

**SUBGRANT AGREEMENT**  
**Nr. 07 -EDGE-MICROFY - AI REDGIO 5.0 Ga nr. 101092069**  
**Sub-Project**

**Evolution experiment to migrate and adopt an Edge-Computing architecture into our AI-powered automated digital microscope for the agrifood processing industry**  
**V0.2**

This subgrant (hereinafter ‘the Subgrant) for providing financial support to selected third parties, is

**BETWEEN THE FOLLOWING PARTIES:**

on the one part,

Politecnico di Milano (POLIMI), with its registered office in in PIAZZA LEONARDO DA VINCI 32, MILANO 20133, Italy, V.A.T. number IT04376620151, PIC 999879881 represented for signature of this Agreement by Prof. Raffaella Cagliano in her capacity as Director of Department of Management, Economics and Industrial Engineering (hereinafter referred to as the “*Beneficiary*”)

AND

on the other part,

MICROFY SYSTEMS , shortname MICROFY , with its registered office in Avenida Carrilet, 243, planta 1, local 2 08907 hospitalet, Spain, V.A.T. number ESB66320847, PIC 935287581, represented for signature of this Agreement by Iratxe Perales in his/her capacity as Legal representative(CEO)

(hereinafter referred to as the *Selected Third Party*).

**Whereas**

- the *Beneficiary* has signed the subgrant n. 101092069 with the European Commission for the purpose of implementing the Horizon Europe Project entitled ‘AI REDGIO 5.0: Regions and (E)DIHs alliance for AI-at-the-Edge adoption by European Industry 5.0 Manufacturing SME.
- The organizations as in Table 1:

**Table 1 AI REDGIO 5.0 beneficiaries**

Number	Legal name	Short name	Country	Role
1	POLITECNICO DI MILANO	POLIMI	IT	COO
2	STEINBEIS INNOVATION GGMBH	SIG	DE	BEN
3	ART-ER-SOCIETA CONSORTILE PER AZIONI	ARTER	IT	BEN
3.1	ALMA MATER STUDIORUM – UNIVERISTA DI BOLOGNA	UNIBO	IT	AE

4	KOMPETENCNI CENTER ZA SODOBNE TECHNOLOGIJE VODENJA	KCSTV	SI	BEN
4.1	INSTITUT JOZEF STEFAN	JSI	SI	AE
4.2	UNIVERZA V LJUBLJANI	UL	SI	AE
5	BRAINPORT INDUSTRIES COOPERATIE UA	BPI	NL	BEN
6	ONTWIKKELINGSMAATSCHAPPIJ OOST NEDERLAND NV	OOST NV	NL	BEN
6.1	UNIVERSITEIT TWENTE	UTW	NL	AE
7	ASSOCIAZIONE FABBRICA INTELLIGENTE LOMBARDIA	AFIL	IT	BEN
8	POLYMERIS	POLY	FR	BEN
9	FONDAZIONE HUB INNOVAZIONE TRENTINO	HIT	IT	BEN
9.1	FONDAZIONE BRUNO KESSLER	FBK	IT	AE
10	FLANDERS MAKE	MAKE	BE	BEN
11	AXENCIA GALEGA DE INNOVACION	GAIN	ES	BEN
12	MADE SCARL	MADEcc	IT	BEN
13	UNIVERSITATEA TEHNICA GHEORGHE ASACHI DIN IASI	TUIASI	RO	BEN
14	CESKE VYSOKE UCENI TECHNICE V PRAZE	CVUT	CZ	BEN
15	FORENINGEN MADE	MADE	DK	BEN
15.1	AALBORG UNIVERSITEIT	AAL	DK	AE
16	PANNON GAZDASAGI HALOZAT EGYESULET	PBN	HU	BEN
17	ENGINEERING - INGEGNERIA INFORMATICA SPA	ENG	IT	BEN
18	SOFTWARE COMPETENCE CENTER HAGENBERG GMBH	SCCH	AT	BEN
19	LULEA TEKNISKA UNIVERSITET	LTU	SE	BEN
20	FUNDACION CENTRO TECNOLOXICO DE TELECOMUNICACIONES DE GALICIA	GRAD	ES	BEN
21	CONSORZIO INTELLIMECH	IMECH	IT	BEN
22	CONSULTORES DE AUTOMATIZACION Y ROBOTICA SA	CARSA	ES	BEN
23	PRIVREDNO DRUSTVO ZA PRUZANJE USLUGA ISTRAZIVANJE I RAZVOJ NISSATECH INNOVATION CENTRE DOO	NISSA	RS	BEN

24	SUITE5 DATA INTELLIGENCE SOLUTIONS LIMITED	SUITE5	CY	BEN
25	EXPERTAI LUX S.A.R.L	EAI	LU	BEN
26	UNPARALLEL INNOVATION LDA	UNP	PT	BEN
27	LIBELIUM LAB SL	HOPU	ES	BEN
28	PORINI INTERNATIONAL LDA	POR	PT	BEN
28.1	SMC TREVISO SRL	SMC	IT	AE
29	S.C.A.MM. SRL - COSTRUZIONI MECCANICHE SPECIALI	SCAMM	IT	BEN
30	ETABLISSEMENTS GEORGES PERNOUD	PERNO	FR	BEN
31	GPALMEC S.R.L.	ALMEC	IT	BEN
32	POLYCOM PREDELAVA PLASTICNIH MAS INORODJARSTVO SKOFJA LOKA DOO	POLYC	SI	BEN
33	INNOLACT SL	INNOL	ES	BEN
34	KATTY FASHION SRL	KATTY	RO	BEN
35	DIGITAL MANUFACTURING INNOVATION HUB WALES LTD	DMIW	UK	BEN
36	CONTROL 2K LIMITED	C2K	UK	BEN
37	CAP ENGINEERING SERVICES LIMITED	CAP	UK	BEN
38	TXT E-TECH SRL	TXT	IT	BEN

(hereinafter collectively referred as the AI REDGIO 5.0 Beneficiaries) participate to the HORIZON EUROPE project entitled AI REDGIO 5.0.

- The AI REDGIO 5.0 project, under the HORIZON EUROPE programme, has launched a First Open Call for proposals regarding AI enabled experiments in manufacturing to become digital game changers for Europe and its regions. In this context, the 07-EDGE-MICROFY, Evolution experiment to migrate and adopt an Edge-Computing architecture into our AI-powered automated digital microscope for the agrifood processing industry, experiment, hereinafter referred to as the *Subproject*, has been retained for funding by AI REDGIO 5.0 within the framework of the AI REDGIO 5.0 First Open Call.
- In fact, the *Subproject* has been chosen, after duly performed evaluation process, as per AI REDGIO 5.0 First Open Call Guide (Annex A), to be conducted as described in the *Technical Annex* (Annex B), with Annex A and Annex B both attached to the present subgrant.
- The *Selected Third Party* has the qualifications and skills needed to carry out the activity provided in the *Technical Annex* as their responsibility.
- The AI REDGIO 5.0 First Open Call will follow the Lump Sum cost reporting system, which is a simplified method of settling expenses in projects financed from Horizon Europe funds. Under this method, the *Selected Third Party* is not required to present strictly defined accounting documents to prove the cost incurred (e.g. invoices), but is

obliged to demonstrate the implementation of the *Subproject* in line with the budget and milestones set for the *Subproject* by the *Beneficiary*. The Lump Sum does not release the *Selected Third Party* from the obligation to collect documentation to confirm the costs under fiscal regulation.

Now therefore

**It is agreed as follows**

with the recitals as above and the Annexes making substantial a part of the present Subgrant.

*Article 1. – Interpretation*

1. The present Subgrant is linked to the *Technical Annex* (Annex B) and is stipulated in order to allow the *Beneficiary* to comply with its obligations towards the European Commission and the other Beneficiaries of the AI REDGIO 5.0 project.

*Article 2. – Applicable provisions and discipline*

1. The present Subgrant shall be governed by:
  - a) the Rules for participation to the Horizon Europe Framework Programme;
  - b) Belgian Law, if not provided by above mentioned legal sources.

*Article 3. – Contacts between the Beneficiary and the Selected Third Party*

1. The contacts between the *Beneficiary* and the *Selected Third Party* shall be carried out as follows.

Any communication or request concerning the *Subproject* shall identify its number, acronym and title, the nature and details of the request or communication and shall be submitted to the following addresses:

For the *Beneficiary*:

Politecnico di Milano (POLIMI)  
Department of Management, Economics and Industrial Engineering  
Office: Via R. Lambruschini 4/b  
20133 Milano  
Italia

For the *Selected Third Party*

Legal representative name: Iratxe Perales  
Legal representative title: Legal representative(CEO)  
Avinguda Carrilet 243, planta 1 local 2 08907 Hospitalet (Spain)

2. For information or documents to be transferred by e-mail, except those related to the signature process of this subgrant, the following addresses shall be used:

For the AI REDGIO 5.0 team:

Deliverables:

CARSA (Naia Muruaga - [nmuruaga@carsa.es](mailto:nmuruaga@carsa.es) , Andreea Radulescu - [aradulescu@carsa.es](mailto:aradulescu@carsa.es)), together with the appointed AI REDGIO 5.0 mentor/s.

Other documents:

POLIMI (Gabriella Monteleone - [gabriella.monteleone@polimi.it](mailto:gabriella.monteleone@polimi.it))

For the *Selected Third Party*:

Name: Iratxe Perales

Email: [iratxe.perales@microfy.ai](mailto:iratxe.perales@microfy.ai)

3. In case of refusal of the notification or absence of the recipient, the *Selected Third Party* is deemed to have been notified on the date of the latest delivery, if notification to the *Selected Third Party* has been sent to one of the addresses mentioned in previous commas 1 and 2 and to their legal representative.
4. Change of contact persons and/or their email addresses does not constitute an amendment to the Subgrant.

#### *Article 4. – Person in charge of the Subproject*

1. The persons in charge of the *Subproject* within the *Beneficiary* are Prof. Raffaella Cagliano and Prof. Marco Taisch.
2. The person in charge of the *Subproject* within the *Selected Third Party* is Iratxe Perales, [iratxe.perales@microfy.ai](mailto:iratxe.perales@microfy.ai)

#### *Article 5. – Duration of the Subgrant*

1. The Subgrant shall enter into force on the day of the last signature. Anyway, the Subgrant intends to ratify all the activities carried out in place within the *Subproject* starting from June 15<sup>th</sup> 2024 to February 15<sup>th</sup> 2025, with the execution of experiment with start June 15<sup>th</sup> 2024 and end February 15<sup>th</sup> 2025.
2. The subgrant shall be effective for the duration of eight (8) months.
3. The *Beneficiary*, in case of extension of the *Subproject* duration, can extend the Subgrant as necessary.

#### *Article 6. – Scope of the subgrant*

1. The *Selected Third Party* shall carry out the activities as described in the *Technical Annex* which is an integral part to the present Subgrant.

#### *Article 7 – Obligations of the Selected Third Party*

1. The *Selected Third Party* shall:

- a) carry out the activity referred to in Article 6 with due diligence, as specified in the *Technical Annex* (Annex B) and the AI REDGIO 5.0 First Open Call Guide for Applicants (Annex A), and will be leader of the *Subproject* work-packages and tasks as specified in the *Technical Annex*.
- b) submit all the four deliverables mentioned below within the due date to the *Beneficiary*, drafted in English language and following the templates drafted by the *Beneficiary*:
  - a. **D1. Technical Specifications, Architecture and/or Data Pipelines** (due month M4, deadline 15<sup>th</sup> October 2024).
  - b. **D2. Experiment implementation, Integration and Testing** (due month M4, deadline 15<sup>th</sup> October 2024).
  - c. **D3. Experimentation and Measurement of technical-business KPIs** (due within month M8, deadline 15<sup>th</sup> February 2025)
  - d. **D4. Dissemination and Exploitation + Communication material** (due within month M8, deadline 15<sup>th</sup> February 2025).
- c) participate to the meetings of Open Call 1 Subprojects which will be organized and conducted by the AI REDGIO 5.0 Team, with physical or online meeting/s (see table 2 below) in which the *Selected Third Party* leader or his/her appointed representatives, will have to present the results of the *Subproject* and the possible plans for next phases, if any; the respect of the above mentioned deadlines shall be considered as essential for the purposes of the present Subgrant. Individual meetings will be organized by the AI REDGIO 5.0 team and the appointed Mentors as needed. Specifically concerning D4, the *Subproject leader* will deliver, included in Deliverable D4, within month M8, a presentation, accompanied by a video, in which the final results of the *Subproject* (demo of AI solution, final KPIs measurement and architecture) will be reported.

**Table 2: Plenary meetings**

No.	Follow-up plenary meeting	When
1	Kick-off meeting	M1 of the experiment (June2024)
2	Mid-term review meeting	M4 of the experiment (October 2024)
3	Final review meeting	M8 of the experiment (February 2025)

- d) The *Selected Third Party* will comply with the instructions given by the person in charge of the *Subproject* within the *Beneficiary*, in order to implement the research and innovation *Subproject* within the timings as foreseen in *Technical Annex* and in order to allow the *Beneficiary* to comply with the technical and financial reporting duties.
- e) All information in whatever form or mode of communication, which is disclosed by a Party (the “Disclosing Party”) to any other Party (the “Recipient”) in connection with the *Subproject* during its implementation and which has been explicitly marked as “confidential” at the time of disclosure, or when disclosed orally has been identified as confidential at the time of disclosure and has been confirmed and designated in writing within 15 calendar days from oral disclosure

at the latest as confidential information by the Disclosing Party, is “Confidential Information”.

e.1) The Recipients hereby undertake in addition and without prejudice to any commitment on non-disclosure under the Subgrant Agreement, for a period of 4 years after the end of the *Subproject*:

- Not to use Confidential Information otherwise than for the purpose for which it was disclosed;
- not to disclose Confidential Information without the prior written consent by the Disclosing Party;
- to ensure that internal distribution of Confidential Information by a Recipient shall take place on a strict need-to-know basis; and
- to return to the Disclosing Party, or destroy, on request all Confidential Information that has been disclosed to the Recipients including all copies thereof and to delete all information stored in a machine readable form to the extent practically possible. The Recipients may keep a copy to the extent it is required to keep, archive or store such Confidential Information because of compliance with applicable laws and regulations or for the proof of on-going obligations provided that the Recipient comply with the confidentiality obligations herein contained with respect to such copy for as long as the copy is retained.

e.2) The recipients shall be responsible for the fulfilment of the above obligations on the part of their employees, or third parties involved in the *Subproject* and shall ensure that they remain so obliged, as far as legally possible, during and after the end of the *Subproject* and/or after the termination of the contractual relationship with the employee or third party.

e.3) The above shall not apply for disclosure or use of Confidential Information, if and in so far as the Recipient can show that:

- the Confidential Information has become or becomes publicly available by means other than a breach of the Recipient’s confidentiality obligations;
- the Disclosing Party subsequently informs the Recipient that the Confidential Information is no longer confidential;
- the Confidential Information is communicated to the Recipient without any obligation of confidentiality by a third party who is to the best knowledge of the Recipient in lawful possession thereof and under no obligation of confidentiality to the Disclosing Party;
- the disclosure or communication of the Confidential Information is foreseen by provisions of the Subgrant agreement;
- the Confidential Information, at any time, was developed by the Recipient completely independently of any such disclosure by the Disclosing Party;

- the Confidential Information was already known to the Recipient prior to disclosure, or
- the Recipient is required to disclose the Confidential Information in order to comply with applicable laws or regulations or with a court or administrative order, subject to the provision of Article 7 comma 1 e.6 hereunder.

e.4) The Recipient shall apply the same degree of care with regards to the Confidential Information disclosed within the scope of the *Subproject* as with its own confidential and/or proprietary information, but in no case less than reasonable care.

e.5) Each Party shall promptly advise the other Party in writing of any unauthorised disclosure, mis-appropriation or misuse of Confidential Information after it becomes aware of such unauthorised disclosure, misappropriation or misuse.

e.6) If any Party becomes aware that it will be required, or is likely to be required, to disclose Confidential Information in order to comply with applicable laws or regulations or with a court or administrative order, it shall, to the extent it is lawfully able to do so, prior to any such disclosure

- notify the Disclosing Party, and
- comply with the Disclosing Party's reasonable instructions to protect the confidentiality of the information.

f) The *Selected Third Party* will inform the *Beneficiary*, in the shortest possible time, on all circumstances concerning the present Subgrant, especially those which can compromise the correct implementation of the present activity.

g) The *Selected Third Party* will comply with the obligations foreseen in this subgrant, to the extent of its responsibility.

2. The obligations listed in the previous paragraphs of Article 7 cannot be transferred to other third parties.
3. The provisions listed in the previous paragraphs of Article 7 shall apply also after the end-date of the Subgrant, as they are compatible.

#### *Article 8 – Obligations of the Beneficiary*

1. The *Beneficiary* shall abide the discipline applicable to the present Subgrant, in particular:
  - a) making available to the *Selected Third Party* all the information necessary for the correct implementation of the activity referred to in Article 6, at the same time maintaining the confidentiality obligation;
  - b) paying the amounts due to the *Selected Third Party* in the modalities and for the amounts set out in Article 9.



## Article 9 – Payment due

1. The lump sum to be paid to the *Selected Third Party* for its *Subproject* activity shall amount to Euro **60000.00 (Sixty thousand /00)**, as specified in the *Technical Annex* and, specifically, according to the Financial Support to Third Parties (FSTP) rules mentioned in this paragraph: “AI REDGIO 5.0 project will organise two open calls (M12, M22). The objective for these open calls is to attract a set of additional 20 (10+10) SME-driven experiments to extend the domains of AI REDGIO 5.0 and benefit directly SMEs and small mid-caps. The characteristics of the financial support will depend on the nature of the working teams and their corresponding experiments. At submission stage, each proposal will include a budget covering eligible Direct Personnel Costs, Subcontracting Costs and Indirect Costs. With a total budget for the two open calls of 1.2M Euros, each Open Call will have a budget of EUR 600K. SMEs or for-profit entities will be funded 60% of their respective eligible cost. Non-profit organizations may receive funding 100% of their cost. The maximum amount of FSTP allowed per proposal will be EUR 60K”. The recipients of the financial support will allow the Commission, the European Anti-fraud Office and the Court of Auditors to exercise their powers of control, on documents, information, even stored on electronic media, or on the final recipient's premises. The Lump Sum payments for the experiments will be linked to the accomplishment and approval by AI REDGIO 5.0 consortium of their previously identified KPIs at M4 and related deliverables as per Article 7 comma 1 b.
2. The total lump sum as per Article 9 comma 1 shall be paid to the *Selected Third Party* as follows:
  - a. A pre-financing of 50% within 45 days from the entering into force of this Subgrant;
  - c. The final payment of the remaining 50% shall be made within 45 days following the date of approval by the *Beneficiary* of all the Deliverables and of the overall experiment progress, as listed in Article 7 comma 1 b and c).

In case of any submission delay of all the deliverables cited in Article 7: specifically, deliverables D3 and D4 must be submitted to the AI REDGIO 5.0 evaluation team within and not later than February 20th 2025, otherwise POLIMI will not guarantee the payment of the corresponding installment, according to EU project rules.
3. In case of non-approval of any of the deliverables as per Article 7 comma 1a, the *Beneficiary* reserves the right to define, and withhold from payments, a percentage of the lump sum amount. The *Selected Third Party* will be given the opportunity to remedy any defects. These defects must be corrected within 21 calendar days since the communication of non-approval by the *Beneficiary*.
4. In case the *Selected Third Party* is suspected of committing fraud or serious financial irregularity, the *Beneficiary* or the European Commission can suspend payments. In these cases, if the European Commission claims back, partially or totally, the contribution received by the *Beneficiary*, the *Selected Third Party*, against written request, is obliged, within a reasonable period of time not superior to 30 days from

receiving the payment request, to give back the sum requested, within the limit of the maximum amount paid to it under the present Subgrant.

5. Article 9 shall be applied without prejudice to the applicability of Article 10.
6. All payments will be made to the bank account provided by the *Selected Third Party* to the Beneficiary via *Selected Third Party* Financial Identification form (Annex C). More specifically, the *Selected Third Party* shall complete in a comprehensive manner the Annex C to the Subgrant and shall notify any changes to the Beneficiary as soon as it has occurred. The *Beneficiary* shall not in any case be liable for any late payment incurred by a change in the financial identification of the Party. The *Selected Third Party* will provide a bank account denominated in euros; otherwise, the *Selected Third Party* will bear the currency conversion costs. Payments shall be considered to have been carried out on the date when they are debited from the Beneficiary account.

#### *Article 10 – Liability of the Selected Third Parties*

1. No Party shall be responsible to any other Party for any indirect or consequential loss or similar damage such as, but not limited to, loss of profit, loss of revenue or loss of subgrants, except in case of breach of confidentiality.
2. A Party's aggregate liability towards the other Parties collectively shall be limited to once the Party's share of the total costs of the *Subproject* as identified in the *Technical Annex*.
3. A Party's liability shall not be limited under either of the two foregoing paragraphs to the extent such damage was caused by a wilful act or gross negligence or to the extent that such limitation is not permitted by law.
4. Each Party shall be solely liable for any loss, damage or injury to third parties resulting from the performance of the said Party's obligations by it or on its behalf under this Subgrant or from its use of Results or Background

#### *Article 11 – Termination of the Subgrant before its end-date*

5. The *Beneficiary* and the *Selected Third Party* can terminate the Subgrant at any time, giving at least 15 days advance notice, by registered mail with proof of delivery.
6. The present Subgrant is rightly terminated in case of serious breach by the *Selected Third Party*, in particular of the obligations which are referred to in Article 7 comma 1. The *Beneficiary* will communicate its intention to avail of the present clause by registered mail with proof of delivery.

#### *Article 12 – Intellectual Property*

1. The results achieved by performing the *Subproject* will be owned by the *Selected Third Party* who generates them.
2. The *Selected Third Party* hereby grants to the *Beneficiary* non-exclusive access rights to their results to the extent needed for the performance of AI REDGIO 5.0 project on royalty-free conditions. The *Selected Third Party* hereby grants to AI REDGIO 5.0 Beneficiaries non-exclusive access rights to their results to the extent needed

for the exploitation of AI REDGIO 5.0 Beneficiaries' own project results on fair and reasonable conditions.

3. The *Selected Third Party* shall not claim any rights of ownership over any AI REDGIO 5.0 Beneficiaries' technologies used for the development of its own results which shall remain exclusive property of its actual owner(s). The use of AI REDGIO 5.0 Beneficiaries' technologies, even if needed for the commercialisation of the results developed during the *Subproject* will be subject to the licensing terms set out by the "owner" of the technology.
4. The *Selected Third Party* shall respect the Intellectual Property Rights, including copyright, and abide by data protection legislation, that apply to software and data available.

#### *Article 13 – Settlement of disputes (alternatively, the Court of Jurisdiction)*

1. The Parties shall endeavour to settle their disputes amicably.
2. If not the case at point 1, any dispute, controversy or claim arising under, out of or relating to this subgrant and any subsequent amendments of this subgrant, including, without limitation, its formation, validity, binding effect, interpretation, performance, breach or termination, as well as non-contractual claims, shall be submitted to mediation in accordance with the WIPO Mediation Rules. The place of mediation shall be Brussels unless otherwise agreed upon. The language to be used in the mediation shall be English unless otherwise agreed upon.
3. If, and to the extent that, any such dispute, controversy or claim has not been settled pursuant to the mediation within 60 calendar days of the commencement of the mediation, the courts of Brussels shall have exclusive jurisdiction.

#### *Article 14 – Promoting the action*

- The *Selected Third Party* must promote the *Subproject* and its results, by providing targeted information to multiple audiences (including the media and the public) in a strategic and effective manner. This does not change the confidentiality obligations in Article 7 comma e) or the obligations in Article 12, all of which still apply. The *Selected Third Party* must inform the *Beneficiary* before engaging in a communication activity expected to have a major media impact, such as:
  - publication in high quality scientific journals (e.g. with impact factor in the top 20% of the journal subject category);
  - participation in European level conferences and events;
  - participation in scientific conferences at national and international level.

Any communication activity related to the *Subproject* (including electronic form, via social media, etc.) and any infrastructure, equipment and major results funded by the subgrant must:

- (a) display the EU emblem and
- (b) include the following text:

“This sub-project has received funding from the European Union’s Horizon Europe research and innovation programme under Open Call 1 of AI REDGIO 5.0 project GA No 101092069”.

*Article 15 – Consent for the processing of personal data*

1. Where necessary, the Parties shall cooperate in order to enable one another to fulfil legal obligations arising under applicable data protection laws (the *Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data* and relevant national data protection law applicable to said Party) within the scope of this Subgrant.
2. In particular, the Parties shall, where necessary, conclude a separate data processing, data sharing and/or joint controller agreement before any data processing or data sharing takes place.

Done in two originals, one for the *Beneficiary* and one for the *Selected Third Party*.

Place\_\_\_\_\_

Date\_\_\_\_\_

The *Beneficiary* Politecnico di Milano

Signature \_\_\_\_\_

Name Prof. Raffaella Cagliano

Title Director of the Department of Management, Economics and Industrial Engineering

Place \_\_\_\_\_

Date \_\_\_\_\_

The *Selected Third Party* MICROFY SYSTEMS

Signature \_\_\_\_\_

Name. Iratxe Perales

Title: Legal representative(CEO)

The *Selected Third Party* accepts in particular the clauses of the following Articles:

Article 5 – *Duration of the Subgrant*

Article 11 – *Termination of the Subgrant before its end-date*

Article 13 – *Settlement of disputes (alternatively, the Court of Jurisdiction)*

Place Barcelona

Date 31/05/2024

The *Selected Third Party* MICROFY SYSTEMS

Signature \_\_\_\_\_

Name Iratxe Perales

Title Legal representative(CEO)



Annexes:

Annex A: AI REDGIO 5.0 First Open Call Guide for Applicants

Annex B: 07-EDGE-MICROFY Evolution experiment to migrate and adopt an Edge-Computing architecture into our AI-powered automated digital microscope for the agrifood processing industry Technical Annex

Annex C: *Selected Third Party* Financial Identification Form

# ANNEX A



## AI REDGIO 5.0 OPEN CALL 1

*Guide for applicants*

<b>Person responsible / Author:</b>	CARSA
<b>Deliverable N.:</b>	-
<b>Work Package N.:</b>	WP1
<b>Date:</b>	01/12/2023
<b>Project N.:</b>	101092069
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## Revision History

Date (dd.mm.yyyy)	Revision version	Author	Comments
14/09/2023	0.1	CARSA	Creation of the Guide for Applicants
01/12/2023	0.6	CARSA	Published version of the document
02/02/2024	0.7	CARSA	Support available for applicants edited

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Abbreviations and Acronyms:	
ICT	information and communication technologies
AI	Artificial Intelligence
SME	Small-medium enterprise
EC	European Commission
EU	European Union
FSTP	Financial Support to Third Parties
SAE	Smart Anything Everywhere
I4MS	ICT innovation for Manufacturing SMEs
EMS	Evaluation Management System
ESR	Evaluation Summary Report
KPI	Key Performance Indicator
CV	Curriculum Vitae

## 1. Introduction to AI REDGIO 5.0

---

AI REDGIO 5.0. aims at reinforcing the alliance between Vanguard European regions and EDIH for the adoption of AI-at-the-Edge by European manufacturing SMEs. This project gravitates towards the fulfilment of three main goals:

- Enabling the evolution of Manufacturing SMEs towards Industry 5.0.
- Evolution of cloud AI Technologies to AI-at-the-Edge procedures.
- Evolution and adaptation of H2020 programme into Horizon and Digital Europe programmes.

In order to achieve these goals, AI REDGIO 5.0. leans on the outcomes of the H2020 I4MS AI REGIO programme, adapting it to the requirements of the Industry 5.0. and implementing a competitive AI-at-the-Edge Digital Transformation for Small and Medium Enterprises. The [AI REGIO](#) project had a three-year duration and played an instrumental and successful role in the adoption of AI in the manufacturing sector by helping both providers and users of AI solutions. 36 partners from 12 different countries took part in this project, which involved more than 20 SME experiments about AI-driven transformations to build the factories of the future.

AI REDGIO 5.0 will maintain the momentum of AI technology adoption in Manufacturing SMEs, while bringing in depth and breakthrough changes to the ongoing efforts. In particular, the project considers the following aspects:

- Conceptual framework and reference architecture for AI-at-the-edge Industry 5.0 applications and experimentations.
- Secure and trustworthy edge-to-cloud continuum data and computational space for highly distributed AI applications.
- Interoperability by design with the pan-EU AI-on-demand platform and its ecosystem of H2020 and Horizon Europe innovation actions.
- Transition from regional DIHs to a network of EDIHs.
- Test-before-invest experiments in AI Didactic Factories and TEF (Testing and Experimentation Facilities) for SME-driven applications.
- Support the transition towards sustainability, through the ecosystem development and replication to SMEs.

## 2. AI REDGIO 5.0 1<sup>st</sup> Open Call for experiments

---

This section presents the objective of the call, who can apply and the eligibility criteria.

### 2.1. Objective

---

The objective for the first open call of AI REDGIO 5.0 project is to select up to **10 SME-driven experiments** focused on the implementation of AI at the Edge and Industry 5.0 systems with the aim of improving existing solutions, products or processes in the manufacturing area. Additionally, the open call will contribute to extend the domains of AI REDGIO 5.0 and benefit directly manufacturing SMEs and small mid-caps.

We expect 3 topics to be covered by experiments. At least 2 experiments will be selected for each of the topics.

## **Technological topics:**

### **1. TOPIC 1: AI at the Edge applications and edge-to-cloud continuum**

AI plays a significant role for almost any industry and the same is a reality for manufacturing. In AI REDGIO 5.0 the main goal is to showcase the advantages AI can bring to manufacturing enterprises when this is performed at the edge, making use of the edge-to-cloud continuum, capitalising on the capabilities that are today offered by novel cloud-to-edge execution frameworks and infrastructures, as well as AI models and libraries that are in a position to realise local execution. Using such approaches manufacturing industries and SMEs are able to grasp all the benefits that accompany this approach (e.g., low latency, minimal data transfer, data sovereignty and privacy, etc.).

Experiments to be selected should demonstrate the above-mentioned approach, with providing real-life use cases that call for AI execution at the edge, or using hybrid cloud-edge infrastructures, and building the necessary services and AI models to realise this target. Experiments shall design the necessary AI pipelines to execute their use cases, and local execution of the AI models should be performed on edge computing environments, such as the one specified by the [AI-REDGIO Open Hardware](#) or similar, which applicants have to deploy. Moreover, the re-use (and at a later experiment stage the publication) of AI models to the [AI-on-Demand platform](#) is strongly encouraged.

Applications of interest include, but are not limited to, the use of AI for predictive and prescriptive maintenance, automation, manufacturing operations planning and scheduling, waste reduction, energy efficiency, resource optimisation, quality control, circularity, resource optimisation, etc.

In all experiments, applicants should clearly showcase how Human-AI teaming can be achieved in their use case, where AI and human interaction are blended to benefit both the AI system, as well as human operators.

### **2. TOPIC 2: Industry 5.0 and human-centric, resilient and sustainable manufacturing**

Whereas Industry 4.0 advocates the fostering of industrial activity that transcends technical and economic objectives such as productivity and efficiency, Industry 5.0 seeks to promote other purposes that are also essential for the future of the sector, i.e., human well-being, sustainability, and resilience. Industry 5.0 is a model of the next level of industrialization characterized by the return of manpower to factories, distributed production, intelligent supply chains, and hyper customization, all aimed to deliver a tailored customer experience time after time.

Experiments to be selected should explore how Industry 5.0 and human-centred digitalization can contribute to the flexibility and adaptability of small and medium-sized enterprise (SME) production processes, resulting in more resilient and sustainable systems. The goal is to explain on real use cases the relationship between digital technologies and production system features through progressively more human-centric stages of a digitalized manufacturing system. Experiments should focus on measurable benefits in Industry 5.0 context, such as improving well-being of workers, creating safer workspace, improved ability to adapt to adverse situations with positive results, reducing negative environmental aspects in the entire product life cycle.

Applicants are encouraged to adopt AI REDGIO 5.0 reference architecture (RA) for providing end-to-end solutions. Proposals in this topic shall provide clear business scenarios, reflecting real industry challenges and defining and measuring realistic technical and business KPIs. In this perspective, it is expected that the application experiments provide their own datasets and the commitment of Manufacturing SMEs to define and measure the business benefits from AI REDGIO 5.0 RA.

### **3. TOPIC 3: TERESA (Technology Regulatory Sandboxes) experiments**

In the Industry 5.0 workplace of the future, envisioned by AI REDGIO 5.0, humans and machines are expected to share physical spaces according to the cutting-edge Collaborative Intelligence-driven paradigm, working



not only sequentially but even with close, physical real-time responses from machines/robots to the operators. The AI-driven autonomous systems will efficiently and effectively interact with the human beings, enabling an immersive AI-based human-machine co-working environment. The work has a pivotal role in most adult lives. Therefore, the ethical, regulatory, psychological and societal impacts of the introduction of Industry 5.0 and CI solutions in the workplace must be taken into account: it is paramount to perform experimentations to ensure that both industrial companies and workers benefit from the advantages of a synergistic collaboration between humans and machines and that the workers (and their rights) are put at the center of the factory, moving ahead towards the ethically-sound and human-centered human-machine co-working environment.

In order to promote the data-and-human-oriented SME digital transformation, the AI REDGIO 5.0 Project is extending the AI REGIO Network of Didactic Factories (DFs). In synthesis, an AI REDGIO 5.0 DF is an open testing and experimentation facility which extends the services of a Learning Factory towards the materialization of the EDIH “test before invest” pillar. By providing access to technical expertise and experimentation as well as the possibility to “test before invest”, A Didactic Factory, like an EDIH, helps companies innovating their business or production.

The main goal of Topic 3 proposals is to develop a TEchnology and REgulatory Sandbox (TERESA) experiment, exploiting a DF’s facilities and addressing Human-AI interactions and regulatory and ethical issues. The experiments to be selected under topic 3 must cover one or more of the Topics 1 and 2, following the “humans in the loop” train-explain-sustain paradigm. The TERESA experimentation should have a twofold objective: i) a technical validation of the Human-AI interaction through a DFs, following the test-before-invest paradigm, and ii) a regulatory and ethical validation, involving volunteers and at least a competent authority (such as regulators, supervisors, policy-makers, innovation agencies, Vanguard Initiative representatives, regional or local authorities, etc.). One or more of the following so-called WISE aspects have to be addressed by the TERESA experiment:

- **Well-being, Comfort and Acceptance**, which refer to the impact on mental well-being and self-esteem, frustration, feeling of usefulness, emotional dependence and overconfidence on the machine, human dignity, autonomy and oversight, concerns/willingness in collaborating with a machine;
- **Inclusion and special categories of workers**, which refers to the effects on older workers, effects on novices, effects on workers with cognitive or physical disabilities/impairment, social isolation, risk of discrimination/bias;
- **Safety of the worker**, including health and safety of the workers, risks of harm, privacy and other.
- **Ergonomics and improving working conditions**, comprising the impact on stress reduction, fatigue reduction, effects on workers' skills.

**NB: If the applicant chooses to conduct the experiment at one of the AI REDGIO 5.0’s DF’s premises, they should indicate it at proposal stage which DF they wish to join. Make sure to include in your budget any foreseen travel costs. The complete list of DFs part of the AI REDGIO 5.0 project can be consulted here:**

**<https://www.airedgio5-0.eu/didacticfactoriesexperiments>**

## 2.2. Key dates

The key dates of the open call are as follows:

**Table 1. Key dates for the AI REDGIO 5.0 first open call**

Activity	Dates
Call opening	01/12/2023

Call closing	01/03/2024 – 12:00 CET
Assignment of evaluators	19/02/2024-08/03/2024
Evaluation of proposals	11/03/2024 – 14/04/2024
Communication of results	15/04/2024-22/04/2024
Sub-grant Agreements	23/04/2024 – 19/05/2024
Execution of experiments	20/05/2024-19/01/2025

### 2.3. Who can apply?

The AI REDGIO 5.0 open call is addressed to **manufacturing SMEs** eligible for Horizon Europe. Only one proposal will be accepted for each SME.

**SMEs:** manufacturing SMEs, as defined in the European Commission recommendation 2003/361/EC<sup>1</sup>, as published in the Official Journal of the European Union L 124, p. 36 of 20 May 2003.

“The category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million.” Extract of Article 2 of the annex to Recommendation 2003/361/EC.

### 2.4. Eligibility criteria

In order to be considered as eligible, applicants must comply with the following:

- All participants must be registered in a EU27 Member State or Horizon Europe Associated Countries<sup>2</sup>.
- Status of all organisations presenting the proposal falls under the categories indicated in section **Who can apply?**

Furthermore, the proposal must:

- Be submitted in English. Proposals submitted in any other language will be excluded.
- Be submitted within the stipulated deadline.
- Be completed and follow the template provided.

## 3. AI REDGIO 5.0 experiments

<sup>1</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32003H0361>

<sup>2</sup> [https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/list-3rd-country-participation\\_horizon-atom\\_en.pdf](https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/list-3rd-country-participation_horizon-atom_en.pdf)

This section presents the mandatory tasks to be carried out by the experiments, the deliverables, the expected timeline, the budget and the payment schedule. The expected duration of AI REDGIO 5.0 experiments is of 8 months.

### 3.1. Experiment tasks

---

The selected experiments will have to participate in various mandatory activities:

- **Kick-off meeting of the AI REDGIO 5.0 selected experiments:** the selected experiments will participate in a kick-off meeting organised by AI REDGIO 5.0 with the aim of presenting their experiment in terms of general overview, objectives, participants and expected outcomes.
- **Participation in at least 1 individual follow-up meeting with AI REDGIO 5.0 monitoring team:** the monitoring team will control the execution of the experiments through the organisation of a follow-up meeting at month 4. This meeting will allow the assessment of the advancement made by each experiment and will enable to solve any problems that may appear during the first months of execution.
- **Preparation and delivery of the established deliverables (see section 3.2):** the experiments will have to develop a set of deliverables defined in section 3.2 that will serve to assess the execution of the experiments and the outcomes achieved.
- **KPIs:** The pilot experiments will define a set of KPIs in order to monitor, and finally assess, their experiment.
- **Dissemination of the experiments:** the selected experiments will carry out dissemination and exploitation activities during and after the execution of the experiments.

### 3.2. Experiment deliverables

---

- **D1. Technical Specifications, Architecture and/or Data Pipelines**  
This deliverable will detail the technical specifications of the pilot as well as the architecture and/or data pipelines. It will describe the system requirements, design decisions, components used in the experiments, as well as the architecture mapping and the phases of the experiment. This deliverable will also include the implementation of the proposed pipeline.
- **D2. Experiment implementation, Integration and Testing**  
This deliverable will explain in detail the phases of implementation, integration and testing of the experiment. It will contain a timeline of the experiment as well as a detailed description of the activities performed during the experiment. This deliverable also considers the definition of the barriers and difficulties faced during the implementation, integration and testing stages and the respective contingency plan.
- **D3. Experimentation and Measurement of technical-business KPIs**  
The pilot experiments will define a set of technical and business KPIs that the experiment is intended to address. These KPIs will reflect the outcomes of the pilot experiment solution and enable a deep analysis.
- **D4. Dissemination and exploitation + communication material**  
This deliverable will define the dissemination and exploitation actions carried out by the pilot experiment participants during the execution of the experiment, as well as the expected activities for the coming months. The impact generated by these dissemination activities will be also considered within this deliverable. Furthermore, the communication material used for these activities (such as posters, infographics, brochures, videos, etc.) will be also presented.



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### 3.3. Experiment timeline

The experiment timeline will be the following:

**Table 2. Expected timeline of experiments**

	M1	M2	M3	M4	M5	M6	M7	M8
Milestones	Kick-off			Individual Monitoring Meeting				
Deliverables				D1. Technical Specifications, Architecture and/or Data Pipelines D2. Experiment implementation, Integration and Testing				D3. Experimentation and Measurement of technical-business KPIs D4. Dissemination and exploitation + communication material

The **follow-up meetings**, scheduled for month 4 of the experiment, will be organised in order to enable the project coordinators to monitor the progress and solve any issues occurred during the implementation of the pilot experiment.

### 3.4. Budget and financial support

This Open Call has a budget of EUR 600.000,00 to fund 10 experiments. The maximum amount of FSTP allowed per experiment is **up to EUR 60.000,00**.

#### **Budget considerations:**

- **Funding rate:** the funding rate follows Horizon Europe rules, the funding rate applicability for the selected SMEs or for-profit entities is 60% of eligible costs, while for non-profit organisations it is 100% of eligible costs.

### 3.5. Structure of the budget

AI REDGIO 5.0 first Open Call will follow the Lump Sum cost reporting system. Lump sum funding provides considerable simplification potential, as it removes all obligations on cost reporting and the need for timesheets, simplifying a big part of the administrative burden on beneficiaries.

Proposers have to include the presentation of the budget requested in the proposal. The costs are exclusively destined to the execution of the pilot experiment and the development of the deliverables defined under section 3.2 Experiment deliverables.

### 3.6. Payments

The payment for the experiments will be linked to the accomplishment and approval by AI REDGIO 5.0 consortium of the defined KPIs and deliverables. The payment of the requested funding will be made in two instalments:

**Table 3. Payment procedure**

Payment	Description	Related deliverables	%
<b>A pre-financing payment</b>	At the signature of the sub-grant agreement.	Sub-grant agreement	50%

<b>A second and final payment</b>	<p>At the end of the experiment, when the defined KPIs and deliverables are accomplished and approved by AI REDGIO 5.0 responsible partner.</p>	<p>D1. Technical Specifications, Architecture and/or Data Pipelines D2. Experiment implementation, Integration and Testing D3. Experimentation and Measurement of technical-business KPIs D4. Dissemination and exploitation + communication material</p>	<p>50%</p>
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### 3.7. What is in AI REDGIO 5.0 for the participants?

The selected experiments will benefit from:

- Financial support of **up to: EUR 60.000 per experiment;**
- Taking advantage of existing AI in the Edge components and AI at the Edge expertise for manufacturing already available in AI REDGIO 5.0 consortium;
- Extend and improve the AI REDGIO 5.0 catalogue of advanced AI at the Edge components and tools;
- Participate in innovative experiments in the domain of AI at the Edge for Manufacturing.

## 4. Experiment design, submission and evaluation

### 4.1. Overall process

Experiments will undergo the following stages:

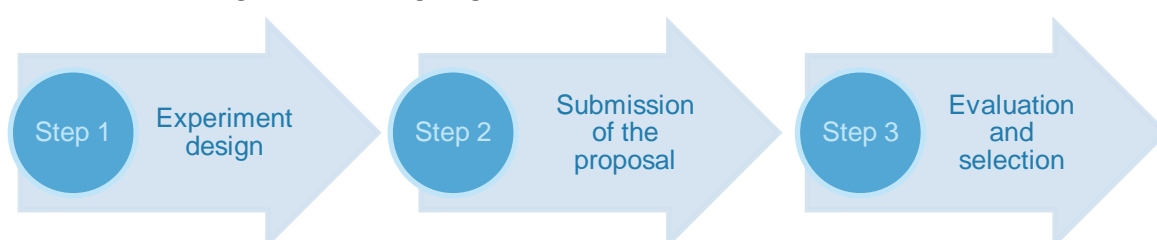


Figure 1. Open Call participation procedure

The steps are briefly described in the sub-sections below.

### 4.2. Step 1: Experiment design

Applicants have to prepare a description of the project proposal, as well as a technical description with further details concerning the implementation of the project and the exploitation of results.

The proposal is submitted in a single stage through the Evaluation Management System (EMS) online platform: <https://airedgio.ems-carsa.com/>. The template can be downloaded from the EMS platform. Applicants are asked to carefully read and follow the instructions provided in the proposal template.

The proposal template details what is expected from the applicants in each section. Please note that each section of the proposal corresponds to an evaluation criterion.

The proposal template includes the following sections:

**Table 4. Structure of the proposal**

Section	Sub-sections
<b>1) Excellence</b> (3 pages)	1.1 Objectives of the experiment 1.2 Experiment overview 1.3 Scientific and Technological Excellence
<b>2) Impact</b> (3 pages)	2.1 Expected impact on the SME 2.2 Dissemination and exploitation plan
<b>3) Implementation</b> (4 pages)	3.1 Work Plan 3.2 Budget of the experiment 3.3 Participant presentation

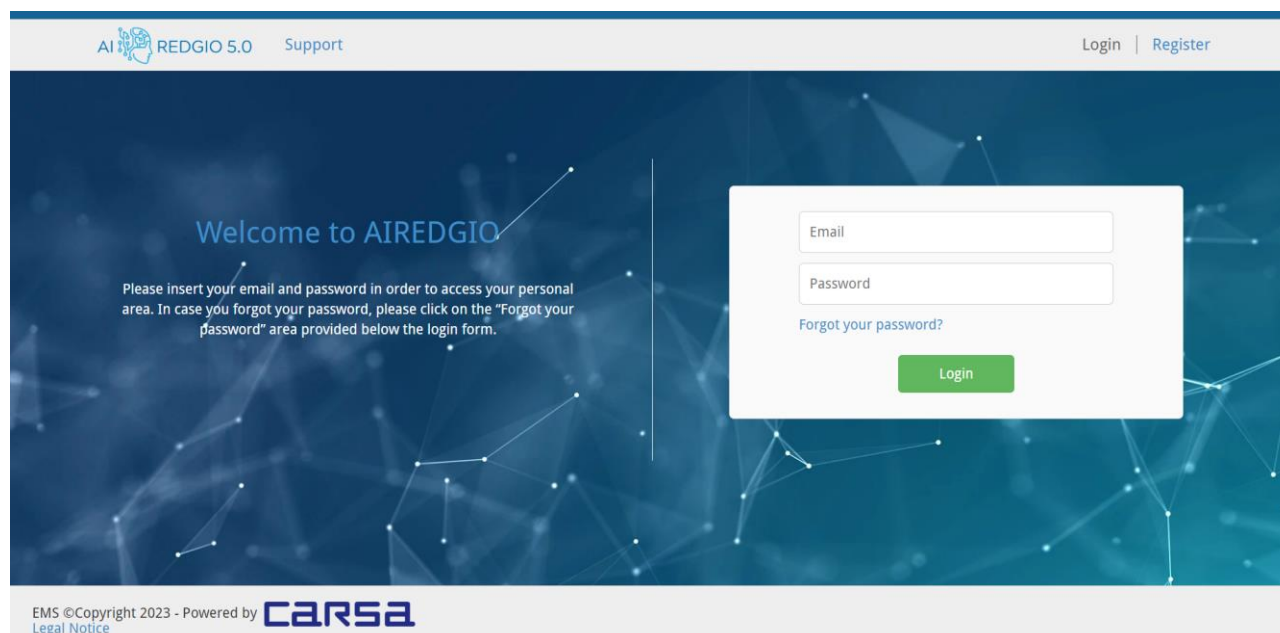
Further detail on what is expected in each sub-section is indicated in the proposal template.

In addition to the proposal template, applicants are welcome to support their proposal by providing the following annexes on the platform:

- **Additional documentation to support the proposal experiment** (not mandatory)

#### 4.3. Step 2: Submission of the proposal

The proposals are submitted digitally, by the SME, in a single-stage through the Evaluation Management System (EMS). proposals prepared according to the instructions provided, shall be submitted electronically through the EMS platform. Applicants should follow the steps starting from the AI REDGIO 5.0 EMS website <https://airedgio.ems-carsa.com/>.



**Figure 2. Home page of EMS platform for AI REDGIO 5.0 Open Calls**

Once the proposal is completed, click "Submit". Applicants will have the chance to submit new versions of their proposal as many times as they wish before the call closure. Only the last version submitted before the deadline will be considered in the evaluation.

The responsibility for a successful and timely reception remains with the applicants. Proposals arriving after the closing date and time will not be taken into consideration.

An acknowledgement of receipt will be sent out via email to all successfully submitted proposals, as soon as possible after the closure of the call. However, this receipt will not be proof that the proposal is eligible for evaluation.

#### 4.4. Step 3: Evaluation and selection

---

The proposals received will go through the following evaluation process detailed below.

##### 4.4.1. Eligibility check

---

All proposals received go through the automatic eligibility check. The eligibility check ensures that the criteria presented in section 2.4 are met. Criteria are the following:

- All participants must be registered in a EU27 Member State or Horizon Europe Associated Countries<sup>3</sup>.
- Status of all organisations presenting the proposal falls under the categories indicated in section **Who can apply?**

Furthermore, the proposal must:

- Be submitted in English. Proposals submitted in any other language will be excluded.
- Be submitted within the stipulated deadline.
- Be completed and follow the template provided.

##### 4.4.2. Evaluation

---

The best proposals of innovative experiments in the domain of AI for Manufacturing complying with the following criteria will be awarded for financial support:

- a) The relevance to AI REDGIO 5.0's objectives and scope including complementarity to the project's technical areas of specialization and manufacturing domains of the AI REDGIO 5.0 Champions.
- b) Its impact to the AI sector needs, the development of AI on the Edge in Europe, AI REDGIO 5.0 ecosystem, and AI REDGIO 5.0's goals and objectives.
- c) The ability of the proposer to implement the experiments and/or integrate its new services, on the basis of the team and company profile, background infrastructures, experience, but also based on its proposed implementation plan.
- d) The ability of the proposed solutions to interface with the outside world (other data sources, external AI pipelines or visualization tools) through open and standard APIs (e.g., gRPC<sup>4</sup>) to enable interoperability with the ever-growing catalogue of AI REDGIO AI on the Edge solutions.

The following table presents the detailed description for each evaluation criteria.

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<sup>3</sup> [https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/list-3rd-country-participation\\_horizon-atom\\_en.pdf](https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/list-3rd-country-participation_horizon-atom_en.pdf)

<sup>4</sup> <https://grpc.io/>



**Table 5. Evaluation criteria**

Evaluation criteria	Description
<b>1) Excellence</b>	<ul style="list-style-type: none"> <li>• Define clear and ambitious objectives.</li> <li>• Demonstrate alignment with AI REDGIO 5.0 objectives.</li> <li>• Address the sectors and technologies of AI REDGIO 5.0 open call.</li> <li>• Develop a sound and ambitious experiment consisting on an end-to-end solution, starting from connecting data sources, till “action handling” (visualization, robot arm, etc.).</li> <li>• Provide a clear description of the challenge the experiment plans to overcome.</li> <li>• Present a draft of the architecture based on the StreamPipes orchestration and further connections with the outside world (open-source API based on existing standards like gRPC).</li> <li>• Demonstrate innovation capacity to improve the current processes, products or services.</li> </ul>
<b>2) Impact</b>	<ul style="list-style-type: none"> <li>• Contribute to increase the digitalisation level of the SME.</li> <li>• Demonstrate clear technological, economic and commercial impacts.</li> <li>• Set clear and realistic KPIs.</li> <li>• Develop an appropriate dissemination and exploitation plan.</li> </ul>
<b>3) Implementation</b>	<ul style="list-style-type: none"> <li>• Develop a coherent and clear work plan with an appropriate assessment of risks, together with a clear assignation of efforts and resources to each work package.</li> <li>• Have the required capacity to carry out the experiment (budget).</li> <li>• Demonstrate capacity to carry out the experiment (personnel, infrastructure, etc.).</li> </ul>

Each proposal will be evaluated by two evaluators against the criteria outlined above. Each evaluator will record his/her individual opinion on each proposal using the evaluation form available in the EMS platform. They will then communicate in order to reach consensus on the quality of each proposal. The result of that agreement (comments and scores) will be reflected on the Evaluation Summary Report (ESR). Only proposals with scores above thresholds for each criterion, as indicated below, will be ranked for funding. Once ESRs of all proposals are completed, AI REDGIO 5.0 partners will have a meeting in order to rank all the proposals and create a shortlist of maximum 10 proposals, which will finally be proposed to receive funding. The rest of the approved proposals will be included in a reserve list.

The evaluation will be carried out by experts who are completely independent from the applicants. These experts will be individuals with experience and knowledge in the fields of digital technologies, with a special focus on Artificial Intelligence and the implementation of digital strategies.

When preparing the ranking, if two or more proposals are tied with the same overall score, priority will be given as illustrated in table below. The thresholds and priorities given to each criterion are the following:

**Table 6. Criteria thresholds and priority**

Criterion	Threshold	Priority (in case of ex-aequo)
<b>Excellence</b>	3	2
<b>Impact</b>	4	1
<b>Implementation</b>	3	3

The following table details the evaluation scores for each criterion:

**Table 7. Evaluation scores**

Score	Description
<b>0. Fail</b>	The proposal fully fails to address the criterion under examination or cannot be judged due to missing or incomplete information.
<b>1. Poor</b>	The criterion is addressed in an inadequate manner, or there are serious inherent weaknesses that will impede success.
<b>2. Fair</b>	While the proposal broadly addresses the criterion, there are significant weaknesses that would hinder the project implementation.
<b>3. Good</b>	The proposal addresses the criterion well, although improvements would be necessary and various details are missing on implementation.
<b>4 Very Good</b>	The proposal addresses the criterion very well, although certain improvements are still possible and some particular details are missing on implementation.
<b>5. Excellent</b>	The proposal successfully addresses all relevant aspects of the criterion in question. Any shortcomings are minor.

All activities proposed should respect fundamental ethical principles, including those reflected in the Charter of Fundamental Rights of the European Union. If any issues with these fundamental ethical principles are identified while the proposal is being evaluated the initiative will take any measures deemed appropriate in order to deal with the situation.

#### 4.4.3. Evaluators

Each proposal will be **evaluated by two experts**, being **one internal expert** and **one expert external from the consortium partners**. Each proposal will be evaluated according to the established criteria and will be given a score which will be used to select the experiments.

The names and CVs of the evaluators are communicated to the European Commission.

These evaluators will sign a declaration of confidentiality and a non-conflict declaration.

#### 4.4.4. Ranking of proposals and final selection

The result of this evaluation is a ranking of the proposals according to the obtained scores. The final selection will ensure diversity in terms of sectors and geographical coverage.

Once the evaluation process is completed for all proposals, applicants, whether successful or unsuccessful, will receive a notice on the outcome of the evaluation and their Evaluation Summary Report.

## 5. Support available for applicants

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In addition to the present Guide for Applicants, the following tools are available to support applicants:

- **Frequently Asked Questions**

A Frequently Asked Questions document is available on the website. The document will be periodically updated to reflect the questions received.

- **Helpdesk**

Applicants may contact the AI REDGIO 5.0 helpdesk should they wish to receive further information on the Call for Proposal content and conditions through the EMS platform.

- **Official AI REDGIO 5.0 website page dedicated to the open call**

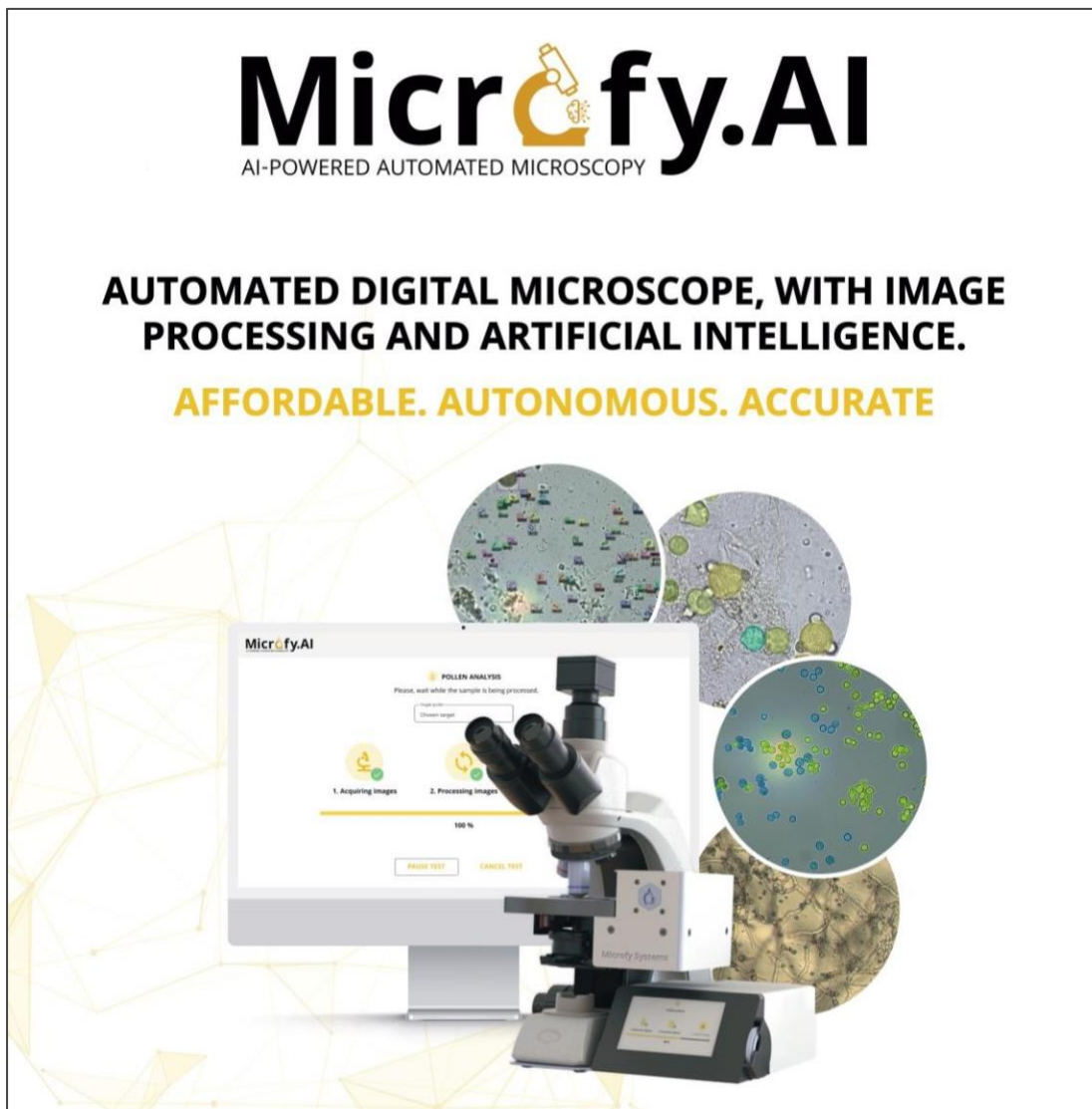
A dedicated webpage is available on the official AI REDGIO 5.0 website to check all the related information and to download all the documents useful for the application. The webpage is linked with the EMS platform to facilitate the connection between the tool and the uploading of the application.



## AI REDGIO 5.0 OPEN CALL 1

*Technical annex*

*07-EDGE-MICROFY*



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## IDENTIFICATION DATA OF THE EXPERIMENT

TITLE OF THE EXPERIMENT	Evolution experiment to migrate and adopt an Edge-Computing architecture into our AI-powered automated digital microscope for the agrifood processing industry.
ACRONIM OF THE EXPERIMENT	EDGE - MICROFY
TOPIC <sup>1</sup>	AI at the Edge applications and edge-to-cloud continuum
SME NAME	Microfy Systems SL
SME COUNTRY	Spain
SME REGION	Barcelona (Catalonia)

<sup>1</sup> TOPIC 1: AI at the Edge applications and edge-to-cloud continuum  
TOPIC 2: Industry 5.0 and human-centric, resilient and sustainable manufacturing  
TOPIC 3: TERESA (Technology Regulatory Sandboxes) experiments

## 1. TECHNICAL EXCELLENCE

### 1.1. The Need and the Solution

There are many different analyses in the agrifood processing chain which are done with traditional microscopy with the aim to detect, count, or even classify microscopic particles/microorganisms in the samples. Microscopy is key in the food manufacturing industries. Typical examples are those with active fermentation processes within the manufacturing process, for instance. But there are many other examples like detection of contaminants, quality assessment, or microorganisms counting, in which traditionally there is an expert technician, observing a sample in detail through a standard light microscope, during long and exhausting periods (sometimes even an hour per test!).

These traditional operations in the food manufacturing industry are labour intensive, tough, repetitive, must be carried out by hand by widely trained experts, and are expensive if externalized to specialized labs. In addition, when these kinds of analysis are externalized to specialized labs, the manufacturing companies receive the results deferred (days, or more than a week), so they lose real-time control of the product, and the process.

All these microscope analyses within the food manufacturing industry are perfect candidates to integrate autonomous AI-powered devices (coupled with image processing algorithms and trained neural networks) to allow faster and cheaper operations, while increasing control of their products. Unfortunately, the commercially available solutions of autonomous scanning microscopes are too expensive for the food sector (typically ranging from 25k€ to 120k€), since they are generally conceived and designed by large firms specifically for the MedTech and BioTech industries, which are more complex/demanding, and typically count with larger purchasing budgets for this type of laboratory equipment.

In view of this clear business need for affordable, easy-to-use and autonomous scanning microscopy device, at Microfy Systems our team started by 2020 to design and manufacture specific solutions for the automated quality control specifically designed for the agrifood industry, by means of robotizing a basic digital microscope (to act as a self-driven autonomous device), coupled with an AI-based image processing pipeline hosted in AWS, which acts as the “intelligence” of the system. Our solutions are specifically conceived for non-expert end-users.

With our devices we aim to assist humans within the control checks usually performed in the food manufacturing industry, including specific optical analysis to determine different parameters as: the presence of a contaminant, the concentration measuring of different particles, the texture of a sample, the number and species of microorganisms or its size in a culture, for instance.

Considering our technology platform (robotized hardware + AI software) as the basis of the business model, our team develops different branded solutions for each different application/market:

- Honey.AI ([www.honey-ai.com](http://www.honey-ai.com)) is our current flagship product, 100% designed for the honey processing industry.

The first manufacturing industry that we decided to target was the honey industry. The reasons are simple: In Europe, due to the directives and best practices of the sector, honey packers must conduct a very specific and complex quality check, which is the “pollen analysis”. It is done mainly for 3 reasons: 1) To classify the kind of honey marketed as polyflora or monoflora, and the specific botanical type (lavender, eucalyptus, thymus, rosemary, etc.), to meet the labelling legal requirements, 2) as a measure of product valorization between producers/importers/exporters/traders/packers. The highest purity the honey has, the more expensive it becomes in the market, and, 3) to help preventing food fraud, as a scanning technique to identify floral and geographical origin of the product.

The problem is that pollen analysis is a very manual test which involves looking at samples under the microscope for 1 hour to detect and classify the pollen grains in the sediment. It must be done by technicians who have been trained and are widely experienced, because there are >300 pollen types, only in EU. The cost of the test performed by a specialized laboratory ranges from 40€ to 80€, and takes 7 – 14 days to get the result back.



Traditional analysis is expensive, time-consuming, usually involves subjectivity and human error, and the results are obtained deferred. Honey.AI is the first smart microscope worldwide that performs automated pollen analysis (pollen counting and specie classification) on honey samples with image processing and AI.

The device, also performs other types of quality analysis, such as colour, starch detection, crystallization degree, and yeast counting (see Annex).

- Ferment.AI – By taking advantage of the work done with Honey.AI, the second product is intended to target beer and wine industries, to perform automated counting of yeast and bacteria cells during different fermentation stages in the production chain, while also discriminating dead/alive cells, based on colour range. This application is on Beta stage, not yet commercial.
- Fungi.AI – Last but not least, the last application is for mycelium growth monitoring (including time-lapse analysis), mostly for the alternative-protein manufacturing industry based in mycoprotein production, and for the pharma sector.

As previously mentioned, our image processing AI-pipeline is currently hosted in the cloud (specifically AWS), where our architecture employs on-demand CPU and GPU EC2 instances to perform the analysis when requested by the users from the APP, after deploying the specific DL-models for each application. This cloud architecture was initially chosen because of the cybersecurity assured by AWS environment to host our models, and also for the availability of powerful GPU to run our models, and re-train them frequently.

However, as our applications grow, there are specific critical disadvantages associated with cloud-computing, such as 1) the limitation of the requirement of high-bandwidth internet for the end-users (not existing in some locations), 2) high dependance on external provider, and 3) the economic costs paid for the infrastructure and GPUs, since some analysis (as pollen one) compute during more than an hour, with more than 5k High-Quality pictures processed per analysis. This is traduced in high GPU demand, which also sometimes are not available.

One year ago, our team tried to migrate to an embedded edge-hybrid architecture in which a specific part of the pipeline (pollen detection) should had been done on a Jetson Nano. However, the computing capacity on Jetson Nano was too low for our MaskRCNN pollen detection model, so a YoloV5 low- accurate model had to be considered, while classification step on EfficientNet models was kept on the cloud. The accuracy decreased a lot.

In that sense, our AI REDGIO 5.0 experiment considers 2 overall goals:



- 1) On one hand, evolve Honey.AI to an edge-hybrid architecture to migrate to a Jetson Orin Nano (see picture on the left) the pollen detection step, in order to avoid uploading thousands of non-useful images to the cloud, thus reducing AWS costs for our company, and avoiding large amounts of data traffic, while not reducing the accuracy/precision of the models.

- 2) Second, for the other three applications and also future ones, assess the feasibility of migrating a whole AI-pipeline to the edge, while taking into account cybersecurity constraints. If successfully implemented, our devices would become 100% autonomous and be self-controlled by the user through the HMI touchable display (see picture on the right), instead of an external laptop of the user.



## 1.2. Objectives of the experiment

With this project, our experiment is totally aligned with the AI REDGIO 5.0 open call objectives: 1) Enabling the evolution of Manufacturing SMEs towards Industry 5.0, not only on our side, but also on the our clients', from the agrifood manufacturing industry, 2) Evolution of cloud AI Technologies to AI-at-the-Edge procedures, showcase the advantages AI can bring to manufacturing enterprises when this is performed at the edge, making use of the edge-to-cloud continuum, capitalizing on the capabilities that are today offered by novel cloud-to-edge execution frameworks and infrastructures. In our case, It is not possible to use AI-REDGIO Open Hardware to the limitations on size and computing capacity, due to the complexity and size of our DL-models.







The specific objectives for this experiment will be:

1. The goal of use case 1 is the detection of pollen grains in images using a detector that can run in real time. The goal is to filter the images that do contain pollen grains before sending them to a cloud for further classification. The algorithms to be used are instance detectors that generate a bounding box and a segmentation mask for each object in the image. Five different categories have been identified for this particle detector use case: “Not Pollen”, “Honeydew”, “Pollen”, “Yeast”, “Starch”.
2. The goal of use case 2 is the detection and classification of pollen in images with a larger model that processes everything, thus removing the need of the cloud or connectivity. This classification is done at pollen species, which have a lot of variety. The categories for this application are ~95 pollen species.
3. The goal of the third use case will be to implement also the application for microorganisms detection and classification used in cell/spore counter and viability analysis based on colour

To allow the deployment of the models within the support NVIDIA Jetson Orin Nano, specific export and optimization modules to convert all the different models to ONNX and further TensorRT to provide a quantized version for each one of the models. Then adapt and train the AI models for pollen detection in the embedded hardware to get the maximum performance per watt using the state-of-the-art NPU.

4. Last goal will be to commission and test the new version of the device, validate performance and KPIs in real operational field and compare overall results with the current version in terms of cloud processing figures, inference time, overall processing lead times, accuracy on detection, accuracy on classification, overall price of the device (current cost is 2.2k, and expected to increase by <600 euros only), and AWS costs.

The quantifiable objectives and criteria for success is:

- a) Cost of Goods < 2,700€
- b) Validate the accuracy, overall lead time, computing needs on AWS, and size of data transferred:
  - a. Goals use case 1 (edge-cloud hybrid architecture): i) 30% traffic reduction ii) 20% GPU needs reduction iii) 20% lead time reduction iv) x25% costs reduction.
  - b. Goals use case 2 and 3 (full edge): i) 80% AWS cost reduction ii) <3% reduction on overall accuracy, iii) <20% increase on overall lead time per analysis.

### 1.3. Experiment overview

Our device now is a combination of 4 subsystems interconnected:

- 1) The robotized microscope with sample stage, built with three integrated high-precision stepper motors for X-Y-Z translational movement (2 micron precision), and a 5MP digital camera that takes thousands of pictures per test. The microscope “scans” the glass slide area at 400X or 600X where the sample is spread, in different types of glass slide or glass chamber depending on the type of analysis done (yeast/bacteria/spore counting, pollen analysis, crystallization rate, or mycelium growth time-lapse tracking). It includes a self-designed control PCB, responsible of controlling the hardware.
- 2) The control APP as an executable desktop application developed in C++ for PCs, the application oversees the communication and movement control of the positioning system, as well as SDK communication with the digital camera. This APP also controls the communication with the cloud, using our API.
- 3) API, AWS and Cloud User Platform - The API is responsible of the tests management and on-demand cloud computation to run the deep learning models. The API also communicates with a MongoDB database and the Clients’ Platform, the communication tool for our customers.
- 4) AI-pipeline module ► Including different image processing algorithms and different deep learning models (mainly Convolutional Neural Networks architectures and Transformers) that have been trained with property datasets (internally developed) with thousands of images of each specific specie to allow the system to learn and recognize the patterns. For pollen analysis we count on more than 200k pictures.

While the current solution depends on the end-user’s laptop for connectivity and communication with the cloud, one of the goals of this experiment is to develop a fully autonomous device that locally computes the full pipeline, without increasing too much inference time, nor losing significant accuracy.



With this experiment we are targeting the industry of agrifood processing sector, including different specific markets and applications. Specifically, the technologies involved would be robotics, digital microscopy, instance detection and segmentation, object classification, traditional computer vision and image processing, and quality analysis/assurance. The hardware involved will be Jetson Orin Nano, due to the good relationship between GPU computing specifications and commercial price.

## 1.4. Scientific and Technological Excellence

### ■ Novelty and state-of-the-art

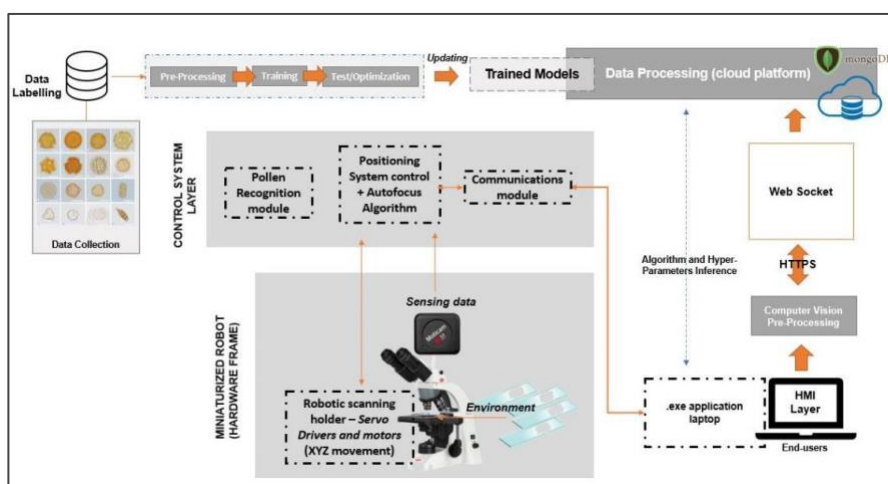
Honey.AI is the first smart device that conduct automated quality analysis of honey based on microscopy. There's no other commercially available solutions that conduct these type of analysis.

The substitute alternatives are the labs who have palynology experts. Approximately, there are 1-3 reference laboratories for honey matters per country (including specialized research groups in Universities). The most important ones are Eurofins, Quality Services International, Intertek Group, Apinevada (ES), Fera (UK), Analytica (NZ), Alnumed (GE), ALS Global(IT), Ventlabs (US), ALFA Chemistry(US). Honey.AI solution would become direct competitor of their business. Honey.AI's value proposition for end-users is:

- Time. Results obtained on-site, in less than 1hour.
- Results. Higher repeatability and no human errors.
- Honey Quality. Honey packers gain real-time process control in their plants when mixing/blending different batches from different beekeepers/traders, since they are able to characterize each batch, thus also estimate the concentration of the resulting marketed product.
- Costs. Investment recovered the 1<sup>st</sup> year of operation.

### ■ Overall architecture [now]

The scheme on the right shows the current architecture that we have, considering the device, the APP, the API, MongoDB, AI pipeline and models, EC2 instance on demand.



### ■ Challenges of the experiment and TRL

The overall challenge is to be able to migrate to an NVIDIA GPU computing on the edge which not increases too much the cost of the equipment, is small enough to be integrated within the current device control case, and assures that inference time and overall precision of our models are not significantly impacted, compared to our current architecture with cloud computing on AWS.

While Honey.AI application is already on Beta stage in the market, Fungi.AI and Ferment.AI are on TRL6. If this experiment ends with successful conclusions and performance KPIs, TRL after the project would be TRL8.

## 2. IMPACT

### 2.1. Expected impact on the SME

#### ■ Impact on Microfy Systems

Our solution is a combination of hardware and software that work interconnected for the best accuracy. We implement a B2B Business Model with an innovative approach with 2 revenue streams:



- A. **Direct sales of the Device** – A purchasing price of 4,800€ for the automated microscope.
- B. **Recurrent payments for database consultation during each analysis conducted** as an additional *pay-per-use* fee per complete honey analysis. It depends on the type of analysis and market. While pollen analysis is at 12€, between 5-10 times cheaper than laboratories, we also consider a subscription model for Fungi.AI.

Honey.AI is already a commercial product that our team has started to sell by summer 2023. Although it is still a Minimum Viable Product to run basic pollen analysis (to assist with botanical origin) and other basic quality parameters, we already count with 15 clients from 9 different countries, and the interest raised among the industry stakeholders is very promising. With this project, it is envisaged 2 different types of impacts for us:

- ① **COMMERCIAL IMPACT** → With a stand-alone device we would be able to reach new applications and collaborations faster, since we are not dependent on cloud architecture, nor variable costs of on-demand GPU. There are specific applications for laboratories in the public sector that demand for standalone alternatives, as well as partnerships with companies that have already developed the AI pipeline for other applications but are very interested in collaborating with us in regard to the automated affordable HW. Thanks to this experiment we could definitely migrate to a full edge-computing architecture.
  - ② **ECONOMIC IMPACT** → The impact on the economic side would be related with the reduction of variable costs per analysis on a AWS hosted full AI-pipeline. By reducing the requirements of GPU on AWS our company would be able to increase profit margin per analysis and offer the service even cheaper to clients, thus increasing the number of customer portfolio.
- Impact on our clients: food manufacturing/processing SMEs
    - ① **DIGITALIZATION IMPACT** → As previously summarized, our technical solution addresses focus area of Human-machine co-working, in which there is a smart use of an automated robot to avoid tough, repetitive labours in the companies, with low added-value. Our solution assists food processing companies to improve their workplaces, increase control of their production processes with almost real-time data, and facilitates human work to implement real added-value tasks.

The food sector is very traditional and has strong resistance to adopt new technologies and approaches to their daily operations, mainly due to the low commercial margins considered in this industry. The reluctance to invest in emerging technologies such robotics, AI, edge-computing, etc. is very high in this sector, but the potential advantages for them are very high, such as productivity increase, product's control increase, and also economic savings. For instance, for Honey.AI, The Return On the Investment [ROI] is between 6 and 24 months, due to the attractive savings obtained by the cheaper prices, compared to those of the labs. The example of a business case would be:

    - A specific honey packer performs 150 analysis per year at the labs, at an average price of 40 €/analysis.
    - So, this packer spends  $150 \times 40 = 6\text{k€}$ . per year, plus  $150 \times 10 = 1.5\text{k€}$  to cover samples' shipment to labs.
    - It means that the packer spends 7.5k€ per year in pollen analysis now.
    - With Honey.AI purchase, the annual expenditure would be only 1.5k€.
    - Payback: the investment of Honey.AI purchase is recovered the 1<sup>st</sup> year!
  - Impact on the overall Project AI REDGIO 5.0
    - ✓ We offer specific use-cases of the agrifood manufacturing sector. The application field is extremely different to the current fields presented within current use-cases.
    - ✓ Our team already designed the new version of stand-alone device with state-of-the-art edge-hybrid distributed architecture to reduce the GPU cloud computing currently used, as well as assure lower latency, higher reliability in remote locations, reduce traffic, bandwidth and data storage. The problem was that the device was not powerful enough, and the results were poor. In our case, our team is highly motivated to test different alternatives and provide the consortium with a real benchmarking of all the alternatives tested.
    - ✓ Our project includes a high demanding AI/ML application, with significant computing needs, and with 2 years of previous data gathered with cloud computing at AWS, so we have plenty of information to compare with.
    - ✓ Last but not least, our company commits to collaborate with the platform AI-on-demand and upload specific datasets of our property to be shared for educational applications.

## ■ KEY PERFORMANCE INDICATORS (KPIs)

The Key Performance Indicators related with the objectives of the experiment are those ones, which will be tracked on evolution and final results at the end of the project. Their target values are on the objectives section:

1. Inference Time per picture and location (position of the sample scanned, with different focal planes)
2. Overall Lead Time per analysis, considering the mechanics for sample scanning + inference.
3. Overall costs Spent on AWS architecture for GPUs/CPUs on demand (EC2 Instances)
4. Precision and Recall for each application, comparing both pipelines (cloud, hybrid and full-edge)

## 2.2. Dissemination and exploitation plan

Microfy Systems owns full property rights of our solution, including robotized hardware, custom PCB, APP, AI-pipeline, and database. Our team has a collaboration agreement with Motic Europe (as exclusive distributors), who are the suppliers of the basic microscope and the commercial industrial camera as components of our hardware. We are currently selling Honey.AI within the honey supply chain:

1. Honey packers ▶ Honey packers are those that buy bulk honey from traders, cooperatives and beekeepers and process it (filtering, homogenization, blending, pasteurization) and pack it for retail. They currently analyse almost all the external purchases of honey they do. As an example, considering a large honey packer ( $\cong$  €15M turnover) that imports part of their packing production, spends around 50-100k€ per year in externalized honey analysis (up to 400 tests), since they do not have an expert team, nor expensive equipment to conduct complex testing at their premises. Our affordable, fast and easy-to-use device would help them to save thousands of euros per year, if used as a screening technique at their premises, and to obtain real-time data without the need of sending samples to the lab.
2. Traders of bulk honey ▶ Better control of their purchases, specifically for large containers coming from those countries with highest incidence of honey fraud, such as China, Ukraine, and Turkey. Traders usually work with large international laboratories able to accurately identify any kind fraud, but the results are obtained 7-14 days after sending the honey sample, thus negatively impacting on their business. As honey trading is a highly speculative business and most of large purchases are done right after harvesting period, traders would benefit of a compact, on-site system, able not only to detect fraud, but also to assess the botanical purity of the sample at real time. The purer the honey is, the higher its commercial value results.

Our team has an approach of direct commercialization with own salesforce in target regions for our technologies, instead of reaching potential clients through industrial distributors. The selling approach is justified by:

- i) The industries we target still are niche market, with very well identified audience, and generally is very accessible to reach decision-makers within the entities,
- ii) we introduce a new business model in the sector, who are used to subcontract analysis services, thus there are not stablished industrial distributors of laboratory equipment focused in producers/traders,
- iii) the clients interested in its acquisition would probably first request a validation of performance with their specific samples, therefore live demonstrations during inverse trade missions are envisaged at our premises, or with free webinars, and finally,
- iv) Installation and maintenance will constitute both an additional revenues stream for us

The **selling approach and dissemination strategy** is mostly based into 3 verticals:

- ✓ Creating market references and technology acceptance and reliance among the stakeholders. We will achieve this by means of formal meetings with lobby groups and decision-making organisms.
- ✓ Second strategy is focused into spread the word with international trade fairs attendance (alimentaria, SIAL, Gulfood, Anuga, Apimell, etc) , public symposiums held in reference conferences, free webinars for stakeholders, direct marketing actions, publications in key journals, and own sales force promoting free-demo periods and inverse trade missions performing technical one-to-one free demonstrations. Microfy will also be very active within their network to spread the work and explain the advantages of the devices,

preparing free “business Cases” for all their clients to demonstrate the potential savings promoted by our invention.

- ✓ The communication channels will be mostly prescribers’ strategy, as well as direct e-mailing, LinkedIn.

Microfy is very active to spread the work and explain the advantages of our technology on different verticals in dissemination activities.



- ✓ **International trade fairs/shows attendance** ➤ This year we are attending Alimentaria Barcelona, IoT WorldCongress, Food4Future and 4YFN. Our team participates in key fairs and will be an active participator in further editions: [National Honey Show](#) (UK), [Anuga](#), [Sana](#), [SIAL](#), [FoodexSaudi](#), [GulFood](#) (UAE), [BIOFACH](#) (GE), [International Production and Processing Expo](#) (US), [Organic&Natural Products Expo Dubai](#) (UAE), [International Trade Fair of food processing technologies](#) (PL), [FoodTech](#) (DK).



- ✓ **Conferences – specific sector** ➤ The following events will be attended as speakers to create awareness among industry stakeholders: [Apimondia](#), [International Conference on Apiculture and Honey Bees](#), [American Beekeeping Federation Conference & Tradeshow](#), [congreso apicultura nacional](#).



- ✓ **Publications in specialized journals and magazines** ➤ In terms of in specialized press, key magazines have been identified: [Apicultura Iberica](#), [Vida Apicola](#), [Bee Culture](#), [American Bee journal](#), [Bee World](#), [Apiservices](#).

#### FINANCIAL GOALS BY 2027

447

Cumulated customers

€2,36 M

Revenue

€1,01 M

EBITDA

43%

EBITDA Margin

## 3. IMPLEMENTATION

The Gantt Chart of the 8-months project (between June 2024 and January 2025) and tasks description is below:

### 3.1. Work plan

WORK PACKAGES	M1	M2	M3	M4	M5	M6	M7	M8
<b>Work Package 1 ► Experiment Design</b>								
Technical specifications								
<b>Work Package 2 ► Experiment Development and Integration</b>								
AI pipeline								
APP/API/Cloud								
Mechatronics				D1, D2				
<b>Work Package 3 ► Experimentation and Assessment</b>								
Commissioning and internal testing								
Real Experimentation with comparative analysis								
Benchmarking and conclusions								D3
<b>Work Package 4 ► Exploitation and Dissemination</b>								
Dissemination								
Exploitation								D4

As can be seen, it will be implemented on a 3-step roadmap: Experiment Design, Experiment Development and Integration and Experimentation and Assessment. Also an additional work package for dissemination and exploitation tasks, running in parallel all project. There is 1 deliverable per WP, as indicated in the Guidelines.

Work Package 1 ► Experiment Design				
Duration	Starting month:	1	Ending month:	1
Task description: During this first task, we will detail the technical specifications of the experiment (including testing plan and models to migrate), as well as the overall architecture for each use-case and the data pipelines. Our team will define the required specific modifications for the APP, the API, MongoDB, current AWS architecture, components used in the experiments, tools to migrate models and carry out the deployment, tools for benchmarking				



analysis, and phases of the experiment. We will also look for specific compatibility of a Jetson Orin Nano with our specific versions of Pytorch, Detectron2 and CUDA.

**Main results:** Technical specifications and tasks, **identification of AS IS and TO BE values of experiment KPIs**. As an outcome, in this task our team will also create an implementation calendar and deadlines to be integrated in JIRA (internal project management). **Milestone:** Cost of Goods confirmed, deadlines and compatibilities confirmed, assessment of GPU capacities confirmed for different Use Cases.

**Deliverable: D1. Technical Specifications, Architecture and Data Pipelines (month 4)**

#### Work Package 2 ► Experiment Development and Integration

Duration	Starting month:	2	Ending month:	4
<p><b>Task description:</b> This task is framed on four different sub-tasks, specifically impacting on different parts of our current architecture: the AI-pipeline (including DL-models), the C++ APP, the API and the cloud (including dashboard and MongoDB) and the overall mechatronics design. The work to be done in this experiment is:</p> <p><b>AI-pipeline ►</b> Adapt the neural network to be deployed in the embedded hardware to get the maximum performance per watt by means of using specific open-source tools such as Kenning. As our aim is to place the AI models on an Edge device with almost no loss of accuracy, the models that we want to test must be very efficient. The inference time is also a limitation for us, as we don't want to block the acquisition of images due to having a large queue of images pending to be processed. We aim to keep our current AI object detection architecture in MaskRCNN, and migrate the pollen detector from current AWS cloud computing site to our specific HW selected. Also test options for the different functionalities: crystals, yeasts, colour and starch detection functionalities. Our expert will work on model optimization, export models, and migrate to TensorRT to get the highest efficiency. Additionally, the other image processing steps currently coded in Python will be migrated to C++ to be integrated in the APP.</p> <p><b>C++ APP ►</b> Re-code the App to make it compatible with the new acquisition hardware and to compile in the new ARM architecture, as well as change the GUI to make it usable without a full OS running in the background (functions to configure, WIFI, network, OTA updates, power control etc.). It is essential for us also to remove Qt libraries from the current APP to avoid paying license in the new stand-alone device. Also include the option to connect with local WiFi and develop a touchable keyboard once removing Qt.</p> <p><b>API/Cloud ►</b> Modify all the communications pipeline between the APP and the API/MongoDB, in order to allow that the AI pipeline runs on the edge and keep the values there during the analysis. The values gathered on MongoDB must be communicated to APP in different steps.</p> <p><b>Integration/Mechatronics ►</b> Physical integration of Jetson Orin Nano within the case of the device and connection with PCB board. For the experiment, the developer Kit is considered, since it already includes the microSD and the USB inputs, which facilitates the integration with the device and also the camera. Manufacture and assembly the new version of the device, test it and do first trials to compare its performance with the current version.</p> <p><b>Main results:</b> AI models migrated and optimized, evolved APP, evolved API, new source code.</p> <p><b>Milestone:</b> AI pipeline deployed within Jetson Orin Nano – functional version (Month 4)</p> <p><b>Deliverable: D2 - Experiment implementation, Integration and Testing (Month 4)</b></p>				

#### Work Package 3 ► Experimentation and Assessment

Duration	Starting month:	5	Ending month:	8
<p><b>Task description:</b> During this stage, the task will be to run and replicate real analysis on the different pipelines available and compare results by doing a real benchmarking and analysing the evolution of KPIs. The goal is to analyze if success KPIs are met (usability, repeatability, traffic reduction, accuracy, lead-time, latency, GPU computing needs) and compare them with the Beta Version performance. Also compare with Manual Counting by our expert. The evaluation methods to be evaluated are: learning and error curves, F1-score, precision, operating characteristic curve (ROC), area under the ROC (AUC), handling of false positives/negatives and analysis of the confusion matrix. Analyze the time taken to capture an entire location (movement included), this will allow us to compare with different solutions also having into account factors like power consumption, temperature of the device, dissipation needs, etc. The performance analysis in terms of AI models will be done using a subset of our datasets of pollen, yeast and color. As feed forward layers of the neural network have a small stochastic component, the variance of the inference time can be significant. To overcome this issue, we will evaluate our model multiple times (at least 10)</p>				



to average the metrics in each run and obtain a more accurate performance analysis. The metrics that we are going to evaluate at each run are: loading time of the model, inference time, precision and memory usage.

At the end of the task, our team will also create specific AI-Assets for the AI on demand platform, including partial datasets of our applications for educational/research purposes.

**Main results:** All the data abovementioned and results gathered will be included in a benchmarking analysis of all the solutions tested during the experiment, to evaluate the performance of each one and relate it with commercial price of each solution. The final decision will take price, dimensions, and performance into account. Final conclusion must be a Go/No-Go decision to commercialize the new version of this device and the final price.

**Milestone:** Prototype ready to be commercialized (after CE review and final optimization)

**Deliverable:** **D3. Experimentation and Measurement of technical-business KPIs (month 8)**

#### Work Package 4 ► Exploitation and Dissemination

Duration	Starting month:1	1	Ending month:	8
<p><b>Task description:</b> Our company is very active in exploitation &amp; dissemination actions. We have just launched a very disruptive product into a traditional sector and our aim is to disseminate the invention all around the globe. We will attend different events related with agritech, food, IA and IoT, including fairs, conferences and symposiums. In addition, we will additionally do a press release and include our information in our website and social networks (LinkedIn). Publications in specialized journals and magazines. We will also prepare a commercial video of the new stand-alone product and actively look for other opportunities with other partnerships that aim to integrate our HW.</p> <p><b>Milestone:</b> Commercial descriptive video for the evolved product (month 8) and leaflet/briefing.</p> <p><b>Deliverable:</b> <b>D4. Dissemination and exploitation + communication material (month 8)</b></p>				

### 3.2. Budget of the experiment

The costs of the experiment are personnel costs, cost of good and services, subcontracting and indirect costs associated with the action, considering the budget categories accepted on the Horizon Europe rules for Innovation Actions. The detailed breakdown and explanation of the costs are described here:

- **Personnel costs:** For this project, it is envisaged internal efforts covering electronics, API development, APP modification, ML migration and optimization, deployment, lab technician an testing, and management and coordination tasks. The overall personnel effort would be **58,500€** (~13.4 PMs at 30€/h average hourly rate)
- **Other direct costs:** **V7Labs**, Darwin annotation tool costs – Our team uses a specific software as automatic annotation tool to create the datasets for training. Estimated costs for this project of 8 months is **1500€**, **Consumables** –testing and tests development, with inventory of honey samples and laboratory consumables. Estimated at **1,000€** for all project. **Hardware costs** – For the project, it is considered to acquire the components and parts for an evolved prototype manufacturing. Considering the microscope, camera, electronica, motors, mechanical parts and electrical items, the overall costs would be **3,000€**. We also consider the HW purchased for testing purposes. **Travel/Dissemination** – It is considered a budget of **3000€** for travelling purposes and fairs/events, **AWS costs** – Specific costs applied for benchmarking at **5,000€**.
- **Subcontracting** It is considered a subcontracting budget of **10,000€** to cover a technical expert consultancy on cybersecurity on the edge and how to protect/codify deployed models within the device.

**Indirect Costs:** A indirect costs flat-rate of 25% on direct costs has been considered (Horizon Europe rules)

<b>TOTAL COST OF THE PROJECT</b>	100,000€
<b>FUNDING RATE (%)<sup>2</sup></b>	60%
<b>FUNDING REQUESTED</b>	60,000 €

<sup>2</sup> **Funding rate:** the funding rate follows Horizon Europe rules, the funding rate applicability for the selected SMEs or for-profit entities is 60% of eligible costs, while for non-profit organisations it is 100% of eligible costs.

### 3.3. Participant presentation

Microfy Systems is an industrial manufacturer of deep tech industrial machinery/equipment for the food processing industry. Due to our innovative solutions offered to food processing industry, our company has been featured many times in journals, press, radio, and even Spanish TV. We have been also awarded with different prizes, and also joined acceleration programmes as NVIDIA, AWS and EIT FOOD FAN. See Annex for more details.

Our team started the development of microscopy device in 2020, and currently counts with 8 employees, with multidisciplinary profiles to cover the whole value chain. Our headquarters are located in Barcelona, which includes the technical office, the mechanical workshop, the electronics lab, the quality lab, production area meeting rooms, and testing areas for all the development stages. At Microfy Systems we are very proud to say that each step of the technical development is 100% developed internally by our own personnel, so our team covers all the technology's value chain. Meet our team (only those involved in the project), built from biologists, computer vision/AI engineer, electronics, mechanical and SW engineers:



- [Iratxe Perales](#) [CEO] has a Joint MSc degree in Chemical and Industrial Engineering and a Master degree in Project Management from the Polytechnic University of Catalonia (UPC). During the last 5 years she was the Head of Operations at Envisyo, leading a technical team of more than 40 engineers. She also has previous experience coordinating EU-funded projects (FP7 and H2020).
- [Naoufal Amrani](#) [PhD. Artificial Intelligence] 7+ years of professional experience in machine learning, deep learning, computer vision, remote sensing, image processing and data science experience with a proven track record of designing and implementing a large scale of algorithms. Large experience applying Python, R, Java, C, Matlab for algorithm design, data modelling, statistical learning, prediction analysis and data compression. Hands-on experience on applying ML algorithm and data prediction to real world problems: Neural Networks, Object detection & recognition, camera calibration, data compression, Nonlinear Transforms and 3D scanner.
- [Álvaro Suarez](#) [Cloud/Web developer and Junior AI] Álvaro is a Senior Software Engineer specialized in Software Architecture at the University of Las Palmas de Gran Canaria.
- [Eduard Lopez](#) [Mechanical Design of Honey.AI] Senior technician specialized in manufacturing processes with more than 16 years of experience in CAD design, mechanical development, manufacturing of prototypes, and the adaptation of manufacturing techniques to the final production process.
- [Pau Cardellach, PhD.](#) [CSO] Dr. Pau Cardellach has a degree in biology with a master's in vegetal biotechnology from the Technical University of Munich (TUM). He has focused his professional career on scientific research and the dissemination of the plant world. He has a Ph.D. in environmental science and technology from the research centre ICTA of the Universidad Autònoma de Barcelona.
- [Miguel Moreno](#) [Embedded firmware] - Miguel is a Computer Engineer specialized in Computer Science graduated from Universitat Politècnica de Catalunya, where he also obtained a master degree in Graphics and VR. He has had previous experience developing applications in C++, focusing on both back-end and front-end.
- [Julian Rodriguez](#) [Community manager, Customer service and marketing] Julian has a degree in marketing and international business (Universidad Autònoma de Occidente) specializing in digital strategy and creativity. In his role, he is in charge of marketing, sales, BackOffice and customer assistance.



**PREVIOUS EXPERIENCE WITH EU FUNDED PROJECTS** ▶ Microfy Systems has been previously awarded with different EU grants to develop different stages of the product, for instance, a VEDLIoT open call to test open-source HW/SW for AI on the edge, and BonsAPPs and DIGIFED to develop the first version of the stand-alone device with the simplified pipeline integrated within a basic Jetson Nano. The results were not good enough to launch a commercial version, so our company still has the need to experiment with more powerful HW and ML models.



## AI REDGIO 5.0 OPEN CALL 1

### FINANCIAL INFORMATION FOR PAYMENTS

Proposal / Contract Number	GRANT AGREEMENT ID: 101092069	Proposal/Contract Acronym (Name)	AI REDGIO 5.0
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Experiment name	Evolution experiment to migrate and adopt an Edge-Computing architecture into our AI-powered automated digital microscope for the agrifood processing industry	Experiment acronym	07-EDGE-MICROFY
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Account holder			
Name of Account holder <i>(as registered with the bank)</i>		MICROFY SYSTEMS	
Full address of account holder <i>(as registered with the bank)</i>			
Street name and number		Avinguda Carrilet 243, planta 1 local 2	
Postal Code	08907	Town/City	Hospitalet
Country	Spain	VAT number	ESB66320847
Contact person of the account holder regarding the payments			
Name	Iratxe	First name(s)	Perales
Phone	+34609578758	Fax	
e-mail	Iratxe.perales@microfy.ai		

Bank-Information			
Bank name	Banc Sabadell		
Branch address (full address – PO box not accepted)			
Street name and number	Rambla Catalunya 73		
Postal Code	08903	Town/City	Barcelona
Country	Spain		
Account no	ES73 0081 5262 4200 0114 8219		
Bank sorting code	BSAB ESBB		
International Bank Account Number (IBAN) The IBAN is mandatory for all European Partners. See also <a href="http://www.ecbs.org/iban.htm">http://www.ecbs.org/iban.htm</a>	ES73 0081 5262 4200 0114 8219		
BIC/SWIFT	BSAB ESBB		