Sinergie tra intelligence & finanziamenti UE per Open Innovation nella Fabbrica del Futuro

18.11.2020

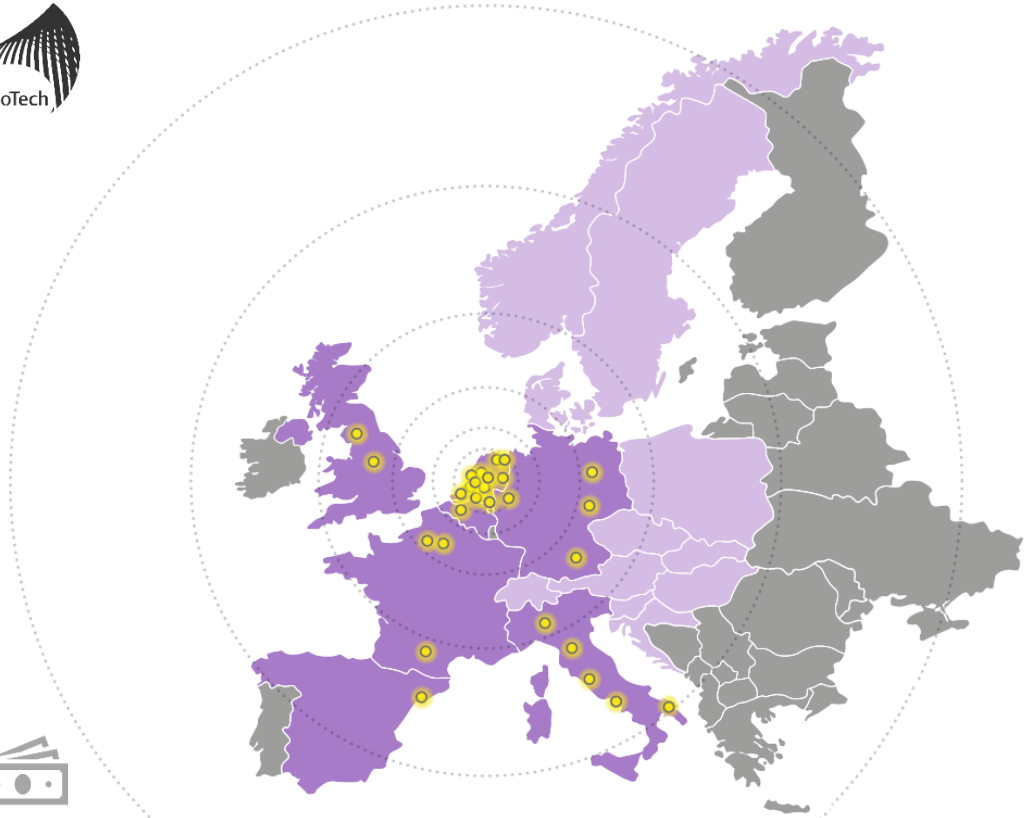
PNO INNOVATION

We make Open Innovation processes intelligence based, more focused, faster and funded

1. Focus your RD&I strategy with recent insights in technology, market and policy trends

2. Tap into external innovations and partners, by building collaborative innovation eco-systems to inspire your innovation process

3. Securing and funding projects through co-development, business modelling, grants, finance and realisation



Key facts

30+	7	400+	>500.000	25.000+	€ 1 Bn
Years of activity	Countries	Open Innovation projects per year	Funded projects and partners in our intelligence tool	Qualified RD&I partners	Total annual funding won

Agenda

1. Industry 4.0 turbulence

   The digital innovation revolution and why you need intelligence

2. Exploiting intelligence

   Main steps towards Industry 4.0 innovation

3. Strategic Positioning

   Knowing the trends in manufacturing industries digital innovation

4. Leveraging networks and data-driven innovation

   Who is doing what in the European innovation eco-system?

5. Exploiting EU funding

   Improve your ROI on R&D – an example

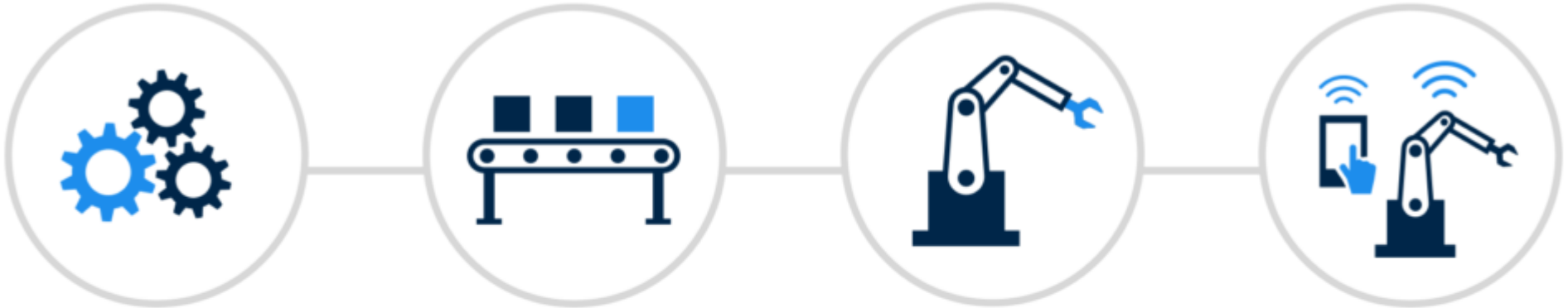
1. Industry 4.0 turbulence: The digital innovation revolution and why you need intelligence

WHY?


"We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten."

Industry 4.0

A revolution powered by emerging technologies, offering a better way to organize and manage all standard processes (prototyping, development, production, logistics, supply etc.) within the manufacturing industry.



Industry 1.0

Mechanization and the introduction of steam and water power

Mechanization
1784

Industry 2.0

Mass production assembly lines using electrical power

Electrification
1870

Industry 3.0

Automated production, computers, IT-systems and robotics

Automation
1969

Industry 4.0

The Smart Factory. Autonomous systems, IoT, machine learning

Digitisation
Today

Industry 4.0: analyses of data from both physical and digital sources

Industrial IoT devices	more devices—sometimes including unfinished products—will be enriched with embedded computing. This will allow field devices to communicate and interact both with one another and with more centralized controllers, as necessary. It will also decentralize analytics and decision making, enabling real-time responses.
Robotics tools and autonomous robots	robots will eventually interact with one another and work safely side by side with humans and learn from them. These robots will cost less and have a greater range of capabilities than those used in manufacturing today.
Big Data Analytics systems	the collection and comprehensive evaluation of data from many different sources—production equipment and systems as well as enterprise- and customer-management systems—will become standard to support real-time decision making.
AI and Cognitive systems	a combination of semantic intelligence (i.e., *machine learning, natural language processing, and ontologies*) and computational intelligence (i.e*. advanced mathematical techniques*) that are capable of automating routine decisions (an industrial age capability), and they bolster Industry 4.0 by generating actionable insights that help human decision makers deal with anomalies or other high-level, complex business decisions.
Augmented Reality	to support a variety of services, such as selecting parts in a warehouse and sending repair instructions over mobile devices. These systems are currently in their infancy, but in the future, companies will make much broader use of augmented reality to provide workers with real-time information to improve decision making and work procedures.

Why Innovation Intelligence?

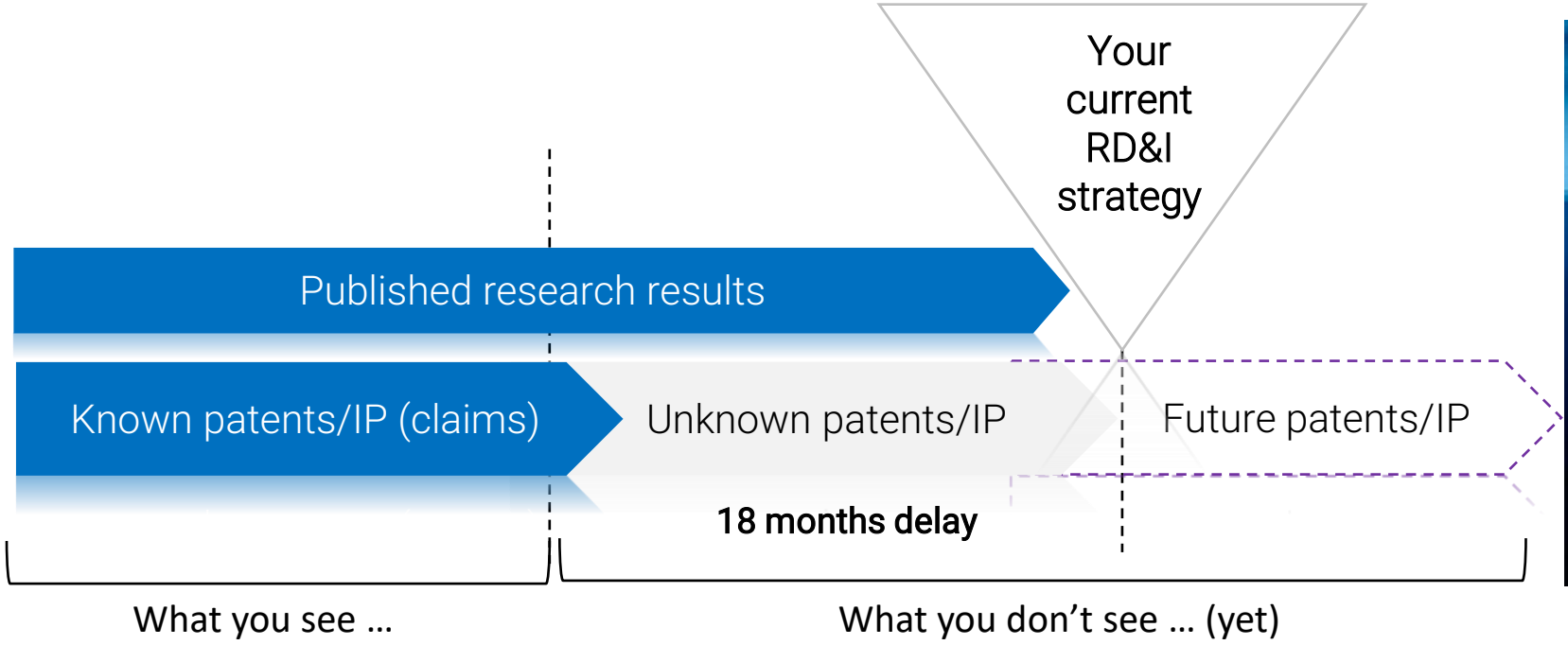
Stupid Innovation

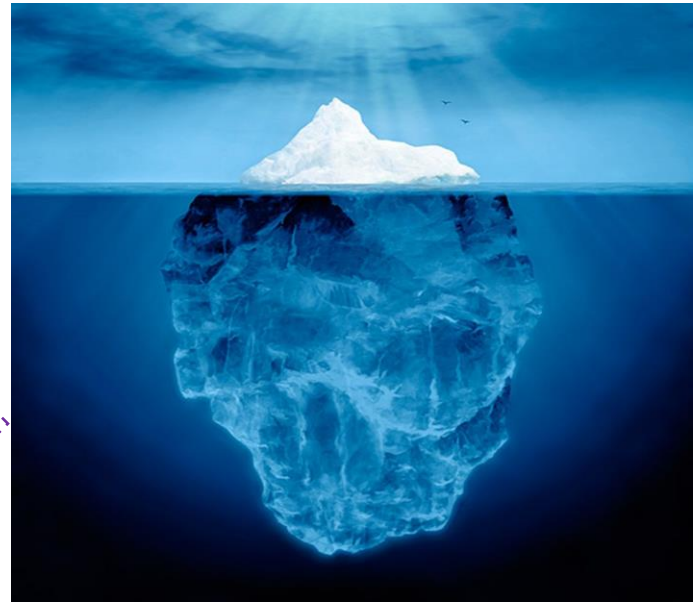
- According to European Commission and the European Patent Office **up to 30% of all expenditure in R&D is wasted on redeveloping existing inventions ***
- It was estimated that up to **25 Billion EUR is wasted each year in the EU in duplicating research and development work** already carried out elsewhere**.

**"Why researchers should care about patents" Report by the European Commission and the European Patent Office*

***CORDIS- QUICK SCAN - a European patent search service*
https://cordis.europa.eu/news/rcn/7027_en.html

INTELLIGENCE: External innovation should not only focus on patents, scientific journals and conference proceedings, but **also take R&D projects, and current alliances on the subject into account**.





Use previous and ongoing global publicly funded Research and Development projects and alliances as a window on potential future IP …

OUR KNOWLEDGE BASE & TOOLS

WEB

Qualified sources

URLs of interest shared by colleagues

or by constant monitoring

Documents & information

Internal and from partners

wheesbee

Powerful Search on aggregated sources and flexible tooling

Open Innovation

(Collaborative projects, technological challenges, etc.)

Patents [>60mln]

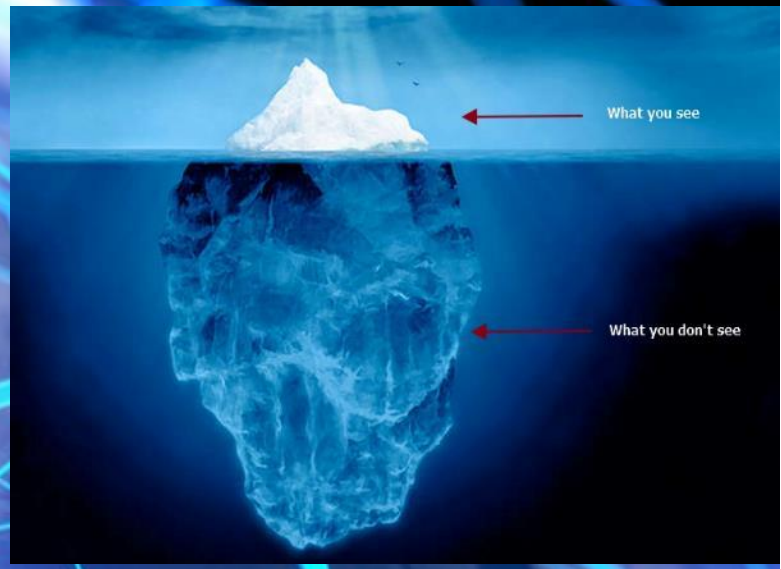
Scientific articles [>115mln]

Funded projects [>500.000]

- EU (FP6, FP7, H2020)
- National (UK, DE, FR, NL, SW,N,F)
- United States
- Canada
- Australia

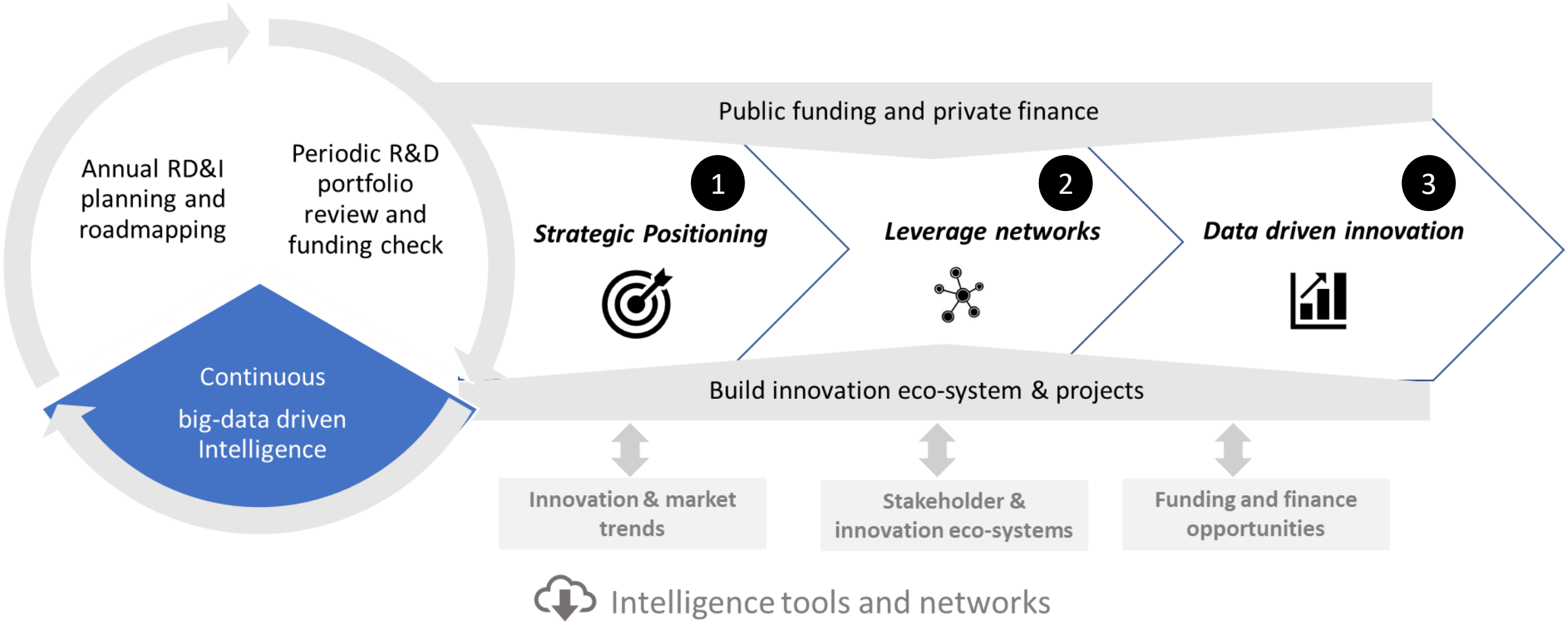
Grants [~200]

- EU
- National (UK, DE, FR, NL, BE, IT)
- Regional



2. Exploiting intelligence: main steps towards Industry 4.0 digital innovation

OPEN INNOVATION – A CONTINUOUS PROCESS



3. Strategic Positioning: The trends in manufacturing industries digital innovation

Strategic Positioning

Use available strategy documents to understand main trends and opportunities

Start with the problem, not the technology
Digital technology is just an enabler. Nobody should try to digitalize for the sake of digitalizing. It's just a tool kit that will help you achieve your objectives

Analyze trends
Public data is available to be analyzed and capture **key trends** of importance for your positioning. Patent data, scientific articles and publicly funded projects provide direction. Moreover, strategy and vision papers are regularly published that can help understand main directions.

Create a long-term strategy.
*What do you expect the market or operational environment to look like **in five years' time**, and **what's the journey your business is going to go on as a result?*** Industry can be disrupted very quickly; you need only look at what's happened to the world of retail over the past decade for evidence of that.

Think holistically.
Don't just focus on individual processes, consider how to improve the whole, rather than a small, isolated area.

Trends for Digital Transformation of Manufacturing industries

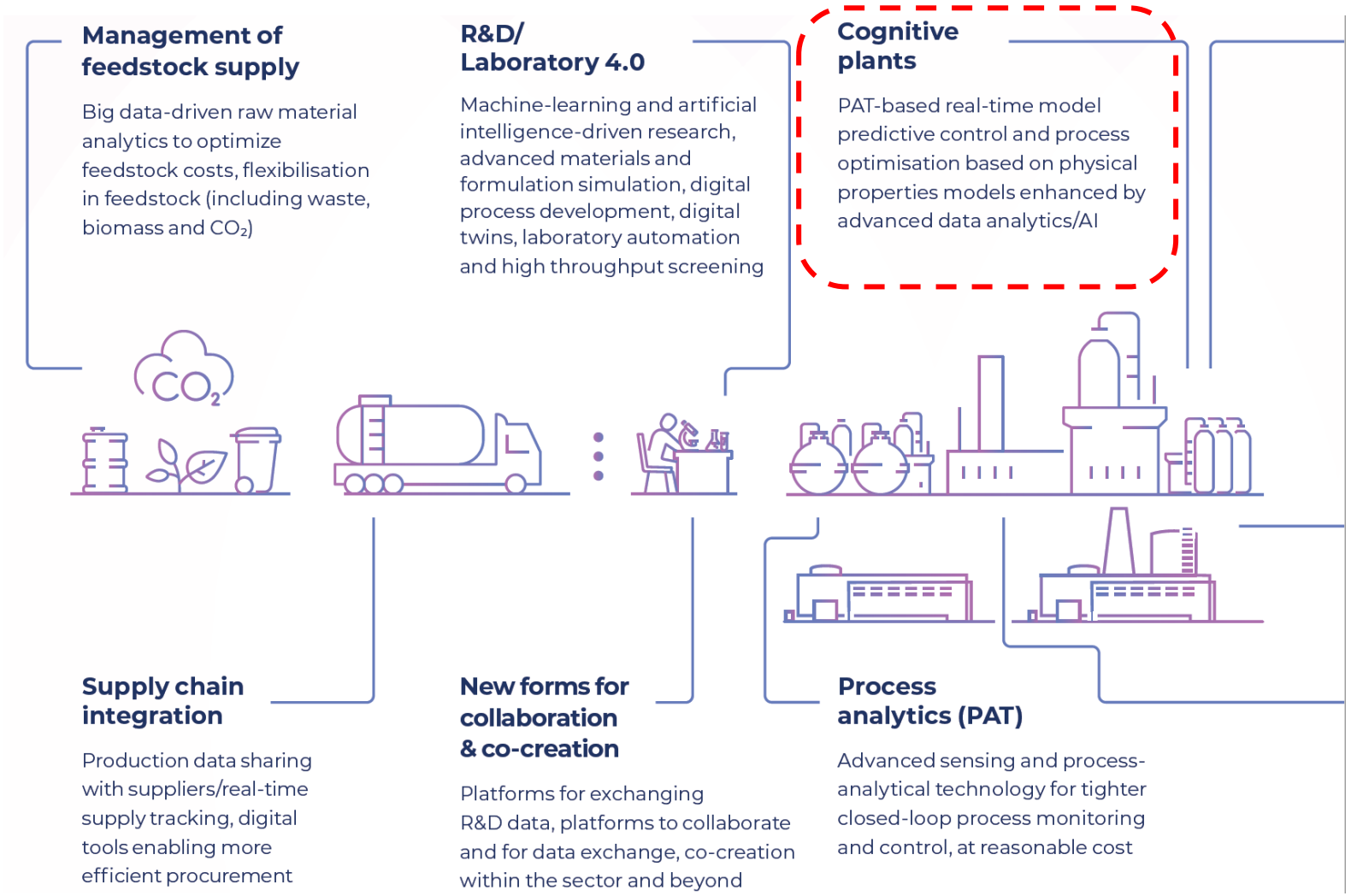
Which are the trends for in digitalization of manufacturing industries, and where the research will focus in the coming years? Apart from the **short-term market demands**, research will be driven by **main societal impacts**, which drive public funding, regulations, and citizens attention:

Study realized by PNO for the realization of the SIRA (*Strategic innovation research Agenda*) of the *European Manufacturing Industry*:

1. *Laboratory 4.0 – Digital R&D*
2. *Cognitive Plants: (Real-time) Process Simulation, Monitoring, Control and Optimisation*
3. *Advanced (big-) Data Analytics and Artificial Intelligence*
4. *Predictive Maintenance*
5. *Digital Support of Operators and Human-process Interfaces*
6. *Data Sharing Platforms and Data Security*
7. *Coordination and Management of Connected Processes at Different Levels*

Trends for Digital Transformation of Manufacturing industries

Digitalization is involving the full value chain:



Cognitive Plants: Process Simulation, Monitoring, and Optimisation

Operations need to understand process problems in a quick way to achieve operational excellence in complex processes:

1) **Process Modelling/Process Simulation/Model Predictive Control Context**: develop and integrate AI based models to enable 'auto-adaptive' processes in real-time. Ensure that data are highly reliable, therefore data generation (e.g. by sensors), data robustness, data quality, and data access need to be improved widely;

2) **Environmental performance optimization with resource and energy efficiency:** Real-time monitoring and optimization methods and indicators for resource efficiency with environmental implications, integrating LCA parameters in monitoring.

3) **Digital Twins/Digital Process Development/Plant Engineering:** Developing digital twins for digital engineering and plant operation management in an integrated way along the whole life cycle of a plant, covering product and process development, plant engineering, procurement, plant construction, commissioning, later operation, as well as plant flexibility, extensions and reuse for next generation and new products;

4. Leveraging networks and data-driven innovation: Who is doing what in the European innovation eco-system?

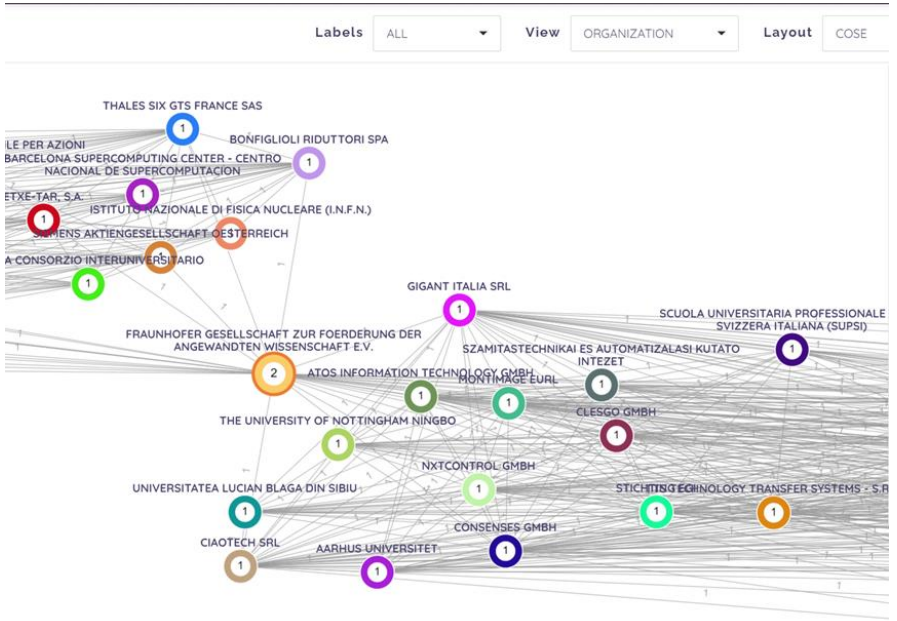
Leverage networks: Build a Collaboration Ecosystem

Select the right partners.
An innovative technology partner can help bring the agility your business needs, it can help prove the value of something quicker, can suggest alternative ways of working, can support new funding models and can even help share risk. All these factors are swiftly becoming business-critical.

Learn from others.
There's a tremendous amount of knowledge out there, supported by reference material and case studies. Build yourself a network to understand who has done it before, learn from their mistakes, and – if possible – work collaboratively and share ideas.

Innovate through strategic partnerships.
You don't need to possess all the skills, and you can focus on your core competencies instead of trying to learn everything from scratch. Benefits are generated for all the businesses involved. It's almost as if you are operating as an ecosystem, an environment that is beneficial for everyone.

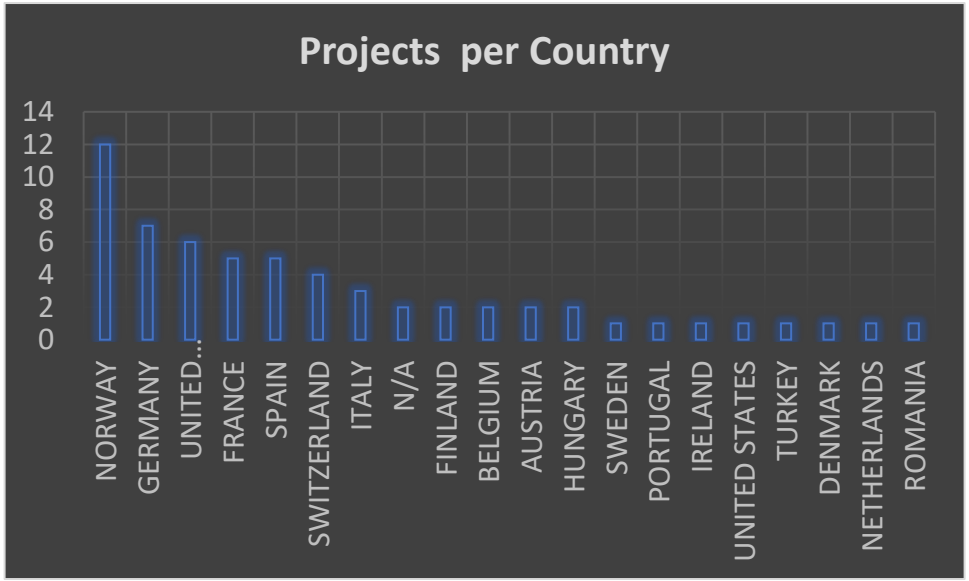
Map your innovation eco-system: example on Digital Twins



"Up to 30% of all expenditure in R&D is wasted on redeveloping existing inventions"

Digital innovation in machinery – Digital Twins

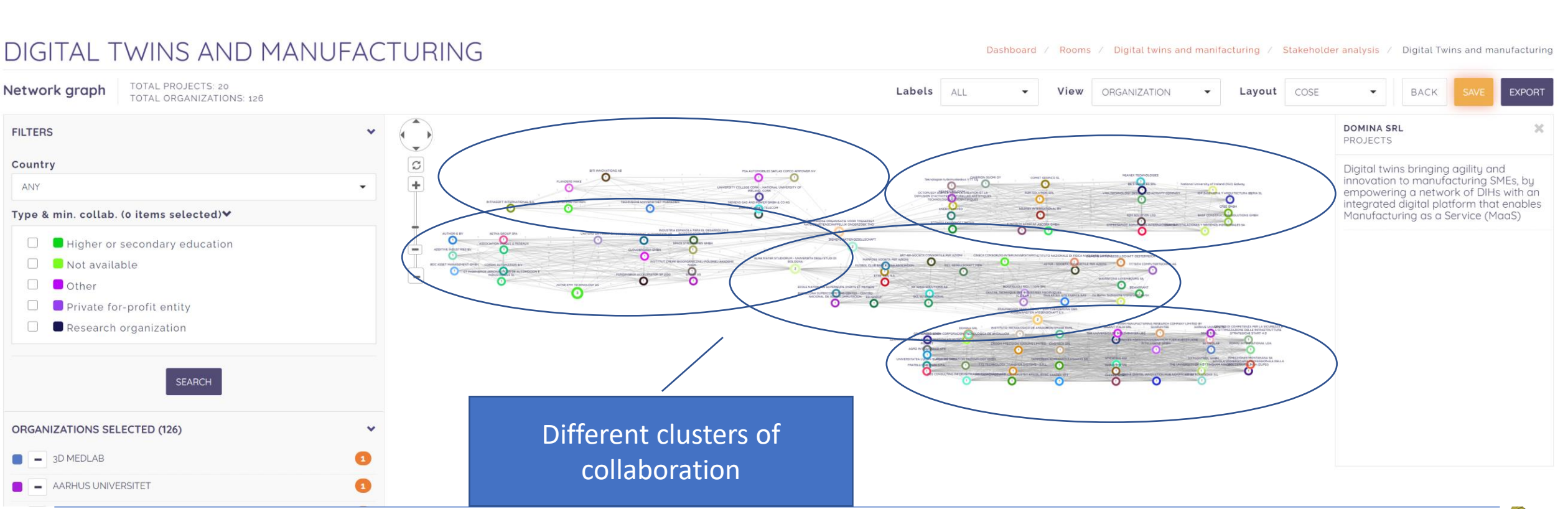
There are ***> 89 projects on manufacturing and digital twins***. Norway is the most active country, with SINTEF one of the most active research centers:



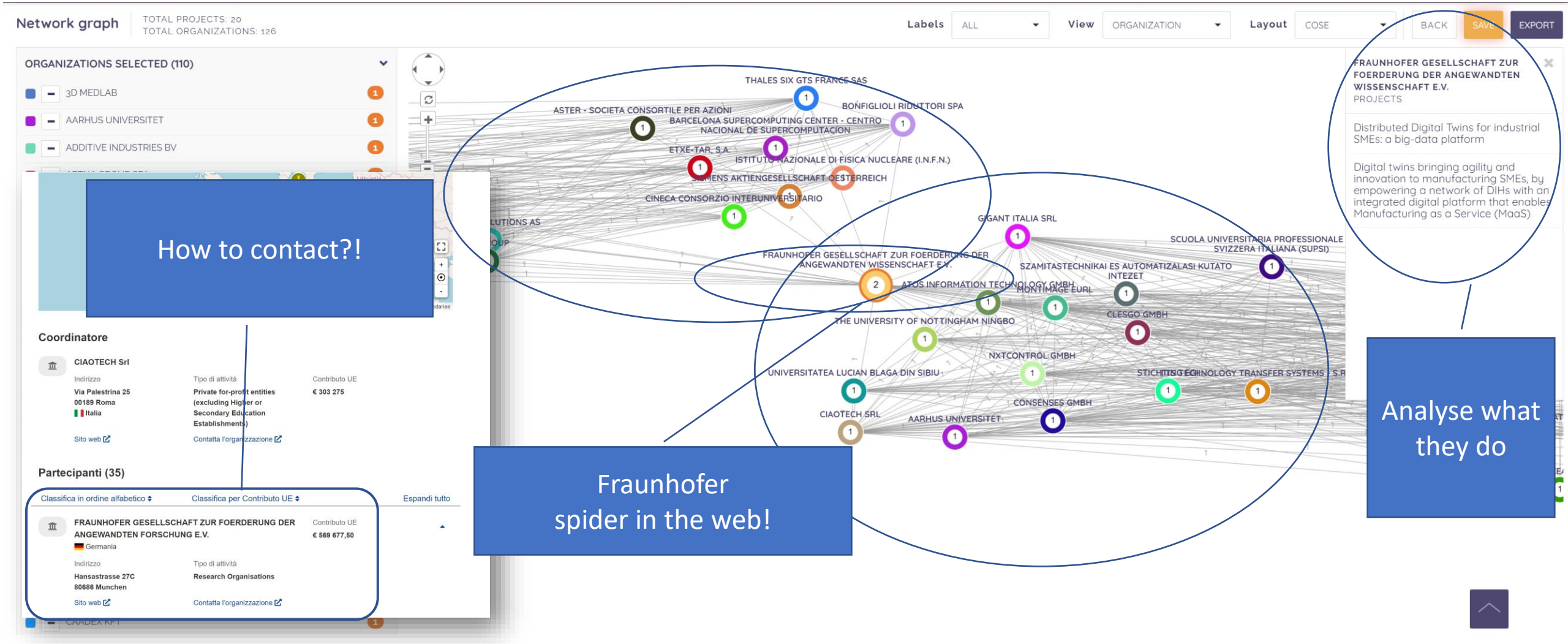
Example of interesting project: Umbra Reality Capture (Finland): *Entire world will be modelled as a three-dimensional digital twin. First step is to 3D scan the world into digital model through laser scanning and photographic 3D reconstruction. In this project we research methods for turning the scanned data into an efficient cloud-based 3D model and database. Machine learning methods are researched for improving the quality of the scanned data.*

Digital Twins & Manufacturing: Mapping the eco-system

Digital Twins/Digital Process Development/Plant Engineering: Developing digital twins for digital engineering and plant operation management in an integrated way along the whole life cycle of a plant, covering product and process development, plant engineering, procurement, plant construction, commissioning, later operation, as well as plant flexibility, extensions and reuse for next generation and new products;



Digital Twins & Manufacturing: Zoom-in and analyse

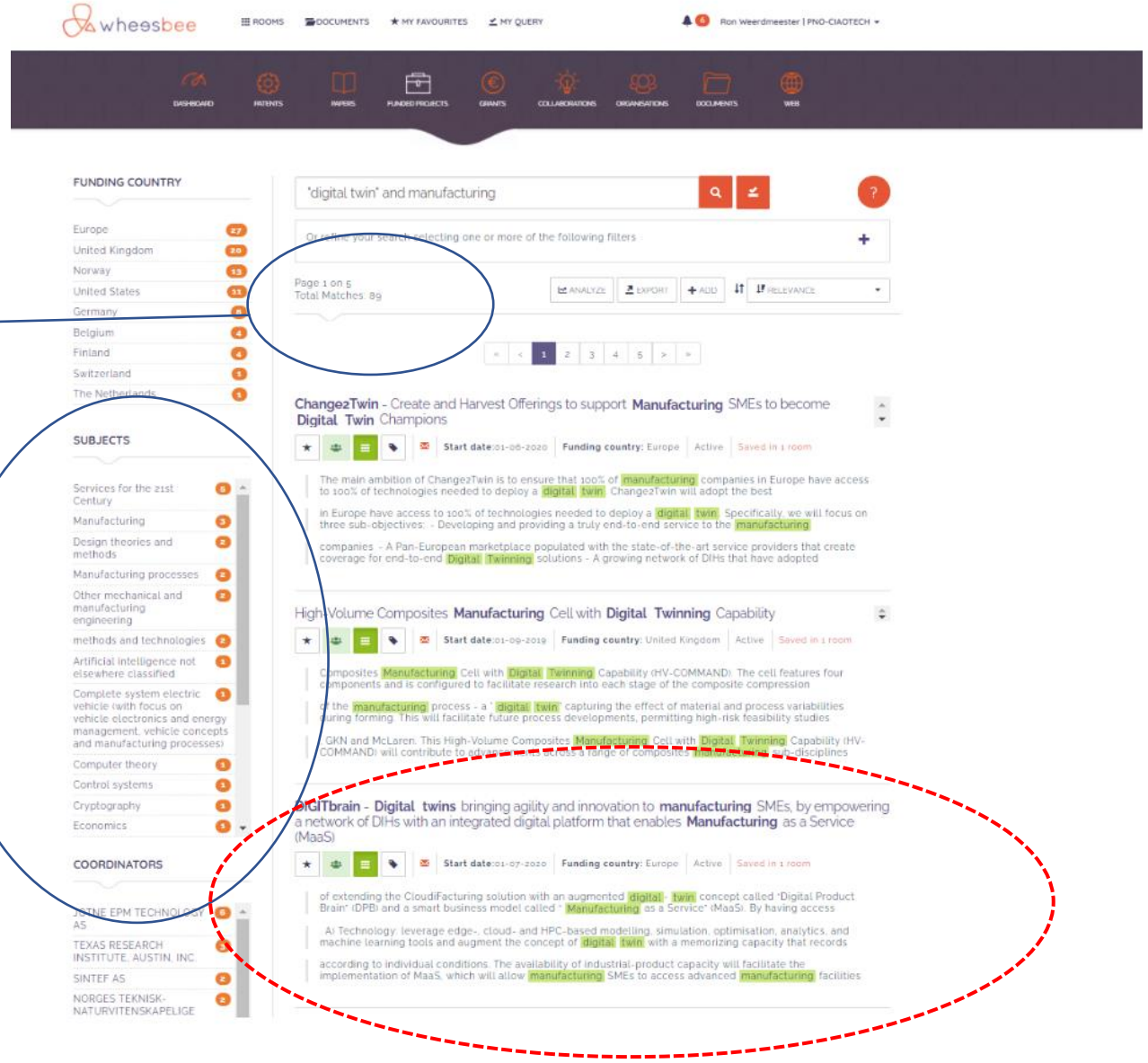


Digital Twins & Manufacturing: Get inspired!

Much more inspiration: 89 projects with 126 unique European organisations

Multiple topics to investigate further e.g.

- Design theories and methods
- Artificial intelligence
- Cryptography
- Instruments, sensors and detectors
- Optical technologies for productrion
- etc



5. Exploiting EU funding: improve your ROI on R&D – an example

DIGITbrain – Digital twins bringing agility and innovation to manufacturing SMEs, by empowering a network of DIHs with an integrated digital platform that enables Manufacturing as a Service (MaaS)

Funding programme: H2020 - DT-ICT-03-2020
Budget / Funding: €9,392,812.09 / €8,340,511.48
Duration: 42 months (July 2020 – December 2023)

Main partners (name and industry):

- Ciaotech – PNO (Coordination)
- Fraunhofer (Digital twins)
- ATOS Germany (AI, DT orchestrator)
- DFKI (Artificial Intelligence)
- ITAINNOVA, Innomine, Irish Manufacturing Research, DIGIT, SMAC, START 4.0 (Digital innovation hubs)
- SUPSI (marketplace exploitation)
- SZTAKI (models and algorithms)

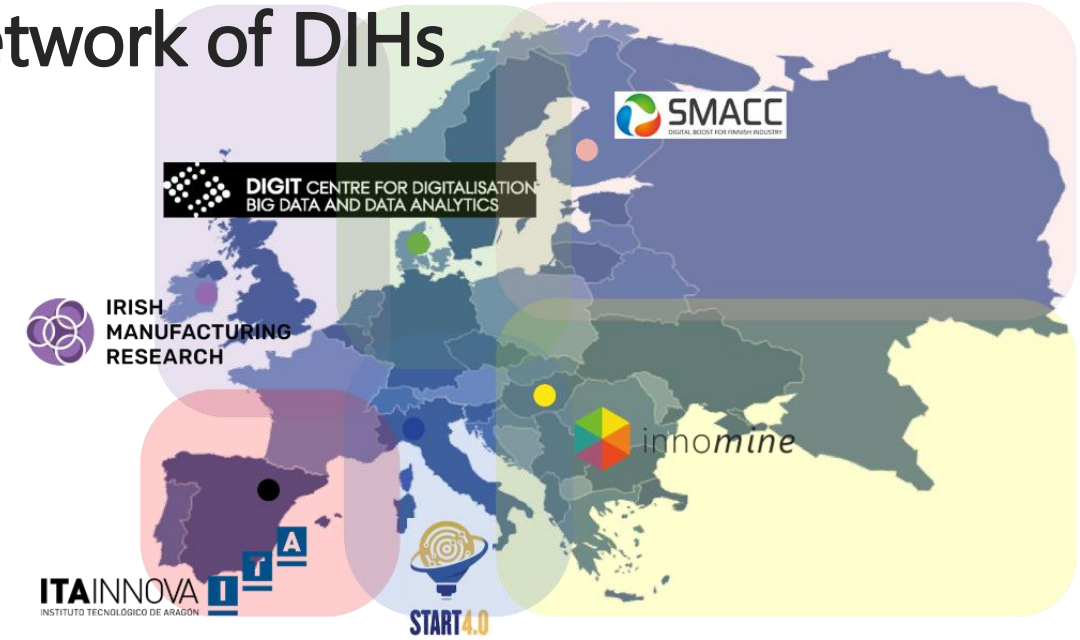
- **The main innovation is** edge-, cloud- and HPC-based modelling, simulation, optimization, analytics, and machine learning tools to extend the Digital Twin concept with memorizing capacity to support the full lifecycle of industrial products.
- **The expected benefits for the manufacturing industry (energy efficiency, cost reduction, etc.):**
  - To enable customized industrial products and to facilitate cost-effective distributed and localized production for manufacturing SMEs.
  - Possibility to offer their products as a service (optimal operation and workload)

Expected results: **DIGITbrain Marketplace implementing the concept of Manufacturing as a Service**, validated through three waves of experiments (both from project partners and open calls).

The DIGITbrain consortium

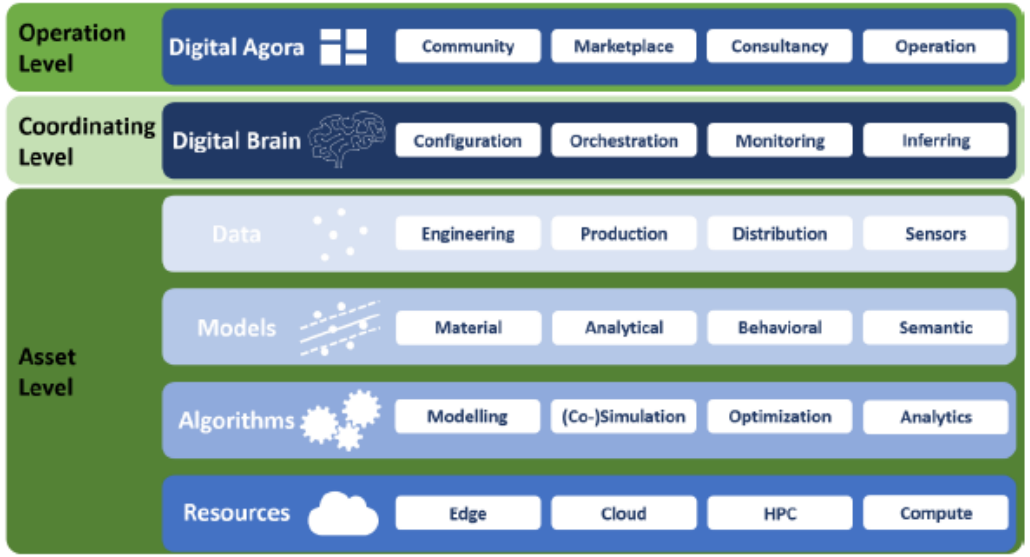
Experiment partners

Network of DIHs



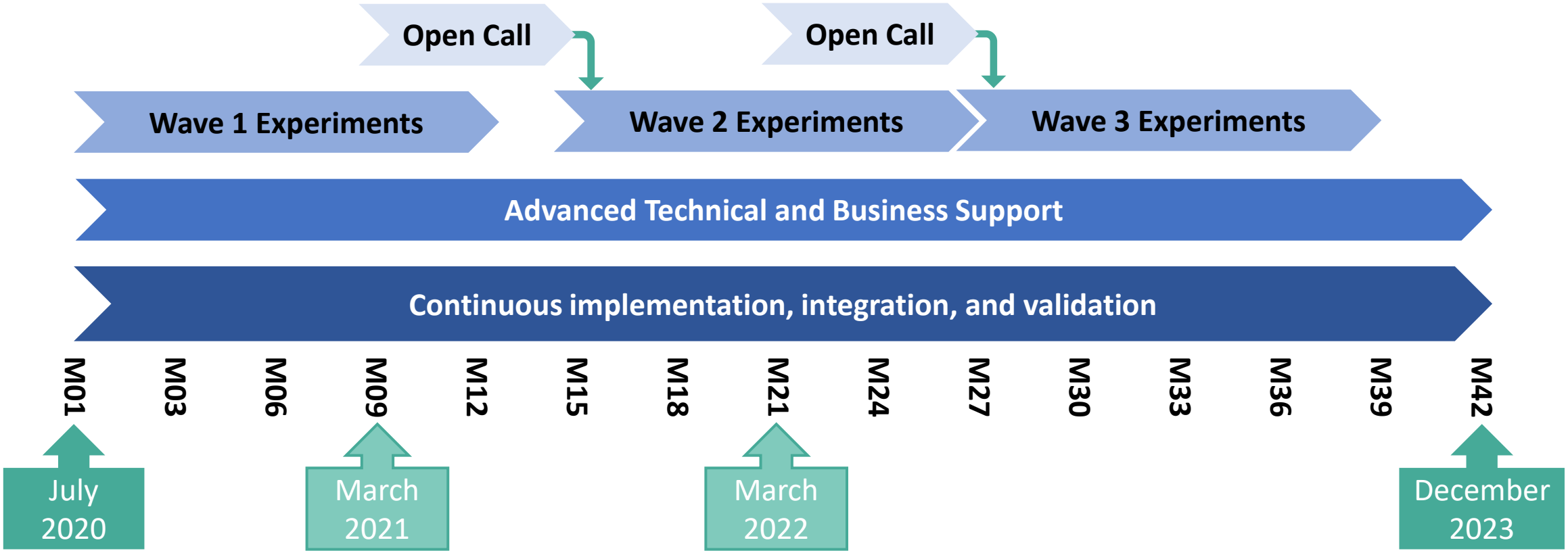
DIGITbrain objectives

1. To implement the Digital Brain concept
   - To configure and orchestrate data, models, algorithms, and resources
2. To develop MaaS business model
   - To be implemented by the DIHs
3. To augment the capabilities of the CloudiFacturing Marketplace
   - Integrating Digital Brain concept and MaaS business model
4. To conduct three waves of experiments
   - To validate the project results: 1 internal, and 2 Open Calls
5. To evangelise the manufacturing community
   - On the benefits and impact of MaaS – DIHs involvement



Cloudi Facturing

DIGITbrain timeline: opportunities to participate



DIGITbrain Open Calls https://digitbrain.eu

- 2 Open Calls
- Number of experiments: 14 (7 per Open Call)
- Budget: 1 400 000 € (≈100K€ per experiment)
- Who can participate?
  - End users (manufacturing companies – SMEs and mid-caps)
  - Independent Software Vendors (ISV) – SMEs and mid-caps
  - Engineering consultants – SMEs and mid-caps
  - Research organisations
  - High-Performance Computing (HPCs)
  - Digital Innovation Hubs
- Open Calls timeline

Open Call (OC)	Launch	Execution
OC1	March 2021	September 2021 – August 2022
OC2	March 2022	September 2022 – August 2023

CONTACTS

some examples of multinational clients for which PNO delivered technology and innovation intelligence

FAMECCANICA Non stop innovation

DSM BRIGHT SCIENCE. BRIGHTER LIVING.

enel

P&G Procter & Gamble

NALCO Water An Ecolab Company

MARS petcare

SPIRE Sustainable Process Industry through Resource and Energy Efficiency

WssTP The European Water Platform

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