

D7.6 Open Call 2 Handbook

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1 Executive Summary

This deliverable comprises all the information needed by applicants to submit applications to the DEMETER Open Call #2 - DEPLOY and for the European Commission to validate the Open Call and publish the announcement in the Funding & Tenders Portal. It contains 10 annexes described below.

2 Acronyms

SME	Small and Medium-sized Enterprise
EU	European Union

3 List of Authors and Reviewers

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4 Document scope and structure

The purpose of this document is to compile all the documents that formalize the third-party financing rules for the first DEMETER Open Call #2 - DEPLOY.

- **Annex 1: Open Call text**, which provides a summary of the information regarding the DEMETER Open Call #2 – DEPLOY.
- **Annex 2: Guidelines for Applicants**, which provides a full set of information regarding the DEMETER Open Call #2 – DEPLOY.
- **Annex 3: Technical information**, describing of the DEMETER technological offering.
- **Annex 4: Application form**, an online form, temporarily available at F6S platform (<https://www.f6s.com/demeter-open-call-2-deploy/apply>)
- **Annex 4.1: Proposal template**, a mandatory template for applicants to describe and submit proposals.
- **Annex 5: Consortium Declaration of Honour**, which defines the role, responsibilities, and budget share of each applicant.
- **Annex 6: SME Declaration**, which evaluates the status of the SMEs participating
- **Annex 7: Bank account information**, which collects information on the applicant(s)' bank account where the DEMETER payments will be sent to.
- **Annex 8: Sub-grant Agreement Template**, which provides a template of the sub-grant agreement that the successful applicants will be requested to sign.
- **Annex 9: Template for H2020 Financial Support to Third Parties**, which contains the formal announcement to be published in the EU portal.

Annex 1: Open Call Text

Annex 1: Open call text

DEMETER Open Call #2 - DEPLOY

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Table 1: DEMETER Consortium

Participant number	Participant organisation name	Short name	Country
1	WATERFORD INSTITUTE OF TECHNOLOGY	WIT	Ireland
2	ENGINEERING – INGEGNERIA INFORMATICA SPA	ENG	Italy
3	INTRASOFT INTERNATIONAL SA	INTRA	Luxembourg
4	EMPRESA DE TRANSFORMACION AGRARIA SA	TRAGSA	Spain
5	JOHN DEERE GMBH & CO. KG*JD	JD	Germany
6	ORGANIZZAZIONE MONDIALE DEGLI AGRICOLTORI	WFO-OMA	Italy
7	INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS	ICCS	Greece
8	OPEN GEOSPATIAL CONSORTIUM (EUROPE) LIMITED LBG	OGCE	United Kingdom
9	ATOS SPAIN SA	ATOS SPAIN SA	Spain
10	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V.	Fraunhofer	Germany
11	SINTEF AS	SINTEF	Norway
12	CONFEDERAZIONE NAZIONALE COLDIRETTI	Coldiretti	Italy
13	LESPROJEKT SLUZBY SRO	LESPROJEKT	Czech Republic
14	CODAN SA	CODAN S.A.	Spain
15	UNIVERSIDAD DE MURCIA	UMU	Spain
16	13 JUL PLANTAZE AD PODGORICA	Plantaze	Montenegro
17	AVR BVBA	AVR BVBA	Belgium
18	SIVECO ROMANIA SA	SIVECO	Romania
19	TEAGASC - AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY	TEAGASC	Ireland
20	AGRICOLUS S.R.L.	Agricolus	Italy
21	ASPLAN VIAK INTERNET AS	AVINET	Norway
22	MACCARESE SPA SOCIETA AGRICOLA	Maccarese	Italy
23	CENTRIA AMMATTIKORKEAKOULU OY	CENTRIA	Finland
24	LANDBRUKETS DATAFLYT SA	Dataflow	Norway
25	DNET LABS DOO NOVI SAD	DNET Labs	Serbia
26	F6S NETWORK LIMITED	F6S	United Kingdom

Participant number	Participant organisation name	Short name	Country
27	FENADEGAS FEDERACAO NACIONALDAS ADEGAS COOPS FCRL	FENADEGAS	Portugal
28	AGROPRODUKT-SINKOVIC DOO	SINKOVIC	Serbia
29	INFORMATION CATALYST FOR ENTERPRISE LTD	ICE	United Kingdom
30	IDEATRONIK SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA	IDEATRONIK	Poland
31	ARIETE FATTORIA LATTE SANO SPA	Latte Sano	Italy
32	INDATA LLC	Indata	Georgia
33	INESC TEC - INSTITUTO DE ENGENHARIA DE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA	INESC TEC	Portugal
34	UBIWHERE LDA	Ubiwhere	Portugal
35	ELLINIKOS GEORGIKOS ORGANISMOS - DIMITRA	ELGO-DIMITRA	Greece
36	M2XPERT GMBH & CO KG	M2XPERT	Germany
37	MIMIRO AS	MIMIRO	Norway
38	PULVERIZADORES FEDE SL	FEDE	Spain
39	ODIN SOLUTIONS S.L.	OdinS	Spain
40	PROSPEH, POSLOVNE STORITVE IN DIGITALNE RESITVE DOO	PROSPEH	Slovenia
41	FEIRMEOIRI AONTUITHE NA HEIREANN IONTAOBIATHE TEORANTA LBG	THE IFA	Ireland
42	PROBOT OY	PROBOT	Finland
43	INSTYTUT CHEMII BIOORGANICZNEJ POLSKIEJ AKADEMII NAUK	PSNC	Poland
44	INSTITUTO NACIONAL DE INVESTIGAÇÃO AGRARIA E VETERINARIA	INIAV	Portugal
45	ITC - INOVACIJSKO TEHNOLOSKI GROZD MURSKA SOBOTA	ITC	Slovenia
46	RO TECHNOLOGY SRL	ROTECH	Italy
47	GEORGIAN FARMERS ASSOCIATION	GFA	Georgia
48	FUNDACION TECNALIA RESEARCH & INNOVATION	TECNALIA	Spain
49	UNIVERSITY COLLEGE CORK - NATIONAL UNIVERSITY OF IRELAND, CORK	Tyndall	Ireland
50	UDRUZENJE PROIZVODJACA GROZDJA I VINA SA OZNAKOM GEOGRAFSKOG POREKLA SREM - FRUSKA GORA	SREM	Serbia
51	UNIVERZITET DONJA GORICA PODGORICA	UDG	Montenegro
52	WIELKOPOLSKI OSRODEK DORADZTWA ROLNICZEGO W POZNANIU	WODR	Poland
53	ASOCIATIA PRODUCATORILOR DE PORUMB DIN ROMANIA	APPR	Romania
54	UNIVERSIDAD POLITECNICA DE MADRID	UPM	Spain
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List of acronyms

Table 2: List of Acronyms

CET	Central European Time
EU	European Union
SME	Small and Medium-sized Enterprise
IoT	Internet of Things

1 Introduction

This document provides information regarding the second Open Call for Proposals for the DEMETER project (also referred as DEMETER Open Call #2 - DEPLOY). All associated Annexes must be additionally considered for the submission of a Proposal.

DEMETER organises this second open call to increase the outreach of its value proposition, by funding small consortia of 2-3 partners for the deployment of new high-value pilots in the agri-food sector, employing DEMETER methodologies and technologies, addressing clear farmers' needs, with particular focus on EU geographic regions not represented within DEMETER pilots, expanding the technological and/or business coverage of the DEMETER project, towards digitalising and boosting the European agro-business.

1.1 Overview of the DEMETER project

The DEMETER Project is a large-scale deployment of farmer centric interoperable smart farming-IoT based platforms delivered through a series of 20 pilots across 18 countries (15 States in the EU). Involving 60 partners, DEMETER adopts a multi-actor approach across the value chain (demand and supply), with 25 deployment sites, 6,000 farmers and over 38,000 devices and sensors being deployed and participants involved come from different production sectors (dairy, meat, vegetables, fruit and arable crops), production systems (conventional and organic) and different farm sizes and types, optimising the data analysis obtained across multiple farms.



Figure 1: DEMETER in figures

DEMETER is demonstrating the real-life potential of advanced standards-based interoperability between IoT technologies by adapting and extending existing standards into an over-arching Agricultural Information Model, concurrently ensuring security, privacy and business confidentiality across the full value chain in multiple agri-food operational environments. DEMETER is encompassing a multi system and multi data source integration considering not only IoT but legacy systems, open data, geographical and satellite information, and in general will provide an open and

interoperable data integration model. DEMETER displays how an integrated approach to business modelling and user acceptance can support sustainable farming and food production systems, provide safe food and support farmers in their decision-making in 'doing more with less'. DEMETER is bringing new business opportunities on the farm and in the wider agri-food economy, while concurrently contributing to the safeguarding of Europe's precious natural resources.

DEMETER's goal is the creation of a secure and sustainable European IoT technology and business ecosystem whose impact could be transformative in the EU food and agriculture sector, and potentially across the world.

2 Open Call #2 – DEPLOY

2.1 Objective

The DEMETER Open Call #2 - DEPLOY aims to increase the outreach of the DEMETER value proposition, by funding small consortia of 2-3 partners for the deployment of new high-value pilots in the agri-food sector, employing DEMETER methodologies and technologies, addressing clear farmers' needs, with particular focus on EU geographic regions not represented within DEMETER pilots, expanding the technological and/or business coverage of the DEMETER project, towards digitalising and boosting the European agro-business.

2.2 Main characteristics

The main characteristics of the DEMETER Open Call #2 – DEPLOY are presented in the table below.

Table 3: DEMETER Open Call #2 - DEPLOY main characteristics

Eligible applicants	Consortia of 2-3 partners representing at least a tech provider/ integrator and an end-user, led by for-profit SME.
Open call timeframe	From the 14 th of December 2021 to the 16 th of February 2022, at 17:00 CET
Activities to be funded	Deployment of high value and impactful pilots employing DEMETER methodologies and technologies, addressing clear farmers' needs, with particular focus on EU geographic regions not represented within DEMETER pilots, towards, digitalising and boosting European agro-business.
Duration of activities	12 months divided in 3 stages: Design > Install & Operate > Assess
Budget per project	Up to €150.000 (lump sum) per consortia. (Maximum financial support per partner of €100.000.)
Evaluation of proposals	Two-stage evaluation (Remote evaluation + online interview for top proposals)
Number of proposals to be selected	4 to 8 pilot projects
Milestones/ payments for selected applicants	<ul style="list-style-type: none"> • Design stage – 2 months: consortia will be invited to engage with farmers to gather their needs that will feed the development of technical requirements, fine-tune their pilot planning and technology usage with DEMETER experts; prepare follow-up/ KPI document associated with respective pilot. • Install & Operate stage – 8 months: deploy technologies in the field, configure units and software, initiate operations and collect relevant data. • Assess stage – 2 months: aggregate results on technologies impacts, communicate achievements.

	Payments are associated with stage results and divided by 20% + 60% + 20%, based the successful completion of specified milestones and reviews.
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2.3 Type of beneficiaries

The DEMETER Open Call #2 – DEPLOY will fund consortia composed by two or three:

- micro, small and medium-sized enterprises (SMEs),
- secondary and higher education establishments, research institutes and other not-for profit research entities.

2.4 Challenges and Objectives

The new pilots to be funded under the DEMETER Open Call #2 - DEPLOY must address specific farmers' needs and fit into one or more DEMETER challenges and objectives listed below:

2.4.1 The DEMETER Challenges

2.4.1.1 Challenge #1 – Control of Knowledge

Farmers should be in control of the knowledge they can obtain from the data relevant to their specific requirements and activities, i.e. moving from the present situation in which farmers can be overwhelmed by the sheer amount of data to one in which they benefit from the insights of that data.

2.4.1.2 Challenge #2 – Deployment Models

A context where the lifespan of agricultural technology extends in some cases over 20+ years requires solutions and innovations to be deployed over existing machines. Protecting the existing investments made by farmers while making them part of a digitally enriched environment is a major driver for DEMETER.

2.4.1.3 Challenge #3 – Optimal Data Analysis

For useful trends and patterns to emerge, there is a need to work on large sets of data obtained across multiple farms. A key transformation resides in the ability to collect more data and measurements about the production: soil quality, irrigation levels, weather, presence of insects and pests, etc. In this context, reaping the full value of data requires the creation of trusted cooperation spaces in which data can be collected and shared, taking into account conflicting interests, competition etc. But this is also an opportunity of putting the farmers fully in control of their rights on the data they generate.

2.4.1.4 Challenge #4 – Overcoming Market Barriers

Large players have aimed, early on, to establish themselves in dominant positions through supplier-operated technological and data platforms. Effectively increasing the lock-in of farmers to a single or a selected group of suppliers and limiting their access to innovation. The challenge is in creating an innovative ecosystem for SMEs and entrepreneur.

2.4.1.5 Challenge #5 – Interoperability

Interoperability and adoption of technological standards are key to ensure compatibility and to support data exchange and standardised communication that links the different systems together in a unified system covering all aspects of the agricultural exploitation.

2.4.2 The DEMETER Objectives

Based on the identified challenges, DEMETER defined 6 objectives to empower farmers and farmer cooperatives to

- better exploit their existing operational context, i.e. the platforms, machinery, sensors they have, to extract new knowledge on which they can improve their decisions and
- ease the acquisition, evolution and update of their context by focusing their investments where these are needed, based on their goals measured by key performance indicators (KPIs) that they select.

2.4.2.1 Objective 1 – Information Modelling

Analyse, adopt, *enhance existing* (and if necessary *introduce new*) **Information Models** in the agri-food sector easing data sharing and interoperability across multiple Internet of Things (IOT) and Farming Management Information Systems (FMIS) and associated technologies. Use the information models to create a basis for trusted sharing / exposure of data between farmers.

Benefits: enable connection from different platforms, sensors, information sources and proprietary (to the farmer / cooperative) knowledge through a DEMETER services model.

2.4.2.2 Objective 2 – Knowledge Exchange Mechanisms

Build **knowledge exchange mechanisms**, delivering an Interoperability Space for the agri-food domain, presenting technologies and data from different vendors, ensuring their interoperability, and using (and enhancing) a core set of open standards (adopted across all agri-food deployments thereby) coupled with carefully-planned security and privacy protection mechanisms (also addressing business confidentiality).

Benefits: ease the deployment of novel solutions based on different platforms, sensors, information sources using the new information models from Objective 1. Ease the uptake of future (not yet developed) services, data sources, technologies by farmers, with the Interoperability Space allowing the farmers and relevant other stakeholders to increase the range of choices for the most appropriate combination of tools from different suppliers in order to support their expected innovation, limiting the vendor lock-in. Allow the combination of existing systems / machinery with new technologies.

2.4.2.3 Objective 3 – Data Ownership

Empower the farmer, as a prosumer, to gain control in the data-food-chain by identifying and demonstrating a series of new IoT-based, data-driven, business models for profit, collaboration and co-production for farmers and across the value chain, leading to disruptive new value creation models.

Benefits: introduce the benefits of data ownership to farmers as a valuable source of income and knowledge sharing

2.4.2.4 Objective 4 – Benchmarking

Establish a **benchmarking mechanism** for agriculture solutions and business, targeting end-goals in terms of productivity and sustainability performance of farms, services, technologies, and practices based on a set of key performance indicators that are relevant to the farming community.

Benefit: ease the comparison between competing services, machineries, sensors, platforms prior to acquisition

2.4.2.5 Objective 5 – User Orientated Solutions

Reverse the relationship with suppliers, through an innovative model in which **suppliers are responsible** for ensuring that a final solution is optimal to the farmer's existing context and expressed needs.

Benefits: ease the adoption of technologies by farmers, by decreasing the burden of the choices and clarifying the responsibility model, linked to needs and performance improvements defined by the farmers.

2.4.2.6 Objective 6 – Real World Impact

Demonstrate the impact of digital innovations across a variety of sectors and at European level.

Benefits: ease and streamline mechanisms for all stakeholders, with clearly identified incentives to participate in a sustainable and value creation ecosystem. Structure collaboration channels in a security and privacy aware approach.

2.5 Submission and selection process

The submission of proposals to the DEMETER Open Call #2 - DEPLOY will be enabled via [F6S](#) from the 14th of December 2021 to the 16th of February 2022, at 17:00 CET.

The evaluation process is shown in the following diagram:

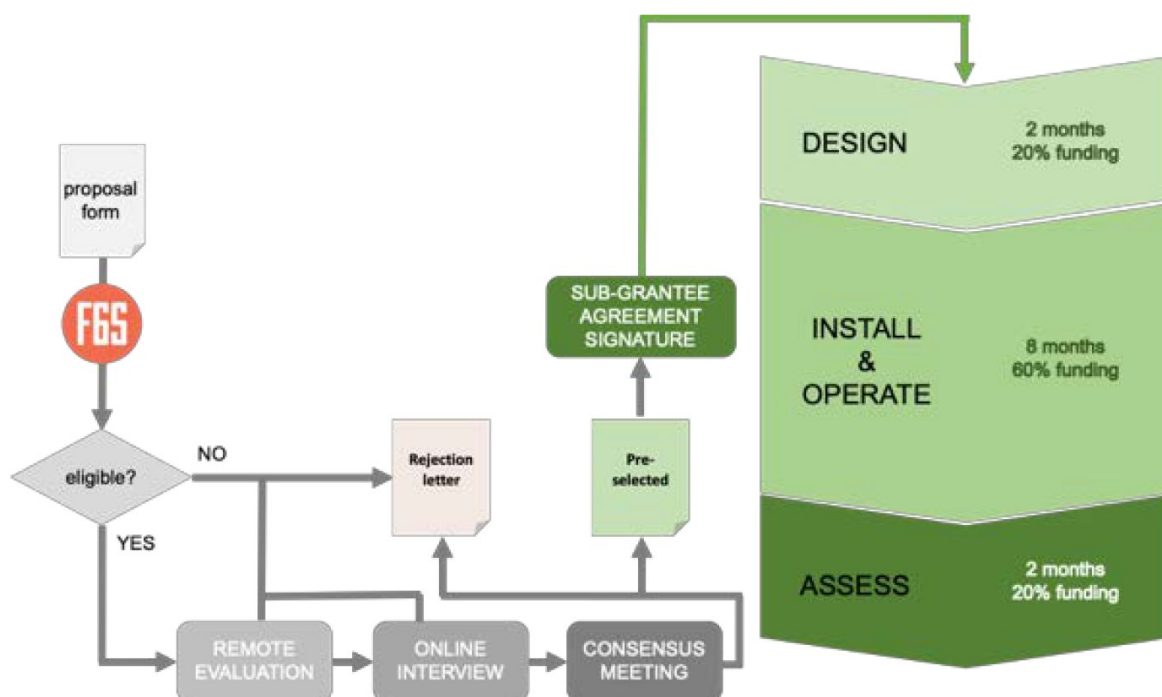


Figure 2 Evaluation process

2.6 Timeline overview

Below are presented the current tentative dates for the different phases.



Figure 3 DEMETER Open Call #2 - DEPLOY timeline

3 Existing DEMETER pilots

DEMETER currently has 20 pilots running that can be an example for potential applicants to develop similar or different pilots to be funded under the DEMETER Open Call #2 – DEPLOY.



Figure 4: Existing DEMETER pilots

A brief description of each one of the pilots currently being implemented by DEMETER is presented in the table below.

Table 4: List of DEMETER pilots by cluster

	CLUSTER #1 ARABLE CROPS
Pilot 1.1 & 1.2 - Water and energy savings in irrigated crops.	
Location: Spain	
More information: Here	
Pilot 1.3 - Smart Irrigation Service in Rice & Maize Cultivation	
Location: Greece	
More information: Here	
Pilot 1.4 - IoT Corn Management & Decision Support Platform	
Location: Romania	
More information: Here	
	CLUSTER #2 PRECISION FARMING
Pilot 2.1 - In-Service Condition Monitoring of Agricultural Machinery	
Location: Germany	
More information: Here	

Pilot 2.2 - Automated Documentation of Arable Crop Farming Processes

Location: Germany

More information: [Here](#)

Pilot 2.3 - Data Brokerage Service and Decision Support System for Farm Management

Location: Czech Republic, Poland, Latvia and Norway

More information: [Here](#)

Pilot 2.4 - Benchmarking at Farm Level Decision Support System

Location: Poland

More information: [Here](#)



**CLUSTER #3
FRUIT AND VEGETABLE PRODUCTION**

Pilot 3.1 - Decision Support System to Support Olive Growers

Location: Italy and Greece

More information: [Here](#)

Pilot 3.2 - Precision Farming for Mediterranean Woody Crops

Location: Portugal

More information: [Here](#)

Pilot 3.3 - Pest Management Control on Fruit Fly

Location: Spain

More information: [Here](#)

Pilot 3.4 - Open Platform for Improved Crop Monitoring in Potato Farms

Location: Belgium

More information: [Here](#)



**CLUSTER 4
LIVESTOCK**

Pilot 4.1 - Dairy Farmers' Dashboard for the Entire Milk and Meat Production Value Chain

Location: Norway

More information: [Here](#)

Pilot 4.2 - Consumer Awareness: Milk Quality and Animal Welfare Tracking

Location: Italy

More information: [Here](#)

Pilot 4.3 - Proactive Milk Quality Control

Location: Ireland

More information: [Here](#)

Pilot 4.4 - Optimal Chicken Farm Management

Location: Serbia, Slovenia and Montenegro

More information: [Here](#)



**CLUSTER 5
SUPPLY CHAIN**

Pilot 5.1 - Disease Prediction and Supply Chain Transparency for Orchards/Vineyards

Location: Serbia, Montenegro, Georgia and Slovenia

More information: [Here](#)

Pilot 5.2 - Farm of Things in Extensive Cattle Holdings

Location: Finland and Spain

More information: [Here](#)

Pilot 5.3 - Pollination Optimisation in Apiculture

Location: Poland

More information: [Here](#)

Pilot 5.4 - Transparent Supply Chain in the Poultry Industry

Location: Serbia, Slovenia and Montenegro

More information: [Here](#)

4 DEMETER technological ecosystem

The DEMETER Open Call #2 – DEPLOY goal is to deploy high value and impactful pilots employing DEMETER methodologies and technologies. A full description of the DEMETER technological offering, available for the implementation of the new pilots, is available in Annex 3: Technical information.

Note: Other technologies may be used to implement the pilots.

5 List of European countries not covered by DEMETER pilots:

The DEMETER Open Call #2 - DEPLOY goal is to deploy high value and impactful pilots employing DEMETER methodologies and technologies, addressing clear farmers' needs, with particular focus on EU geographic regions not represented within DEMETER pilots. A list of EU countries not covered by DEMETER pilots is presented below:

Austria, Bulgaria, Croatia, Cyprus, Denmark, Estonia, France, Hungary, Lithuania, Luxembourg, Malta, Netherlands, Slovakia and Sweden.

6 Additional Information

6.1 Open Call Additional Material

Open Call support material:

- **Annex 1: Open Call text**, this document
- **Annex 2: Guidelines for Applicants**, the document defining the terms and conditions to apply for DEMETER Open Call #2 - DEPLOY.
- **Annex 3: Technical information**, describes the DEMETER technological offering.
- **Annex 4: Application form**, an online form, temporarily available at F6S platform (<https://www.f6s.com/demeter-open-call-2-deploy/apply>)
- **Annex 4.1: Proposal template**, a mandatory word document for applicants to describe and submit proposals.
- **Annex 5: Consortium Declaration of Honour**, which declares that all conditions related to the DEMETER Open Call #2 - DEPLOY are accepted by the consortium partners legal representatives.
- **Annex 6: SME Declaration**, which evaluates the status of the SMEs participating.
- **Annex 7: Bank account information**, which collects information on the applicants' bank account where the DEMETER payments will be sent to.
- **Annex 8: Sub-grant Agreement Template**, which provides a template of the sub-grant agreement that the successful applicants will be requested to sign.
- Frequently Asked Questions & answers published at the DEMETER project's website (<https://h2020-demeter.eu/>).

6.2 Contacts

The DEMETER consortium will provide information to the applicants via the F6S blog, so that the information (question and answer), will be visible to all participants.

- Online Q&A: <https://www.f6s.com/demeter-open-call-2-deploy/discuss>
- Apply via: <https://www.f6s.com/demeter-open-call-2-deploy/apply>
- F6S support team: support@f6s.com
- More info at: <https://h2020-demeter.eu/>

For extraordinary communication need, please contact the Help Desk: opencalls@h2020-demeter.eu

7 References

ⁱ H2020 Call Objective H2020-DT-2018-2020 TOPIC: Agricultural digital integration platforms, <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/dt-ict-08-2019>

Annex 2: Guidelines for Applicants

Annex 2: Guidelines for Applicants

DEMETER Open Call #2 – DEPLOY

Closing Date for Proposals:

Wednesday, 16 February 2022, at 17:00 CET

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The DEMETER Consortium is the following:

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3	INTRASOFT INTERNATIONAL SA	INTRA	Luxembourg
4	EMPRESA DE TRANSFORMACION AGRARIA SA	TRAGSA	Spain
5	JOHN DEERE GMBH & CO. KG*JD	JD	Germany
6	ORGANIZZAZIONE MONDIALE DEGLI AGRICOLTORI	WFO-OMA	Italy
7	INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS	ICCS	Greece
8	OPEN GEOSPATIAL CONSORTIUM (EUROPE) LIMITED LBG	OGCE	United Kingdom
9	ATOS SPAIN SA	ATOS SPAIN SA	Spain
10	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V.	Fraunhofer	Germany
11	SINTEF AS	SINTEF	Norway
12	CONFEDERAZIONE NAZIONALE COLDIRETTI	Coldiretti	Italy
13	LESPROJEKT SLUZBY SRO	LESPROJEKT	Czech Republic
14	CODAN SA	CODAN S.A.	Spain
15	UNIVERSIDAD DE MURCIA	UMU	Spain
16	13 JUL PLANTAZE AD PODGORICA	Plantaze	Montenegro
17	AVR BVBA	AVR BVBA	Belgium
18	SIVECO ROMANIA SA	SIVECO	Romania
19	TEAGASC - AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY	TEAGASC	Ireland
20	AGRICOLUS S.R.L.	Agricolus	Italy
21	ASPLAN VIAK INTERNET AS	AVINET	Norway

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22	MACCARESE SPA SOCIETA AGRICOLA	Maccarese	Italy
23	CENTRIA AMMATTIKORKEAKOULU OY	CENTRIA	Finland
24	LANDBRUKETS DATAFLYT SA	Dataflow	Norway
25	DNET LABS DOO NOVI SAD	DNET Labs	Serbia
26	F6S NETWORK LIMITED	F6S	United Kingdom
27	FENADEGAS FEDERACAO NACIONALDAS ADEGAS COOPS FCRL	FENADEGAS	Portugal
28	AGROPRODUKT-SINKOVIC DOO	SINKOVIC	Serbia
29	INFORMATION CATALYST FOR ENTERPRISE LTD	ICE	United Kingdom
30	IDEATRONIK SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA	IDEATRONIK	Poland
31	ARIETE FATTORIA LATTE SANO SPA	Latte Sano	Italy
32	INDATA LLC	Indata	Georgia
33	INESC TEC - INSTITUTO DE ENGENHARIA DE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA	INESC TEC	Portugal
34	UBIWHERE LDA	Ubiwhere	Portugal
35	ELLINIKOS GEORGIKOS ORGANISMOS - DIMITRA	ELGO-DIMITRA	Greece
36	M2XPERT GMBH & CO KG	M2XPERT	Germany
37	MIMIRO AS	MIMIRO	Norway
38	PULVERIZADORES FEDE SL	FEDE	Spain
39	ODIN SOLUTIONS S.L.	OdinS	Spain
40	PROSPEH, POSLOVNE STORITVE IN DIGITALNE RESITVE DOO	PROSPEH	Slovenia
41	FEIRMEOIRI AONTUITHE NA HEIREANN IONTAOBIATHE TEORANTA LBG	THE IFA	Ireland
42	PROBOT OY	PROBOT	Finland
43	INSTYTUT CHEMII BIOORGANICZNEJ POLSKIEJ AKADEMII NAUK	PSNC	Poland
44	INSTITUTO NACIONAL DE INVESTIGAÇÃO AGRARIA E VETERINARIA	INIAV	Portugal
45	ITC - INOVACIJSKO TEHNOLOSKI GROZD MURSKA SOBOTA	ITC	Slovenia
46	RO TECHNOLOGY SRL	ROTECH	Italy
47	GEORGIAN FARMERS ASSOCIATION	GFA	Georgia
48	FUNDACION TECNALIA RESEARCH & INNOVATION	TECNALIA	Spain
49	UNIVERSITY COLLEGE CORK - NATIONAL UNIVERSITY OF IRELAND, CORK	Tyndall	Ireland
50	UDRUZENJE PROIZVODJACA GROZDJA I VINA SA OZNAKOM GEOGRAFSKOG POREKLA SREM - FRUSKA GORA	SREM	Serbia
51	UNIVERZITET DONJA GORICA PODGORICA	UDG	Montenegro
52	WIELKOPOLSKI OSRODEK DORADZTWA ROLNICZEGO W POZNANIU	WODR	Poland

Participant number	Participant organisation name	Short name	Country
53	ASOCIATIA PRODUCATORILOR DE PORUMB DIN ROMANIA	APPR	Romania
54	UNIVERSIDAD POLITECNICA DE MADRID	UPM	Spain
55	FUNDACION CENTRO DE TECNOLOGIAS DE INTERACCION VISUAL Y COMUNICACIONES VICOMTECH	VICOM	Spain
56	VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V.	VITO	Belgium
57	TRONDELAG FORSKNING OG UTVIKLING AS	TFoU	Norway
58	NAPIERALA RYSZARD	RNapierala	Poland
59	FRACKOWIAK MACIEJ	Frackowiak	Poland
60	ZOETIS BELGIUM SA	ZOE BEL	Belgium

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List of acronyms

ACS	Access Control Server
AIM	Agriculture Information Model
AIS	Agricultural Interoperability Space
AT	After Treatment
AWU	Annual Work Unit
BSE	Brokerage Service Environment
CAP	Common agricultural policy
CET	Central European Time
DEH	DEMETER Enabler Hub
DSM	Distributed System Management
DSS	Decision Support System
EC	European Commission
EIP	European Innovation Partnership
ESR	Evaluation Summary Report
EU	European Union
FMIS	Financial Management Information System
GDPR	General Data Protection Regulation
GPL	General Public License
ICT	Information Communication Technology
IoT	Internet of Things
IPM	Integrated pest management
M2M	Machine to Machine
MAA	Multi Actor Approach
ML	Machine Learning
MS	Member States
OCT	Overseas Countries and Territories
PDF	Portable Document Format
PEMS	Performance Effectiveness Management
SME	Small and Medium-sized Enterprise
SOC	Stakeholders Open Collaboration Space
VAT	Value-Added Tax

1 Introduction

This document provides a full set of information regarding the second Open Call for Proposals, also referred as Open Call #2 - DEPLOY, for the DEMETER project. All associated Annexes must be additionally considered for the submission of a Proposal.

DEMETER organises this second open call to increase the outreach of its value proposition, by funding small consortia of 2-3 partners for the deployment of new high-value pilots in the agri-food sector, employing DEMETER methodologies and technologies, addressing clear farmers' needs, with particular focus on EU geographic regions not represented within DEMETER pilots, expanding the technological and/or business coverage of the DEMETER project, towards digitalising and boosting the European agro-business.

1.1 Context

Agriculture is a major component of Europe's economy, and the diversity of challenges it faces is addressed by a set of European policies. In addition to Europe's common agricultural policy (CAP), policies address a whole range of issues, from food (FOOD2030) to bioeconomy (BioEconomy strategy, jointly updated in 2018 by DG Research and Innovation, DG Agriculture and Rural Development, DG Environment, DG Maritime Affairs, and DG Industry and Entrepreneurship). The increasing importance of digitally engineered solutions to support farmers is also reflected in the Digital Single Market strategy which focuses on three main pillars, including '**the right environment for networks and services**' and 'ensuring that the European economy takes full advantage of what digitisation offers'. This has been complemented, in April 2018, by the adoption of the communication 'Towards a common European data space'ⁱⁱ, key steps towards the creation of a common data space in Europe - a seamless digital area with the **scale that will enable the development of new products and services based on data**. In parallel, important changes have been introduced in the H2020 programme in 2018 to **boost impact**. One of these changes is the introduction of **focused areas**; of particular importance is the 'Digitising and transforming European Industry and Service' (DT), which highlights the **importance of facilitating and demonstrating the benefits of increased adoption of digital enablers** in vertical domains. Furthermore, the farming context benefits from an active European Innovation Partnerships, EIP-AGRI, providing a focal point for streamlining innovation in a coherent approach.

This rich policy context is set at a time where **digital transformation applied in the agriculture domain faces very specific challenges**. On the one hand, it can build on a wide array of digital technologies, Internet of Things, Big Data, Artificial Intelligence, Robotics. Together, these enable increased automation, more precise control on production itself. But most of all, they deliver the ability to collect more and more data – from a maze of sensors and applications. This ability is not yet fully at the service of farmers, even if the problem of sharing and exchanging data in agriculture has been studied for a long time. Future Farm (Sorensen, et al.) says that farmers need to **manage a lot of information in order to make economic and environmental sound decisions**. Such process is very labour intensive due the fact that most parts have either to be executed manually, and/or require farmers use different tools to manage monitoring and data acquisition on-line in the field.

1.2 DEMETER project

1.2.1 DEMETER's ambition

With no common European data space existing for the agricultural sector and ever more data relevant to farmers being generated by sensors/IoT devices, farm equipment, production systems and reporting mechanisms, industry players have seized the opportunity to build their own proprietary data spaces that are not interoperable. This forces **agricultural data consumers** to relate to a multitude of different systems, data models and user interfaces in order to access data they need to

support their increasingly complex decision making. It has also undermined the potential of farmers as **data producers** to fully benefit from the economic potential of the data they generate. DEMETER's ambition is to facilitate and speed-up the deployment of **interoperable data driven smart farming solution providing decision support and control systems for the agricultural sector** that **empower farmers** to take better decisions, allowing them to harness the full value of their own data and knowledge as well as those shared with others, therefore improving the functioning of the agricultural knowledge and innovation systems and fostering the DSM based on innovation in the sector. Taking into account that 'better' is a word that can take on multiple meanings that are always context-dependent. One farmer may want to improve its irrigation planning, while another may need to increase milk quality with respect to criteria set by a cooperative.

DEMETER aims to put digital means at the service of farmers

- **using a human-in-the-loop model** that constantly focuses on mixing human knowledge and expertise with digital information
- **focusing on interoperability as the main digital enabler**, extending the **coverage of interoperability** across data, services, platforms M2M communication, and online intelligence but also human knowledge, and the **implementation of interoperability** by connecting farmers, advisors and providers of ICT solutions and machinery
- transforming the sector by building the solution on an array of digital technologies: Internet of Things, Earth Observation, Big Data, Artificial Intelligence, and of digital practices: cooperation, mobility and open innovation.

These choices have been made working with DEMETER's large user base (**more than 5000 farmers**) and extensive piloting coverage (**20 pilots across 18 countries** – Belgium, Czech Republic, Finland, Georgia, Germany, Greece, Ireland, Italy, Latvia, Montenegro, Norway, Poland, Portugal, Romania, Serbia, Slovenia, Spain, Turkey).



Figure 1: DEMETER in figures

DEMETER delivers a combination of human and digital solutions, concretely deployed through:

- The **DEMETER Stakeholders Open Collaboration Space (SOCS)** whose focus is on **resolving the needs of the farmers** using a structured process that converts an individual need or the most relevant / shared need from a set of needs to a **challenge**. A challenge is then resolved through a unique **co-creation process**, in which farmers, service advisors and providers can select, together, the most appropriate set of tools, devices, components, data sources etc taking into account the existing ones already deployed at the farmers and the farmer-defined improvement goals. The SOCS also includes a wide range of features that, together, deliver the knowledge sharing and improvement process, structuring the **human-in-the-loop dimension of DEMETER**. The SOCS is strongly inspired by the EIP Agri Social Spaces and Operational Groups, operating as a set of defined activities for multiple actors implemented through physical meetings, workshops, hackathons etc and supported by a dedicated online platform.

- The **DEMETER Agricultural Interoperability Space (AIS)**, whose focus is on **delivering** a full set of interoperability mechanisms to actually **deploy** the solution. DEMETER does not define completely new interoperability mechanisms, but uses (and extends) a wide range of pre-existing mechanisms at sensor, data and service levels
- The **DEMETER Enabler HUB**, which centralises the full description of all the components, devices, services, data sources, platforms etc that are accessible for deployment. The HUB provides, on the one side, the harmonised description that enables each component to be used in the co-creation mechanism, and on the other side its uptake in different deployment through the full set of DEMETER enabled interoperability mechanisms. The DEMETER Enabler HUB importantly includes the **mechanisms** to ensure interoperability with components provided through other initiatives, such as IOF2020, DATABIO HUB, AFAR Cloud, Smart AgriHub etc.

A fundamental pillar of the DEMETER strategy is that it reverses the existing relationship from farmers to suppliers. Indeed, in addition to the complexity of non-interoperable solutions, farmers also face the challenge of *choosing between different solutions* without a clear logic between benefits, features and economic models. Nor do they know, a priori, whether new extensions will be compatible with their current solutions, in effect limiting their access to digital improvements. The DEMETER **co-creation mechanism** reverses this relationship: it transfers the responsibility to the suppliers, as the co-creation mechanism requires suppliers to understand the need, identify which other suppliers to work with, analyse the existing solution already deployed at the farmer(s) and propose, either alone or as a pool of suppliers, the appropriate solution.

To **incentivise farmers, service advisors and suppliers** to participate to this co-creation mechanism, DEMETER defines a complete governance for this relationship that clarifies financial retributions, channels to farmers etc. In addition to actively promoting this to farmers, service advisors and suppliers, DEMETER implements two open calls during the lifetime of the project to encourage new challenges to test the DEMETER concept from the initial expression of a need through to the deployment of the best solution.

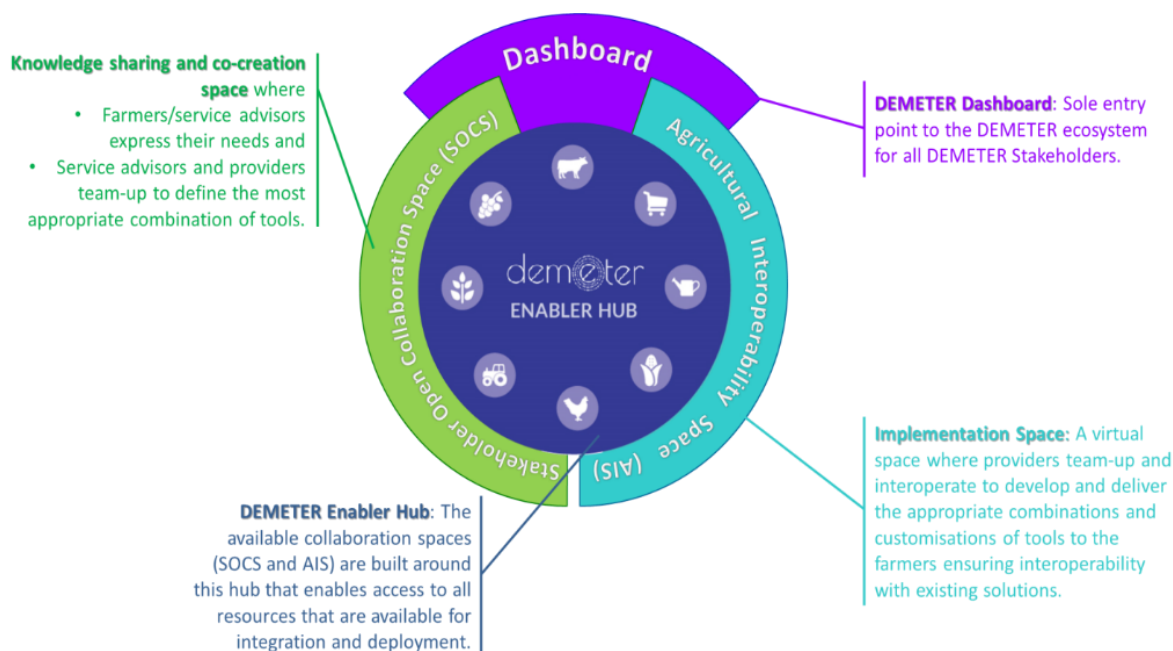


Figure 2 DEMETER Reference Architecture

A high-level overview of DEMETER is provided in the figure above. Its key benefits being to connect a human focused interaction space, on the left with the actual digital implementation space. This is a key benefit of DEMETER, ensuring that it remains fully human centric and human driven – delivering digital enablers that are fully aligned to the needs expressed by the farmers, and based on the knowledge and wisdom captured through structured mechanisms.

2 Call for proposals

2.1 Objectives

The DEMETER Open Call #2 - DEPLOY aims to increase the outreach of the DEMETER value proposition, by funding small consortia of 2-3 partners for the deployment of new high-value pilots in the agri-food sector, employing DEMETER methodologies and technologies, addressing clear farmers' needs, with particular focus on [EU geographic regions not represented within DEMETER pilots](#), expanding the technological and/or business coverage of the DEMETER project, towards digitalising and boosting the European agro-business.

2.2 Main characteristics

The main characteristics of the DEMETER Open Call #2 – DEPLOY are presented in the table below.

Table 2: DEMETER Open Call #2 - DEPLOY main characteristics

Eligible applicants	Consortia of 2-3 partners representing at least a tech provider/integrator and an end-user, led by for-profit SME.
Open call timeframe	From the 14 th of December 2021 to the 16 th of February 2022, at 17:00 Central European Time
Activities to be funded	Deployment of high value and impactful pilots employing DEMETER methodologies and technologies, addressing clear farmers' needs, with particular focus on EU geographic regions not represented within DEMETER pilots, towards, digitalising and boosting European agro-business.
Duration of activities	12 months divided in 3 phases: Design > Install & Operate > Assess
Budget per project	Up to €150.000 (lump sum) per consortia. (Maximum financial support per partner of €100.000.)
Evaluation of proposals	Two-stage evaluation (Remote evaluation + online interview for top proposals)
Number of proposals to be selected	4 to 8 pilot projects
Milestones/ payments for selected applicants	<ul style="list-style-type: none"> • Design phase – 2 months: consortia will be invited to engage with farmers to gather their needs that will feed the development of technical requirements, fine-tune their pilot planning and technology usage with DEMETER experts; prepare follow-up/ KPI document associated with respective pilot. • Install & Operate phase – 8 months: deploy technologies in the field, configure units and software, initiate operations and collect relevant data. • Assess phase – 2 months: aggregate results on technologies impacts, communicate achievements. <p>Payments are associated with phase results and divided by 20% + 60% + 20%, based the successful completion of specified milestones and reviews.</p>

2.3 Challenges and Objectives

The new pilots to be funded under the DEMETER Open Call #2 - DEPLOY must address specific farmers' needs and fit into one or more DEMETER challenges and objectives listed below:

2.3.1 The DEMETER Challenges

2.3.1.1 Challenge #1 – Control of Knowledge

Farmers should be in control of the knowledge they can obtain from the data relevant to their specific requirements and activities, i.e. moving from the present situation in which farmers can be overwhelmed by the sheer amount of data to one in which they benefit from the insights of that data.

2.3.1.2 Challenge #2 – Deployment Models

A context where the lifespan of agricultural technology extends in some cases over 20+ years requires solutions and innovations to be deployed over existing machines. Protecting the existing investments made by farmers while making them part of a digitally enriched environment is a major driver for DEMETER.

2.3.1.3 Challenge #3 – Optimal Data Analysis

For useful trends and patterns to emerge, there is a need to work on large sets of data obtained across multiple farms. A key transformation resides in the ability to collect more data and measurements about the production: soil quality, irrigation levels, weather, presence of insects and pests, etc. In this context, reaping the full value of data requires the creation of trusted cooperation spaces in which data can be collected and shared, taking into account conflicting interests, competition etc. But this is also an opportunity of putting the farmers fully in control of their rights on the data they generate.

2.3.1.4 Challenge #4 – Overcoming Market Barriers

Large players have aimed, early on, to establish themselves in dominant positions through supplier-operated technological and data platforms. Effectively increasing the lock-in of farmers to a single or a selected group of suppliers and limiting their access to innovation. The challenge is in creating an innovative ecosystem for SMEs and entrepreneur.

2.3.1.5 Challenge #5 – Interoperability

Interoperability and adoption of technological standards are key to ensure compatibility and to support data exchange and standardised communication that links the different systems together in a unified system covering all aspects of the agricultural exploitation.

2.3.2 The DEMETER Objectives

Based on the identified challenges, DEMETER defined 6 objectives to empower farmers and farmer cooperatives to

- better exploit their existing operational context, i.e. the platforms, machinery, sensors they have, to extract new knowledge on which they can improve their decisions and
- ease the acquisition, evolution and update of their context by focusing their investments where these are needed, based on their goals measured by key performance indicators (KPIs) that they select.

2.3.2.1 Objective 1 – Information Modelling

Analyse, adopt, *enhance existing* (and if necessary *introduce new*) **Information Models** in the agri-food sector easing data sharing and interoperability across multiple Internet of Things (IOT) and Farming

Management Information Systems (FMIS) and associated technologies. Use the information models to create a basis for trusted sharing / exposure of data between farmers.

Benefits: enable connection from different platforms, sensors, information sources and proprietary (to the farmer / cooperative) knowledge through a DEMETER services model.

2.3.2.2 Objective 2 – Knowledge Exchange Mechanisms

Build **knowledge exchange mechanisms**, delivering an Interoperability Space for the agri-food domain, presenting technologies and data from different vendors, ensuring their interoperability, and using (and enhancing) a core set of open standards (adopted across all agri-food deployments thereby) coupled with carefully planned security and privacy protection mechanisms (also addressing business confidentiality).

Benefits: ease the deployment of novel solutions based on different platforms, sensors, information sources using the new information models from Objective 1. Ease the uptake of future (not yet developed) services, data sources, technologies by farmers, with the Interoperability Space allowing the farmers and relevant other stakeholders to increase the range of choices for the most appropriate combination of tools from different suppliers in order to support their expected innovation, limiting the vendor lock-in. Allow the combination of existing systems / machinery with new technologies.

2.3.2.3 Objective 3 – Data Ownership

Empower the farmer, as a prosumer, to gain control in the data-food-chain by identifying and demonstrating a series of new IoT-based, data-driven, business models for profit, collaboration and co-production for farmers and across the value chain, leading to disruptive new value creation models.

Benefits: introduce the benefits of data ownership to farmers as a valuable source of income and knowledge sharing

2.3.2.4 Objective 4 – Benchmarking

Establish a **benchmarking mechanism** for agriculture solutions and business, targeting end-goals in terms of productivity and sustainability performance of farms, services, technologies, and practices based on a set of key performance indicators that are relevant to the farming community.

Benefit: ease the comparison between competing services, machineries, sensors, platforms prior to acquisition

2.3.2.5 Objective 5 – User Orientated Solutions

Reverse the relationship with suppliers, through an innovative model in which **suppliers are responsible** for ensuring that a final solution is optimal to the farmer's existing context and expressed needs.

Benefits: ease the adoption of technologies by farmers, by decreasing the burden of the choices and clarifying the responsibility model, linked to needs and performance improvements defined by the farmers.

2.3.2.6 Objective 6 – Real World Impact

Demonstrate the impact of digital innovations across a variety of sectors and at European level.

Benefits: ease and streamline mechanisms for all stakeholders, with clearly identified incentives to participate in a sustainable and value creation ecosystem. Structure collaboration channels in a security and privacy aware approach.

3 DEMETER technological ecosystem

The DEMETER Open Call #2 – DEPLOY goal is to deploy high value and impactful pilots employing DEMETER methodologies and technologies. In this section, the DEMETER technological ecosystem, available for the implementation of the new pilots, is briefly presented.

The DEMETER technological ecosystem follows a modular approach that allows the composition of systems and apps from various providers: these assets represent the “enablers” able either to provide the necessary data or the necessary processing capabilities (e.g., analytics, decision support, visualization) needed to compose complete agritech applications.

The DEMETER Consortium is committed to provide relevant examples of technological solutions to be composed and orchestrated. Central to our ecosystem is the **DEMETER Enabler Hub (DEH)**, which centralises the full description of all the components, devices, services, data sources and platforms, accessible for exploitation and ultimately for deployment and which provides the tools and facilities that allow to compose DEMETER enabled apps and systems from the various enablers registered in it. The DEH is supported by the **DEMETER Brokerage Service Environment (BSE)**, which facilitates the deployment of a DEMETER enabled application by providing information regarding the endpoints offered by the various DEMETER enabled entities (e.g., endpoints for getting data, for processing information in offered enablers) which have already been discovered and consumed through the DEH. In this way, the enablers have all the necessary information to execute the application. Another component crucial for this process is the **DEMETER Access Control Server (ACS)** that provides part of the security and authentication facilities needed. Finally, the **DEMETER Stakeholders Open Collaboration Space (SOCS)** focuses on resolving the needs of the farmers and provides an endpoint for them to access DEMETER.

In order to facilitate the interoperability between the various enablers of the architecture, a key component is the DEMETER **Agriculture Information Model (AIM)** which provides a common data model for any DEMETER enhanced entities and which is interoperable with the best known ontologies and models used in the project.

This can be seen in the following diagram, which presents the high-level view of the DEMETER Reference Architecture.

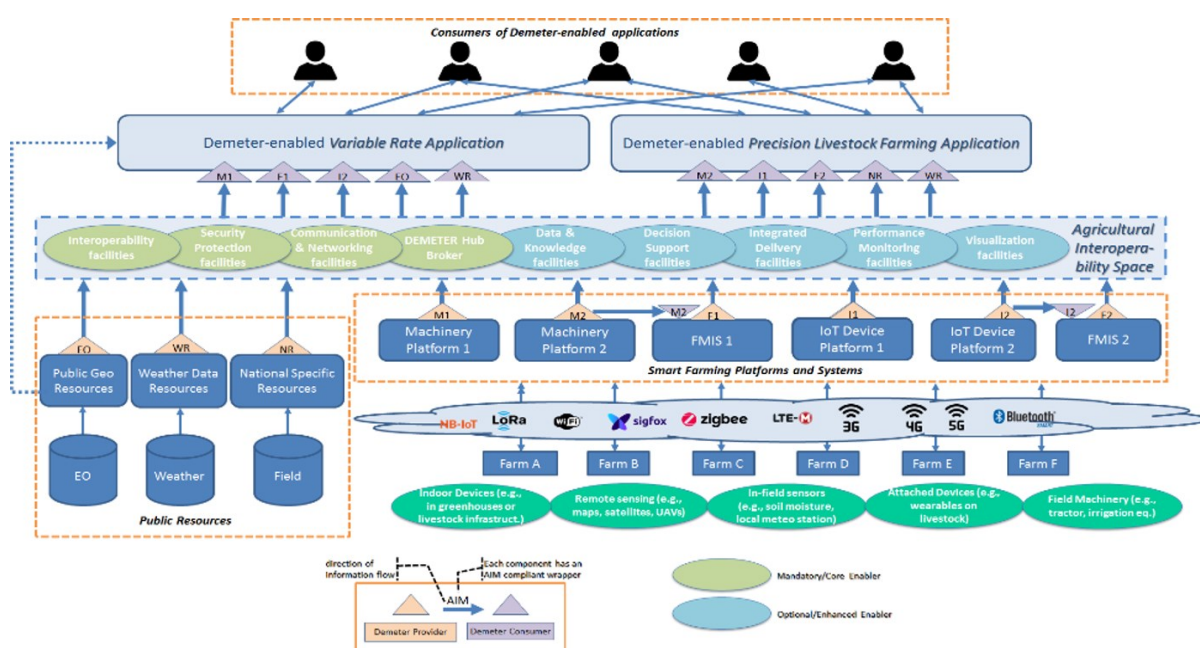


Figure 3: DEMETER Reference Architecture II

Now, to implement this high-level view of the architecture, DEMETER needs to provide several modules that interact with each other, with the various stakeholders as well as with a wealth of existing devices, platforms, systems and data sources. In addition to the DEH, SOCS and AIS which have already been presented previously in this document, key to this process are several needed enablers. These fall within two categories: mandatory core enablers and optional advanced enablers.

The core enablers provide key functionality that is needed in every DEMETER app and therefore must be included in every app. These include, first, enablers for functional and semantic interoperability, which work on top of the existing resources, e.g., platforms, devices, services or applications, and provide data wrappers that allow the resource to interoperate with other enablers. Second, another core enabler is the Access Control enabler used, e.g., to prevent access to unauthorized entities. Finally, the last type of core enabler is a Client for the DEMETER Enabler Hub, for any information that needs to be communicated with the DEH's runtime facilities, e.g., to get computing resources usage by other enablers which would be important when running DEMETER enabled apps.

The other type of enablers offered, the Advanced Enablers are optional and give additional functionality, as needed for each type of application. They are discoverable and accessible through the DEMETER Enabler Hub. The ones developed for the DEMETER pilots fall under several distinct categories. First, the Data & Knowledge Enablers are responsible for Collecting and Curating data from the various sources that the DEMETER developers and stakeholders have been registered for. The Data Preparation and Integration enablers curate, prepare, integrate and link the data obtained, while the Knowledge Extraction enablers handle matters related to data quality assessment, fusion of data collected from heterogeneous sources, targeted data analytics applicable to specific pilots and machine learning. Furthermore, several other enablers have been developed for Decision Support, Performance Monitoring and Benchmarking, as well as visualisation enablers that convey the information and actions taken automatically (or needed) to the final users of the DEMETER applications, such as the farmers.

Note 1: Other technologies may be used to implement the pilots.

Note 2: A full description of the DEMETER Technological Ecosystem is available in Annex 3: Technical Information.

4 DEMETER Multi Actor Approach (MAA)

4.1 What is the DEMETER MAA

DEMETER follows an interactive innovation model as developed by the agricultural European Innovation Partnership (EIP-AGRI) and fosters the development of research and the uptake of innovations into operational applications and the creation of new ideas thanks to interactions between actors ("cross-fertilisation"), sharing knowledge, expertise, capabilities, and a wide range of "components" (software, hardware, machinery, sensors, data sources etc). The interactive innovation model is implemented through the "multi-actor approach" (MAA). The "multi-actor approach" aims to make innovation fully demand-driven, involving various actors during the whole cycle.

Using a multi-actor approach aims to bring together the right people throughout a project. This includes people from varying backgrounds: farmers, advisors, software and hardware developers and researchers. This provides a multi-directional flow of knowledge that provides a better understanding of challenges faced by users and a clear picture of the problems that need to be addressed.

This approach changes the narrative from “designing for” to “designing with”, specifically within the design and development process to ensure that all stakeholder needs are met, and the final solution is useful and usable.

However, the stakeholders might have different degrees of commitment and representativeness in the innovation space that may guarantee or prevent a successful technology transfer and/or sustainability of the DEMETER solutions during and beyond the project life.

Therefore, it is important to fix if each stakeholder has global/international, national or regional representativeness and how strong is the commitment on the co-creation process of DEMETER solutions at which level.

It is also important to track, and if possible, to benchmark, from needs to deployments including social validation and market validation trials.

4.2 How new pilots should implement the MAA

The aim of the DEMETER MAA approach is to create systems that are useful and usable by focusing on the end users.

New pilots must include farmers at the earliest stage of design and development, among other relevant stakeholders. This can involve user focus groups, workshops or interviews to identify and gather farmers’ needs that will feed the development of technical requirements.

To ensure MAA is user-centric, stakeholders should regularly be contacted for input in a balanced way, through surveys or testing prototypes / new builds of the final software.

The applicants should register the farmers and other stakeholders involved in the innovation ecosystem as active actors and co-creators of the solutions, not only those involved directly in the call as applicants. Events involved in the co-creation process and their outcomes needs to be also reported and tracked as part of the process.

Finally, special attention to gender and ethical issues will be very much appreciated, requesting measurable information on the actions addressed supporting these initiatives from any of the stakeholders involved in the pilot.

5 Existing DEMETER pilots



DEMETER currently has 20 pilots running that can be an example for potential applicants to develop similar or different pilots to be funded under the DEMETER Open Call #2 – DEPLOY.





Figure 4: Existing DEMETER pilots


A brief description of each one of the pilots currently being implemented by DEMETER is presented in the table below.

Table 3: Brief description DEMETER pilots by cluster

	<p>CLUSTER #1 ARABLE CROPS</p>
<p>Pilot 1.1 & 1.2 Water and energy savings in irrigated crops</p>	<p>Location: Spain Aim: This pilot aims to optimise the irrigation of arable crops by improving the automation of irrigation zones. By using open and standards-based technologies, it will allow irrigation communities to choose and combine hardware and software from different providers ensuring interoperability. More information: Here</p>
<p>Pilot 1.3 Smart Irrigation Service in Rice & Maize Cultivation</p>	<p>Location: Greece Aim: This pilot aims to maximise water use efficiency in the rice–maize crop rotation system, through the deployment of appropriate sensor systems and science-based decision making. Since irrigation is tightly linked to fertilisation, a nitrogen fertilisation advisory service is also provided by the pilot. This will lead to optimisation of the spatial distribution of nitrogen application based on the real needs of the field. More information: Here</p>
<p>Pilot 1.4 IoT Corn Management & Decision Support Platform</p>	<p>Location: Romania Aim: This pilot aims to implement an IoT Corn Decision Support System Platform for farmers to improve agricultural inputs management including rationalization of costs and obtaining a higher yield. For this purpose, modern methods of monitoring agricultural crops will be used, such as: automatic pixel classification of satellite images, automatic processing of data received from in-situ sensors and weather forecast algorithms, in order to help the farmers to make faster and more efficient decisions in the distribution of inputs and treatments on their crops. This will be done via an integrated platform, INOVAGRIA, that gives the farmer access to data at physical block level (as recorded in the National Paying Agency APIA) throughout Romania. This will assist the farmer in making informed and robust decisions regarding the technical mix to be employed in the production process. More information: Here</p>
	<p>CLUSTER #2 PRECISION FARMING</p>
<p>Pilot 2.1 In-Service Condition Monitoring of Agricultural Machinery</p>	<p>Location: Germany Aim: This pilot aims at demonstrating the potential application of onboard sensors for in-service monitoring, as well as testing the legal applicability of existing After Treatment (AT) sensors as an alternative to PEMS, while considering aspects of data management, privacy and integrity. More information: Here</p>

<p>Pilot 2.2 Automated Documentation of Arable Crop Farming Processes</p>	<p>Location: Germany Aim: This pilot will develop an automated job identification and documentation, and job cost calculation for fertilisation, tillage, seeding, and spraying applications. This will largely eliminate the need for manual documentation. More information: Here</p>
<p>Pilot 2.3 Data Brokerage Service and Decision Support System for Farm Management</p>	<p>Location: Czech Republic, Poland, Latvia and Norway Aim: This pilot will establish a trust-based and compliant data market for agricultural enterprise data that sits between the owners and operators of agricultural data clouds and the farmer. This will include both a technical platform and advisory services that will ensure easy adoption of data and technology by farmers. More information: Here</p>
<p>Pilot 2.4 Benchmarking at Farm Level Decision Support System</p>	<p>Location: Poland Aim: This pilot aims at developing services to support benchmarking on the productivity and sustainability performance of farms, leveraging and extending existing Decision Support Systems (DSS) for farmers. This will involve monitoring different conditions and parameters affecting such indicators, collecting the data and integrating it in a unified layer accessible by the DSS. More information: Here</p>
	<p style="text-align: center;">CLUSTER #3 FRUIT AND VEGETABLE PRODUCTION</p>
<p>Pilot 3.1 Decision Support System to Support Olive Growers</p>	<p>Location: Italy and Greece Aim: The aim of this pilot is to develop and demonstrate a Decision Support System (DSS) for olive tree growers, advisers and agri-food processors to address common issues associated with olive tree growing and olive oil production, including fertilisation, irrigation and integrated pest management (IPM). The DSS integrates in-field sensor data, remotely sensed data, a modelling platform, and a farm management system, combining weather patterns and soil information with crop traits, to foster the sustainable production of olive tree orchards. More information: Here</p>
<p>Pilot 3.2 Precision Farming for Mediterranean Woody Crops</p>	<p>Location: Portugal Aim: This pilot aims at promoting technology, methods and IoT solutions to optimise precision farming practices of Mediterranean Woody Crops (Apple, Olive and Grape), considering the small farmers' economic constraints. The proposed solutions (IoT and Ground Robots) will enable a more efficient usage of inputs such as water, energy, macro-nutrients, and pesticides, thus increasing the profits of small farmers and reducing their environmental impact. More information: Here</p>
<p>Pilot 3.3 Pest Management Control on Fruit Fly</p>	<p>Location: Spain Aim: This pilot aims to optimise the release strategy of sterile male fruit flies by collecting enough field data in an efficient way. More information: Here</p>

<p>Pilot 3.4 Open Platform for Improved Crop Monitoring in Potato Farms</p>	<p>Location: Belgium Aim: This pilot aims to integrate field machinery data from AVR potato harvesters with remote sensing, meteorological and soil data into the WatchITgrow (WIG, watchitgrow.be) platform, to increase ground truth data. Using detailed data from the machinery in the field (detailed yield information, planting dates), the manually fine-tuned physical crop model can be replaced by a purely data-driven approach using machine learning (ML) techniques. More information: Here</p>
	<p>CLUSTER 4 LIVESTOCK</p>
<p>Pilot 4.1 Dairy Farmers' Dashboard for the Entire Milk and Meat Production Value Chain</p>	<p>Location: Norway Aim: The main aim of this pilot is to develop a farmer's digital dashboard delivering a better view or outlook of the farm activities and the farmer's cooperation with both private and public actors. This will ensure a more efficient use of digital tools by the farmer and a better and more customised decision support. In addition, over time, the pilot aims to develop a new system for data collection, modelling and calculation of greenhouse gas emissions on farm level, and a new model for milk prognosis that are essential to optimise production in economic terms, animal numbers, milk quality and feed production. More information: Here</p>
<p>Pilot 4.2 Consumer Awareness: Milk Quality and Animal Welfare Tracking</p>	<p>Location: Italy Aim: Many farmers already monitor their animals by using different smart devices which collect data in a scattered way. However, they often miss an overall vision of the most important animal welfare and milk yield indicators. In addition, processing companies are interested in data relating to the milk's quality levels while consumers want more transparency regarding the food they eat. However, data is not exchanged between actors in the supply chain. The challenge is therefore to optimise the flow of this information. More information: Here</p>
<p>Pilot 4.3 Proactive Milk Quality Control</p>	<p>Location: Ireland Aim: This pilot aims to integrate animal behaviour and physiological data into a welfare and health scoring framework with progression to a reference system to increase animal wellbeing standards on dairy cow farms. More information: Here</p>
<p>Pilot 4.4 Optimal Chicken Farm Management</p>	<p>Location: Serbia, Slovenia and Montenegro Aim: This pilot focuses on poultry farm management, from providing guidance and support regarding biosafety and feed mixture preparation to continuous monitoring of environmental conditions, operations and animal welfare. It also focuses on creating a transparent supply chain sharing information about animal wellbeing and the resources used during production. More information: Here</p>

	CLUSTER 5 SUPPLY CHAIN
Pilot 5.1 Disease Prediction and Supply Chain Transparency for Orchards/Vineyards	Location: Serbia, Montenegro, Georgia and Slovenia Aim: This pilot focuses on complete farm management in vineyards and orchards, providing pest and disease management tools to optimise pesticide usage and increase crop quality. Furthermore, pesticide usage data is collected and stored to enable a transparent supply chain. More information: Here
Pilot 5.2 Farm of Things in Extensive Cattle Holdings	Location: Finland and Spain Aim: This pilot focuses on improving animals' wellbeing and health in dairy farms, and how this can affect the quality and information of processed products, also considering cereals and eggs as raw materials. This pilot also considers the collaboration of farmers and end user involvement in quality testing and feedback provision. More information: Here
Pilot 5.3 Pollination Optimisation in Apiculture	Location: Poland Aim: This pilot aims to develop and provide a service for pollination optimisation. The service will connect farm management systems and apiary management systems with advisory and decision support services. The goal of the integration of different agriculture systems is to enable better communication between farmers and beekeepers, to protect bees and to optimise pollination of crops with the aim of improving their yields. More information: Here
Pilot 5.4 Transparent Supply Chain in the Poultry Industry	Location: Serbia, Slovenia and Montenegro Aim: This pilot focuses on the supply part of the poultry industry. It will enable information sharing about animal wellbeing and resources used during production, thus creating the basis of a transparent supply chain. More information: Here

5.1 List of EU countries not covered by DEMETER pilots:

The DEMETER Open Call #2 - DEPLOY goal is to deploy high value and impactful pilots employing DEMETER methodologies and technologies, with particular focus on EU geographic regions not represented within DEMETER pilots. A list of EU countries not covered by DEMETER pilots is presented below:

Austria, Bulgaria, Croatia, Cyprus, Denmark, Estonia, France, Hungary, Lithuania, Luxembourg, Malta, Netherlands, Slovakia and Sweden.

5.2 Timeline

The submission of proposals to the DEMETER Open Call #2 - DEPLOY will be enabled via [F6S](#) from the 14th of December 2021 to the 16th of February 2022, at 17:00 Central European Time (CET). Below are presented the current tentative dates for the different phases. The dates can be subject to change in case of any modifications in the DEMETER project's schedule.

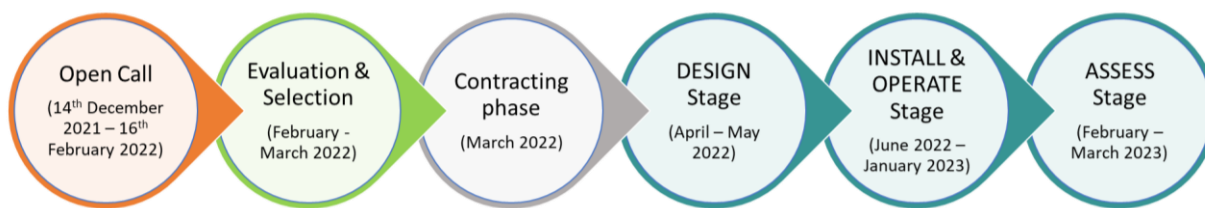


Figure 5: DEMETER Open Call #2 - DEPLOY timeline

6 Eligibility criteria

All applicants will have to abide to all general requirements described in this section to be considered eligible for DEMETER Open Call #2 - DEPLOY.

Therefore, please read this section carefully.

6.1 Beneficiaries

DEMETER invites consortia of 2-3 partners representing at least a tech provider/ integrator and an end-user, led by a for-profit SME.

6.1.1 Type of beneficiaries

The DEMETER Open Call #2 – DEPLOY will fund consortia composed by two or three:

- micro, small and medium-sized enterprises (SMEs),
- secondary and higher education establishments, research institutes and other not-for profit research entities.

Micro, small and medium-sized enterprises (SMEs) are considered eligible only if complying with the European Commission Recommendation 2003/361/EC¹ and the SME user guide². As a summary, the criteria which define an SME are:

- a) Headcount in Annual Work Unit (AWU) less than 250.
- b) Annual turnover less or equal to €50 million OR annual balance sheet total less or equal to €43 million.

A self-employed person might be considered as an SME.

Start-ups that do not have yet annual turnover or balance sheets are also considered eligible given that they fulfil the criteria (a) and (b) of section 6.1.1 at submission time.

In case an SME is awarded, it will remain eligible even if, at a certain point during the execution of DEMETER activities, it does not fulfil criteria (a) or (b) of section 6.1.1.

Please note that a signed version of **Annex 5: Consortium Declaration of Honour** and **Annex 6: SME Declaration** (for each SME) are mandatory for a proposal submission.

In addition, the following condition apply:

- The applying applicants should not:

¹ European Commission Recommendation 2003/361/EC.

<http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:124:0036:0041:en:PDF>

² SME definition: Please check “User guide to the SME definition” available at <https://op.europa.eu/s/n3t1>

- have convictions for fraudulent behaviour, other financial irregularities, unethical or illegal business practices.
- have been declared bankrupt or have initiated bankruptcy procedures.
- be under liquidation or an enterprise under difficulty accordingly to the Commission Regulation No 651/2014, art. 2.18
- be excluded from the possibility of obtaining EU funding under the provisions of both national and EU law, or by a decision of both national or EU authority
- Proposals from Linked SMEs³ must demonstrate that there is no risk of double funding. The fundamental principle underpinning the rules for public expenditure in the EU states that no costs for the same activity can be funded twice from the EU budget, as defined in the Article 111 of Council Regulation (EC, Euratom) No 1605/2002 of 25 June 2002 on the Financial Regulation. In the case of proposals submitted by linked SMEs, all must clearly state the differences between them including but not limited to, technical aspects, market strategy and team composition, so that it remains no doubt that there is no risk of double funding. In order to properly assess these concerns DEMETER may assign all proposals to the same set of evaluators and, should any doubt remain, exclude all proposals.

6.2 Eligible countries

Only applicants legally established in any of the following countries (hereafter collectively identified as the “Eligible Countries”) are eligible:

- The Member States (MS) of the European Union (EU), including their outermost regions;
- The Overseas Countries and Territories (OCT) linked to the Member States⁴;
- H2020 associated countries (those which signed an agreement with the Union as identified in Article 7 of the Horizon 2020 Regulation): according to the updated list published by the EC⁵;

The UK applicants are eligible under the conditions set by the EC for H2020 participation at the time of the deadline of the call.

6.3 Language

English is the official language for DEMETER Open Call #2 - DEPLOY. Submissions done in any other language will not be evaluated. English is also the only official language during the whole execution of the DEMETER programme. This means any requested submission of deliverables will be done in English in order to be eligible.

6.4 Multiple submission

Only one proposal will be accepted for funding per applicant.

In the case of a multiple submission, only the last one received (timestamp of the system) will enter into the evaluation process, the rest being declared as non-eligible. If the last submitted proposal is declared then non-eligible or fails to reach the thresholds of the evaluation, the other proposals submitted earlier will not be considered for evaluation in any case.

³ Please check the definition of Linked SME in the “User guide to the SME definition” available at <https://op.europa.eu/s/n3t1> and include the relevant information in annex 6: SME Declaration.

⁴ Entities from Overseas Countries and Territories (OCT) are eligible for funding under the same conditions as entities from the Member States to which the OCT in question is linked.

⁵ https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cp/h2020-hi-list-ac_en.pdf

6.5 Documentation format

Any document requested in any of the phases must be submitted electronically in PDF format without restrictions for printing.

6.6 Submission system

Only proposals submitted through the Open Call submission tool (F6S platform) at <https://www.f6s.com/demeter-open-call-2-deploy/apply> and within the Call duration will be accepted. Proposals submitted by any other means, will not be evaluated. Only the documentation included in the application will be considered by evaluators. It will be composed by a form with administrative questions to be completed directly in the F6S platform, the Annex 4.1: Proposal template, the Annex 5: Consortium Declaration of Honour, and Annex 6: SME Declaration (for each SME). The information provided should be actual, true and complete and should allow the assessment of the proposal.

The regular functioning of the F6S platform limits to one application submission per F6S user in each call. If an F6S user wishes to submit more than one application, for example on behalf of different SMEs, the F6S user should request support from the F6S support team (support@f6s.com) at least 10 days prior the open call deadline.

6.6.1 Data protection

In order to process and evaluate applications, DEMETER will need to collect Personal and Industrial Data. F6S Network Limited, as partner of the DEMETER project, will act as Data Controller for data submitted through the F6S platform for these purposes. The F6S platform's system design and operational procedures ensure that data is managed in compliance with The General Data Protection Regulation (EU) 2016/679 (GDPR). Each applicant will accept the F6S terms to ensure coverage. Please note that DEMETER requests the minimum information needed to deliver the evaluation procedures or the DEPLOY activities.

Please refer to <https://www.f6s.com/terms> to check F6S platform data privacy policy and security measures.

6.7 Deadline

Only proposals submitted before the deadline will be accepted. After the call closure no additions or changes to received proposals will be taken into account. The deadline for this call is 16 February 2022, at 17:00 CET.

6.8 Absence of conflict

Applicants shall not have any actual or/and potential conflict of interest with the DEMETER selection process and during the whole project. All cases of conflict of interest will be assessed case by case. In particular, applicants cannot be DEMETER Consortium partners or affiliated entities nor their employees or co-operators under a contractual agreement.

7 Evaluation process

The evaluation process is shown in the following diagram:

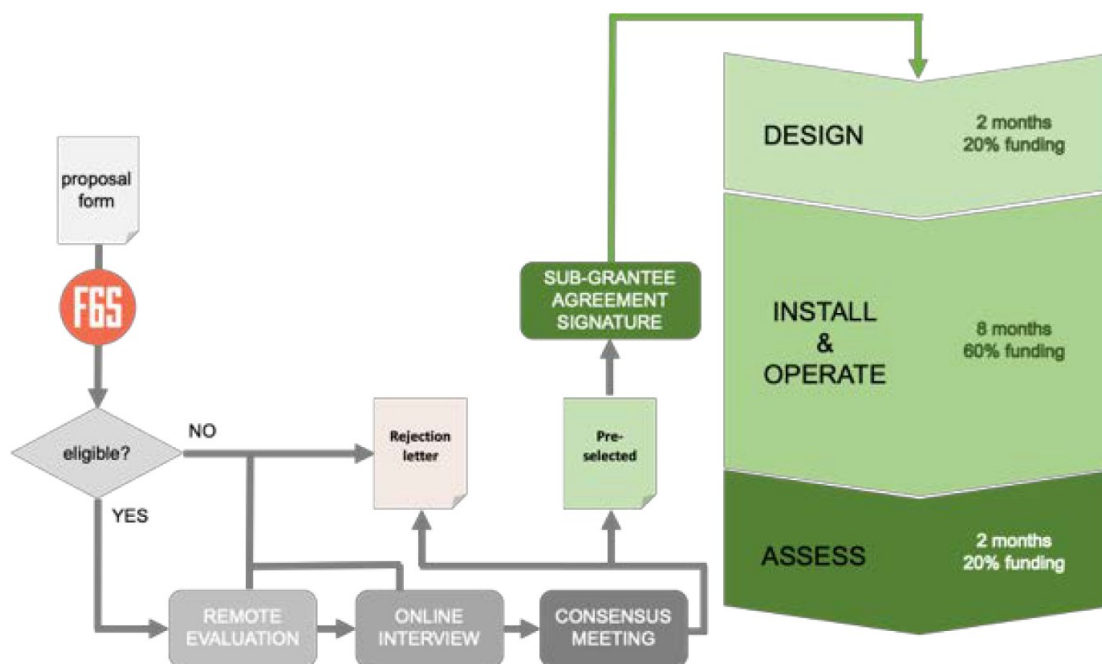


Figure 6: Evaluation process

Each of the stages will have a set of criteria to access the next stage but also to raise the obligation from DEMETER Consortium on the financial support. The following paragraphs provide a detail set of procedures and criteria at the time of evaluating and awarding the financial support to the third parties.

7.1 Evaluation criteria

1. Proposal's reception: via F6S.
2. Eligibility filter: A combination of automatic filtering and manual checking will discard proposals that do not meet the eligibility criteria listed in section 6 of this document.
3. Remote evaluation: After the eligibility filter, the final proposals shortlist for evaluation will be created. Then, the proposals will be given to the external evaluators with experience in agriculture applied technologies and agro-business/ market development, bound by confidentiality agreement. Every proposal will be evaluated by at least two different experts. The criteria for evaluation will be:

- Excellence & innovation (40% weighting)

Pilot projects must demonstrate a clear set of objectives aligned with the definition and objectives of the DEMETER Open Call #2 – DEPLOY.

- Appropriateness of the pilot project scope and alignment with DEMETER challenges and objectives.
- Focus on EU countries not represented within existing DEMETER pilots.
- Innovation degree and level of integration with DEMETER.
- Appropriateness of Multi Actor Approach.
- Quality, credibility, and clarity of pilot project description.

- Impact (25% weighting)

Applicants must define a clear set of deliverables, milestones and KPIs aligned with the objectives of the open call. Proposals must demonstrate impact on the DEMETER ecosystem and its contribution to meeting the overall project objectives.

- Potential for the outcomes to be adopted, or to be used or to be streamlined by farmers and farm managers into existing practices.
- Strengthening the competitiveness and growth of companies by developing innovations meeting the needs of European and global markets, and, by delivering such innovations to the markets.
- Effectiveness of the proposed measures to exploit and disseminate the project results.
- Implementation (20% weighting)

Applicants must provide credible evidence that the project delivery team have the necessary skills, infrastructure and management experience to be able to deliver the project in the timescales and budget specified.

 - Appropriateness of the skills and experience of the project delivery team.
 - Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources, justification of resources.
- Value for money (15% weighting)

Proposals must also include a clear budget, detailing the overall project cost, the amount of funding requested and how it will be spent. This budget must represent good value for money in the opinion of the evaluation panel.

 - Appropriateness of expected costs and resources assigned to the project.

The experts will score each award criterion on a scale from 0 to 5 (decimal and centesimal point scores may be given):

0 = Proposal fails to address the criterion or cannot be assessed due to missing or incomplete information.

1 = Poor: criterion is inadequately addressed or there are serious inherent weaknesses.

2 = Fair: proposal broadly addresses the criterion, but there are significant weaknesses.

3 = Good: proposal addresses the criterion well, but a number of shortcomings is present.

4 = Very good: proposal addresses the criterion very well, but a small number of shortcomings is present.

5 = Excellent: proposal successfully addresses all relevant aspects of the criterion. Any shortcomings are minor.

For each section, the minimum threshold is 3 out of 5 points. The default overall threshold, applying to the sum of the three individual scores with the corresponding weight each, is 16. That means if a proposal receives less than 3 in one criterion or less than 16 in the overall score it is automatically rejected. At the end of this phase the proposals will be ranked in one final list.

4. Online interview and consensus meeting: Evaluators will gather in a teleconference meeting to talk with the top 8 ranked proposals defined in the previous step. During this teleconference applicants will start by doing a pitch of their pilot project concept, followed by Q&A. This will be an opportunity for evaluators to cover any doubts that they may had about the written application as well as about the commitment and engagement of applicants

towards participating in DEMETER ecosystem. At the end of the meeting, the applicants will leave, and evaluators will share, compare and revise (if necessary) their scores aiming to have a consensus about respective proposal.

5. Final ranking: At the end of the evaluation process, the proposals will be ranked taking into account the revised scores from the online interview phase. The criteria for the ranking of the proposals will be semi-automatic following the rules below:
 - Rule 1: The proposals will be ranked based on their overall score.
 - Rule 2: In case following Rule 1 there are proposals in the same position, priority will be given to proposals that have higher score on the Excellence & innovation award criterion.
 - Rule 3: In case following Rule 2 there are proposals in the same position, priority will be given to proposals that have higher score on the Impact award criterion.
 - Rule 4: In case following Rule 3 there are proposals in the same position, priority will be given to the number of women participating in the team.
6. Selection: The selection of the proposals will follow the rule below:
 - Rule a): The top ranked proposals will be selected until reaching the available funding. However, the DEMETER Consortium is not obliged to select the highest scoring proposal where it has objective grounds for objecting to the participant if, for example commercial competition issues or strategic issues to balance technologies between the different platforms available in DEMETER become apparent during the evaluation process. In this case the choice may pass, to the next ranked proposal.
7. The DEMETER Consortium will then formally approve a list of proposals within the limits of the available funding.
8. Approval by European Commission prior to contracting: The list of selected projects will be submitted to the European Commission for final screening.
9. Communication of Results: Every applicant will receive via e-mail:
 - An Evaluation Summary Report (ESR)
 - A letter informing of rejection decision or invitation to enter the negotiation phase.

The DEMETER Consortium may conclude that there are not enough proposals with an adequate quality (indicated by their evaluation scores meeting or exceeding specific pre-defined thresholds), in which case it will make no selection or select fewer proposals than the cascaded funding budget allows. This conclusion is obligatory if not enough proposals score above the threshold given on the bespoke evaluation form.

7.2 Negotiation

7.2.1 Contract Preparation

After the Open Call evaluation conclusion and projects selection, the DEMETER coordinator will start the contract preparation in collaboration with the selected proposals' coordinators. Contract preparation will go via an administrative and financial checking (and potentially into technical or ethical/security negotiations) based on evaluators' comments. On a case-by-case approach, a phone call or teleconference may be needed for clarification.

The objective of the contract preparation is fulfilling the legal requirements between DEMETER Consortium and every beneficiary of the open call. The items covered will be:

- Inclusion of the comments (if any) in the Evaluation Summary Report of the proposals and mapping to the Sub-grant agreement (contract).

- To validate the status information of SMEs, the following documents will be required:
 - SME declaration: signed and stamped. In the event the applicant declares being nonautonomous, the balance sheet, profit and loss account (with annexes) and Headcount (AWU) documentation for the last period for upstream and downstream organizations should also be provided.
 - Legal existence. Company Register, Official Gazette or other official document per country showing the name of the organisation, the legal address and registration number and a copy of a document proving VAT registration (in case the VAT number does not show on the registration extract or its equivalent).
 - In cases where the number of employees and/or the ownership is not clearly identified: any other supporting documents which demonstrate headcount and ownership such as payroll details, annual reports, national regional association records, etc.
 - SME Bank account information: The account where the funds will be transferred will be indicated via a form signed by the SME legal representative and the bank representative. The account should be a business bank account of the SME.

The request, by DEMETER Consortium, of the above documentation will be done within deadlines. In general, the sub-project negotiation should be concluded within 2 weeks. An additional week may be provided by the DEMETER coordinator in case of a significant reasoning. In case negotiations have not been concluded within the above period, the proposal is automatically rejected and the next proposal in the reserve list is invited.

7.2.2 Contract Signature

At the end the negotiation phase, a Sub-Grant Agreement (Contract) will be signed between the DEMETER Consortium represented by its coordinator (WIT) and the selected consortia, represented by its leader (the leader must be an SME) and it is the responsibility of the consortium leader and the other consortium partners to make an agreement that shall cover the rights and obligations between them.

Please note:

- The sub-grantee funding agreement/contract will cover the complete 3 phases: DESIGN, INSTALL & OPERATE and ASSESS. No additional sub-grant agreement will be signed.
- The sub-grant agreement will automatically expire at the end of each phase - DESIGN, INSTALL & OPERATE and ASSESS - without any further notice from the DEMETER Consortium, in case the concerned consortium does not enter or qualify for the next phase or if the Consortium Declaration of Honour has been violated.
- The DEMETER coordinator (WIT) will only transfer funds to the selected consortium leaders. The consortium leaders must transfer the respective funds to the other consortium partners, based on the budget established in the Consortium Declaration of Honour.

7.3 Appeal procedures

If, at any stage of the evaluation process, the applicant considers that a mistake has been made or that the evaluators have acted unfairly or have failed to comply with the rules of this DEMETER Open Call #2 - DEPLOY, and that her/his interests have been prejudiced as a result, the following appeal procedures are available.

A complaint should be drawn up in English and submitted by email to: opencalls@h2020-demeter.eu. Any complaint made should include:

- contact details,
- the subject of the complaint,
- information and evidence regarding the alleged breach.

Anonymous complaints or those not providing the mentioned information will not be considered. Complaints should also be made within five (calendar) days since the evaluation results are presented to the applicants. As a general rule, the DEMETER Team will investigate the complaints with a view to arriving at a decision to issue a formal notice or to close the case within no more than twenty days from the date of reception of the complaint, provided that all required information has been submitted by the complainant. Where this time limit is exceeded, the DEMETER Team will inform the complainant by email.

Please note:

- This procedure is concerned only with the evaluation and/or eligibility checking process. The DEMETER Team will not call into question the scientific or technical judgement of appropriately qualified experts.
- A re-evaluation will only be carried out if there is evidence of a shortcoming that affects the final decision on whether to fund it or not. This means, for example, that a problem relating to one evaluation criterion will not lead to a re-evaluation if a proposal has failed anyway on other criteria.
- The evaluation score following any re-evaluation will be regarded as definitive. It may be lower than the original score.

7.4 Activities evaluation

The DEPLOY activities are divided in 3 phases.

7.4.1 DESIGN Phase

The Phase 1 Design is associated with the starting point of each project and will have a maximum duration of 2 months. Within this phase, consortia must design a detailed pilot plan, aligned with the DEMETER objectives. The Pilot plan should include the following:

- Report engagement with farmers to identify and gather farmers' needs that will feed the development of technical requirements
- Description of how the pilot will be carried out
- Description of how the Multi Actor Approach will continue to be implemented
- Description of the technologies to use
- List of milestones and KPIs to achieve (metrics and target values for how the success will be determined)
- Pilot timeline
- Pilot costs
- Risk management plan
- Dissemination and exploitation plan

At the end of the Design Phase, consortia will have to deliver their 1st Report, which will describe the activities undertaken during this phase.

7.4.2 INSTALL & OPERATE Phase

The Phase 2 INSTALL & OPERATE is the most relevant phase of each project and will have a maximum duration of 8 months. Within this phase, projects will perform their technical developments to achieve what has been previously proposed. Pilot's development and operation should consider the following:

- Reporting of the Multi Actor Approach implementation
- Reporting of technical development
- Configuration of units and software
- Reporting of the operation initiation
- Reporting of technology deployment in the field
- Collection of relevant data
- Project performance (in terms of quantitative KPIs identified in the previous phase)
- Proof that the DEMETER offering has been used for the pilot purposes
- Provide a Demo (video).

At the end of Phase 2, consortia will have to deliver their 2nd Report, which will demonstrate the projects pilot development results and its operation system. The 2nd Report must clearly show the milestones and KPIs accomplished during this phase and provide justifications in case targets are not reached.

7.4.3 ASSESS Phase

The Phase 3 ASSESS is critical to leverage the results of DESIGN and INSTALL & OPERATE phases and will have a maximum duration of 2 months. The aim of the ASSESS phase is to provide a business support that will foster the exploitation of projects results, sustainable growth and envisages an investment round for the pilot. Within this phase, projects have to focus on the assessment and exploitation of results/achievements. Pilot's assessment and exploitation should include the following:

- Business Model & Exploitation Plan
- Multi Actor Approach impact
- Market Analysis Completeness
- Direct & Indirect competition analysis
- Scalability potential
- Report dissemination activities

At the end of Phase 3, consortia will deliver the 3rd Report (final report), which will be a report on market associated activities.

7.4.4 Phase's evaluation

The milestones and deliverables will be evaluated at the end of each phase. A remote review will take place after each phase to evaluate the progress of the consortia. One week before each review, the consortia should submit their deliverables. The review will be remote via a teleconference platform (e.g. Skype or Zoom). The consortia will make a presentation of the work done, analyse the progress and answer questions from the experts.

After the review, the consortia will receive a review report, including comments and potential recommendations. The report will also state if the deliverables are accepted or not.

- On acceptance of the deliverables, the consortia will be requested to submit a financial statement (template will be provided) requesting the voucher of the corresponding phase.

- Payments will be released no later than thirty (30) natural days after the notification by the Contractor.
- On rejection of any of the deliverables, or in case of not satisfactory review, the consortia will be requested to continue to the next phase without receiving the corresponding voucher. The rejected deliverables may be (re-) submitted at the next phase review, hence qualifying for its payment, if and when said deliverable is approved. If the a rejection of deliverable or an unsatisfactory review happens in the last stage (ASSESS), the DEMETER Consortium will consider if a short extension can be conceded in order to invite a specific consortium to update and resubmit deliverables, hence qualifying for its payment, if and when said deliverable is approved.

7.4.5 Participation in events

During the 3 phases, the selected consortia should participate in various types of events (audio calls, video calls, webinars, online trainings, virtual conferences, etc..) organised or suggested by the DEMETER Consortium, to support the development of the proposed pilots. Each consortium should be available to participate in a minimum of 4 remote events per month, and in one face to face event in Europe during one of the 3 phases.

8 Financial support provided

8.1 Financial support

The maximum amount of funding that a consortium may receive from DEMETER is 150.000 EUROS via any mean.

The maximum amount of funding that a consortium member may receive from DEMETER is 100.000 EUROS via any mean.

DEMETER funding is results-driven, provided as vouchers in a lump sum way. As such, there is no need for a traditional administrative-justification system (e.g. counting hourly dedication or calculating workload), but getting the funding is associated with the full achievement of the relevant milestone.

Selected consortia will become part of DEMETER DEPLOY activities and will go through an exhaustive sequential process which will last 12 months and will be composed of 3 phases. Payments will be done in 3 instalments (20% + 60% + 20%) based on concrete results, deliverables and review of each phase.

Summary of funding:

DEPLOY Phases	Duration	Funding	Example (€150k)
DESIGN	2 months	20%	€30.000
INSTALL & OPERATE	10 months	60%	€90.000
ASSESS	2 months	20%	€30.000

Detailed payment schedule and payment conditions will be settled in the Sub-grant Agreement.

8.2 Origin of funds

Any selected consortium will sign a dedicated Sub-grant Agreement with the DEMETER project coordinator (on behalf of DEMETER Consortium). The funds attached to the Sub-grant Agreement come directly from the funds of the European Project DEMETER, and the DEMETER Consortium is

managing the funds according to the Grant Agreement Number 857202 signed with the European Commission.

As will be indicated in the Sub-grant Agreement, this relation between the sub-grantees and the European Commission through DEMETER project carries a set of obligations to the sub-grantees with the European Commission. It is the task of the sub-grantees to accomplish them, and of the DEMETER Consortium partners to inform about them.

9 Preparation and submission

The submission will be done through the F6S platform (<https://www.f6s.com/demeter-open-call-2-deploy/apply>) which is directly linked from DEMETER website. The applicants are required to register a profile at F6S to be able to submit a proposal. The documents that will be submitted are:

- Application form: administrative questions to be filled in directly in the F6S platform. In addition, some general questions for statistic purpose and tick boxes to be clicked by applicants confirming to have read the conditions and agree with the conditions defined in this document.
- Annex 4.1: Proposal template: document in PDF format containing the description of the project. It will include different sections: (1) Overview of the proposal, (2) Excellence & innovation, (3) Impact, (4) Expertise and excellence of the team, (5) Project planning and value for money, (6) Ethics self-assessment.
- Annex 5: Consortium Declaration of Honour
- Annex 6: SME Declaration

Annexes 7: Bank account information, and 8: Sub-grant Agreement Template, are provided for reference and will only be requested to the selected applicants. These two documents are not necessary for the submission of applications.

The project proposals must strictly adhere to the template provided by DEMETER Consortium which defines sections and the overall length. Participants are requested to carefully read and follow the instructions in the form. Evaluators will be instructed not to consider extra material in the evaluation. Additional material, which has not been specifically requested in the online application form, will not be considered for the evaluation of the proposals. Data not included in the proposal will not be taken into account.

It is strongly recommended not to wait until the last minute to submit the proposal. Failure of the proposal to arrive in time for any reason, including communications delays, automatically leads to rejection of the submission. The time of receipt of the message as recorded by the submission system will be definitive.

10 Communication flow

10.1 General communication procedure

The contact point of each selected consortium should:

- Provide any notice be in writing to the DEMETER project coordinator;
- Notify immediately any change of persons or contact details to the DEMETER coordinator. The address list shall be accessible to all concerned.

11 Responsibility of beneficiaries

The selected consortia are indirectly beneficiaries of European Commission funding. As such, they are responsible for the proper use of the funding and ensure that the recipients comply with obligations under H2020 specific requirements as described in Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020). The obligations that are applicable to the recipients include⁶:

11.1 Conflict of interest

The selected consortia must take all measures to prevent any situation where the impartial and objective implementation of the DEPLOY activities is compromised for reasons involving economic interest, political or national affinity, family or emotional ties or any other shared interest ('conflict of interests').

They must formally notify to the DEMETER coordinator without delay any situation constituting or likely to lead to a conflict of interests and immediately take all the necessary steps to rectify this situation.

The DEMETER coordinator may verify that the measures taken are appropriate and may require additional measures to be taken by a specified deadline.

If the sub-contract member breaches any of its obligations, the sub-contract may be automatically terminated. Moreover, costs may be rejected.

11.2 Data protection and confidentiality

During implementation of the DEPLOY activities and for four years after the end of the DEPLOY activities, the parties must keep confidential any data, documents or other material (in any form) that is identified as confidential at sub-contract signing time ('confidential information').

If a selected consortium requests, the Commission and the DEMETER Consortium may agree to keep such information confidential for an additional period beyond the initial four years. This will be explicitly stated at the sub-contract.

If information has been identified as confidential during the sub-project execution or only orally, it will be considered to be confidential only if this is accepted by the DEMETER coordinator and confirmed in writing within 15 days of the oral disclosure. Unless otherwise agreed between the parties, they may use confidential information only to implement the Agreement.

The selected consortia may disclose confidential information to the DEMETER Consortium and to the selected reviewers, who will be bounded by a specific Non-Disclosure Agreement.

11.3 Promoting the action and give visibility to the EU funding

The selected consortia must promote the DEPLOY activities, the DEMETER project and its results, by providing targeted information to multiple audiences (including the media and the public) in a strategic and effective manner and to highlight the financial support of the EC.

Unless the European Commission or the DEMETER coordinator requests or agrees otherwise or unless it is impossible, any communication activity related to the action (including in electronic form, via social media, etc.), any publicity, including at a conference or seminar or any type of information or

⁶ The obligations described here are not binding and may be modified, refined or additional obligations may be inserted during the sub-project negotiation if needed.

promotional material (brochure, leaflet, poster, presentation etc.), and any infrastructure, equipment and major results funded by the grant must:

(a) display the EU emblem;

(b) display the DEMETER logo and

(c) include the following text:

- For communication activities: “This project has indirectly received funding from the European Union’s Horizon 2020 research and innovation programme under project DEMETER (grant agreement No 857202)”.
- For infrastructure, equipment and major results: “This [infrastructure][equipment][insert type of result] is part of a sub-project that has indirectly received funding from the European Union’s Horizon 2020 research and innovation programme under project DEMETER (grant agreement No 857202)”.

When displayed in association with a logo, the European emblem should be given appropriate prominence. This obligation to use the European emblem in respect of projects to which the EC contributes implies no right of exclusive use. It is subject to general third-party use restrictions which do not permit the appropriation of the emblem, or of any similar trademark or logo, whether by registration or by any other means. Under these conditions, the Beneficiary is exempted from the obligation to obtain prior permission from the EC to use the emblem. Further detailed information on the EU emblem can be found on the Europa web pageⁱⁱⁱ.

Any publicity made by selected consortia in respect of the project, in whatever form and on or by whatever medium, must specify that it reflects only the author’s views and that the EC or DEMETER project is not liable for any use that may be made of the information contained therein.

The EC and the DEMETER Consortium shall be authorised to publish, in whatever form and on or by whatever medium, the following information:

- the name of the selected consortia members;
- contact address of the selected consortia members;
- the general purpose of the project;
- the amount of the financial contribution foreseen for the project; after the final payment, and the amount of the financial contribution actually received;
- the geographic location of the activities carried out;
- the list of dissemination activities and/or of patent (applications) relating to foreground;
- the details/references and the abstracts of scientific publications relating to foreground and, if funded within DEMETER project, the published version or the final manuscript accepted for publication;
- the publishable reports submitted to DEMETER;
- any picture or any audio-visual or web material provided to the EC and DEMETER in the framework of the project.

The selected consortia shall ensure that all necessary authorisations for such publication have been obtained and that the publication of the information by the EC and DEMETER does not infringe any rights of third parties.

Upon a duly substantiated request by a selected consortium coordinator, on behalf of any consortium partner, the DEMETER Consortium, if such permission is provided by the EC, may agree to forego such publicity if disclosure of the information indicated above would risk compromising the beneficiary's security, academic or commercial interests.

11.4 Financial audits and controls

The European Commission (EC) will monitor that DEMETER beneficiaries and the selected consortium members comply with the conditions for financial support to third parties such as set out in Annex 1 of the DEMETER grant agreement and may take any action foreseen by the grant agreement in case of noncompliance vis à vis the selected consortium members concerned.

Moreover, the EC may at any time during the implementation of the DEMETER project and up to 5 (five) years after the end of the DEMETER project, arrange for financial audits to be carried out, by external auditors, or by the EC services themselves including the European Anti-Fraud office (OLAF). The audit procedure shall be deemed to be initiated on the date of receipt of the relevant letter sent by the EC. Such audits may cover financial, systemic and other aspects (such as accounting and management principles) relating to the proper execution of the grant agreement. They shall be carried out on a confidential basis.

The selected consortia shall make available directly to the EC all detailed information and data that may be requested by the EC or any representative authorised by it, with a view to verifying that the grant agreement is properly managed and performed in accordance with its provisions and that costs have been charged in compliance with it. This information and data must be precise, complete and effective.

The selected consortia shall keep all sub-project deliverables and the originals or, in exceptional cases, duly authenticated copies – including electronic copies – of all documents relating to the sub-project contract for up to five years from the end of the project. These shall be made available to the EC where requested during any audit under the grant agreement.

In order to carry out these audits, the selected consortia shall ensure that the EC's services and any external body(ies) authorised by it have on-the-spot access at all reasonable times, notably to the subproject applicant offices, to their computer data, to their accounting data and to all the information needed to carry out those audits, including information on individual salaries of persons involved in the project. They shall ensure that the information is readily available on the spot at the moment of the audit and, if so requested, that data be handed over in an appropriate form.

On the basis of the findings made during the financial audit, a provisional report shall be drawn up. It shall be sent by the EC or its authorised representative to the consortium member concerned, which may make observations thereon within one month of receiving it. The Commission may decide not to take into account observations conveyed or documents sent after that deadline.

The final report shall be sent to the consortium member concerned within two months of expiry of the aforesaid deadline. On the basis of the conclusions of the audit, the EC shall take all appropriate measures which it considers necessary, including the issuing of recovery orders regarding all or part of the payments made by it and the application of any applicable sanction.

The European Court of Auditors shall have the same rights as the EC, notably right of access, for the purpose of checks and audits, without prejudice to its own rules.

In addition, the EC may carry out on-the-spot checks and inspections in accordance with Council Regulation (Euratom, EC) No 2185/96 of 11 November 1996 concerning on-the-spot checks and inspections carried out by the Commission in order to protect the European Communities' financial interests against fraud and other irregularities.

12 Intellectual property rights (IPR)

Applicants will remain the sole owners of their respective IPR and retain the IPR to their respective solutions. The DEMETER Consortium itself will not retain an equity stake in any applicant's company, nor will it retain any IPR.

Each evaluator will sign a non-disclosure agreement (NDA) before receiving access to the database of proposals in order to protect the intellectual property of the applicants. However, DEMETER and the European Commission may ask participants who have received funding to present their work as part of public relations and networking events in order to showcase the benefits of the DEMETER project.

12.1 Data ownership

The type of data available for the DEMETER Open Call #2 pilots is manifold, representing the contextual diversity of smart environments which mirrors the complex reality of the agri-tech sector. The type of data that selected applicants may make use of could be open data and close data, with either open access or restricted access. DEMETER deals with several data policy and preferences on how data should be treated in their framework.

It will be the responsibility of the selected applicants to understand the conditions on data in each case, as well as associated licences and costs. It will be also the responsibility of selected applicants to implement data processing solutions compliant with the GDPR.

GDPR Considerations:

In the text below "Parties" refers to selected applicants and DEMETER project partners.

Parties must agree that any Background, Results, Confidential Information and/or any and all data and/or information that is provided, disclosed or otherwise made available during the implementation of the project and/or for any Exploitation activities ("Shared Information"), shall not include Personal Data as defined by the General Data Protection Regulation 2016/679 hereinafter referred to as the GDPR. However, Shared Information may contain anonymised data according to the applicable data protection laws.

Parties shall notify to the other affected Parties in writing, without undue delay, any anticipated change affecting such Party's representation and warranty set forth in the paragraph above. In such a case, neither Party shall deliver or otherwise provide to the other Party with access to any data that may include additional Personal Data (beyond the Business Contact Information) that may be subject to the GDPR or other applicable data protection laws, until the Parties have reached an agreement in writing on the steps to be taken with respect to such data.

The Parties agree that the Business Contact Information will only be processed to the limited extent required to manage the business relation between the Parties and its Affiliated Entities and in compliance with the regulations of the applicable data protection laws.

The Parties acknowledge that each Party has no obligation to review the Shared Information provided by either Party to determine if the Shared Information contains any additional Personal Data beyond

the Business Contact information. However, if either Party becomes aware of any additional Personal Data provided by the other Party, it will delete it or return the Personal Data

No Party shall during or after the project engage in any activity to re-identify the Shared Information by any means whatsoever, including but not limited to singling out, linking back or matching any dataset with any personal or pseudonymous dataset available to a Party.

13 Schedule

Submission for the DEMETER Open Call #2 - DEPLOY will be enabled from the 14th of December 2021 to the 16th of February 2022, at 17:00 CET. Below are presented the current tentative dates for the different phases. The dates can be subject to change in case of any modifications in the DEMETER project's schedule.



Figure 7: DEMETER Open Call #2 - DEPLOY timeline

14 Checklist

1) Does your planned work fit with the call for proposals? Check that your proposed work does indeed address the objectives of DEMETER Open Call #2 - DEPLOY.

2) Is your proposal eligible? The eligibility criteria are given in chapter 6 “Eligibility Criteria”.

3) Budgetary limits. Check that you comply with any budgetary limits as expressed in chapter 8 “Financial support provided”. Any proposal not meeting the eligibility requirements will be considered ineligible and will not be evaluated.

4) Is your proposal complete? Have you completed all mandatory questions?

5) Does your proposal fulfil the requested information? Proposals should be precise, concise and must answer to requested information, which are designed to correspond to the applied evaluation. Omitting requested information will almost certainly lead to lower scores and possible rejection.

6) Have you maximised your chances? There will be strong competition. Therefore, edit your proposal tightly, strengthen or eliminate weak points.

7) Have you submitted your proposal before the deadline? It is strongly recommended not to wait until the last minute to submit your proposal. Failure of the proposal to arrive in time for any reason, including network communications delays, is not acceptable as an extenuating circumstance. The time of receipt of the message as recorded by the submission system will be definitive.

8) Have you provided the necessary annexes? Annex 4.1: Proposal template, Annex 5: Consortium Declaration of Honour, and Annex 6: SME Declaration (for each SME).

9) Do you need further advice and support? You are strongly advised to communicate with the DEMETER team via the DEMETER online Q&A.

15 Contacts

The DEMETER Consortium will provide information to the applicants via the F6S blog, so that the information (question and answer), will be visible to all participants.

- Online Q&A: <https://www.f6s.com/demeter-open-call-2-deploy/discuss>
- Apply via: <https://www.f6s.com/demeter-open-call-2-deploy/apply>
- F6S support team: support@f6s.com
- More info at: <https://h2020-demeter.eu/>
- For extraordinary communication needs, please contact the DEMETER Open Call Help Desk: opencalls@h2020-demeter.eu

16 References

ⁱ H2020 Call Objective H2020-DT-2018-2020 TOPIC: Agricultural digital integration platforms, <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/dt-ict-08-2019>

ⁱⁱ European Commission Communication, Towards a common European data space, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0232&from=EN>

ⁱⁱⁱ REGULATION (EU) No 1290/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" and repealing Regulation (EC) No 1906/2006

EUROPEAN COMMISSION, Directorate-General for Communications Networks, Content and Technology, "Guidance note on financial support to third parties under H2020", Annex K. "Actions involving financial support to third parties", http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2016_2017/annexes/h2020-wp1617-annex-k-fs3p_en.pdf

Annex 3: Technical Information

Annex 3: Technical Information

DEMETER Open Call #2 - DEPLOY

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Table 1: DEMETER Consortium

Participant number	Participant organisation name	Short name	Country
1	WATERFORD INSTITUTE OF TECHNOLOGY	WIT	Ireland
2	ENGINEERING – INGEGNERIA INFORMATICA SPA	ENG	Italy
3	INTRASOFT INTERNATIONAL SA	INTRA	Luxembourg
4	EMPRESA DE TRANSFORMACION AGRARIA SA	TRAGSA	Spain
5	JOHN DEERE GMBH & CO. KG*JD	JD	Germany
6	ORGANIZZAZIONE MONDIALE DEGLI AGRICOLTORI	WFO-OMA	Italy
7	INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS	ICCS	Greece
8	OPEN GEOSPATIAL CONSORTIUM (EUROPE) LIMITED LBG	OGCE	United Kingdom
9	ATOS SPAIN SA	ATOS SPAIN SA	Spain
10	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V.	Fraunhofer	Germany
11	SINTEF AS	SINTEF	Norway
12	CONFEDERAZIONE NAZIONALE COLDIRETTI	Coldiretti	Italy
13	LESPROJEKT SLUZBY SRO	LESPROJEKT	Czech Republic
14	CODAN SA	CODAN S.A.	Spain
15	UNIVERSIDAD DE MURCIA	UMU	Spain
16	13 JUL PLANTAZE AD PODGORICA	Plantaze	Montenegro
17	AVR BVBA	AVR BVBA	Belgium
18	SIVECO ROMANIA SA	SIVECO	Romania
19	TEAGASC - AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY	TEAGASC	Ireland
20	AGRICOLUS S.R.L.	Agricolus	Italy
21	ASPLAN VIAK INTERNET AS	AVINET	Norway
22	MACCARESE SPA SOCIETA AGRICOLA	Maccarese	Italy
23	CENTRIA AMMATTIKORKEAKOULU OY	CENTRIA	Finland
24	LANDBRUKETS DATAFLYT SA	Dataflow	Norway
25	DNET LABS DOO NOVI SAD	DNET Labs	Serbia
26	F6S NETWORK LIMITED	F6S	United Kingdom

Participant number	Participant organisation name	Short name	Country
27	FENADEGAS FEDERACAO NACIONALDAS ADEGAS COOPS FCRL	FENADEGAS	Portugal
28	AGROPRODUKT-SINKOVIC DOO	SINKOVIC	Serbia
29	INFORMATION CATALYST FOR ENTERPRISE LTD	ICE	United Kingdom
30	IDEATRONIK SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA	IDEATRONIK	Poland
31	ARIETE FATTORIA LATTE SANO SPA	Latte Sano	Italy
32	INDATA LLC	Indata	Georgia
33	INESC TEC - INSTITUTO DE ENGENHARIA DE SISTEMAS E COMPUTADORES, TECNOLOGIA E CIENCIA	INESC TEC	Portugal
34	UBIWHERE LDA	Ubiwhere	Portugal
35	ELLINIKOS GEORGIKOS ORGANISMOS - DIMITRA	ELGO-DIMITRA	Greece
36	M2XPERT GMBH & CO KG	M2XPERT	Germany
37	MIMIRO AS	MIMIRO	Norway
38	PULVERIZADORES FEDE SL	FEDE	Spain
39	ODIN SOLUTIONS S.L.	OdinS	Spain
40	PROSPEH, POSLOVNE STORITVE IN DIGITALNE RESITVE DOO	PROSPEH	Slovenia
41	FEIRMEOIRI AONTUITHE NA HEIREANN IONTAOBIATHE TEORANTA LBG	THE IFA	Ireland
42	PROBOT OY	PROBOT	Finland
43	INSTYTUT CHEMII BIOORGANICZNEJ POLSKIEJ AKADEMII NAUK	PSNC	Poland
44	INSTITUTO NACIONAL DE INVESTIGAÇÃO AGRARIA E VETERINARIA	INIAV	Portugal
45	ITC - INOVACIJSKO TEHNOLOSKI GROZD MURSKA SOBOTA	ITC	Slovenia
46	RO TECHNOLOGY SRL	ROTECH	Italy
47	GEORGIAN FARMERS ASSOCIATION	GFA	Georgia
48	FUNDACION TECNALIA RESEARCH & INNOVATION	TECNALIA	Spain
49	UNIVERSITY COLLEGE CORK - NATIONAL UNIVERSITY OF IRELAND, CORK	Tyndall	Ireland
50	UDRUZENJE PROIZVODJACA GROZDJA I VINA SA OZNAKOM GEOGRAFSKOG POREKLA SREM - FRUSKA GORA	SREM	Serbia
51	UNIVERZITET DONJA GORICA PODGORICA	UDG	Montenegro
52	WIELKOPOLSKI OSRODEK DORADZTWA ROLNICZEGO W POZNANIU	WODR	Poland
53	ASOCIATIA PRODUCATORILOR DE PORUMB DIN ROMANIA	APPR	Romania
54	UNIVERSIDAD POLITECNICA DE MADRID	UPM	Spain
55	FUNDACION CENTRO DE TECNOLOGIAS DE INTERACCION VISUAL Y COMUNICACIONES VICOMTECH	VICOM	Spain

Participant number	Participant organisation name	Short name	Country
56	VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V.	VITO	Belgium
57	TRONDELAG FORSKNING OG UTVIKLING AS	TFoU	Norway
58	NAPIERALA RYSZARD	RNapierala	Poland
59	FRACKOWIAK MACIEJ	Frackowiak	Poland
60	ZOETIS BELGIUM SA	ZOE BEL	Belgium

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The DEMETER project, co-funded from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 857202, foresees as an eligible activity the provision of financial support to third parties, as a mean to achieve its own objectives.

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 Start date of project: 01 September 2019

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List of acronyms

Table 2: List of Acronyms

ACS	Access Control Server
AIM	Agricultural Information Model
AIS	Agricultural Interoperability Space
API	Application Programming Interface
BSE	Brokerage Service Environment
DEH	DEMETER Enabler Hub
DSS	Decision Support System
DPI	Data Preparation and Integration
DQA	Data Quality Assessment
FADN	Farm Accountancy Data Network
FIE	Functional Interoperability Enabler
GUI	Graphical User Interface
IdM	Demeter Identity Manager
OC	Open Call
PEP	Policy Enforcement Point
RA	Reference Architecture
REST	Representational State Transfer
RRM	Resource Registry Management
SOCS	Stakeholders Open Collaboration Space
WP	Work Package

1 Introduction

The goal of the DEMETER Open Call #2 – DEPLOY is to deploy high value and impactful pilots employing DEMETER model and technologies. In this document, the DEMETER technological ecosystem, available for the implementation of the new pilots, is presented.

Other complementary and interoperable technologies may be used to implement the new pilots.

2 Architecture

The DEMETER Reference Architecture (RA) follows a modular approach that allows the composition of systems and apps from various enablers: these enablers either provide the necessary data or the necessary processing capabilities (e.g., analytics, decision support, visualization) needed to compose complete applications. In addition, key to the DEMETER architecture is the Agricultural Information Model (AIM) developed, which provides a common ontology in order to allow all enablers to communicate with one another (and which is described later in this report). To this end, another category of DEMETER enablers allows for the translation of various data formats (as needed) to and from the AIM model and format and these allow the communication of the various components to each other, thus achieving the desirable interoperability between existing components and new enablers.

An overview of the key concepts of the DEMETER RA are presented in the figure below:

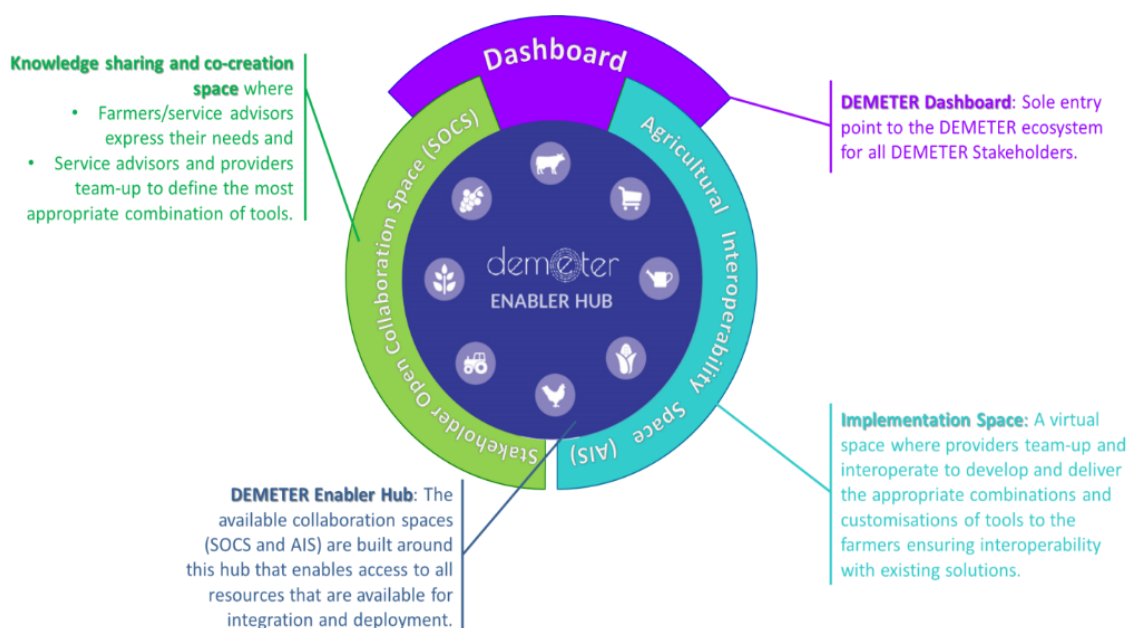


Figure 1: DEMETER Reference architecture

Central to the whole architecture is the **DEMETER Enabler Hub (DEH)**, which centralises the full description of all the components, devices, services, data sources and platforms, accessible for exploitation and ultimately for deployment and which provides the tools and facilities that allow to compose DEMETER enabled apps and systems from the various enablers registered in it. The DEH is supported by the DEMETER **Brokerage Service Environment (BSE)**, which facilitates the deployment of a DEMETER enabled application by providing information regarding the endpoints offered by the various DEMETER enabled entities (e.g., endpoints for getting data, for processing information in offered enablers) which have already been discovered and consumed through the DEH. In this way, the enablers have all the necessary information to execute the application. Another component crucial for this process is the DEMETER **Access Control Server (ACS)** that provides part of the security and authentication facilities needed.

The DEH and all related architecture tools developed are accessed via the appropriate dashboards offered by DEMETER by the appropriate stakeholders. More specifically, the DEMETER **Stakeholders Open Collaboration Space** (SOCS), focuses on resolving the needs of the farmers and provides an endpoint for them to access DEMETER. On the other hand, the **Agricultural Interoperability Space** (AIS), focuses on delivering a full set of interoperability mechanisms to develop, validate and then deploy the solution, providing an endpoint for the developers and advisors to access DEMETER. Both SOCS and AIS are instantiations of the DEMETER Dashboard which is the entry point to the DEMETER ecosystem for all DEMETER Stakeholders, enabling them to access SOCS and AIS, and, through these, to the DEMETER Enabler HUB (DEH).

In order to facilitate the interoperability between the various enablers of the architecture, a key component is the DEMETER **Agriculture Information Model** (AIM) which provides a common data model for any DEMETER enhanced entities and which is interoperable with the best-known ontologies and models used in AKISs. This can be seen in the following diagram, which presents the high-level view of the RA:

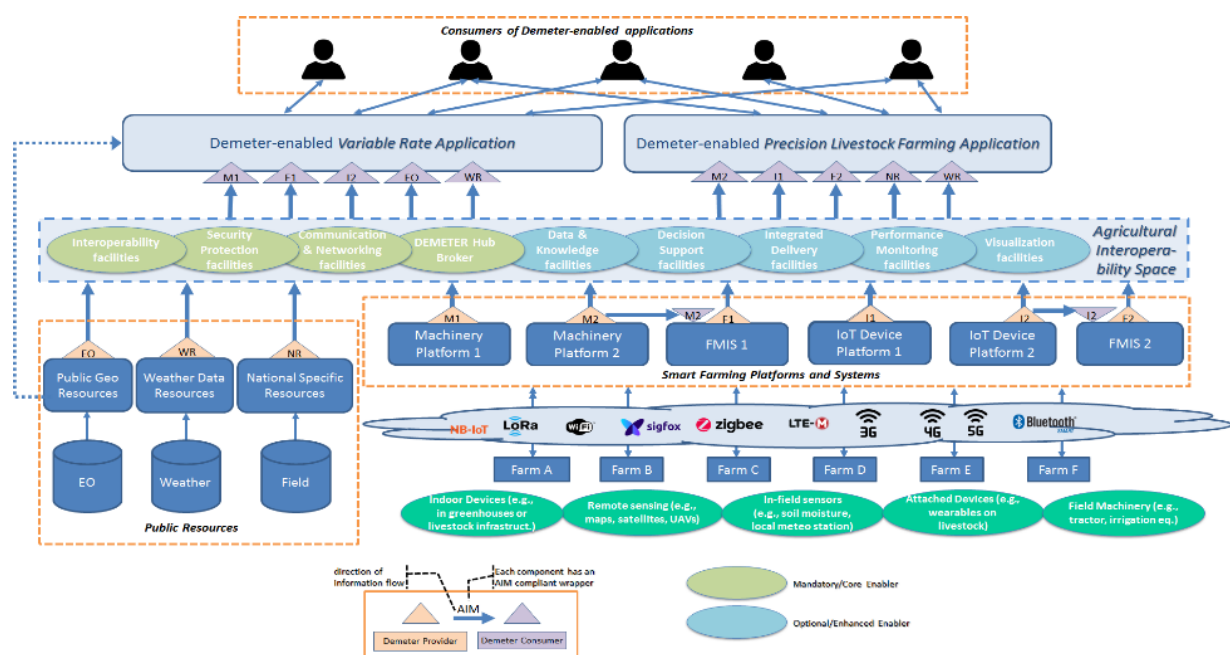


Figure 2: DEMETER Reference Architecture II

The proposed architecture consists of services available from DEMETER Providers and to DEMETER Consumers. As data interoperability is of critical importance, the proposed solution provides the necessary data translation mechanisms combining the use of a semantic data model (Agriculture Information Model — AIM) developed by DEMETER, along with the respective data translation/management/inference mechanisms to and from widespread standardised ontologies and systems such as NGSI-LD, Saref4Agri, ADAPT, etc. To enable interoperability of heterogeneous data handling approaches, the DEMETER enablers, translate and exchange data based on the AIM common data format with the use of lightweight data wrappers/translators.

DEMETER enablers also maintain the necessary mechanisms for satisfying data security and privacy concerns. First, they need to be trusted to be deployed and hosted by the AKIS on their own cyber-premises (i.e., hosting environments). Furthermore, the RA also supports each of the components being situated in different locations. For example, the provider of data maintains an endpoint from which the data can be obtained/streamed from. In this case, security and being able to maintain ownership and control of one's data is of paramount importance. The DEMETER RA can maintain

control by putting in place policies about how data is accessed and for where this data would be accessible from.

Now, to implement this high-level view of the architecture, DEMETER needs to provide several modules that interact with each other, with the various stakeholders as well as with a wealth of existing devices, platforms, systems and data sources. In addition to the DEH, SOCS and AIS which have already been presented previously in this document, key to this process are several needed enablers. These fall within two categories: mandatory **core enablers** and optional **advanced enablers**.

The **core enablers** provide key functionality that is needed in every DEMETER app and therefore must be included in every app. These include, first, enablers for *functional and semantic interoperability*, which work on top of the existing resources, e.g., platforms, devices, services or applications, and provide data wrappers that allow the resource to interoperate with other enablers. Second, another core enabler is the *Access Control enabler* used, e.g., to prevent access to unauthorized entities. Finally, the last type of core enabler is a *Client for the DEMETER Enabler Hub*, for any information that needs to be communicated with the DEH's runtime facilities, e.g., to get computing resources usage by other enablers which would be important when running DEMETER enabled apps.

The other type of enablers offered, the **Advanced Enablers** are optional and give additional functionality, as needed for each type of application. They are discoverable and accessible through the DEMETER Enabler Hub. The ones developed for the DEMETER pilots fall under several distinct categories. First, the *Data & Knowledge Enablers* are responsible for Collecting and Curating data from the various sources that the DEMETER developers and stakeholders have been registered for. The *Data Preparation and Integration enablers* curate, prepare, integrate and link the data obtained, while the *Knowledge Extraction enablers* handle matters related to data quality assessment, fusion of data collected from heterogeneous sources, targeted data analytics applicable to specific pilots and machine learning. Furthermore, several other enablers have been developed for *Decision Support, Performance Monitoring and Benchmarking*, as well as *visualisation enablers* that convey the information and actions taken automatically (or needed) to the final users of the DEMETER applications, such as the farmers.

All the key components of the architecture together with the various enablers developed are presented later in this document.

3 DEMETER GitLab for the OC participants

GitLab has been selected to be used for managing source code and version control in DEMETER. GitLab is an open-source code management system based on Git, which includes a user management part that can be hosted online. DEMETER's code repository is using GitLab's online version where several private repositories have been created following the structure indicated by the partners involved. The group functionality offered by GitLab allows for code isolation, hence, to better accommodate privacy and IPR concerns among the consortium, subgroups have been defined where access is only granted to partners directly involved to the related component and task. In cases where public repositories are required, e.g., for public components, according to the Description of Action (DoA) commitments, source code that will be made public, and will, of course, be subject to licensing terms and conditions as agreed between the partners involved. GitLab provides the ability to allow access to external parties, such as the Open Call participants for which special groups (namely OpenCallDEPLOY) are created to host mainly documentation, tutorials, and other useful material related to DEMETER.

DEMETER GitLab also offers an option to setup an issue tracker for projects. DEMETER leveraged on this functionality by using issue trackers at different levels. Issue Trackers have been setup and configured for DEMETER internal use, but also one dedicated for the Open Call projects. Issue trackers can be used by Open Call selected applicants to create issues that DEMETER partners need to pick, review, and address.

Access to DEMETER is granted upon request, hence, any OC winner will get access to DEMETER GitLab requesting access to the specific groups his/her organization participates in (e.g., Open Call winners cannot get access to DEMETER internal groups/repositories but only to their designated one). An invitation will be then sent via email to the requested accounts. Notice: Only accepted OC projects can request access to DEMETER GitLab, not all applicants.

4 Tools

4.1 DEMETER Core Enablers

4.1.1 Agricultural Information Model (AIM) - Semantic Interoperability

Description

The DEMETER Agricultural Information Model (AIM) provides a common language and model for all agri-data exchanged within DEMETER apps. Thus, it provides a common data format to be used by all apps and components, which has been created by reusing available (well-scoped) models from pre-existing well know ontologies, instead of defining new terms, whenever possible. More specifically, AIM fuses concepts from and is interoperable with the following models and vocabularies: FIWARE (and FIWARE Agri), Saref4Agri, ADAPT, INSPIRE (and FOODIE), AGROVOC, EO data and others.

The DEMETER AIM has the following subcomponents (layers):

- The AIM core metamodel, which defines the modelling language and rules of AIM and follows overall the NGSI-LD meta-modelling approach.
- The AIM cross-domain ontology layer, i.e., the set of generic models which provide common definitions for the entire agri-food domain and thus avoids conflicting or redundant definitions of the same classes at the domain-specific layer.
- The AIM domain-specific ontologies layer, which model specific concepts such as crops, animals, agricultural products as well as farms and farmers, etc. which are typically fused from existing well-known ontologies widely in use.
- The AIM pilot-specific ontologies layer: this comprises of tailor-made ontologies to our pilots which extend ontologies from the domain-specific layer and mostly define new concepts that exist in no other known agriculture ontology.
- The AIM metadata schema, which expresses semantics, related to meta-information about the datasets, based on the cross-domain and domain specific ontologies.

In the following figure, the AIM layers are presented as a diagram:

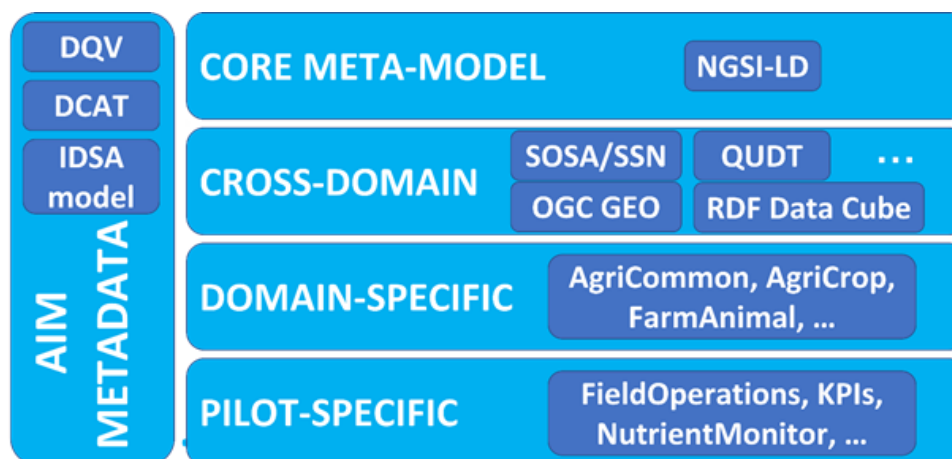


Figure 3: AIM Layers

Due to its modular structure, it can be extended as needed with new concepts and terms, e.g., by extending in most cases the domain-specific and the pilot-specific ontologies that it provides.

Now, in order to make all enablers used be DEMETER compliant, if these use another data model (not AIM) then appropriate data wrapper (i.e., translators) need to be provided that would transform any data to/from the AIM format.

Use Cases & examples

To create the required data wrappers that translate existing models to and from the AIM, some brief guidelines are being provided on how to accomplish this. This procedure has been or is now being undertaken in several DEMETER pilots where data wrappers have been provided for different formats to/from AIM.

First, any data exchanged needs to use the JSON-LD format. JSON-LD is designed around the concept of a "context" to provide mappings from JSON to a shared/common model and links terms in a JSON document to elements in an ontology or vocabulary, i.e., AIM in the case of DEMETER. So, in order to generate AIM-based JSON-LD content, one needs to define the [@context](#) in the JSON document, and reference AIM context(s) from there, e.g.:

```
{
  "@context": "https://w3id.org/demeter/agri-context.jsonld",
  ....
}
```

Second, to find AIM terms and retrieve annotations, there are several different options:

- Load the whole ontology (<https://w3id.org/demeter/agri>) in an ontology editor like Protege.
- All modules of AIM domain layer can be searched on the OGC definition server.
- AIM is available in the agroPortal site: <http://agroportal.lirmm.fr/ontologies/DEMETER-AIM>.

In some of these sites and, in DEMETER deliverables (e.g. D2.3) sample code is also available.

Third, several concepts (especially those which are taken and mapped from other existing ontologies) are represented hierarchically and there are mappings between these concepts in other ontologies and AIM. For example, if we take the "farm" concept in AIM, this maps to "farm" in Saref4Agri and Adapt, to "AgriFarm" in FIWARE and to "Holding" in Foodie. However, a farm could be part of a larger area which contains multiple farms, and this is the "Plot" concept in AIM which semantically is mapped to "Parcel" in Saref4Agri, to "AgriParcel" in FIWARE, and to "Plot" in Foodie.

Finally, regarding *the validation of AIM code*: it is possible to use the json-ld playground: <https://json-ld.org/playground/>, which will only check that the elements in the code are resolvable,

but not the semantics. To validate the semantics as well, we are evaluating tools like SHACL: <https://shacl.org/playground/>, but this work is not complete yet.

4.1.2 Access Control Server (ACS)

Description

Access Control Server (ACS) offers authentication, authorisation, and traceability functionalities to the brokerage environment. These functionalities have been implemented in six main security components: Identity Manager, XACML PDP, Capability Manager, PEP Proxy, Traceability Agent and Traceability blockchain repository.

The Demeter Identity Manager (IdM) component is based on the FIWARE Keyrock GE and will provide the Keyrock's REST API for authentication based on the OAuth 2.0 protocol. The XACML PDP manages the access control policies and decides who can access a resource and what actions they can perform with that resource. The Capability Manager is the component for generating capability tokens for the user in the event of an affirmative authorisation decision from the XACML PDP following a request about an action or access to a resource. The PEP (Policy Enforcement Point) is responsible for validating a generated assertion in an authentication token (X-AUTH-TOKEN) with the capability token that was already generated in a response by the Capability Manager to a user's authorization request. The traceability agent will expose a REST API to register authentication and authorisation events (POST) and retrieve their details (GET). The REST API has been designed to be flexible enough to be able to use different traceability blockchain repositories.

Use Cases & examples

The OAuth 2.0 protocol supports several grants ("methods") types for a client application to acquire an access token (which represents a user's permission for the client to access their data) which can be used to authenticate a request to an API endpoint. The Grant Types to be used for the Demeter components are:

- **Authorisation Code:** defined for apps running on a web server. The client will redirect the user to the authorisation server (Keyrock GE), and the user will then be asked to login to the authorisation server and to approve the client.
- **Password:** for logging in with a username and password.
- **Client credential:** the simplest of all of the OAuth 2.0 grants, this grant is suitable for machine-to-machine authentication where a specific user's permission to access data is not required.
- **Refresh token:** the access token obtained after being authenticated, provided with an expiration time; Keyrock GE provides a way to refresh the token which enables the client to get a new access token without requiring the user to be redirected.

The IdM provides functionalities to gain an identity within the system and manage the access privileges. Identity Manager Keyrock define the following common objects:

- **User:** Any signed-up user able to identify themselves with an email and password. Users can be assigned rights individually or as a group.
- **Application:** Any securable FIWARE application consisting of a series of microservices. Users or a group of users (i.e., organizations) will be granted permission to interact with the application.
- **Organization:** a group of users who can be assigned a series of rights. Altering the rights of the organization effects the access of all users of that organization. Users within an

organization can either be members or admins. Admins are able to add and remove users from their organization, while members merely gain the roles and permissions of an organization. This allows each organization to be responsible for their members and removes the need for a super-admin to administer all rights.

- **Role:** a role is a descriptive bucket for a set of permissions. A role can be assigned to either a single user or an organization. A signed-in user gains all the permissions from all of their own roles plus all of the roles associated to their organization
- **X-Subject-Token:** identifies who has logged in on the application. This token is required in all subsequent requests to gain access.

4.1.3 Access Control Enabler (ACE)

Description

Authentication Security Enabler

The Security Authentication Enabler library provides to the DEMETER components and the pilots developments an abstract way to access to the Authentication OAuth 2.0 functionalities exposed by the DEMETER Authentication component REST API.

This library provides the following functions:

- Authentication by username and password
- Refresh authentication
- Revoke authentication token

The Security Authentication Enabler will interact with the Communication and Networking Enabler to obtain a secured communication channel to perform the authentication functionalities.

This enabler will also provide to the Security Authorisation Enabler(s) the authentication token needed to perform authorization functionalities.

The library needs to be imported in the programming language of choice, and the function imported.

Authorization Security Enabler

The authorisation enabler provides a solution for controlling the access to the resources stored in an information repository. It is based on a technology called Distributed Capability-Based Access Control, which basically decouples the traditional XACML framework, into two phases: one for receiving the authorisation, which is represented by the receipt of an authorisation token called Capability Token, and a second one for accessing the information repository where basically, the user/service inserts the previous Capability Token in the corresponding query so that a Policy Enforcement Point Proxy (PEP_Proxy) could check if the query matches the content of the Capability Token. In case of a positive answer, the PEP_Proxy acts as a mere intermediary between the user/service and the information repository.

The authorisation enabler comprises different sub-components, nevertheless, only the endpoint for the Capability Manager is provided to the other components. For this reason, it can be accessed by following a specific REST API. Additionally, a java library (jar) has been developed to make it easier to interact with the corresponding servers. As this library uses JAVA, it can be run on different OS's.

Use Cases & examples

The functionalities provided by the security enablers will be used by the other Core/Advanced Enablers and other DEMETER components in order to obtain a secured communication channel and get direct access to DEMETER resources.

The authorisation enabler comprises different sub-components, nevertheless, only the endpoint for the Capability Manager is provided to the other components. For this reason, it can be accessed by following a specific REST API. Additionally, a java library (jar) has been developed to make it easier to interact with the corresponding servers. As this library uses JAVA, it can be run on different OS's.

4.1.4 DEMETER Enabler Hub (DEH)

Description

The DEMETER Enabler HUB (DEH) represents the digital space dedicated to (technically capable) end users of DEMETER where they are able to create and register their own resources. Users have two roles; they act as DEMETER Provider and DEMETER Consumer. A DEMETER Provider is able to offer and manage his resources (components, services, data sources, devices, platforms, etc), while DEMETER Consumers will be able to browse it and find suitable resources matching their requirements. In order to support this, the DEH involves communication between various DEMETER components. Taking this into account, each component inside DEH exposes endpoints through their internal API's. Data entities from any Platform, Thing, Application, Service will be managed through these APIs, but for the sole purpose of discovery and management of the resource registry maintained by the DEH. To make the solution more flexible and easier to maintain, all components inside the DEH will be developed as separate services and deployed as standalone Docker containers.

Use Cases & examples

End-users as DEMETER Providers, through the DEH, can promote their resources that thus can be validated by different DEMETER Consumers; on the other side, DEMETER Consumers are able to browse the collection of registered digital tools and services, and find suitable resources matching their requirements.

Components such as Estimate Animal Welfare DSS and Milk Quality DSS were registered in the DEH by pilot 4.2 with the aim to improve the DSS solution and make its output more accurate. Indeed, to better exploit project results, all the pilot solutions (based on machine learning algorithm) will be adopted and validated in the field, so it is important to make them available and reusable through the DEH.

4.1.5 DEH Client

Description

DEH Client is a core component of Demeter Enabler Hub, whose core functionality is to communicate with Docker Host (i.e., where the DEH Enablers will be deployed as Container/s) over a secured channel, generate resource consumption metrics of all DEH Resources deployed. The generated metrics are reported back to Resource Registry Management (RRM) periodically over metrics POST API. The communication thus established between DEH Client and remote Docker Host is secured using OpenSSL.

DEH Client interface/ communicates with other DEMETER components like ACS, BSE & RRM, associates registration information along with the metrics data sent to RRM for tracking. DEH Client also provides a rich set of APIs, which end-user can use to download DEH Resources/ DEH Enablers

locally, Start instances of DEH Enablers as Docker Containers, Analyse Container logs, and Resource Discovery i.e. get Docker Containers deployed matching set of valid filters.

Use Cases & examples

Use Case for a DEMETER Provider: DEH Client deployed on Consumer environment.

- DEH Client continuously monitors if any DEH Enabler/s is/are deployed as Docker Containers on configured Docker Host.
- If any Docker Container is found, validate if the Ancestor/Docker Image of the Docker Containers is registered with DEH RRM. If registered get RRM ID/UID.
- For those Docker Containers whose DEH Enabler is registered generate resource consumption metrics at regular intervals and periodically update the metrics data to DEH RRM.
- The metrics data thus updated are visualized in DEH Dashboard.

These metrics data will give valuable insights to DEMETER Providers' on how his/her DEH Enabler/s is/are used, with stats like

- Number of downloads.
- Container attributes tracked as part of metrics include.
 - Volume = Memory Usage & CPU Usage.
 - Time Usage = Duration of running containers.

Use Cases for a DEMETER Consumer: DEH Client deployed on Consumer environment.

DEH Client deployed, provides a rich set of RESTFUL APIs for

- Resource/ Docker Container Discovery based on filters: With this API, users can identify a set of Docker Containers matching search criteria like the current status of the containers & ancestor.
- Metrics API: With this API users can get the Resource Consumption Metrics of any Docker Container at RunTime by name or id or uid (RRM registration ID).
- DEH Resource Management APIs: With this set of APIs, users can download DEH Enablers and deploy the same Demeter Enablers as containers to a remote Docker Host.
- Log Parser API: With this API an end-user can parse and analyse any Container logs without having.

Interoperability:

DEH Client established interface/ communicates with other DEMETER components like ACS, DEH RRM & BSE.

- ACS: Request for authentication token, which will be used to communicate with other DEMETER components.
- DEH RRM: The Client communicates with DEH RRM to check if the DEMETER Enabler is registered with DEH RRM. If found returns RRM ID/ UID.
- BSE: The Client communicates with BSE to check if the Docker Container is registered with BSE. If found returns BSE-ID.

- Both UID & BSE-ID are unique IDs generated to identify DEMETER Enablers, and these IDs will be included in the metrics data sent to RRM.

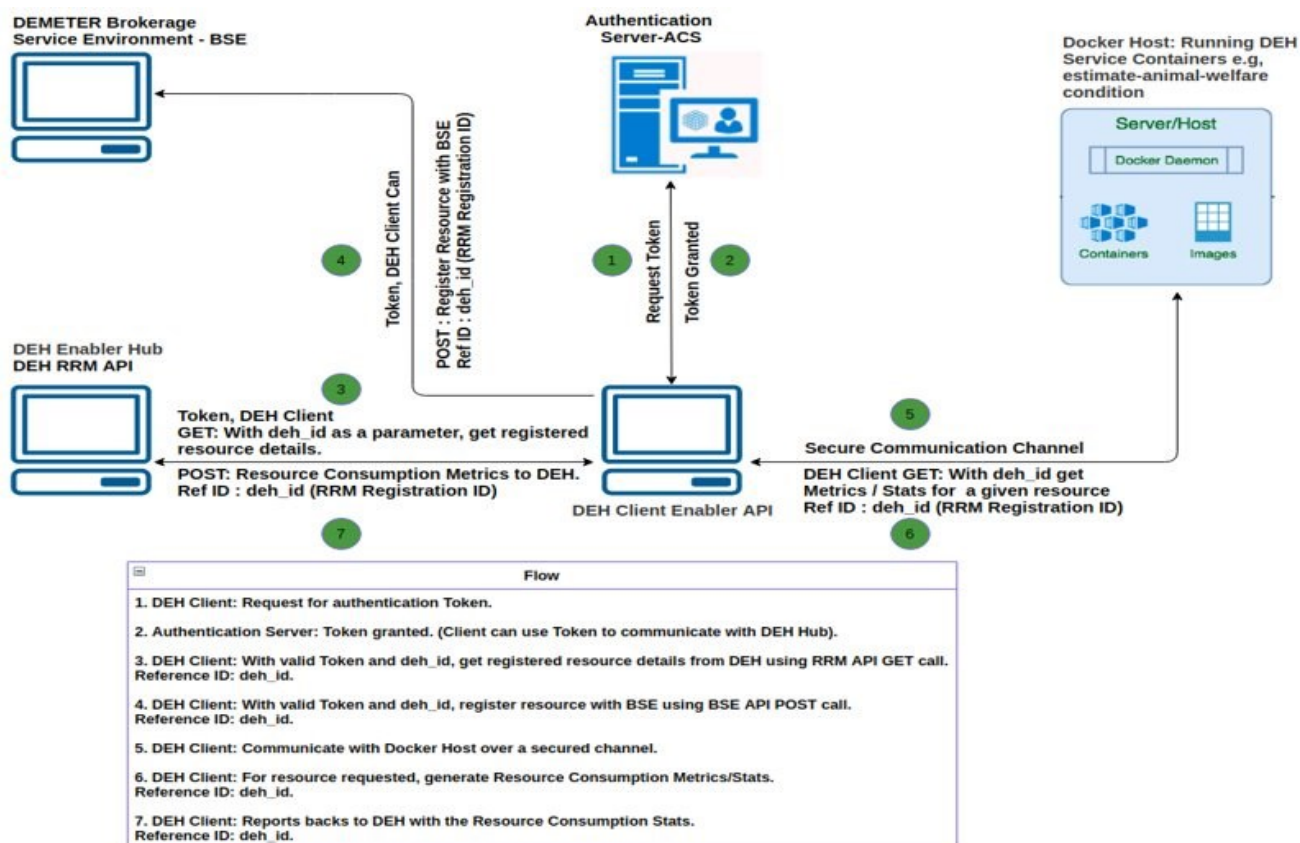


Figure 4: DEH Client flow diagram and interoperability (Interface with other DEH components DEH RRM & BSE)

4.1.6 Brokerage Service Environment (BSE)

Description

The **Brokerage Service Environment (BSE)** is a core module of DEMETER architecture, which facilitates the registration, discovery and ultimately communication process for the DEMETER-enabled resources in a secure and privacy preserving manner. In the framework of DEMETER, a resource coupled with the necessary enablers (core and advanced) is named a DEMETER enhanced entity (DEE). A DEE, once authenticated and authorised by the BSE, can register as a service with the BSE specific registry. Subsequently, it becomes discoverable by all the other registered DEE's. Finally, based on the suitable core and advanced enablers that each DEE implement and after resource provisioning information from the BSE, DEE's can communicate directly with each other. In addition to the functionalities, BSE can interconnect (interface) with DEMETER HUB in case a useful flow is identified or required.

The BSE is implemented as a self-contained application that enables an external party to deploy it as a complete brokerage service solution. Each DEMETER-enabled application should utilise at least one BSE. The BSE accompanied by a publish-subscribe communication mechanism that addresses the required communication data throughput realises the backbone of the DEMETER reference architecture.

Use Cases & examples

Developers and integrators (BSE is not meant for end users) can register their resources to the BSE so that other developers/integrators will then be able to discover them and use their functionality by e.g., consuming their declared APIs. Services registered to the BSE are services/resources that are available and accessible online. Note that the endpoints of the services are expected to be opened and accessible for others (allowed) to be used or provide information on how access can be obtained. It is up to the developer/integrator to parse and find the needed information (from the data retrieved by using the BSE) to use/call the discovered service (endpoint).

The BSE service registration is not to be confused with the resources registered on DEH which might be or might not be online.

BSE is not a web application, it does not have a Graphical User Interface (GUI), and also, BSE is not a database, it does not store any data from the registered DEMETER-enabler resources; only metadata for the registration, discovery, and provisioning information are stored.

Online documentation (Swagger) on how BSE API looks like can be found on <https://bse.h2020-demeter-cloud.eu/api/swagger/>

4.1.7 Functional Interoperability Enabler (FIE)

Description

Functional Interoperability core Enabler (FIE) is a core DEMETER enabler and can be regarded as the client-side of the Brokerage Service Environment. This Enabler provides all the services of the BSE to the rest of the DEMETER modules and enablers (Core and Advanced), and also to the Consumer's application. It serves as a wrapper for the Registration, Discovery, and Provisioning services offered by the BSE, but also offers the compatibility check feature, i.e., a compatibility check of a service to be registered, with the BSE data model. Despite initially envisioned being deployed on the consumers' application premises, aiming to ease its use remove complexity from the consumer, the Functional Interoperability (core) enabler is bundled with the BSE module and provides its functionality along with the BSE module.

Use Cases & examples

BSE is checking the compatibility of our service (metadata content in the Service Register JSON body) using the Compatibility Checker functionality of the Functional Interoperability core enabler. The Functional Interoperability enabler functionality is embedded in the BSE API endpoints providing explanatory responses in cases the model needs modifications. FIE is not an enabler that needs to be deployed separately (it is already included in the BSE). Please, refer to the BSE documentation.

4.1.8 Stakeholder Open Collaborating Space (SOCS)

Description

The DEMETER SOCS is a digital space dedicated to all DEMETER stakeholders (farmers, advisors, and suppliers) where they can collaborate, share knowledge and best practices, and participate in the co-creation processes.

The SOCS provides the access point to the DEMETER ecosystem. Through the SOCS, all DEMETER stakeholders are able to interconnect into a unified digital community, where to find new contacts, share best practices and get inspiration, facilitate the emergence of new collaborations, find update on relevant topics, learn from the others' experiences, innovate, promote yourselves and create the

basis for new business, have access to skills and technologies as well farmer's requests and needs and expert advice.

One of the main functionalities offered by the SOCS is, undoubtedly, gathering and addressing farmers' needs according to a co-creation process. Through this process, farmers' needs can be better elicited, through the collaboration tools and thanks to the help of other users (i.e., advisors). The need expressed by a farmer is analysed and can evolve into a **challenge** which represents the area of interest that requires new solutions or approaches. The creation of a challenge aims to involve stakeholders in the creation of solutions (**ideas**) that represent their contributions to the requests expressed through the challenge. The final result of the challenge is the selection of the idea that best matches with the challenge and the elaboration of the optimal solution, relying on the resources present in the DEMETER Enabler Hub (DEH). The DEH centralises the full description of all the components, devices, services, data sources, platforms etc., that are accessible for deployment.

Use Cases & examples

The importance of all the SOCS services varies based on a specific subgroup taken into consideration and their expressed needs. For example: a specific farmer subgroup could be interested more in the knowledge exchange about relevant topics with other users, a specific farmer subgroup could be interested to interact with advisors and IT providers and being involved in the innovation development, a specific farmer subgroup could be interested in the knowledge exchange and in the cooperation with the local authorities and farmers organisation, an IT providers subgroup could be interested to participate to discussions started from farmers and advisors to see how she/he can contribute with his/her experience/competences, an IT provider subgroup could be interested to contact other IT providers that have already solved a specific farmer problem, an IT provider subgroup could be interested to access to DEH and use components already validated for the elaboration of a new solution, and so on.

4.1.9 Adaptive Visualisation Dashboards

Description

The Adaptive Visualisation Dashboard module is an advanced enabler, which facilitates the dashboard DSS implementation. The reference implementation is based on Knowage¹, a solid visualisation and adaptive framework for building and developing user interfaces (business driven and not pilot specific). Given the great demand coming from DEMETER pilots, heterogenous both in the graphics and in the specific elements of each dashboard and given the multiplicity of user visualisation requirements gathered by the area and component leaders, Knowage was selected as the most suitable technology to support these challenges, leveraging the modular structure of its sub-components and integrated technologies that make it a complete visualisation suite.

Use Cases & examples

The Knowage-based module in DEMETER was used by all Pilots to create dashboards to their DSS. The interfaces are powered by data from the analytical algorithms implemented within WP2/WP4. The result of this activity was the implementation of a catalogue of agricultural dashboards, which saw the development and integration of more than 20 DSS dashboards. The DSS dashboards catalogue on agriculture follows the trend of the DSS areas defined in the context of WP4 and represents a list of user interfaces (UI) related to specific analytical components. The coverage areas of this catalogue range from a series of contexts ranging from Crop Growth, Status and Yield, Milk Quality to the Benchmarking, to other contexts such as Irrigation Management, Animal Welfare, Traceability and so on. The catalogue contains a list of heterogeneous visualisations, showing the

¹ <https://www.knowage-suite.com/site/licensing/community-edition>

results of machine learning or computer vision algorithms to give the end-user a clear idea of what is being monitored.

4.1.10 Benchmarking and KPIs

Description

The DEMETER benchmarking system aims to provide end-users with tools to evaluate the productivity and the sustainability of the practices adopted, as well as the efficacy of the developed digital solutions. The benchmarking components will enable the comparison for individual and peer to peer learning, linked to the impact of operational processes brought by DEMETER. The challenge of defining and measuring proper indicators has been undertaken in the implementation of the DEMETER benchmarking system to fulfil objective 04 *“Establish a benchmarking mechanism for agriculture solutions and business, targeting end-goals in terms of productivity and sustainability performance of farms, services, technologies, and practices based on a set of key performance indicators that are relevant to the farming community”*. In other words, the target of DEMETER benchmarking system is to create a framework to manage a complex set of indicators able to meet the needs of the 20 DEMETER pilots in evaluating the achievement of pilots’ objectives and the success in applying DEMETER technologies.

Use Cases & examples

The Benchmarking components have been published in the GitLab repository and can be installed at pilot premises, Moreover, there is an already available cloud version of the components. The benchmarking contains after the installation a list of common benchmarking indicators that have been evaluated collecting the needs of the pilots and cross-referenced with the Work Package 7 task to be the backbone to support the calculation of the farm-level KPIs of the project. These indicators include the three main areas: Economic, Environmental and Agronomic Indicators.

The Generic benchmarking on the cloud version has been integrated with the FADN database (Farm Accountancy Data Network) allowing the user for all the EU countries to query the database to define for their own farm the closest FADN categories, accessing the value of the main indicators. It has been created a User Interface that allows user with a valid DEMETER ACS account to enter the main farm data, convert them in the AIM data format and access the value of the indicators in the AIM data format. The Cloud version of the Benchmarking has been associated with an instance of the Knowage.

Online documentation (Swagger) on how Benchmarking API looks like can be found on <https://demeter-benchmarking.d.agricolus.com/doc/>

4.2 DEMETER Advanced Enablers

4.2.1 WP2 Advanced Enabler: Data Management

The Data Management module is about data storage, data retrieval process and information security management. The data management module block module consists of three main software sub-modules:

- ACS - Access control server
- DEH - DEMETER Enabler HUB
- BSE – Brokerage Service Environment

Each of these modules exposes standard APIs that depending on the case, perform specific tasks in the data management process. DEMETER data source (Data Provider) that wants to share its own

data and services interact with the data management module APIs. The data source, which in some cases translate the data into the AIM (Agricultural Information Model) data format, pushes the data to DEMETER management APIs. The entities are represented by users, resources and services; these latter entities are non-static entity that can expose specific endpoints or APIs. These APIs can be used within the DEMETER context from a Software-as-a-Service perspective by the Pilots who intend to use them for their own needs, in order to build their business scenarios. The data, acquired by the data management module APIs such as ACS (Access Control Server), DEH RRM (Resource Registry Management) and BSE (Brokerage Service Environment) are then stored in specific databases.

4.2.2 WP2 Advanced Enabler: Data Preparation & Integration

The Data Preparation and Integration (DPI) Enabler² provides a simple yet powerful interface to the functionalities of data preparation & integration that are based on the use of linked data as a federated layer. The enabler has been developed through on the implementation of linked data pipelines as already described in D2.2. The enabler exposes a RESTful API that facilitates the exploitation of the pipelines' underlying components via a homogeneous layer, enabling other DEMETER enablers or enhanced entities to launch the whole Linked Data pipeline, or individual steps.

The goal of the enabler is to abstract the different types of interfaces and implementation details through an interface that is simple to use. Additionally, the enabler facilitates access to the integrated data, represented according to DEMETER AIM, available in the Data & Knowledge (D&K) repository. Accordingly, access to the data is possible in two different ways: i) via SPARQL queries directly submitted to the repository's SPARQL endpoint; ii) via the API that exposes pre-defined queries as simple access methods, which may be more convenient and require less effort from developers and client applications. The second way not only allows to execute pre-defined methods, leveraging AIM terms, but also allows users and developers to define their own queries that are converted on the fly to API methods. The enabler has been implemented as a CLI tool³ and as a Web Service⁴.

4.2.3 WP2 Advanced Enabler: Data Quality

Data Quality plays an important role in the data analytics pipeline. Before data is fed into downstream analytics and decision support tasks it has to be ensured that incoming data meets general quality criteria. Two types of data quality assessment components were implemented in Python, namely the DQA (Data Quality Assessment) component for **data quality assessment of structured data** and the DQA component for **data quality assessment of linked data**. Both need to be integrated in one single DQA service to the DEMETER platform. Both components use a JSON specification (Data-Spec) for the data source from which to load data, and a JSON specification specifying the measures to be performed on the data. Both specifications differ in certain aspects (e.g., to load structured data other parameters might be used as when to load linked data). In order to create an integrated version of the DQA, both specification types will be merged, and a small routing component will take over to delegate the DQA request to the needed component. The details about how that merging will be realized is ongoing work.

Also, we provide **Embeddable Data Quality Checks** which is an extension to the Data Quality Service, which is targeted towards Data Analytics and Data Fusion Enablers specifically. It offers a large set of

² <https://docs.psnc.pl/display/DEM/The+architecture+of+dpi-enabler>

³ <https://git.man.poznan.pl/stash/projects/DEM/repos/pipelines/browse>

⁴ <https://dpi-enabler-demeter.apps.paas-dev.psnc.pl/api/swagger/>

quality metrics for Python-based machine learning pipelines. The library for embeddable data quality checks (DuckDQ) allows validating tabular data in different data sources, based on user-defined constraints. It is also suitable for equipping scikit-learn pipelines with data quality checks. DuckDQ stops the pipeline or generate a warning when user-defined constraints are not met. The library was implemented in Python 3.7 and uses DuckDB⁵ as computational backend. It offers a data validation API similar to deequ⁶ and additionally a tight integration with the scikit-learn machine learning library.

Besides, quality assessment of large RDF datasets is performed using open-source Semantic Analytics Stck (SANSa) that can scale out to a cluster of machines. SANSa inherits the following advantages from the semantic technology stack and machine learning research and distributed computing. We plan to provide examples in both standalone Scala and interactive-notebook formats using Apache Zeppelin. For example, we can assess the number of valid redirects of URIs or the number of incorrect numeric range for the given predicate and given class of subjects in a linked data (e.g., RDF). With regards to the following dimensions: availability, completeness, conciseness, interlinking, licensing, performance, relevancy, responsiveness, syntactic validity and understandability.

4.2.4 WP2 Advanced Enabler: Pattern Extraction for Optimal Fertilizer Usage

The Optimal Fertiliser Usage module tackles the challenge of estimating nitrogen status in rice and maize crops, based on indices extracted by processing UAV or satellite imagery. Advanced analytics can assist this task by estimating the level of nitrogen and consulting the farmer on whether an intervention should take place. This module is destined to be a component of a broader decision support system that consults farmers about the appropriate fertiliser usage and also on better scheduling of the aforementioned treatment, facilitating in-farm operations. The model deploys a randomized technique to choose the few most appropriate among all indices and then feed a model that estimates the aforementioned quantities. While conventional techniques try to estimate the exact Nitrogen content, this approach is based on random forest ML algorithm and subsequently, solves a classification problem. The dataset is appropriately transformed to support labelling instead of measuring. The component is implemented in Python programming language using the pandas and scikit learn libraries. As mentioned, random forest algorithm is being used to classify the plots and the final output of the component is a list of the nitrogen level in each plot included in the analysis. Specifically, there are three levels of nitrogen status, those being a) “urgent action needed”, b) “needs fertilization soon” and c) “no fertilization needed”.

4.2.5 WP2 Advanced Enabler: Data Analysis for Irrigation

This enabler takes as input UAV images of the rice field and can indicate in which places there is higher water salinity. So the farmer can identify where on the field should change the old water with fresh one. The application uses many salinity indices so that the user can choose which best fits for his needs. More specifically, a sophisticated algorithm is being implemented so that by using small number of ground salinity sensors (at least 2) we can identify the salinity levels to the rest of the rice farm field based only on UAV RGB/multispectral images. The application uses many Salinity Indices, based on literature research, so that the user can choose the appropriate index. The application can quantize the salinity index UAV image and colour it with up to 6 different colours so that it is more easily identified by the user the salinity levels on ground. Each colour stands for different salinity level range (EC) from low to high.

⁵ <https://duckdb.org/>

⁶ <https://github.com/aws-labs/deequ>

4.2.6 WP2 Advanced Enabler: Prediction Model Training Web Service

The Prediction Model Training Web Service enabler allows researchers / practitioners to train predictive models by machine learning tools via a web interface, validating their final performance / efficiency. The enabler is used by and integrated with the Olive Phenology Prediction Web Service module from WP4. It is not by itself deployed in isolation, yet it is deployed as an integrated part of the Olive Phenology Prediction Web Service module from WP4 mentioned above (which is currently deployed at a private cloud system).

The Models created based on this enabler are currently deployed at a private web service and are used in the pilot of VITO-Agricolus / Crop Growth, Status and Yield.

It also offers a separate user interface for model building. As already mentioned, the models created by this enabler can be integrated in prediction services such as olive phenology prediction service.

4.2.7 WP2 Advanced Enabler: Pattern Extraction with Computer Vision

The pattern extraction with computer vision component provides the capability to detect specific patterns in pictures via computer vision tools. To do that, it is necessary to use a trained model to detect the desired patterns. This model can be either uploaded or generated by the component, providing, in the latter case, a rich dataset containing labelled images (which will define the quality of the results provided, depending on the number of images provided, complexity of the patterns to be identified and quality of both the images and the labelling). To detect the elements, the component needs as input an unlabelled image and it will return the areas of the images where the patterns have been identified by the model (over a given accuracy threshold).

All this functionality is provided by the enabler by exposing an API including all the possible operations with the component. The component has been developed with the objective of being compliant with AIM and, in order to do so, all its inputs/outputs are processed/created using such format. Additionally, it was integrated with MLFLOW to save/recover the data models and is currently being integrated with the core enablers of Demeter (i.e., DEH, BSE, ACS...)

4.2.8 WP2 Advanced Enabler: Data Analytics "meteo/weather Forecast" component

The understanding of meteorological and climatic variables is essential for agriculture, in order to achieve the maximum production of the crop. Plants and by extension crops depend 100% on environmental conditions to be able to develop properly. All environmental and terrain parameters can become a limiting factor for growth if certain critical limits are exceeded. In agriculture, it is essential to control parameters like air temperature, relative humidity, rainfall, and the sun radiation. Other meteorological factors, such as the wind, can also be needed or even decisive in the case of very high gust values or associated with storms.

Several pilots in DEMETER need meteorological data not only to work with historical time series but also with weather forecast information. Thanks to the DEMETER architecture, a component to expose weather forecast data from trustworthy external sources (i.e., Openweather, Weatherbit, etc.) is provided by the DEH for these pilots to improve their functionalities, i.e., advising the farmers about how to optimise the irrigation in their crop fields.

This advanced enhanced enabler exposes, using DEMETER AIM data format and a REST API, hourly weather forecast data (i.e., air temperature, relative humidity, wind speed, etc.) for a given geolocation (latitude, longitude). It can use different weather services' APIs available (in most cases a new user must be registered to the weather service to get an API-key to be granted to get weather forecast data). Data is retrieved in raw format (i.e., json) and then modelled using DEMETER AIM.

4.2.9 WP2 Advanced Enabler: Data Analytics for "Crop Irrigation based on ETo-Kc"

To minimize the impact of irrigation (the needed water resources and energy), an assessment must be made of the irrigation water requirement for every crop. Irrigation water requirement depends on the crop water requirement and the water naturally available to the crops (i.e., effective precipitation, soil moisture, etc.), where part can be estimated based on climatic conditions (i.e., rainwater, temperature, evapotranspiration, etc.) and part on physiological processes at plant level (i.e., the crop coefficients for the different crops and growing stages, etc.). This estimation of the crop's irrigation requirement means using data fusion with parametric mathematical models and, additionally, with machine learning techniques with different inputs for needed data from weather stations, IoT infield devices, satellite imagery, the crop plant, the soil, etc.

To this end, a component to calculate and expose a crop's irrigation requirement estimation has been developed. This advanced enabler uses a mathematical model based on an update of the procedure for calculating the reference evapotranspiration and crop evapotranspiration from meteorological data and crop coefficients, which was presented by first time in the publication of the FAO Irrigation and Drainage Series No. 24 «Crop Water Needs» and that is referred to as the "Kc ETo" approach. In this procedure, the effects of the climate on the water requirements of the crop are reflected in the crop reference evapotranspiration (ETo), obtained using the FAO Penman-Monteith method, and the effect of the crop itself incorporated in the crop coefficient (Kc). It also uses other information related with the crop, the soil, the irrigation system, and climate:

- Plot area (it is the same as the crop area) (m²)
- Crop category ("arable" or "woody")
- Number of plants (i.e., seeds planted, number of trees, etc.)
- Distance between plants in a row (m)
- Distance between rows (m)
- Crop plant family ("cereal", "poaceae", "herbaceus" or "fruit trees")
- Crop plant cup diameter (needed only for "woody")
- Soil percolating efficiency value.
- Water irrigation type ("drip" or "sprinkler")
- Water irrigation conductivity (dS/m at 25 °C)
- Rainwater (liters/day)

4.2.10 WP2 Advanced Enabler: Predictive Model Training web service

Smart farming makes agriculture more efficient and effective with the help of high-precision algorithms. Those algorithms for benchmarking or prediction purposes can be obtained applying machine learning methods to representative data sets. The machine learning procedure can be simplified to the steps: independent and dependent (target) feature selection, feature analysis and model comparison. This enabler provides an interface to apply those steps over a data set selected by the user.

Technically, this tool supplies a Prediction Model Training Web Service that can be launched locally from a Docker image. More precisely, this enabler allows researchers / practitioners to train predictive models by machine learning tools via a web interface, validating their final performance / efficiency. Through the web service, the following three functionalities are available: 1. the selection of relevant input and output / target features, 2. the analysis of the selected features and the training of prediction models, and 3. the comparison of different trained models in terms of their quantitative performance / relative error on a validation data set. The enabler is currently used at least by the Olive Phenology Prediction Web Service module from WP4.

4.2.11 WP2 Advanced Enabler: Data Analysis for Optimal Pesticide Usage

The Data analysis for optimal pesticide usage is a component with a REST API, using temperature and humidity data as an input to quantify and return back the instructions as a decision support to farmers. The decision support provides forecast of the fungal disease occurrence by quantifying the risk index for 4 different fungal diseases in vineyards.

Technically the tools are deployed locally as a part of the commercial service and the code is proprietary as it represents the company's IPR. Nevertheless, the dockerised version of the service without the actual access to the code is being provided within DEMETER and the integration with the hub and other DEMETER components is ongoing.

4.2.12 WP2 Advanced Enabler: Fusion of Weather information

This enabler takes as input numerical data pertaining to weather (e.g. air temperature or humidity) from several sensors in a geographical area and fuses the information into an overall measure of the feature examined, using both temporal and spatial correlations of the input data. This enabler is currently in development.

4.2.13 WP2 Advanced Enabler: Model Management and AIM-Compliant Serving

Model Management is an essential component of a modern, production Machine Learning infrastructure. Model Management solutions are concerned with storing and versioning Machine Learning experiments in a multi-user setting. The Model Management component is intended to be used by ML-training scripts of Targeted Analytics/Fusion Modules in order to store ML-Models (and associated metrics) in a managed way. Apart from an on-premises deployment, the DEMETER Model Management component is also available as managed service, hosted by Fraunhofer FIT. This service is available to all DEMETER developers but is meant for testing purposes only. For more info on the design of the MLFlow-based Model Management server, visit: <https://demeter.fit.fraunhofer.de> (user: 'admin', pw: '|mlflow@123|').

The **AIM-compliant Serving** component is complementary to the Model Management component. Models which were registered using the Model Management component can be fetched with an AIM-compliant Serving module and generate predictions on-demand. The result of the prediction will be returned in AIM-format, while the input data will be checked for quality, using the Embeddable Data Quality component. This establishes a standardized but flexible way to access data analytics and data fusion enablers. It also allows for a better integration with downstream components such as the DSS, while maintaining semantic interoperability between all these services by using AIM format to send and receive data.

4.2.14 WP2 Advanced Enabler: Traceability

Following up on the Access Control System (ACS) presented earlier in this document and which forms the heart of the DEMETER authentication and authorization, two other enablers have been developed that tie together with ACS to provide additional functionality. The first one is the authentication and authorization traceability component; this enabler logs the access to DEMETER resources by logging the issue and use of authentication and authorization tokens. These tokens contain the information about the user who is logged to the system and the resources the user is intended to access.

The traceability agent exposes a REST API to register authentication and authorization events (POST) and retrieve their details (GET). The REST API has been designed to use traceability Ethereum/Quorum blockchain repository. The events logged contain information about the receiver

of the token, the sender of the token, the timestamp, the token details, and an optional data field to extend the information of the event.

A permissioned version of a blockchain repository has been chosen to provide the characteristics of immutability, privacy and compatibility required by the DEMETER Traceability Component. It supports both public and private transactions and smart contracts, and their states derived from a single, common, complete blockchain for transactions validated by every node in the network. Thus, using this enabler it is possible to trace back any (authorised) access to various enablers and components of DEMETER.

4.2.15 WP2 Advanced Enabler: Confidentiality

The second related enabler provides Confidentiality and encryption of (private) data and is provided by the Communication Encryption Enabler. It is based on ComNet, a cryptographic class library written in C++. It can perform encryption and decryption of textual elements inside an xml or json file. The library can be compiled on both Windows and Linux operating systems, and can be easily imported in a new or existing project.

The access point to the functionalities of the library is a method (startEnabler) which accepts as inputs the following elements:

- A number to identify the type of file to be considered (10 for a json file and 11 for a xml file).
- The path to the file the program has to read, minus the file name and the extension.
- The name of the file, minus the extension.
- A list containing the labels corresponding to the values to be encrypted (or decrypted) inside the file.
- A number to specify the type of action to be performed on the values (20 for encryption and 21 for decryption).
- The encryption/decryption key to be used.

Once called on a file, the library shall encrypt or decrypt the values corresponding to the labels taken as input, and produce a new file (appending the text “_ENCRYPTED” or “_DECRYPTED” to the file name, accordingly) into the same folder of the original one. The Encryptor and Decryptor components of the library make use of the open-source C++ class library Crypto++, whilst base64 encoding is used on the encrypted text for a better display.

4.2.16 WP4 Advanced Enabler 4.A.1 – Plant Yield Estimation

The yield prediction component will receive a field as input, including attributes such as geometry and crop information (with start date of crop). A request can be made against the field which will return the predicted yield. The request can only be made 1 to 4 weeks before expected harvest date. Yield prediction is currently based on NDVI/Fapar timeseries derived from Sentinel-2, but meteorological data will be added in the future. This yield prediction component at the moment only includes functionality to predict the yield based on a pre-trained model. An additional module is being added allowing the user to train his/her own yield prediction model based on his/her own training data.

4.2.17 WP4 Advanced Enabler 4.A.2 – Plant Phenology Estimation

The DSS component on Plant Phenology Estimation provides the farmer with a prediction of the olive phenology state for the next six days. In other words, it allows the farmer to estimate the best day to harvest as well as being a tool to monitor growing conditions. The internal functionality design of this component is based on data extracted from external weather API Meteostat. The final

output of this component is presented to the farmer using the DEMETER visualisation and adaptive framework module, Knowage. In addition, this DSS component employs a previously trained Random Forest Model, a model that has been constructed using the DSS of the WP2 Prediction Model Training Web Service Enabler.

4.2.18 WP4 Advanced Enabler 4.A.3 – Plant Stress Detection

Plant stress can come from many causes such as: extreme temperatures (scorching heat and winter harshness), lack/excess of water, etc. The composition of the NDVI vegetation plan will be used as a modern method of determining plant problems. Plant Stress Detection is responsible with detection of plant stress using a combination of remote sensing data, meteorological data and in-situ data. The main functionalities of this component are to automatically locate on the map the less favourable areas from a cultivated plot, but also to estimate the vegetation condition. The indication of the affected areas by various factors will be done by taking NDVI images from Terrascope service and applying automatic pixel classification method. The classification of pixels involves the process of grouping them into 3 categories according to the values of the vegetation index: Low Stress Detected, Medium and High. Another agropedoclimatic parameter is the intensity of the heat during the summer and the harshness of the winter in the cold season. Its calculation is done by a mathematical algorithm that gathers the degrees that exceed a certain threshold, in a certain number of days.

4.2.19 WP4 Advanced Enabler 4.A.4 – Crop Type Detection

The goal of this component is to detect the crop type for a given polygon and a given timeframe (growing season of the crop), using Sentinel-1 and Sentinel-2 time series data as input. The model for crop type detection in this component is implemented as a Recurrent Neural Network (RNN) using the TensorFlow deep learning framework. A recurrent architecture is chosen because we need to take into account not just individual images, but timeseries of images. Instead of looking at individual pixels in the field, the timeseries is composed of data averaged over the parcel, e.g., 1 NDVI value per field per timestep. The crop type prediction component is by default equipped with a crop type detection model trained for the most common crop groups in Western-Europe based on training data from Belgium. However, a user also has the possibility to provide a custom model, as long as it solely uses Sentinel-1 and Sentinel-2 timeseries as model inputs.

4.2.20 WP4 Advanced Enabler 4.A.5 – Estimate Beehive

The Estimate Beehive component will receive a field as input, including attributes of the field that may affect the calculation of pollination requirements. Once the field has been registered with the component, a request can be made against the field which will return the estimated number of beehives required to optimally pollinate the identified field.

4.2.21 WP4 Advanced Enabler 4.B.1 – DSS for Irrigation Management

The DSS component for Irrigation Management provides the farmer with information to estimate the irrigation water needed for a crop using other components and data retrieved from the pilot cloud platform. The final output of this component is presented to the farmer using the DEMETER visualisation and adaptive framework Knowage module.

4.2.22 WP4 Advanced Enabler 4.B.2 – Reference Evapotranspiration Prediction

This component presents a solution for the prediction of the reference evapotranspiration (ET_0). This component uses an ensemble prediction model to estimate the ET_0 based on the *Penman-Monteith* model using weather forecast and historical data (temperature, humidity, wind speed, and solar radiation) for a given location (latitude, longitude, and elevation) from trustworthy external sources (i.e., OpenWeather, Weatherbit, AEMET, etc.), and predictive time series models such as naive approaches to complex autoregressive neural nets.

4.2.23 WP4 Advanced Enabler 4.B.3 – Soil Moisture Estimation

This component presents an optical trapezoidal model (OPTRAM) algorithm to infer the surface soil moisture with physical units using ML techniques and data fusion with remote sensing using satellite multispectral imagery and local sensing using ground soil moisture probes data.

4.2.24 WP4 Advanced Enabler 4.B.4 – Crop Water Status Anomalies Detection

This component provides the farmer with information to estimate the needed irrigation water for a crop using other components. It presents a solution for plant water status anomalies detection. This component, developed in R language, is based on multispectral analysis of images provided by Sentinel-2 satellite. The images, corresponding to the crop over several seasons, are compared with the last image obtained to classify using ML the pixels in several categories according to the expected behaviour extracted from the history of the same crop or the adjacent ones.

4.2.25 WP4 Advanced Enabler 4.C.1 – Nitrogen Balance Model

This component describes a crop nitrogen balance model that estimates crop nitrogen requirements and provides the scheduling of fertilisation. SIMAVI (pilot 1.4 DSS to support maize crops) will develop a nitrogen balance model which will be integrated in platform along with remotely sensed indices. This model can be used by other pilots dealing with fertilisation management. A component that estimates crop nitrogen needs and the crop fertilisation scheduling during the season to optimise nitrogen fertilisation, avoiding nitrogen excess. The main input for this component is NDVI satellite imagery. The images from the Terrascope service are passed through a supervised classification process through which 3 areas are obtained: Optimum nitrogen level, Medium and low. The amount of fertilizer is transmitted in the form of text, following a mathematical algorithm that has as parameters such as: previous crop, soil type, climate type, etc. The information will be transmitted automatically, only if all the parameters have been completed by the farmer. All previous values will be kept, so that, when queried, the last record will be sent. Another useful recommendation for the farmer is the one related to the weather conditions. Based on the weather forecast, the decision will be made whether it is an optimal time for the nitrogen distribution or to postpone the agricultural works.

4.2.26 WP4 Advanced Enabler 4.C.2 – Nutrient Monitor

The Nutrient monitor component estimates the quantity of crop seeds to be applied to different areas. The analysis performed by the DSS takes into account data samples from two types of sources: data from farmers such as field coordinates and geometry etc.; and data from external systems such as satellite images and weather forecasts. The analysis of the parameters will determine recommendations for the future planting, allowing an increase in agricultural productivity.

4.2.27 WP4 Advanced Enabler 4.D.1 – Emission

The component on emissions will receive engine data as input, including data from the engine after treatment system. This data will be analysed and as an output there will be an overview of the status of different engine conditions. In case of malfunctions there will be instructions and/or recommendations for the farmer.

4.2.28 WP4 Advanced Enabler 4.D.2 – Field Operation

The component provides the table with a list of drivers and list of machines with details about the driver behaviour, machine distance covered and vehicle average speed. The components receive data about latitude, longitude, speed, breaking and fuels consumption as an input in the DEMETER AIM format. These data are then analysed, and the output of the classification process is then provided to the dashboard output including the data about the users' behaviour, distance covered and average speed. The component is generic in a sense it can be used not only for field operations,

but with slight adaptation it can be employed in any use cases involving transport, where it is necessary to monitor the driver behaviour, or the performance of the vehicles (for low fuel consumption, high-risk and sensitive merchandise, etc.).

4.2.29 WP4 Advanced Enabler 4.D.3 – Variable Rate

The variable rate application component provides a taskmap in AIM format, based on a WatchItGrow service that generates a polygonization of a Sentinel-2 NDVI image. Each individual polygon within the field will receive its own variable rate value. The component will start a flask server on localhost:5000, to which you can send a HTTP POST request containing, as payload, an AIM JSON object holding the field information, notably the field geometry, and a Treatment description containing a base application rate and also the definition of the application width of the field machinery that will execute the variable rate actions. The service will then check for a cloud-free Sentinel-2 NDVI image for the 30 days prior to the date specified in the Treatment “interventionStart” parameter. All acquisition dates with a minimum 95% of cloud-free pixels are withheld, and of those dates the last one is chosen to retrieve the NDVI information.

4.2.30 WP4 Advanced Enabler 4.E.1 – Pest Estimation with Sterile Fruit Flies

The Pest Estimation with Sterile Fruit Flies component aims at monitoring the fruit fly pest tracking providing an estimation of the current and future population. To do so, this DSS component has been designed to receive images taken from fruit fly traps and get an estimation of the flies captured. This estimation is carried out by using a WP2 component (pattern-extraction-with-computer-vision) that performs element identification in images from a trained model. This module keeps track of the different estimations over time and calculates a tendency based on the last observations.

4.2.31 WP4 Advanced Enabler 4.E.2 – Estimate Temperature-related Pest Events

The DSS component on the estimation of temperature-related pest events provides the farmer with a prediction of the occurrence and of the trend of pest flight. As target species, the olive fruit fly (*Bactrocera oleae*) has been selected since it is the most harmful pest of the olive tree causing dramatic quality deterioration and product loss. The component is focused on specific pest events: (i) absence (no flight), (ii) start of the flight, (iii) peak of the flight, (iv) end of the flight. The broader aim of this component is that it should be easy to apply to other pests and crops.

4.2.32 WP4 Advanced Enabler 4.F.1 – Estimate Milk Production

The Estimate Milk Production component will receive milking events for an individual cow as input, including attributes describing the individual cow’s current lactation. The component then returns a forecast describing the estimated yield still remaining in the current lactation.

4.2.33 WP4 Advanced Enabler 4.F.2 – Poultry Feeding

This component presents the overall animal feeding quality based on a food and water level in the silo with estimated water and food consumption intake. The component provides the UI dashboard with food level in the silo with estimated consumption. The animal feeding quality can be then assessed by farmers based on the level of the food in the silo.

4.2.34 WP4 Advanced Enabler 4.G.1 – Estimate Animal Welfare Condition

The DSS module on animal welfare makes it possible to evaluate the state of health of the analysed cows to determine the degree of well-being, in terms of nutrition, hygiene, rest and movement and consequently also to evaluate their productivity (which is strictly connected to their welfare).

The information flows, containing the data relating to the nutritional and milking values of the milk produced by the livestock farm, and those relating to the activities and rest periods of the analysed

cows, are acquired by Knowage module, which processes them both to visualise the results of the training and prediction algorithm analysis. The data related to cows' health status, based on the pathologies like ketosis, mastitis, and lameness, obtained by processing data from the Random Forest algorithm, are shown in a dashboard hosted by the Knowage module. The DSS dashboard provides the monitoring of the health status of the livestock using graphical widgets. Through this DSS, the farmer can establish their current health status, by means of specific ML predictive algorithms. Through these predictions the farmer can understand and optimise the health of the herd.

4.2.35 WP4 Advanced Enabler 4.G.2 – Poultry Well-Being

This component for poultry well-being provides the overall poultry stress based on parameters from environment and patterns detected from environment and video/ microphone. The component provides the UI dashboard with the following data: Air temperature, Humidity, Air flow, Light intensity, CO₂, Power losses, Animal species, Detected stress level, Flock age, Safety instruction.

4.2.36 WP4 Advanced Enabler 4.H.1 – Milk Quality Prediction

The DSS on Milk Quality Prediction, within the milk processing chain, allows to evaluate the analysis of raw and processed milk samples coming from dairy farm, to determine the quality level of the milk, thus identifying the goodness both of the milk arriving at the processing company and of the processed milk ready for packaging, in order to understand if and what choice to make in order to improve its quality.

The analysis of the milk samples considered by the DSS is related to two main events: samples collected on arrival of the tanker before unloading, and samples collected before packaging.

The samples are processed by Pilot machinery, a device which analyses them using FTIR (Fourier Transform InfraRed Transform) spectroscopy. The DSS dashboard, produced using adaptive visualisation module (T4.3), provides monitoring of the quality degree of milk using Knowage graphical widgets. This DSS enables the farmer to establish the current level of milk quality, by means of specific predictions of Machine Learning algorithms. These predictions enable the farmer to understand and optimise the quality of the milk produced by their whole herd.

4.2.37 WP4 Advanced Enabler 4.H.2 – Transport Condition

This component for transport condition covers the post-farm cycle for poultry and it provides output of the classification for the environmental conditions during the transport. The overall assessment of the environment based on parameters collected from IOT devices enables direct insight to farmers and involved stakeholders over the UI dashboard if transport conditions are meeting the requirements.

4.2.38 WP4 Advanced Enabler 4.H.3 – Field Book and FaST

The Field Book and FaST component will record information about farms, including all the information related to phytosanitary treatments. This field book is currently being done on paper, which is a tedious process and does not allow this information to be exploited properly. Each region, even those within the same country, requires different entries, so the main objective of this component is to make it easier for the farmers to maintain this field book by providing them with a tool that allows them to do it digitally and that can be adaptable to the different mandatory entries.

4.2.39 WP4 Advanced Enabler 4.I.0 – Indicator Engine for Benchmarking Purpose

The main target of this component is the management of indicators to evaluate the efficacy of the practices adopted and of the digital solutions delivered to boost economic, environmental, and agronomic sustainability at the farm level. Indicators managed with this component, will be used in “generic farm comparison”, “neighbour benchmarking” and “technology benchmarking”

components described in the following paragraphs. The indicator engine component (i) publishes and keeps track of the list of indicators defined in D4.3, (ii) enables pilot developers to calculate the indicators and to extend the list of indicators following the provided framework, (iii) stores the indicator results if the values are needed for benchmarking components.

4.2.40 WP4 Advanced Enabler 4.1.1 – Generic Farm Comparison

The DSS component “generic farm comparison” provides a set of basic economic indicators (plus simple agronomic indicators) to obtain a basic benchmark of the farm economic activities. This component is usable by all EU farms, as it requires a minimum set of requested inputs. This component has been designed to provide a benchmark solution reducing the amount and the quality of data required to calculate economic indicators, since it delivers economic comparisons even if the farm has no data to share. The economic indicators provided by this component allowing farm comparisons are based on the database of Farm Accountancy Data Network (FADN) which delivers a set of reference values calculated with data of similar farms (e.g., same area, similar surface per crop) belonging to the FADN network.

4.2.41 WP4 Advanced Enabler 4.1.2 – Neighbour Benchmarking

The DSS component on the neighbour benchmarking allows a group of farms belonging to the same area and of the same typology (e.g., DEMETER pilot, consortia, cooperatives) to share data in order to compare performance. The component provides comparison of agronomic, economic, and environmental indicators.

4.2.42 WP4 Advanced Enabler 4.1.3 – Technology Benchmarking

The aim of DSS component - technology benchmarking is to support the general DEMETER Objective 3: “Establish a benchmarking mechanism for agriculture solutions and business, targeting end-goals in terms of productivity and sustainability performance of farms, services, technologies, and practices based on a set of key performance indicators that are relevant to the farming community”. The component has therefore two potential types of use: (i) allow a farmer or a group of farmers to evaluate the impact of a technology in terms of agronomic, economic, and environmental sustainability (e.g., compare the value of a specific indicator before and after the adoption of a technology); (ii) support the overall DEMETER benchmarking by using data collected at the farm/pilot level for the calculation of the DEMETER KPIs.

ⁱ H2020 Call Objective H2020-DT-2018-2020 TOPIC: Agricultural digital integration platforms, <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/dt-ict-08-2019>

Annex 4: Application Form

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DEMETER OPEN CALL #2 - DEPLOY

Deploy agri-food pilots employing DEMETER model and tech [Edit](#)

DISCUSS



Your application is hidden. Only Admins and Team Members can see it

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Overview

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DEMETER OPEN CALL #2 - DEPLOY

The DEMETER Project is a large-scale deployment of farmer centric interoperable smart farming-IoT based platforms delivered through a series of 20 pilots across 18 countries (15 States in the EU). Involving 60 partners, DEMETER adopts a multi-actor approach across the value chain (demand and supply), with 25 deployment sites, 6,000 farmers and over 38,000 devices and sensors being deployed and participants involved come from different production sectors (dairy, meat, vegetables, fruit and arable crops), production systems (conventional and organic) and different farm sizes and types, optimising the data analysis obtained across multiple farms.

The DEMETER Open Call #2 - DEPLOY aims to increase the outreach of the DEMETER value proposition, by funding small consortia of 2-3 partners for the deployment of new high-value pilots in the agri-food sector, employing DEMETER methodologies and technologies, with a particular focus on EU geographic regions not represented within DEMETER pilots, expanding the technological and/or business coverage of the DEMETER project, towards digitalising and boosting the European agro-business.

Please visit h2020-demeter.eu/ for more information on the DEMETER project.

Demeter is a Horizon 2020 project (857202) supported by the European Union.

APPLICATION FORM

This application form has the following mandatory sections:

SECTION 1: Proposal identification

SECTION 2: Consortium description

SECTION 3: Proposal description

SECTION 4: Administrative data

Documents to be reviewed when preparing the application:

Annex 2: Guidelines for Applicants, defining the Open Call Terms & Conditions
LINK

Annex 3: DEMETER Technological Information, defining the DEMETER methodologies and technologies offered by the DEMETER project
LINK



Change it

If you have any questions, don't hesitate to ask them on the online Q&A page (www.f6s.com/demeter-open-call-2-deploy/discuss) or for extraordinary communication need, please contact the DEMETER Open Call Help Desk: opencalls@h2020-demeter.eu.

Failure to provide the required information in all sections will result in disqualification.

Up to 150.000 EUR and a vibrant ecosystem await you. Good luck!

SECTION 1: PROPOSAL IDENTIFICATION

1 Pilot Title *

100

2 Pilot Acronym *

20

SECTION 2: CONSORTIUM DESCRIPTION

Partner #1 Coordinator (SME)

3 SME Name *

The official name of the SME

4 Role *

Select One ▾

5 Country *

Country of registration

6 VAT number

7 Incorporation year

8 Contact person full name *

Contact person for the proposal and coordination of the project

9 Contact person email address *

10 Contact person phone number *

In rare but urgent situations, we need to quickly get in touch with your team. (Include country code)

11 Please upload the "Annex 5: Consortium Declaration of Honour" properly fill-in and signed (Max file size 30MB.) *

Choose a File

12 Please upload the "Annex 6: SME Declaration" properly fill-in and signed (Max file size 30MB.) *

Choose a File

Change it



Select One ▼

4244532

15 Country *

16 Role *

Select One ▼

17 If Partner #2 is an SME, please upload the "Annex 6: SME Declaration" properly fill-in and signed (Max file size 30MB.)

Choose a File

Partner #3 (Optional)

18 Entity name

19 Type

Select One ▼

20 Country

21 Role

Select One ▼

22 If Partner #3 is an SME, please upload the "Annex 6: SME Declaration" properly fill-in and signed (Max file size 30MB.)

Choose a File

SECTION 3: PROPOSAL DESCRIPTION

Please upload your proposal in Portable Document Format (pdf)

23 Upload proposal (Max file size 30MB.) *

Use the official template available at: [LINK](#)

Applicants using other kind of template/ document will be automatically ineligible.

Choose a File

SECTION 4: ADMINISTRATIVE DATA

24 Acceptance of the Data Privacy Policies *

☐ I accept the data privacy policy as detailed in the Annex 2: Guidelines for Applicants

25 Acceptance of the DEMETER open call conditions *

☐ We have reviewed and accept the terms and conditions

26 How did you hear about DEMETER? *

☐ News/media

☐ Social media

☐ Event

☐ E-mail



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...

Annex 4.1: Proposal Template



PROPOSAL TEMPLATE

DEMETER Open Call #2 – DEPLOY

Version of 30/11/2021

Please use this template to prepare your proposal. It has been organised to ensure that the important aspects of your planned work are clearly measurable with respect to the evaluation criteria. See the Guidelines for Applicants document for details: <https://h2020-demeter.eu/wp-content/uploads/2020/02/Annex-2-Guidelines-for-Applicants.pdf>

The structure of this template must be followed when preparing your proposal. Applicants using other kind of template/ document structure will be automatically ineligible.

Only proposals that successfully address all the required aspects will have a chance of being funded.

Please take advantage of the different communication instruments offered by the DEMETER Consortium (i.e. info webinars, help-desk, online Q&A, and FAQ section in the website) to receive feedback on any questions you may have before submitting your proposal.

The **page limit for full proposal is 13 pages** (Not including cover page, table of content page and the Ethical/Security Checklist). Please also respect the limits indicated in each section. All tables and eventual figures must be included within this limit. The allowed font type is “Calibri” and the minimum font size is 11 points. The page size is A4, and all margins (top, bottom, left, right) should be at least 15 mm.

If you attempt to upload a proposal longer than the specified limit, excess pages will be made invisible, and will not be taken into consideration by the experts.

Please delete this page when submitting the proposal

Delete the guidance text in blue in each section.

Upload the document in PDF format.



DEMETER Open Call #2 – DEPLOY

Acronym of your Pilot

Full title of your Pilot

Date of submission:

SME/Coordinator name and logo (If any)

2nd entity name and logo (If any)

3rd entity name (If applicable) and logo (If any)



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1 OVERVIEW OF THE PROPOSAL (MAXIMUM 1 PAGE)

1.1 Consortium composition

Indicate in the table below who are the member of the consortium and their corresponding roles.

Table 1: Consortium

Consortium	Entity Name	Entity Type (SME; Secondary or higher education establishment; Research institute; Other not-for profit research entity)	Entity role (Tech provider/integrator or End-user) (The proposal must include at least one applicant of each type)
Entity 1 (Coordinator) Must be a for-profit SME			
Entity 2			
Entity 3 (Optional)			

1.2 Executive summary

Describe an overview of your pilot.

Where will it be implemented, who will be involved, challenges to address, objectives to meet and potential impact.

Maximum 350 words

Text style to be used



2 EXCELLENCE/INNOVATION (MAXIMUM 5 PAGES)

Current Scenario

-Describe the challenging/problematic scenario to be addressed by the pilot, explaining the how does the current situation looks like, what are the farmers' pains and struggles. Identify the technical challenges and barriers.

Whenever possible quantify the aspects involved.

-Alignment with the DEMETER's challenges.

Text style to be used

Envisioned Scenario

-Describe the aim of the pilot, how a future scenario looks like, the farmers involved, and the agricultural areas addressed.

-Alignment with the DEMETER objectives.

Text style to be used



Technical Approach

- Describe how you will reach the envisioned scenario.
- Describe your technical approach including the identification of the platforms/technologies required to be integrated/developed, the applicable standards to be used and/or updated, data to be captured for decision support systems, validation methodologies.
- Identify the DEMETER technical components to be used.
- Describe how you will make use of the Agriculture Information Model (AIM)

Text style to be used

Multi Actor Approach

- Describe how you will engage with farmers to identify and gather their needs that will feed the development of technical requirements and continuous improvement of the pilot's activities.
- Identify the elements of the supply chain covered, the list stakeholders to involve and how they will be involved.

Text style to be used



3 IMPACT (MAXIMUM 2 PAGES)

Expected benefits

- Describe expected benefits of the pilot for its partners, farmers and other stakeholders involved.
- Identify the scaling opportunities and replication possibilities in Europe.
- Justify your project outcomes (which should be clear, measurable, and realistic) and how they will generate added-value with respect to DEMETER's vision and objectives.
- Define the potential socio-economic impact of your solution
- Explain the exploitation potential of your pilot.

Text style to be used

Contribution to DEMETER KPIs

KPI	Value at the end of the pilot implementation
Number of farms involved in this pilot	
Land coverage for this pilot - hectares (ha).	
Number of DEMETER interoperability mechanisms implemented	
Volume of data observing the information models (exa)	... / ... / ...
Number of Data Sources	
Amount of data collected daily	

Additional Pilot Specific KPIs

KPI	Value at the end of the pilot implementation

Add rows as needed



4 EXPERTISE AND EXCELLENCE OF THE TEAM (MAXIMUM 1 PAGE)

Summarise the team involved in the pilot project in the table below. Notice that the people included in the proposal must be later involved in the execution.

Table 2: Proposed Team

Entity	Name of the person	Role in the project	Link to LinkedIn profile or equivalent

Add rows as needed

- Please provide a short summary of the relevant experience of each team member. Include previous project references relevant to the proposal, products, publications, participation in conferences, collaborations, community projects, etc. Link to evidence of these records will be appreciated as they will help evaluators to assess the team experience and skills (e.g. GITHUB, LinkedIn...).
- Justify why the team has the required knowledge to assure a successful project execution.

Text style to be used



5 PROJECT PLANNING AND VALUE FOR MONEY

5.1 PROJECT ACTIVITIES AND MILESTONES (MAXIMUM 2 PAGE)

5.1.1 Main activities of the project

Notice that the DEPLOY activities have three phases DESIGN (2 months), INSTALL & OPERATE (8 months) and ASSESS (2 months). Take this into account to align your planning with this.

Describe the activities that will take place in your project from the technical point of view. Break down your work in work packages and tasks and provide timing of the different activities and components. This section should answer the question “how are we going to implement the project to reach the defined objectives?”

Text style to be used

5.1.2 Milestones & Deliverables

Please list the main milestones of the project.

Table 3: Milestones & Deliverables

Phase (DESIGN, INSTALL & OPERATE; ASSESS)	Milestone or Deliverable Number	Milestone/Deliverable description	Means of verification	Deadline (From M1 to M12)

Add lines as needed



5.2 VALUE FOR MONEY (MAXIMUM 2 PAGE)

Please indicate the number of person-months (full-time equivalent) of people involved in the project in the table below for the 6 months of project:

Table 4: Person-month & Personnel costs

Entity	Name of the person	Person-month (PM)	Monthly rate in Euros (MR) (Actual cost only)	Direct personnel costs (PMxMR)
Total				

Add lines as needed

Notice that a PM is a metric for expressing the effort of a person dedicated full time in one month.

Provide a description of expected costs and the requested total contribution using the table.

Table 5: Total budget

Item	Amount (€)			
	Entity 1	Entity 2	Entity 3 (If applicable)	Total
Direct personnel costs (a)				
Other direct cost (Equipment) (b) (Depreciation cost only)				
Other direct cost (Software licenses) (c)				
Other direct cost (Travel expenses) (d)				
Other direct cost (Others) (e)				
Indirect costs (0,25 x (a +b +c +d+e))				
Total				

The maximum amount of funding that a **consortium** may receive from DEMETER is 150.000 EUROS via any mean.
The maximum amount of funding that a **consortium member** may receive from DEMETER is 100.000 EUROS via any mean.



ANNEX: Ethics Self-Assessment

ETHICAL ISSUES TABLE - CHECKLIST


	YES/NO
Informed Consent	
• Does the proposal involve children?	
• Does the proposal involve patients or persons not able to give consent?	
• Does the proposal involve adult healthy volunteers?	
• Does the proposal involve Human Genetic Material?	
• Does the proposal involve Human biological samples?	
• Does the proposal involve Human data collection?	
Research on Human embryo/foetus	
• Does the proposal involve Human Embryos?	
• Does the proposal involve Human Foetal Tissue / Cells?	
• Does the proposal involve Human Embryonic Stem Cells?	
Privacy	
• Does the proposal involve processing of genetic information or personal data (e.g. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)	
• Does the proposal involve tracking the location or observation of people?	
Research on Animals	
• Does the proposal involve research on animals?	
• Are those animals transgenic small laboratory animals?	
• Are those animals transgenic farm animals?	
• Are those animals cloned farm animals?	
• Are those animals nonhuman primates?	
Research Involving Developing Countries	
• Use of local resources (genetic, animal, plant etc)	
• Benefit to local community (capacity building i.e. access to healthcare, education etc)	
Dual Use	
• Research having direct military application	
• Research having the potential for terrorist abuse	
ICT Implants	
• Does the proposal involve clinical trials of ICT implants?	
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	




Ethics

If you have entered any ethics issues in the ethical issue table, you must:

- submit an ethics self-assessment, which:
 - describes how the proposal meets the national legal and ethical requirements of the country or countries where the tasks raising ethical issues are to be carried out;
 - explains in detail how you intend to address the issues in the ethical issues table, in particular as regards:
 - research objectives (e.g. study of vulnerable populations, dual use, etc.)
 - research methodology (e.g. clinical trials, involvement of children and related consent procedures, protection of any data collected, etc.)
 - the potential impact of the research (e.g. dual use issues, environmental damage, stigmatization of particular social groups, political or financial retaliation, benefit-sharing, malevolent use, etc.).
- provide the documents that you need under national law (if you already have them), e.g.:
 - an ethics committee opinion;
 - the document notifying activities raising ethical issues or authorizing such activities

 *If these documents are not in English, you must also submit an English summary of them (containing, if available, the conclusions of the committee or authority concerned).*

 *If you plan to request these documents specifically for the project you are proposing, your request must contain*

Security

Please indicate if your project will involve:

- Activities or results raising security issues:.....(YES/NO)
- 'EU-classified information' as background or results:(YES/NO)
- Any potential “dual use” of results:(YES/NO)

Annex 5: Consortium Declaration of Honour

Consortium Declaration of Honour

Title of the pilot: _____

BETWEEN

_____ (SME name) established in
_____, (Official SME address), SME VAT number _____,
represented for the purposes of signing and submitting the proposal and the Consortium Declaration of Honour by _____ (Name of legal representative).

AND

_____ (Entity name) established in
_____, (Official entity address), VAT number _____,
represented for the purposes of signing and submitting the proposal and the Consortium Declaration of Honour by _____ (Name of legal representative).

_____ (Entity name) established in
_____, (Official entity address), VAT number _____,
represented for the purposes of signing and submitting the proposal and the Consortium Declaration of Honour by _____ (Name of legal representative).

IT IS HEREBY AGREED THAT

- All provided information is true and legally binding.
- The _____ (SME name) is acting on behalf the following partner(s) as the Consortium leader:
 - _____ (Entity name)
 - _____ (Entity name)
- The Consortium partners have agreed on their roles and budgets shares.
- The Consortium leader is solely responsible to distribute the budget shares to Consortium partners in accordance with this Consortium Declaration of Honour.
- DEMETER Consortium bears no responsibility in case the Consortium leader violates the mutual agreement set in this Consortium Declaration of Honour.
- DEMETER Consortium bears no responsibility in case of dispute among consortium partners regarding IP rights.
- All Consortium partners declare that they are not members of any other competitive Consortium in DEMETER Open Call #3 - DEPLOY. In case, an applicant participates in more than one Consortium, both Consortia will be excluded.
- The Consortium accepts all the rules explained in DEMETER Guidelines for Applicants (as given in Annex 2).

- All partners declare not been in one of the following situations:
 - a) it is bankrupt or being wound up, is having its affairs administered by the courts, has entered into an arrangement with creditors, has suspended business activities, is the subject of proceedings concerning those matters, or is in any analogous situation arising from a similar procedure provided for in national legislation or regulations;
 - b) it or persons having powers of representation, decision making or control over it have been convicted of an offence concerning their professional conduct by a judgment which has the force of res judicata;
 - c) it has been guilty of grave professional misconduct proven by any means which the contracting authority can justify including by decisions of the European Investment Bank and international organizations;
 - d) it is not in compliance with its obligations relating to the payment of social security contributions or the payment of taxes in accordance with the legal provisions of the country in which it is established or with those of the country of the contracting authority or those of the country where the contract is to be performed;
 - e) it or persons having powers of representation, decision making or control over it have been the subject of a judgment which has the force of res judicata for fraud, corruption, involvement in a criminal organization or any other illegal activity, where such illegal activity is detrimental to the Union's financial interests;
 - f) is subject to an administrative penalty for being guilty of misrepresenting the information required by the contracting authority as a condition of participation in a grant award procedure or another procurement procedure or failing to supply this information or having been declared to be in serious breach of its obligations under contracts or grants covered by the Union's budget.
- Each partner declare that:
 - g) is not subject to a conflict of interest;
 - h) has not made false declarations in supplying the information required by the as a condition of participation in the Open Calls of DEMETER Project or does not fail to supply this information;
 - i) is not in one of the situations of exclusion, referred to in the abovementioned points a) to f).
 - j) Is aware and fully accepts all DEMETER condition and rules as expressed in DEMETER open call documents Annex 2, Annex 3 and Annex 4.1.
- Each partner certifies that:
 - is committed to participate in the abovementioned pilot;
 - has stable and sufficient sources of funding to maintain its activity throughout its participation in the above-mentioned pilot and to provide any counterpart funding necessary;
 - has or will have the necessary resources as and when needed to carry out its involvement in the above-mentioned pilot;

1) Consortium leader (SME)

Company name	
Full address of the company	
Country	
Name of legal representative	
Position in the company	
Pilot Budget share	_____ EUR
I have the power of legally binding the above-mentioned SME on submitting this proposal.	
Signature and stamp	
Done at (place)_____	
The (day)_____ (month)_____ (year)_____	

2) Consortium partner No 2

Entity name	
Full address of the entity	
Country	
Name of legal representative	
Position in the company	
Pilot Budget share	_____ EUR
I have the power of legally binding the above-mentioned entity on submitting this proposal.	
Signature and stamp	
Done at (place)_____	
The (day)_____ (month)_____ (year)_____	

2) Consortium partner No 3

Entity name	
Full address of the entity	
Country	
Name of legal representative	
Position in the company	
Pilot Budget share	_____ EUR
I have the power of legally binding the above-mentioned entity on submitting this proposal.	
Signature and stamp (if applicable)	
Done at (place) _____ The (day) _____ (month) _____ (year) _____	

Annex 6: SME Declaration



Declaration on information on the SME qualification

Precise identification of the applicant enterprise

Name or Business name

Address (of registered office)

Registration / VAT number

Names and titles of the principal director(s)

Type of enterprise (see explanatory note)

Tick to indicate which case(s) applies to the applicant enterprise:

- ☐ Autonomous enterprise In this case the data filled in the box below result from the accounts of the applicant enterprise only. Fill in the declaration only, without annex.
- ☐ Partner enterprise Fill in and attach the annex (and any additional sheets), then complete the declaration by copying the results of the calculations into the box below.
- ☐ Linked enterprise

Data used to determine the category of enterprise

Calculated according to Article 6 of the Annex to the Commission Recommendation 2003/361/EC on the SME definition.

Reference period (*)		
Headcount (AWU)	Annual turnover (**)	Balance sheet total (**)

(*) All data must be relating to the last approved accounting period and calculated on an annual basis. In the case of newly-established enterprises whose accounts have not yet been approved, the data to apply shall be derived from a reliable estimate made in the course of the financial year

(**) EUR 1 000.

Important:

Compared to the previous accounting period there is a change regarding the data, which could result in a change of category of the applicant enterprise (micro, small, medium-sized or big enterprise).

☐ No

☐ Yes (in this case fill in and attach a declaration regarding the previous accounting period).

Signature

Name and position of the signatory, being authorised to represent the enterprise:

.....

I declare on my honour the accuracy of this declaration and of any annexes thereto.

Done at

Signature

EXPLANATORY NOTE ON THE TYPES OF ENTERPRISES TAKEN INTO ACCOUNT FOR CALCULATING THE HEADCOUNT AND THE FINANCIAL AMOUNTS

I. TYPES OF ENTERPRISES

The definition of an SME¹ distinguishes three types of enterprise, according to their relationship with other enterprises in terms of holdings of capital or voting rights or the right to exercise a dominant influence².

Type 1: Autonomous Enterprise

This is by far the most common type of enterprise.

It applies to all enterprises which are not one of the two other types of enterprise (partner or linked).

An applicant enterprise is autonomous if it:

- does not have a holding of 25%³ or more in any other enterprise,
- and is not 25%³ or more owned by any enterprise or public body or jointly by several linked enterprises or public bodies, apart from some exceptions⁴,
- and does not draw up consolidated accounts and is not included in the accounts of an enterprise which draws up consolidated accounts and is thus not a linked enterprise⁵.

Type 2: Partner Enterprise

This type represents the situation of enterprises which establish major financial partnerships with other enterprises, without the one exercising effective direct or indirect control over the other. Partners are enterprises which are not autonomous, but which are not linked to one another.

The applicant enterprise is a partner of another enterprise if:

¹ Henceforth in the text, the term "Definition" refers to the Annex to Commission Recommendation 2003/361/EC on the definition of SMEs.

² Definition, Article 3

³ In terms of the share of the capital or voting rights, whichever is higher is applied. To this percentage should be added the holding in that same enterprise of each enterprise, which is linked to the holding company (Definition, Article 3 paragraph 2)

⁴ An enterprise may continue being considered as autonomous when this 25% threshold is reached or exceeded, if that percentage is held by the following categories of investors (provided that those are not linked with the applicant enterprise):

- a) public investment corporations, venture capital companies, individuals or groups of individuals with a regular venture capital investment activity who invest equity capital in unquoted businesses ("business angels"), provided the total investment of those business angels in the same enterprise is less than EUR 1 250 000,
- b) universities or non-profit research centres,
- c) institutional investors, including regional development funds,
- d) autonomous local authorities with an annual budget of less than EUR 10 million and less than 5000 inhabitants.

(Definition, Article 3 paragraph 2, second sub-paragraph)

⁵ - If the registered office of the enterprise is situated in a Member State which has provided for an exception to the requirement to draw up such accounts pursuant to the Seventh Council Directive 83/349/EEC of 13 June 1983, the enterprise should nevertheless check specifically whether it does not meet one or other of the conditions laid down in Article 3 paragraph 3 of the Definition.

- There are also some very rare cases in which an enterprise may be considered linked to another enterprise through a person or a group of natural persons acting jointly (Definition, Article 3 paragraph 3).

- Conversely, there are very few cases of enterprises drawing up consolidated accounts voluntarily, without being required to do so under the Seventh Directive. In that case, the enterprise is not necessarily linked and can consider itself only a partner.

To determine whether the enterprise is linked or not, in each of the three situations it should be checked whether or not the enterprise meets one or other of the conditions laid down in Article 3 paragraph 3 of the Definition, where applicable through a natural person or group of natural persons acting jointly.

- it has a holding or voting rights equal to or greater than 25% in the other enterprise, or the other enterprise has a holding or voting rights equal to or greater than 25% in the applicant enterprise,
- the enterprises are not linked enterprises within the meaning defined below, which means, among other things, that the voting rights of one in the other do not exceed 50%,
- and the applicant enterprise does not draw up consolidated accounts which include the other enterprise by consolidation, and is not included by consolidation in the accounts of the other enterprise or of an enterprise linked to it⁵.

Type 3: Linked Enterprise

This type corresponds to the economic situation of enterprises which form a group through the direct or indirect control of the majority of the voting rights (including through agreements or, in certain cases, through natural persons as shareholders), or through the ability to exercise a dominant influence on an enterprise. Such cases are thus less frequent than the two preceding types.

In order to avoid difficulties of interpretation for enterprises, the Commission has defined this type of enterprise by taking over – wherever they are suitable for the purposes of the Definition – the conditions set out in Article 1 of Council Directive 83/349/EEC on consolidated accounts⁶, which has been applied for many years.

An enterprise thus generally knows immediately that it is linked, since it is already required under that Directive to draw up consolidated accounts or is included by consolidation in the accounts of an enterprise which is required to draw up such consolidated accounts.

The only two cases, which are however not very frequent, in which an enterprise can be considered linked although it is not already required to draw up consolidated accounts, are described in the first two indents of endnote 5 of this explanatory note. In those cases, the enterprise should check whether it meets one or other of the conditions set out in Article 3 paragraph 3 of the Definition.

II. THE HEADCOUNT AND THE ANNUAL WORK UNITS⁷

The headcount of an enterprise corresponds to the number of annual work units (AWU).

Who is included in the headcount?

- The employees of the applicant enterprise,
- persons working for the enterprise being subordinate to it and considered to be employees under national law,
- owner-managers,
- partners engaging in a regular activity in the enterprise and benefiting from financial advantages from the enterprise.

Apprentices or students engaged in vocational training with an apprenticeship or vocational training contract are not taken into account in the headcount.

How is the headcount calculated?

⁶ Seventh Council Directive 83/349/EEC of 13 June 1983, based on Article 54(3)(g) of the Treaty and concerning consolidated accounts (OJ L 193, 18/7/1983, p. 1), as last amended by Directive 2001/65/EC of the European Parliament and of the Council (OJ L 283, 27/10/01, p. 28).

⁷ Definition, Article 5.



One AWU corresponds to one person who worked full-time in the enterprise in question or on its behalf during the entire reference year. The headcount is expressed in AWUs.

The work of persons, who did not work the entire year, or who worked part-time - regardless of its duration - and seasonal work is counted as fractions of AWU.

The duration of maternity or parental leaves is not counted.



ANNEX TO THE DECLARATION CALCULATION FOR THE PARTNER OR LINKED TYPE OF ENTREPRISE

Annexes to be enclosed if necessary

- Annex A if the applicant enterprise has at least one partner enterprise (and any additional sheets)
- Annex B if the applicant enterprise has at least one linked enterprise (and any additional sheets)

Calculation for the partner or linked type of enterprise⁸ (see explanatory note)

Reference period ⁹ :			
	Headcount (AWU)	Annual turnover (*)	Balance sheet total (*)
1. Data ⁹ of the applicant enterprise or consolidated accounts (copy data from box B(1) in annex B ¹⁰)			
2. Proportionally aggregated data ⁹ of all partner enterprises (if any) (copy data from box A in annex A)			
3. Added up data ⁹ of all linked enterprises (if any) – if not included by consolidation in line 1 (copy data from box B(2) in annex B)			
Total			
(*) EUR 1 000.			

The data entered in the "Total" row of the above table should be entered in the box "Data used to determine the category of enterprise" in the declaration.

⁸ Definition, Article 6 paragraphs 2 and 3

⁹ All data must be relating to the last approved accounting period and calculated on an annual basis. In the case of newly-established enterprises whose accounts have not yet been approved, the data to apply shall be derived from a reliable estimate made in the course of the financial year (Definition, Article 4).

¹⁰ The data of the enterprise, including the headcount, are determined on the basis of the accounts and other data of the enterprise or, where they exist, the consolidated accounts of the enterprise, or the consolidated accounts in which the enterprise is included through consolidation.



ANNEX A

Partner enterprises

For each enterprise for which a 'partnership sheet' has been completed (one sheet for each partner enterprise of the applicant enterprise and for any partner enterprises of any linked enterprise, of which the data is not yet included in the consolidated accounts of that linked enterprise), the data in the 'partnership box' in question should be entered in the summary table below:

BOX A

Partner enterprise (name / identification)	Headcount (AWU)	Annual turnover (*)	Balance sheet total (*)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
Total			

(*) EUR 1 000.

(attach sheets or expand the present table, if necessary)

Reminder:

This data is the result of a proportional calculation done on the 'partnership sheet' for each direct or indirect partner enterprise.

The data entered in the "Total" row of the above table should be entered in line 2 (regarding partner enterprises) of the table in the Annex to the declaration.



PARTNERSHIP SHEET

1. Precise identification of the enterprise

Name or Business name

Address (of registered office)

Registration/VAT number¹¹

Names and titles of the principal director(s)¹²

2. Raw data regarding that partner enterprise

Reference period			
	Headcount (AWU)	Annual turnover (*)	Balance sheet total (*)
Raw data			
(*) EUR 1 000.			

Reminder: These raw data are derived from the accounts and other data of the partner enterprise, consolidated if they exist. To them are added 100% of the data of enterprises which are linked to this partner enterprise, unless the accounts data of those linked enterprises are already included through consolidation in the accounts of the partner enterprise¹³. If necessary, add "linkage sheets" for the enterprises which are not yet included through consolidation.

3. Proportional calculation

- a) Indicate precisely the holding¹⁴ of the enterprise drawing up the declaration (or of the linked enterprise via which the relation to the partner enterprise is established) in the partner enterprise to which this sheet relates:

.....

Indicate also the holding of the partner enterprise to which this sheet relates in the enterprise drawing up the declaration (or in the linked enterprise):

.....

- b) The higher of these two holding percentages should be applied to the raw data entered in the previous box. The results of this proportional calculation should be given in the following table:

'Partnership box'

Percentage:	Headcount (AWU)	Annual turnover (*)	Balance sheet total (*)
Proportional results			
(*) EUR 1 000.			

These data should be entered in Box A in Annex A.

¹¹ To be determined by the Member State according to its needs

¹² Chairman (CEO), Director-General or equivalent.

¹³ Definition, Article 6 paragraph 3, first sub-paragraph

¹⁴ In terms of the share of the capital or voting rights, whichever is higher. To this holding should be added the holding of each linked enterprise in the same enterprise (Definition, Article 3 paragraph 2 first sub-paragraph).



ANNEX B

Linked enterprises

DETERMINE THE CASE APPLICABLE TO THE APPLICANT ENTERPRISE:

- ☐ **Case 1:** The applicant enterprise draws up consolidated accounts or is included by consolidation in the consolidated accounts of another enterprise. (Box B(1))
- ☐ **Case 2:** The applicant enterprise or one or more of the linked enterprises do not establish consolidated accounts or are not included in the consolidated accounts. (Box B(2)).

Please note: The data of the enterprises, which are linked to the applicant enterprise, are derived from their accounts and their other data, consolidated if they exist. To them are aggregated proportionally the data of any possible partner enterprise of that linked enterprise, situated immediately upstream or downstream from it, unless it has already been included through consolidation¹⁵.

CALCULATION METHODS FOR EACH CASE:

In case 1: The consolidated accounts serve as the basis for the calculation. Fill in Box B(1) below.

Box B(1)

	Headcount (*)	Annual turnover (**)	Balance sheet total (**)
Total			

(*) Where in the consolidated accounts no headcount data appears, the calculation of it is done by adding the data from the enterprises to which the enterprise in question is linked.

(**) EUR 1 000.

The data entered in the "Total" row of the above table should be entered in line 1 of the table in the Annex to the declaration.

Identification of the enterprises included through consolidation

Linked enterprise (name / identification)	Address (of registered office)	Registration / VAT number (*)	Names and titles of the principal director(s) (**)
1.			
2.			
3.			
4.			
5.			
6.			
7.			

¹⁵ Definition, Article 6 paragraph 3, second sub-paragraph

Total			
--------------	--	--	--

(*) To be determined by the Member State according to its needs

(**) Chairman (CEO), Director-General or equivalent.

Important: Partner enterprises of such a linked enterprise, which are not yet included through consolidation, are treated like direct partners of the applicant enterprise. Their data and a 'partnership sheet' should therefore be added in Annex A.

In case 2: For each linked enterprise (including links via other linked enterprises), complete a "linkage sheet" and simply add together the accounts of all the linked enterprises by filling in Box B(2) below.

Box B(2)

Enterprise No.:	Headcount (AWU)	Annual turnover (**)	Balance sheet total (**)
1. (*)			
2. (*)			
3. (*)			
Total			

(*) attach one "linkage sheet" per enterprise

(**) EUR 1 000.

The data entered in the "Total" row of the above table should be entered in line 3 (regarding linked enterprises) of the table in the Annex to the declaration.



LINKAGE SHEET

(only for linked enterprises not included by consolidation in Box B(1))

1. Precise identification of the enterprise

Name or Business name

Address (of registered office)

Registration/VAT number¹⁶

Names and titles of the principal director(s)¹⁷

2. Data on enterprise

Reference period			
	Headcount (AWU)	Annual turnover (*)	Balance sheet total (*)
Total			

(*) EUR 1 000.

These data should be entered in Box B(2) in Annex B.

Important: The data of the enterprises, which are linked to the applicant enterprise, are derived from their accounts and their other data, consolidated if they exist. To them are aggregated proportionally the data of any possible partner enterprise of that linked enterprise, situated immediately upstream or downstream from it, unless it has already been included through consolidation¹⁸.

Such partner enterprises are treated like direct partner enterprises of the applicant enterprise. Their data and a 'partnership sheet' have therefore to be added in Annex A.

¹⁶ To be determined by the Member State according to its needs

¹⁷ Chairman (CEO), Director-General or equivalent.

¹⁸ If the data of an enterprise are included in the consolidated accounts to a lesser proportion than the one determined under Article 6 paragraph 2, the percentage rate according to that article should be applied (Definition, Article 6 paragraph 3, second sub-paragraph).

Annex 7: Bank Account Information

Annex 8: Sub-grant Agreement Template



Sub-Grant Agreement

Agreement Number: DEMETER-OC2-2022/



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 857202

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Contracting parties

WATERFORD INSTITUTE OF TECHNOLOGY (WIT), established in CORK ROAD, WATERFORD, Ireland, VAT number: IE9503034A, represented for the purposes of signing the Agreement by VP Research, Innovation & Graduate Studies, Mark White, legal representative of WIT.

Hereinafter referred as the “Contractor”

Of the one part,

[COMPANY_NAME], a SME organized under the laws of [COUNTRY], established in [LEGAL_ADDRESS], with VAT number [VAT_NUMBER], duly represented by [LEGAL_REPRESENTATIVE], [LEGAL_REPRESENTATIVE_POSITION],

Hereinafter referred as the “Beneficiary”

The “Beneficiary” is acting on behalf the following partner(s) as the Consortium leader:

Partner 1 Leader: [ENTITY_NAME], an ENTITY organized under the laws of [COUNTRY], established in [LEGAL_ADDRESS], with VAT number [VAT_NUMBER], duly represented by [LEGAL_REPRESENTATIVE], [LEGAL_REPRESENTATIVE_POSITION],

Partner 2: [ENTITY_NAME], an ENTITY organized under the laws of [COUNTRY], established in [LEGAL_ADDRESS], with VAT number [VAT_NUMBER], duly represented by [LEGAL_REPRESENTATIVE], [LEGAL_REPRESENTATIVE_POSITION],

Partner 3: [ENTITY_NAME], an ENTITY organized under the laws of [COUNTRY], established in [LEGAL_ADDRESS], with VAT number [VAT_NUMBER], duly represented by [LEGAL_REPRESENTATIVE], [LEGAL_REPRESENTATIVE_POSITION],

It will be the responsibility of the Beneficiary to establish its own agreement with the other partner(s).

of the other part

Hereinafter collectively referred as the “Contracting Parties”

HAVE AGREED to the following terms and conditions including those in the following Annexes, which form an integral part of this DEMETER Open Call #2 - DEPLOY Sub-Grant Agreement (hereinafter referred as the “Contract”):

General Provisions

The European Commission (hereinafter referred as the “EC”) and the Contractor, as a member of the DEMETER consortium, have signed the Grant Agreement no 857202 for the implementation of the project “Building an Interoperable, Data-Driven, Innovative and Sustainable European Agri-Food

Sector” (Acronym: DEMETER) within the framework of the Programme H2020-DT-2018-2020/H2020-DT-2018-2.

The Beneficiary has received the favourable resolution by the external evaluators and therefore is entitled to receive funding and services according to the terms and conditions set out under this Sub-Grant Agreement and in accordance with the Annex 2: Guidelines for Applicants.

This Contract aims at defining the framework of rights and obligations of the Contracting Parties.

The Funding received by the Beneficiary is property of the EC. The Contractor is mere holder and managers of the funds.

Article 1 – Entry into force & Termination of the contract

1.1 Entry into force

This Contract shall enter into force on the day of its signature by the last Contracting Party. The Contractor shall sign this contract, only after all of the following documents have been received from the Beneficiary:

- The original signed Consortium Declaration of Honour (as given in Annex 5 of this Contract);
- *SME Declaration* form (as given in Annex 6 of this Contract);
- Copy of ID-card or Passport of legal representative(s) of the SME;
- Copy of the original Extract of SME registration;
- Proof of VAT registration;
- Bank Information Form (as given in Annex 7 of this Contract).

All documents shall be sent to the Contractor first via email to the following address: ???@???.??, while the Annexes 2, 4 and 4.1 of this Contract will also be sent as originals, via regular mail, to the following address:

WATERFORD INSTITUTE OF TECHNOLOGY
Main Campus Cork Road,
Waterford City
Co. Waterford, Ireland

The Beneficiary is solely responsible for the accuracy of all data provided to the Contractor.

1.2 Contract Termination

This Contract covers all three phases (DESIGN, INSTALL & OPERATE, ASSESS) of DEMETER DEPLOY activities.

At the end of each the aforementioned phases, an evaluation of the Beneficiary projects’ progress will take place as fully described in Annex 2 “Guidelines for Applicants”.

In case the evaluators of the Beneficiary projects’ progress do not receive or accept any due deliverable, at the end of each phase, this Contract is automatically terminated, and the Beneficiary fully accepts that no additional payments related to the phase of the missing or not accepted deliverable will be made by the Contractor.

This Contract also terminates in the event of unjustified withdraw by the Beneficiary of the current fulfilment of its Contract obligations. “Unjustified withdraw” covers any situation out of “Force Majeure” qualification which determines the absence of performance of the Beneficiary contractual obligations. In this particular case, it entitles the Contractor the right to claim the Beneficiary the full refund of all payments made to the Beneficiary up to date.

Article 2 – Obligations and Responsibilities of the Beneficiary

The obligations and responsibilities of the Beneficiary are defined in detail in the Annex 2 - Guidelines for Applicants.

Additionally, the Beneficiary shall take every necessary precaution to avoid any risk of conflict of interest relating to economic interests, political or national affinities, personal or any other interests liable to influence the impartial and objective performance of the Project. In case the Beneficiary is involved in a conflict of interest or in a risk of conflict of interest, the Beneficiary must formally notify this situation to the Contractor without delay and immediately take all the necessary steps to rectify this situation.

The Beneficiary confirms and guarantees that a Consortium Agreement between the members of the consortium has been signed clarifying all participation, financial and IP rights issues. In more details:

- The Consortium leader (beneficiary) declares that all Consortium partners have agreed on their roles and budget shares.
- The Consortium leader (beneficiary) is solely responsible to distribute the budget shares to Consortium partners in accordance to the Consortium Declaration of Honour.
- DEMETER Consortium bears no responsibility in case the Consortium leader (beneficiary) violates the mutual agreement set in the Consortium Declaration of Honour.
- DEMETER Consortium bears no responsibility in case of dispute among consortium partners regarding IP rights.

The above are also evident in the attached “Consortium Declaration of Honour”.

The Consortium leader (beneficiary) declares that no Consortium partner will receive an amount greater to 100.000 EUROS in the context of this sub-grant agreement.

Article 3 – Breach of Contractual obligations

In the event of the breach of the contractual obligations by the Beneficiary, the Contractor reserves the right to claim the Beneficiary the full refund of all payments made to the Beneficiary up to date. The breach of the contractual obligations by the Beneficiary shall be determined by the DEMETER Consortium or DEMETER Project Coordinator. Not participation in the Activities (unless in the case of Force Majeure) or participating in the Activities in a manner which intentionally disrupts the Activities, shall be deemed as breach of the contractual obligations by the Beneficiary. The provision of false or misleading declarations by the Beneficiary or any unsolved situation of conflict of interest also constitute examples of breach of contractual obligations by the Beneficiary.

Article 4 – Financial contribution and financial provisions

4.1 Maximum financial contribution

The maximum financial contribution to be granted by the Contractor to the Beneficiary shall not exceed the amount of One Hundred and Fifty Thousand Euros (150,000€).

4.2 Distribution of the financial contribution

The financial contribution to be granted to the Beneficiary shall be calculated and distributed in accordance with the provisions of the Annex 2: Guidelines for Applicants.

In any case, the financial grant to be paid will always be subject to:

- A favourable resolution by the evaluators and DEMETER project responsible for assessing the Project in each of the phases;
- Reception and acceptance of the relevant Financial Statement (F1, F2, and F3) of the beneficiary;
- The Beneficiary Bank Account (Annex 7) matches the Financial Statement Bank Account;
- The availability of funds in Contractor bank account during the relevant payment period
- Payments to the Beneficiary will be made by the Contractor. In particular:
 - The Contractor reserves the right to withhold the payments in case the Beneficiary does not fulfil with its obligations and tasks as per Annex 2 - Guidelines for Applicants;
 - Banking and transaction costs charged by any of the banks related to the handling of any financial resources made available to the Beneficiary by the Contractor shall be covered by the holder of the bank account which originated the cost. This means that the Contractor bears the cost of transfers charged by its bank and the Beneficiary bears the cost of transfers charged by its bank.;
- Payments will be released no later than thirty (30) natural days after the notification by the Contractor;
- The Beneficiary is responsible for complying with any tax and legal obligations that might be attached to this financial contribution.

4.3 Payments schedule

The payment schedule is directly linked to the relevant phase of the Project as per the Guidelines for Applicants (Annex 2).

Expected date of payment	Amount	Condition / Event	Linked Phase
June 2022	Up to 30.000 EUR	Achievement of milestones and successful review of DESIGN report	DESIGN
March 2023	Up to 90.000 EUR	Achievement of milestones and successful review of INSTALL & OPERATE report	INSTALL & OPERATE
May 2023	Up to 30.000 EUR	Achievement of milestones and successful review of ASSESS report	ASSESS

The Beneficiary is entitled to receive exclusively those payments allocated to each specific phase of the Project provided that the conditions under Article 4.2 are met.

Article 5 – Liability of the Beneficiary

Neither the Contractor nor the EC can be held liable for any acts or omissions of the Beneficiary in relation to this Contract. At the same time, the Beneficiary is responsible for any act or omission that causes damage to the Contractor, the Data Provider, and/or the EC in relation to this Contract.

The Beneficiary shall bear sole responsibility for ensuring that their acts within the framework of this Contract do not infringe third parties' rights. There is no joint liability between the Contracting Parties.

Article 6 – Confidentiality

With respect to all information of whatever nature or form as is disclosed between the Contracting Parties in connection with the Project and identified in writing as confidential, the terms of this Article shall apply.

The Contracting Parties agree that such information is communicated on a confidential basis and its disclosure may be prejudicial to the owner of the information, and undertakes that:

- i) it will not, during the term of the Sub-project and for a period of five (5) years from the expiration date of the Sub-project, use any such information for any purpose other than in accordance with the terms of the Contract.
- ii) it will, during the term of the Sub-project and for a period of five (5) years from the expiration date of the Sub-project, treat the same as (and to procure that the same be kept) confidential provided always that such agreement and undertaking shall not extend to any information which the receiving Party can show:
 - was, at the time of disclosure to the Subcontractor, published or otherwise generally available to the public, or
 - has, after disclosure to either of the Contracting Parties, been published or become generally available to the public otherwise than through any act or omission on the part of the receiving Party, or
 - was already in the possession of the Contracting Parties, without any restrictions on disclosure, at the time of disclosure to the Party, or
 - was rightfully acquired from others without any undertaking of confidentiality; or
 - is subsequently independently developed by the Contracting Parties without use of the information provided by the disclosing party.

In case of breach of the confidential rules hereinabove set, the Contracting Party breaching the confidentiality will remain solely liable towards possible claims.

Article 7 – Force Majeure

“Force Majeure” shall mean, any unforeseeable exceptional situation or event beyond the Contracting Parties control, which prevents either of them from fulfilling any of their obligations under the Agreement, which was not attributable to error or negligence on their part and which proves to be inevitable in spite of the exercising all due diligence.

Any default of a service, defect in equipment or material or delays in making them available, unless they stem directly from a relevant case of force majeure, as well as labour disputes, strikes or financial difficulties cannot be invoked as force majeure.

The Contracting Parties shall take the necessary measures to limit any damage due to force majeure. They shall do their best to resume the implementation of the action as soon as possible.

No Contracting Party shall be considered to be in breach of its obligations and tasks if such breach is caused by Force Majeure. A Contracting Party will notify the other Contracting Party of any Force

Majeure as soon as possible. In case the Beneficiary is not able to overcome the consequences of Force Majeure within 10 (ten) days after such notification, the Contractor will decide accordingly including the termination of the Contract.

Article 8 – Information and communication

Any publicity made by the Beneficiary in respect of the project, in whatever form and on or by whatever medium, must specify that it reflects only the author's views and that the Contractor, DEMETER consortium or EC are not liable for any use that may be made of the information contained therein.

The Contractor, DEMETER consortium and EC shall be authorized to publish, in whatever form and on or by whatever medium, the following information:

- the name of the Beneficiary;
- contact address of the Beneficiary;
- the general purpose of the project;
- the amount of the financial contribution of the EC.

The Beneficiary shall ensure that all necessary authorizations for such publication have been obtained and that the publication of the information by the Contractor, DEMETER Consortium or EC does not infringe any rights of third parties.

Unless the EC or the Coordinator requests or agrees otherwise or unless it is impossible, any communication activity related to the action (including in electronic form, via social media, etc.), any publicity, including at a conference or seminar or any type of information or promotional material (brochure, leaflet, poster, presentation etc.), and any infrastructure, equipment and major results funded by the grant must:

- display the EU emblem,
- display the HUBCAP logo and,
- include the following text:

“The NAME_of_PROJECT/PILOT has indirectly received funding from the European Union's Horizon 2020 research and innovation action programme, via the Open Call #2 - DEPLOY issued and executed under project DEMETER (grant agreement No 857202)”

When displayed in association with a logo, the EU emblem should be given appropriate prominence. This obligation to use the European emblem in respect of projects to which the EC contributes implies no right of exclusive use. It is subject to general third-party use restrictions which do not permit the appropriation of the emblem, or of any similar trademark or logo, whether by registration or by any other means. Under these conditions, the Beneficiary is exempted from the obligation to obtain prior permission from the EC to use the emblem. Further detailed information on the EU emblem can be found on the Europa web page.

Upon a duly substantiated request by the Contractor on behalf of the Beneficiary, the EC may agree to forego such publicity if disclosure of the information indicated above would risk compromising the beneficiary's security, academic or commercial interests.

Article 9 – Data protection

9.1 Data protection obligations

The Contracting Parties have the obligation to abide by the Regulation (EU) 2016/679 (General Data Protection Regulation – GDPR) 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.

The processing of personal data shall be carried out lawfully, fairly and in a transparent manner, collected for specified purposes and adequate, relevant and limited to what is necessary in relation to the purposes for which it is processed.

The Beneficiary will use and process the data only for the purposes of this Contract and during the length of the Contract. Any unauthorised use is forbidden. In any event, neither the Contractor nor the Data Provider will be held responsible for any abusive use of data incurred into by the Beneficiary.

The Beneficiary shall not try to re-identify anonymised data. In the event that re-identification occurs, the Beneficiary commits not to use such data.

The Beneficiary shall delete, at the end of this Contract, the data to which the Beneficiary has been granted access during the pilot implementation, except where an agreement is entered into with the Data Provider.

9.2. New data produced

The Beneficiary acknowledges that he/she will be the “data controller” of any new dataset of piece of personal information that the Beneficiary may produce in the course of the DEMETER project.

Article 10 – Financial audits and controls

The EC may, at any time during the implementation of the Project and up to five years after the end of the DEMETER project (foreseen for 28 February 2023), arrange for financial audits to be carried out, by external auditors, or by the EC services themselves including the European Anti-Fraud office (OLAF), on the Beneficiary. The audit procedure shall be deemed to be initiated on the date of receipt of the relevant letter sent by the EC. Such audits may cover financial, systemic and other aspects (such as accounting and management principles) relating to the proper execution of the Grant Agreement. They shall be carried out on a confidential basis.

The Beneficiary shall make available directly to the EC all detailed information and data that may be requested by the EC or any representative authorised by it, with a view to verifying that the Grant Agreement is properly managed and performed in accordance with its provisions and that costs have been charged in compliance with it. This information and data must be precise, complete and effective.

The Beneficiary shall keep the originals or, in exceptional cases, duly authenticated copies – including electronic copies - of all documents relating to the Contract until 2028. These shall be made available to the EC where requested during any audit under the Grant Agreement.

In order to carry out these audits, the Beneficiary shall ensure that the EC’s services and any external body(ies) authorised by it have on-the-spot access at all reasonable times, notably to the

Beneficiary's offices, to its computer data, to its accounting data and to all the information needed to carry out those audits, including information on individual salaries of persons involved in the project. They shall ensure that the information is readily available on the spot at the moment of the audit and, if so requested, that data be handed over in an appropriate form.

On the basis of the findings made during the financial audit, a provisional report shall be drawn up. It shall be sent by the EC or its authorised representative to the beneficiary concerned, which may make observations thereon within one month of receiving it. The EC may decide not to take into account observations conveyed or documents sent after that deadline. The final report shall be sent to the beneficiary concerned within two months of expiry of the aforesaid deadline.

On the basis of the conclusions of the audit, the EC shall take all appropriate measures which it considers necessary, including the issuing of recovery orders regarding all or part of the payments made by it and the application of any applicable sanction.

The European Court of Auditors shall have the same rights as the EC, notably right of access, for the purpose of checks and audits, without prejudice to its own rules. In addition, the EC may carry out on-the-spot checks and inspections in accordance with Council Regulation (Euratom, EC) No 2185/96 of 11 November 1996 concerning on-the-spot checks and inspections carried out by the EC in order to protect the European Communities' financial interests against fraud and other irregularities.

Article 11 – Amendments

Amendments or changes to this Contract shall be made in writing and signed by the duly authorized representative of the Contracting Parties. Nevertheless, In the event the EC modifies the conditions, the Contractor will amend the Contract accordingly.

Article 12 – Language

This contract is drawn up in English, language which shall govern all documents, notices, meetings and processes relative thereto.

Article 13 – Applicable Law

This Contract shall be construed in accordance with and governed by the laws of Belgium.

Article 14 – Settlement of disputes

If the Contracting Parties are unable to resolve a dispute amicably, such dispute will be finally settled under the Rules of Arbitration of the International Chamber of Commerce by three (3) arbitrators in Brussels.

Each of the Contracting Parties to the dispute shall appoint one (1) arbitrator and the two (2) arbitrators so appointed shall elect the presiding arbitrator. Should a Party to the dispute which should appoint an arbitrator fails to do so within fourteen (14) days of the delivery of the written notice to do so from the other Party to the dispute or should the appointed arbitrators fail to reach agreement on the presiding arbitrator within fourteen (14) days after their appointment, such arbitrator shall be appointed in accordance with the Rules upon request of any of the Parties to the dispute.

The seat of arbitration shall be Brussels.

The Contracting Parties agree that the language of the arbitration, including oral hearings, written evidence and correspondence, shall be English.

A duly rendered arbitration award shall be final and binding on the Contracting Parties to the dispute. Each Contracting Party to the arbitration conducted in accordance with this section hereof shall bear its own expenses incurred in connection with such arbitration, including fees of its legal counsels. All other costs and expenses shall be apportioned between the Contracting Parties to the arbitration in accordance with the decision of the arbitrators.

Nothing in this Contract shall limit the Contracting Parties right to seek injunctive relief or to enforce an arbitration award in any applicable competent court of law.

AS WITNESS:

The Contracting Parties have caused this Contract to be duly signed by the undersigned authorized representatives in two (2) copies:

<p>For WIT (the Contractor) Mr Mark White Vice President Signature</p> <p>Done at XXXXXX on DD/MM/2022</p>	<p>For [SME_NAME] (the Beneficiary) Mr/Ms [NAME SURNAME] [POSITION_IN_COMPANY] Signature</p> <p>Done at on DD/MM/2022</p>
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Annexes

Annex 2: Guidelines for Applicants

[This refers to the Guidelines for applicants published by the time the call is open]

Annex 4.1: Proposal

[This refers to the proposal after introducing the changes, if any, during the negotiation phase.]

Annex 5: Consortium Declaration of Honour

[This refers to the form submitted with the proposal]

Annex 6: SME Declaration

[This refers to the form(s) submitted with the proposal in the application phase]

Annex 7: Bank account information

[This refers to the document including the bank account information of the coordinator where the funds will be transferred]

Annex 9: Template for H2020 Financial Support to Third Parties

TEMPLATE for FP7 Competitive Calls and H2020 Financial Support to Third Parties

To publish a call on the Participant Portal (PP), the Project Officer must send to the PP team at least the following information:

	Information to be provided by the project consortium
Call title:	DEMETER Open Call #2 – DEPLOY
Full name of the EU funded project:	Building an Interoperable, Data-Driven, Innovative and Sustainable European Agri-Food Sector
Project acronym:	DEMETER
Grant agreement number:	H2020-857202
Call publication date:	<i>14 December 2021</i>
Call deadline:	<i>16 February 2021 at 17:00 (CET - Brussels time)</i>
Expected duration of participation:	<i>12 months</i>
Total EU funding available:	740.000€
Submission & evaluation process:	<p>The DEMETER Open Call #2 - DEPLOY aims to increase the outreach of the DEMETER value proposition, by funding small consortia of 2-3 partners for the deployment of new high-value pilots in the agri-food sector, employing DEMETER methodologies and technologies, addressing clear farmers' needs, with particular focus on EU geographic regions not represented within DEMETER pilots, expanding the technological and/or business coverage of the DEMETER project, towards digitalising and boosting the European agro-business.</p> <p>DEMETER Open Call #2 - DEPLOY, will select around 4 to 8 pilots.</p> <p>The maximum amount of funding that each consortium may receive is 150.000€, with a maximum financial support of 100.000€ per consortium member.</p> <p>The consortia must be led by a for-profit SME, and composed by 2-3 partners representing at least a tech provider/integrator and an end-user.</p> <p>Submissions are available via: https://www.f6s.com/demeter-open-call-2- </p>

	<p>deploy/apply</p> <p>The evaluation process comprises an eligibility check, a remote evaluation and an online interview with top applicants based on the following criteria:</p> <ul style="list-style-type: none"> • Excellence & innovation (40% weighting). • Impact (25% weighting). • Implementation (20% weighting). • Value for money (15% weighting)
Further information:	Details available at https://h2020-demeter.eu/open-call-deploy
Task description:	<p>DEMETER aims to empower farmers and farmer cooperatives to a) better exploit their existing operational context, i.e. the platforms, machinery, sensors they have, to extract new knowledge on which they can improve their decisions and b) ease the acquisition, evolution and update of their context by focusing their investments where these are needed, based on their goals measured by key performance indicators (KPIs) that they select.</p> <p>The selected consortia will deploy high-value pilots in the agri-food sector, employing DEMETER methodologies and technologies, addressing clear farmers' needs, with particular focus on EU geographic regions not represented within DEMETER pilots, expanding the technological and/or business coverage of the DEMETER project, towards digitalising and boosting the European agro-business.</p>