

Call: HORIZON-CL4-2022-DIGITAL-EMERGING-02

(Digital and emerging technologies for competitiveness and fit for the green deal)

Topic: HORIZON-CL4-2022-DIGITAL-EMERGING-02-07

Type of Action: HORIZON-IA

Proposal number: 101120386

Proposal acronym: FRESHLAND-UVF

Type of Model Grant Agreement: HORIZON Action Grant Budget-Based

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Administrative forms

Proposal ID **101120386**

Acronym **FRESHLAND-UVF**

1 - General information

Fields marked * are mandatory to fill.

Topic	HORIZON-CL4-2022-DIGITAL-EMERGING-02-0	Type of Action	HORIZON-IA
Call	HORIZON-CL4-2022-DIGITAL-EMERGING-02	Type of Model Grant Agreement	HORIZON-AG
Acronym	FRESHLAND-UVF		
Proposal title	FRESHLAND, the Urban Vertical Farm with Robotics and AI		
	Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &		
Duration in months	24		
Fixed keyword 1	Artificial intelligence, intelligent systems, multi agent systems		
Fixed keyword 2	Robotics and automatic control		
Free keywords	Enter any words you think give extra detail of the scope of your proposal (max 200 characters with spaces).		

Abstract *

The project will create a new business and organizational model that is unique in the world by coherently merging the "PRODUCTION - PROCESSING - SALES" processes of the agricultural, food and hospitality industries. Although the underlying vertical farm technology is among the most advanced technologies available today, existing applications are limited to the B2B (Business to Business) flows and there is no project that integrates the entire B2C (Business to Consumer) flow in a coherent system in this area. The unique business and organizational model makes it imperative to further develop current technologies and create specific robotic or AI-enabled data processing systems and flows that go beyond the current known solutions and create new and innovative solutions that fully cover the "PRODUCTION - PROCESSING - SALES" vertical:

- "PRODUCTION - PROCESSING - SALES" process interactions specialized in robotic technology
- development of measurement technologies specified for the control system in production processes, AI control, automated intervention robot technology
- AI to measure consumer attitudes, needs, habits and from that to control production and processing
- Application of AI to serve consumer needs (development of a health-conscious lifestyle and meal program, diets tailored to health problems)
- Big data from "PRODUCTION - PROCESSING - SALES" processes processing, structuring and utilization of large amounts of data
- the development of a modular IT system to manage the entire food production process and, where possible, introducing human-like decision-making wherever possible
- the development of a customer relationship module to manage sales efforts, keep records of records sales, processes sales data, and uses artificial intelligence to drive intelligent sales processes for business development.

The project will create a new business unit combining sales, production and service activities, which is a radically new business concept.

Remaining characters

16

Has this proposal (or a very similar one) been submitted in the past 2 years in response to a call for proposals under any EU programme, including the current call?

☐ Yes ☒ No

Please give the proposal reference or contract number.

Administrative forms

Proposal ID **101120386**

Acronym **FRESHLAND-UVF**

Declarations

Field(s) marked * are mandatory to fill.

1) We declare to have the explicit consent of all applicants on their participation and on the content of this proposal. * ☒

2) We confirm that the information contained in this proposal is correct and complete and that none of the project activities have started before the proposal was submitted (unless explicitly authorised in the call conditions). * ☒

3) We declare:

- to be fully compliant with the eligibility criteria set out in the call
- not to be subject to any exclusion grounds under the [EU Financial Regulation 2018/1046](#)
- to have the financial and operational capacity to carry out the proposed project. *

☒

4) We acknowledge that all communication will be made through the Funding & Tenders Portal electronic exchange system and that access and use of this system is subject to the [Funding & Tenders Portal Terms and Conditions](#). * ☒

5) We have read, understood and accepted the [Funding & Tenders Portal Terms & Conditions](#) and [Privacy Statement](#) that set out the conditions of use of the Portal and the scope, purposes, retention periods, etc. for the processing of personal data of all data subjects whose data we communicate for the purpose of the application, evaluation, award and subsequent management of our grant, prizes and contracts (including financial transactions and audits). * ☒

6) We declare that the proposal complies with ethical principles (including the highest standards of research integrity as set out in the [ALLEA European Code of Conduct for Research Integrity](#), as well as applicable international and national law, including the Charter of Fundamental Rights of the European Union and the European Convention on Human Rights and its Supplementary Protocols. [Appropriate procedures, policies and structures](#) are in place to foster responsible research practices, to prevent questionable research practices and research misconduct, and to handle allegations of breaches of the principles and standards in the Code of Conduct. * ☒

7) We declare that the proposal has an exclusive focus on civil applications (activities intended to be used in military application or aiming to serve military purposes cannot be funded). If the project involves dual-use items in the sense of [Regulation 2021/821](#), or other items for which authorisation is required, we confirm that we will comply with the applicable regulatory framework (e.g. obtain export/import licences before these items are used). * ☒

8) We confirm that the activities proposed do not

- aim at human cloning for reproductive purposes;
- intend to modify the genetic heritage of human beings which could make such changes heritable (with the exception of research relating to cancer treatment of the gonads, which may be financed), or
- intend to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer.
- lead to the destruction of human embryos (for example, for obtaining stem cells)

These activities are excluded from funding. * ☒

9) We confirm that for activities carried out outside the Union, the same activities would have been allowed in at least one EU Member State. * ☒

The coordinator is only responsible for the information relating to their own organisation. Each applicant remains responsible for the information declared for their organisation. If the proposal is retained for EU funding, they will all be required to sign a declaration of honour.

False statements or incorrect information may lead to administrative sanctions under the EU Financial Regulation.

Administrative forms

Proposal ID **101120386**

Acronym **FRESHLAND-UVF**

2 - Participants

List of participating organisations

#	Participating Organisation Legal Name	Country	Role	Action
1	Freshness and Health Korlatolt Felelossegu Tarsasag	Hungary	Coordinator	
2	BUDAPESTI MUSZAKI ES GAZDASAGTUDOMANYI EGYETE	Hungary	Partner	
3	Smart System Informatikai és Tanacsada Zartkoruen Muko	Hungary	Partner	
4	BIOPOLUS INTEZET NONPROFIT ZRT.	Hungary	Partner	
5	Arizona Machinery Gepgyarto es Gepipari Szolgaltato Kor	Hungary	Partner	
6	EPSON Europe BV	Netherlands	Partner	
7	Springer & Jacoby Kft.	HU	Partner	
8	Springer & Jacoby Österreich GmbH	Austria	Partner	

Organisation data

PIC	Legal name
884481018	Freshness and Health Korlatolt Felelossegu Tarsasag

Short name: Freshness and Health Korlatolt Felelossegu Tarsasag

Address

Street	Váci út 47/B
Town	Budapest
Postcode	1134
Country	Hungary
Webpage	www.freshland.hu

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	01/11/2022 - yes
SME self-assessment	unknown
SME validation	unknown

Administrative forms

Departments carrying out the proposed work

Department 1

Department name Headquarters ☐ not applicable

☒ Same as proposing organisation's address

Street Váci út 47/B

Town Budapest

Postcode 1134

Country Hungary

Administrative forms

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title **Mr**

Gender ☐ Woman ☒ Man ☐ Non Binary

First name* **Akos**

Last name* **Gyomber**

E-Mail* **akos.gyomber@freshland.hu**

Position in org. **CFO**

Department **Headquarters**

☐ Same as organisation name

☒ Same as proposing organisation's address

Street **Váci út 47/B**

Town **Budapest**

Post code **1134**

Country **Hungary**

Website **www.freshland.hu**

Phone **+36209370487**

Phone 2 **+xxx xxxxxxxxx**

Administrative forms

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Administrative forms

Role of participating organisation in the project

Project management	☒
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☒
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

Administrative forms

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Service	Development of freshland.hu sales portal including ordering and delivery system.

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
"Freshland" Shops and Sales Points	Operating "Freshland" fast food units and currently operating 4 "Freshland" fast food Sales Points

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Sales infrastructure and equipment	4 fully equipped "Freshland" sales points (infrastructure, equipment, IT system, furniture)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below?

☐ Yes ☒ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas to be covered** and addressed via concrete measures and targets are:
 - o work-life balance and organisational culture;
 - o gender balance in leadership and decision-making;
 - o gender equality in recruitment and career progression;
 - o integration of the gender dimension into research and teaching content;
 - o measures against gender-based violence including sexual harassment.

Administrative forms

PIC	Legal name
999904228	BUDAPESTI MUSZAKI ES GAZDASAGTUDOMANYI EGYETEM

Short name: BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS

Address

Street	MUEGYETEM RAKPART 3
Town	BUDAPEST
Postcode	1111
Country	Hungary
Webpage	www.bme.hu

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	15/09/2022 - no
SME self-assessment	unknown
SME validation	06/01/2009 - no

Administrative forms

Departments carrying out the proposed work

Department 1

Department name Faculty of Electtical Engineering and Informatics ☐ not applicable

☒ Same as proposing organisation's address

Street MUEGYETEM RAKPART 3

Town BUDAPEST

Postcode 1111

Country Hungary

Administrative forms

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title **Mr**

Gender ☐ Woman ☒ Man ☐ Non Binary

First name* **Peter**

Last name* **Stefan**

E-Mail* **stefan.peter@bme.hu**

Position in org. **director**

Department **Faculty of Electtical Engineering and Informatics** ☐ Same as organisation name

☒ Same as proposing organisation's address

Street **MUEGYETEM RAKPART 3**

Town **BUDAPEST** Post code **1111**

Country **Hungary**

Website **https://www.bme.hu**

Phone **+36303836265** Phone 2 **+xxx xxxxxxxxx**

Administrative forms

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	Peter	Stefan	Man	Hungary	stefan.peter@bme.hu	Category B Senior researcher	Leading		
	Domokos	Kiss	Man	Hungary	Kiss.Domokos@aut.bme.hu	Category C Recognised	Team member	0000-0001-9686-9795	Orcid ID
Dr	Akos	Nagy	Man	Hungary	Nagy.Akos@aut.bme.hu	Category B Senior researcher	Team member	0000-0003-0735-3127	Orcid ID
	Krisztian	Pomazi	Man	Hungary	pomazi.krisztian@vik.bme.hu	Category C Recognised	Team member	0000-0002-6082-0604	Orcid ID
Dr	Kristof	Csorba	Man	Hungary	kristof@aut.bme.hu	Category B Senior researcher	Team member	G-7744-2012	Researcher ID
Dr	Laszlo	Lengyel	Man	Hungary	lengyel.laszlo@vik.bme.hu	Category A Top grade researcher	Team member	0000-0002-5129-4198	Orcid ID

Administrative forms

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

Administrative forms

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	<i>Real-Time Monitoring of Continuous Pharmaceutical Mixed Suspension Mixed Product Removal Crystallization Using Image Analysis / In this work, we developed an in-line image analysis system for the monitoring of the continuous crystallization of an active pharmaceutical ingredient. Acetylsalicylic acid was crystallized in a mixed suspension mixed product removal crystallizer, which was equipped with overflow tubing as an outlet. A steep glass plate was placed under the outlet onto which the slurry</i>
Publication	<i>Sequential Time-Optimal Path-Tracking Algorithm for Robots / This paper focuses on minimum-time path tracking, a subproblem in motion planning of robotic systems. We generate a time-optimal velocity profile for robotic manipulators taking into account kinematic and dynamic constraints. Based on the special structure of the constraints (called peaked constraints), profile generation is formulated as a linear programming (LP) problem. The LP-based control problem is solved by a sequential optimiza</i>
Publication	<i>Autonomous Path Planning for Road Vehicles in Narrow Environments: An Efficient Continuous-Curvature Approach / In this paper we introduce a novel method for obtaining good quality paths for autonomous road vehicles (e.g., cars or buses) in narrow environments. There are many traffic situations in urban scenarios where nontrivial maneuvering in narrow places is necessary. Navigating in cluttered parking lots or having to avoid obstacles blocking the way and finding a detour even in narrow street</i>
Publication	<i>In-line particle size measurement based on image analysis in a fully continuous granule manufacturing line for rapid process understanding and development / The present paper serves as a demonstration how an in-line PAT tool can be used for rapid and efficient process development in a fully continuous powder to granule line consisting of an interconnected twin-screw wet granulator, vibrational fluid bed dryer, and a regranulating mill. A new method was investigated for the periodic in-line parti</i>

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
KnowARC Work Package leader	<i>Grid-enabled Know-how Sharing Technology Based on ARC Services and Open Standards (KnowARC) was a Sixth Framework Programme Specific Targeted Research Project, funded under Priority IST-2005-2.5.4 "Advanced Grid Technologies, Systems and Services" from June 2006 to November 2009. In many ways it was the project that shaped ARC. The main goal was to make ARC based on open community standards, and among the key results was creation of the standardized Hosting Environment for ARC services (HED).</i>
EGI Task Leader	<i>EGI-ACE will deliver the EOSC Compute Platform and will contribute to the EOSC Data Commons through a federation of cloud compute and storage facilities, PaaS services and data spaces with analytics tools and federated access services.</i>
SOLSUN	<i>The SOLSUN (Sustainable Outdoor Lighting & Sensory Urban Networks) project is about to demonstrate how intelligent city infrastructure can be created in a cost-effective and sustainable way by re-using existing street lighting as the communications backbone. We apply different technologies and methods to reduce energy consumption at the same time as turning streetlights into nodes on a scalable network that is also expandable for other applications. Sensors capture data on air pollution, noise p</i>

Administrative forms

URBMOBI	<i>The URBMOBI (Urban Mobile Instruments for Environmental Monitoring, i.e. a Mobile Measurement Device for Urban Environmental Monitoring) project integrates a mobile measurement unit for operation on vehicles in urban areas (i.e. local buses and trams), with data post-processing, inclusion in enhanced environmental models and visualization techniques for climate related services, environmental monitoring, planning and research needs.</i>
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Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
<i>AI and robotics infrastructure and equipment</i>	<i>Full equipped AI and robotics labs</i>

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below?

☒ Yes ☐ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas to be covered** and addressed via concrete measures and targets are:
 - o work-life balance and organisational culture;
 - o gender balance in leadership and decision-making;
 - o gender equality in recruitment and career progression;
 - o integration of the gender dimension into research and teaching content;
 - o measures against gender-based violence including sexual harassment.

Administrative forms

PIC	Legal name
888704010	Smart System Informatikai és Tanacsada Zartkoruen Mukodo Reszvenytarsasag

Short name: Smart System Informatikai és Tanacsada Zartkoruen Mukodo Reszvenytarsasag

Address

Street	Gusztav utca 143-145.
Town	Budapest
Postcode	1162
Country	Hungary

Webpage

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	01/11/2021 - yes
SME self-assessment	unknown
SME validation	unknown

Administrative forms

Departments carrying out the proposed work

Department 1

Department name Headquarters ☐ not applicable

☒ Same as proposing organisation's address

Street Gusztav utca 143-145.

Town Budapest

Postcode 1162

Country Hungary

Administrative forms

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title **Mr**

Gender ☐ Woman ☒ Man ☐ Non Binary

First name* **Krisztian**

Last name* **Fritsche**

E-Mail* **fritsche@smartsystemzrt.hu**

Position in org. **director**

Department **Smart System Informatikai és Tanácsadá Zártkörűen Működő Részvénytársaság**

☒ Same as organisation name

☒ Same as proposing organisation's address

Street **Gusztáv utca 143-145.**

Town **Budapest**

Post code **1162**

Country **Hungary**

Website **http://smartsystemzrt.hu/index.html**

Phone **+36706029437**

Phone 2 **+xxx xxxxxxxxx**

Administrative forms

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Administrative forms

Role of participating organisation in the project

Project management	☒
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☐
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

Administrative forms

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Software	<i>"To carry out the following tasks for the National Centre for Public Health in the National Screening Support System (OSzTR) development project: I. Preparation and approval of the OSzTR PAD (project establishment document) II. design and approval of the final OSzTR functional specification, system boundaries, interfaces, development phases (sprints) III. development and testing of OSzTR according to schedule IV. customer testing (load, integration, E2E), training V. Installations, delivery"</i>
Service	<i>"Ensuring WiFi coverage in vocational training institutions in the Convergence regions project to carry out administrative quality assurance tasks for 440 sites"</i>

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
<i>"Screening Support System (OSzTR) project"</i>	<i>"To carry out the following tasks for the National Centre for Public Health in the National Screening Support System (OSzTR) development project: I. Preparation and approval of the OSzTR PAD (project establishment document) II. design and approval of the final OSzTR functional specification, system boundaries, interfaces, development phases (sprints) III. development and testing of OSzTR according to schedule IV. customer testing (load, integration, E2E), training V. Installations, delivery"</i>
<i>WiFi coverage project</i>	<i>"Ensuring WiFi coverage in vocational training institutions in the Convergence regions project to carry out administrative quality assurance tasks for 440 sites"</i>

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below?

☒ Yes ☐ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas to be covered** and addressed via concrete measures and targets are:
 - o work-life balance and organisational culture;
 - o gender balance in leadership and decision-making;
 - o gender equality in recruitment and career progression;
 - o integration of the gender dimension into research and teaching content;
 - o measures against gender-based violence including sexual harassment.

Administrative forms

PIC	Legal name
928835238	BIOPOLUS INTEZET NONPROFIT ZRT.

Short name: BIOPOLUS INSTITUTE NONPROFIT PLC

Address

Street	FUTO UTCA 37-45
Town	BUDAPEST
Postcode	1082
Country	Hungary
Webpage	www.biopolus.org

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	no
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	21/04/2022 - yes
SME self-assessment	31/12/2020 - yes
SME validation	unknown

Administrative forms

Departments carrying out the proposed work

Department 1

Department name	Headquarters	☐ not applicable
	☒ Same as proposing organisation's address	
Street	FUTO UTCA 37-45	
Town	BUDAPEST	
Postcode	1082	
Country	Hungary	

Administrative forms

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title **Mr**

Gender ☐ Woman ☒ Man ☐ Non Binary

First name* **Marton**

Last name* **Kenyeres**

E-Mail* **marton.kenyeres@biopolus.net**

Position in org. **director**

Department **BIOPOLUS INTEZET NONPROFIT ZRT.**

☒ Same as organisation name

☒ Same as proposing organisation's address

Street **FUTO UTCA 37-45**

Town **BUDAPEST**

Post code **1082**

Country **Hungary**

Website **http://www.biopolus.net**

Phone **+36302077657**

Phone 2 **+xxx xxxxxxxxx**

Administrative forms

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Mr	Istvan	Kenyeres	Man	Hungary	ikenyeres@biopolus.org	Category A Top grade re	Leading	0000-0003-2035-4992	Orcid ID
Mr	Marton	Kenyeres	Man	Hungary	marton.kenyeres@biopolus.net	Category B Senior resea	Team member	0000-0002-0442-7592	Orcid ID
Mr	Marton	Papp	Man	Hungary	marton.papp@biopolus.net	Category D First stage r	Team member	0000-0003-0559-7267	Orcid ID
Ms	Luca	Gotczy	Woman	Hungary	luca.gotzy@biopolus.net	Category D First stage r	Team member	0000-0003-4047-2953	Orcid ID
Mr	Mate	Katona	Man	Hungary	mate.katona@aero.green	Category D First stage r	Team member	0000-0003-3667-996X	Orcid ID

Administrative forms

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

Administrative forms

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	Z. Gázsó, F. Ház, I. Kenyeres, L. Váci. (2017) Full-scale wastewater treatment plant simulation for real-time optimization. <i>Water Practice & Technology</i> . 12(4), 848-856.
Publication	N. Szilágyi, R. Kovacs, I. Kenyeres, Z. Csikor. (2013) Biofilm development in fixed bed biofilm reactors: Experiments and simple models for engineering design purposes. <i>Water Science & Technology</i> . 68(6), 1391-9.
Other achievement	Awards for the Kongingshoven BioMakery (NL): 2019 Dutch Ministry Circular Economy Waterboards Award, 2018 Water Innovation Audience Award

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Budapest Demonstration Plant Factory and R&D centre	Biopolus partnered with Tungsram Agritech to create a 150 m2 commercial demonstration plant factory in an unused factory hall. The facility uses Biopolus biotechnology and experience to further continuously develop the aero.green system.
LivingIsland Modular Container Plant Factory (2016)	Biopolus in cooperation with Budapest waterworks, built a modular container facility (70 m2 net cultivation area) for experimentation and demonstration. Biopolus developed the controlled urban farming factory system called aero.green, integrating hydroponics, NFT, and aeroponics.
H2020 / SME INSTRUMENT / Phase 1: Biopolus Aero.Gr	Feasibility study and market analysis for controlled environment urban plant production facility that could stand alone or be integrated into other urban circular systems.
H2020/ euPOLIS : Integrated NBS-based Urban Planni	The €10 million EU-funded euPOLIS project aims to create urban ecosystems and living spaces that improve public health and human well-being. The development is based on the integration of natural values and urban built systems. The project's innovative urban planning solutions will be tested in four cities: Belgrade, Lodz, Piraeus and Gladsaxe.
H2020/ NEXTGEN : Circular Water Solutions, Grant a	NextGen evaluates and champions transformational circular economy solutions and systems around resource use in the water sector. The team aims to challenge embedded thinking and practices by bringing financially sustainable innovations to life. Biopolus is pleased to be a partner at two of the ten demonstration sites: in Athens, Greece and at the La Trappe Brewery in the Netherlands.

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Vertical farm infrastructure and equipment	Circular vertical farming system: A resilient and sustainable method of urban farming. (https://www.biopolus.net/technology/vertical-farming/)
Vertical farm infrastructure and equipment	BioMakery: An urban metabolic hub, to integrate circular urban infrastructure and technology with open innovation, helping cities transition from their current linear system of consumption and waste, to a sustainable and regenerative circular model. The BioMakery was created based upon the principle

Administrative forms

<i>Vertical farm infrastructure and equipment</i>	<i>Metabolic Network Reactor technology: Special biofilm- and multireactor-based bioreactors using engineered ecosystems for water and wastewater treatment and recycling. MNR uses natural plant roots and Biopolus patented synthetic roots as biofilm carriers.</i>
<i>Program : SUMO</i>	<i>dynamic modelling and simulation software package</i>

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below?

☐ Yes ☒ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas to be covered** and addressed via concrete measures and targets are:
 - o work-life balance and organisational culture;
 - o gender balance in leadership and decision-making;
 - o gender equality in recruitment and career progression;
 - o integration of the gender dimension into research and teaching content;
 - o measures against gender-based violence including sexual harassment.

Administrative forms

PIC	Legal name
884427183	Arizona Machinery Gepgyarto es Gepipari Szolgaltato Korlatolt Felelossegu Tarsasag

Short name: Arizona Machinery Kft.

Address

Street	Dorozsmai ut 35.
Town	Szeged
Postcode	6728
Country	Hungary

Webpage

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	07/11/2022 - no
SME self-assessment	unknown
SME validation	unknown

Administrative forms

Departments carrying out the proposed work

Department 1

Department name	Headquarters	☐ not applicable
	☒ Same as proposing organisation's address	
Street	Dorozsmai ut 35.	
Town	Szeged	
Postcode	6728	
Country	Hungary	

Administrative forms

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title **Mr**

Gender ☐ Woman ☒ Man ☐ Non Binary

First name* **Andras**

Last name* **Dombovari**

E-Mail* **ad@arizonam.com**

Position in org. **managing director**

Department **Arizona Machinery Gepgyarto es Gepipari Szolgaltato Korlatolt Felelossegu Tarsas** ☒ Same as organisation name

☒ Same as proposing organisation's address

Street **Dorozsmai ut 35.**

Town **Szeged** Post code **6728**

Country **Hungary**

Website **http://www.arizonam.com**

Phone **+3662462665** Phone 2 **+xxx xxxxxxxxx**

Administrative forms

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Administrative forms

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☒
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

Administrative forms

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
<i>Beres, Hungary</i>	<i>Custom built, complete automatic filling line for Beres Pharmaceuticals using Epson industrial robots.</i>
<i>Sanofi, Hungary</i>	<i>Automatic tablet counting line, with robotic solutions.</i>
<i>Gold Drop, Poland</i>	<i>Custom built, robotic packaging line for the household chemical industry.</i>
<i>Unilever, Hungary</i>	<i>Custom built, high speed bottle handling equipment.</i>
<i>Scitec Nutrition, Hungary</i>	<i>Custom build, full scale powder production lines.</i>

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
<i>Robotics infrastructure and equipment</i>	<i>All necessary infrastructure and equipment for robotics</i>

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below?

☐ Yes ☒ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas to be covered** and addressed via concrete measures and targets are:
 - o work-life balance and organisational culture;
 - o gender balance in leadership and decision-making;
 - o gender equality in recruitment and career progression;
 - o integration of the gender dimension into research and teaching content;
 - o measures against gender-based violence including sexual harassment.

Administrative forms

PIC	Legal name
928904302	EPSON Europe BV

Short name: EPSON EUROPE BV

Address

Street	Azië building, Atlas ArenA Hoogoorddreef 5
Town	Amsterdam
Postcode	1101 BA
Country	Netherlands
Webpage	http://global.epson.com/company/global_network/epson_europe.html

Specific Legal Statuses

Legal person	no
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	08/04/2015 - no
SME self-assessment	unknown
SME validation	unknown

Administrative forms

Departments carrying out the proposed work

Department 1

Department name	technical department	☐ not applicable
	☒ Same as proposing organisation's address	
Street	Azië building, Atlas ArenA Hoogoorddreef	
Town	Amsterdam	
Postcode	1101 BA	
Country	Netherlands	

Administrative forms

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title **Mr**

Gender ☐ Woman ☒ Man ☐ Non Binary

First name* **Dirk**

Last name* **Folkens**

E-Mail* **dirk.folkens@epson.de**

Position in org. **director**

Department **EPSON Europe BV**

☒ Same as organisation name

☒ Same as proposing organisation's address

Street **Azië building, Atlas ArenA Hoogoorddreef 5**

Town **Amsterdam**

Post code **1101 BA**

Country **Netherlands**

Website **http://global.epson.com/company/global_network/epson_europe.html**

Phone **+4921595381206**

Phone 2 **+xxx xxxxxxxxx**

Administrative forms

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Administrative forms

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☒
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

Administrative forms

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
<i>Robotics infrastructure and equipment</i>	<i>All necessary infrastructure and equipment for robotics</i>

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below?

☐ Yes ☒ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas to be covered** and addressed via concrete measures and targets are:
 - o work-life balance and organisational culture;
 - o gender balance in leadership and decision-making;
 - o gender equality in recruitment and career progression;
 - o integration of the gender dimension into research and teaching content;
 - o measures against gender-based violence including sexual harassment.

Administrative forms

PIC	Legal name
884385473	Springer & Jacoby Kft.

Short name: Springer & Jacoby Budapest

Address

Street	Orbánhegyi út 5.
Town	Budapest
Postcode	1126
Country	Hungary
Webpage	sjbp.hu

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	10/11/2022 - no
SME self-assessment	unknown
SME validation	unknown

Administrative forms

Departments carrying out the proposed work

Department 1

Department name Headquarters ☐ not applicable

☒ Same as proposing organisation's address

Street Orbánhegyi út 5.

Town Budapest

Postcode 1126

Country Hungary

Administrative forms

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title **Mr**

Gender ☐ Woman ☒ Man ☐ Non Binary

First name* **Peter**

Last name* **Sikos**

E-Mail* **sikos.peter@sjbp.hu**

Position in org. **director**

Department **Springer & Jacoby Kft.**

☒ Same as organisation name

☒ Same as proposing organisation's address

Street **Orbánhegyi út 5.**

Town **Budapest**

Post code **1126**

Country **Hungary**

Website **https://www.sjbp.hu/**

Phone **+36209344488**

Phone 2 **+xxx xxxxxxxxx**

Administrative forms

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Administrative forms

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

Administrative forms

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Scitec Nutrition	Support sales and commercial activities based on customer-integrated database systems.
Shell	Support sales and commercial activities based on customer-integrated database systems.
Yamaha	Support sales and commercial activities based on customer-integrated database systems.

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below?

☐ Yes ☒ No

Minimum process-related requirements (building blocks) for a GEP

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 - o gender balance in leadership and decision-making;
 - o gender equality in recruitment and career progression;
 - o integration of the gender dimension into research and teaching content;
 - o measures against gender-based violence including sexual harassment.

Administrative forms

PIC	Legal name
884379653	Springer & Jacoby Österreich GmbH

Short name: Springer & Jacoby Österreich GmbH

Address

Street	Schönbrunner Strasse 31/31
Town	Wien
Postcode	1050
Country	Austria
Webpage	www.sjaustria.com

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	10/11/2022 - no
SME self-assessment	unknown
SME validation	unknown

Administrative forms

Departments carrying out the proposed work

Department 1

Department name	Headquarters	☐ not applicable
	☒ Same as proposing organisation's address	
Street	Schönbrunner Strasse 31/31	
Town	Wien	
Postcode	1050	
Country	Austria	

Administrative forms

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title **Mr**

Gender ☐ Woman ☒ Man ☐ Non Binary

First name* **Ralf**

Last name* **Kober**

E-Mail* **ralf.kober@sjaustria.com**

Position in org. **director**

Department **Springer & Jacoby Österreich GmbH**

☒ Same as organisation name

☒ Same as proposing organisation's address

Street **Schönbrunner Strasse 31/31**

Town **Wien**

Post code **1050**

Country **Austria**

Website **https://sjaustria.com/**

Phone **+4311751050**

Phone 2 **+xxx xxxxxxxxx**

Administrative forms

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Administrative forms

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

Administrative forms

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
<i>Campaign for Weinviertel DAC</i>	<i>The goal was to promote the wines from "Weinviertel DAC" in Austria and Germany based on customer consumption data</i>
<i>Website for SanLucar</i>	<i>Developing a customer data based sales structure and design for SanLucar, the biggest fruit and vegetable brands in Europe.</i>
<i>360° communication Wien Energie</i>	<i>Developing a customer data based communication channels of Austria's #1 energy supplier</i>

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below?

☐ Yes

☒ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
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 - o gender balance in leadership and decision-making;
 - o gender equality in recruitment and career progression;
 - o integration of the gender dimension into research and teaching content;
 - o measures against gender-based violence including sexual harassment.

Administrative forms

Proposal ID **101120386**
Acronym **FRESHLAND-UVF**

3 - Budget

No.	Name of beneficiary	Country	Role	Personnel costs/€	Subcontracting costs/€	Purchase costs - Travel and subistence /€	Purchase costs - Equipment/€	Purchase costs - Other goods, works and services/€	Financial support to third parties/ € (actual cost)	Internally invoiced goods and services/€ (Unit costs-usual accounting practices)	Indirect costs/€	Total eligible costs	Funding rate	Maximum EU contribution to eligible costs	Requested EU contribution to eligible costs/€	Max grant amount	Income generated by the action	Financial contributions	Own resources	Total estimated income
1	Freshness And Health Korlatolt Felelossegu Tarsasag	HU	Coordinator	570 000	0	0	0	0	0	0	142 500.00	712 500.00	70	498 750.00	498 750.00	498 750.00	0.00	0.00	0.00	498 750.00
2	Budapesti Muszaki Es Gazdasagtudo manyi Egyetem	HU	Partner	400 000	40 000	20 000	0	0	0	0	105 000.00	565 000.00	100	565 000.00	565 000.00	565 000.00	0.00	0.00	0.00	565 000.00
3	Smart System Informatikai és Tanacsada Zartkoruen Mukodo Reszvenytarsasag	HU	Partner	230 000	0	0	0	0	0	0	57 500.00	287 500.00	70	201 250.00	201 250.00	201 250.00	0.00	0.00	0.00	201 250.00
4	Biopolus Intezet Nonprofit Zrt.	HU	Partner	144 000	0	0	95 000	70 000	0	0	77 250.00	386 250.00	100	386 250.00	386 250.00	386 250.00	0.00	0.00	0.00	386 250.00
5	Arizona Machinery Gepgyarto Es Gepipari Szolgáltato Korlatolt Felelossegu Tarsasag	HU	Partner	117 000	0	0	800 000	85 000	0	0	250 500.00	1 252 500.00	70	876 750.00	876 750.00	876 750.00	0.00	0.00	0.00	876 750.00

Administrative forms

Proposal ID **101120386**
Acronym **FRESHLAND-UVF**

6	Epson Europe Bv	NL	Partner	12 000	0	0	80 000	0	0	0	23 000.00	115 000.00	70	80 500.00	80 500.00	80 500.00	0.00	0.00	0.00	80 500.00
7	Springer & Jacoby Kft.	HU	Partner	230 000	0	0	0	0	0	0	57 500.00	287 500.00	70	201 250.00	201 250.00	201 250.00	0.00	0.00	0.00	201 250.00
8	Springer & Jacoby Österreich Gmbh	AT	Partner	115 000	0	0	0	0	0	0	28 750.00	143 750.00	70	100 625.00	100 625.00	100 625.00	0.00	0.00	0.00	100 625.00
	TOTAL			1 818 000	40 000	20 000	975 000	155 000	0	0	742 000.00	3 750 000.00		2 910 375.00	2 910 375.00	2 910 375.00	0.00	0.00	0.00	2 910 375.00

Administrative forms

Proposal ID **101120386**

Acronym **FRESHLAND-UVF**

4 - Ethics & security

Ethics Issues Table

1. Human Embryonic Stem Cells and Human Embryos		Page
Does this activity involve Human Embryonic Stem Cells (hESCs)?	☐ Yes ☒ No	
Does this activity involve the use of human embryos?	☐ Yes ☒ No	
2. Humans		Page
Does this activity involve human participants?	☐ Yes ☒ No	
Does this activity involve interventions (physical also including imaging technology, behavioural treatments, etc.) on the study participants?	☐ Yes ☒ No	
Does this activity involve conducting a clinical study as defined by the Clinical Trial Regulation (EU 536/2014) ? (using pharmaceuticals, biologicals, radiopharmaceuticals, or advanced therapy medicinal products)	☐ Yes ☒ No	
3. Human Cells / Tissues (not covered by section 1)		Page
Does this activity involve the use of human cells or tissues?	☐ Yes ☒ No	
4. Personal Data		Page
Does this activity involve processing of personal data?	☐ Yes ☒ No	
Does this activity involve further processing of previously collected personal data (including use of preexisting data sets or sources, merging existing data sets)?	☐ Yes ☒ No	
Is it planned to export personal data from the EU to non-EU countries? Specify the type of personal data and countries involved	☐ Yes ☒ No	
Is it planned to import personal data from non-EU countries into the EU or from a non-EU country to another non-EU country? Specify the type of personal data and countries involved	☐ Yes ☒ No	
Does this activity involve the processing of personal data related to criminal convictions or offences?	☐ Yes ☒ No	
5. Animals		Page
Does this activity involve animals?	☐ Yes ☒ No	
6. Non-EU Countries		Page
Will some of the activities be carried out in non-EU countries?	☐ Yes ☒ No	
In case non-EU countries are involved, do the activities undertaken in these countries raise potential ethics issues?	☐ Yes ☒ No	
It is planned to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)?	☐ Yes ☒ No	
Is it planned to import any material (other than data) from non-EU countries into the EU or from a non-EU country to another non-EU country? For data imports, see section 4.	☐ Yes ☒ No	
Is it planned to export any material (other than data) from the EU to non-EU countries? For data exports, see section 4.	☐ Yes ☒ No	
Does this activity involve low and/or lower middle income countries , (if yes, detail the benefit-sharing actions planned in the self-assessment)	☐ Yes ☒ No	
Could the situation in the country put the individuals taking part in the activity at risk?	☐ Yes ☒ No	
7. Environment, Health and Safety		Page

Administrative forms

Proposal ID **101120386**

Acronym **FRESHLAND-UVF**

Does this activity involve the use of substances or processes that may cause harm to the environment, to animals or plants.(during the implementation of the activity or further to the use of the results, as a possible impact) ? ☐ Yes ☒ No

Does this activity deal with endangered fauna and/or flora / protected areas? ☐ Yes ☒ No

Does this activity involve the use of substances or processes that may cause harm to humans, including those performing the activity.(during the implementation of the activity or further to the use of the results, as a possible impact) ? ☐ Yes ☒ No

8. Artificial Intelligence

Page

Does this activity involve the development, deployment and/or use of Artificial Intelligence? (if yes, detail in the self-assessment whether that could raise ethical concerns related to human rights and values and detail how this will be addressed). ☐ Yes ☒ No

9. Other Ethics Issues

Page

Are there any other ethics issues that should be taken into consideration? ☐ Yes ☒ No

I confirm that I have taken into account all ethics issues above and that, if any ethics issues apply, I will complete the ethics self-assessment as described in the guidelines [How to Complete your Ethics Self-Assessment](#)



Administrative forms

Proposal ID **101120386**

Acronym **FRESHLAND-UVF**

Ethics Self-Assessment

Ethical dimension of the objectives, methodology and likely impact

Explain in detail the identified issues in relation to:

- objectives of the activities (e.g. study of vulnerable populations, etc.)
- methodology (e.g. clinical trials, involvement of children, protection of personal data, etc.)
- the potential impact of the activities (e.g. environmental damage, stigmatisation of particular social groups, political or financial adverse consequences, misuse, etc.)

Remaining characters

5000

Compliance with ethical principles and relevant legislations

Describe how the issue(s) identified in the ethics issues table above will be addressed in order to adhere to the ethical principles and what will be done to ensure that the activities are compliant with the EU/national legal and ethical requirements of the country or countries where the tasks are to be carried out. It is reminded that for activities performed in a non-EU countries, they should also be allowed in at least one EU Member State.

Remaining characters

5000

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Security issues table

1. EU Classified Information (EUCI) ²		Page
Does this activity involve information and/or materials requiring protection against unauthorised disclosure (EUCI)?	☐ Yes ☒ No	
Does this activity involve non-EU countries which need to have access to EUCI?	☐ Yes ☒ No	
2. Misuse		Page
Does this activity have the potential for misuse of results?	☐ Yes ☒ No	
3. Other Security Issues		Page
Does this activity involve information and/or materials subject to national security restrictions? If yes, please specify: (Maximum number of characters allowed: 1000)	☐ Yes ☒ No	
Are there any other security issues that should be taken into consideration? If yes, please specify: (Maximum number of characters allowed: 1000)	☐ Yes ☒ No	

Security self-assessment

Please specify: (Maximum number of characters allowed: 5000)

Remaining characters 5000

²According to the Commission Decision (EU, Euratom) 2015/444 of 13 March 2015 on the security rules for protecting EU classified information, “European Union classified information (EUCI) means any information or material designated by an EU security classification, the unauthorised disclosure of which could cause varying degrees of prejudice to the interests of the European Union or of one or more of the Member States”.

³Classified background information is information that is already classified by a country and/or international organisation and/or the EU and is going to be used by the project. In this case, the project must have in advance the authorisation from the originator of the classified information, which is the entity (EU institution, EU Member State, third state or international organisation) under whose authority the classified information has been generated.

⁴EU classified foreground information is information (documents/deliverables/materials) planned to be generated by the project and that needs to be protected from unauthorised disclosure. The originator of the EUCI generated by the project is the European Commission.

Administrative forms

Proposal ID **101120386**

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5 - Other questions

Proposal template Part B: technical description

FRESHLAND, the Urban Vertical Farm with Robotics and AI

List of participants

Participant No. *	Participant organisation name	Country
1 (Coordinator)	Freshness and Health Kft.	HU
2	Budapest University of Technology	HU
3	Biopolus Institute Nonprofit Zrt.	HU
4	Smart System Informatikai és Tanácsadó Zrt.	HU
5	Arizona Machinery Kft.	HU
6	Epson Europe BV	NL
7	Springer & Jacoby Kft.	HU
8	Springer & Jacoby Österreich	AT

1. Excellence

1.1 Objectives and ambition

In the framework of the project, the applicant consortium, led by a small Hungarian company, will implement a complex development that is linked to sales, production and service activities. The aim of the development is to create an integrated, novel business and organizational model for the production of indoor vegetables, the processing of the basic products grown here and the service and sale of these products to customers/consumers. The business and organizational model is based on a completely new approach, where the naturally intertwined processes of "PRODUCTION - PROCESSING - SALES" are integrated into a complex, coherent system on a single site, and where each process incorporates innovations and technologies that ensure a high degree of efficiency to make optimal use of resources and thus achieve maximum effectiveness. In the business and organizational model that we are planning to implement, we are therefore reorganizing the three activities, which are now increasingly separated in space and time and are therefore defined by independent market players. The business and organizational concept and the development plan were based on the assumption that the products to be served to our customers must meet the following criteria:

- a unique, healthy, fast service concept that is fully personalized;
- functional food made from quality and fresh ingredients;
- salad as a main meal: one-dish meals with salad-based side dishes;
- a wide product portfolio with premium complementary products;
- a wide range of salad combinations to suit everyone's taste;
- design a meal service to meet the individual needs of the consumer;



Figure 1.2.1. „From farm to table” concept sketch

Throughout the project, our main objective is to translate vertical farming from research to real food production industry through rigorous automation, robotics, data processing and artificial intelligence. Build a modular IT system around a vertical farm that enhances automation through the use of robotic technology, improves human-like decision making through the use of artificial intelligence, and creates an optimal sales module to keep customer relationships in safe hands. Based on these objectives, a work program was formulated to put the project concept into practice. The implementation will produce outputs that give measurable feedback on the achievement of the objectives - vertical farm to factory production measured quantitatively and qualitatively by product output and linked to processing and sales systems - generating verifiable outputs that work in a real business system. In addition to the resources available, the definition of the objectives was based on the expertise and practical knowledge of the consortium members, so that the results to be achieved are plausible and realistically achievable. The project is based on vertical farm technology. Soil-free crop production (hydroponics¹, aeroponics², chemoponics³, ionoponics⁴) is gaining ground worldwide and the use of a number of soil substitutes for crops has been experimented with. Artificial growing media are created which are generally free of organic matter and whose purpose is merely to allow roots to grow well and cling to them (provide support). In this case, the plants receive their nutrients under controlled environment. This may not seem very natural, but it has several advantages: in the case of so-called inert growing media, the medium does not react with the nutrients or the plant, whereas in the case of so-called active growing media, some nutrient modification is already expected, often only in the form of a buffering effect. In hydroponic systems, the fertilizer solution is continuously circulated over the roots of the plants, resulting in the formation of a nutrient film (NFT). Grodan or other organic, recyclable materials are used as growing media instead of soil to support plant root systems. Automatic nutrient, light and carbon dioxide supply is used, and conventional irrigation is not used during cultivation. Nutrient tanks and nutrient pumps are located in a separate room. Crops are grown in 60 x 40 cm trays. According to the project's production plans, there are 480 trays in total, covering 115.2 m² of growing area. After sowing, special fabrics or sheets are prepared on trays as growing media for micro-vegetables, or hydrobags filled with Grodan cubes for lettuce, strawberries, cabbage, etc.

¹ Growing in water, i.e. the plants are rooted in an organic substrate and the nutrients are dissolved in water.

² Plants are suspended in the air, where they use neither soil nor substrate. To do this, the plants are placed in special pots in which only the lower part of the root system is in aqueous medium, the rest of the roots being placed between the solution and the upper lid of the pot.

³ The plants are grown in a substrate without a nutrient medium, which can be organic material such as bark, sawdust or coconut, or inert material such as sand, gravel, crushed stone or bricks. In this case, all feeding is done by irrigation.

⁴ In essence, we are talking about soil, but artificial topsoil, where synthetic substrates made from ion exchange resins, fabrics and polyurethane are used as a base.

After germination, these are placed on the frames of the module trays to allow the seedlings to grow. Vertical farming modules are equipped with several rows of growing trays. The trays can ideally be moved around the plant on a small trolley designed for this purpose. The growing modules are placed side by side, while some systems can be moved sideways on rails, similar to filing shelves, to make the best use of the space available. The production area and directly adjacent rooms, which are isolated from the rest of the facility by a locked room, are accessible only to those working in them and equipped with the necessary equipment. In addition, it is important that all items entering the production area are kept clean. This type of crop production has a number of advantages that give it an irreplaceable competitive edge over outdoor or greenhouse fruit and vegetable production for commercial sale, such as:

- it has a continuous yield that can be planned even for daily harvesting, independent of climate and weather conditions;
- the quality of the crop is constant and can be guaranteed;
- low water use: irrigation water is repeatedly delivered directly to the roots, where there is almost no evaporation and run-off loss, so water use is up to 95 - 98 % lower than in crop production with crop irrigation;
- no nutrient loss: a nutrient solution with a perfectly adjusted pH and high oxygen content surrounds the roots;
- the closed growing environment allows chemical-free, yet pathogen-free production.

This method of cultivation has many advantages, such as improved programmability of production, the promise of a significantly higher yield, a more "marketable" appearance, the freedom of production resulting from automation, and the growing importance of economic aspects. There are also some drawbacks, such as the high investment costs involved, the low tolerance of technological errors, the need for specialized, high-level skills and precision in operation, and the quality of the water. The PROCESSING process is designed to process plants produced on site and raw materials from external sources, which cannot currently be produced on site, according to the output requirements. We envisage that the process will be designed in close conjunction with the SALES and PRODUCTION processes, in an optimized way, where the highest efficiency is achieved through a continuous and reciprocal flow of data and data feedback. Processing involves peeling, chopping, grinding, cutting and cleaning to produce semi-finished and finished products. The aim is to get the products to the final consumer as quickly as possible, which is why it is of paramount importance to ensure a constant daily yield, taking into account the weekly and monthly seasonality (fluctuations in consumer demand), in order to ensure that our customers always have access to the freshest products possible. The closed technology also ensures maximum hygiene, keeping pathogens at bay and eliminating the need for pesticides, which makes it easier to process the vegetables grown in this way. It follows from the above that it would be necessary to draw conclusions from the fact that a sterile environment is created, i.e. a closed, inanimate and artificial system where pests and pathogens are unable to colonize and do no harm, and as a result the use of bactericides and fungicides is eliminated. It is also logical to assume that a new type of serving technology can be developed, i.e. a different way of processing the food on the table:

- no pathogens, pests or artificially applied pesticides,
- however, there is the question of what chemical substances are present in the nutrient solution (water can contain both organic and inorganic substances).

The multi-channel system of SALES allows us to reach a wide target market and this is an area where we have years of local and real market knowledge. We know from experience that we need to reach consumers in a targeted and personalized way using modern information technology solutions based on our own customer database. In the first instance, the unit will be used for the catering/retail sale of finished products, partly produced locally and partly sourced from suppliers. Its function will be that of a restaurant specializing in specific raw materials, aimed at catering for the main dietary needs. Consumers will thus have the possibility to consume the finished products on the spot in a restaurant setting or as take-away.

The restaurant will be served at the counter in a fast-food style, i.e. the kitchen will be largely visible through window, allowing customers to see what is being used to prepare their food and how it is prepared. In addition to the classic restaurant service, our aim is to enable and manage the delivery of web-based orders from the outset. It is undeniable that home delivery is now of paramount importance in the context of the growing of vegetables in an artificial, closed environment, the delivery and serving of freshly harvested produce in a very short time, and the significant simplification of processing procedures (e.g. by substantially reducing the processing time (e.g. by eliminating washing), we provide our customers with finished products that have a vitamin and nutritional value that exceeds the 'nutritional' value of products that are not grown locally but are transported remotely, packaged and processed using industrial food processing methods.

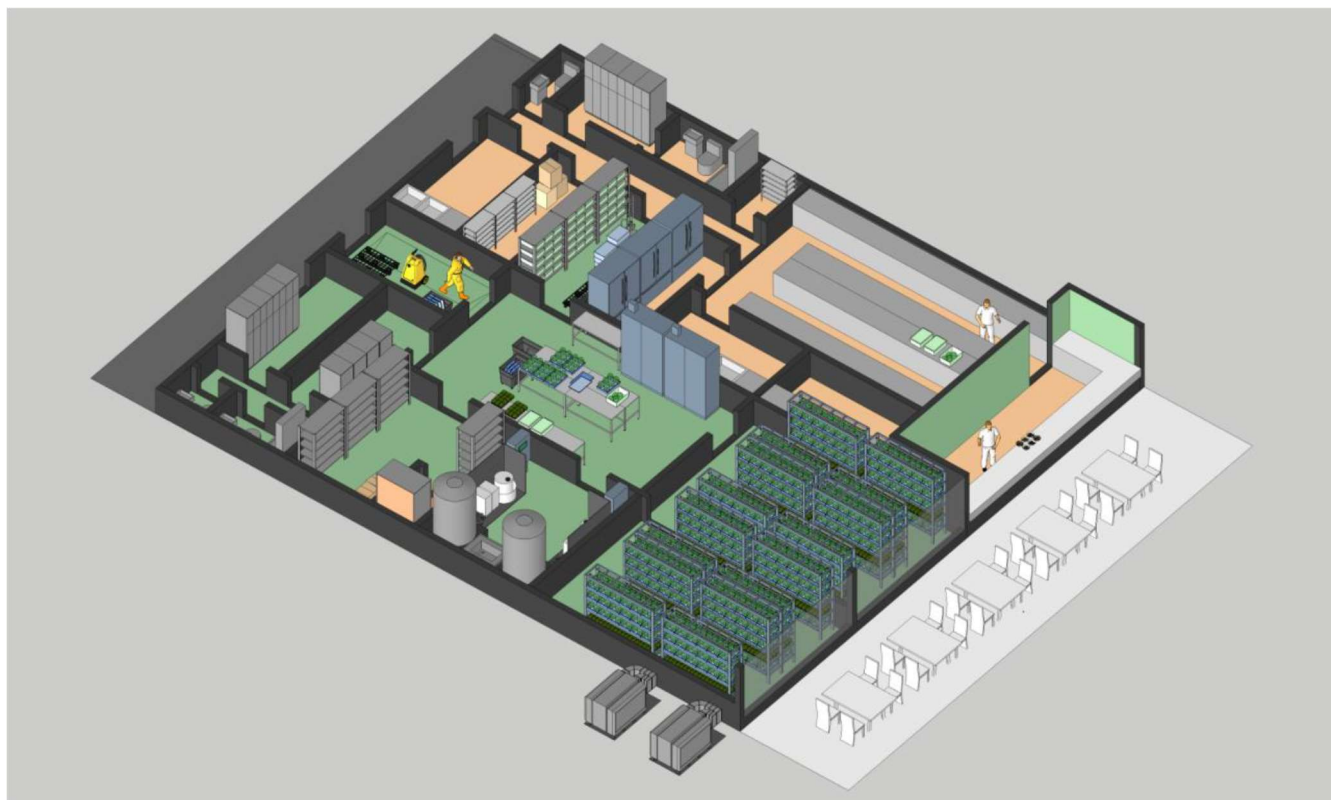


Figure 1.2.2. "PRODUCTION - PROCESSING - SALES" unit

The investment will create a vertical farm that will initially allow for the local production of five types of lettuce raw materials on a total area ⁵of 115.2 m², as follows⁶:

Növény	Igényelt mennyiség/hó	Igényelt mennyiség/hét	Technológia	Info	db/hó	Termőterület-dántálca igény	Felfele kerekített dántálca igény	Klíma	EC
Lollo	150 kg	38 kg	Dán tálcá	60 db/1 dántálca, 50 nap, 200g (18 nap előnevelés)	750	12,5 dántálca, plusz az előneveléshez 1 dántálcára 2200 db fér	14	hűvös	magas
Spenót	25 kg	7 kg	Dán tálcá	30 nap-250g/ szap.tálca (16/dántálca)	100 szap.tálca	6,25 dántálca	7	hűvös	magas
Rukkola	25 kg	7 kg	Dán tálcá	27 nap-200g/ szap.tálca (16/dántálca)	50 szap.tálca	3,2 dántálca	3	hűvös	alacsony
Kapor	0,3 kg	75 g	Dán tálcá	21 nap-230g/ szap.tálca (16/dántálca)	2 szap.tálca	0,13 dántálca, ha duplázunk 0,26	1	melegebb	alacsony
Bazsal	1 kg	250 g	Dán tálcá	23 nap-180g/ szap.tálca (16/dántálca)	6 szap.tálca	0,38 dántálca, ha duplázunk 0,76		melegebb	alacsony
					24 dántálca=69,12 m ²		25 dántálca=72 m ²		

Figure 1.2.3. Varieties and quantities of vegetables produced locally at introduction

The project will create a new business and organizational model that is unique by coherently merging the "PRODUCTION - PROCESSING - SALES" processes of the agricultural, food and hospitality industries. Although the underlying vertical farm technology is among the most advanced technologies available today, existing applications are limited to the Business to Business (B2B) flows and there is no project yet that integrates the entire B2C (Business to Consumer) flow in a coherent system in this area.

⁵ One piece of dántálca measures 110 cm x 63 cm x 4 cm. Propagation trays used in cultivation can be reused after cleaning.

⁶ The estimated turnover figures are projected on the basis of the monthly turnover of one shop.

The unique business and organizational model makes it imperative to further develop current technologies and create specific robotic or AI-enabled data processing systems and flows that go beyond the current known solutions and create new and innovative solutions that fully cover the "PRODUCTION - PROCESSING - SALES" vertical:

- "PRODUCTION - PROCESSING - SALES" process interactions specialized in robotic technology;
- development of measurement technologies specified for the control system in production processes, AI control;
- automated robot technology;
- AI to measure consumer attitudes, needs, habits and from that to control production and processing;
- application of AI to serve consumer needs (development of a health-conscious lifestyle and meal programme, diets tailored to health problems);
- big data from "PRODUCTION - PROCESSING - SALES" processing, structuring and utilization of large amounts of data;
- the development of a modular IT system to manage the entire food production process and, where possible introducing human-like decision-making;
- the development of a customer relationship module to manage sales efforts, keep records of records sales, processes sales data and uses artificial intelligence to drive intelligent sales processes for business development.

With this development, we set the goal of creating a new concept by further developing state-of-the-art technologies and applications, which will enable the benefits and results of these technologies to be directly available to the final consumer and, based on their needs, to make access to healthy food and health-conscious nutrition accessible to the whole spectrum of society by improving existing products and creating new ones. Since the new business and organizational model created by the development can be easily established physically anywhere, there is a wide multiplication potential, i.e. the results of the project can be disseminated to any consumer population, regardless of geographical location or economic development. The project will create a business unit combining sales, production and service activities, breaking with the previous concept and radically new business concept. We plan to expand the unit's production and processing capacity in a modular way to meet expected market needs. We will also implement IT systems and market presence promotion activities to support the business activities created by the investment. The finished product portfolio will be continuously reviewed with the applications that will be created as a result of the project and our recipes will be continuously updated according to customer feedback. The vertical farm will be built with the most modern industrial technology available, allowing the autotrophic⁷ plants to exist and be productive in an automated way with the minimum of human intervention. The project will use vacuum and modified atmosphere packaging machines for processing, as well as modern peeling, chopping, mincing and cutting equipment, and will prioritize the use of the highest level of robotics available today. Robotized technology will allow for the highest level of hygienic processing. We will also strive to provide personalized service in the restaurant with pre-defined processes, which we have already gained a lot of experience in, in a highly automated way. In fact, we envisage that the research and development activities we will be implementing will result in the creation of a new service for the industry: a quality assurance system that will form the basis for the international quality system and procedures to be implemented, and the development of certification and certification-accreditation procedures. The project is currently at the level of development of principles, technology concepts (TRL3) and laboratory validated technology (TRL4) and the timeframe for implementation is 24 months (July 2023 - June 2025) with the final stage to be reached at the end of the project being the prototype demonstration in an operational environment (TRL7).

⁷ That is, they can build their own organisms from carbon dioxide, water and mineral nutrients. We now know how these factors can be best and most effectively controlled by the grower to ensure optimum conditions for achieving the highest yield per unit area for a given crop.

1.2 Methodology

1.2.1. Detailed description of the methodology

1.2.1.1 Our research program

The overall methodology is a brief outline of the scientific method that defines the course of our research. We will implement a research program that focuses on the recognized fact that there is a great - and growing - worldwide demand for the production of high quality, predictable quantities of vegetables and fruits that are resistant to weather extremes. There are now many technical developments and research results available for this cultivation, and many scientific results are known and published in this area, which we will also use in our research. However, we have found that there is a topic in this area which has not been subject to any scientific analysis - and one which could provide the basis for further research. We see this as a challenge.

The starting point for our research is that we have set up a completely new approach. Our theoretical premise (hypothesis) is that by coherently merging the processes of "PRODUCTION - PROCESSING - SALES", we will create a new model in which the simultaneous application of robotic technology and AI will lead to a more productive food production, fully resistant to weather extremes and at the same time programmable according to the planned needs. This is the concept that we are working on as a scientific hypothesis, which we will validate theoretically, and then, if our theory can be validated by the scientific methods we have put in place, we will carry out the experimental developments related to this hypothesis, which will provide a real and realistic basis for the implementation of our theoretical models in large-scale conditions.

Our research is therefore primarily aimed at validating the following - these are our main objectives:

- to compare outdoor and greenhouse crop production with indoor precision farming, to identify similarities and differences. This is already a well-researched topic, there is no need for further research, but it is necessary to take into account and build on existing research results;
- the use of energy from natural sunlight for indoor farms, which has also been thoroughly researched and the research results widely published, and therefore existing scientific results should be taken into account;
- the highest possible level of automation: making the processes associated with indoor precision farming free of human intervention. To this end, robot technology will be used, and our research will therefore be aimed at identifying the processes where robotization is possible. Contemporary research and testing of this already exists, so our task in this area will be to study and evaluate existing solutions and synthesize their results, focusing on our own research topic;
- replacing human intelligence with artificial intelligence: AI-based production management. This is the central subject of our research, namely the analysis of how to plan food demand based on consumer habits in the most accurate way. Our goal is to demonstrate that it is possible to quantify and qualitatively determine what consumers will demand at a given future point in time (e.g. in 15 days, consumers will demand 5 kg of lettuce) and to program production/processing accordingly, based on sales processes, without human intervention. The basis of our assumption is that we cannot expect a group of consumers to coordinate and agree with each other on the expected production output from the farm (e.g. by broadly agreeing with each other on what they want to order in two weeks' time, but we want to plan this for them. The need for this planning is greater the larger the group of consumers to which it is applied, since the larger the group, the smaller the group and the possibility of collecting data directly from consumers on this is lost.

In the course of our preliminary topic formulation and the examination of the individual research topics, we found that the last topic of our research tasks is one that has not yet been modeled and investigated, or at least has not yet been published in the international literature. The results of our research and the actual experimental developments planned on the basis of these results can help to make food production and manufacturing more conscious and we hope that our results can be used to lay the foundations for further research and to stimulate new research. For this reason, we will place great emphasis on the wide publication of our results and will also give high priority to testing our experimental developments under real conditions and with real data.

1.2.1.2 Our methodological approach

During the preparation of the research, we also had to think about the overall methodology for conducting the research as a project, which would permeate the whole process from design to documentation. There are always many uncertainties in a research project and this is especially true for basic research. In the preliminary stages of our research, we have made the following observations, which have implications for the overall methodology we should apply:

- we can be flexible in addressing our challenges,
- we can accept minor changes in deadlines for meeting milestones,
- we work with smaller and separate teams, which otherwise work well independently,
- we face complex, multi-stage R&D tasks.

Recognizing all of these factors, we decided to conduct the research project using an agile methodology because it gives us the flexibility to do so.

At the same time, we need to have a starting point, i.e. a vision, on the basis of which the scope of each research project can be defined, although this may change during the implementation of the R&D project, as appropriate. However, we need to have an overall plan before any research activity. Our research plan is summarized in the following nodes:

1. consumer data-driven production management in the indoor vertical economy;
2. self-learning and artificial intelligence in automated sales processes;
3. creating a fully integrated system to implement these technologies in industrial quality and quantity production processes.

This plan will guide our research activities. We will introduce both quantitative and qualitative research methods according to the basic rules of scientific knowledge acquisition: we will experiment, measure, observe, collect data, study literature, evaluate, create models and processes.

1.2.1.3. Compliance of our methodology with the EU objectives of establishing a framework to promote sustainable investment

Regulation 2020/852 of the European Parliament and of the Council of the European Union (18 June 2020) has already set as one of its fundamental objectives (see Article 4 of the Regulation) the Community's objective that sustainability and the transition to a secure, climate-neutral, resilient, more resource-efficient and circular economy are crucial to ensure the long-term competitiveness of the EU economy. Article 23 of the Regulation also states that an indicative list of environmental objectives must be established for the purpose of determining the environmental sustainability of an economic activity. And to this end, the Regulation has assigned a list of six environmental objectives. We have carried out such an assessment of the preliminary design and the research program and the research methods that we intend to implement, and we have concluded that our project fully meets the objectives.

1. mitigation of climate change: the objectives and intended outcomes of the project will fully promote;
2. adaptation to climate change: the objectives and intended results of the project will fully promote;
3. sustainable use and protection of aquatic and marine resources: fully promoted by the objectives and planned results of the project;
4. transition to a circular economy: fully promoted by the project objectives and planned results;
5. pollution prevention and reduction: the objectives and planned results of the project will fully promote; and
6. protection and restoration of biodiversity and ecosystems: fully promoted by the project objectives and planned results.

1.2.2. External framework of our research

1.2.2.1. Outline methodology for using prior knowledge in our research

Scientific results that have already been achieved in all relevant areas of the project and are available to the scientific community as a whole are considered as existing knowledge and, if verified, do not need to be further researched until there is no doubt about their results, models, calculations and conclusions. We will use these results. Our aim is therefore to identify published research and innovation activities whose results we should incorporate into the project and build upon. We will prioritize these research activities and their results and present them with a focus on our own themes. This will be done through a review of the available literature on the following topics:

- understanding and recording the advantages of indoor precision farming over outdoor and greenhouse farming,
- the use of solar energy for indoor farms,
- automation at the highest level, robotization of the entire process chain.

Our methodology in this area is to review the literature and extract relevant results. At the same time, in addition to the literature review, we will also examine the business results that are already being implemented, i.e. we cannot limit ourselves to the results of the scientific community, but will complement this with results that are relevant but not published in the scientific community. Indeed, we must recognize that many automation manufacturers and agribusinesses have already recognized the benefits of automation, and we must extend our data collection to this area. The method for doing this is to organize the data available on the web and to contact and collect data from these companies.

We will therefore not revisit areas that have already been thoroughly researched and analyzed - as long as there is no doubt as to the relevance of the results for us - and we will evaluate the results in the light of our own research logic and subjects, and finally we will adapt them to the purpose and incorporate them into our results.

1.2.2.2. Interdisciplinary approach and the role of social sciences in research

From the data we have gathered during the preparation, we see that there is a need to integrate knowledge from several disciplines that are otherwise not or only sparsely intersecting, and therefore, in our view, an interdisciplinary approach is absolutely necessary and justified. The research topic is complex and the subject of the research is diverse, and we therefore want to free the solution of the problem from a kind of and correspondingly strict disciplinarity, because we want to provide practical and useful answers to the real problem posed. The problem itself is multifaceted: social and technological, and therefore we cannot give a one-plane answer.

We are determined to conduct typical problem-solving research. To this end, our research must synthesize the results of chemical engineering developments, agricultural economics, sociology, anthropology, political economy, information engineering, smart automation, and psychology as a science. The use and further analysis of the results may be of interest to members of several disciplines and organizations.

Among the social sciences, research in the fields of sociology and psychology should definitely be introduced, because we want to analyze and evaluate simultaneously the behavior and choices of consumers as individuals and as a group of consumers. We know that marketing as a practice has achieved a great deal in recent decades using the research findings of these disciplines, but we must definitely introduce new research in this area, because this time we do not want to influence consumers from the direction of the company, but we must look at existing consumer attitudes that we have not shaped, which essentially justifies a reverse logic. There are also valuable research findings in this area, both from sociology and psychology, which we should of course incorporate into our research, but we need to complement them.

The questionnaire method and focus group interviews seem obvious for this research, but we will also work on new methods of gaining knowledge in order to gain an even more accurate picture of consumer behavior, trends and the factors and circumstances that influence them. The development of new methods is part of the research activity.

1.2.2.3. Our position on open science

We will join the Open Science exercise, and to this end we will seek to share scientific knowledge rather than compete for it. The scientific results will be classified into two basic groups: results that are related to some patenting (i.e. connected to vertical farming propriety systems), and those that are not. The two will be treated in different ways. While the former should be thoroughly investigated and any commercial aspects are to be removed from publishing, the latter are free to distribute and we plan to publish these results within corresponding scientific papers, distribution channels, conferences and also on the web. Furthermore, we also plan to use the social media for digesting and distributing the practical aspect of the results in order that the greatest scope of audience would be familiar how science can help to solve practical issues. The best practices will also be organized as a “free franchise” for those who would like to ignite similar or corresponding businesses.

1.2.2.4. Handling research data and results according to FAIR principles

When sharing scientific results will correspond to the FAIR principles, namely:

- Findable: We are about to publish all scientific achievements in open scientific papers, conferences, and also on the web. We plan to register the results into scientific metadata sources to allow scientific communities to find them easily.
- Available: The metadata of the scientific results will openly be available in the corresponding databases.
- Interoperable: The metadata of the scientific results will be organized with respect to their correspondence to those of other similar fields, and will be composed accordingly.
- Reusable: The metadata of the scientific results will be described and registered with a broad range of attributes commonly accepted among the community standards of particular areas.

1.2.2.5. Concept validation and short risk analysis

Once we have the innovative idea, we have to subject it to a process of concept validation before we can move forward. We have subjected our innovative idea to this - and this is where the market validation aspect comes back in - it is not enough to be intuitive about our concept and feel that it will be good. Based on the criteria of the tender, we have assembled an objective, concept-checking process, which is in fact a specific data collection process: we can achieve an evaluable and usable result by answering the following key questions correctly, i.e. preferably based on data:

1. can it be done (must it be plausible)?
2. what is its innovation potential?
3. what is the potential target market for the product/service?
4. what does an analysis of future trends and directions in the market segment show?

1. The first question actually leads us to an analysis of the technical and business risks inherent in the project. We know that what we have conceived can be realized, and we know this from the fact that our preparatory work has provided us with a wealth of information that has shown us that we will be successful in laying the foundations for our research and in designing the development steps. At the same time, we identify the following technical risks in the implementation:

- technological risk: during the approximately two years of development of our production management system, new technical solutions will be developed that would be inevitable to integrate into our own processes that are currently being developed. To manage this risk, we assign a project manager who is in close contact with the engineers of our external partners who are constantly working on our production technologies and can provide immediate feedback to the project team on the introduction of any such new industry solutions;
- standardization risks: we cannot ignore the fact that, due to the dispersed location of production and processing units around the world, there is a high degree of variation and uncertainty in some man-made environmental factors (e.g. variations in water quality, variations in crop species). We see the only way to address this is to base our quality requirements on the most comprehensive data collection, and to impose reasonable 'from' to limits on specific indicators.

2. The innovation potential of the project has already been demonstrated. We expect it to have a new, market-creating impact.
3. The potential target market for our newly introduced service can be evaluated globally, because we are entering into this in the hope that this production management method and toolkit, and the system developed on the basis of it, should become a dominant factor in the production of soil-less crops and in the processing and marketing of the vegetables harvested from them.
4. As we have already shown, this market segment is positioned for explosive growth. The last few years have seen a mushrooming of 'cellar farms' in the big cities. These produce mainly micro-vegetables that are harvested between the germination and seedling stage, giving tender, tasty and colorful little plants. They are excellent for flavoring, but are not a substitute for the products that form the basis of a main meal. For this reason, we do not consider this type of crop production as belonging to our segmented market, but it does indicate a direction that could represent a potential for renewal for the targeted industry. Because indoor precision farming creates a controlled environment that provides a steep increase in yield, quality, nutritional value and water use compared to conventional agriculture, while at the same time producing nearby, fresh and nutrient-dense food, without seasonality, on demand, locally.

2. Impact

2.1 Project's pathways towards impact

The current vertical farm research infrastructure is conceptually changing with the emergence of industrial production units. The agro-industrial experience that previously existed in human minds is concentrated in machine intelligence, in a knowledge base, and thus becomes usable in industrial dimensions (scale, throughput). At the end of the project, a sales-driven vertical farm unit will be implemented, in which production will follow exactly the order requirements and the production process will be optimized in several ways:

1. the machine intelligence applied in the sales portal will allow for a broad management of order portfolios, even according to individual needs (e.g. a complete nutrition program, individual nutrition plan);
2. the production will be significantly less wasteful than before, machine intelligence will automate and speed up many previously human processes;
3. the degree of automation of the system will be higher, which will reduce operational costs;
4. the order chain will be more transparent, the customer will be able to see how the plants ordered are growing, where they are, there is even the possibility to create a visual kitchen.

The system developed will provide best practice for the installation of other similar facilities. It is also important to point out that many analysts expect shortages of certain food raw materials in the near future - due to climate change, production costs, especially the drastic increase in fuel and energy costs - which will lead to production and supply disruptions. The coronavirus epidemic itself led to a temporary disruption of supply chains, which of course immediately forced operators to seek and market alternative sources of supply or alternative products. In many cases, therefore, the temporary disruption of the supply chain also led to changes that later proved to be permanent, causing previously strong players to disappear in a matter of moments and be replaced by others. With the development, we will create a complex operational unit in line with the business concept of "farm to table", i.e. the product is transferred in a controlled way from the place of production, in our case the vertical farm, directly to the consumer, and we intend to start operating it according to a business plan. With this development we aim to create a new concept that will enable the benefits and results of these technologies to be directly available to the final consumer by further developing state-of-the-art technologies and applications, and to make access to healthy food and health-conscious nutrition available to the whole spectrum of society by developing existing products and creating new ones based on their needs. As the new business and organizational model created by the development can easily be physically established anywhere, there is a wide scope for multiplication, i.e. the results of the project can be disseminated to any consumer population, regardless of geographical location or economic development. As a result of the project, an **increase in life expectancy** within the target population can be clearly demonstrated.

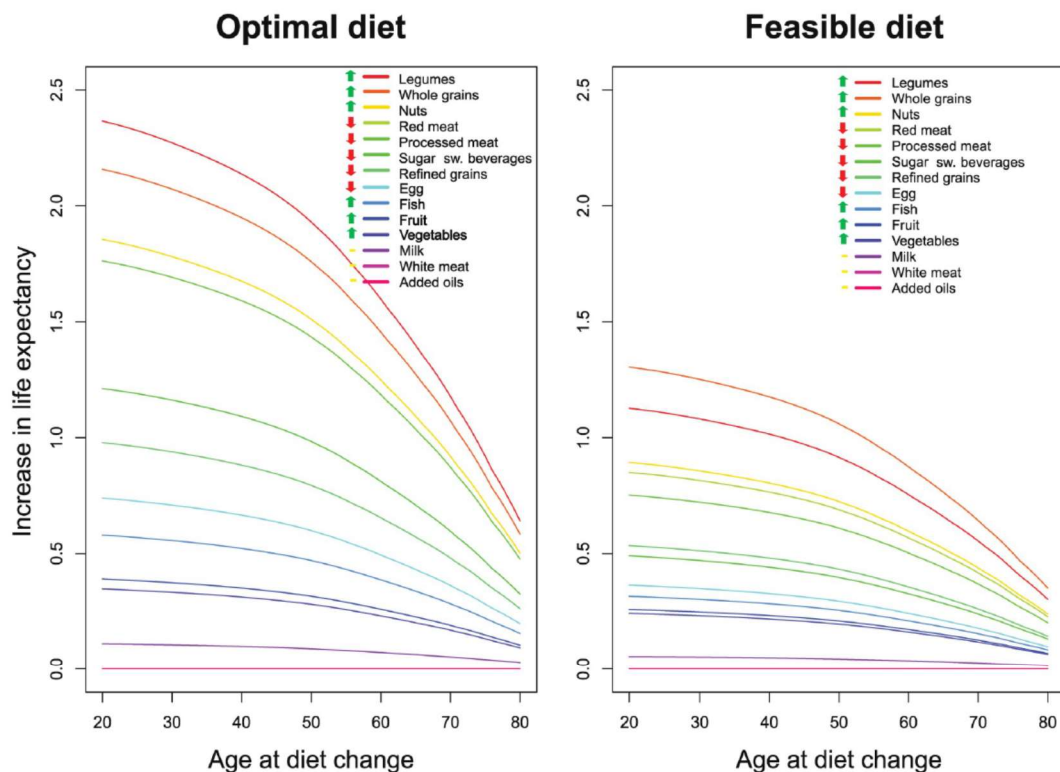


Fig 3. Expected increase in LE for optimizing different food groups with diet changes initiating from various ages between 20 and 80 years of age (left plot). Right plot presents similar estimates with a feasible approach* diet (time to full effect: 10 years). *For the optimal diet and feasibility approach diet, the following intakes were used: 225 g and 137.5 g whole grains (fresh weight), 400 g and 325 g vegetables, 400 g and/ 300 g fruits, 25 g and 12.5 g nuts, 200 g and/ 100 g legumes, 200 g and 100 g fish, 25 g and 37.5 g eggs, 200 g and 250 g milk/dairy, 50 g and 100 g refined grains, 0 g and 50 g red meat, 0 g and 25 g processed meat, 50 g and 62.5 g white meat, 0 g and 250 g sugar-sweetened beverages, and 25 g and 25 g added plant oils. Note that lines for LE for red and processed meat changes are overlapping and similarly also for white meat and added oils. LE, life expectancy.

Figure 2.1.1. Impact of food choices on life expectancy

Food is essential for good health and nutritional risk factors are estimated to cause 11 million deaths and 255 million disability-adjusted life years every year. The Global Burden of Diseases, Injuries and Risk Factors (GBD) study provides summary data on population health that are important for comparing health systems, but does not estimate the impact of changes in the composition of food groups and the corresponding health benefits. While the EAT-Lancet Committee has presented the diet of the planet, it provides limited information on the health effects of other diets and few people are able to adhere to strict health-maximizing approaches. A modelling methodology using meta-analyses, data from the Global Burden of Disease study and life table methodology showed that a prolonged switch from a typical Western diet to an optimizing diet could result in an increase in life expectancy (LE) of more than a decade for young adults. The biggest gains are from eating more pulses, whole grains and nuts, high nutrient vegetables and less red and processed meat. For older adults, the gains would be smaller but significant. Even the feasibility approach to diet indicates that both sexes would see a 7% or more increase in life expectancy in both age groups. The researchers found that if a person from the US, Europe or China followed this optimal diet from the age of 20, they could live more than 10 years longer. They also showed that switching from a Western-style diet to this optimal diet can increase a 60-year-old's life expectancy by up to 8 years, and by up to 3.5 years at the age of 80. Of course, it's not always easy to switch to this optimal diet, so the research also looked at what a halfway house between a Western diet and the coveted one would achieve. They found that this would increase life expectancy by around 6 years for women aged 20 and 7 years for men. As a result of the project, the shift towards a more *environmentally and health-conscious lifestyle* could be increased among the target group and the wider social strata. Following a diet that is balanced for the individual and the environment is a personal choice, but whether the diet chosen is appropriate to our expectations must be objective and not opinion-based.

This would require everyone who is serious about eating for the environment and health to take individualized advice from a trusted professional, which is understandably not an option for most people at the moment. The result of the project will be an AI-driven consumer advice platform that will eliminate the above-mentioned problems and create a professionally based, objective, health and environmentally conscious lifestyle tailored to individual needs. A further result of the project will be the **reduction of obesity-related diseases**. In developed countries, including the European Union, an increasing proportion of health expenditure is spent on obesity and closely related diseases. Based on funding data from the Hungarian health insurance fund, the cost of treating obese or overweight patients is estimated to be around 15% of total health insurance fund expenditure and nearly 1% of gross domestic product (GDP).⁸ Obesity has reached a level today that it is imperative to address and combat it. Over the past decades, the number of overweight people in European countries has increased by 10-40%.⁹ Cardiovascular diseases, hypertension, type 2 diabetes, cancers, joint diseases, metabolic disorders, premature mortality. According to the



The Impact of Obesity on Employers

WHO, obesity is clearly the most common non-communicable chronic disease.¹⁰ It sounds scary, but 80% of the Hungarian population has an obesity problem. This is not just a health problem, it is a social problem. Reducing fat intake, cutting down on sugar consumption, and eating regular fruit and vegetables and quality protein are the foundations for successful weight loss. Claire Wang and colleagues at Columbia University have also shown that obesity leads to more absenteeism and lower productivity.¹¹ Obesity can lead to a variety of health, psychological, and social effects that then can lead to decreased productivity, increased healthcare costs, and lower morale for a business/organization. [Courtesy of Global Obesity Prevention Center (GOPC) at Johns Hopkins] Speaking at the 2019 HVG Healthy Workplace Conference, Frigyes Schannen of Roland Berger said that in their experience, the performance of workers who eat healthily is on average 25 per cent higher.¹² Nutritious, healthy food can improve concentration and cognitive function, thereby improving employees' performance at work. A Brigham

Young University study claims that people with unhealthy eating habits are 66 percent more likely to have lower productivity.¹³ As Jelena Länger, founder and CEO of the Longevity Project and one of the country's foremost experts on healthy eating, has written, 22 weeks of healthy (predominantly whole plant) nutrition training at a US insurance company resulted in participants' physical health improving significantly compared to the control group, as well as their mental performance and the quality of their social relationships.¹⁴ The results of the project will make the healthy choice the most obvious and easiest choice in a corporate environment. As the technology introduced and further developed allows for chemical-free, pesticide-free production, no chemicals are added to the products, making them easily and cheaply available to the target group, thus **eliminating the chemical allergy** that affects an increasing part of society today.

⁸ Iski G, Rurik I. The estimated economic burden of overweight and obesity in Hungary. [Becslések a túlsúly és az elhízás hazai gazdasági terheiről.] Orv Hetil. 2014; 155: 1406–1412

⁹ Obesity: preventing and managing the global epidemic. Report of a WHO Consultation. WHO Technical Report Series 894. Geneva: World Health Organization, 2000

¹⁰ WHO European Regional Obesity Report 2022. Copenhagen: WHO Regional Office for Europe; 2022. Licence: CC BY-NC-SA 3.0 IGO

¹¹ State-Level Estimates of Obesity-Attributable Costs of Absenteeism ,Andreyeva, Tatiana PhD; Luedicke, Joerg MS; Wang, Y. Claire PhD, Journal of Occupational and Environmental Medicine: November 2014 - Volume 56 - Issue 11 - p 1120-1127 doi: 10.1097/JOM.0000000000000298

¹² Terítéken a táplálkozás, a túlsúly és az elhízás Dr. Szabó Ágnes, egyetemi adjunktus, Budapesti Corvinus Egyetem Oct 16, 2020, <https://www.longevity-project.org/post/teriteken-a-taplalkozas-a-tulsuly-es-az-elhizas>

¹³ Presenteeism According to Healthy Behaviors, Physical Health, and Work Environment Ray M. Merrill, Steven G. Aldana, James E. Pope, David R. Anderson, Carter R. Coberley, R. William Whitmer, and the HERO Research Study Subcommittee. Published Online: 11 Sep 2012, <https://doi.org/10.1089/pop.2012.0003>

¹⁴ Länger Jelena (2019): Táplálkozás a munkahelyen: így hat az irodai étkezde a dolgozók teljesítményére:

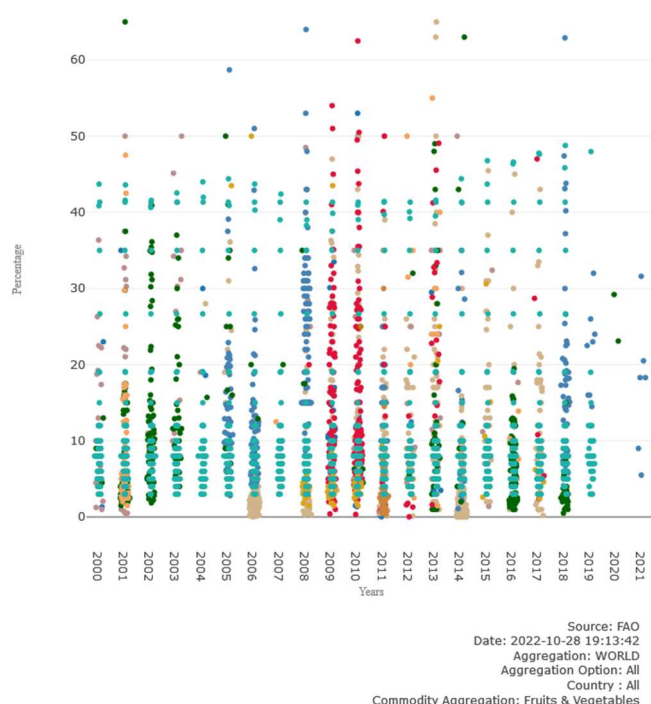
https://hvg.hu/brandchannel/HVG_Konferencia_20190507_Taplalkozas_a_munkahelyen?fbclid=IwAR0ynpcK5rvpsjuU_AADZd6CryXUZOl9nM2Xr198StnnCRmQ81d-HfvTqTQ

The products are delivered to the consumer in a clean, chemical-free state, with high quality standards. An additional advantage and positive effect of the improved and refined technology resulting from the project is that there is no need to genetically modify (GM) plants to increase their resistance to environmental impacts - new varieties with improved properties compared to previous ones, such as better drought tolerance or even disease resistance - thus **producing non-GM food** for the target consumer audience. Representative surveys show that around two thirds of the European community are against GM products, mainly because of fears of long-term consequences and complications. In Hungary, all products containing more than 0.9% of genetically modified ingredients are required to be labelled, and there is also a moratorium on the cultivation of GM crops, and Hungary's Fundamental Law currently maintains a GM-free agriculture with regard to the right to physical and mental health. Genetic engineering is still at the center of intense scientific, economic and political debate. Rapid progress in the field of genetic modification in scientific terms has not allowed sufficient time to fully investigate the potential risks and long-term effects on human health and wildlife. There is a lack of long-term environmental impact studies, properly conducted toxicological/allergy studies and feeding trials. Our current knowledge is insufficient to make a realistic assessment of the environmental, ecological, health, social and economic risks of GMOs. Within the European Union, the EFSA (European Food Safety Authority) assesses the safety of genetically modified organisms (GMOs) before they are authorized for food or feed use and/or cultivation in the EU. This includes GM plants, GM micro-organisms and GM animals. It is very important that we protect our unique natural assets, preserve the non-GMO nature of our agriculture and develop a GMO-free food chain. A GMO-free policy is based on the one hand on the scientific evidence of the already known negative effects of certain GMOs, and on the other hand we must think about future generations, the safety of the environment and, last but not least, the competitive advantages and the growing market and economic interests that will result from GMO-free status within the European Union. As a result of the project, there will be opportunities for the introduction of **new or forgotten plant varieties** to consumers, for their wider public awareness, and for further contacts and common areas of interest, including with the International Union for the Protection of International Plant Varieties, an intergovernmental organization based in Geneva (Switzerland), established by the International Convention for the Protection of New Varieties of Plants, to ensure and promote the effective protection of plant varieties with a view to encouraging the development of new plant varieties for the benefit of society.¹⁵ The project's unhidden aim is to **develop a conscious dieting attitude and health awareness** among a wide range of people in society. Conscious, critical consumer behavior is characterized by the ability to distance oneself from influencer marketing, to constantly consider consumer needs, and to understand, communicate and solve consumer problems as they arise. In Europe, too, there is a growing phenomenon of the emergence and social spread of consumer awareness groups, which make a number of recommendations to their members, which are then put into practice as a result of the project:

- Find the original: Don't be fooled by the nice looks and the funny talk: avoid factory-made foods made from non-natural ingredients, chemicals and additives.
- Read the labels: Food and cosmetics can contain a lot of harmful (and unnecessary) substances. There are lots of chemicals and lots of unnecessary and unhealthy substances.
- Fresh: Buy fresh, home-grown seasonal vegetables and fruit instead of greenhouse-grown, artificially ripened, over-packaged and preserved goods that have travelled tens of thousands of kilometers.
- Buy local products: Look for things made near where you live. This way you support your local environment and contribute less to the environmental impact of transport.

The results of the project will help to develop sustainable and environmentally conscious consumption among the target group and, through them, in the wider society. Sustainable consumption can be understood as the use of goods and services that ensures the satisfaction of basic needs, provides an adequate quality of life, but requires a minimum use of natural resources and a minimum emission of toxic, hazardous substances, waste and pollutants. Environmentally responsible consumption "results in purchases that meet needs at least as well as conventional consumer behavior, but can contribute to reducing waste and lowering environmental impact. On this basis, it therefore broadly corresponds to the 'sub-area' of sustainable consumption."

¹⁵ <https://www.upov.int/portal/index.html.en>



The results of the project can be used to educate the consumer and reduce food waste. The World Food and Agriculture Organisation (FAO) estimates that a significant proportion of the food produced in the global food supply chain - around one third - ends up as waste, amounting to around 1.3 billion tonnes per year. These figures have shocked everyone, including the scientific community, because the environmental impact of such a large amount of biomass that is produced unnecessarily, squeezed through processing and logistics and finally destroyed is considerable. A popular metaphor is that if food waste were a country, its greenhouse gas emissions would rank third behind the United States and China. In tropical climates, for example, a large amount of fruit and vegetables often spoil before reaching the consumer due to poorly organised supply chains, while in Western societies most waste is generated by household waste. Thanks to the technology used in the project, water use can be significantly reduced as irrigation water is repeatedly delivered directly to the roots, where there is almost no evaporation and run-off loss, resulting in up to 95 - 98 % less water use than in crop irrigation. As a result of

the implementation of a technology that does not require arable land, the project will result in 100% avoidance of soil depletion. Conventional farming depletes the soil, drains marshes, cuts forests, eliminates wildlife habitats and increases desertification. And the degradation of land and water resources is leading to a decline in global food production, which can cause supply insecurity, soaring food prices, migration and crisis conflicts. Agriculture, forestry and other land use (the so-called AFOLU sector) is a major source of greenhouse gases, accounting for about 24% of total human emissions, which is close to the amount emitted by electricity and heat production. So land use change (agriculture, livestock, logging, etc.) is about 24% of greenhouse gas emissions. Changing weather patterns due to global climate change, such as more frequent and intense extreme events, can lead to soil degradation and degradation, vegetation loss, desertification, fire damage, permafrost (permanently frozen ground) loss and overall loss of soil fertility and thus soil carrying capacity. Most of these contribute to an increase in greenhouse gas emissions, thus exacerbating climate change. Intergovernmental Panel on Climate Change (IPCC) report¹⁶ warns that our food production methods and consumption patterns are a major contributor to a number of environmental and socio-economic problems, including climate change and soil degradation. Scientists agree that changing land-use patterns to environmentally friendly ones will not be easy, as it will require conscious redesign and changes in farming and livestock practices for nearly half a billion farmers. The IPCC also says that solutions could include preserving natural forests, with a strong emphasis on tropical rainforests, and switching to a plant-based diet with less red meat consumption. Jane Rickson, Professor at Cranfield University, said in the report that rising global average temperatures and intense rainfall are exacerbating soil degradation, compaction, organic matter leaching, biodiversity loss and landslides, many of which are causing irreversible changes.¹⁷ The project will make the production cycle of vegetables much shorter, more predictable, we don't have to wait for natural processes to occur, and we are less exposed to the forces of nature. As a result of the project, optimizing energy use by designing alternative energy supply is key to the return on investment, which is why the building will be equipped with state-of-the-art ventilation and air conditioning equipment. In addition, a 46 kWp solar panel system will be installed, which will contribute significantly to the economic operation of the farm.

¹⁶ IPCC, 2014: Summary for Policymakers. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

¹⁷ <https://www.bbc.com/news/science-environment-49149761>

The investment will also include the installation of a customized solar power system to meet the electricity needs of the unit, which will significantly improve the return on investment and will also strongly improve the profitability of the investment in the future. An additional benefit is that it will increase the energy independence of the plant's operations and contribute to the "greening" of the urban environment.¹⁸ According to the preliminary survey, the flat roof has a surface area of 300 square meters and 122 pcs. Astro 4 Semi 380 Wp solar panels¹⁹ will be installed on an area of 300 m², which will be accompanied by a high-performance inverter. Based on simulation, the expected annual energy production of the system is 56009 kWh, which is capable of partially replacing electricity consumption, making it highly energy efficient and moving towards zero emissions (LED, solar). Solar energy utilization helps address the main problem of the vertical farm and provides its energy needs using 100% renewable energy.

2.2 Measures to maximize impact - Dissemination, exploitation and communication

The sales module is an integral part of the business and organizational model that will be created through the implementation of the project, supported by a pre-designed marketing strategy and communication, and we know from experience that we need to reach consumers in a targeted and personalized way with modern information technology solutions based on our own customer database, which we have the potential to do from the start of the business. In our view, these two interacting factors, i.e. planned and database-driven communication with customers, can reach a very broad base of end-users early on in the project. In the first instance, the unit to be developed will be responsible for the catering/retail sale of finished products, prepared by processing raw materials partly grown locally and partly sourced from suppliers. Its function will be that of a restaurant specializing in specific raw materials, aimed at catering for the main catering needs. Consumers will thus have the possibility to consume ready-to-eat products on the spot in a restaurant setting or as take-away. The restaurant will be served at the counter in a fast-food style, i.e. the kitchen will be largely open, allowing customers to see what is being used to prepare their food and how it is prepared. Counter service also means that the customer takes the food and drink they have ordered and paid for from the vendor. However, the concept of the new restaurant is that it will be beyond the standards of a fast-food restaurant in terms of appearance, quality of furniture, serving methods and equipment. This will be combined with a visual element that will allow guests to observe the place of production through a glass wall while eating their food, thus acting as a "show room". Our experience shows that this will be a great boost to customer confidence and interest. In addition to the classic restaurant service, the project aims to enable and manage the delivery of web-based orders from the outset. By growing vegetables in an artificial, closed environment, serving and serving freshly harvested produce in a very short time, and by greatly simplifying processing procedures (e.g. no washing), we will be able to offer our customers finished products with a vitamin and nutritional value that exceeds the 'nutritional' value of products that are not grown locally but transported from afar, packaged and processed using large-scale food processing methods. This is an advantage over other similar products available on the market, the value of which can be translated into a concrete price at the end-user level - and this is particularly true in a world where consumer demands/expectations for products and services are constantly increasing. There is now evidence from a number of studies that in the health food market, a higher price is an indicator of quality for most consumers and can therefore, up to a certain level, positively influence the consumer's choice, but the positive role of higher price is also evident in Veblen's prestige consumption. Research has also shown that in this market, consumers are willing to pay a higher so-called 'price threshold' for products with a demonstrable, verifiable and real higher 'intrinsic' value. The sales module created by the project, i.e. the 'showroom' restaurant, which will make the products accessible to the end consumer, will provide a suitable basis for disseminating and exploiting the results of the project. On the one hand, the products of the results achieved during the implementation process are accessible and tangible to the end-user group, and on the other hand, the visualization of a unique business and organizational model can be easily communicated to the wider public.

¹⁸ According to our preliminary calculations, the solar panel system that will be installed will result in an annual carbon dioxide reduction of 21,000 kg, which is equivalent to 955 t of carbon dioxide sequestration.

¹⁹ They come with a 12-year warranty and a 25-year performance guarantee.

We will implement a pre-planned and structured communication strategy:

	Definition	Note
1. target group	Middle-aged and older (40-80 years old), with secondary and tertiary education, middle class, men and women.	A target group who want to enjoy the benefits of healthy eating, healthy and nutrient-dense foods, and a healthy lifestyle;
2. target group	A group of young and middle-aged (14-50 years old), middle-class men and women with primary, secondary and tertiary education, who are sporty and enjoy a healthy lifestyle.	A target group who focus on environmental and health-conscious lifestyles.
3. target group	Wider social groups (5 - 80 years old) who are not currently paying attention to healthy lifestyles and healthy eating.	A target group who need to be trained to consume consciously and thus lead a health-conscious lifestyle to reduce food waste and food wastage.
4. target group	Small and medium-sized enterprises with stable operations, mainly in the region, that are receptive to innovative technologies.	Delivering information to the professional audience through presentations, professional days, workshops and conferences.

COMMUNICATION

CHANNELS:

- | | | |
|---|--|--|
| <ul style="list-style-type: none"> • TV • Radio • Printed press • Outdoor advertising media | <ul style="list-style-type: none"> • Internet fairs • Shopping promotion • Telemarketing • Sponsorship • Personal sale • Public Relations (PR) | <ul style="list-style-type: none"> • Online marketing • Point of sale advertising material (POS, POP) • Direct marketing (DM) |
|---|--|--|

COMMUNICATION TOOLS:

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> • Duna TV • Travel • Vital TV • Életadó Televízió • FEM3 • mr1, mr2 • Class FM • FM1 • Családi Lap • Patika Magazin • Gyógyhír Magazin | <ul style="list-style-type: none"> • Turista Magazin • Vital Magazin • Wellness Magazin • Elixír • BikeMag • Giant poster • Transparent • Billboards • Flyers • Tourism sites (banner) • Health pages (banner) • Community sites | <ul style="list-style-type: none"> • Sport pages • Accommodation booking sites • Travel exhibition (Febr.-March) • VitalExpo (Febr.-March.) • Snow-Show (Nov.) • Personal Hungary Trade Fair (Okt.) • SIRHA BUDAPEST |
|--|--|---|

B2B Communication:

LinkedIn

Media consumers:

- Business people, decision makers, job seekers

Communication methods:

- Business content, education
- International and local news sharing, best practices, success stories
- Employee branding content for jobseekers

Events, conferences

CSR activity

Social responsibility

- Kindergarten renovation, food donation
- Support for Santa Claus factory, animal farms with unused raw materials, #zöldenjobb - the movement for the protection of the environment

Organizations

- TeSzedd; <http://szelektalok.hu/teszedd/>
- Bohócdoktor; <http://pirosorr.hu/>
- Ételt az életért <http://eteltazeletert.hu/>
- Máltai Szeretetszolgálat; <https://maltai.hu/>
- SOS Gyermekfalv; <https://www.sos.hu/adomany/>
- Mikulásgyár; <http://mikulasgyar.hu/>

Facebook

- Conferences where we can meet investors and decision-makers
- Franchise Conference, Franchise Exchange

Online & offline PR

- The concept and its potential
- communicating to decision-makers
- Branded content, business and lifestyle articles

Media:

- HVG, Portfolio, Piac&Profit.hu, Index, VS.hu, Origo, franchise.hu, EU newspapers and portals

Communication objectives:

- Community building, thematic and regular post generation
- Interaction with consumers
- Give them the opportunity to communicate with the brand
- Inbound marketing - INBOUND communication

Prize draws

Question, opinion, feedback, vote

Market research for product development e

- Video content, live stream
- Lifestyle posts
- Blog, Articles

Following the guidelines outlined above, we will set out the dissemination, exploitation and communication actions we plan to carry out for each event, as well as for each event in isolation.

Year												
	I	II	III	IV	V	VI	VII	VIII.	IX	X	XI	XII
1	Own website											
2	Social Media / Facebook, Twitter, LinkedIn, Instagram											
3			Conference			Conference			Conference			Conference
4				Exhibition						Exhibition		
5	Média											
6			Open day			Open day			Open day			Open day
7		Publication				Publication			Publication			
8			Workshop			Workshop			Workshop			Workshop
9				Roadshow						Roadshow		

2.3 Summary

KEY ELEMENT OF THE IMPACT SECTION

SPECIFIC NEEDS	EXPECTED RESULTS	D & E & C MEASURES
<i>What are the specific needs that triggered this project?</i> Major problems have emerged in food supply chains. Environmental factors such as climate change are making outdoor crop production unpredictable (drought, hail, soil shortages). Current production technologies produce end products with significant losses of nutrients and vitamins. Resources (energy, water, land) are becoming increasingly scarce. Crop production is heavily reliant on chemical inputs.	<i>What do you expect to generate by the end of the project?</i> The practical implementation of a new business and organizational model in an operational unit, based on a completely new approach, where the process of "PRODUCTION - PROCESSING - SALES" is integrated into a complex, coherent system in a single location and where each process incorporates innovative technologies. A new model for the integration of the "PRODUCTION - PROCESSING - SALES" processes, driven by AI and based on robotic technology. New products: AI processing of consumer preferences and attitudes to produce healthy end products that did not exist before, through the production of unknown crops enabled by technology. Demand-driven crop production.	<i>What dissemination, exploitation and communication measures will you apply to the results?</i> Use: Patenting the algorithmic model of artificial intelligence. Communication to citizens. Dissemination to the scientific community and industry: Participation in conferences; organization of workshops for industry; participation in EC project portfolios to disseminate results as part of a team and maximize visibility to companies.

TARGET GROUPS

Who will use or further up-take the results of the project? Who will benefit from the results of the project?

The implementation of the new business and organizational model will be put into practice in an operational unit that can be run by the consortium leader.

End users: consumers of catering and food products

Scientific community in AI, robotics and plant biology.

OUTCOMES

What change do you expect to see after successful dissemination and exploitation of project results to the target group(s)?

Among end-user consumers, the following is achieved

- increase in lifetime
- the promotion of an environmentally and health-conscious lifestyle
- reducing obesity-related diseases
- development of consumer awareness and health consciousness
- consumer education and reduction of food waste and food wastage

Achieved within the industry:

- a significant reduction in water consumption
- preventing soil depletion
- optimization of energy use

IMPACTS

What are the expected wider scientific, economic and societal effects of the project contributing to the expected impacts outlined in the respective destination in the work programme?

Scientific:

- a new breakthrough scientific discovery on AI and robot-assisted modelling of "PRODUCTION - PROCESSING - SALES" processes based on vertical technology.

Economy:

- Bringing new products, services, business processes to market, increasing efficiency, reducing costs, increasing profits, contributing to standard setting.
- Increase the lifetime by 8-10 years within the target end-user population
- improve policies and decision making, increase consumer awareness

Social:

- Reduced environmental and climate impact of agricultural production (including through 95% reduction in water use, 100% avoidable soil depletion and reduction in food loss and waste)

3. Quality and efficiency of the implementation

3.1 Work plan and resources

The work plan of the project is composed in line to achieve its objectives. The three key objectives, i.e. to create an AI boosted sales module, to build industrial quality sales driven vertical farming production control system and to significantly enhance production processes with robots, are organized into three core work packages (WP1 - WP3). Each of them addresses the corresponding objective. There is an additional work package (WP4) to synthesize the core achievements into a coherent demand-driven, automated production control system, built on top of modern IT infrastructure. Then, there is a generic work package (WP5) integrating all dissemination, outreach efforts with a special exercise of creating a showroom, i.e. a visual monitoring possibility at the customer sites that reveals how the plants are produced on a day by day basis. Figure 3.1.1. illustrates the organization of the work plan.

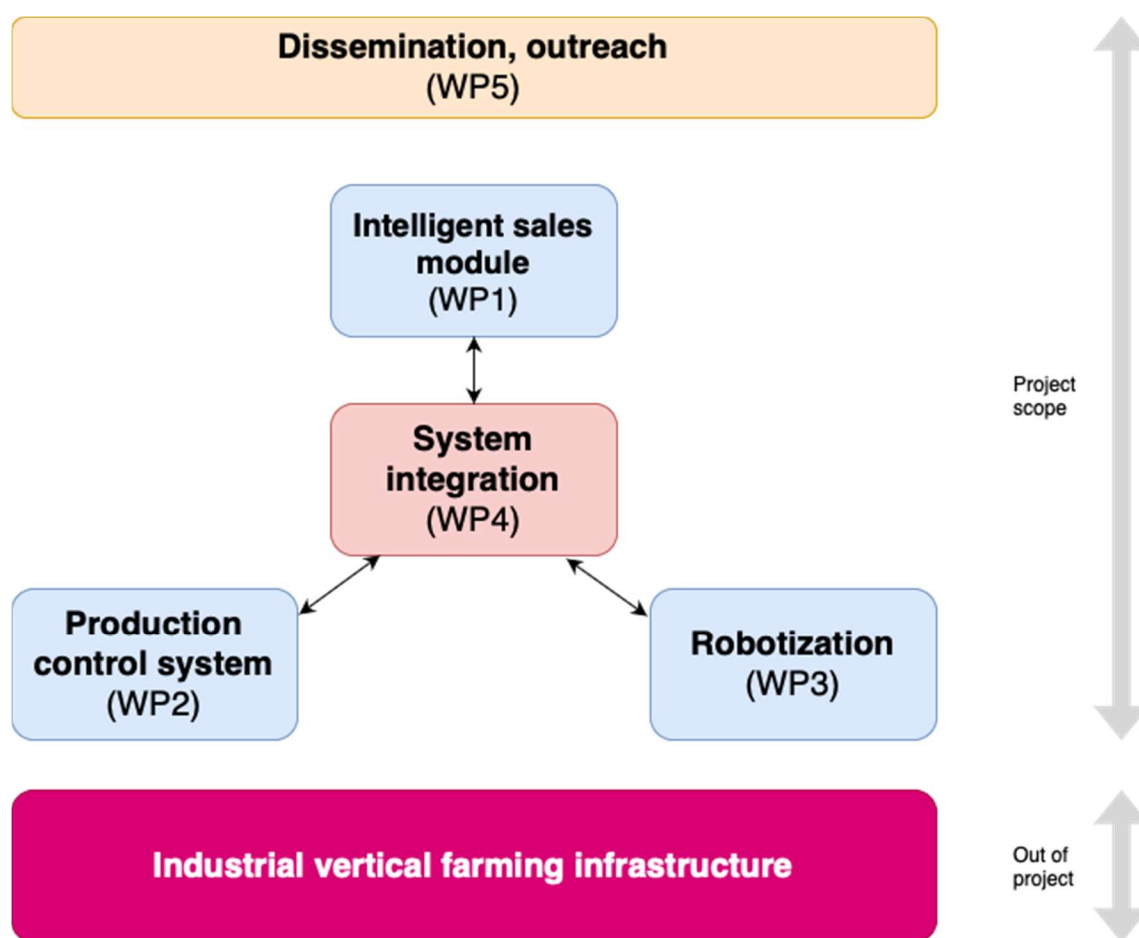


Figure 3.1.1. Organization of work plan.

Figure 3.1.2. and Figure 3.1.3. illustrate the GANTT chart and the PERT chart of the project:

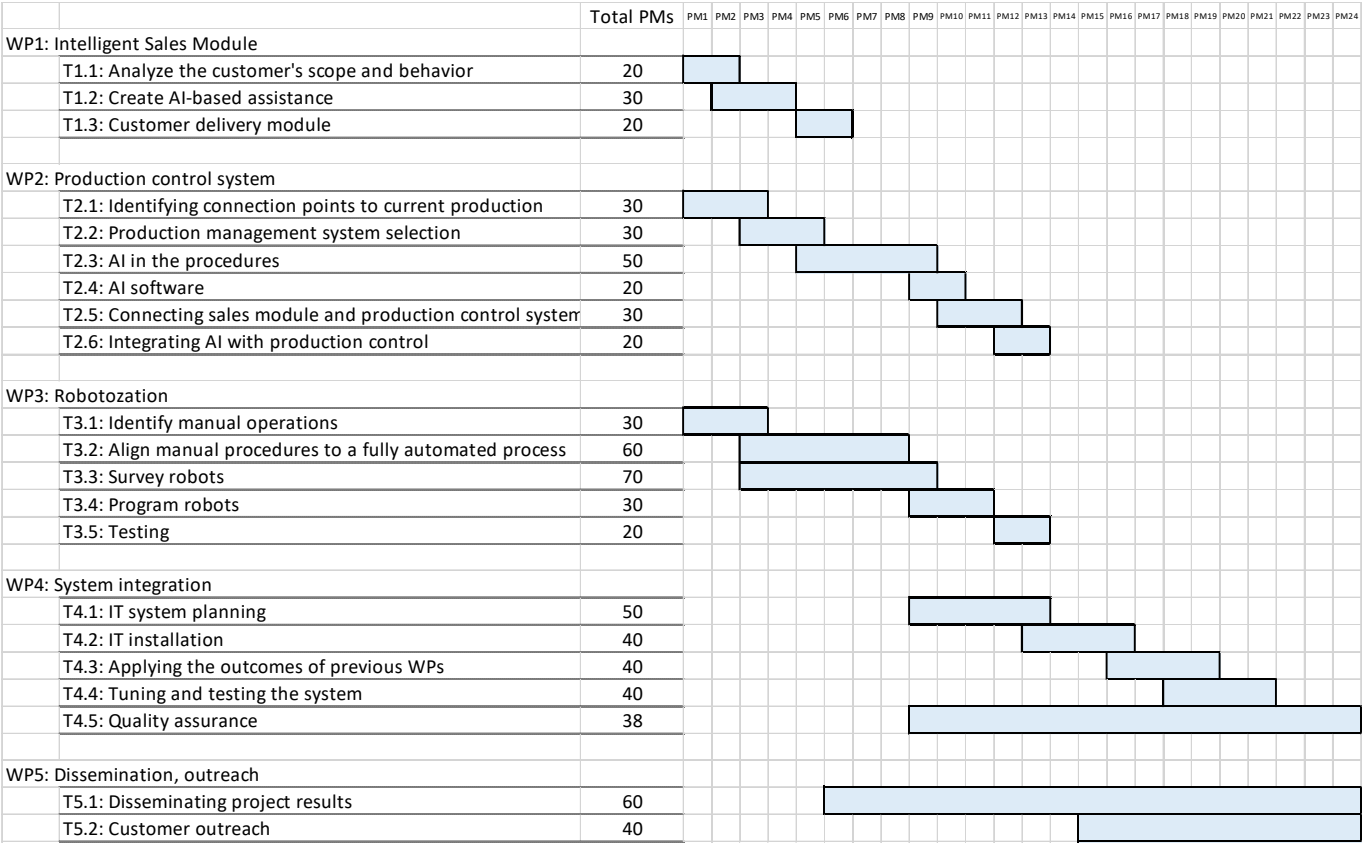


Figure 3.1.2. GANTT chart

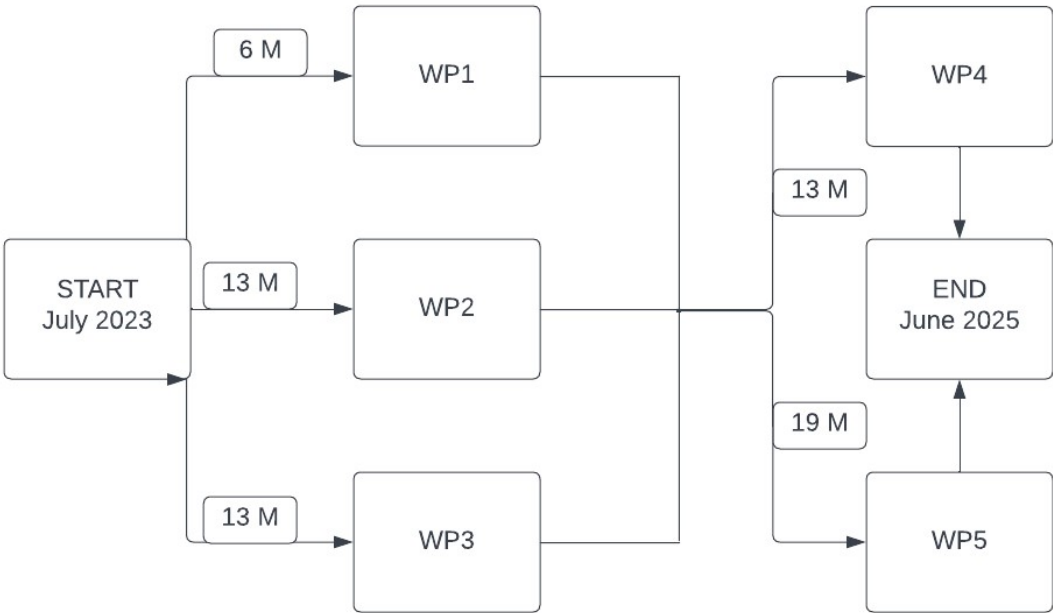


Figure 3.1.3. PERT chart

3.2 Capacity of participants and consortium as a whole

The most important criterion for the selection of partners when setting up the consortium was the availability of intellectual capital, know-how and infrastructure that could best support the achievement of all the project's objectives. The aim of the development is to create an integrated, novel business and organizational model that will bring together in a single location the production of indoor vegetables, the processing of the basic products grown there and the service and sale of these products to customers/consumers, taking advantage of the benefits of artificial intelligence and robotics. The whole project is therefore about developing a business and organizational model based on the experience of the consortium leader **Freshness and Health Kft.**, based on the vertical farm technology provided and supervised by the **Biopolus Institute Nonprofit Zrt.** and as an integral part of the development, research on artificial intelligence and robotics technology to fit this business and organizational model, the **Budapest University of Technology** will provide the professional background and knowledge base that will enable the execution of high quality research and development activities in these areas, according to the specific needs of the project. At the same time, the objective of the project is to move from the development of basic principles and technological concepts (TRL 3) and laboratory validated technology (TRL 4) to the demonstration of the prototype in an operational environment (TRL 7) during the implementation period, thus it is essential to include in the project the professional knowledge that can adapt the results of the research and development processes to a practical environment and thus provide empirical opportunities for research, development results in a real operational situation and to determine the direction of further research and development through feedback, so the project involved **Arizona Machinery Kft** and **Epson Europe BV**, who have significant international experience and references in the field of robotization, and **Springer & Jacoby Kft.** and **Springer & Jacoby Österreich GmbH**, who have extensive international experience in the practical application of artificial intelligence on the customer side, and **Smart System Informatikai Zrt**, who can implement the system integration of development outputs and the practical adaptation of the research and development results of artificial intelligence and robotisation and the feedback of the results to the research and development departments at a high level.

An increasing share of research and development activities draws on the results of social sciences and humanities and this, combined with the development of information technology, leads to significant innovations in services and products. Accordingly, the consortium members come from disciplines that cover a wide range of disciplinary and interdisciplinary knowledge and each participant can provide a very strong synergy for the successful implementation of the project by exploiting the disciplines in their own field. As the project is essentially based on the understanding and processing of end-user consumer needs and the definition of processes driven by these needs, it is of utmost importance to use the results of social sciences and humanities (psychology, sociology), which include the understanding of consumer behavior, complemented by the application of economics and law, which provide the framework for the economic exploitation of the project results and commercial exploitation. The production basis of the business and organizational model is the vertical farm technology, which in the course of research and development activities generates a number of questions in the field of biophysics and biochemistry, which are interdisciplinary disciplines. The results of the project's research and development will be managed through a new approach to scientific communication, based on the FAIR and CARE approach to research data management, based on the principles of transparency and collaboration, and an innovative way of disseminating latest research results using the latest technological developments and digitalization. As scientific research has shown that the presence of women increases innovation and team performance, we have included women researchers in the research and development activities, and in the implementation of the business and organizational model, dissemination and exploitation of the results, several women are involved in the project, and the managing director of the consortium leader Freshness and Health Kft.

The development will be a vertical farm in Budapest, which will initially allow the local cultivation of five types of salad ingredients on a total area of 115.2 m² and will be accompanied by a processing and sales unit. The business and organizational model will therefore be set up on a site developed by Freshness and Health Kft. and the infrastructure necessary for all the project activities will be available here. In other words, a vertical farm designed and supervised by the Biopolus Institute Nonprofit Zrt. at the central location of the project will provide the basis for the implementation of the activities defined in the work plan. Here, in addition to the practical application of vertical technology, it will be possible to introduce and test the results of research and development and to feedback data and information from these processes to the research and development areas. As the processing and sales units are also linked as an integral unit at the central site, the customer-oriented sales and processing and production research and development processes outlined in the work plan can also be implemented on site. The central site developed by the project will be a multifunctional unit where, in addition to the practical and real-life operation of the business and organizational model, the whole complex will also function as a "test laboratory" where the processes defined in the project work plan will be implemented.

By creating a centralized infrastructure, the consortium members involved in the project will thus have easy and locally concentrated access to the critical infrastructure needed to implement the project activities. Furthermore, the accessibility and availability of the research and development activities defined in the project activities is a high priority in the IT system design, so that no consortium member has problems in accessing the research results and data generated remotely. When defining the members of the consortium, the primary objective was to select those who can provide the most appropriate knowledge and practical experience to achieve the project objectives and to maximize the complementarity of the members' competences in achieving the project objectives. Accordingly, the project host and consortium leader Freshness and Health Kft will provide the business and organizational model framework within which the research and development activities can be carried out and the development will result in a modern business and organizational model supported by artificial intelligence applications and robotics technology, which will contribute in a sustainable way to making the results and positive impacts of the project available to the target group and to making the results available to a wider target audience at EU level in the future.

Freshness and Health Kft. has the market knowledge to formulate goals and ambitions and to formulate development concepts that combine the development results of AI and robotization research in the integration of specific fields - agricultural production, agro-processing and catering - with a successful business model based on consumer needs. As the basis of this new business and organizational model is the vertical farm production technology, which is the next link in the project chain away from field crop production, the Biopolus Institute Nonprofit Zrt. Freshness and Health Kft and Biopolus Institute Nonprofit Zrt have the competences that form the basis of the business and organizational model, but in order to develop the system to a serious level, which can be integrated with artificial intelligence and robotics solutions, the appropriate scientific and experimental expertise is needed. A suitable partner for that is the Budapest University of Technology, which has a knowledge base that is an excellent complement to the professional base of Freshness and Health Kft. and Biopolus Institute Nonprofit Zrt. Since the aim of the project is to ensure that the results of the experiments and developments generated during the implementation phase can be put into practice and even operate under real operating conditions, it is essential to involve partners who can translate the theoretical results into practical operation. In other words, the business and organizational framework established by Freshness and Health Kft. and Biopolus Institute Nonprofit Zrt. and the research and development directions they have formulated within the framework of the project are to be followed by research and development processes professionally managed and supervised by the Budapest University of Technology, which will provide possible answers - both in the field of artificial intelligence and robotics - that can be mapped and integrated into practical processes. These competences are provided by Arizona Machinery Kft and Epson Europe BV in the field of robotics, Springer & Jacoby Kft and Springer & Jacoby Österreich GmbH in the field of artificial intelligence, which enables feedback into customer-driven and processing and production processes, and Smart System Informatikai Zrt.

The selection of the companies participating in the consortium was based on a methodology that ensures that the competence and available resources of the participating companies cover the entire value chain of the project, from the definition of the theoretical issues to the practical implementation of the objectives. The consortium leader, Freshness and Health Kft, provides the framework for the project, with a new business and organizational model defined by the consortium that encapsulates the project's objectives. The company has been operating and is currently operating sales units under the "Freshland" franchise - the company owns the rights to use the "Freshland" trademarks²⁰ - and is present in the Budapest market for healthy food companies - the Budapest agglomeration has 3 million inhabitants - and has considerable experience and knowledge of this market. The company currently has 4 sales points in Budapest and is continuously developing its sales network, which will ensure coverage of the entire Budapest agglomeration. Freshness and Health Kft. will cover the whole spectrum of the project and will coordinate the tasks defined in the work plan throughout the project implementation. An advantage for the project is that the construction of the site does not have to start from scratch, as only one investment involving the conversion of a point of sale is required. The company has the appropriate material and human resources to ensure the participation of 6 people with the appropriate professional background to carry out the tasks defined in the work plan, so that the company's role is to ensure the implementation of the whole project, optimizing the objectives of the research and development activities, ensuring their theoretical and practical implementation, bringing the sub-areas together and ensuring that the project reaches TRL7 - prototype demonstration in an operational environment - during the implementation period. The company plays an important role in the further exploitation of the project results and in the dissemination of the project results after the development period, as the operation of the unique industrial vertical farming site combined restaurant created during the development - i.e. the infrastructure that integrates the production - processing - sales processes into one unit - enables the exploitation of the project results in the target group and at EU level in the longer term.

Biopolus Institute Nonprofit Zrt. will provide the vertical farm technology on which the project is based. The company is the non-profit research and development arm of the Biopolus Group, focusing on process and product development, and investing mainly in R&D to expand the development of circular economy solutions for these technologies. It is also active in biotechnological innovations for water recycling and organic resource recovery and is in the process of developing new solutions for process and product optimization. In addition to biotechnology, they are also expanding into vertical farming where they are working with strategic partners to create the factories of the future. The Biopolus plant factory will be built with a modular system that is scalable and customizable, with growth modules optimized for each crop type. For each plant, a specific feeding and lighting schedule (with ideal wavelengths and intensities) is set up to produce the highest quality product. Crop types can include specialty exotic products (including micro vegetables and evergreen varieties), propagating material for outdoor farming, medicinal and cosmetic plants and flowers. The company's role is to provide the expertise in vertical farm technology to underpin research and development activities in artificial intelligence and robotics and to work with the other project team members to help achieve the objectives set out in the work plan. To this end, the company will have the necessary physical and human resources for its role in the project and will be able to provide 5 people actively involved in the research activities.

The Budapest University of Technology and Economics (BME) provides the scientific, research and development base for the project. BME is a prestigious institution of higher education in Hungary. Its primary mission is to train technical, IT, natural science, economic, business and management professionals for the relevant sectors of the national economy. The university's mission is inseparable from its teaching: to cultivate science, scientific research and creation, encompassing basic and applied research, technical product and service development and the exploitation of results, which form the innovation chain. In the rankings of higher education in Hungary, the institution's engineering and IT programs are among the best. BME currently relies partly on public funding and partly on its own revenues, and its faculties have access to market funding through a wide range of activities, including national and EU grants and strong industrial links. BME's role is to provide the human resources needed to carry out research and development activities in the fields of artificial intelligence and robotics, as a key element in achieving the goals set out in the vision. The University has the necessary physical and human resources for the project and can provide 6 people to participate in the research and development activities in both AI and robotics, providing a solid scientific and professional background for the research and development activities.

²⁰ It includes three different marks: the word "FRESHLAND" and two colourful designs, "freshland FEEL THE RYTHM OF THE TASTE" and "freshland". All three marks are protected by the National Intellectual Property Office and are owned by Freshland Europe.

Arizona Machinery Kft. Located in Szeged, Hungary, specializes in the design and manufacture of custom industrial solutions. It has extensive experience in robotics solutions in various industrial fields: agricultural, chemical, food, pharmaceutical. Arizona Machinery designs and manufactures the required automated, complex robotic solutions. It builds the necessary warehouse for vertical management and provides overall system integration. Epson Europe BV specializes in the supply and sale of robot products for various applications and has more than 300 different robot types, together with the necessary accessories, making them ideal for integration into automated industrial robot cells. Epson Europe BV provides the robot hardware and software required for vertical agricultural automation.

Springer & Jacoby was founded in Hamburg in 1979 and during more than three decades of operation, the German parent company has been one of the 20 most successful agencies in the world from a creative point of view. In 2014, the owners decided to spin off the advertising communications division from the parent company and to continue its operations as Springer & Springer & Jacoby Kft. as an independent company, based on the principle that the successful and accurate completion of a project depends above all on joint thinking, mutual fairness and good relations with our partners. The Austrian company Springer & Jacoby Österreich GmbH was founded in 2002 and has been owner-managed since 2009. The team of more than 20 experienced professionals and young creatives develops and consults on successful campaigns for national and international companies and is based in Vienna's fifth district at Schönbrunner Straße 31. Springer & Jacoby's role in the project is primarily to define the research and development direction in the areas of customer-driven artificial intelligence and feedback into processing and production processes, and to adapt and test the results of this research and development in practice on customer relationship management systems, for which they can draw on their Hungarian and international experience in the full range of verticals. The companies have the relevant experience and the material and human resources to carry out the tasks.

Smart System Informatikai és Tanácsadó Zrt. was founded in 2018 by owners with decades of experience in IT and finance. The strategic goal of the company is to provide IT consulting, services and development projects, and to continuously look for innovative areas of development that will differentiate the company in the market and allow it to build on a long-term basis, as well as to offer new services to existing and future clients. Their competencies include design and operation of data storage systems, backup such as SAN, NAS, iSCSI systems, backup environment design, data backup recovery, design and operation of database systems: SQL, LDAP, high performance computing, support for scientific computing, simulations; user support; cloud technology: design and operation of IaaS virtual services; proficiency in XEN, QEMU, Hyper-V, VMware. Based on all these competences, the company is perfectly suited to transfer the results of the theoretical research and development areas generated during the project implementation to the project team members carrying out the practical implementation and to provide feedback of the empirical outputs of the practical activities to the research and development areas in an appropriate manner and form. For all these activities, the company has the appropriate expertise, physical and human resources.

The exploitation of the results of the project will be ensured mainly through the operation of the unique point of sale that will be created by Freshness and Health Kft. In the longer term, the company's involvement in commercial activities will enable the dissemination, exploitation and communication of the project results. The point of sale itself will provide an excellent basis for measures and communication opportunities to maximize the impact of the project, as a significant part of the activities identified in 2.2 can be built on this platform. The unit will provide excellent opportunities for media coverage (television, newspaper, web portals), an excellent basis for public media coverage (Facebook, Twitter, LinkedIn, Instagram) through on-site participation of the target consumer group and a venue for workshops, open days, conferences, events to present the results. Last but not least, the "showroom" character of the unit design, i.e. the vertical farm, enhanced with AI and robotics solutions, separated by a glass wall and visible to the final consumer on site, has a significant communication value in itself and allows direct communication of the project results to the target user group.

Tables for section 3.1

Table 3.1a: List of work packages

Work package No	Work Package Title	Lead Participant No	Lead Participant Short Name	Person-Months	Start Month	End month
WP1	Intelligent sales module	1	Freshness	50	PM1	PM6
WP2	Production control system	3	Biopolus	120	PM1	PM13
WP3	Robotics in vertical farming	2	BME	145	PM1	PM13
WP4	System architecture and integration	4	Smart	187	PM9	PM24
WP5	Dissemination, outreach, showroom	8	Springer Jacoby Öst	100	PM6	PM24

Table 3.1b: Work package description

Work package number	WP1
Work package title	Intelligent sales module

Objectives

Key research and innovation objectives:

- customer-driven production control in vertical farming;
- use artificial learning and intelligence in automating sales procedures;
- use continuously trained recommender systems;
- create an integrated system that allows industrial quality and quantity of plant production.

The key distinguishing feature of the project is creating a sales-driven (demand-driven) ecosystem of vertical farming-produced plants. One of the three key elements is what is referred to as the "sales module". This module is meant to keep relationships with the customers as well as the production control system.

The sales module has the following features:

- it maintains the customers and connects them via social media, or any other platforms;
- it processes, analyses, and digests orders while processing order data and customer profiles while creating structured order data used for controlling production;
- it uses artificial intelligence to make predictions on future orders, and also to accumulate experience into synthesized knowledge;
- it uses recommender systems that are trained with initial sales data.

The main purpose of this work package is to research, design, and implement the sales module and apply artificial intelligence solutions to enhance or even replace human decision-making procedures in the entire sales process. It also uses artificial intelligence to give structured feedback to configure the production system to ensure that the sales orders are by the farming productions.

Description of work

T1.1: Analyze the customer's scope and behavior

This task is about creating a consistent, process-based model for the virtual farming product customers, their behavior, as well as on the entire sales procedure. As the customers require quality products, measures on quality will be applied. The model will list not only the main platforms that customers typically use including ordinary IT solutions such as e-mail, and web platforms, but also the most up-to-date social media platforms used in everyday business.

The model describes sales structures, sales procedures, and sales actions, and also documents the most relevant human knowledge related. It also describes the connectors to the different social media and IT platforms, illustrating how the sales module will fit the interfaces of external systems. The purpose of connecting the sales portal to as many different platforms as possible is to ease usage and extend the user authentication possibilities to cover the broadest possible set of customers. Special care will thus be taken on user authentication, authorization, and, in general, user attribute transfer. The social media platforms will pass permitted user attributes to the sales module, so it can prevent the customers from having to register yet another platform and multiple user accounts.

As ergonomics is an important element, the model will use communication protocols to feed structured order data to the production system to allow the production system to be automatically configured by the orders.

T1.2: Create AI-based assistance

While the previous task is about yielding a comprehensive sales model, this one ought to identify manual elements within procedures related to sales. The manual elements, such as customer order analysis, processing information shared by customers, data digesting, order recommendation, order bookkeeping, and quality and quantity analysis will be studied and folded out into more detailed procedural models.

As soon as these models are ready artificial intelligence solutions fitting them the most will be researched. We plan to find such solutions as recommender systems and study their operations and their suitability.

Based on the selected platform a learning module framework will be set up including AI software, and services. AI assistance modules will be installed within virtual execution environments.

Finally, the training data model and training data sets will be identified corresponding to the individual AI assistance models so that they are used for training assistance modules. It is an important research challenge to allow assistant modules to continuously train themselves while working in production.

T1.3: Customer delivery module

As a result of the previous task, a comprehensive sales model, as well as AI-assisted services, will have been created. This task plans to architect the sales portal, test it, and put it into production.

The development focuses on selecting a suitable software/web platform on which the product sales module will be based, and software development disciplines, such as rapid prototyping, backend-frontend separation, and flexible data backend will be used. In the end, some ergonomics will help to streamline the portal to allow easy usage.

The portal will be able to authenticate users from the main customer relationship platforms, such as email platforms, web platforms, and social media platforms, and will be able to use any allowed user credentials issued there. The users will be able to get into the portal, submit orders, get recommendations, and, in general, access all the available production services, while they will be supported by AI assistance modules. Internal control messages will be delivered to the production system.

Work package number	WP2
Work package title	Production control system

Objectives

Key research and innovation objectives:

- replace manual procedures in production with AI;
- synthesize domain-specific human knowledge into automated learning.

Currently, most of the vertical farming systems are research infrastructures that help to study different plantation procedures on the vocational level. Most of their procedures are aligned with agricultural research targeting to the production of better plants under better conditions, the most effective energy usage, etc. being ill-suited to industrial production. Industrial production, however, requires a different infrastructure where the entire plantation procedure is orchestrated into a single, most favorably, pipeline-like framework with all the procedures automated, controlled, and generally driven by sales orders.

For this purpose, we need to study the current research infrastructures and offer a comprehensive automation framework that incorporates all subprocesses of the entire plant development process, including germination, growth, and harvesting, extended by delivery-related issues such as product processing, cleaning, packaging, and delivery. This work package focuses on composing the automation model by surveying what kinds of technologies are available, where the human decision-making points are, and how these points can be tuned by artificial learning. The main purpose is to compose an entirely pipeline-based, automated production framework with explicit control points being able to early recognize and prevent system failures and out-of-order plant production.

Description of work

T2.1: Identifying connection points to current production

The current vertical farming research environment already contains software and hardware solutions that help in several subprocesses in the plantation, which are as follows:

- the artificial sunlight control system that helps to set the right amount and right composite of artificial sunlight that is particular to the plant and the climate in which it is grown;
- the ingredients control system that helps to add the necessary nutrients and other components such as minerals, carbon dioxide, etc. in the necessary proportion;
- solar energy control systems help to transfer natural sunlight from above to solar power and thus transfer this energy to the plantation.

These components all have an established environment that needs the production control system to fit.

On the one hand, this task plans to give an extensive survey on such already existing systems, and their description with special respect to their control interfaces that the production control system may interact with.

Based on the learned lessons, a process-oriented automation framework is created that will compose the whole industrial production into a single manufacturing-like procedure divided into subprocedures. The logistics of the entire plant production will be designed under the following terms:

- the logistical unit, such as identified plant trays are designed;
- the tray identification, registration, and treatment methods will be worked out;
- the automation paths will be determined detailing what will happen with the trays in the different subprocesses of plant production;
- the precise functions and description of the different spaces, such as germination chambers, plant growing chambers, harvesting rooms, packaging lines, etc;
- the measurement points and equipment such as moving cameras, sensors, kind of robotics (this allows us to collect images for the early recognition of ill-grown plant structures);
- the whole logistics will match the actual physical environment of the production site.

It is also important to define the transfer interfaces among the subprocesses, both in logical and physical terms, and to design how the different units will be transferred from one phase to the other and on what time scale.

T2.2: Production management system selection

We need to look around the market about what kinds of production systems are available. The different solutions will be classified based on their flexibility, maturity, configurability, suitability, and naturally, their cost. We have to find the most suitable solution for the vertical farming environment.

Then, the appropriate software, or suitable prototype will be selected, installed, and tested against those functionalities collected in the logistics plan.

After completing a successful test the software will be configured to perform production control functions in the logistics plan. At the same time the production control hardware, such as sensors and cameras will also be installed.

If the production control system needs additional pieces of software to join other software components this task will also be responsible to design and develop such middleware components.

T2.3: AI in the procedures

The current research vertical farming infrastructure needs a lot of manual interferences such as selecting the seeds to grow, discovering and selecting ill-grown plants, setting up the right amount of nutrients, or controlling the artificial sunlight being typical to the particular plant. This knowledge is currently stored in the mindsets of agricultural experts who have spent a great deal of their research time experimenting with different variations on different plants.

The purpose of automation is to make these mindsets explicit and try to synthesize such knowledge into automated artificial learning and decision-making systems since in industrial, pipeline-like production environments there is no room for manual processes.

This task aims to reveal these manual procedures with special care about the decision points they correspond to. Then a proper artificial intelligence solution is assigned to the decision points. For example, for ill plant discovery, image recognition and processing algorithm are the most suitable.

The human mindset knowledge is then documented and transferred to training samples.

T2.4. AI software

Suitable artificial intelligence solutions will be selected as replacements for manual procedures. Available AI software will be surveyed based on their functionality, completeness, programming and communication interfaces, and, naturally, price.

The corresponding human knowledge will then be collected and transformed into learning samples. The proper AI software will be installed, trained, and tested against the training samples from the other tasks.

In the end, AI microservices helping, or replacing manual procedures will be available.

T2.5: Connecting sales module and production control system

Being unique in the field, this project will deliver a sales-driven industrial production planning system. The sales orders will be recorded, digested, and assigned to production configurations. So if a sales order is submitted, and, say, a particular plant is requested in a particular quantity, and for a particular delivery time, then this signal should be decomposed to production planning configuration that plans the germination, the estimated plant growth, harvesting and any other auxiliary times took to complete the order.

This knowledge is also based on human knowledge but is pretty static, most of the parameters come from the natural growth cycle of a particular plant. But as we grow plants 24 hours a day, it is faster and easier to predict than in the case of natural lands.

The task plans to describe production configuration setups regarding the different plants produced on the industrial site. Both the quality and the quantity measures will be furnished into the model. The configurations will be matched against the sales module communication protocol, that signals the production.

T2.6: Integrating AI with production control

This task plans to fit AI services and production control systems together and apply the automated knowledge in the production control system. In the beginning, the real production system will be emulated based on some software model, and the entire knowledge base will be tested. The correspondence, the decision-making capabilities, and the quality of decisions will be accounted and the records will be used to refine the artificial knowledge base.

Most likely the experience over the emulated system will offer useful feedback that impacts the outcome of the previous tasks, so re-training of AI components, refining system correspondences, and fine-tuning will occur. Special care will be taken on AI facing unmet conditions. The unmet situations will be matched and rechecked against human experts' knowledge.

Finally, the production control system and the AI services will form an integrated system, tested and trained and performing the same exercise as is needed in the pipeline framework.

Work package number	WP3
Work package title	Robotics in vertical farming

Objectives

Key research and innovation objectives:

- transfer and organize industrial production into a single coherent pipeline framework;
- apply robotics in difficult, not-yet-automated operations.

As is already pointed out there is a significant difference between a mainly research vertical farming site and an industrial production vertical farming site in terms of the level of automation. While in the previous work package a logical model of pipeline-like production has been created, this work package mainly focuses on how the different processes and subprocesses of the automated plant production can be decomposed into more elementary operations and how these can be assisted by different robotics solutions.

The operations are classified into two main classes: Some of them are quite straightforward and well-determined by the corresponding manual procedure. This class is mainly the physical transferring of the logistics unit trays, stacking the units, or moving subcomponents to/from the other logistics units. The other class, however, is not defined yet, as they have been too complex, and need some additional accurate planning to be automated properly and generally enough. An example of this kind of operation is harvesting, which is performed entirely manually in the research site, as it was too difficult and needless to automate. Here the challenge is not only to assign robotics assistance to the operations but to plan the entire operation, their suboperations, and operation sequences and assign suitable robotics afterward.

In general, this work package aims to enhance the robotization level of the entire industrial plant production and to apply automation and robotics in those parts of production wherever it is needed but has not been applied.

Description of work

T3.1: Identify manual operations

In the previous tasks entire plant production procedures are decomposed into consecutive processes and subprocesses, such as germination, plant growing, harvesting, processing, cleaning, packaging, and delivery.

In this task, we plan to review these processes/subprocesses from the automation point of view and will decompose them into more elementary operations and suboperations. Special care will be taken to those processes that are hard to automate or even they are entirely manual at this stage.

We create a robotization plan for the operations in question finding the most redundant, but yet functional solution.

T3.2: Align manual procedures to a fully automated process

After the planning phase, we cross-check the description of manual operations against robotization models based on available robots, their robustness, and their complexity.

Wherever it is necessary we plan to offer robotization alternatives, performing the same thing but in conceptually different ways. This needs cunning robotization, or even non-uniform robotization, i.e. some plants are harvested by one kind of robotics, and some by the other.

The following operations need special care:

- putting seedlings into growth cubes: align the cubes on a tray, get the seedlings, move them above the cubes, and push them;
- putting cubes into baskets: remove the cubes, place them in baskets, and place the baskets onto the tray;
- transferring trays: move trays from one functional space to the other;
- harvesting procedure: remove plants from trays, from the baskets, and also from the cubes by making them clean and ready to consume;
- packaging plants: putting the plants into packages while assuring sanity and quality;
- tray cleaning: wash up the trays, check them, and drive them back to the beginning of production.

Wherever it is necessary, we must rationalize the entire procedure to keep the whole process simple, redundant, and fault-tolerant. Manual procedures often do not consider automation efficiency, simplicity is key to a successful automated production.

T3.3: Survey robots

After creating a robotization plan suitable robots have to be surveyed and selected. Again we have to consider availability, functionality, and costs.

This task is also responsible to get suitable hardware in a sufficient amount for extensive testing. If a particular robot is not available, or is found not to be suitable for the particular purpose, or is considered to be too sensitive, then feedback will be given to the planning phase and alternative solutions will be offered. So this task will strongly be coupled with the robotics planning task due to their interdependencies.

T3.4: Program robots

This task plans to configure the robots and tell them how to perform the task laid down in the robotics plan. Several programming libraries help in high-level programming and make the task easier. The tasks will focus on common tasks including feedback loops, control, pathfinding, data filtering, locating, and sharing data.

T3.5: Testing

Each programmed robot device has to be thoroughly tested if it does the right movements at the right time and in the right way. Both static, functional, and temporal tests (stress tests) are considered.

Work package number	WP4
Work package title	System architecture and integration

Objectives

Key research and innovation objectives:

- put together modular system components and build a coherent system;
- create an IT framework that yields a higher reward than its cost;
- built-in quality assurance data processing supported by AI.

The result of the tree pillar work packages yields the three main components of the vertical farming ecosystem:

- the sales module;
- the production control module;

- and the necessary robotics.

This work package aims to integrate the main components into a single, coherent system that fully automates vertical farming parts into a single, coherent industrial plant production ecosystem. Tasks in this work package focus mostly on the information technology components that will glue the different components together. It also focuses on building the hardware environment necessary to host fundamental components and the communication network needed to pass planting and control information among the components.

Software is also a crucial part here where we build up a structure well suited for robust industrial environments. The software stack will include:

- hypervisor components to facilitate operating environments;
- operating systems that will treat microservices;
- libraries to host common, and shared service components;
- micro, and other types of services mostly the products of fundamental work
- packages, such as AI assistance services;
- any other auxiliary services that are needed to round up the whole.

Not only a production system, but also a test system will also be developed to be able to handle smooth system management, operations, and further development.

Description of work

T4.1: IT system planning

First, the IT system plan will be created. Up-to-date operations and software engineering principles will be used to have a flexible system. The main components of the infrastructure are:

- hardware components necessary to host software services;
- internal data network connecting sensors, cameras, production control points, and different hardware components directly related to plant production;
- virtualization and industrial cloud technology to allow more flexibility;
- operating environments, patch level, and differences to the factory standard products (wherever it is possible we need factory-compliant software to ensure factory guarantees);
- libraries and micro-services;
- applications and AI assistance services.

T4.2: IT Installation

After planning we need to get the different IT components and install them. An important factor of the exercise is to apply configuration and tailor the IT infrastructure to the physical and hardware needs. The production industrial site will be a physical room furnished with vertical farming equipment, and chambers, so the whole IT structure should be compliant with the environment. Several non-office parameters, like temperature, humidity, resistance against the leakage of different nutrition ingredients, etc., are the essence of industrial planning.

Quality measures will be made to ensure the capabilities and bottleneck-free nature of the system. It is also important to ensure industrial quality both in terms of software and hardware and fault tolerance since any system breakdowns have a strong impact on the production as well as the business around.

T4.3: Applying the outcomes of previous WPs

As the IT infrastructure is designed to be able to facilitate virtual services it is straightforward to treat both the test and the production services on the same infrastructure provided that there is enough redundancy.

After an initial test period, the services will be put into production. Safe procedures will be established for how the different components are deployed into different levels of testing, and also into a production environment.

T4.4: Tuning and testing the system

All the system components will be tested in empty operation and also with emulated sales demands. The testing will be carried out according to a comprehensive system testing plan, where all components are tested individually, and a system as a whole. The test results are documented and are used to tune the system components wherever it is needed. Failures will be documented and classified by severity and impact on the production and will be treated according to their priority.

T4.5: Quality assurance

The quality assurance measures will be built into the system components, but they need to be collected and analyzed while in production. Artificial intelligence and data processing can be used to digest the available data and discover malfunctionality patterns trying to discover discrepancies in the system even before they occur.

Interface tests are crucial parts of quality as most of the data goes through interfaces implemented among main system components, so special care will be taken to interfaces.

Human knowledge will be used initially and real problems and their logging footprints will be used as training samples. It is similar to smart log file processing and intrusion detection in IT security, but all the measures will be applied to real-life production. These decisions will then be used to leverage the system and streamline it to the original plan: customer-driven plant production.

Work package number	WP5
Work package title	Dissemination, outreach, showroom

Objectives

The Dissemination work package will set up and deploy all useful and relevant tools (website, social media, print materials, articles and press releases, meetings at events, etc.) to inform and engage the project's stakeholders on the project achievements, developments, and to disseminate the project's outputs (reports, best practices guidelines, policies, standards, methodologies, technical and operation information, guidance documents, tutorials, etc.). First, we involve national and international technical forums and EU forums. Then we also plan to disseminate project achievements to business partners. Finally, we plan to outline the next step visions in the VR area, e.g. using treadmills.

Description of work

T5.1: Disseminating project results

Creating a dissemination plan is one of the auxiliary tasks in the project. There are several future achievements and innovative values that need to be articulated to the outside world. The achievements are classified as entirely public, open science products, or proprietary components of the project. (There might be inherited propriety components even.) Based on the collected information a dissemination plan will be created and used as a guideline for where and how to display the results of the project.

The main purpose is to put together a successful vertical farming environment and a hidden objective is to create a best-case product that is rational to be multiplied. The dissemination efforts will include published articles in newspapers, scientific papers, social media, advertisements, and participation in vertical farming events sharing knowledge with other stakeholders.

T5.2: Customer outreach

It is a special part of dissemination to lay down the major guidelines on how to reach out to new customers. An information package is to be put together about the benefits of being a vertical farm customer compared to ordinary plant production. This package is then used for getting more customers and more sales in the business.

It is also important to collect the needs of customers and feed them back to further system development.

Table 3.1c: List of Deliverables

Number	Deliverable name	Short description	Work package number	Short name of lead participant	Type	Dissemination level	Delivery date (in months)
D1.1.1	Sales model	document on sales module model	WP1	Freshness	R	PU	PM3
D1.1.2	Protocol description	communication protocol, and interface descriptions	WP1	Biopolus	R	SEN	PM3
D1.2.1	Customer delivery model	AI-aided customer delivery model	WP1	BME	R	PU	PM5
D1.3.1	Customer AI report	production sales portal assisted by AI services	WP1	BME	DEM	PU	PM7
D2.1.1	Production control description	hardware and software survey summary	WP2	Biopolus	R	PU	PM2
D2.1.2	Production control interfaces	description of production control point communication interfaces	WP2	BME	R	SEN	PM3
D2.1.3	Production control logistics plan	logistics plan	WP2	BME	R	PU	PM4
D2.2.1	Production control system plan	production management system plan	WP2	Biopolus	R	PU	PM5
D2.2.2	Production control system report	initial production control system	WP2	Smart	DEM	PU	PM6
D2.3.1	Manual procedures	description of manual decision-making procedures	WP2	Biopolus	D	PU	PM10
D2.4.1	Production control AI	description of AI solutions, and AI services	WP2	BME	D	PU	PM11
D2.5.1	Production program	list of plants, assigned production configurations	WP2	Biopolus	DAT A	SEN	PM13
D2.6.1	Production AI report	trained and production-ready AI	WP2	BME	R	PU	PM12
D2.6.2	Production control system report	integrated production control, and AI	WP2	Smart	DEM	PU	PM13

D3.1.1	Vertical farming operations	description of manual operations, and suboperation within processes	WP3	Biopolus	R	PU	PM5
D3.2.1	Robotization plan	robotization plan	WP3	Epson	R	SEN	PM9
D3.3.1	Robotization summary	plain robotics hardware	WP3	Epson	OTH	SEN	PM10
D3.4.1	Robotization report	operating robots, and robot programs	WP3	BME	R	SEN	PM12
D3.5.1	Testing report	testing report on robot functionality	WP3	Epson	R	PU	PM14
D4.1.1	IT system plan	IT system plan	WP4	BME	R	PU	PM14
D4.2.1	IT system report 1	operable IT system	WP4	Smart	DEM	PU	PM17
D4.3.1	IT system report 2	operable IT system incorporating technical achievements of the project	WP4	BME	DEM	PU	PM20
D4.4.1	IT system test	testing report	WP4	Smart	R	PU	PM19
D4.4.2	IT system report 3	error report, feedback	WP4	BME	R	PU	PM22
D4.5.1	IT system feedback report	eliminated system shortcomings, and production vertical farming	WP4	Smart	DEM	PU	PM24
D5.1.1	Outreach plan	dissemination plan, project results appearance wherever possible	WP5	Springer Jacoby Öst	R	PU	PM12
D5.2.1	Customer plan	information package for potential customers, set of potential customers	WP5	Springer Jacoby Öst	DEC	PU	PM23

Table 3.1d: List of milestones

Milestone number	Milestone name	Related work package(s)	Due date (in month)	Means of verification
M1	Functioning sales module	WP1	6	demonstrating the result
M2	Functioning production control system	WP2	13	demonstrating the result
M3	Functioning robots	WP3	13	demonstrating the result
M4	Integrated system	WP4	16	demonstrating the result

Table 3.1e: Critical risks for implementation

Description of risk (indicate level of (i) likelihood, and (ii) severity: Low/Medium/High)	Work package(s) involved	Proposed risk-mitigation measures
technological risk: during the approximately two years of development of our production management system, new technical solutions will be developed that would be inevitable to integrate into our own processes that are currently being developed. Indicate level: medium ; severity: medium .	WP2-WP3	To manage this risk, we assign a project manager who is in close contact with the engineers of our external partners who are constantly working on our production technologies and can provide immediate feedback to the project team on the introduction of any such new industry solutions.
standardization risks: we cannot ignore the fact that, due to the dispersed location of production and processing units around the world, there is a high degree of variation and uncertainty in some man-made environmental factors (e.g. variations in water quality, variations in crop species). Indicate level: medium ; severity: medium .	WP2, WP4	The solution we choose is that the only way to solve the problem is to base our quality requirements on the most comprehensive data collection and to set reasonable "from" to "to" limits on certain indicators.

Table 3.1f: Summary of staff effort

	WP1	WP2	WP3	WP4	WP5	Total Person-Months per Participant
1 / FRESHNESS	11	25	28	28	31	123
2 / BME	12	26	27	42	21	128
3 / SMART	3	11	7	16	0	37
4 / BIOPOLUS	8	14	31	38	13	104
5 / ARIZONA MACH.	4	11	15	28	0	58
6 / EPSON EUROPE	3	11	9	14	0	37
7 / SPRINGER JACOBY	6	11	22	20	20	79
8 / SPRINGER JACOBY ÖST	3	11	6	1	15	36
Total Person Months	50	120	145	187	100	602

Table 3.1g: ‘Subcontracting costs’ items

2 / BME		
	Cost (€)	Description of tasks and justification
Subcontracting	40 000	BME holds available programmer in a spin-off company called BME ISZ Informatikai Szolgáltató Kft (BME IT Services Kft), that is 100% owned by the university. The programming efforts in the work plan will be subcontracted internally to the spin-off company. A programmer costs 10000 EURO/project/year, and two programmers will be contracted during the 2 years lifespan of the project.

Table 3.1h: 'Purchase costs' items (travel and subsistence, equipment and other goods, works and services)

2 / BME		
	Cost (€)	Justification
Travel and subsistence	20 000	In the dissemination phase BME has undertaken to represent project achievements on international conferences, forumus. A conference with 2 people's participation costs roughly 2000 EURO/conference, and we plan 10 of those in the project' lifetime.
Equipment	0	-
Other goods, works and services	0	-
Remaining purchase costs (<15% of pers. Costs)	0	
Total	20 000	

4 / BIOPOLUS		
	Cost (€)	Justification
Travel and subsistence	0	-
Equipment	95 000	Equipment needed for research development activities to put theoretical possibilities into practice and test them before implementation.
Other goods, works and services	70 000	The tools and services needed for research development activities, enabling the practical implementation of theoretical possibilities and pre-deployment testing.
Remaining purchase costs (<15% of pers. Costs)	0	
Total	165 000	

5 / ARIZONA MACH.		
	Cost (€)	Justification
Travel and subsistence	0	-
Equipment	800 000	The equipment needed to implement the robotic research and development results, which will be integrated into the business and organisational workflows during the project and will allow the robotic workflows to be tested in practice.
Other goods, works and services	85 000	The tools and services needed for research development activities, enabling the practical implementation of theoretical possibilities and pre-deployment testing.
Remaining purchase costs (<15% of pers. Costs)	0	
Total	885 000	

6 / EPSON EUROPE		
	Cost (€)	Justification
Travel and subsistence	0	-
Equipment	80 000	The equipment needed to implement the robotic research and development results, which will be integrated into the business and organisational workflows during the project and will allow the robotic workflows to be tested in practice.
Other goods, works and services	0	-
Remaining purchase costs (<15% of pers. Costs)	0	
Total	80 000	



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