MUSHNOMICS

Unlocking data-driven innovation for improving productivity and data sharing in mushroom value chain

Dr Dimitrios Argyropoulos
University College Dublin

Kick-off cofunded Projects Seminar
17-18th March 2021

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

Dr Dimitrios Argyropoulos|

https://people.ucd.ie/dimitrios.argyropoulos/about
https://orcid.org/0000-0002-0632-4634

Work Experience

- University College Dublin, Ireland
  Nov 2019 – Assistant Professor, School of Biosystems & Food Engineering
- University of Hohenheim, Stuttgart Germany
  Nov 2016 – Oct 2019: Scientific Coordinator, Research Centre for Bioeconomy
  Nov 2016 – Oct 2019: Adjunct Lecturer, Institute of Agricultural Engineering

Background

- PhD Agricultural Engineering
- MSc Environmental Protection & Agricultural Food Production
- BSc Biosystems Engineering (Agricultural Machinery & Irrigation)

Research

- A particular research interest in the application of IoT and sensor technology to enhance the operational efficiency of circular agri-food systems, from on-farm operations right through to food and biomaterial processing.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

Goal and context

- Commercial edible mushroom cultivation is a ‘big business’ world-wide with a total production exceeding 27 million tons.
- A 25-fold increase during the last 35 years, which is combined with a high increase in the respective per capita consumption.
- *Pleurotus* species are of particular interest because:
  i. their production amounts to ca. 30% of the total, corresponding to the fastest growing and most profitable section of the mushroom market.
  ii. they are commonly grown on pasteurized wheat straw, however, they can also be cultivated on a wide variety of agro-industrial residues and urban organic wastes.
- Substrate composition and environmental factors such as temperature, humidity, oxygen, carbon dioxide and light are anticipated to exert an effect on mushroom yield.

Data must be collected and analysed in a systematic manner over the production processes along the mushroom value chain in order to quantify the effects of different environmental schedules on mushroom yield.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

Aim and objectives

The aim of the **MUSHNOMICS project** is to demonstrate the feasibility of dynamic data-driven analytics for multi-domain mushroom production environments in order to optimize yield, lower costs and improve the economic viability of this agri-food sector.

Specific objectives:

- **AI Integration:** Develop best-performing artificial intelligence (AI)-driven algorithms for yield prediction of mushrooms in a prototype MUSHNOMICS Module with IoT devices for real time production management and demonstration.
- **Data Exchange:** Develop the MUSHNOMICS Digital Platform to exchange data and information from production to points of sale along the mushroom value chain.
- **Innovative Business:** Develop innovative business models based on the IoT-enabled MUSHNOMICS Module for informed decision making by mushroom entrepreneurs.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

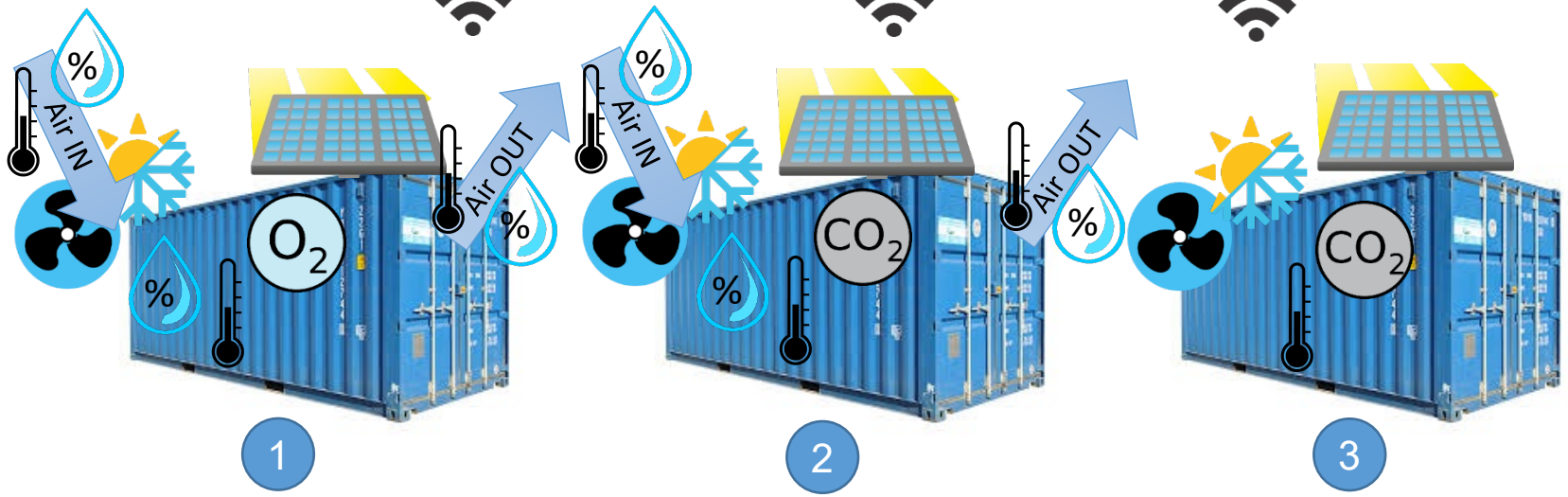
MUSHNOMICS Concept

- MUSHNOMICS Module
- MUSHNOMICS Cloud
- MUSHNOMICS Digital Platform

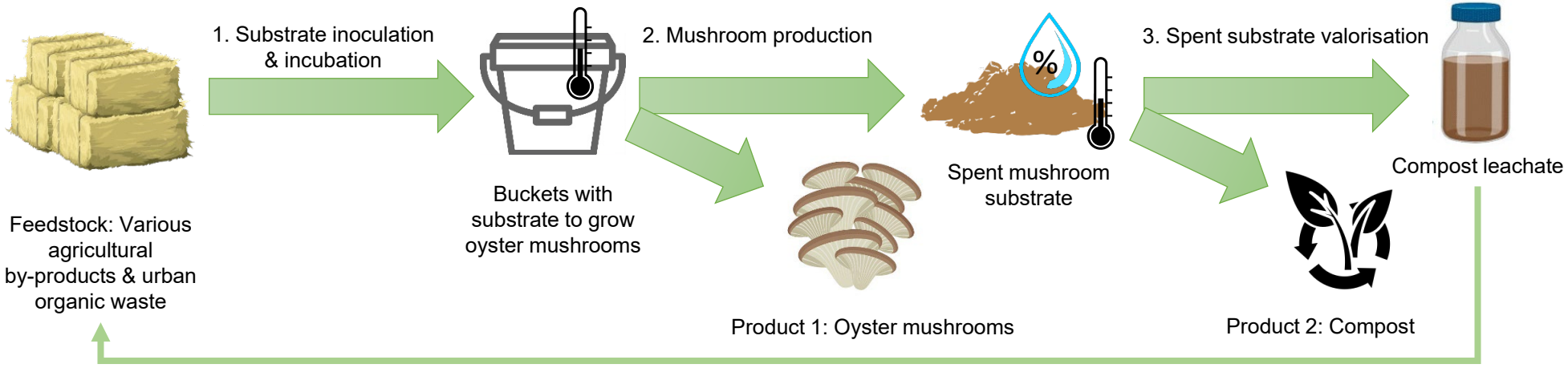
Data storage, computing & process control

MUSHNOMICS Digital Platform

Integrate Analyse Visualise

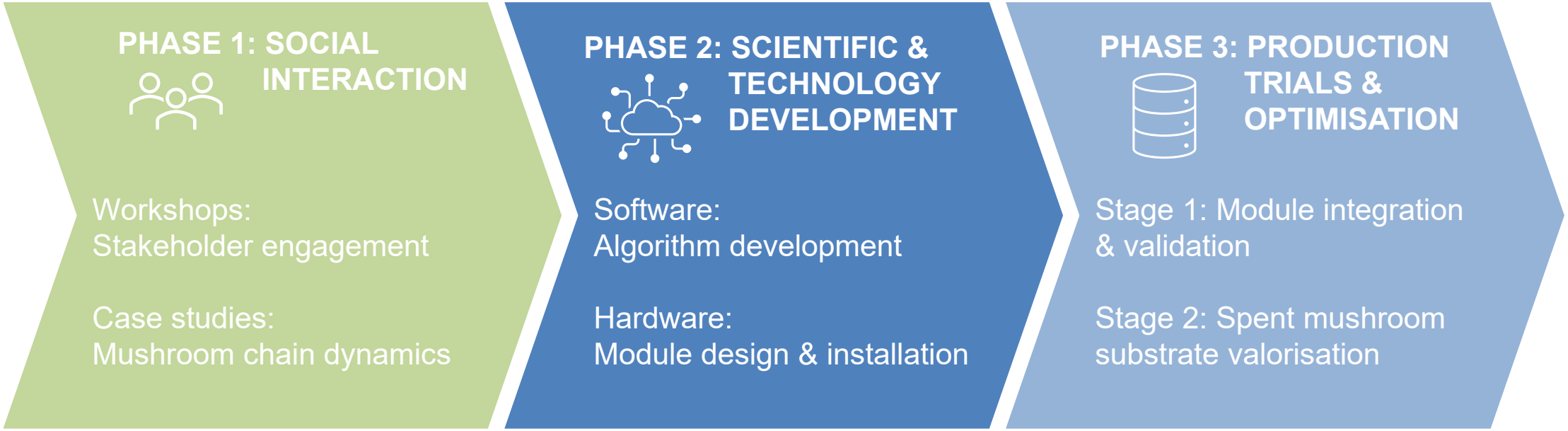


MUSHNOMICS Module
IoT-based & environment-controlled modular container farm unit



Research approach and activities

MUSHNOMICS is a 36-month project that will be implemented in three phases



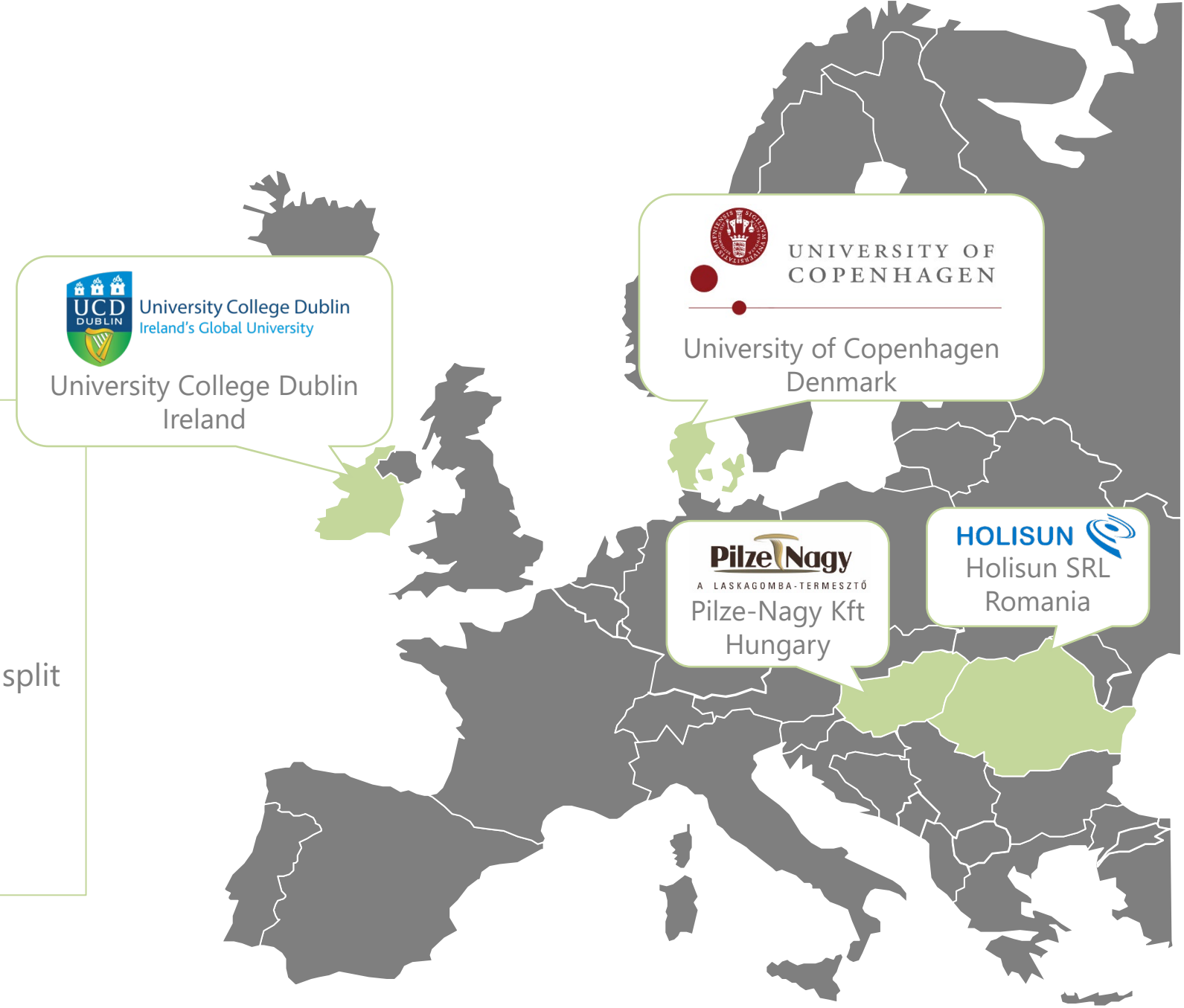
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

Consortium

MUSHNOMICS

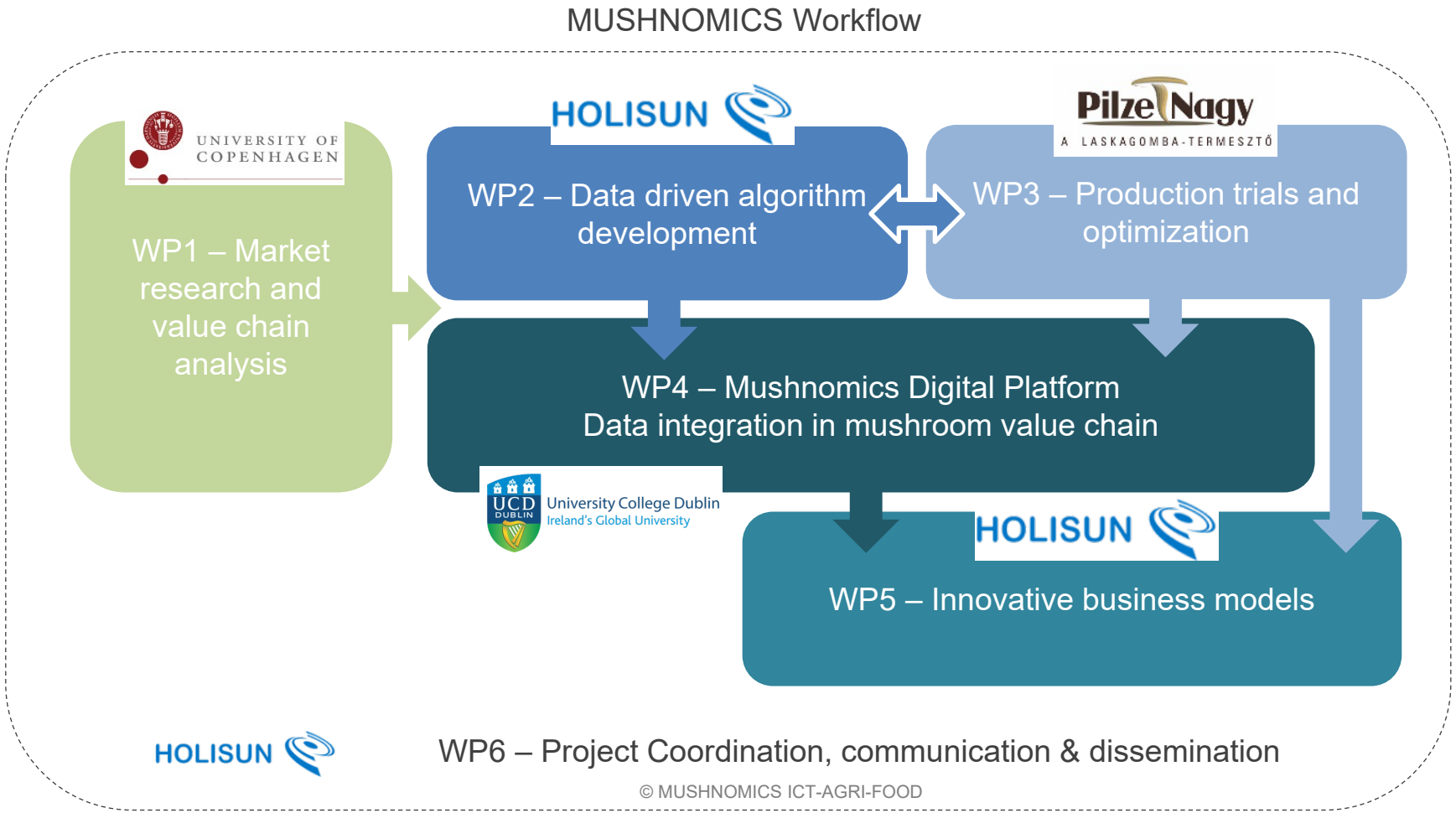
ERA-NET COFUND ICT-AGRI FOOD

- Coordinator: HS Holisun SRL (RO)
- Partners: 50-50 research-business split
- Countries involved: RO, DK, HU, IE
- Project duration (months): 36
- March 2021 – February 2024
- Total project costs (K€): 982
- Total requested budget (K€): 816



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

Organisation of work



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

Dissemination and outreach

Project Months	Focus Main objectives
0 - 18	**Approach-oriented** • Presentation of MUSHNOMICS objectives and expected results • Promotion of the MUSHNOMICS Module, AI-based solution and MUSHNOMICS Digital Platform
19 - 36	**Results-oriented** • Communication of intermediate and final MUSHNOMICS results • Dissemination of the results obtained from production trials and the use of the MUSHNOMICS Digital Platform

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

Dissemination and outreach

TARGET GROUPS

Mushroom growers, IT companies, entrepreneurs	• Workshops with growers • Targeted media articles • EIP-AGRI Practice abstracts
Research and scientific community	• Peer-reviewed articles • Participation in conferences • Side events at conferences
Policy makers	• Policy brief • Engagement in EU level platforms • Bilateral meetings
Networks, associations, NGOs	• Collaboration with relevant EU projects • Platforms and working groups • Participation in exhibitions, workshops

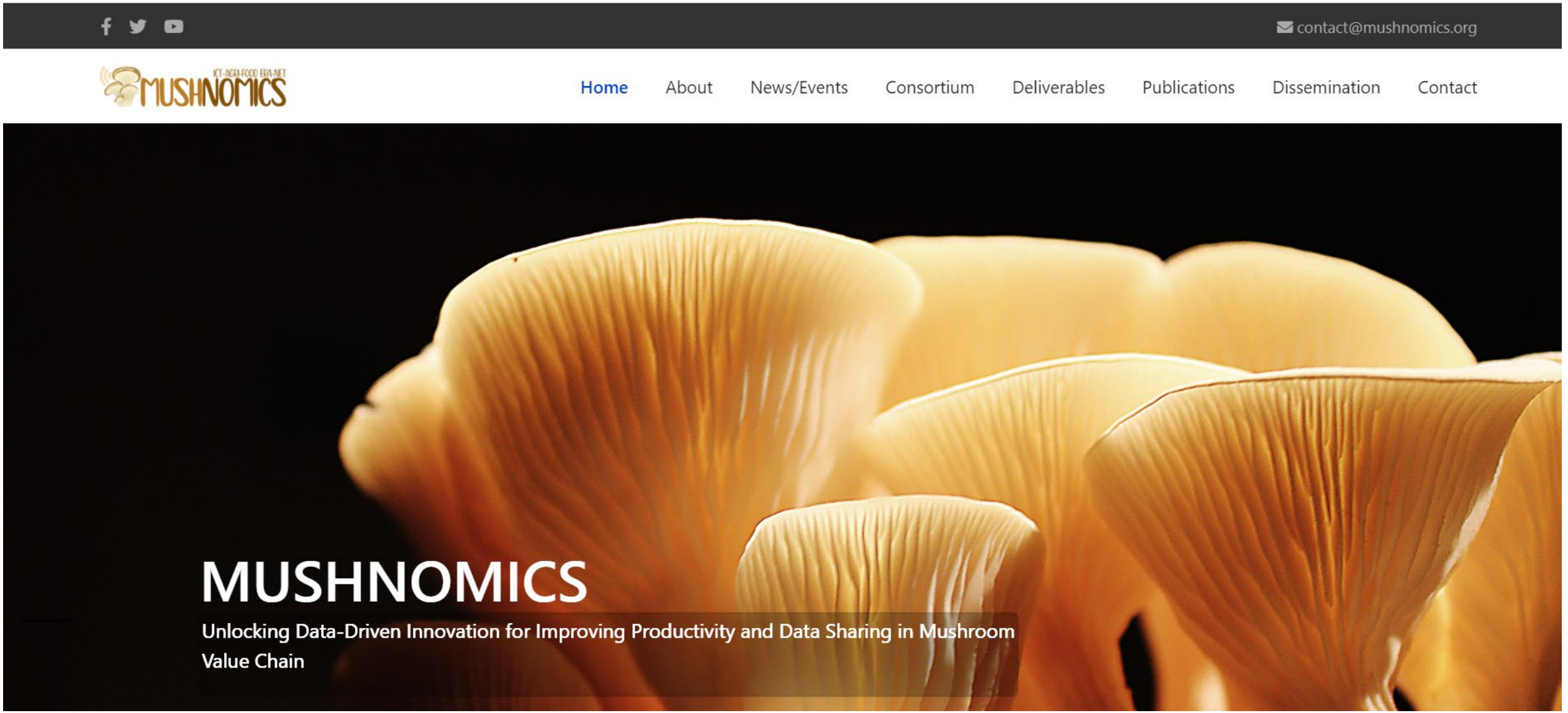
COMMUNICATION

- Press releases
- Website
- Bi-annual newsletters
- Project brochure
- Social networks
- Specialized events
- Final conference

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

MUSHNOMICS Website

https://mushnomics.org/



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

Cooperation with Stakeholders / value chain

The International Society for Mushroom Science

ASABE

EurAgEng

EFFoST
European Federation of Food Science and Technology

IEEE
Advancing Technology for Humanity

SMART AGRI HUBS

FAIRshare
DIGITAL TOOLS FOR FARM ADVISORS

PLOUTOS

DIVA
Boosting innovative Digitech Value chains for Agrofood, forestry and environment

FOODSHIFT 2030

euvrin
European Vegetable Research Institutes Network

TPorganics
European Technology Platform

copa*cogeca
european farmers
european agri-cooperatives

GEC
GROUPEMENT EUROPÉEN DES PRODUCTEURS DE CchampignON
EUROPEAN MUSHROOM GROWERS' GROUP

HLP

FOODDRINK EUROPE

eip-agri
AGRICULTURE & INNOVATION

BIO-BASED INDUSTRIES
Public-Private Partnership

eit
European Institute of Innovation & Technology

HORIZON 2020
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

Potential impact

MUSHNOMICS contributes to a smart and sustainable digital future for European agri-food and bioeconomy

Target 2.2: End all forms of malnutrition
Target 2.4: Sustainable food production and resilient agricultural practices

Target 11.6: Reduce the environmental impacts of cities

Target 12.2: Sustainable management and use of natural resources

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

Partners / funders

Partner	Logo	Country	Funding Agency
Holisun SRL https://www.holisun.com/ Dr Oliviu Matei	HOLISUN	Romania	UEFISCDI Executive Agency for Higher Education, Research, Development and Innovation Funding
Pilze Nagy http://pleurotus.hu/ Dr Adrien Nagy	Pilze Nagy A LASKAGOMBA-TERMESZTŐ	Hungary	National Research, Development and Innovation Office
University of Copenhagen https://www.ku.dk/ Dr Bhim Bahadur Ghaley	University of Copenhagen	Denmark	Ministry of Environment and Food of Denmark
University College Dublin https://www.ucd.ie/ Dr Dimitrios Argyropoulos	UCD Dublin University College Dublin Ireland's Global University	Ireland	An Roinn Talmhaíochta, Bia agus Mara Department of Agriculture, Food and the Marine

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

LET'S KEEP IN TOUCH!

Please feel always free to reach out to us.

TWITTER - LINKEDIN

@mushnomics
https://www.linkedin.com/in/mushnomics-project-645668206/

WEBSITE

https://mushnomics.org/

EMAIL

contact@mushnomics.org

Thank you for your attention!

dimitrios.argyropoulos@ucd.ie