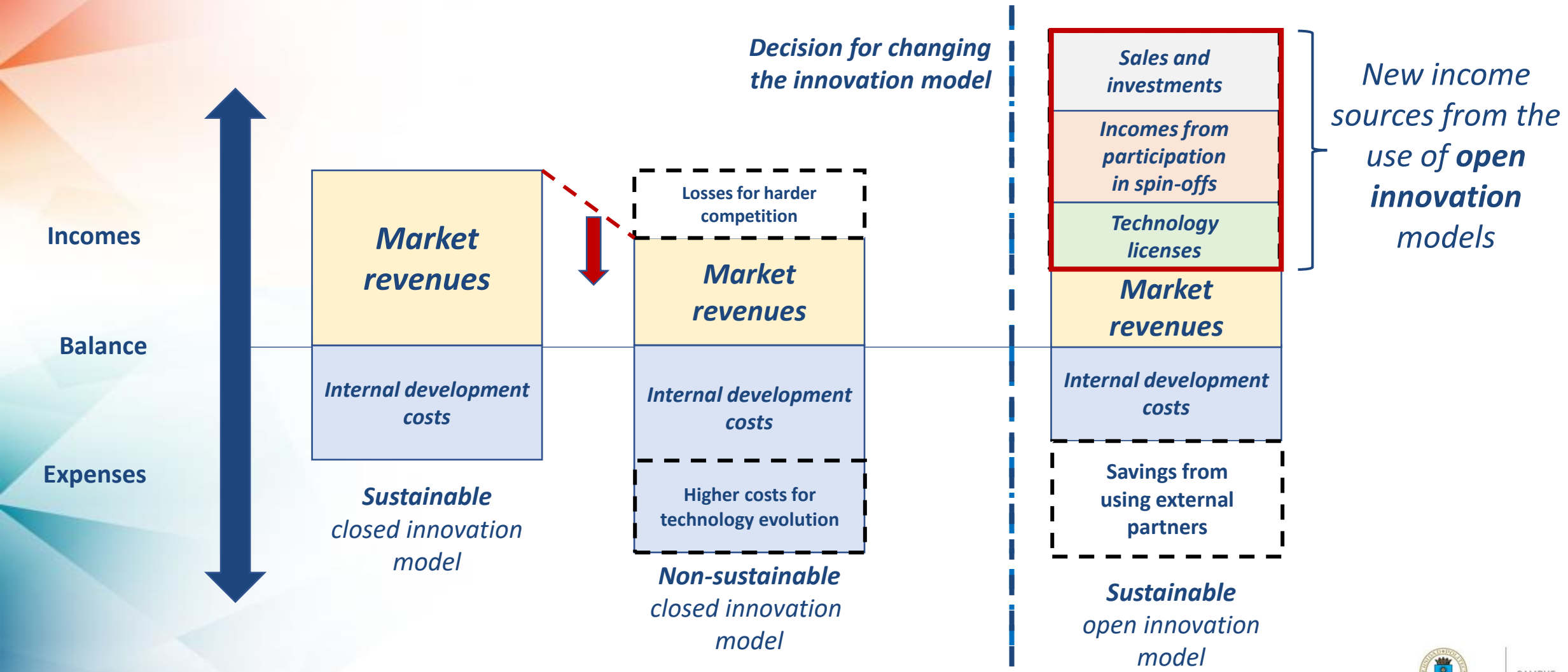

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Management of open innovation

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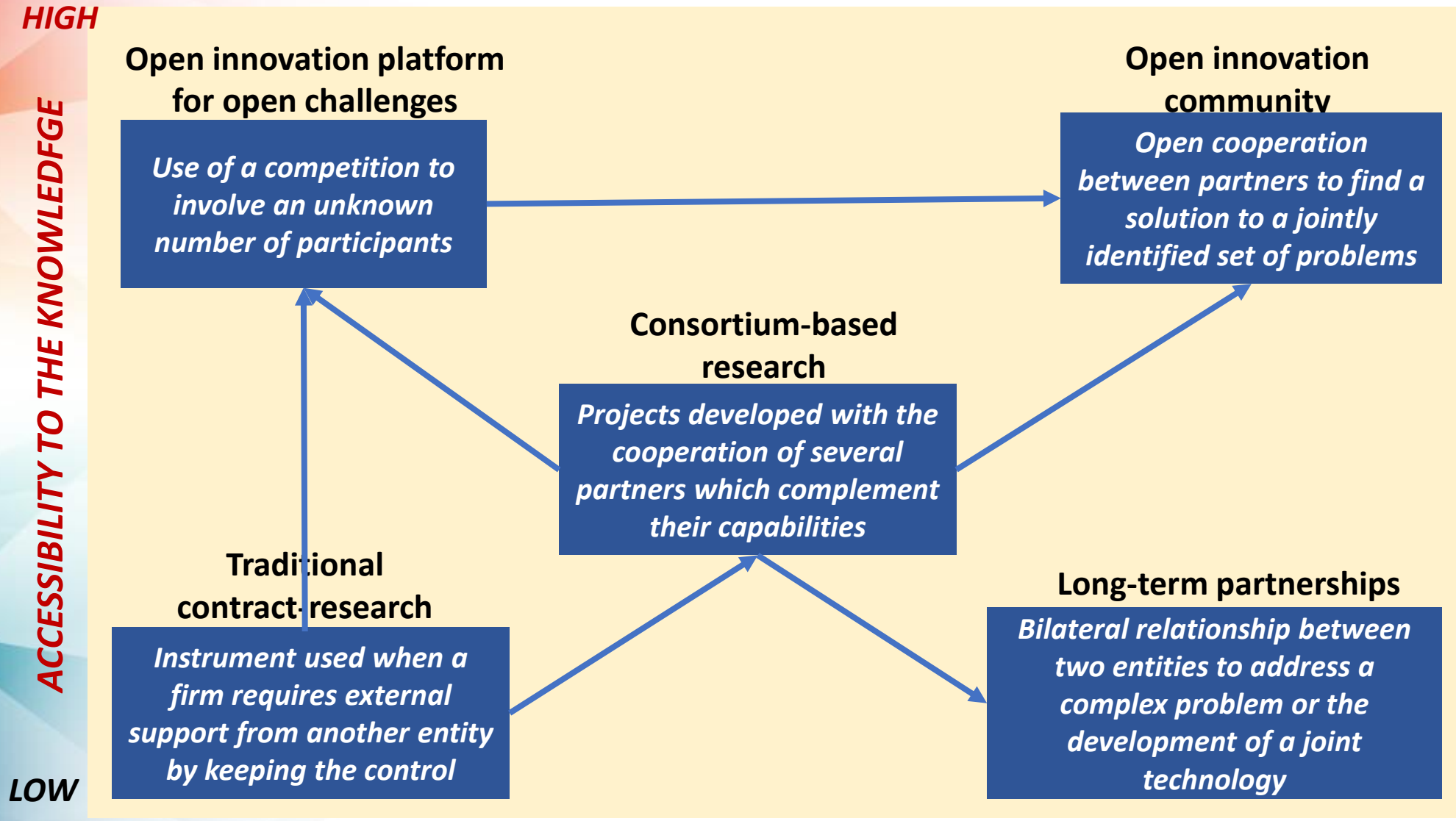

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Open innovation in HBP (I)

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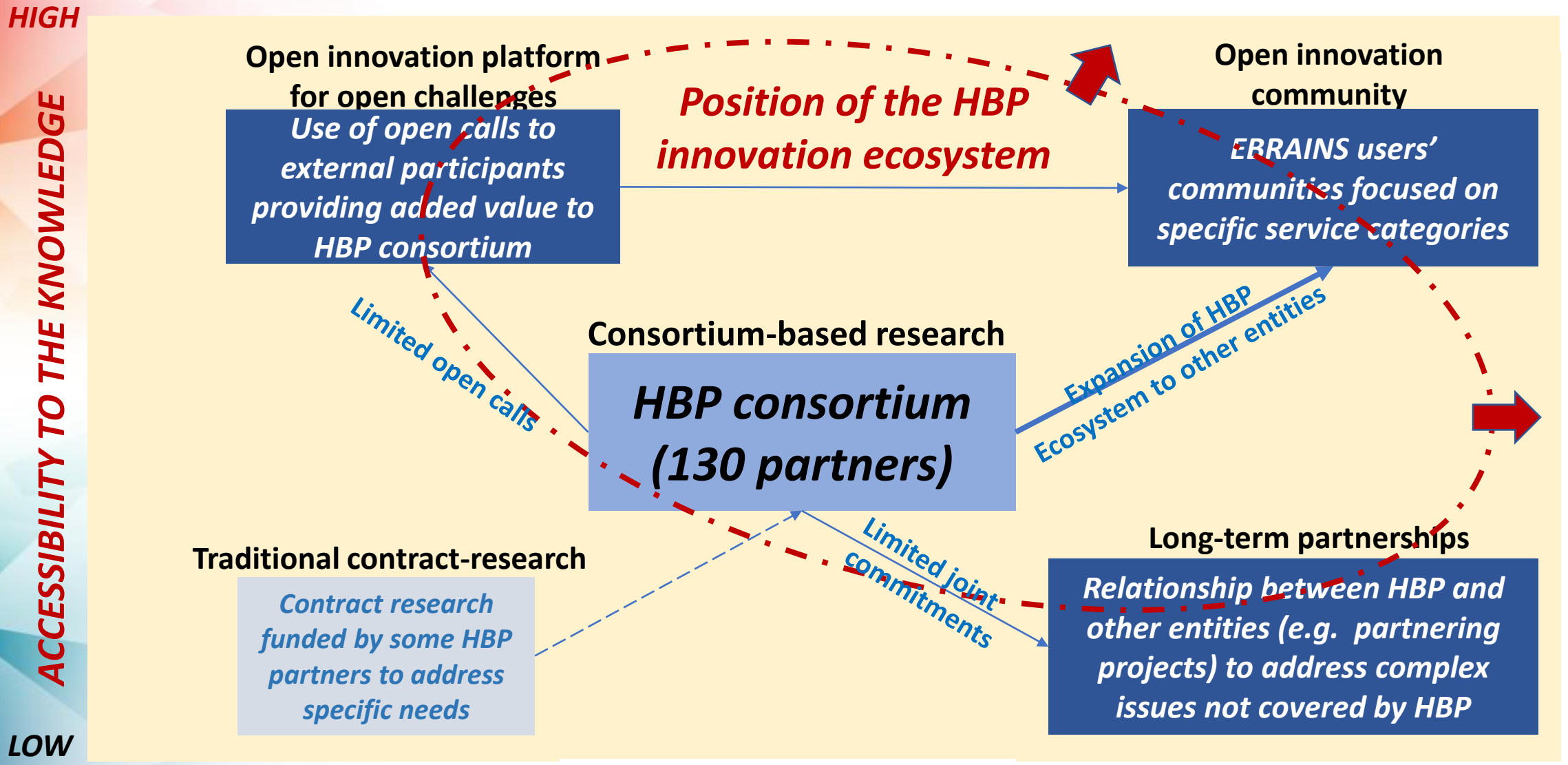

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Open innovation in HBP (I)

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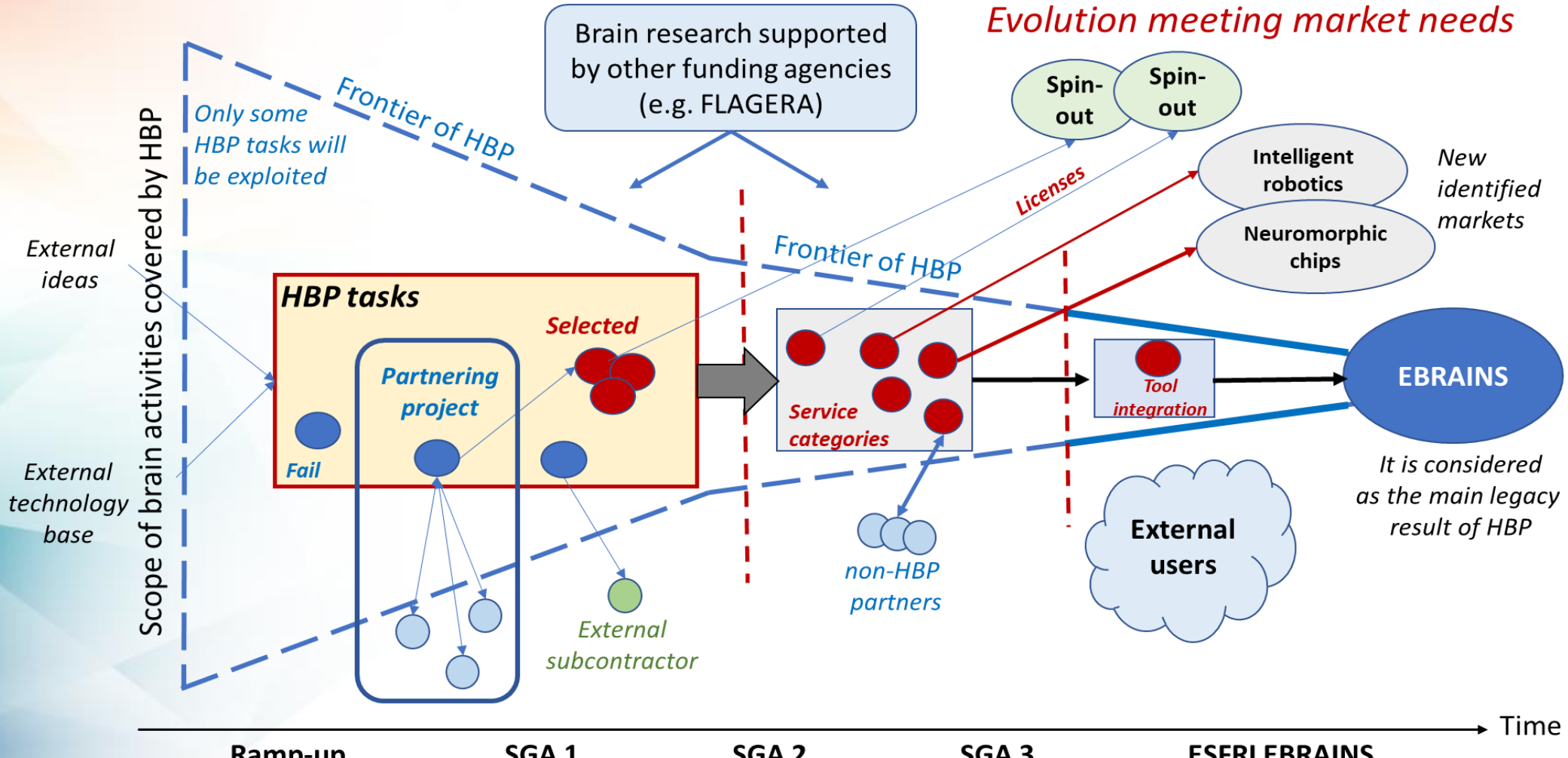
Open technological product and service innovation



Open innovation in HBP (II)

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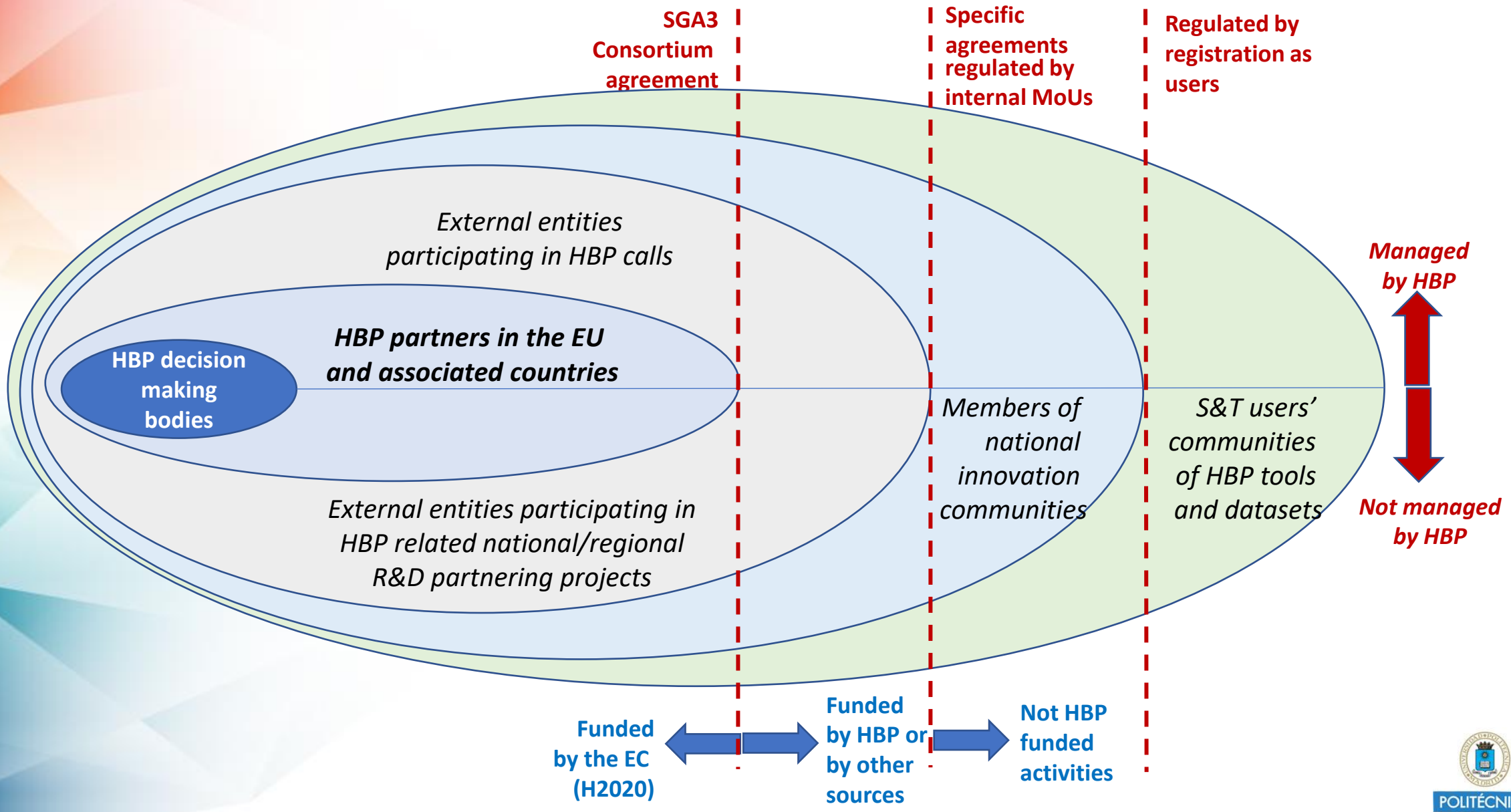

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Innovation management in HBP

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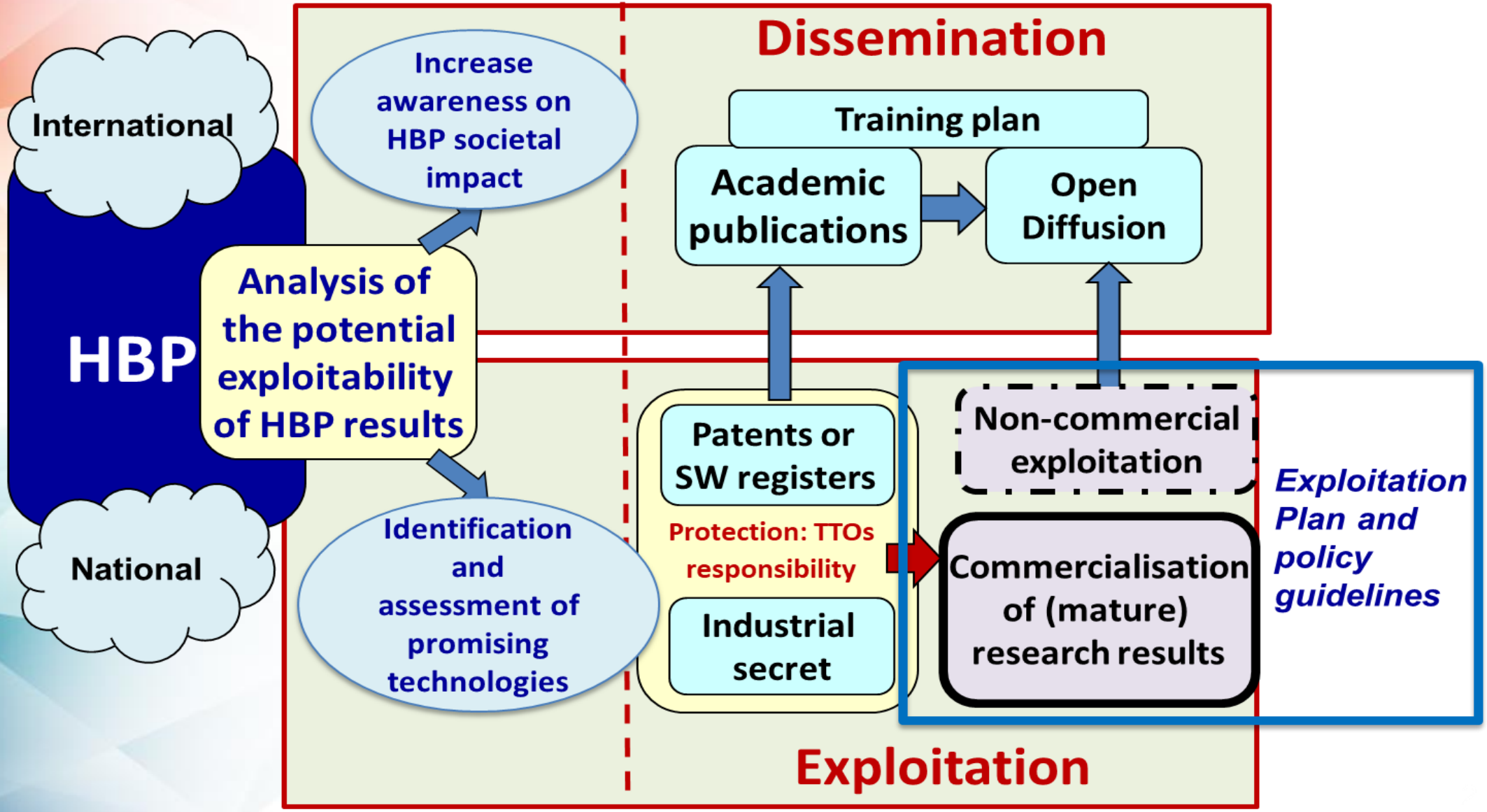

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Structure of Horizon Europe

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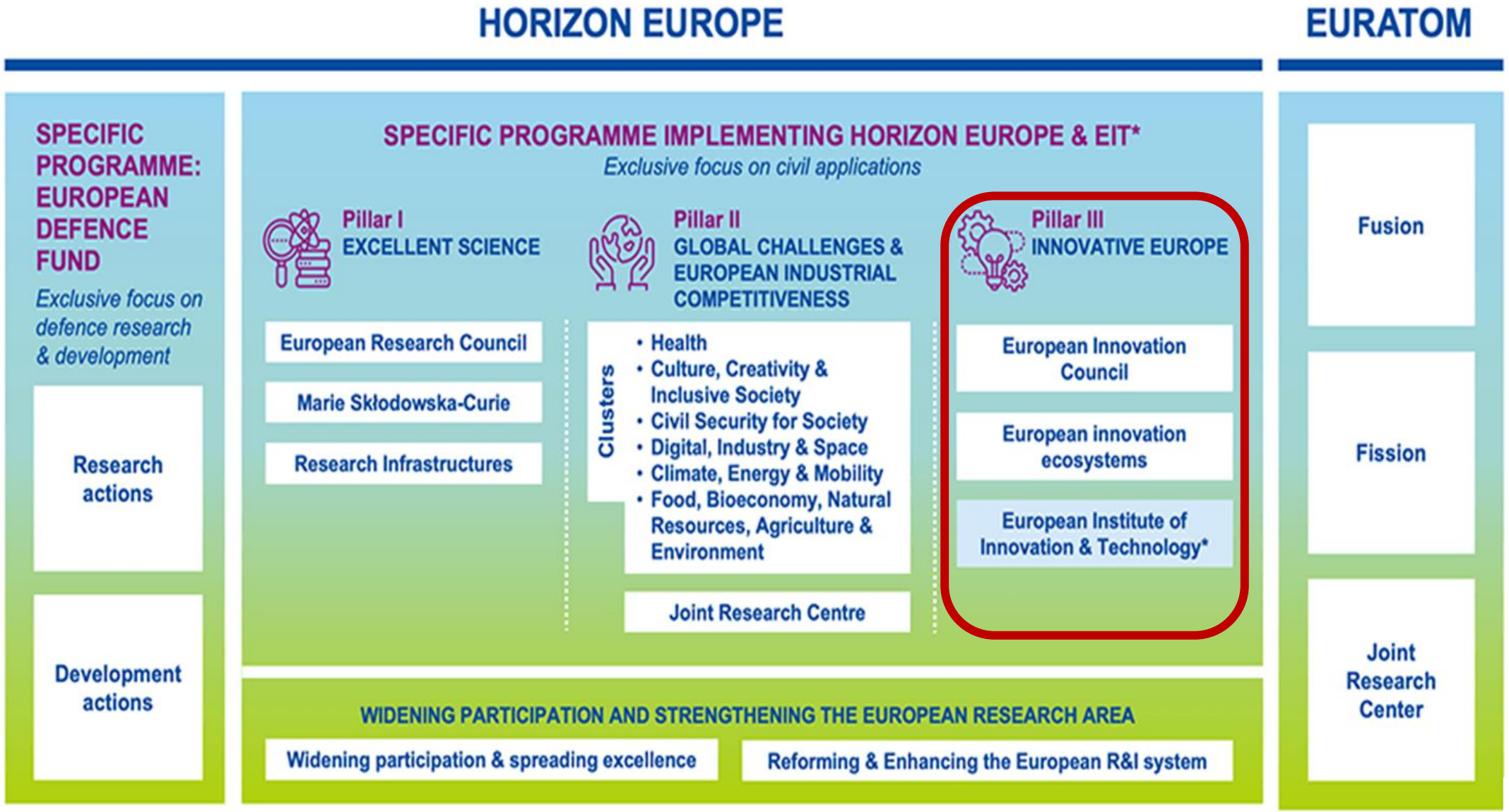

* The European Institute of Innovation & Technology (EIT) is not part of the Specific Programme

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European Innovation Council

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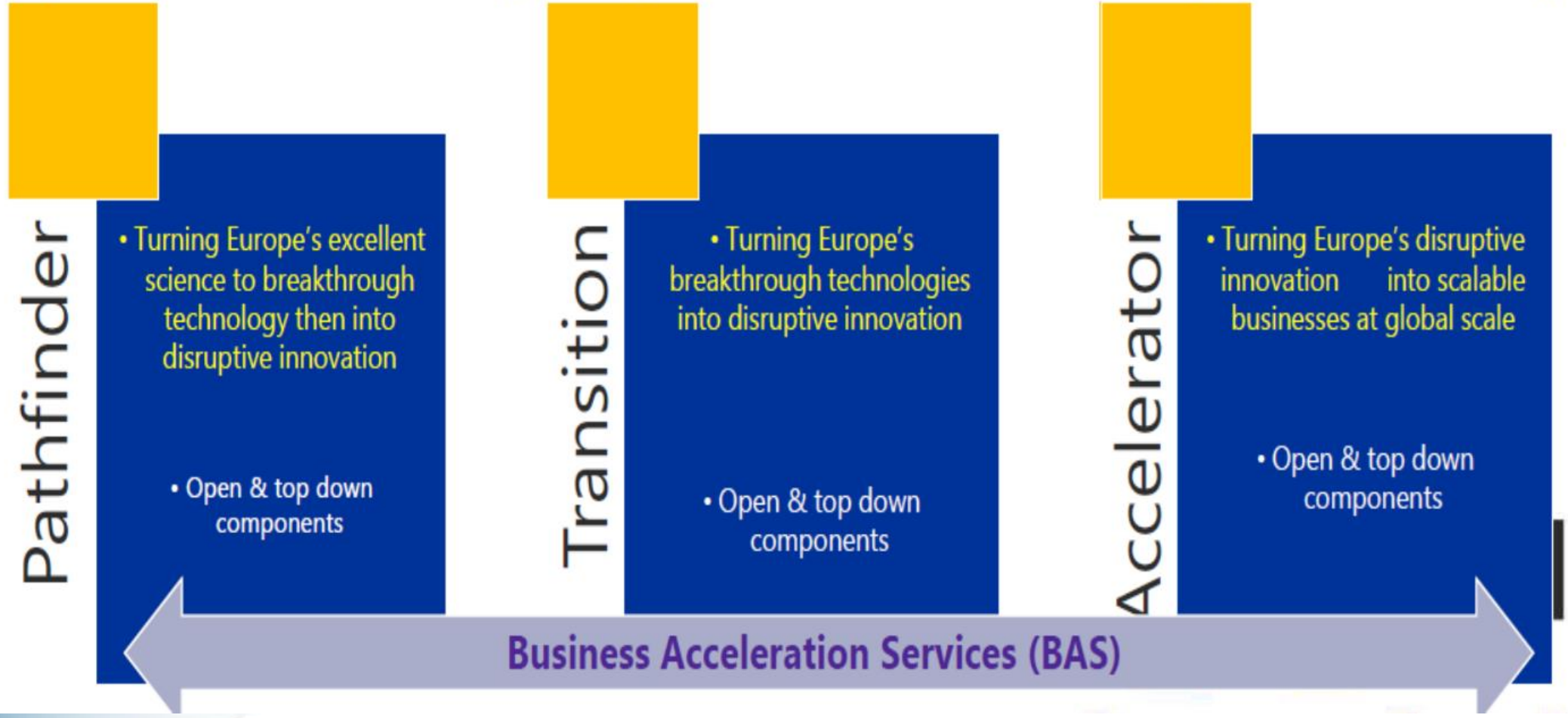
EIC: Integrated, agile support across the full innovation spectrum from early stage research to start-up and scale-up.



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Pathfinder Challenges for 2021

Pathfinder Challenges
1. Awareness inside
2. Tools to measure & stimulate activity in brain tissue
3. Emerging Technologies in Cell & Gene Therapy
4. Novel routes to green hydrogen production
5. Engineered living materials

Call opening:
15 June 2021

Deadline:
27 October 2021 at 17.00.00 CET

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	Pathfinder Challenges
Total budget	€132 million
Proposals (indicative)	Up to €4 million
Funding rate	100% of eligible costs
Opening	15 June 2021 – and publication of Challenge Guides
Deadline	27 October 2021 at 17.00 CET
Length of proposal	25-page proposal (Part B, Sections 1-3)
Applicants	1. Single legal entities in a MS/AC (conditions apply) 2. Consortia: - If 2 partners: from different MS/AC, otherwise - Min. 3 partners from 3 different MS/AC (of which at least 1 partner in a MS) (unless differently stated in the Challenge chapter)

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Transition challenges for 2021 (II)
Medical Technology and Medical Devices: from Lab to Patient

The starting point in the project should be a preliminary prototype of a medical device or technology (TRL3-4)

The endpoint deliverables in the project should be a completely functional version of the technology suitable in its end-of-project state for clinical validation (TRL 5-6), supported by a sound and implementable commercialisation strategy.

*Proposals submitted to this call can target **any technology** addressing important health needs in the direct clinical treatment and care of patients*

EU contribution of € 2.5 million and duration of up to 3 years (but other amounts and durations possible)

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Novelty: investments in shares!!

Investment component

- The EIC Fund invests at **early stage** (seed, start-up, scale-up) from €0.5 to 15 million.
- The Fund may reserve **follow-on capital** to invest in subsequent series.
- The Fund usually targets **minority ownership** stakes (from 10 to 25%), and up to a blocking minority in cases identified by the EC as of strategic interest for the EU.
- Investments will normally be made with a long average perspective (7-10 years) with a maximum of 15 years.
- The EIC Fund will manage the investment component for proposals retained for either blended or investment-only support.

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Conclusions

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- **Innovation** became a key driver for competitiveness through new products, processes and services hitting the market
- **There are many ways of classifying innovations** depending on the perspective and goals required by institutions
- **Open innovation** is an innovation model where the process is carried out by combining the knowledge and effort from multiple partners which share risks and profits
- **HBP** has developed many types of innovations which are available to users (scientists, clinical and industrial) to address better their needs
- **EBRAINS** is the legacy product of HBP where many innovations are integrated
- **Horizon Europe**, and the European Innovation Council in particular offers opportunities to move research results to the market

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Questions?

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PROGRAM DAY 1

- Introduction
  - What is innovation?
  - Innovation taxonomies
  - Open and closed innovation
- Exploitation in the context of H2020 and Horizon Europe
  - Evolution from Horizon 2020 to Horizon Europe
  - The European Innovation Council

- **IMTs used in HBP and the EBRAINS context**

PROGRAM DAY 2

- Business intelligence
  - Technology and market watch
  - Risk assessment
  - Foresight and technology roadmapping
- IP strategies
  - Licensing strategies
  - Co-ownership and co-exploitation
- Practical examples of IMT application to the HBP results

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General view of IMT used in R&I projects

IMT key areas

- Innovation awareness
- Technology transfer
- Industrial engagement
- Technology intelligence
- Entrepreneurship
- IP protection and ownership

THESE AREAS HELP INNOVATORS TO BE…

- COMMITTED WITH INNOVATION
- OPEN/PRACTICAL
- COLLABORATIVE
- INFORMED/PROACTIVE
- PIONNER
- CAUTIOUS/STRATEGIC

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General view of IMT used in R&I projects

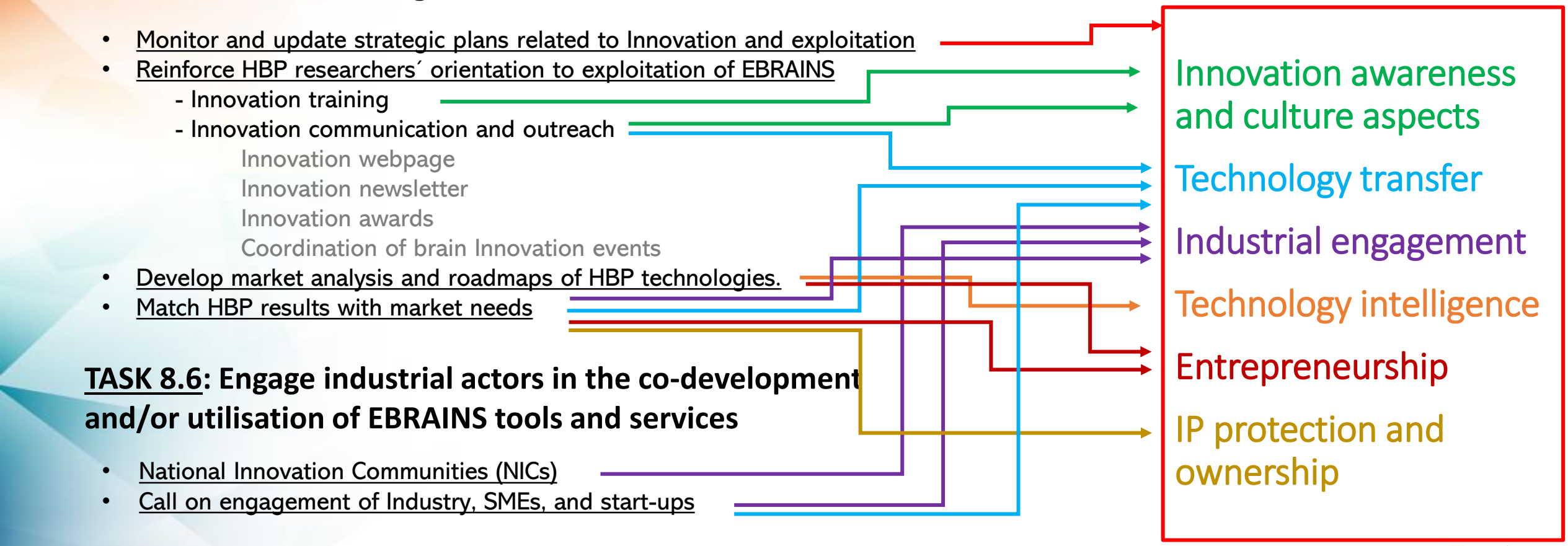
IMTs in the context of our HBP SGA3 tasks

TASK 8.5: Facilitate technology transfer processes and accelerate the exploitation of HBP services and tools through EBRAINS

- Monitor and update strategic plans related to Innovation and exploitation
- Reinforce HBP researchers´ orientation to exploitation of EBRAINS
  - Innovation training
  - Innovation communication and outreach
    - Innovation webpage
    - Innovation newsletter
    - Innovation awards
    - Coordination of brain Innovation events
- Develop market analysis and roadmaps of HBP technologies.
- Match HBP results with market needs

TASK 8.6: Engage industrial actors in the co-development and/or utilisation of EBRAINS tools and services

- National Innovation Communities (NICs)
- Call on engagement of Industry, SMEs, and start-ups



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IMTs used in HBP and the EBRAINS context

Innovation awareness tools

Capacity building
- Innovation training courses
- Innovation follow-up activities

Communication
- Innovation webpage
- Innovation newsletter

Incentives
- Innovation awards
- Innovation radar

With these tools we aim to develop a culture of innovation in HBP.

To achieve that, we need people to know what is innovation, understand the discipline and its importance.

Communicating achievements and best practices facilitate the gradual increasing of innovation awareness.

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IMTs used in HBP and the EBRAINS context

Innovation awareness tools

Capacity building

- Innovation training courses
- Innovation follow-up activities

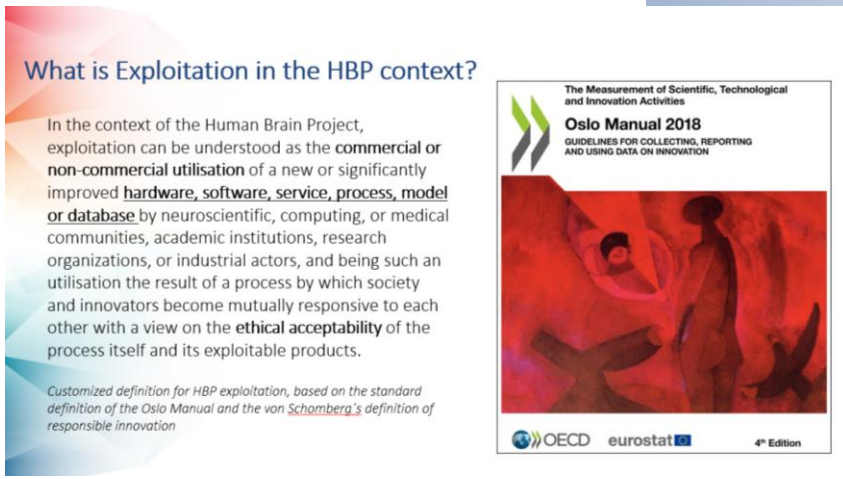
One strategic task of the Innovation Team to reinforce HBP researchers´ orientation to the exploitation of EBRAINS is the organization of capacity-building modules on innovation and commercialisation of research results.

With that objective in mind, the Innovation team has launched a series of two-days courses that will provide HBP members, during SGA3, with the minimum but necessary training on exploitation aspects like technology readiness levels (TRL), elaboration of exploitation plans, innovation management, mechanisms to protect intellectual property rights, technology transferring, software licensing, new modalities of research funding, horizon scanning, road-mapping and technology foresight.

This training offer will allow attendants to explore innovation from multiple and diverse perspectives and contribute to consolidate a culture on exploitation in HBP. Two pilot courses have been already delivered in November and December 2020: the TRL assessment module and the Guidelines for the exploitation of HBP technologies (which included practical recommendations for the elaboration of exploitation plans).

The courses include practices and selected cases in the specific areas where the audiences work on

Both courses will be repeated in 2021. Around fifty HBP researchers, developers and managers have taken part in these courses, and expressed a high level of interest in understanding and discussing how to measure and leverage the potential of their most promising results.



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IMTs used in HBP and the EBRAINS context

Innovation awareness tools

Communication

- Innovation webpage
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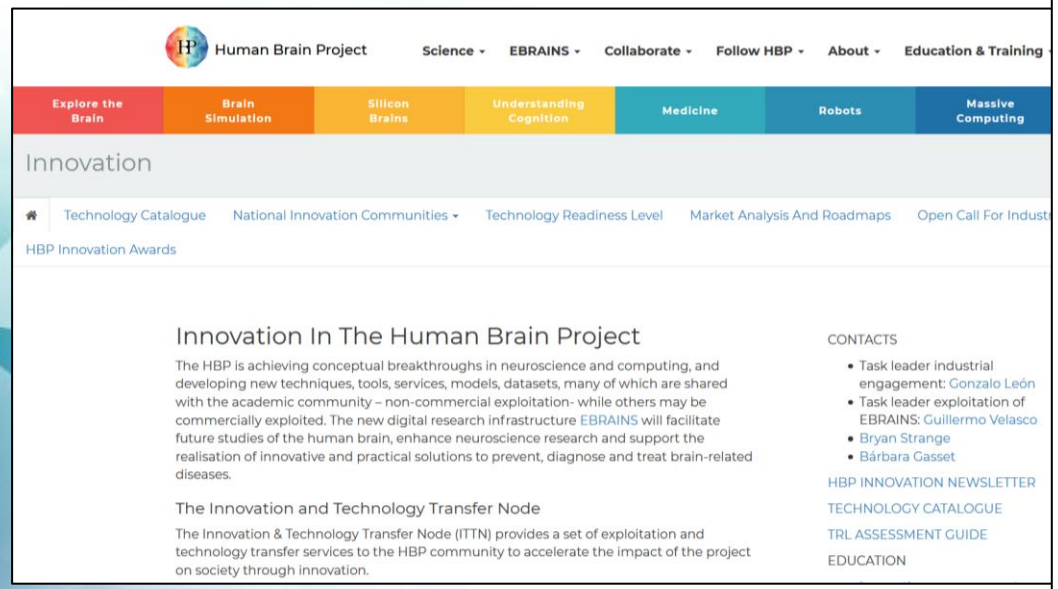

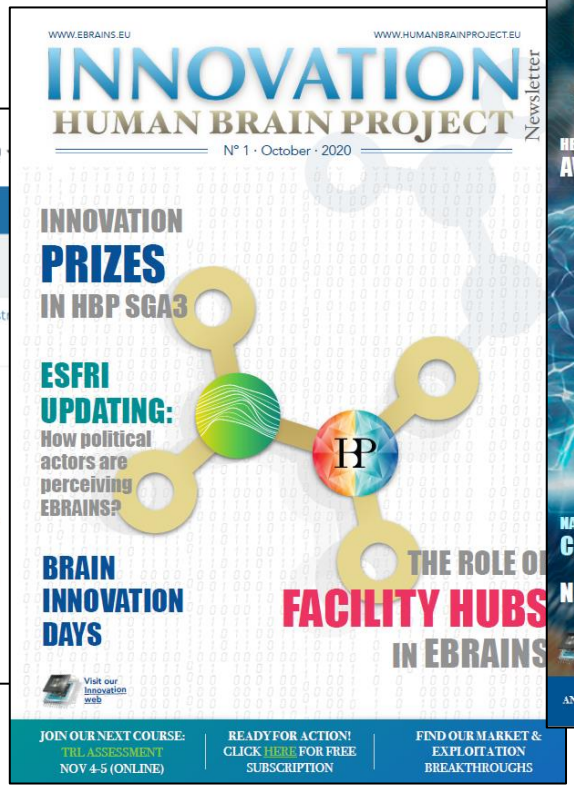

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IMTs used in HBP and the EBRAINS context

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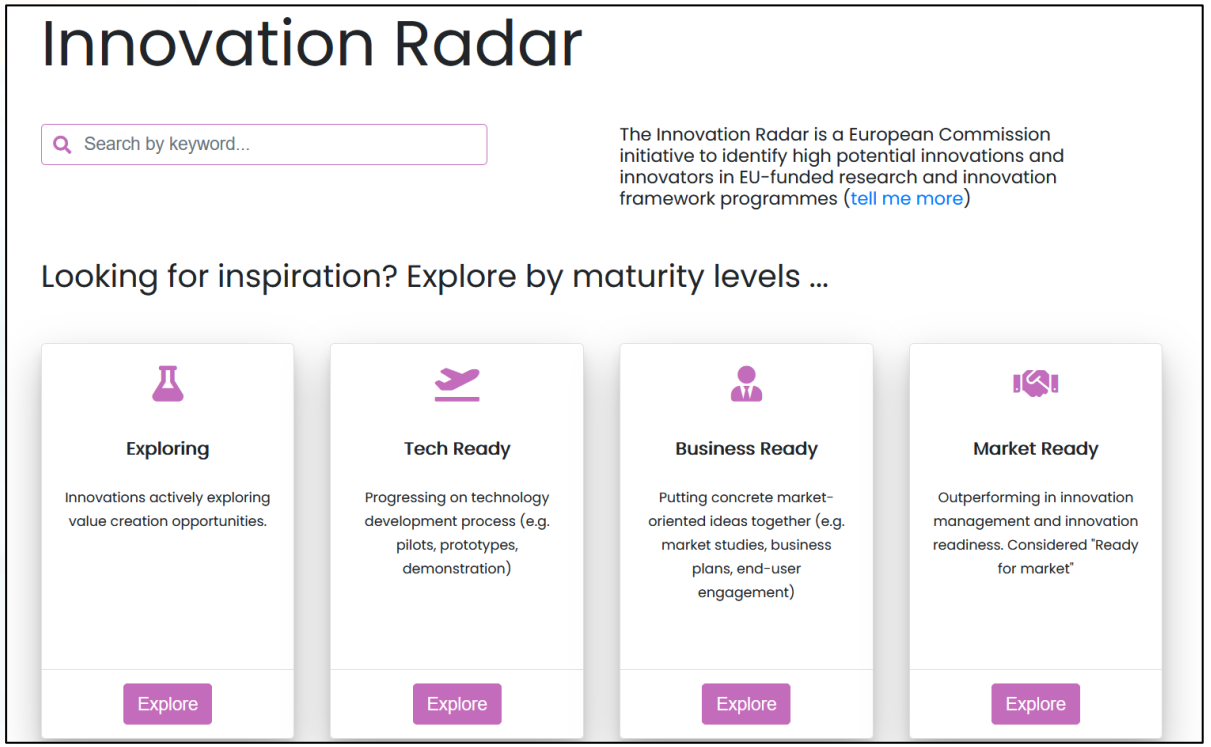

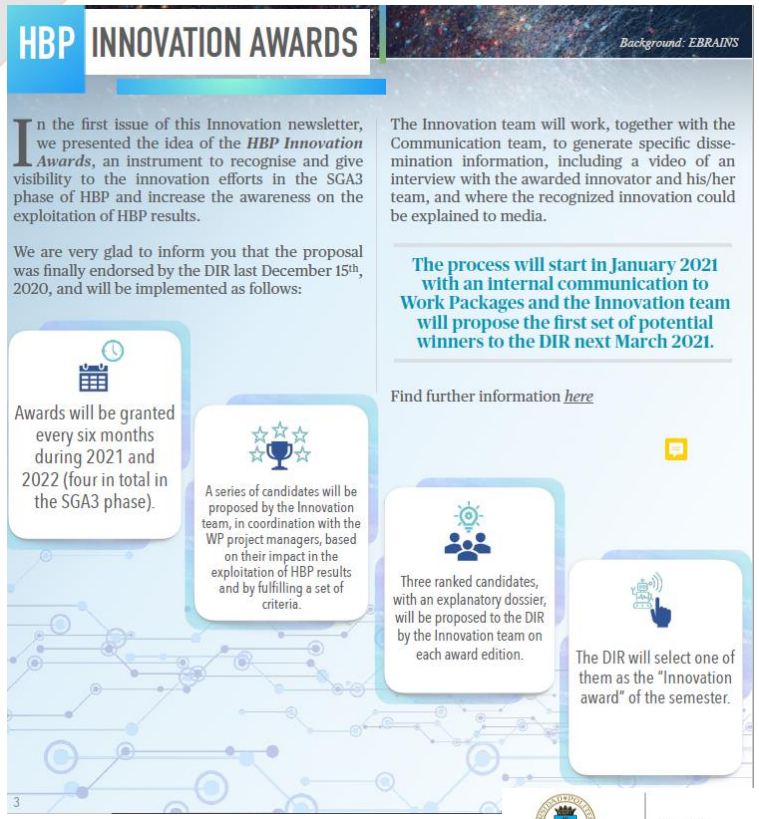

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IMTs used in HBP and the EBRAINS context

Technology transfer tools

Assessment of tech development process
- Novelty and usefulness
- TRL assessment

Transferring modality
- Understand the options
- Feasibility and implications

Matching offer and demand
- Technology catalogue
- Users identification & approach

With these tools we help HBP researchers to translate their innovative results to the users´ markets.

To achieve that, we need people to know what is actual maturity of their tools, and to know how results can be transferred.

Presenting attractive descriptions and advantages of the tools helps users to evaluate the actual usefulness of those tools .

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IMTs used in HBP and the EBRAINS context

Technology transfer tools

Assessment of tech development process

- Novelty and usefulness
- TRL assessment

Conditions to get a patent

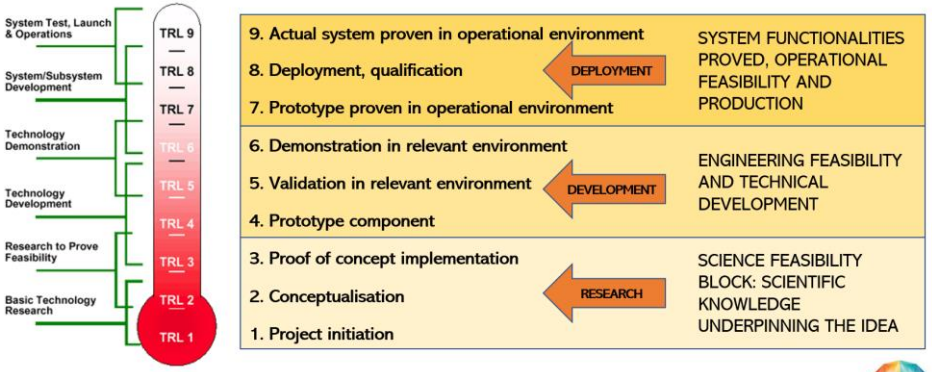
1. NOVELTY: an invention is new/novel if it was not known (by means of written or oral description, by use, or in any other way) to the public before the date of filing of the patent application or the priority date claimed, at global level. This implies to develop a coherent plan for publications, conferences, that does not limit patenting opportunities

2. INDUSTRIAL APPLICATION: the invention needs to be able to be used or made in any kind of industry. There is no industrial application if the invention is just used in personal/private context.

3. 'NON-OBVIOUS': invention should not be obvious for a person with standard skills in the field

WIPO
WORLD
INTELLECTUAL PROPERTY
ORGANIZATION

The three key blocks of the TRL scale



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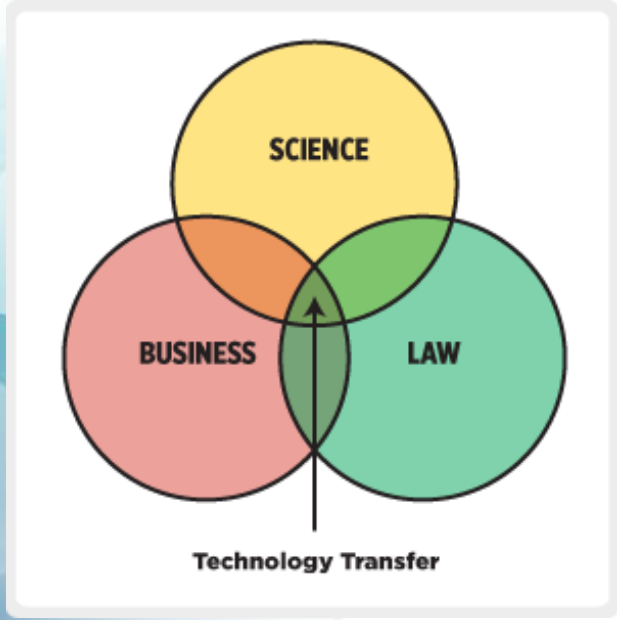
IMTs used in HBP and the EBRAINS context

Technology transfer tools

Transferring modality

- Understand the options
- Feasibility and implications



Technology transfer implies to bring technological solutions or services from an institution or person, **which holds the intellectual property right (IPR)**, to other scientific or industrial actors.

Source: https://tt.research.ucf.edu/about-ott/

- **Technology acquisition**
- **Technical and/or scientific services**
- **Technical and/or scientific advice, consultancy**
- **IPR licensing & cross-licensing**
- **Research collaborations**
- **Start-up/spin-offs**
- **Joint ventures**
- **Shared facilities**
- **Exchange of personnel**
- **Know-how contracts**
- **Turn-key projec**

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IMTs used in HBP and the EBRAINS context

Technology transfer tools

Matching offer and demand

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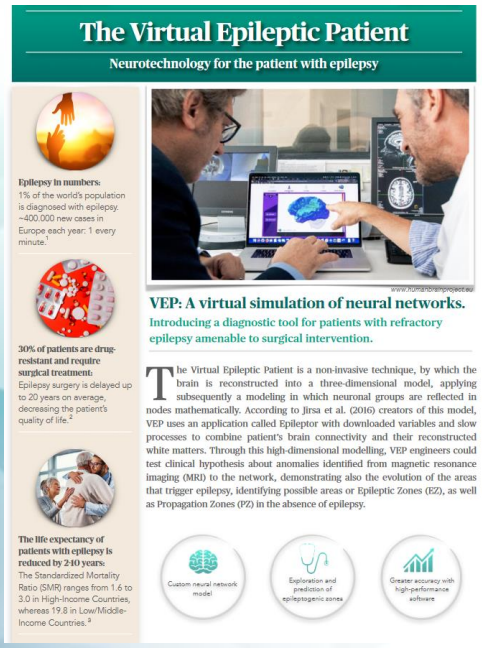

The Virtual Epileptic Patient

Neurotechnology for the patient with epilepsy

Epilepsy in numbers:
1% of the world's population is diagnosed with epilepsy. ~400.000 new cases in Europe each year: 1 every minute.[1]

30% of patients are drug-resistant and require surgical treatment:
Epilepsy surgery is delayed up to 20 years on average, decreasing the patient's quality of life.[2]

The life expectancy of patients with epilepsy is reduced by 2-10 years.
The Standardized Mortality Ratio (SMR) ranges from 1.6 to 3.0 in High-Income Countries, whereas 19.8 in Low/Middle-Income Countries.[3]

VEP: A virtual simulation of neural networks.

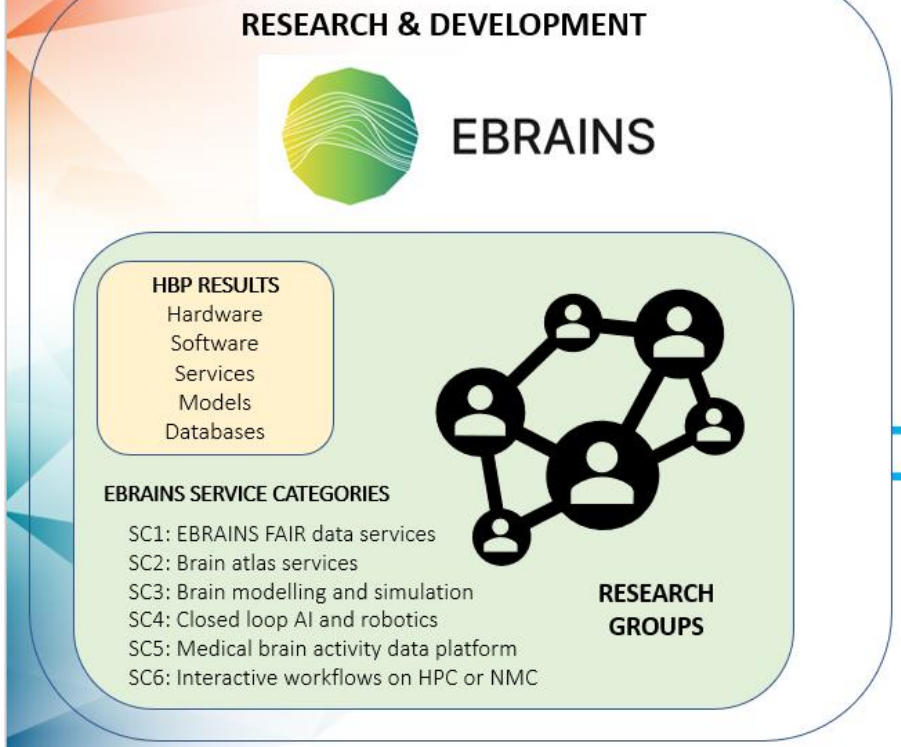
Introducing a diagnostic tool for patients with refractory epilepsy amenable to surgical intervention.

The Virtual Epileptic Patient is a non-invasive technique, by which the brain is reconstructed into a three-dimensional model, applying subsequently a modeling in which neuronal groups are reflected in nodes mathematically. According to Jirsa et al. (2016) creators of this model, VEP uses an application called Epileptor with downloaded variables and slow processes to combine patient's brain connectivity and their reconstructed white matters. Through this high-dimensional modelling, VEP engineers could test clinical hypothesis about anomalies identified from magnetic resonance imaging (MRI) to the network, demonstrating also the evolution of the areas that trigger epilepsy, identifying possible areas or Epileptic Zones (EZ), as well as Propagation Zones (PZ) in the absence of epilepsy.

Custom neural network model

Exploration and prediction of epileptogenic zones

Greater accuracy with high-performance software



Technology acquisition
Technical and/or scientific services
Technical and/or scientific advice, consultancy
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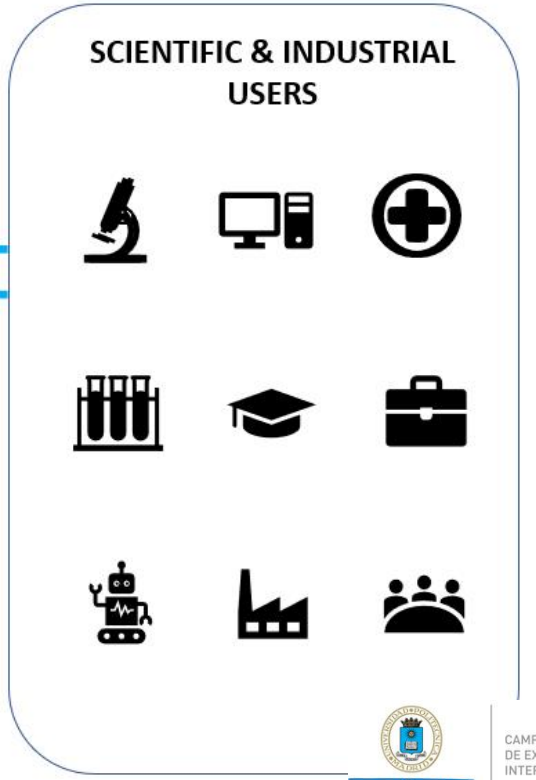

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IMTs used in HBP and the EBRAINS context

Industrial engagement

Industrial networking

- Design a National Innovation Communities (NIC) network
- Maintain NIC momentum

Collaboration and co-creation

- Call for industry engagement
- Solution workshops with start-ups and spin-offs

With these initiatives we involve industrial actors in HBP. To achieve that, we need to offer interesting contents and inform NIC members on relevant initiatives and opportunities.

The call is an efficient and straight forward method to put companies on board and launch co-creation processes

Engaging start-ups to HBP is a strategic decision that brings new users to EBRAINS and may ensure the sustainability of services beyond HBP.

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IMTs used in HBP and the EBRAINS context

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Industrial networking

- Design National Innovation Communities (NIC) networks
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Industry and health associations

Ametic – La voz de la industria digital
farmaindustria
fenin
FIPSE
ASEBIO
Alianza de la Sanidad Privada Española

Biomedical institutions

PRACTICUM
ibima
bioaraba
IdiSSC Instituto de Investigación Sanitaria
ibs.GRANADA
IdiPAZ Hospital La Paz Institute for Health Research
Hospital Universitario Virgen Macarena
Valdecilla IDIVAL
SJD Sant Joan de Déu Fundació de Recerca
Hospital Virgen de la Poveda
Hospital Universitario Infanta Leonor
INiBICA
IDIBELL
Vall d'Hebron Barcelona Campus Hospitalari
i3B Instituto de Investigación e Innovación en Bioingeniería

Companies

ADDITUM BLOCKCHAIN
ALLINKY Biopharma
biocross
EFFECTIA consulting
RCK
NIMGenetics New Integrated Medical Genetics
Since 2002 norayBIO NorayBG
Newmanbrain
QUBIO tech
SMARTHEALTH TV SOLUTION
Starlab LIVING SCIENCE
alia
vicomtech MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE
quirónsalud La salud persona a persona

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IMTs used in HBP and the EBRAINS context

Industrial engagement

Collaboration and co-creation

- Call for industry engagement
- Solution workshops with start-ups and spin-offs

AND THE WINNERS ARE…

- **NEURO-CONNECT - Knowledge management solution for multimodal brain atlas and connectome integration**
  Coordinator: Biomax Informatics AG, Germany
- **CESPAR - Closed-loop exoskeleton simulation for personalized assistive rehabilitation within HBP NRP**
  Coordinator: Alpine Intuition, Switzerland
  Partners: Autonomyo, Switzerland
- **Neuro-robin - Closed loop upper limb neurorobot simulator**
  Coordinator: BitBrain, Spain
- **LB2020 - LIVING BRAIN Next generation dedicated brain PET**
  Coordinator: GEM Imaging SA – ONCOVISION, Spain

START-UPS SOLUTION WORKSHOPS

- Focused in brain-technology start-ups
- Problem-oriented
- Thematic areas
- A series of workshops: first one (pilot) to be organised in May

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IMTs used in HBP and the EBRAINS context

Technology intelligence

Market studies and roadmaps

- Market analysis on the most relevant HBP areas
- Roadmaps on specific technology developments

Environmental scanning

- Identify main actors and their relations within the scientific/industrial domain
- Identification of SMEs and start-ups

Technology intelligence activities allow a wide understanding of the technology landscape.

The identification of technology trends help researchers and developers to position their efforts and achievements in the broader context

The analyses are practical, with identification of potential users, industrial companies, collaborations, capital ventures, and other exploitation opportunities

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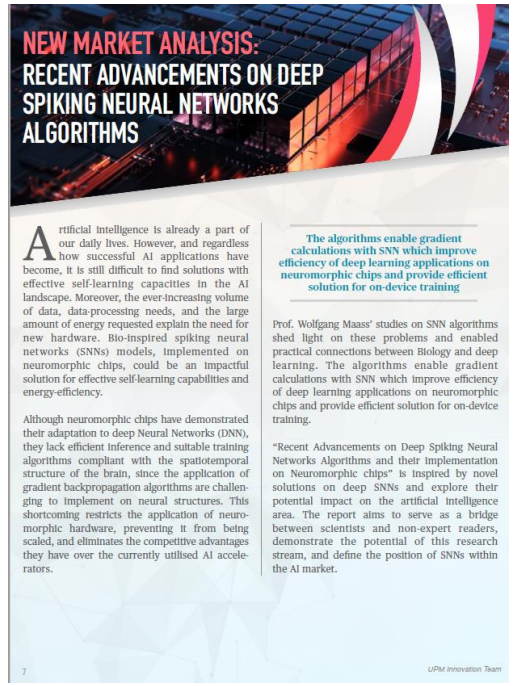

Completed analyses

- Neuromorphic computing
- Virtual Epileptic Patient
- Spiking network modelling and training

Ongoing analyses

- Brain Atlases
- Brain Simulation & NEST
- MIP & HIP
- HBP applications and tools for hospitals (transversal analysis)
- Mapping of the Brain technology European start-ups

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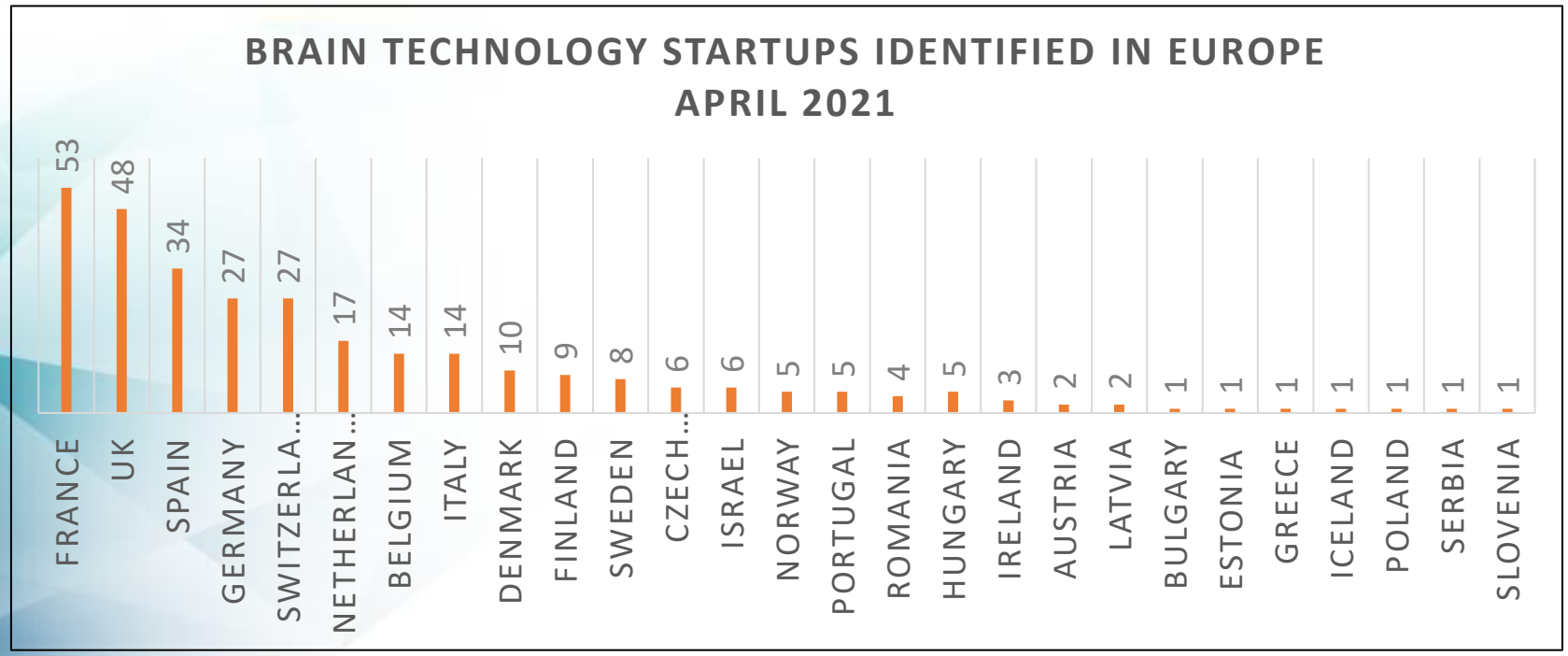
IMTs used in HBP and the EBRAINS context

Technology intelligence

Environmental scanning

- Identify main actors and their relations within the scientific/industrial domain
- Identification of SMEs and start-ups



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IMTs used in HBP and the EBRAINS context

Entrepreneurship

Identifying promising initiatives throughout HBP and connecting them with funders and collaboration actors

- Exploitation plans revealing start-ups initiatives
- Providing start-ups with IP-related and business plans insights
- Specific workshops for connecting HBP start-ups with capital investors and other actors of the brain innovation system

Setting up a start-up is a decision that requires reflection and acknowledgement of available resources.

We identify start-up opportunities within the project and provide them support (capacity building, market studies)

Start-ups can get advantages from the networking initiatives and the capacity of HBP members to establish collaboration and exploitation connections

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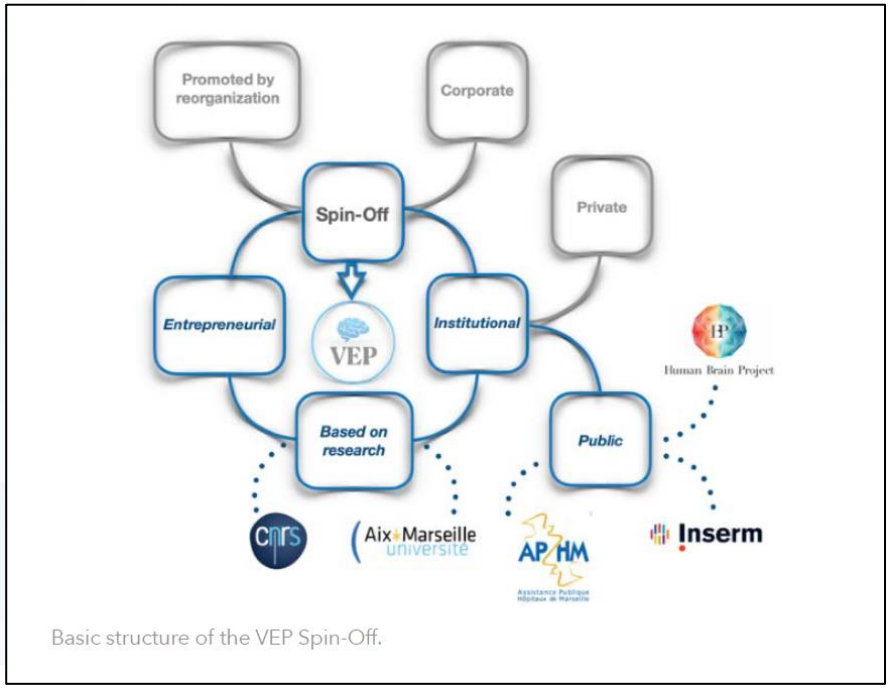

Basic structure of the VEP Spin-Off.

STRENGTHS	WEAKNESSES
1. Recreates an accurate and personalized brain model through its network connectivity. 2. Allows the establishment of precise hypotheses based on EZ y PZ, with the Epileptor as a mathematical model of the neural network. 3. Contributes to the precision of surgical interventions. 4. It allows to reflect certain lesions that are not detected in the MRI. 5. Non-invasive. 6. It is flexible in its application, allowing it to adapt to specific needs and parameters. 7. A macro level approach to the brain. 8. Support as an EU project. 9. It involves numerous talented scientists in a variety of disciplines. 10. According to the creator team, the progression of the disease means progression of parameters, being a long term benefit to reflect the evolution of the disease. 11. Registered patent application. 12. Fast response test (24/48 hours).	1. Dependence on evaluations or alternative technologies (EEG, tractographies, etc.) as well as invasive neurological evaluations (SEEG) necessary to improve their predictions, increasing approach costs. 2. The definition of the parameters in the model are not sufficiently accurate, which affects their predictions (limited prediction of epileptogenic zones). 3. Its accuracy also depends on a specific level of preparation, experience and exchange of opinions among specialists while using the tool (doctors, engineers, radiologists). 4. The tool is still being applied to larger groups of patients (concrete results are expected in 2022). 5. Being open source, the VEP does not bring an associated economic return (for the moment), so their investment costs are translated into scientific and technological reach. 6. According to its creators, epileptic brains for the lesions do not show clear MRIs, requiring manual interventions by the VEP engineer.
OPPORTUNITIES	**THREATS**
1. Improve the quality of medical diagnoses through personalized medicine. 2. Possibility of being inserted as a habitual use at clinical level, reducing times for surgical interventions. 3. Planning in the training of new skills, to facilitate their understanding and application in diagnosis. 4. It is being applied for other no less important diseases such as Alzheimer's. 5. Possibility to support other preoperative stereotactic evaluations by representing large scale neural networks. 6. Application in the pharmaceutical industry for testing new treatments and combinations on a virtual scale, as a long-term vision. 7. Being open source increases the possibility of creating new solutions and applications worldwide, being able to reach less developed countries. 8. By requiring the introduction of new and large-scale data to perfect the tool, there is a future possibility of simulating ZE and ZP without a patient requiring prior invasive evaluations.	1. Emerging in the medium term in similar technologies in other international projects that inhibit their application to new markets. 2. Lack of strategic planning in the distribution and application of this technology. 3. Appearance of scenarios and external factors that eclipse the application and advancement of this technology. 4. If not applied correctly as a complement to diagnostics it shows weak predictions. 5. Do not plan a global training methodology for its application, undermining its relevance. 6. To stop making improvements to the tool in terms of parameters, interface and design. 7. Regulations for its introduction by the health industry of certain countries.

SWOT analysis of the VEP.

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IMTs used in HBP and the EBRAINS context

IP protection and ownership

Protection of the research and development results

- Training in IP protection (patents and licenses)
- Monitoring HBP patents application
- Using patent analysis to detect opportunities in market analysis

Ownership of results in collaborative projects

- Extract ownership aspects to be aware of (from the project Gran Agreement)
- Support on collaboration and co-creation agreements

We deliver IP related courses to HBP members

IP aspects are crucial for exploitation, as the protection of research results, and their commercialisation are intimately linked

Ownership of results have influence in the protection possibilities

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IMTs used in HBP and the EBRAINS context

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Protection of the research and development results

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- Using patent analysis to detect opportunities in market analysis

a. **Patents** protect inventions (which can be products or processes).

b. **Copyright** protects creations such as, software, literature or artworks. Recognized automatically, they have effect since the date of creation.

c. **Database** Rights protect data sets which have been systematically arranged, organized and accessible.

d. **Trade secrets** protect confidential knowledge that is valuable and identifiable, including experiments, scientific methods or formulations.

e. **Designs** protect the shape and aesthetics of objects.

f. **Trademarks** protect brands, the value of which is based on the reputation and quality of the product or services offered.

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IMTs used in HBP and the EBRAINS context

IP protection and ownership

Ownership of results in collaborative projects

- Be aware of ownership aspects before exploitation (Gran Agreement)
- Analyse collaboration and co-creation agreements

Results are the property of the **partner generating it...**
…but there may be many nuances and mis-understandings !!

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Conclusions

- When Innovation management tools (IMTs) are effectively utilized, they can reinforce exploitation **commitment** of teams, **openness** to **collaboration**, **proactivity**, **entrepreneurship** and **strategic thinking**
- The HBP research and development groups should implement **IMTs** in their **operational and planning work**
- The **HBP Innovation team** is actively implementing, through tasks 8.5 and 8.6, a full spectrum of **IMTs** to **complement and support** project members´ efforts towards innovation and exploitation

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Questions?