EARTO Innovation School

How to Exploit the Untapped Potential of RTO's Deep-Tech Start-ups in Europe?

EARTO
IMPACT DELIVERED

28th June, Brussels

Introduction

Muriel Attané
Secretary General, EARTO

RTOs Solve Real-World Problems

Smart Cranes for smart industry

Low-allergic surgical gloves

Test environment for road safety

Fast-charging electric bus system

Innovative treatment for muscle rehabilitation

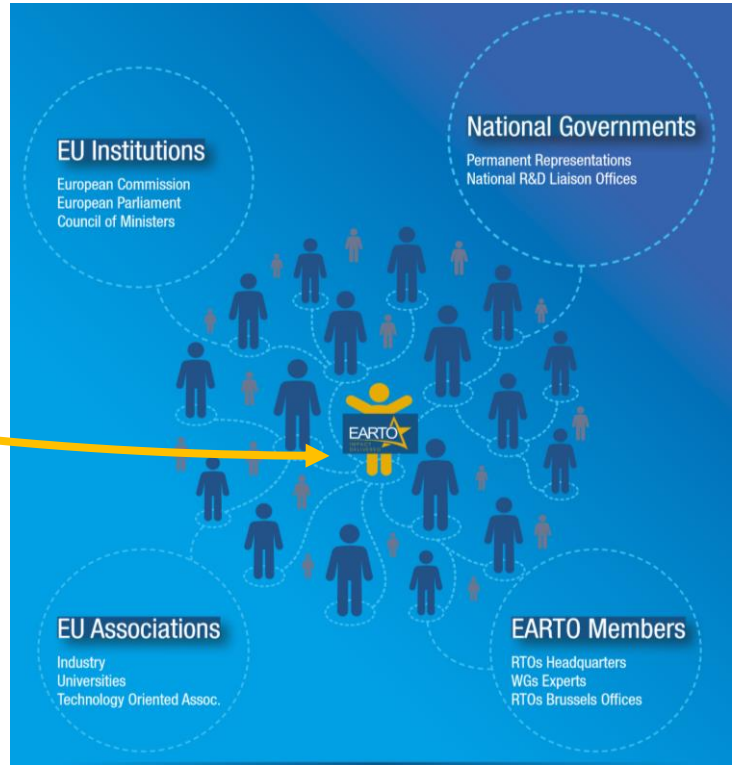
Eco-friendly and fire-proof rubber

Cheaper & more efficient LED lamps

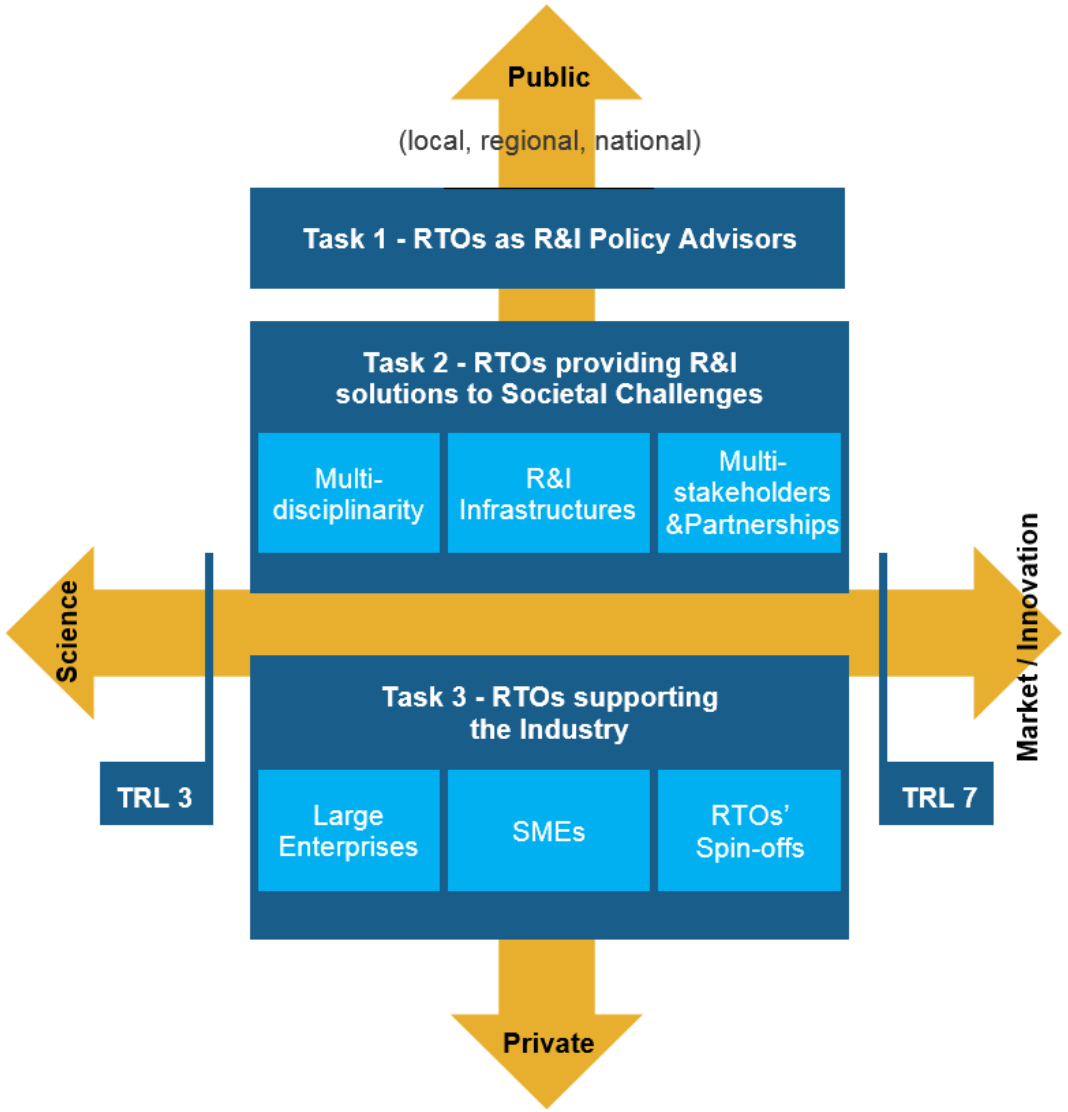
Innovative treatment for lung and skin infections

EARTO Moto: **Impact Delivered!**
EARTO Vision: **Technology for a Better World**

csem · SINTEF · Tyndall National Institute · cea · Danish Technological Institute · VTT · AIT Austrian Institute of Technology · inegi driving innovation · RISE · TNO innovation for life · RB · CATAPULT High Value Manufacturing · vito vision on technology · Luxembourg Institute of Science and Technology LIST · imec · TWI · Institut "Jožef Stefan" · tecnalia Corporación Tecnológica · Fraunhofer · Technology Partners · GTS Advanced Technology Group · SignalGeneriX Advanced Signal Solutions · Cti Réseau Centres Techniques Industriels · CETMA · ACR Austrian Cooperative Research Kooperation mit Kompetenz · Fedit Centros Tecnológicos de España · National Research Council Canada



Understanding European RTOs

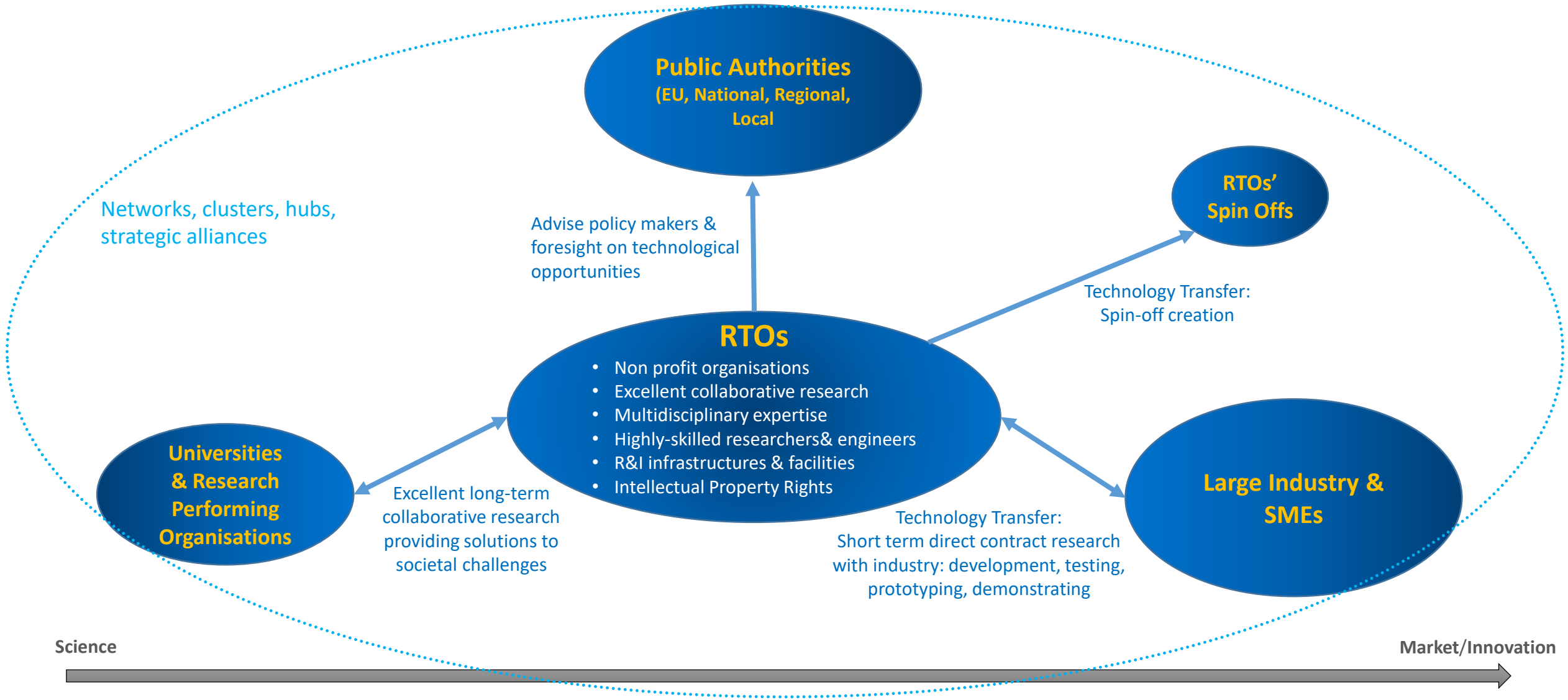


RTOs are key players in the innovation chain at local, national and European level

1. **RTOs have high skilled staff conducting world class R&I offering professional skills to EU industry**
2. **RTOs secure innovation with strong IP**
3. **RTOs house various research infrastructures & demonstration facilities benefitting many stakeholders**

⇒ **RTOs are best positioned to transfer technology to Industry to develop their global competitiveness with concrete impact**

RTOs Open Innovation Ecosystem



Joint Declaration by Industry and RTOs

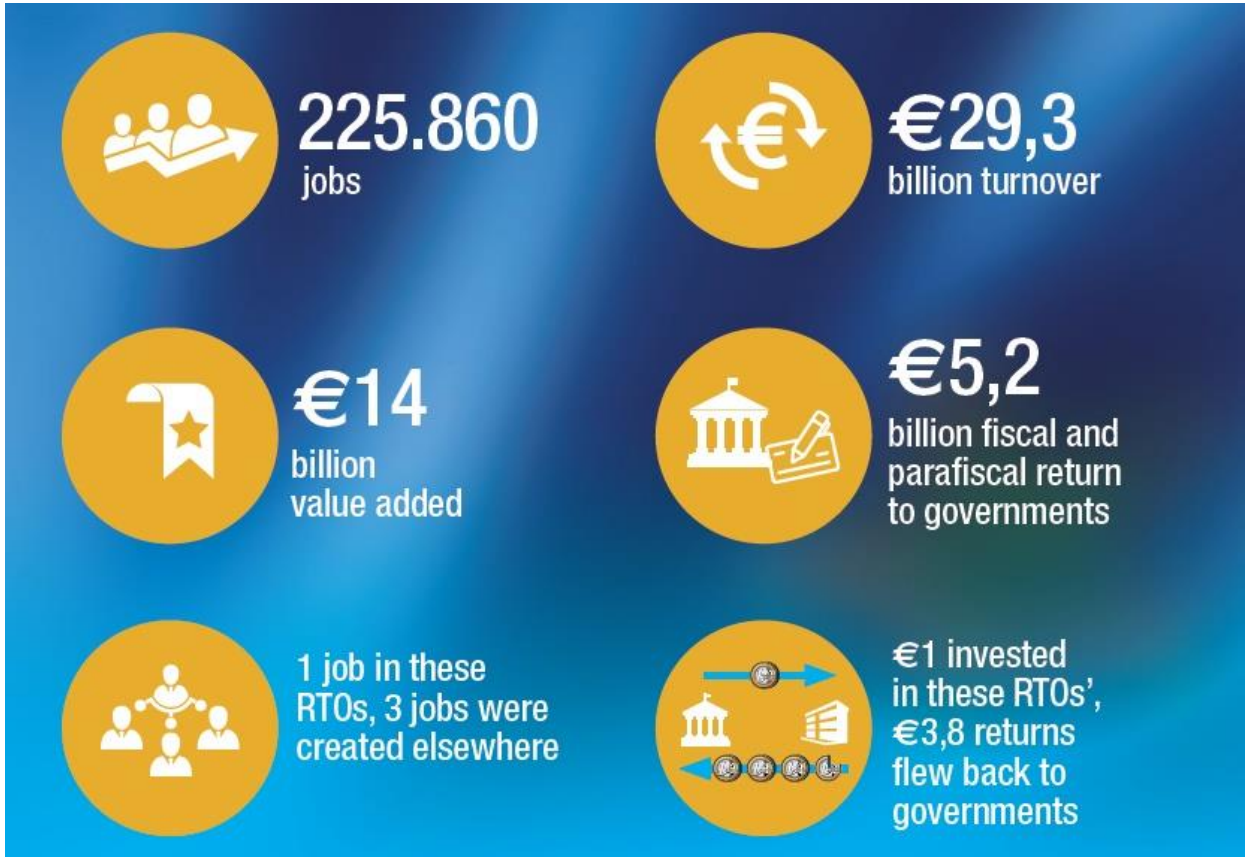
An Ambitious FP9 Strengthening Europe's Industrial Leadership

- **Increase significantly the overall EU budget for R&I**
- Focus on a **well-balanced three-pillar structure**, with equivalent share of budget,
- **Strengthen the EU industrial leadership** to guarantee sustainable application and implementation of European research,
- **Continue financial incentives in form of grants** for all actors of the value chain

Economic Footprint of 9 EARTO Members in one year (2014)

- **The aggregated economic effect of 9 European RTOs**
  - Core activities through spending & employment
  - Knowledge transfer through collaborative research with industry and spin-offs' creation
- CEA, DTI, Fraunhofer, IMEC, SINTEF, SP, Tecnalia, TNO, VTT

Jobs & Growth
Economic Footprint Study
Impact of 9 European RTOs in 2014



EARTO Members Among World's Most Innovative Research Institutions

- **CEA - IFPEN - Fraunhofer**
  in Clarivate (ex-Reuters)
  Top 100 Global Innovators
  for several consecutive years

TOP100 GLOBAL INNOVATORS

- **CEA – Fraunhofer – NRC – Helmoltz**
  in Clarivate (ex-Reuters)
  Top 25 World's Most Innovative Research Institutions 2017

Clarivate Analytics
The State of Innovation

INSTITUTION & GOVERNMENT RESEARCH

Figure 1.10. Top 3 PCT applicants distributed across TRL.[43]

Graph source: Final report - KETs: Time to Act, 2015

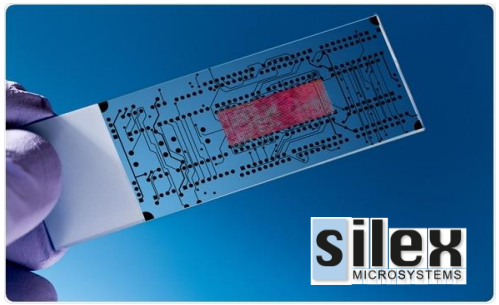
RTOs' Deep-Tech Start-Ups Solve Real-World Problems

Cheaper & More Efficient 3D LED Lamps

Making Waste Water Re-usable

Smart Glasses Making the Invisible Visible

Really Sustainable Packaging Solutions with Bioplastic Materials



World's Leading Manufacturer of Customized Micro-Chips

Collaborative Platform for Creative Television Teams

Some figures on RTOs' support to Deep-Tech Start-Ups

550+

Spin-offs still active in 2014 from 7 large European RTOs

70+

Spin-offs created each year by 7 large European RTOs

+80%

Success rate of RTOs' spin-offs after 5 years

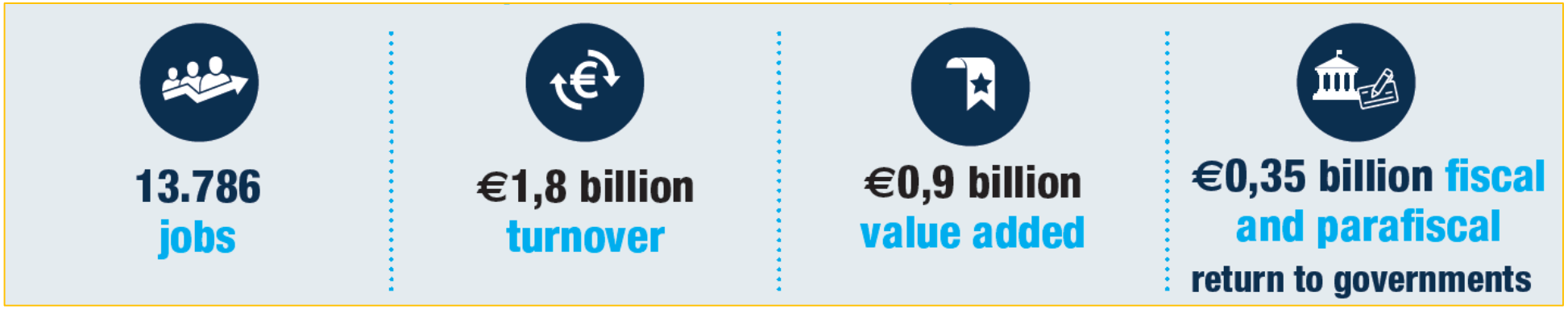
13.000+ Jobs Created

€1,8 bn Turnover

Providing access to RTOs' untapped technology potential would deliver high value for society

Socio-Economic impact of RTOs' Deep-Tech Start-Ups

- **EARTO Economic Footprint Study:** 257 spin-offs created by 7 of the largest EU RTOs and active in 2014 represent:



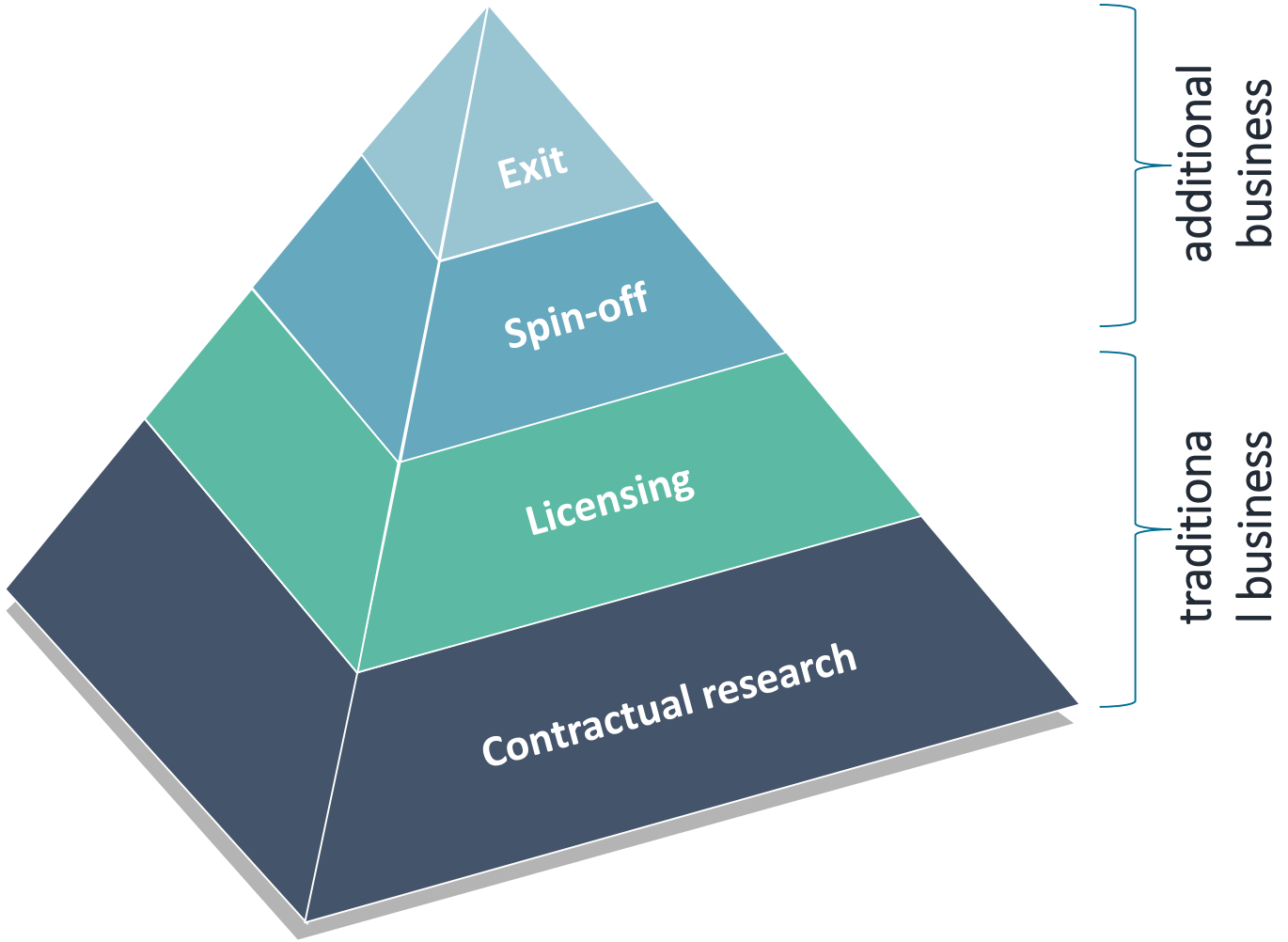
- Human capital moving from the founding RTO to the spin-off contributes to the availability and **dispersion of highly qualified knowledge and skills to the local economy and related industries**

- **Culture evolution** due to the contact (direct or indirect) of young citizens and students with these start-ups in their local ecosystem

Deep-Tech Start-Ups Are Europe's Distinctive Strength

Julia Schmalenberg
Senior Policy Advisor Technology Transfer, Fraunhofer

RTOs' core mission: Transfer technology to the market with high impact for society



- **RTOs develop new, sometimes game-changing technologies, with a market-oriented approach** and the objective to develop strong IP and to transfer their technology to the market
- However, **it is not in RTOs' core business to undertake a commercial approach themselves** or sustain a pool of entrepreneurs
- **Public authorities could play a role to support this type of activity** which helps make innovations investment-ready

Specificities of RTOs' Deep-Tech Start-Ups

- **Based on deep-tech:** unique, differentiated, often protected or hard to reproduce technology from various sectors (KETs)
- **Strong industry focus** with Business to Business approach (B2B)
- **Focused on two types of technological innovation**:
  - **Breakthrough innovation** creating new markets based on breakthrough technology
  - **Innovation through use** resolving large profit & loss problems
- **Balanced socio-economic impact**: job creation & increased turnover and capitalisation across the value-chain
- **Better live expectancy after 5 years** than average start-ups
- 7-10 employees at the time of creation and ~50 employees at the 2nd round of financing

Deep-Tech start-Ups': Europe's Distinctive Strength

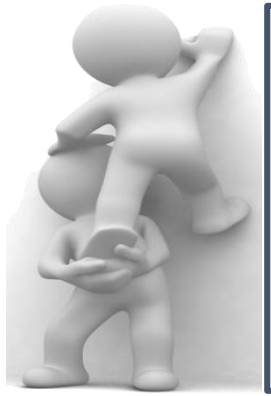
US-type Digital Start-ups (incl. US-Unicorns)	EU-type Deep-Tech Start-ups (RTOs' Spin-offs)
Used-tech (often no own technology)	Deep-tech (unique, protected or hard to reproduce)
Business to Consumers (B2C)	Business to Business (B2B)
Business-model challenge	Technology & Market challenge
Service-based	Technology-based
Low Resources' Needs Before Foundation	Resource-intensive
Immediate reach to market	3 to 5 years for proof of concept & minimum viable product
Exponential growth (fast & resource-intensive) to achieve market leadership - "winner-takes-it-all"	Linear/controlled growth directly linked to revenues & acquisition of industrial customers' - targeted approach
Low life expectancy after 5 years: <25% success rate	High life expectancy after 5 years: >80% success rate
Short to medium-term societal impact accompanied by important disruption	Long-term societal impact sustaining industry
Everyday life services exploiting ICT	All technology sectors

Europe should not aim at copying the US ICT-focused Silicon Valley ecosystem but rather focus on its distinctive strength: deep-tech start-ups closely linked to a strong European industrial base

RTOs' Core Mission: Adding Value Through Technology Maturation

TRL	
9	**System Test, Launch and Operations and System Development**
8	
7	
6	**Technology Maturation**
5	
4	
3	**Basic research and technological feasibility**
2	
1	

- System operation
- System test and demo
- System prototype

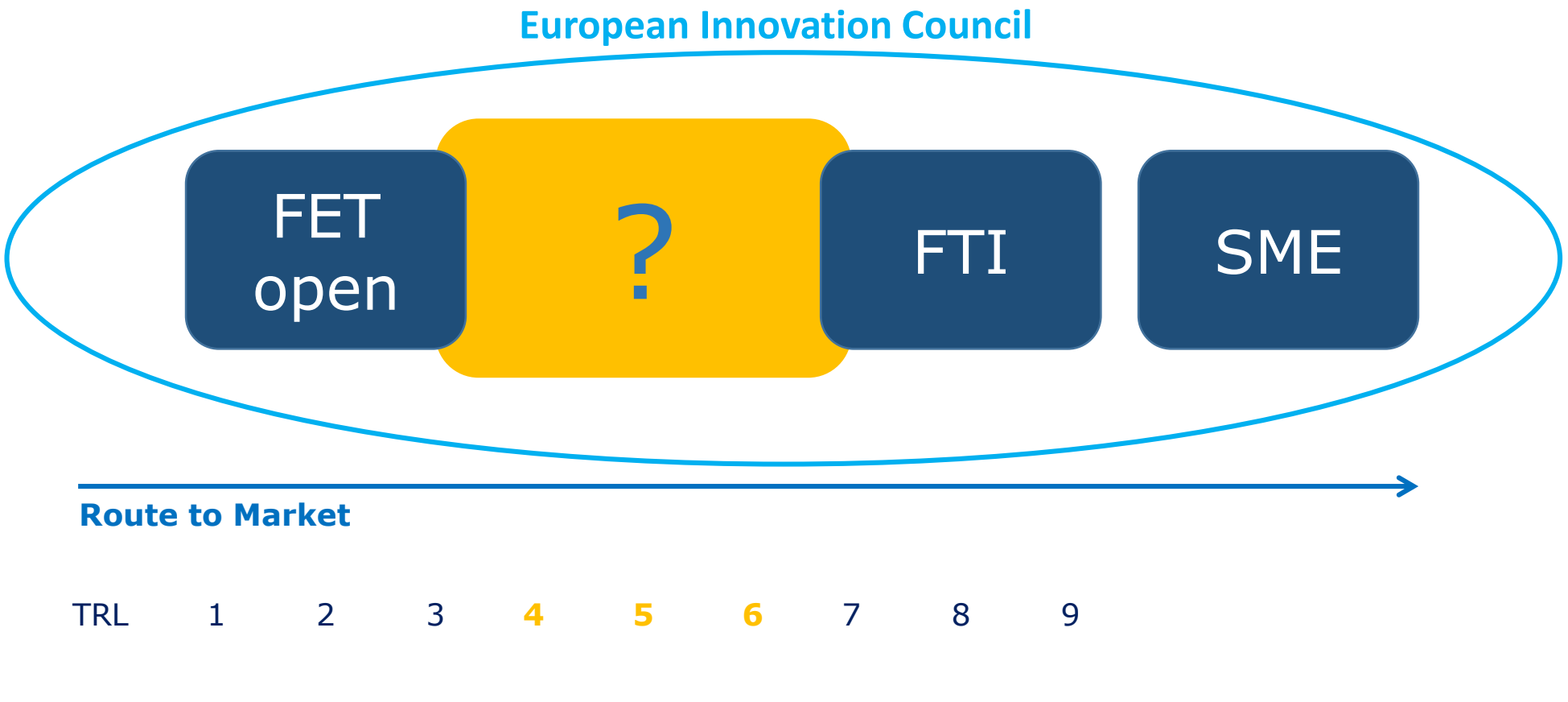


- **Prototype**
- **Validation in relevant environment**
- **Validation in laboratory environment**

- Analytical/Experimental proof
- Technology concept
- Basic principle

Source: NASA Technology Readiness Levels, ISO 16290

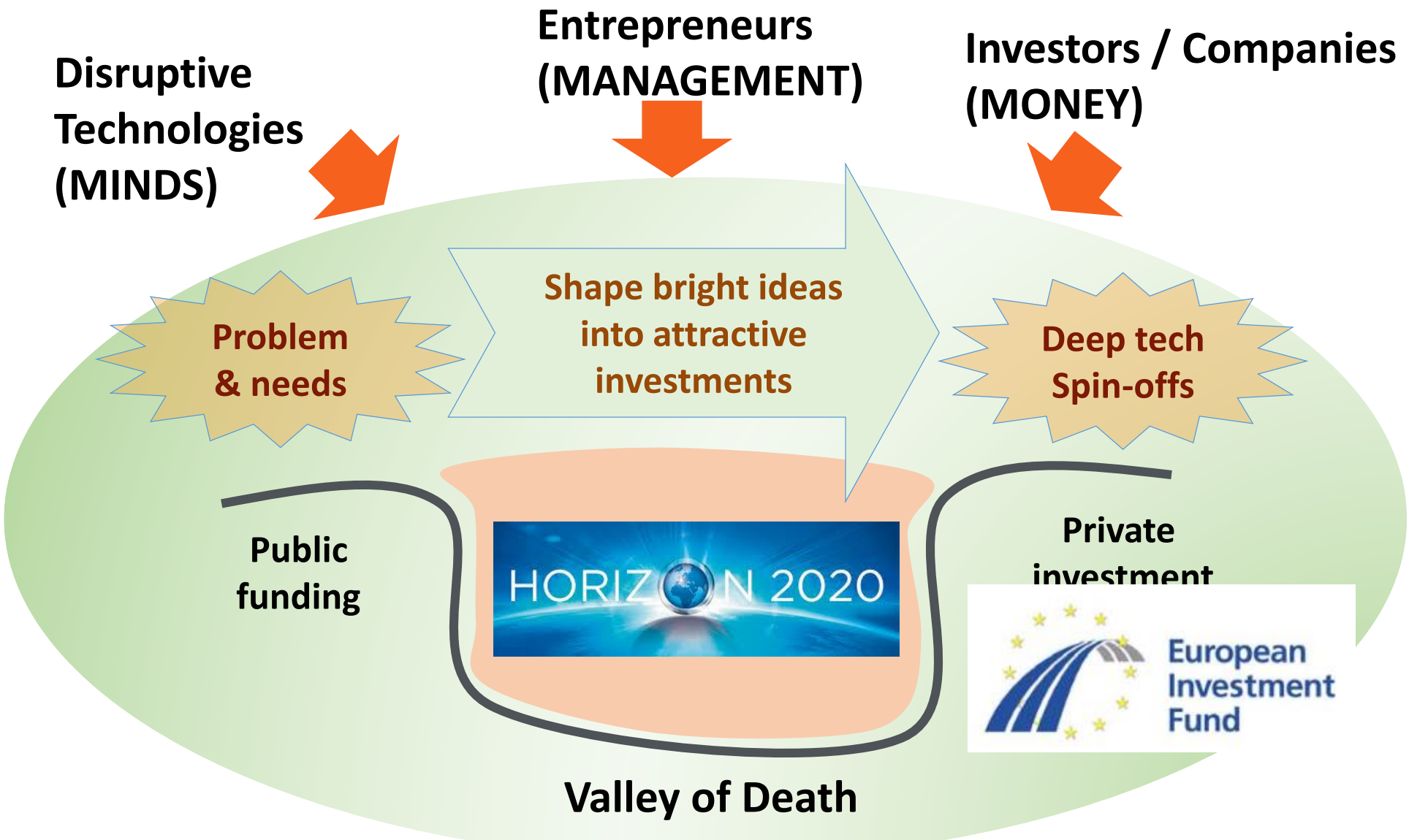
Support Technology Maturation Phase to Make Innovations Investment-Ready!



4 Key Dimensions to Create Deep-Tech Start-ups

Asier Rufino,
General Director, Tecnalia venture

Successful Open Innovation Ecosystem Ingredients

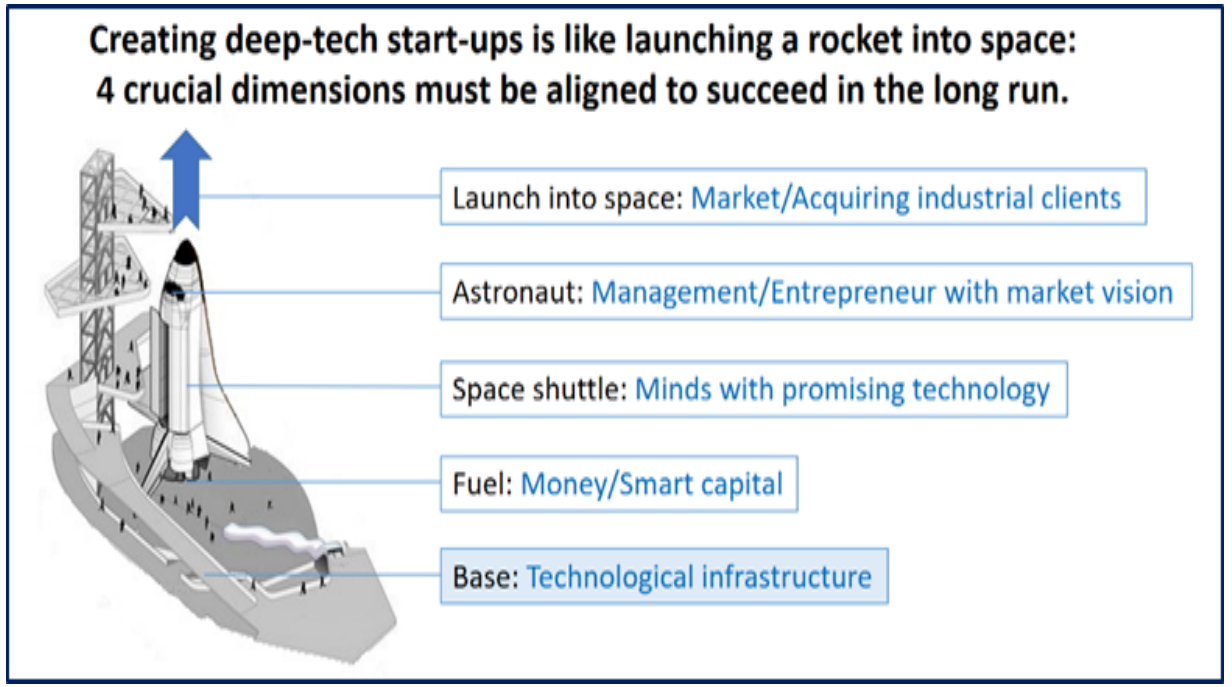


4 Key Dimensions to Create Deep-tech Start-Ups

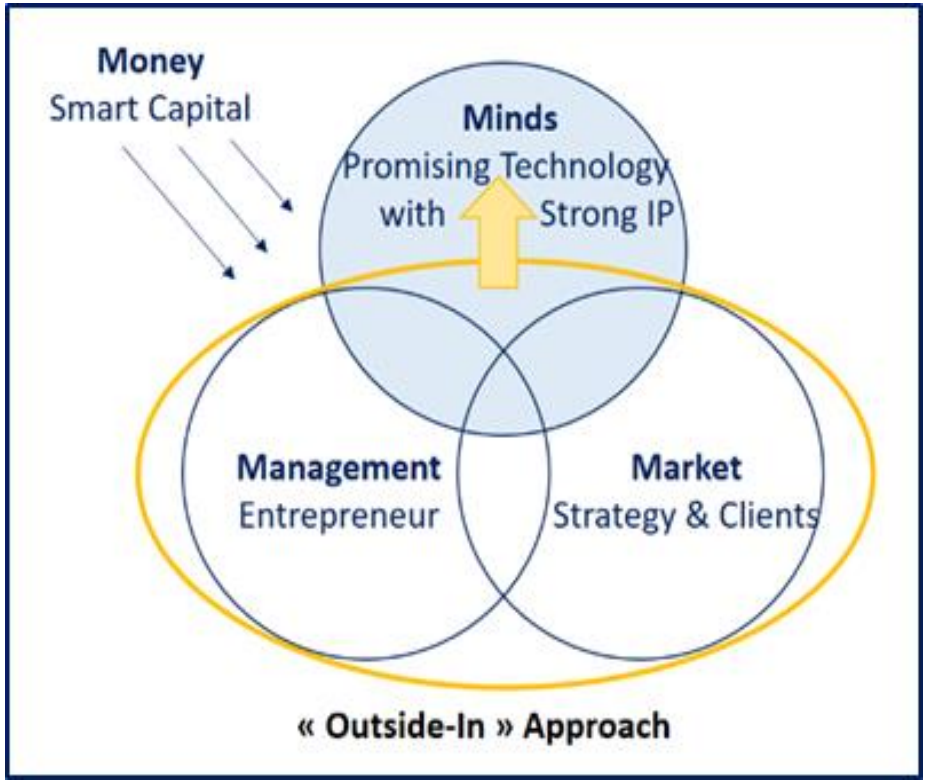
- **Minds**: technology experts with access to excellent technological infrastructure to provide a promising market-oriented RTO technology.
- **Management**: smart team around an entrepreneur with a market vision, willing convert disruptive technologies into ready-to-invest business opportunities.
- **Market**: strategy with interested and committed industrial partners/clients.

+

- **Money**: smart capital from investor to transform technology into business value and growth.



Two models of Deep-Tech Start-Ups:
Outside-In Approach



1. Entrepreneurs in low TRLs, with good market vision contact RTOs to develop a promising technology portfolio for the new business

2. RTOs collaborate with these entrepreneurs, helping them create the needed technology or apply an existing RTO technology to their needs

3. After project ends, RTOs can take the opportunity to invest in the start-up

Two models of Deep-Tech Start-Ups:
Outside-In Approach

TINKERLIST
Platform for creative television teams

Collaborative Platform for Creative Television Teams

ROBO TT NET
robot technology transfer network

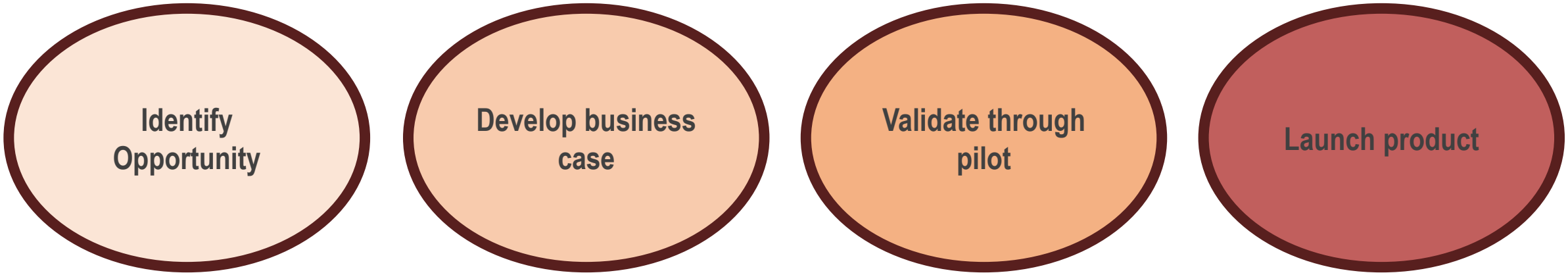
Technological Voucher Connecting RTOs & Early-Stage Start-Ups in Robotics

Two models of Deep-Tech Start-Ups:
Outside-In Approach

ROBO TT NET — robot technology transfer network

The joint power of 4 leading European RTOs to launch new businesses in robotics

DANISH TECHNOLOGICAL INSTITUTE · Fraunhofer IPA · tecnalia · mtc Manufacturing Technology Centre

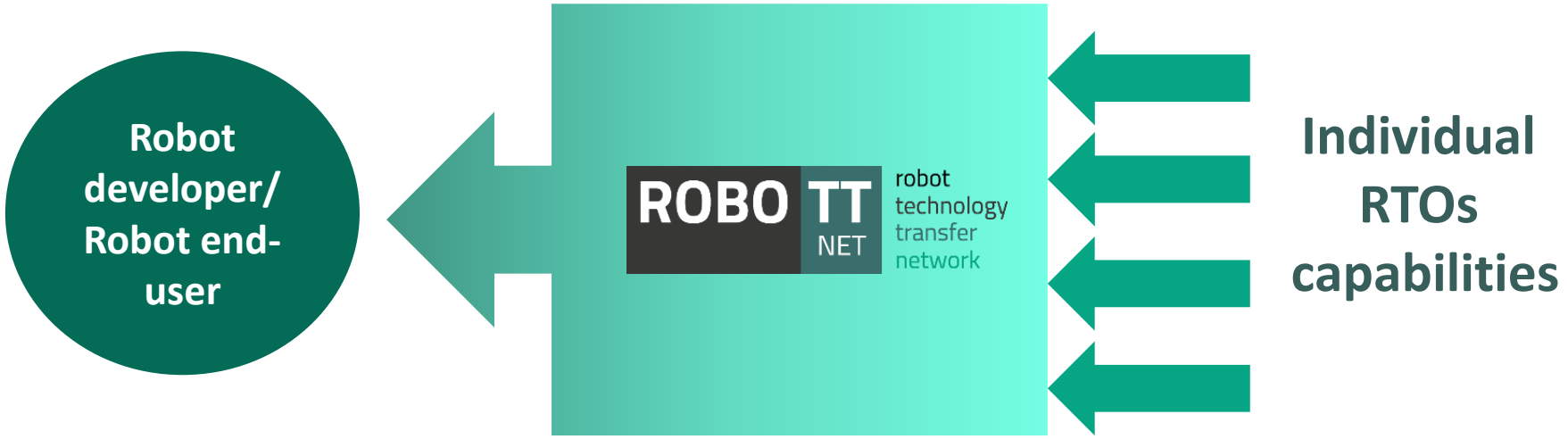


+1500 agents → +120 voucher applications → 64 business case → 8 pilots → + 4 products

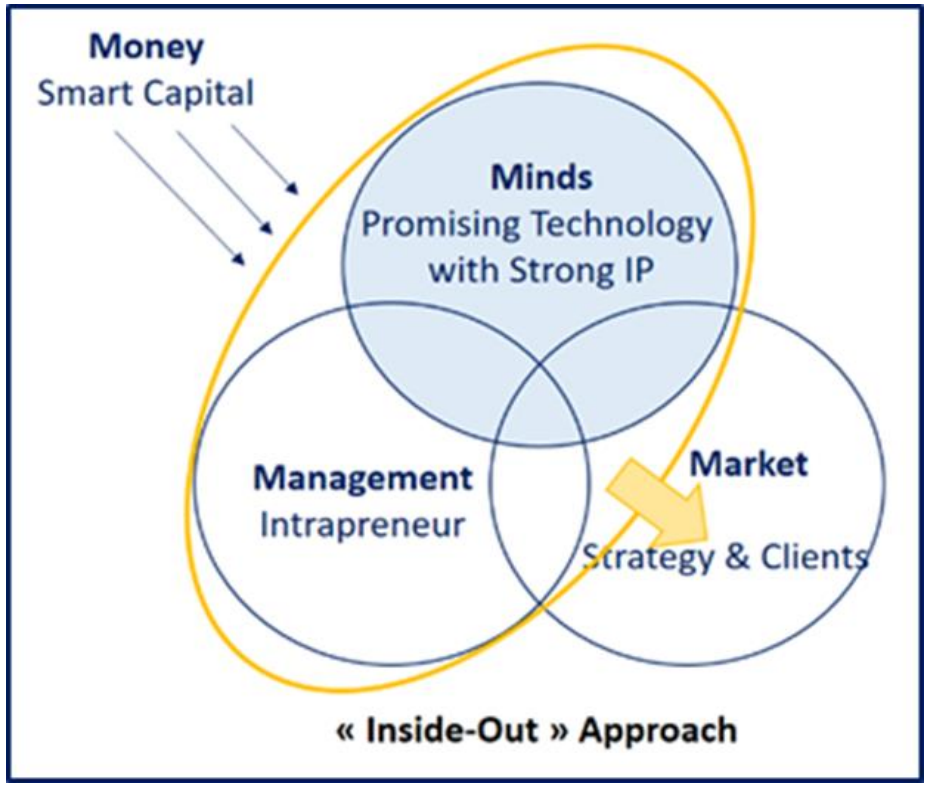
Two models of Deep-Tech Start-Ups:
Outside-In Approach

ROBOTT-NET
A one-stop shop to first class robot technology capability Europe-wide

- Venture building of industrial businesses require access to scarce capabilities
- RTOs make available these capabilities to develop/improve business case based on novel robot technology



Two models of Deep-Tech Start-Ups:
Inside-Out Approach



1. Starting point: RTOs' promising technology at a close-to-market level of development, with potential applications in different markets

2. Leadership dilemma: RTOs need to find a motivated intrapreneur who will act as a driving force to find the right market

3. Market Development: smart team needs to develop the market and the technology hand in hand and to identify the industrial clients interested in the technology

Two models of Deep-Tech Start-Ups:
Inside-Out Approach

Cheaper & More Efficient 3D LED Lamps

Smart Glasses Making the Invisible Visible

Making Waste Water Re-usable

Really Sustainable Packaging Solutions with Bioplastic Materials

Two models of Deep-Tech Start-Ups:
Inside-Out Approach

NEOS Surgery is an innovative and technology-based company dedicated to the research and development of surgical products through the creation, analysis, design, production and commercialization of innovative medical devices in the field of cranial and spinal neurosurgery which occupy a place in the existing niches of the current market and to respond to the needs of neurosurgery and neurosurgeons.

Targeted Markets:
Medical technology , Medical Manufacturer

NEOS Surgery has currently a cranial fixation product in market selling in more than 25 countries. Additionally is developing products as Minimally Invasive Spinal Implants (launching expected in 2019), Sternal Closure Device (launching expected in 2018) and Aneurysm Clip (launching expected in 2021).

HORIZON 2020

SME Instrument

Two models of Deep-Tech Start-Ups:
Inside-Out Approach

Green biochemistry spin-off aimed at becoming the first producer in the World to obtain renewable rubber

BIOSYN CAUCHO

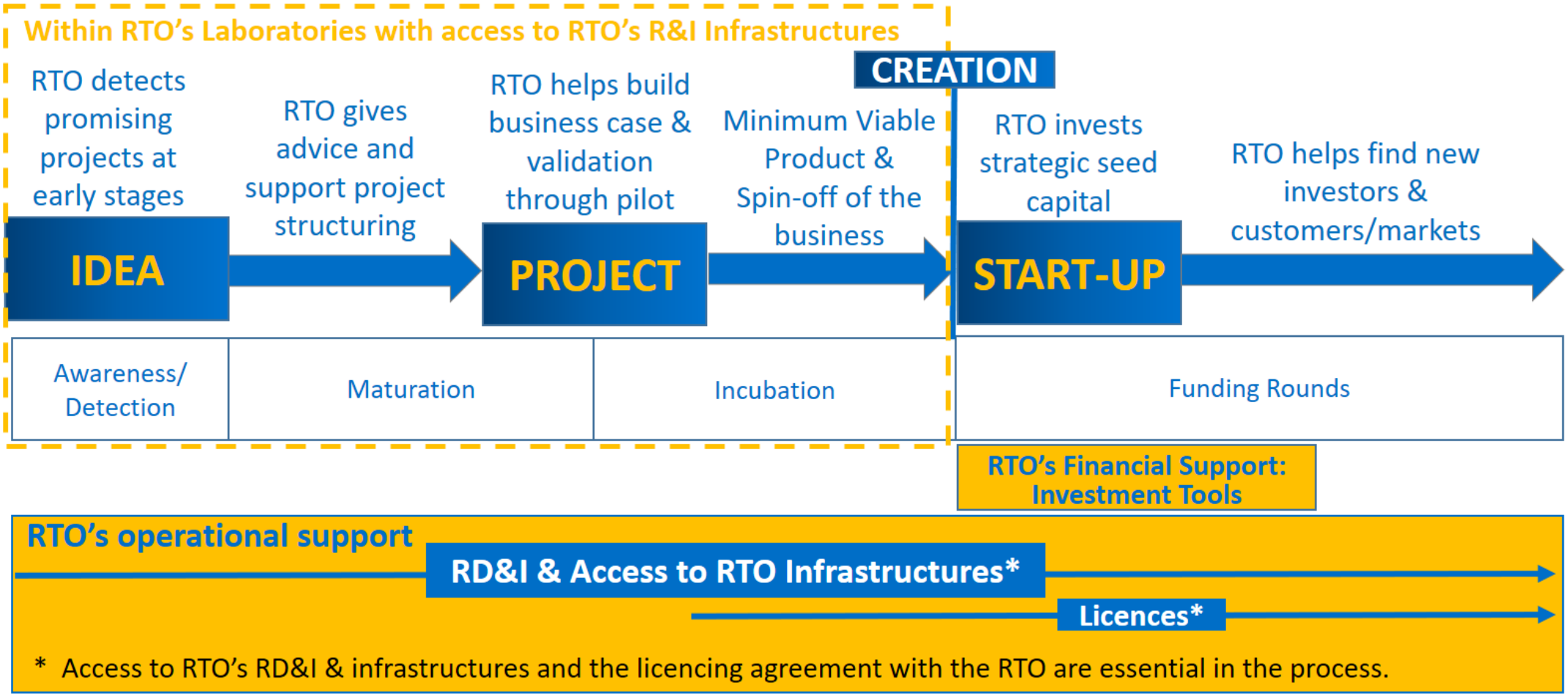
HORIZON 2020

SEVENTH FRAMEWORK PROGRAMME

RTO's In-House Support for the Creation of Deep-Tech Start-Ups

Isabelle Rivat
Interim Director, Technology Transfer Directorate, CEA

RTOs' Support System for the Creation of Deep-Tech Start-ups



Making Innovations Investment-Ready: RTOs' Operational Support for Deep-Tech Start-Ups

Deep-tech Start-ups are strongly linked with the lab from which they come from.

- They are "**innovation oriented**" => very often they need to continue R&I activities to keep improving their offer.
- Their activity requires **high skilled profile but not only technological**:
  - They need to improve their **knowledge and understanding of the market** so that the technology they carry meets a need.
  - They have to sharp a speech to **convince investors** that the project is viable and promising.

⇒ RTO are there to lend their support, throughout the maturation of the project.

⇒ **They provide technological, marketing, financial support to bridge the gap between a promising technology and the creation of a company**.

Making Innovations Investment-Ready: RTOs' Operational Support for Deep-Tech Start-Ups

RTOs' multifaceted support provided to their deep-tech start-ups at every step of the way is crucial to their success:

- Detection of promising projects at early stages
- Support to build the business case & implement the business plan
- Support for the validation phase through pilots and prototypes
- Access to in-house technological research infrastructures
- Transfer of strong Intellectual Property Rights
- Support to build smart teams with high-level entrepreneurs
- Staff detachment
- Financial support & advice: RTOs' label as due diligence process
- Connecting to industry and finding customers
- Legal support, IP issues assessment
- Advice on internationalisation
- Coaching to reinforce the technological basis of the venture

Bringing Science into Finance: RTOs' Financial Support for Deep-Tech Start-Ups

- RTOs sometimes also manage investment funds to leverage the risk and produce investable opportunities for "smart capital"
- With their deep technological knowledge and expertise, RTOs bring science into finance and act as due diligence for investors, helping them assess the technology value

Downsides for RTOs to Create Deep-Tech Start-Ups

- High commitment & resources required to ensure success in high risk environment: what return?
- Transfer of heads to the spin-offs: loss of high-level researchers with expertise & network
- Transfer of customers' connections

Supporting RTOs' to make their untapped technology potential investment-ready would deliver high value for society

How to Support RTO's Creation of Deep-Tech Start-Ups for High Societal impact in Europe ?

Leena Sarvaranta

Vice President EU Affairs, VTT Technical Research Centre of Finland

1. Creating a Pan-European Investment Mechanism for RTOs' Technological Infrastructures

- **RTOs manage complex large scale R&I infrastructures** supporting validation, piloting and prototyping: essential to the creation of deep-tech start-ups but too expensive for any single industry investment

VTT Technology Infrastructures

Support needed:

- **Create a pan-European investment mechanism for RTO's technological infrastructure**
- **Create a network of accessible facilities for RTO's spin-off development to reduce cost and speed up the prototype development**

2. Connecting RTOs' Deep-Tech Start-Ups Accelerator Units

- **Connect RTOs' tech start-ups and business accelerator units to create high efficiency-gains and contribute to building the ERA:**
  - Create a catalogue of RTOs' spin-offs and patents to boost collaboration
  - Share information on RTOs' patent portfolio to look at complementarities and create incentives for RTOs to commercialise another RTO's IP
  - Support for matchmaking managers with RTOs' business opportunities
  - Increase collaboration between RTOs towards investors by building a joint access for investors to the whole range of opportunities in RTOs, and creating a show-casing event of top 15 European investment opportunities
  - Develop a joint "innovation challenge" programme to encourage RTOs' technology experts to create deep-tech start-ups

3. Developing a Pre-Seed Funding Grant to Make Innovation Investment-Ready

- **RTOs' tech transfer via the creation of deep-tech start-ups requires continuity and high operational and financial investments,** at a time when equity is too risky and private investors don't invest at that stage.

Support needed:

- **EU grant funding scheme with a bottom-up approach focussing on the maturation and incubation phase**
  - target a few game-changing and market-creating deep-tech innovations with scale-up potential
  - make them investment-ready, increasing both the technological and commercial readiness-level.

4. Connecting Technological Experts to Entrepreneurs to Build Smart Teams

- **A smart team is crucial to attract industrial clients and investors**: essential success factor in deep-tech start-up creation.
- **Need to better connect technological experts to entrepreneurs with strong market insights**

Support needed:

- **Creating a pool of entrepreneurs/intrapreneurs with market insights looking for high potential business opportunities, and connecting it to a pool of untapped RTOs' technological potential.**
- Using a pool of seasoned "entrepreneurs" as mentors to support less experiences ones.

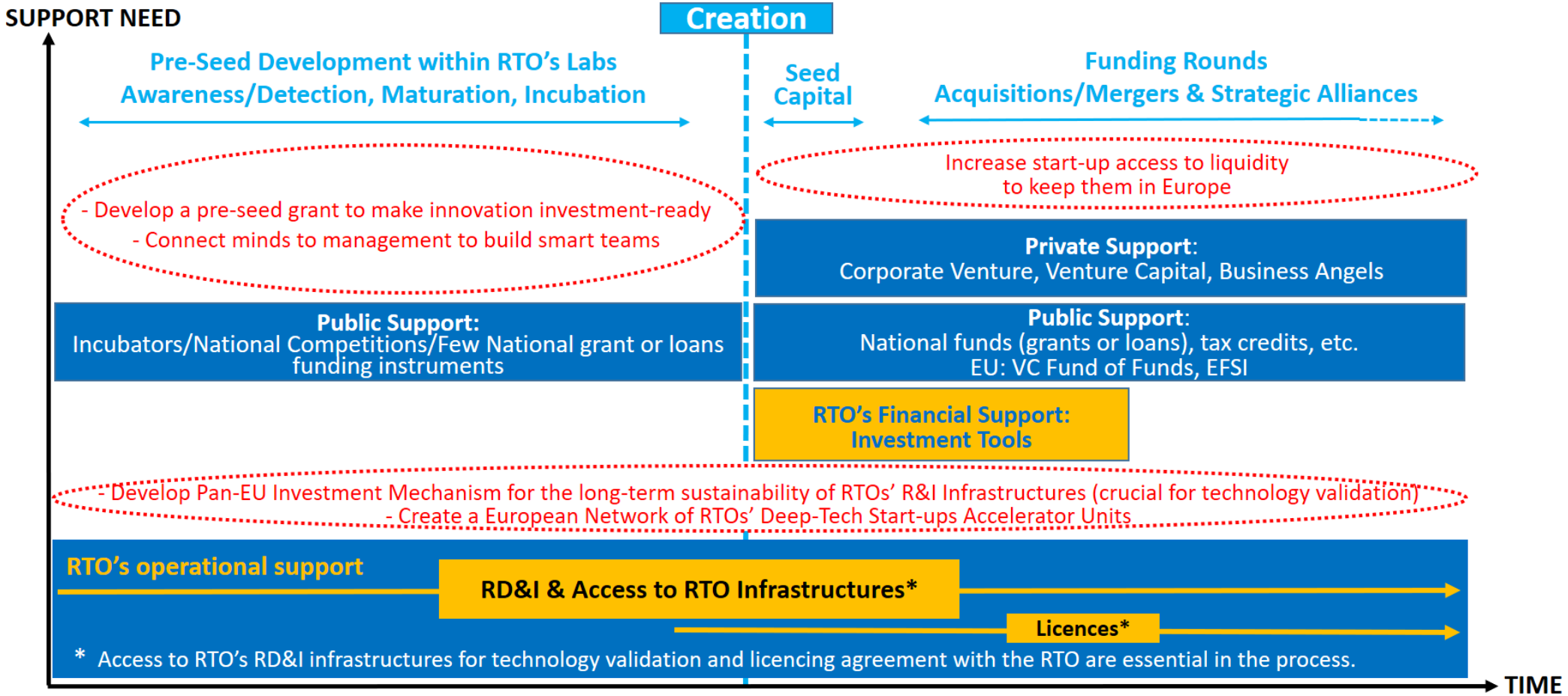
5. Access to Liquidity after the Start-Up Foundation to Keep Start-Ups in Europe

- After creation, many **EU deep-tech start-ups tend to move out of Europe** to find funding and less regulatory constraints
- **RTOs do not have the means on their own to provide the liquidity that these companies** require to stay in Europe

Support needed:

- **Increase public & private support to provide liquidity to start-ups at a later stage after their creation, to make the high investment they require worthwhile and create jobs & growth in Europe**
  - Stimulate seed and early round investors to work on a more European scale
  - Improve the regulatory framework in Europe to attract foreign investors from overseas (ex. Show-casing the top European investment opportunities with proven potential)

Support System for the Creation & Development of Deep-Tech Start-Ups



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EARTO October Events 2017

11 October 2017

- **Policy Event:** ***Towards FP9: Maximising R&I Impact to Ensure Europe's Position As Global Player*** – 15.00-18.30 at BIP Info Place

- **Innovation Awards** – 18.30-21.00 at BELvue Museum

12 October 2017

- **EARTO High-Level Debate at the EU Week of Regions & Cities:** *Cohesion Policy Post-2020: Inter-regional collaboration of Innovation Hubs* – 09.00-10.45 at Committee of the Regions Jacques Delors Building, JDE 51

REGIONS & CITIES | European Week Brussels 9-12 October 2017