

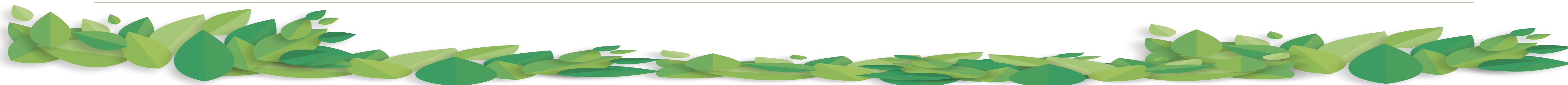
# Nano-futures: FlexFunction2Sustain and ESNA

Dirk Brueckner

John Fahlteich, KETMarket

Christian May, Fraunhofer FEP

2023 Sustainable Packaging Summit; Amsterdam, November 14





# Nano-futures: FlexFunction2Sustain and ESNA

14 November 2023

Sustainable Packaging Summit

**Dirk Brückner**

- Business Consultant
- Business Trainer & Coach
- multiple industries

**Dr. John Fahlteich**

- KETMarket GmbH, Managing Director
- background nanotechnology, thin film coating and Open Innovation

**Dr. Christian May**

- Fraunhofer FEP, Business Development
- ESNA Vice President Research; Coordinator Flexfunction2Sustain
- >25 years background in functional thin film coating





**FlexFunction2Sustain** boosts innovation for sustainable and smart plastic and paper products

- to reduce plastic waste
- get ready for the digital age

using  
**nano-functionalization of novel plastic and paper surfaces**



OPEN INNOVATION ECOSYSTEM  
FOR SUSTAINABLE  
NANO-FUNCTIONALIZED  
PLASTIC & PAPER  
SURFACES & MEMBRANES



# FLEX FUNCTION 2 SUSTAIN

- FlexFunction2Sustain project aims at creating an **Open Innovation Test Bed (OITB)** for nano-functionalisation technologies that enable sustainable and smart plastics and paper based products.
- FlexFunction2Sustain ecosystem supports innovative SMEs and industries by drastically reducing the time-to-market for novel concepts, ideas and products.

### Target markets




sustainable surfaces & smart membranes in packaging  
plastic & paper bio application  
optical films for security & design  
plastic films for architecture applications  
smart plastics in automotive application



Partnership




[www.flexfunction2sustain.eu](http://www.flexfunction2sustain.eu)

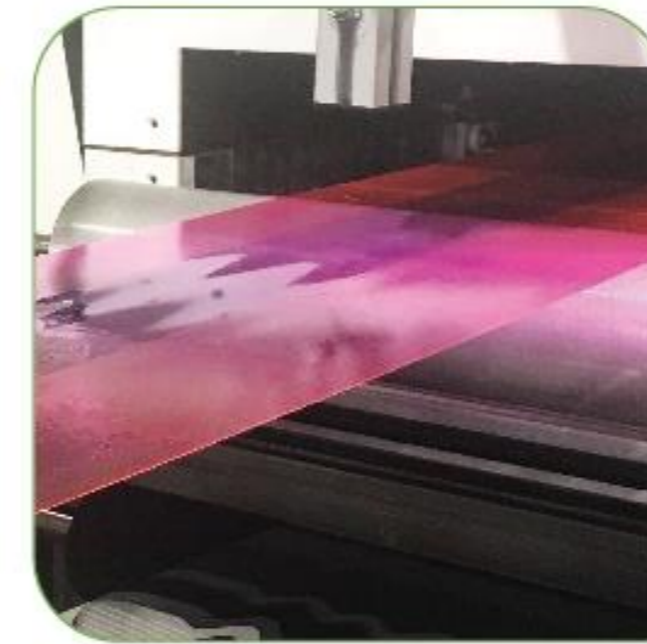
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n°862156 



# FlexFunction2Sustain Approach



**CIRCULARITY BY  
DESIGN**



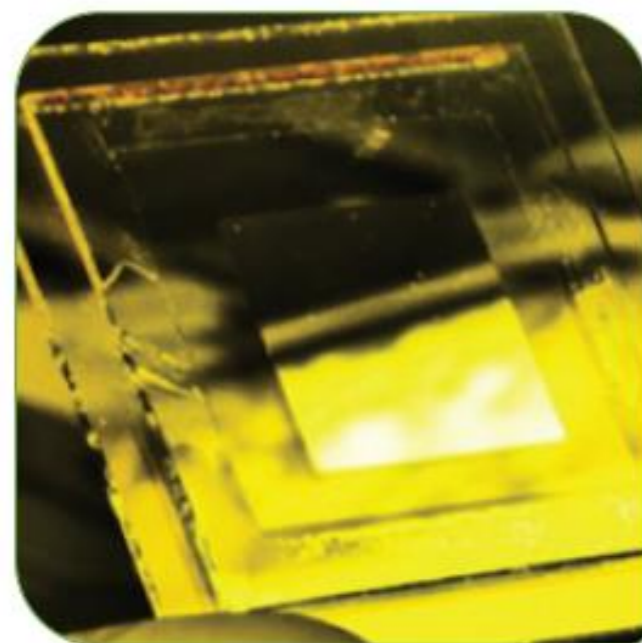
**ROLL-TO-ROLL  
ATMOSPHERIC  
PRESSURE COATING &  
SURFACE TREATMENT**



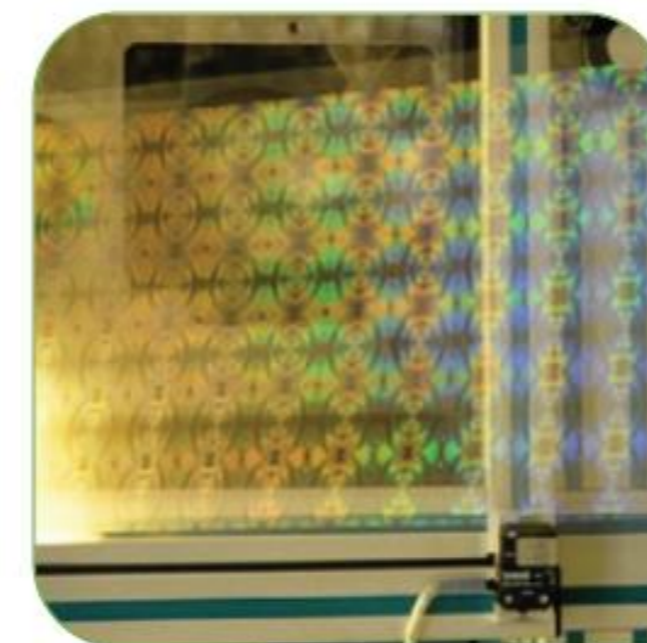
**PRINTED AND FLEXIBLE  
ELECTRONICS**



**VACUUM ROLL TO ROLL  
COATING AND SURFACE  
TREATMENT**



**FUNCTIONAL  
CHARACTERISATION  
AND APPLICATION  
VERIFICATION**



**ROLL-TO-ROLL  
NANOIMPRINT  
LITHOGRAPHY**



# Lab-to-Fab nano-surface treatment



Roll-to-roll vacuum coating



Atmospheric pressure coating,  
printing and surface treatment



R2R micro- and nanostructuring

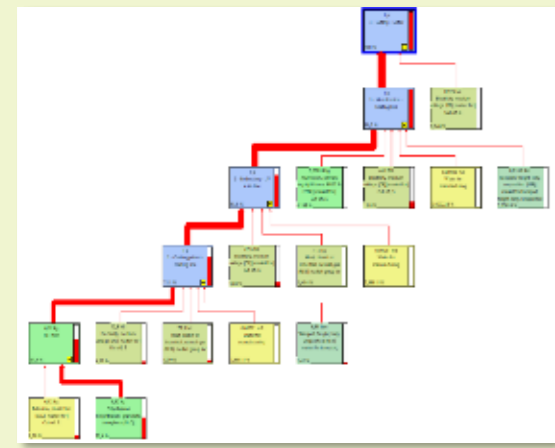


Printed electronics pilot lines

- from sheets to roll  
from about  $2 \times 2 \text{ cm}^2$   
up to  $> 1000 \times 0.6 \text{ m}^2$
- all major thin film technologies  
evaporation, sputtering,  
slot-die coating, corona  
treatment, nanoimprint  
lithography, ...
- small-series production  
capacity available  
 $10\,000 \text{ m}^2$  and more



# Circular Economy of Plastics



• Fully qualified LCA studies



**LCA**  
Life Cycle Assessment  
(IPC)

**Ecodesign**  
of products

• **Circularity by design**

Materials  
formulation and  
**processing**

High shear rate  
mixing  
(IVV)

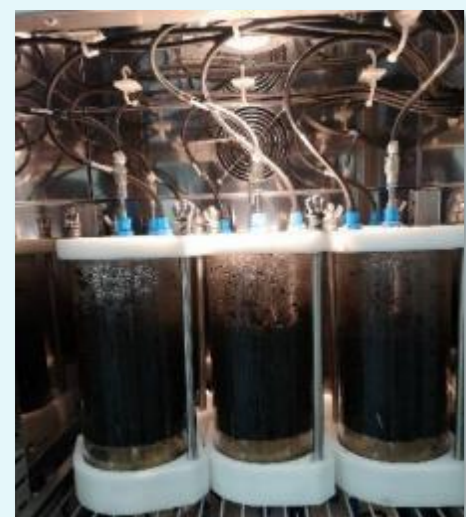
Slot-die  
coating  
(IVV)

METEOR<sup>®</sup>  
Pilot line  
(IPC)

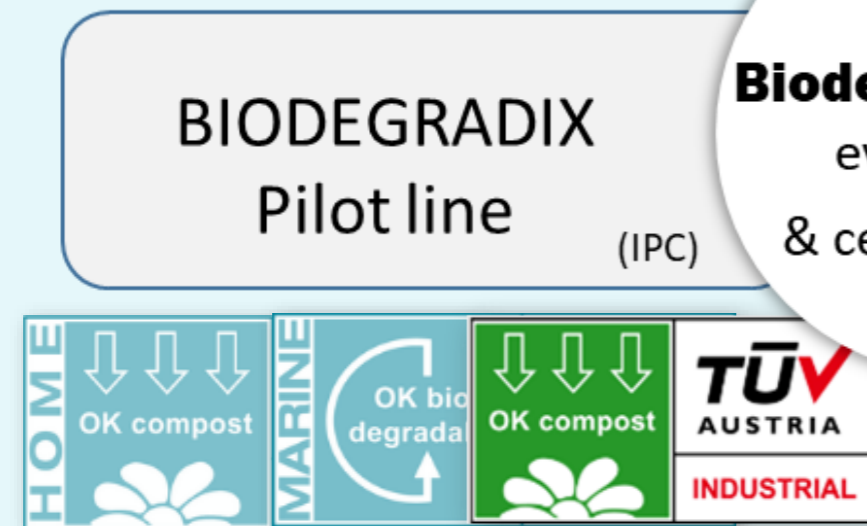
R2R UV imprinting  
Pilot line  
(JOA)



• Compounding, film extrusion, coating and nanopatterning



• Biodegradability assessment following TÜV Austria protocol for Industrial Composting



**Biodegradability**  
evaluation  
& certifications

**Recyclability**  
evaluation  
& certifications

REMIX  
Pilot line  
(IPC)

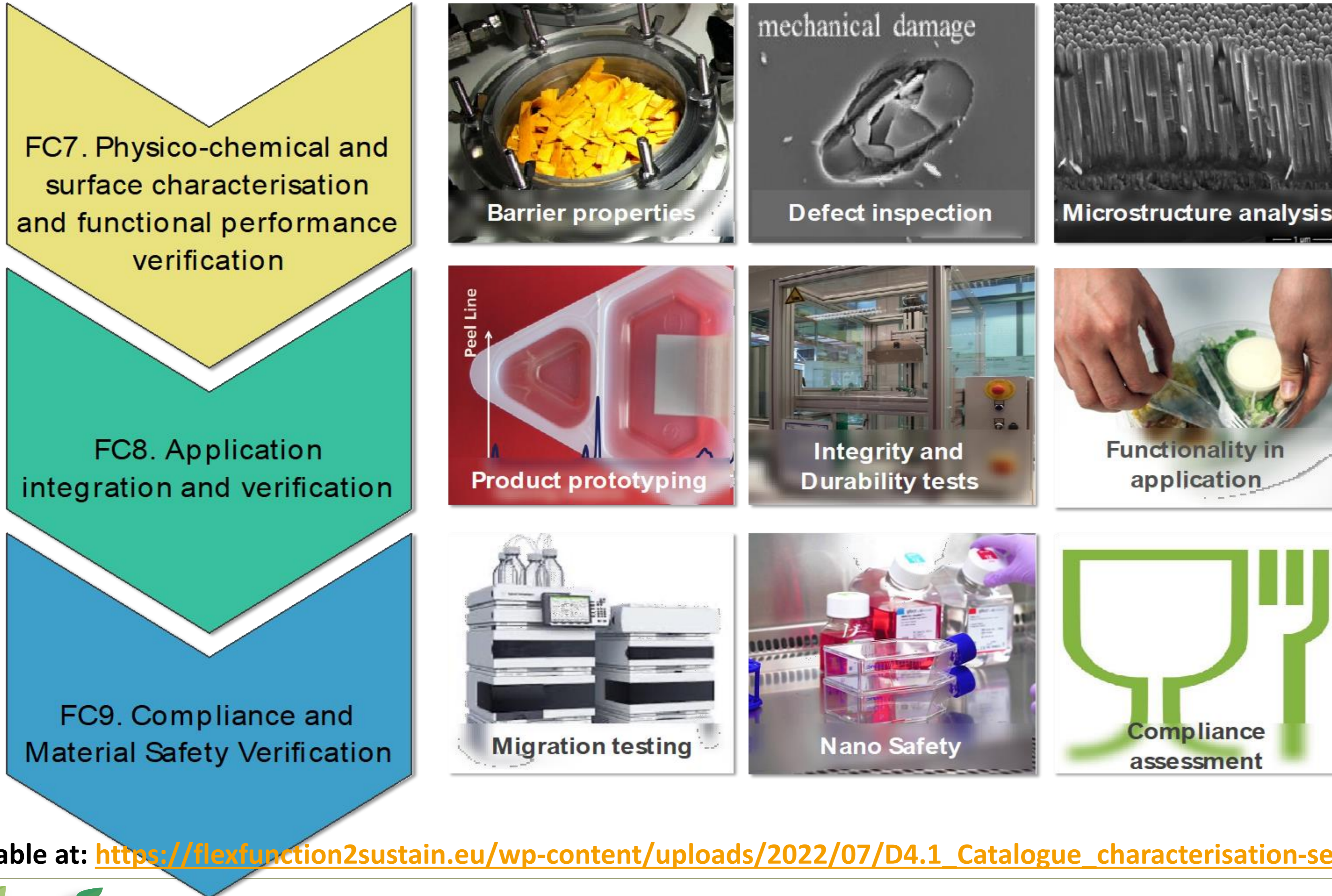


• Recyclability evaluation according to RecyClass protocol for PP films





# Characterisation & Verification Facilities



Catalogue available at: [https://flexfunction2sustain.eu/wp-content/uploads/2022/07/D4.1\\_Catalogue\\_characterisation-services.pdf](https://flexfunction2sustain.eu/wp-content/uploads/2022/07/D4.1_Catalogue_characterisation-services.pdf)

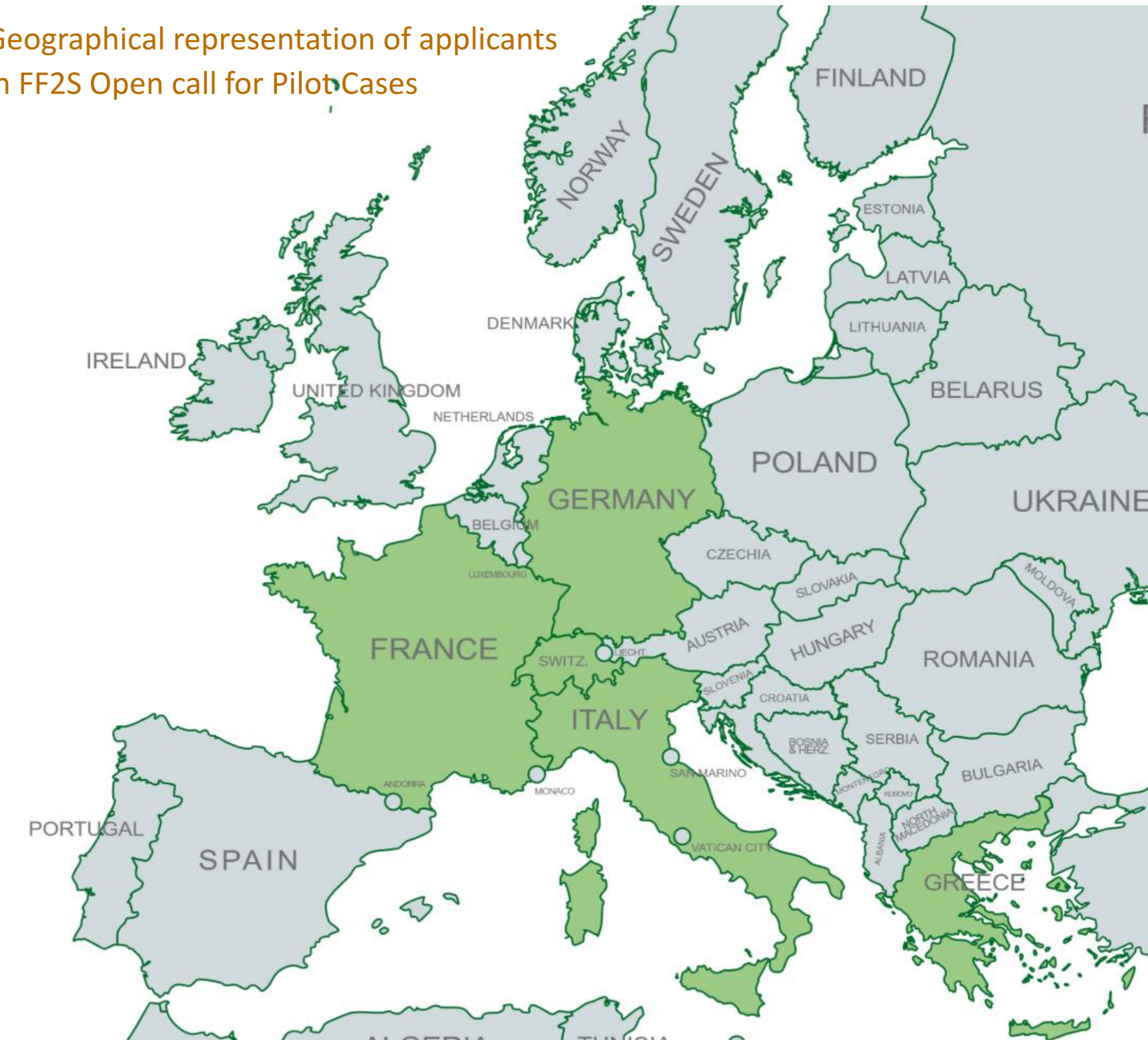


# OITB Pilot Case projects by Open Call



Acronym	Pilot case full name	Company	Country
<b>1st cut-off : 4 Cases selected</b>			
IDOLES	Improvement of durability by optimizing Low Energy Surface	Infrascreen	
FunFlex	Surface functionalization of Circular flexible food packaging	LEYGATECH	
SustainPack	Sustainable Packaging	HPX Polymers	
DCC	Dispersion Coating Compostable	Cartiera Rivignano	
<b>2nd cut-off : 5 Cases selected</b>			
ENLIGHTEN-MENT	Functionalisation of agricultural films with multi-season fluorescent dye to enhanced plant developm	CASCADE	
POSIDONIA	Hydrophobic & UV-protective films for Sustainable panels based on natural waste fillers and bio-base	PHEE PRIVATE COMPANY	
POSEIDON	Pouch made of cellulose for liquid container applications	ARJOWIGGINS	
BIOESS	Barrier Improved Ovtene for Environmentally Sustainable Strategies	ARCADIA SPA	
RECYBIB	Fully Recyclable Monomaterial Bag-in-Box	Smurfit Kappa Bag-in-Box	
<b>3rd cut-off : 8 Cases selected</b>			
AMB2022-004	AMB barrier film for thermoforming application	AMB Spa	
LOOPTUBE	Lamination of high barrier properties coated PE films on PE films for cosmetic tubing application	Albea Services SAS	
BB-BROF	Biobased high refractive optical film	Bruno Bock GmbH	
BAGS4RETORT	Mono-material plastic retort pouches	SDR PACK	
AGRILOOP	Recyclability of PE/EVOH and PE/PA agricultural films while keeping high gas barrier and mechanical	Groupe Barbier	
TORAYFAN+	OPP mono-material structure for food packaging	Toray Films Europe	
RESTO	REcycling & Sorting of plastics with Timegated Optical technology	SINBIOSYS SRL	
P.L.	PETLoop	TRANSPARENT PAPER	

Geographical representation of applicants in FF2S Open call for Pilot Cases





# Sustainable OITB for the time after funding period



- OITB Business & Sustainability Plan
  - Three level business model: Members ↔ association ↔ Single Entry Point(s) (SEP)
- OITB Structure: European Sustainable Nanotechnology Solutions Association ESNA
  - Non-profit French 1901 association as collaborative network of experts

- ESNA selected **KETMarket** as the SEP to offer Flexfunction2Sustain services
  - Handbook [downloadable](#)
  - [contact@esna-assoc.eu](mailto:contact@esna-assoc.eu)
  - [LinkedIn](#) (@ESNA)
  - [Twitter](#) (@ESNA\_EU)



European Sustainable Nanotechnology solutions Association



Part of   
project funded from the European Union's  
Horizon 2020 research and innovation  
programme under GA n°862156



# Open Innovation for Sustainable Packaging



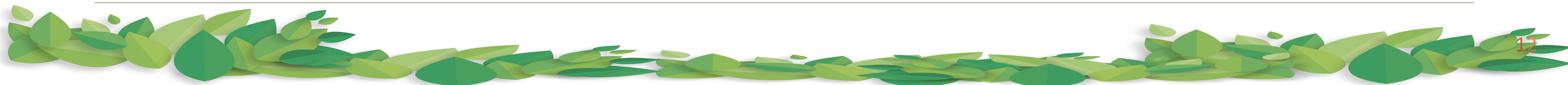
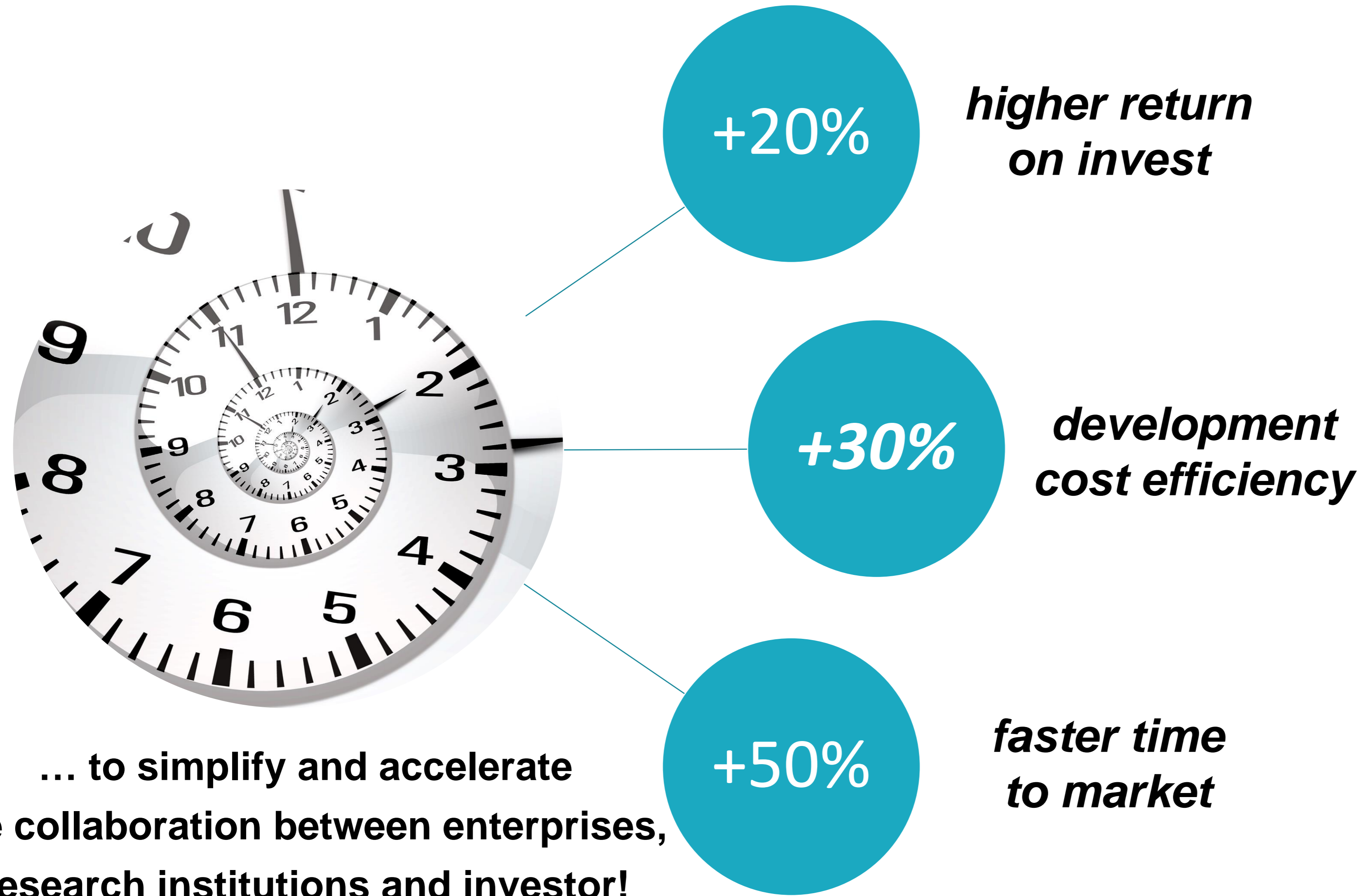
Dr. John Fahlteich

14<sup>th</sup> Nov 2023, Sustainable Packaging Summit, Amsterdam

**KET**Market<sup>®</sup>

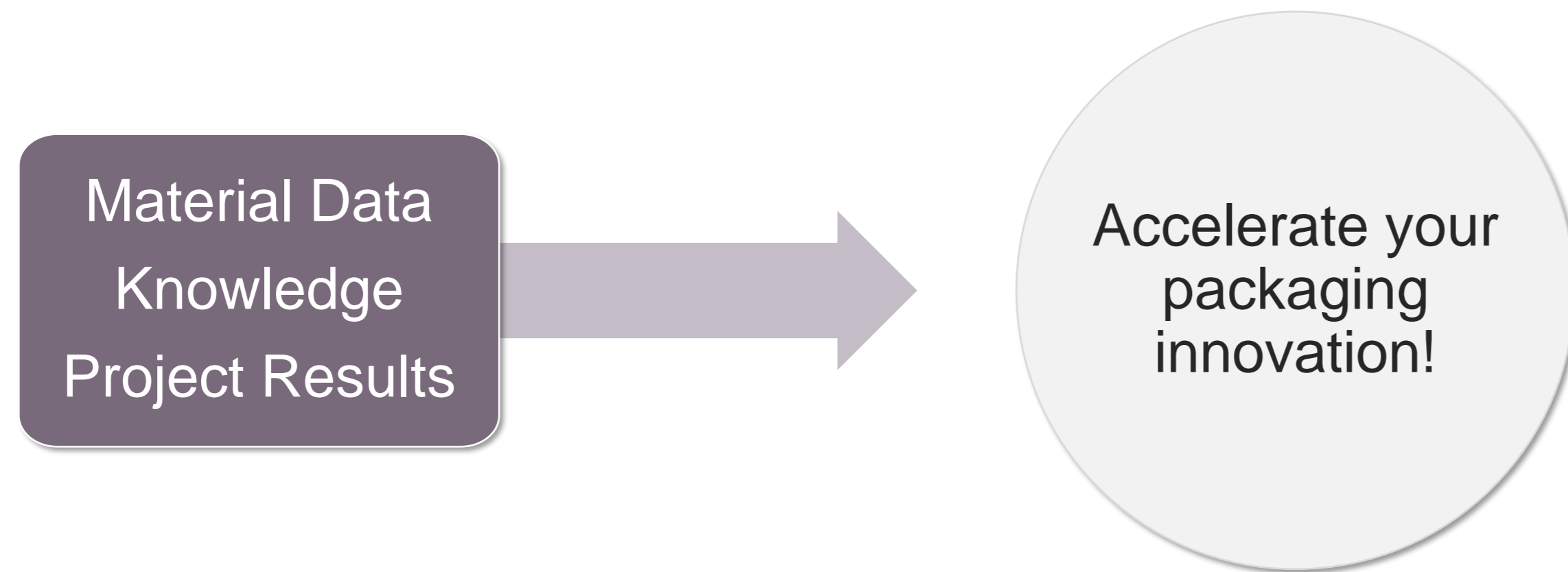


# KETMarket role



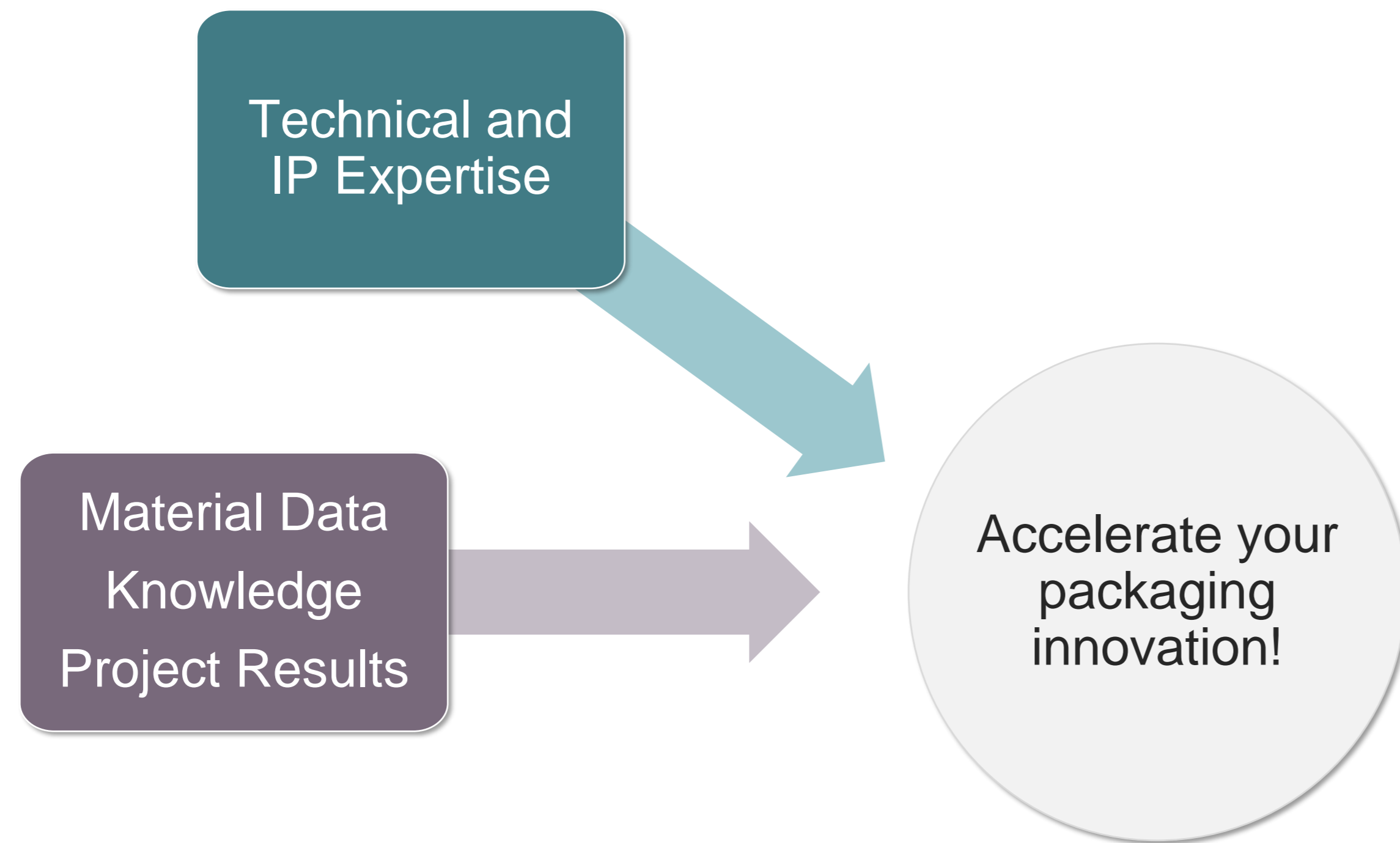


# Open Innovation Ecosystems give access to



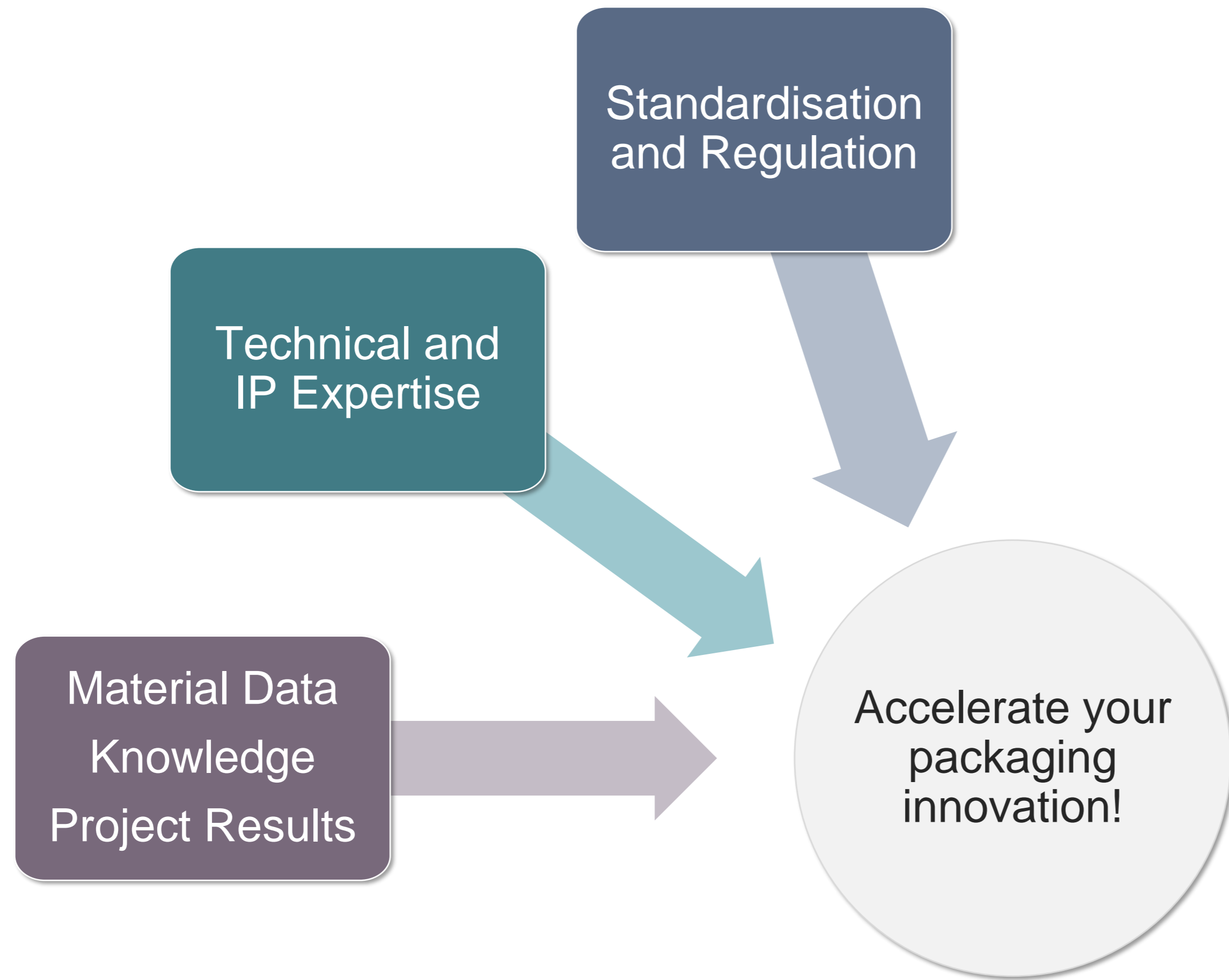


# Open Innovation Ecosystems give access to



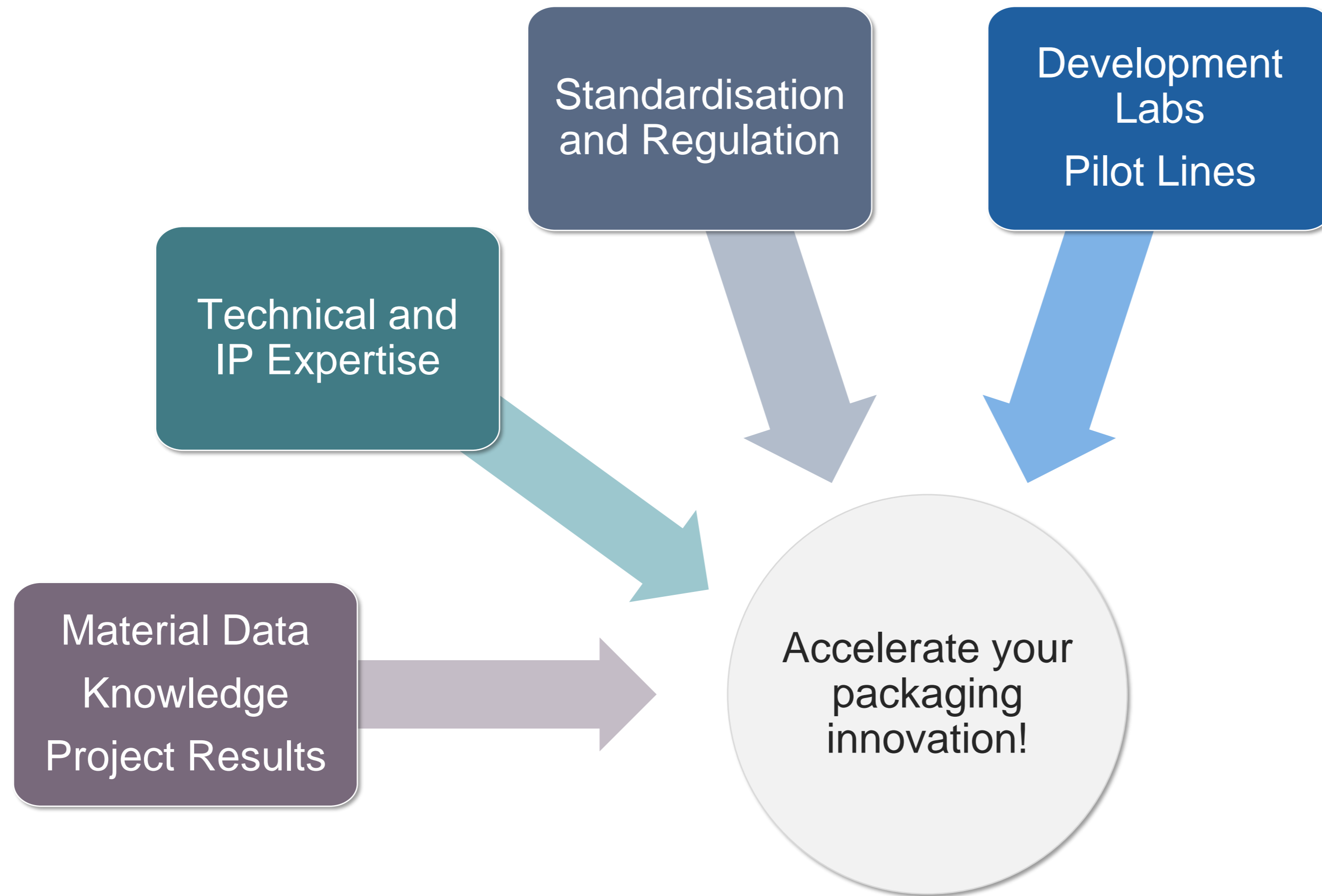


# Open Innovation Ecosystems give access to



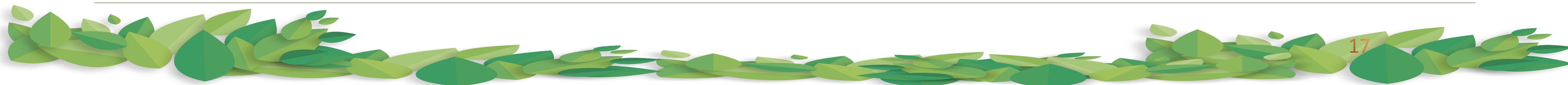
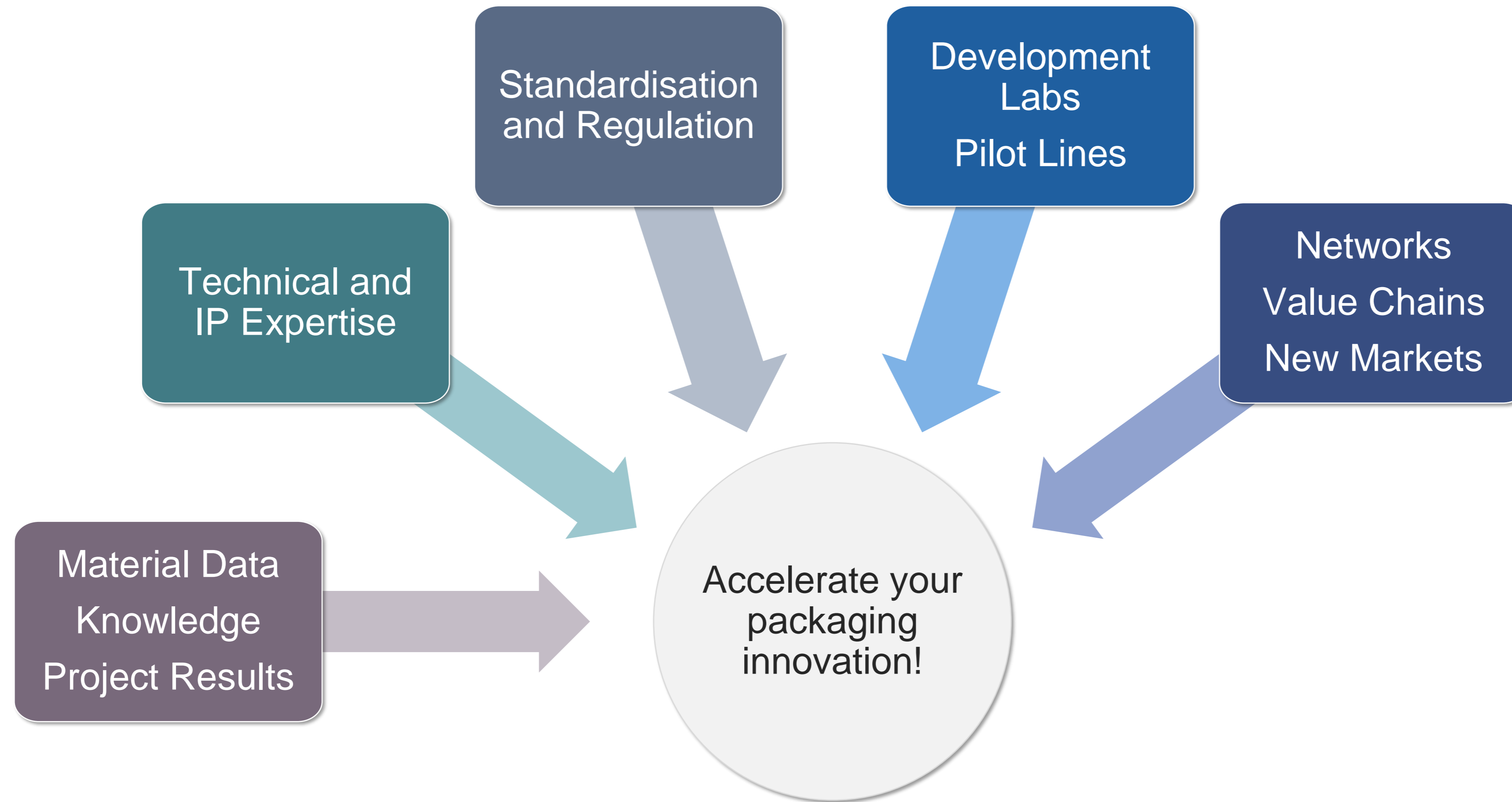


# Open Innovation Ecosystems give access to



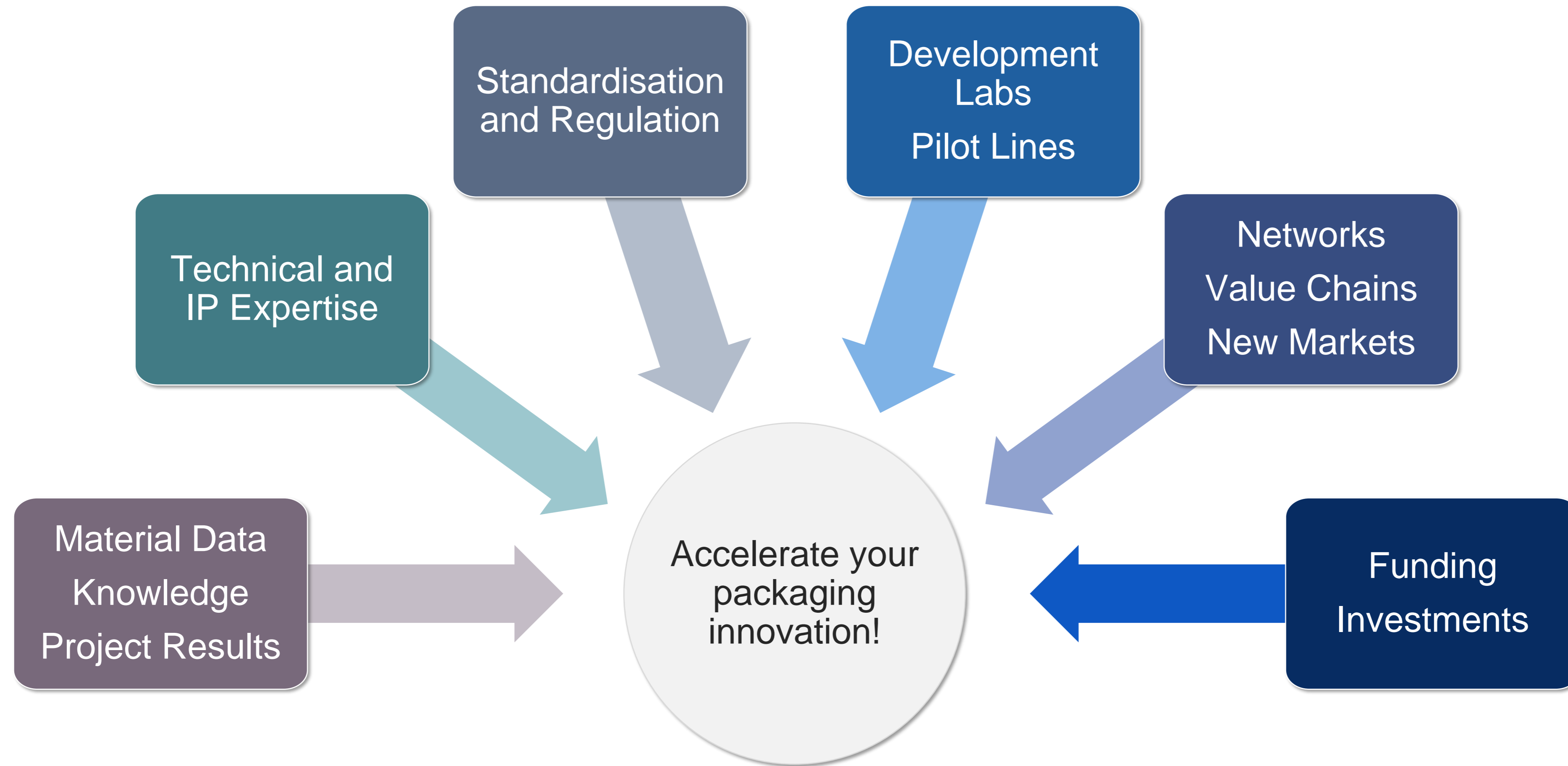


# Open Innovation Ecosystems give access to





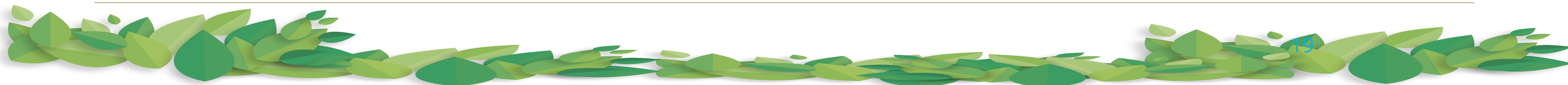
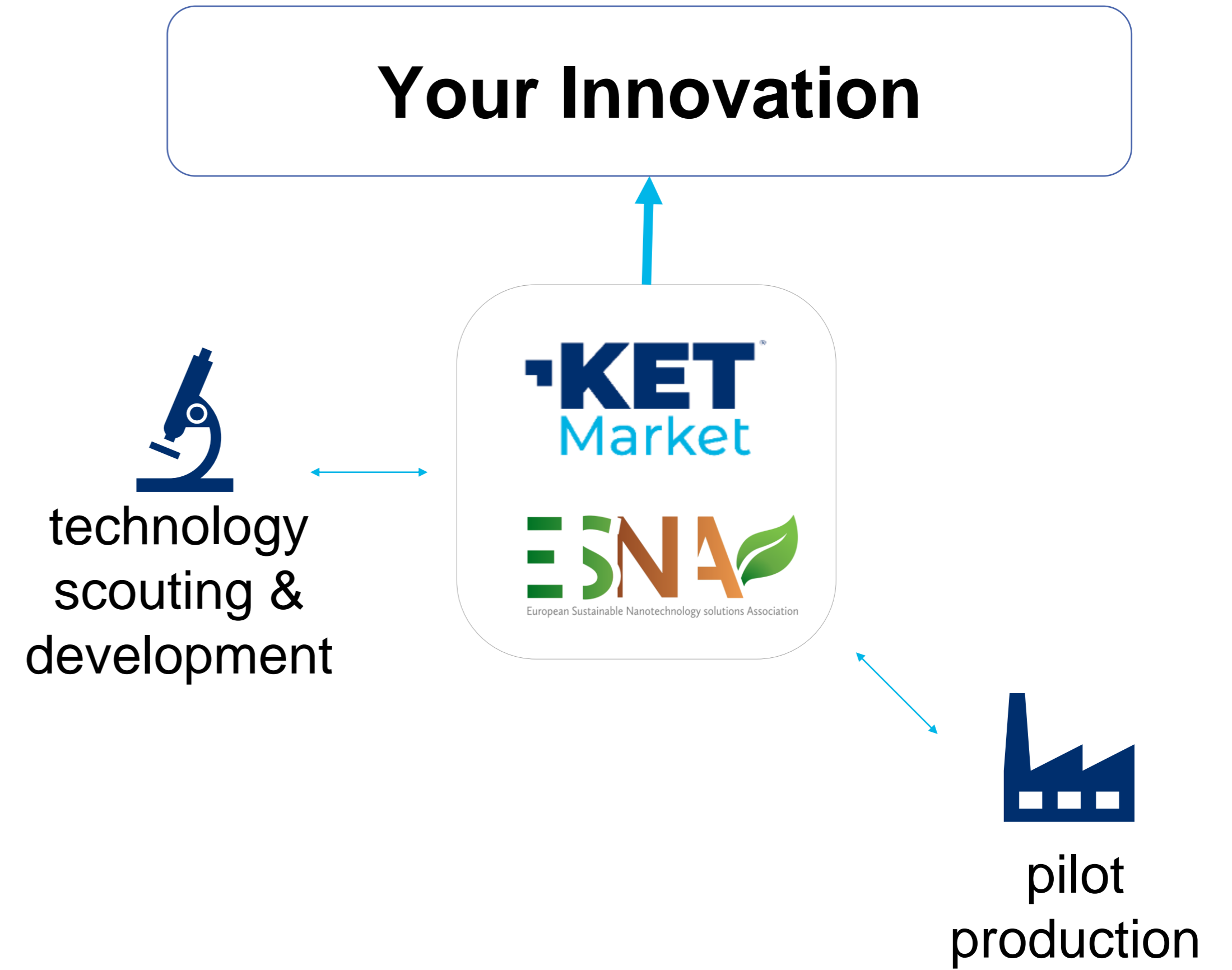
# Open Innovation Ecosystems give access to





# Benefits!

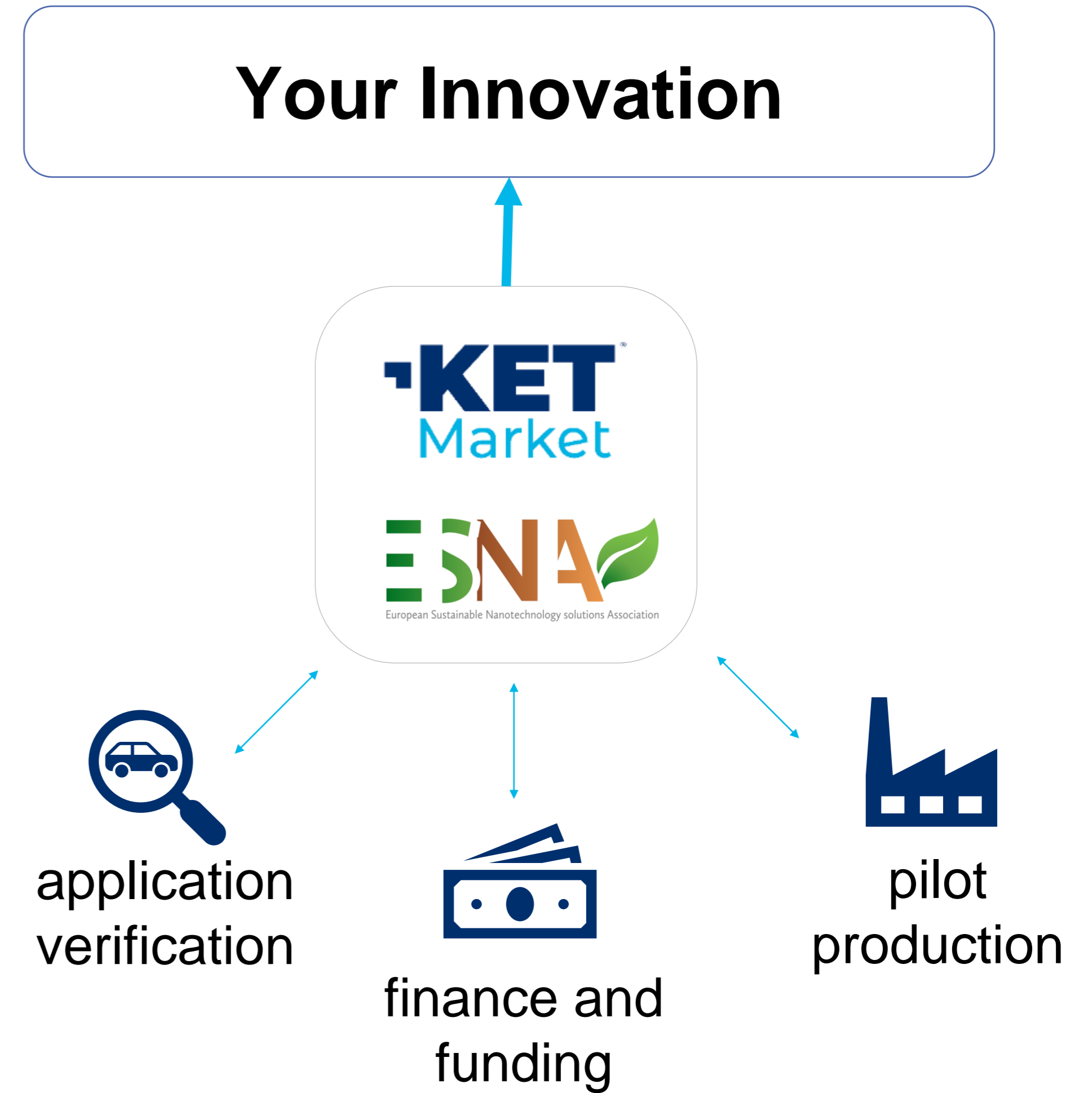
Access to innovation





# Benefits!

Accelerate innovation



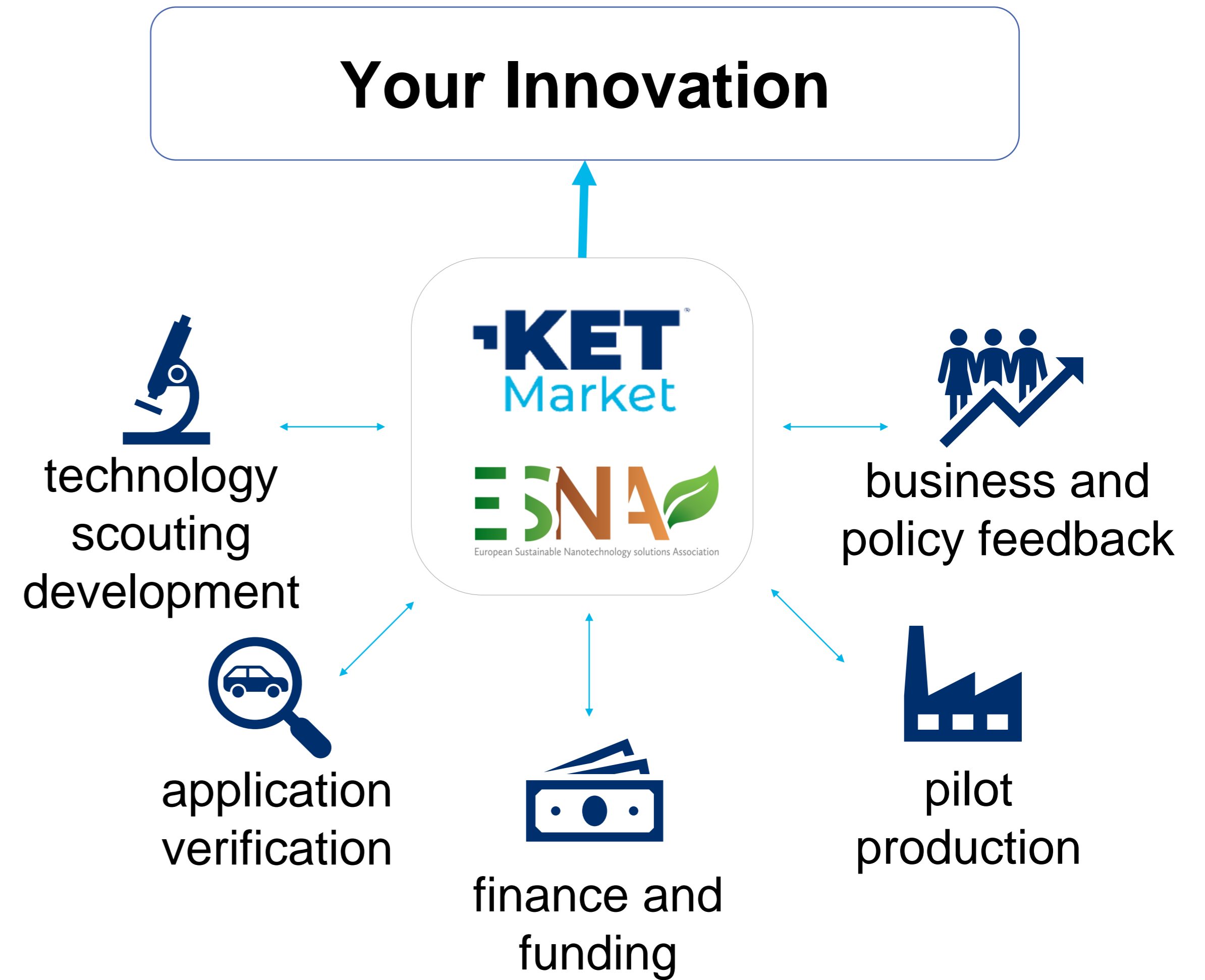


# Benefits!

Access innovation

Accelerate innovation

Innovation networks







**Book a free assessment to accelerate your packaging innovation by 25 to 50%!**

**Call our sales team: +49 151 58 46 22 99  
esna@ketmarket.eu**

**<https://ketmarket.eu/marketplace>**



**·KETMarket**

Dr. John Fahlteich  
john.fahlteich@ketmarket.eu  
Phone: +49 351 4275 67 37  
<https://ketmarket.eu>



# Business Opportunities

- Investments

- Pre-seed investments
- Partnership investment
- Angel investment
- Seed investment

- Resource Partners

- Capacities
- Structures (Labs, Incubators, etc.)
- Expertise
- Market access, etc.





## Capri Sun Use Case

# Recyclable drink pouches



### Objective:

Development of a „Recycle Ready Pouch“ made from mono-material to facilitate recycling; introduce a recyclable polymer laminate with sufficient barrier and light blocking properties (thin film nanomaterials) for mono-material drink pouches.

### Context

**Use Case Capri-Sun:** from the PET/Alu/PE multimaterial to the FF2S mono-PP pouch - Fully recyclable mono-materials drink pouches

*FF2S innovation: positive results from sorting and recycling trials*

### Our ambition





# Capri-Sun Drink with Multi-layer Pouch vs Recyclable Mono-material Pouch



Recyclability trials



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n°862156



## SONAE MC Use Case

# Paper-based food packaging

### Objective:

Development of paper-based food packaging that can act as an alternative to existing plastic packaging, ensure a better performance of paper packaging (when compared to existing paper-based packaging) and ensure a better recyclability/ biodegradability of paper-based packaging.

### Context

**Use Case SONAE MC:** Paper based fresh food packaging

*FF2S innovation: bio-based barrier coating on transparent paper*

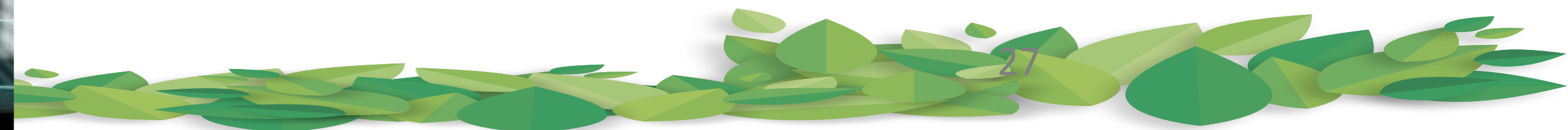
### Our ambition





# Examples

- Immediate Access to Expert Networks
- Future Development Consulting
- Strategy Consulting
- Technology Consulting
- EU regulation and funding influence
  
- Project related Services:
  - Due Diligence
  - Feasibility
  - Centralized (outsourced) project acceleration & coordination





# We packaged a sustainable structure that provides



**R&D expert  
access**



**Capacities in  
research and  
industry**



**The Network of  
expertise**



We packaged a sustainable structure package to



**Accelerate your time to market**



**Increase your return on invest**



**Reduce your development costs**



Investment

Participation

Profit

For your





Q & A

14 November 2023





# Next step

If you want or need to create a specific solution with nano-functionalized surfaces

If you want to accelerate the operations

Then we have the network, expertise and experience you need on your journey.



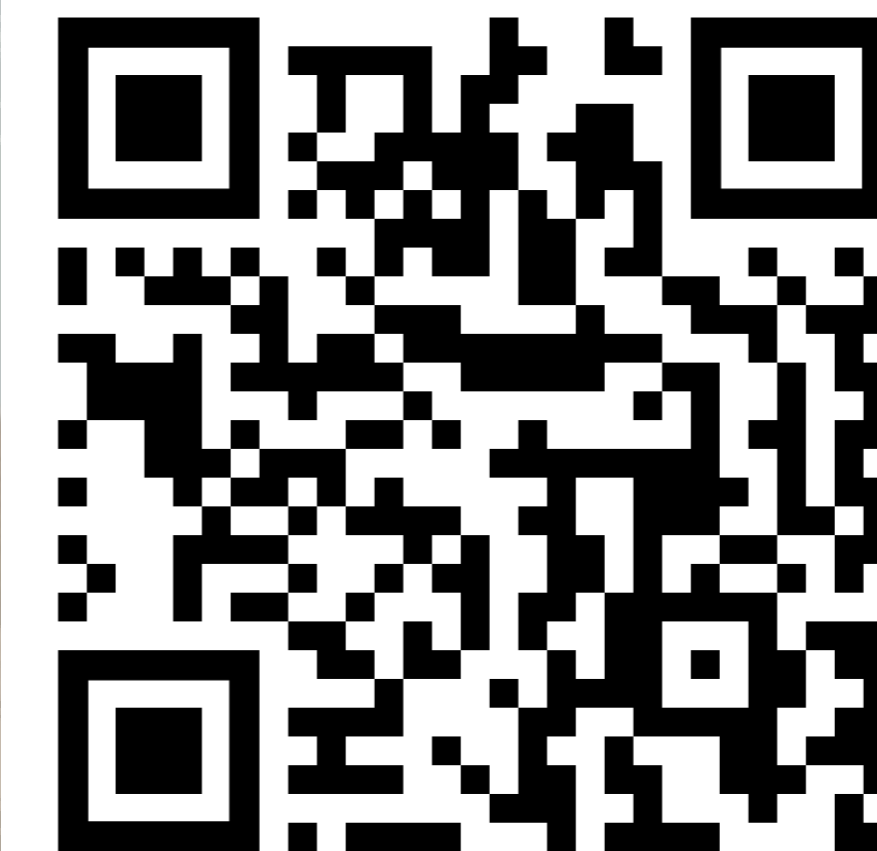


# Upcoming

- **4<sup>th</sup> Pilot Case Open Call**
- **Investor Relations Conference Q2/2024**



Get in touch for  
your access



Call our sales team: +49 151 58 46 22 99  
esna@ketmarket.eu

<https://ketmarket.eu/esna>

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n°862156, project FlexFunction2Sustain.



European Sustainable Nanotechnology solutions Association