DIGITBRAIN

DIGITBrain Project
Introduction of the Open Call Opportunity

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Innomine Group

innomine

DIGITbrain has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952071

Agenda

1. Introduction of the DIGITBrain Project and its Experiments
2. 1st Open Call Details and Topic
3. Expectations, Consortia and Eligibility
4. Main Elements of the Application and Evaluation
5. Useful Links to Apply with Success
6. Q&A

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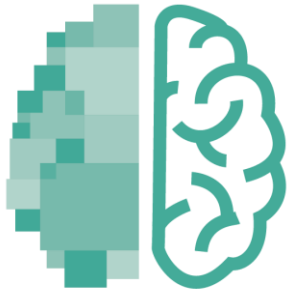

DIGITBRAIN

1/6. Introduction of the DIGITBrain Project

DIGITbrain – in brief

- DIGITbrain is an EU innovation program to give SMEs easy access to digital twins. ***A Digital Twin is a computer-based application/simulation:***
  - *Mimics the real production line of a company*
  - *Runs in parallel with the real manufacturing process*
  - *Using this Digital Twin, companies can rationalize the manufacturing process*
  - *Makes predictions regarding expected machine failures*
  - *Can predict maintenance needs*
- Duration: July 2020 – December 2023 (42 months)
- Topic: H2020 – ICT-03
- Type of action: Innovation Action
- Offer **two opportunities (Open Calls) for another 35-40 companies to join** and receive funding from the European Commission.

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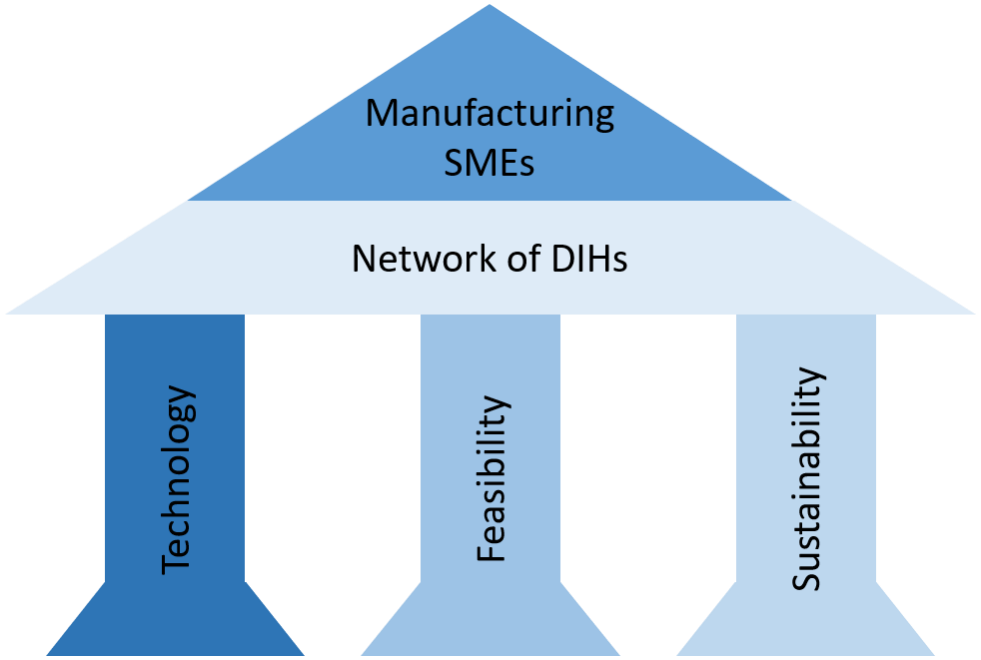
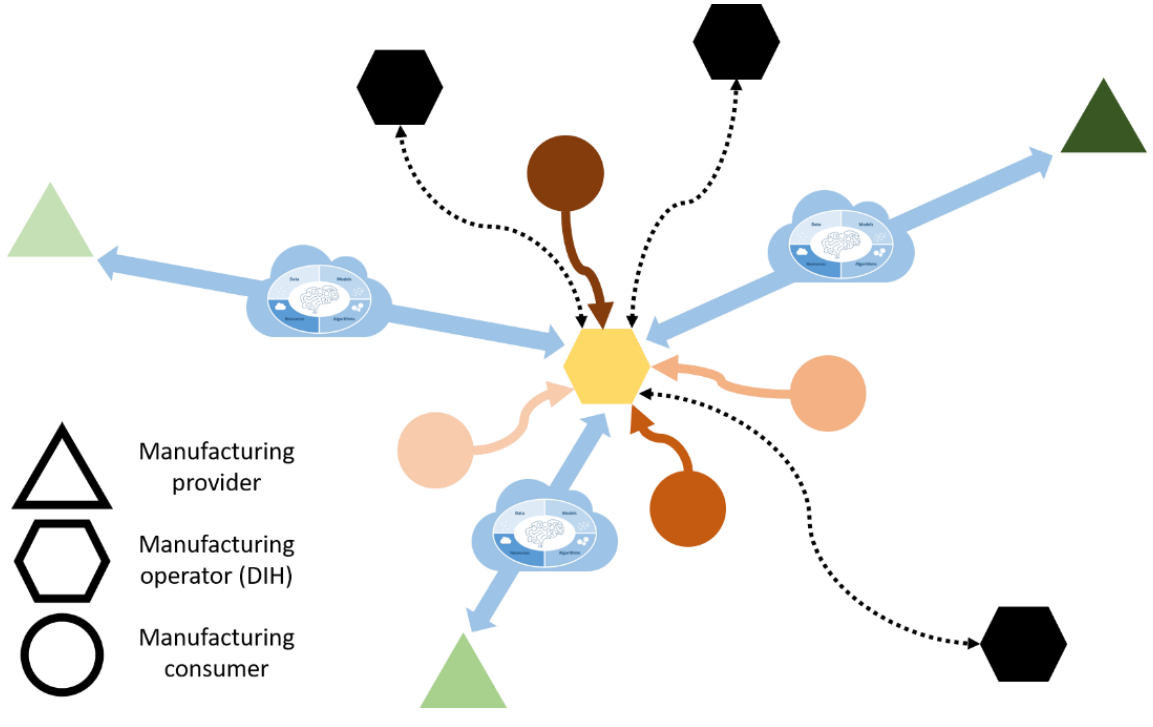
DIGITbrain approach





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The DIGITBrain consortium – 36 partners from Europe

Core technical and administrative partners

PNO
Fraunhofer IGD
cleargo
University of Westminster
SZTAKI
German Research Center for Artificial Intelligence
Atos
ConSenses
SUPSI
cloudSME
Aarhus Universitet
egi
University of Nottingham UK | CHINA | MALAYSIA
ITAINNOVA Instituto Tecnológico de Aragón
enide
STAM Mastering Excellence
innomine
START4.0
c+t=an Corporación Tecnológica de Andalucía

Network of DIHs

Aragón DIH – Aragón Digital Innovation Hub High Performance Cloud & Cognitive Systems
START4.0
DIGIT Centre for Digitalisation Big Data and Data Analytics
innomine
Irish Manufacturing Research
SMACC Digital Boost for Finnish Industry

Experiment partners

3D Medlab
AGROINTELLI
DGS Consulting
Tampere University
montimage
CAADEX
gigant
ULBS Universitatea "Lucian Blaga" din Sibiu
NXT Control
Piacenza 1733 Cashmere
PORINI A DGS Company
DOMINA Organizzazione e Logistica
Croom Precision Tooling
Inyecciones Montañana S.A. inymon

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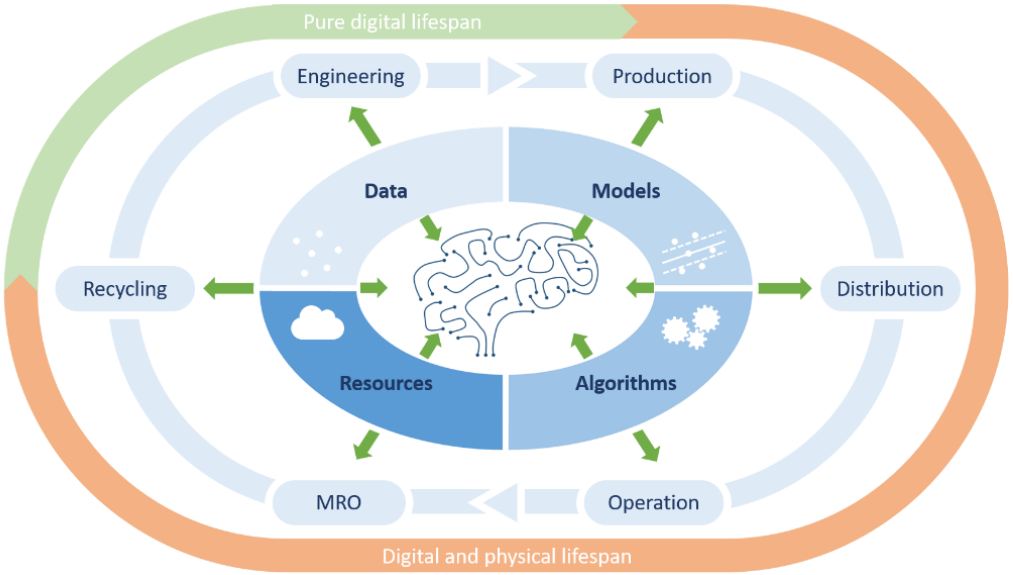
DIGITBrain Challenge

- DIGITbrain main challenge
  - "…to enable customised industrial products and to facilitate cost-effective distributed and localised production for manufacturing SMEs…"
- How?
  - "…by means of modelling, simulation, optimisation, analytics, and machine learning tools to augment the concept of digital twin with a memorising capacity…"



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Ongoing experiments – as an example

- Experiment 1: Digital Style - Digital twin for fabric production optimization
- Experiment 2: Digital Brain for Injection Moulding
- Experiment 3: Digitization and optimization of snow guards manufacturing process
- Experiment 4: Digital Twin for Additive Manufacturing (AM) ensuring compliance across multiple machines
- Experiment 5: Digital Brain for Laser-Cutting and Forming of Aluminium
- Experiment 6: DIGITbrain in Agricultural Robots
- Experiment 7: Data-Driven Modeling Of Powder Bed Fusion Technology To Improve Product Quality

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Experiment 1 - example

Piacenza: SME manufacturer of fine woolen fabrics, for the high-end luxury market. The production strategy of Piacenza is based on strict and integrated control of production. ***End-user in the experiment, providing the use case and the data.***

Porini is an Independent Software Vendor, who will mainly run the experiment for providing the optimization algorithm.

Domina is the services provider of Piacenza and is in charge of gathering and providing the relevant dataset.

START4.0 is the Digital Innovation Hub with the role of experiment supervisor.

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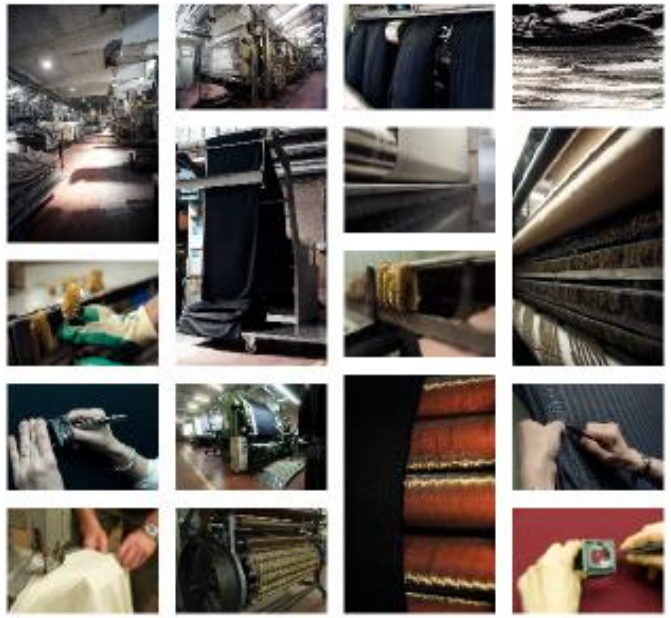
The End-User (Experiment 1)

Piacenza

SME **manufacturer of fine woolen fabrics**, for the **high-end luxury market.** The production strategy of Piacenza is based on **strict and integrated control of production**. End-user in the experiment, providing the use case and the data.



Piacenza keeps internal those production phases which give an added value perceived by the customer (for ex. Raw material acquisition, finishing, inspection) or a production flexibility and cost advantage (weaving, yarn dyeing).

Piacenza competitive strategy is focused on **maximum differentiation of the product, in terms of raw material choice, style, and colour. Each season more than 2.000 designs are introduced into the market**. This key competitive advantage is enforced by design know-how and quick flexibility to customer requests, where Piacenza offers new, customized and/or exclusive fabrics in close cooperation with fashion stylists.

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Goals of experiment 1

- The goal of the experiment is to **create a digital copy of the production process (digital twin)** that shows all the parameters necessary for its **elaboration and analysis**

- This digital model has the goal of **optimizing** **the production planning in the weaving department** thus facilitating, taking into consideration all the existing constraints (machines, article compatibility, technical lead-times, customer delivery dates)

- **Improving the accuracy and effectiveness of this planning** (at the same time **reducing the use of intermediate production batches**, **reducing the stock of semi-finished and finished products** produced in larger than needed quantities in order to accommodate technical constraints)

- The solution aims to use **cloud-based software and services (Machine Learning, AI, Advanced Analytics)** and with these tools to **build optimization algorithms** that can **provide alternatives and what-if simulations** to **evaluate the impact of certain choices** on the production mix and on the machines allocation and on the respect or not of the delivery term (dates and quantities).

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Technical impact of experiment 1

- **Aims: to meet with the requirements of the rigid and high demanding service and design requests** by clothing fashion customers
- **Complex and fully integrated production process** with around 1 million meters produced per year
- 200 meters of average lot and a **continuous refreshing of the planning** due to the overlapping of regular production, exclusive one, prototyping and sampling, the repetition of the same lot with the complexity of the management of Piacenza production planning
- **New and innovative approaches** to remain up to date to the needs of the market
- The above-mentioned production scenarios make the data analysis a huge challenge. A big effort must be placed in **gathering the sufficient amount of data for a good output without overloading the system of un-necessary data.**

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Experiment 3 - example

- **CAADEX** is a manufacturer of roofing products.
- **DSS** is specializing in Business Intelligence systems, implementing analytical solutions and customized applications:
- **FSUKG**, University of Kragujevac will cut out unnecessary scenarios from the optimization reducing the needed resources to run the optimization.
- **Innomine** as the Digital Innovation Hub coordinates the implementation of the experiment and identifies synergies.

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The End-User (Experiment 3)

CAADEX, the end-user in this experiment, owns multiple complex machines with life cycles of tens of years. One of the complex machines produces **snow guards for the roofs.** It is able to produce 3000 snow guards within 8 hours. While one piece of product weighs only 0.18 kg, the required raw material can only be ordered in large quantities (24.000 kg). Additionally, customers usually need a minimum **of 5 different colours**, resulting in a minimum raw material order of 120 tons. Moreover, **each roof tile producer has its own specific type of product** and therefore CAADEX currently produces **150 different types of roof snow guards in a quantity of 1,500,000 kg. Machine switchover times** cause major delays (usually 4-5 hours), and **the number of threads** is also high (12 daily). To reduce the switchovers, **synchronization of machines is needed**.

The experiment targets the **optimization of CAADEX manufacturing processes** by using the software of DSS (ISV) for simulation and modelling. DSS developed a **discrete event simulation model in the cloud**, which could be **customized and used for the case of CAADEX** to optimize the operation of the two machines. It will collect data and prepare simulations (digital twins).

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Aims – Experiment 3

- As a result of the experiment, CAADEX will be able to **reduce switchover times and increase the efficiency** of the production line.
- At the same time this will allow CAADEX to **better measure the process and collect information** about the whole manufacturing process, which will result in **better control of the operation.**
- Specific **research will be conducted to optimize the algorithm**, to reduce the number of scenarios, allowing the optimization tool to **consume less energy, less cloud resources** and therefore also protect the environment.

DSS's optimization model will be run in the cloud to allow **quick response times** and it will also be customized to the needs of CAADEX. One major area of customization will be cutting off the unlikely scenarios in order to **save time on the calculations**, especially in this complex and multi-step production process. This goal will be achieved by a pre-filtering algorithm, which will optimize the number of potentially useful simulations. The University of Kragujevac will provide specific expertise to this aspect of the project.

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Technical impact – experiment 3

- The use of the DSS's solution, the targeted application developed in the project, will bring value not only to the **shop-floor but also to management levels**.
- CAADEX will be able to **increase the accuracy and reduce the response time** of order confirmation.
- Based on the output of the software, CAADEX will be able to **visualize the material flow and detect the bottlenecks of manufacturing steps.**
- This will also bring **the possibility to run what-if scenarios and find new business models** (such as T&M based manufacturing, or manufacturing-as-a-service model) to optimize the utilization of production lines/machines.

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2/6. 1st Open Call Details and Topic

Key Call Details

- **Project full name:** 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)
- **Call opening:** 31th March 2021, 10:00h (CEST Time)
- **Submission Deadline:** 30th June 2021, 17:00h (CEST Time)
- **Expected duration of participation in experiments:** 12 months
- **Total EC funding available for third parties in DIGITbrain-OC1:** up to 700.000 EUR financial support for Third Parties. DIGITbrain considers that proposals requesting a contribution **up to 100,000 EUR per experiment** would allow the specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.
- **Maximum amount of financial support for each Third Party:** 60,000 EUR
- **Language in which proposal should be submitted:** English
- **Email address for further information:** opencall@digitbrain.eu

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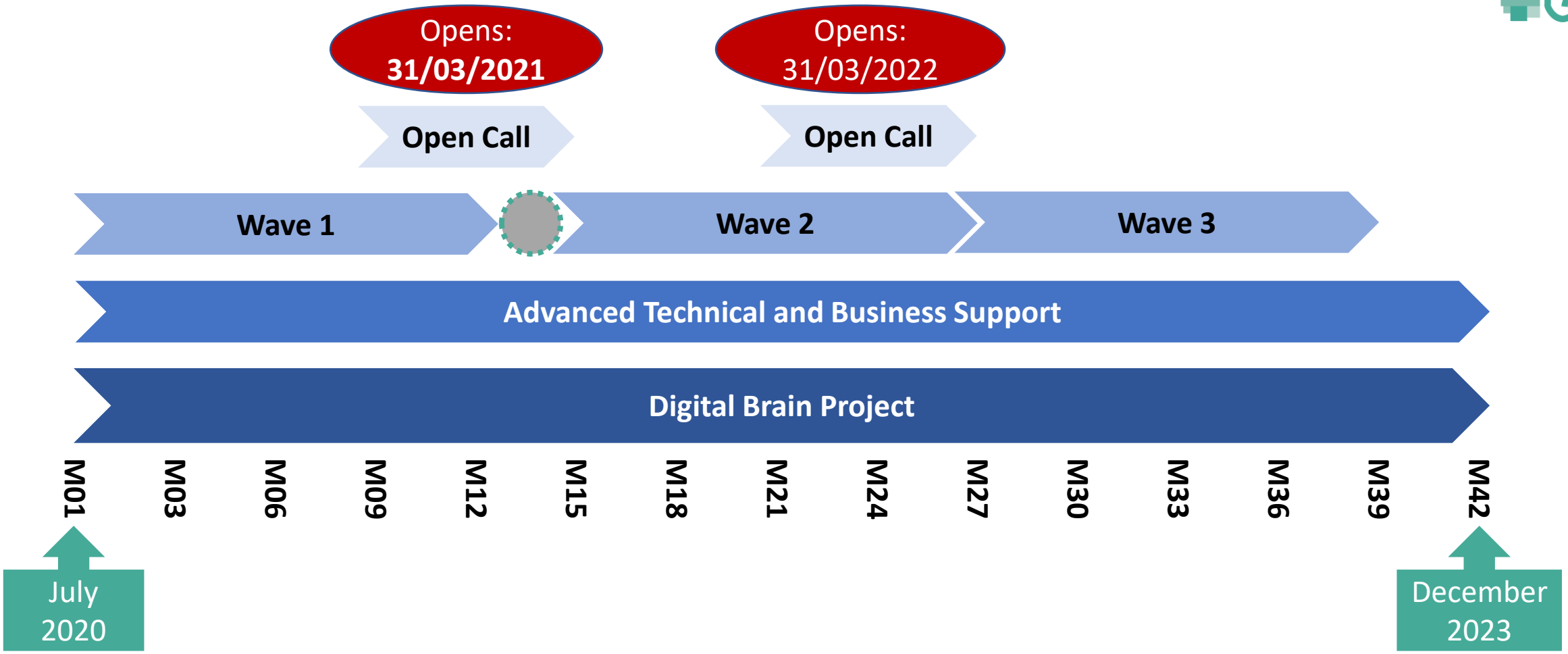
DIGITbrain Open Call Schedule



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Open Call main focus

- Attracting Third Parties (especially **manufacturing and ISV SMEs and mid-caps**)
- Perform experiments to **validate the DIGITbrain solution**
- **Make SMEs more competitive** by transferring innovative solutions into the wider manufacturing community
- Experiments will be implemented in close collaboration **with Digital Innovation hubs and technical partners** of competence centers:
  - *Interaction start during proposal preparation*
  - *DIHs and technical partners of competence centers act as business and technical supporters for applicants*
  - *Collaboration continues during the experiments' deployment and execution*

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Role of Digital Innovation Hubs (DIHs)

- Digital Innovation Hubs (DIHs) maximise the **implementation** of application experiments in each wave of the project
- Conduct activities to help experiment applications reaching their socio-economics **impact**
- Improve applications' **user experience.**

DIGITAL INNOVATION HUBS OF DIGITBRAIN

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3/6. Expectations, Consortia and Eligibility

Expectations from experiments

Grounding on the Digital Twin concept:

- Creating *customised industrial products*
- Facilitating *cost-effective distributed and localised production*
- Leveraging cloud and HPC – based *modelling, simulation, optimisation, analysis and machine learning tools*
- Covering the development and uptake of digital technologies

Experiments will cover any segments in the manufacturing sector at large, including (but not limited to) **discrete manufacturing, continuous production, or construction**

The project collects **14 highly innovative cross-border experiments in two Open Calls**, bringing together technology providers and manufacturing end-users to perform experimentation, in order to validate the DIGITbrain solution.

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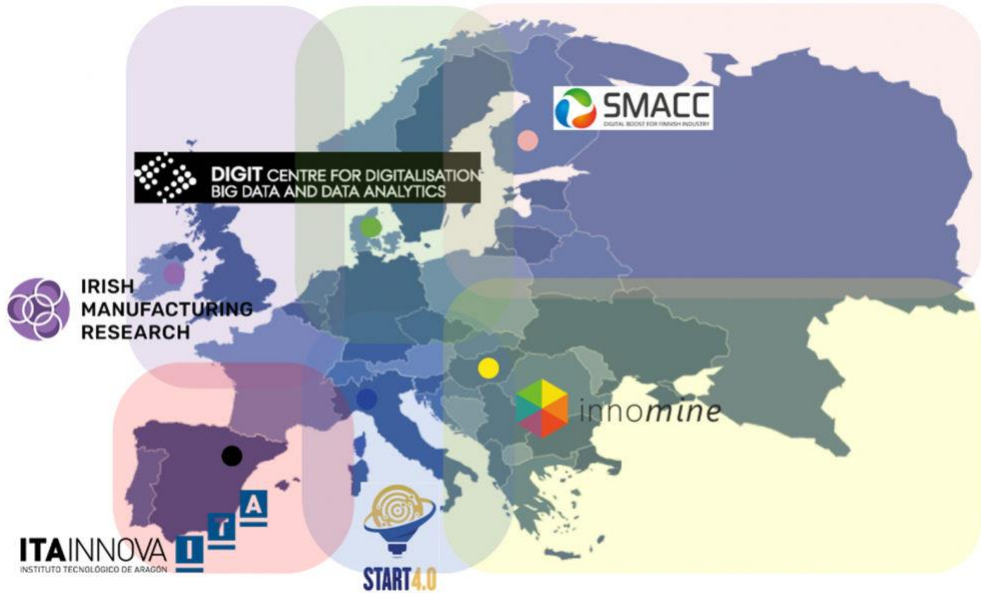
Experiment consortium

The minimum number of partners in an experiment consortium must include:

- One **End User** (SME and mid-cap manufacturing companies) and
- One **Technical partner** acting as ISV, engineering or software consultant, Research Organization, High-Performance Computing (HPC) providers.
- Digital Innovation Hub

In order to maximise the impact of the experiments, each experiment is accompanied by a Digital Innovation Hub (DIH) which will provide help from *proposal writing to the implementation* of the experiment.



Regional coverage of the Network of DIHs in Europe.

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Eligibility - List of Third Parties

- End Users from the manufacturing sector will be driving the experiments. Preferably an SME but also mid-caps
- Independent Software Vendors (ISVs)
- Engineering or software consultants
- Research Organizations
- High-Performance Computing (HPC) providers
- Any organization that will act as a Digital Innovation Hub (DIH)

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Eligibility

- All Third Parties must come from European Member States, Associated Countries or the United Kingdom

OFFICIAL ELIGIBILITY CRITERIA

- According to the EC rules, no third party is allowed to have received more than 100,000 EUR from Horizon 2020 I4MS and SAE Open Calls!

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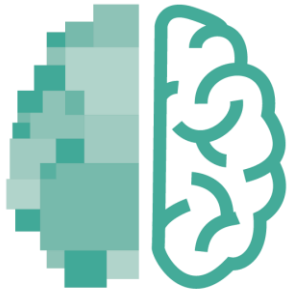

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5/6. Evaluation Process and the Main Elements of the Application

Proposal selection process

- The board of two independent experts will be complemented by a representative of the Core Coordinating Committee to oversee all proposals and to ensure maximum complementarity and impact of the proposals best ranked by the external experts.

- Evaluation board for each proposal:
  - Two Independent Experts (two votes, one vote each). → External evaluator
  - One representative of the core Coordinating Committee (one vote). → Internal evaluator

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Proposal – main elements

Approximately 10 pages is expected including:

1. Industrial relevance
2. Dissemination and Exploitation strategy
3. Experiment design
4. Technical approach
5. Work plan (Activities, Milestones)
6. Experiment Internal Deliverables
7. Resources to be committed
8. Consortium

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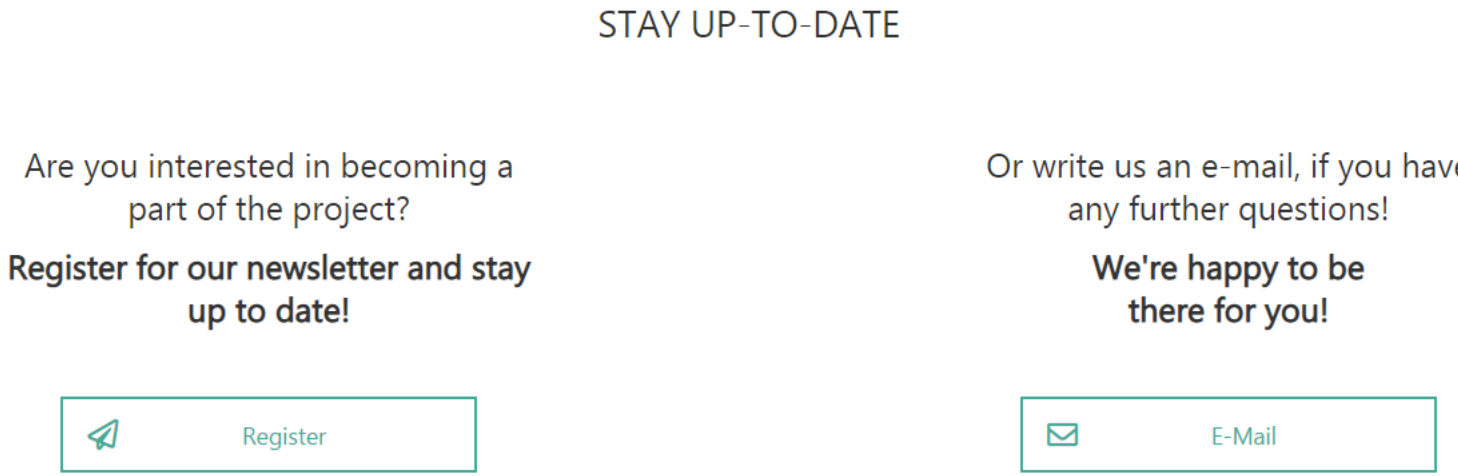
6/6: Useful Links to Apply with Success

Digitbrain Open Call Official Announcement: https://digitbrain.eu/open-calls/
Digital Innovation Hubs: https://digitbrain.eu/digital-innovation-hubs/
Save the Date! - April 20th, 2021 - 11:00h AM (CEST): Registration for the first Webinar



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Q&A

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Thank you for your interest!

Katalin Kovács, Ph.D.

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