Food Systems in European Cities

Deliverable 4.2 – Publication of the results of the open challenge

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Project Consortium

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3	RMN	COMMUNE DE ROMAINVILLE	FR
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5	ILS	INSTITUT FÜR LANDES- UND STADTENTWICKLUNGSFORSCHUNG gGMBH	DE
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Document Control Sheet

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0.1	5.07	First draft	WR
0.2	9.07	Revised draft by the internal reviewer and circulated to partners	SBD, UNIBO
0.3	16.07	Revised draft by all partners	UNIBO, ILS, BEE, APT, UNINA, METAINST, RMN
1.0	19.06	Final version including feedback from partners	WR, UNIBO

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Executive summary

In the first phase (T4.1), FoodE launched open "calls for ideas" (FoodE challenges, D4.1) where the civil society and relevant food-chain stakeholders were asked to actively contribute to the co-design, improvement and/or integration of local food system projects identified in EU cities (pilot case studies).
The current deliverable presents the results of the co-design and co-creation process of innovative CRFS (City-Region Food System) pilot projects. The participatory co-design registered a total of 1290 participants, well beyond the minimum threshold of 750 people set as KPI (Key Performance Indicator). The participants included students, academics, citizens, private companies and entrepreneurs, associations, chefs, canteens, CRFS employees, public authorities, schools, NGOs, media and financial investors, involved in several on-site and/or online activities: student competitions and projects, workshops, focus groups, questionnaires and interviews.
Based on the outcomes of the co-creation activities, each local FoodE Partner will proceed with the executive design of the final pilot project to be implemented (T4.2 and T4.3). Each CRSF initiative will be subsequently monitored and will provide new data and indicators to validate and refine the first version of sustainability framework assessment (WP2) and will contribute to the definition of key sustainability indicators (WP5) and business models (WP6) for the replication and up-scaling of sustainable CRFS in different European contexts.

1. Introduction

WP4 aims to implement newly designed pilot projects or improve and integrate already existing projects in the City-Region Food System (CRFS) landscape with innovative food production systems, technologies, business models, social innovations. A co-design and cross pollination process will foster the innovation of existing CRFS initiatives and the creation of new business-oriented pilot cases. This relies on participatory processes actively involving the civil society and relevant food-chain stakeholders in the definition of priorities and optimal features to be implemented in all partner regions. Based on the outcomes of the co-design activities, the CRFS projects will be implemented and subsequently monitored and evaluated for their environmental, societal and economic sustainability. They will feed the first version of sustainability framework assessment (WP2) with new data and indicators, will contribute to the definition of key indicators (WP5) and business models (WP6) for the replication and up-scaling of sustainable CRFS in different European contexts for increasing access to affordable, safe and nutritious food in EU cities.

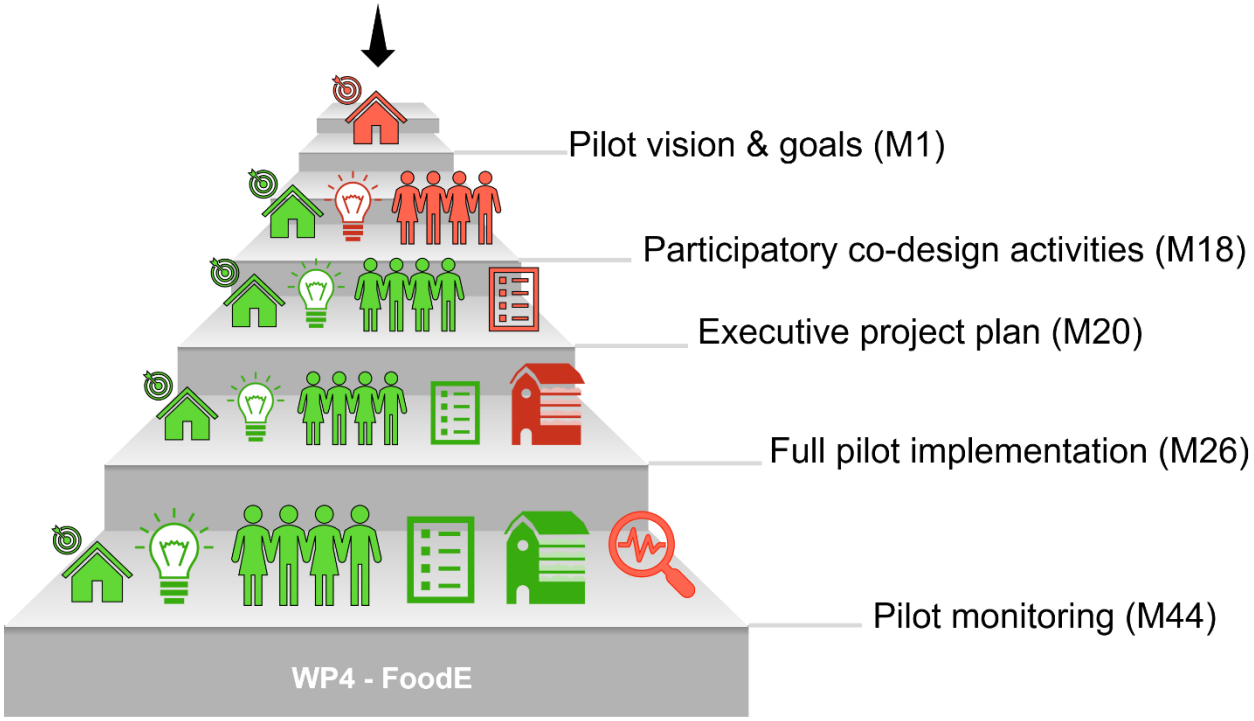

Figure 1. Visual representation of WP4's main tasks from the Pilot project perspective. In brackets the deadline for the completion of the activity, expressed in project month.

Work package 4 is structured in four stages, that include the launch of the "FoodE challenges" for the co-design of innovative pilot projects in pre-selected locations and in collaboration with existing and innovative CRFS projects (T4.1), the finalization of the executive projects of the best selected ideas (T4.2), the project implementation (T4.3) and the citizen-driven monitoring and assessment of the project outcomes (T4.4). Figure 1 is a visual representation of WP4's main tasks.

The current deliverable reports the winning ideas and solutions resulting from the co-design and co-creation activities launched in September 2020 by each CRFS Pilot initiative (D4.1, [3]), according to relevance, novelty and feasibility criteria.

2. Co-design of FoodE Pilots: overview

The need of community-designed food systems

FoodE Pilots (Figure 2) represent concrete examples of local food systems in the European city-region landscape that will be designed or improved by integrating societal, technological, economic, and/or environmental innovations.

However, it is difficult to base local food system design on abstract, standardized models due to the specificity of each project ([1]).

The design should adopt a more systemic perspective, centered on a community-designed approach "that involves end-users and stakeholders as key actors in a trans- and interdisciplinary way, promoting Agri-innovations in a co-design process, and possibly considering actual costs and external effects including risks of sudden events (such as pandemics)" ([4]).

The integration of user-centered approaches to design-driven innovation allows to take into account the needs and desires of the actors involved as well as local needs and available resources. This process could radically innovate in food systems and re-conceptualize and promote their resilience across global to local scales ([1,4]).

The design process should facilitate connections between potential network actors, in a framework of activities such as storytelling, convivial events, co-design and prototyping workshops, while providing the right tools and support to facilitate the implementation of the proposed solutions.

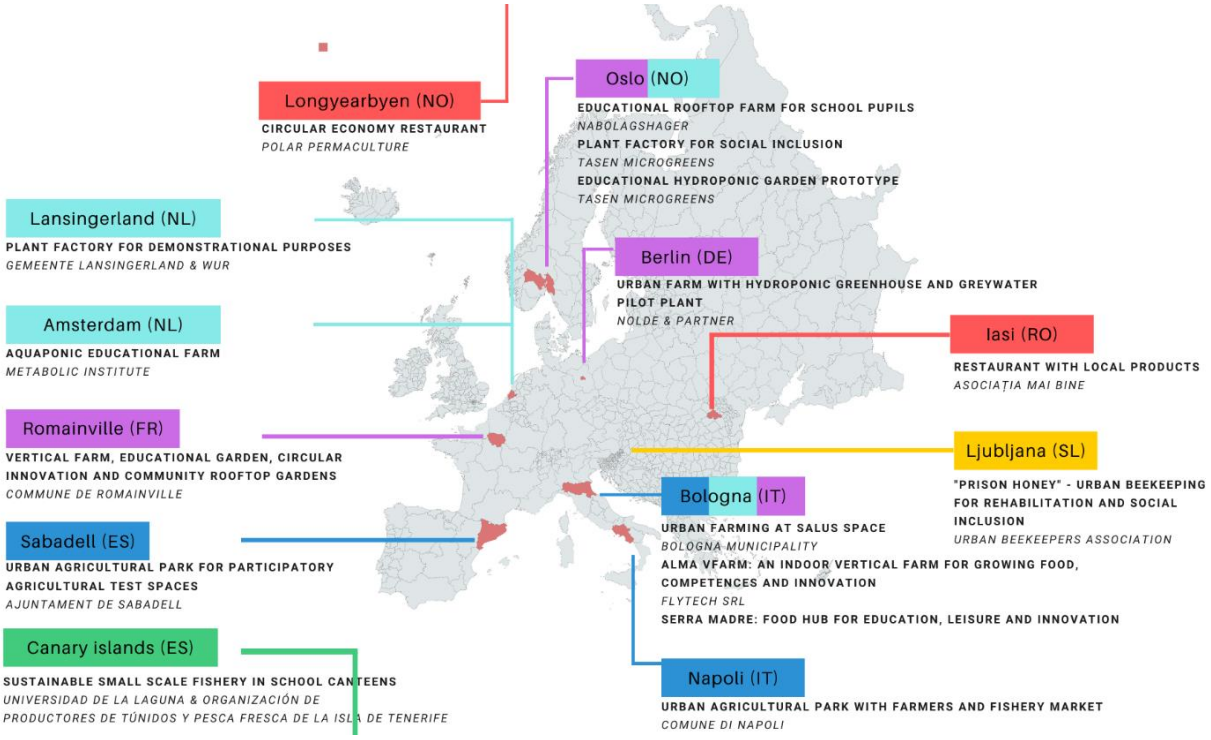

Figure 2. The FoodE consortium includes 16 City-Region Food System (CRFS) initiatives located in 12 European cities which serve as pilot projects.

The activities organized by FoodE Partners for the purpose of co-design and co-creation were (Figure 3, right):

- Student competitions (hackathons, local challenges);
- Student projects, assignments.
- Surveys (e.g. questionnaires, interviews);
- Workshops;
- Focus groups.

Such activities were introduced and extensively described in D4.1 ([3]).
The activities were held on-site and/or online. In fact, the COVID-19 pandemic has seriously challenged the organization of massive, participatory events. Therefore, some of the activities and events originally planned on-site have been partly (or entirely) held online in order to comply with current national rules and guarantee the safety of the participants. FoodE partners were all committed to promoting activities and ensuring high participation.
Overall, 1290 participants were involved by FoodE Partners in the co-design and co-creation process of the CRFS pilot initiatives (T4.1) (Figure 4), going beyond the minimum threshold set at 750. The participants included different types of stakeholders and representatives of the civil society (Figure 3, left): students, academics, citizens, private companies and entrepreneurs, associations (e.g. parents', producers', citizens' associations etc.), chefs, CRFS employees, public authorities, schools, NGOs, media and financial investors. From the perspective of pilot categories, 37% of the stakeholders actively participated in the co-design of agricultural parks, 14% of food hubs, 27 % of indoor farming, 11% of circular economic restaurants, 7% of urban beekeeping and 4% of small-scale fisheries (Figure 4, right).

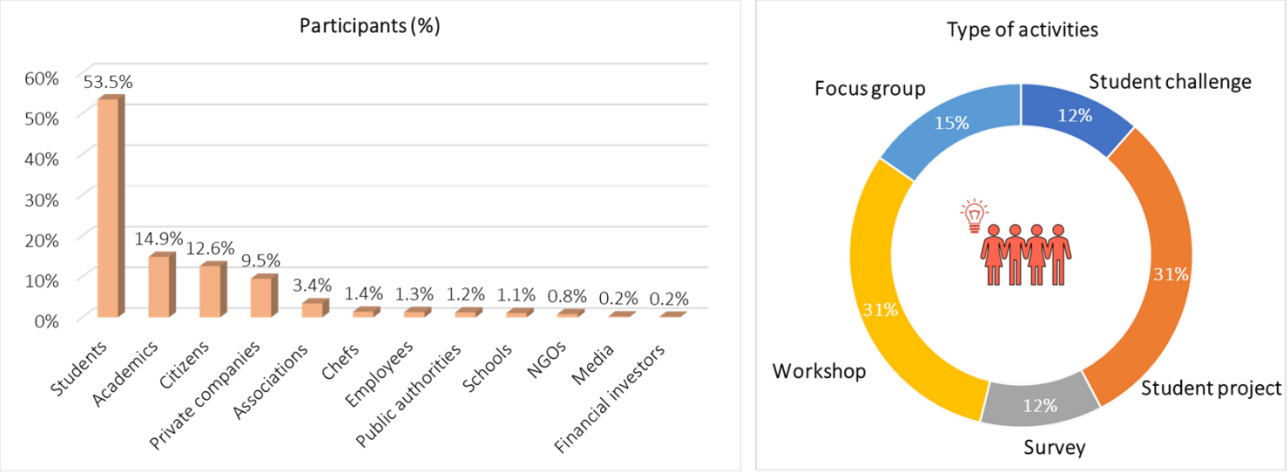

Figure 3. Types and number of participants (left) and type of co-design activities performed (right).

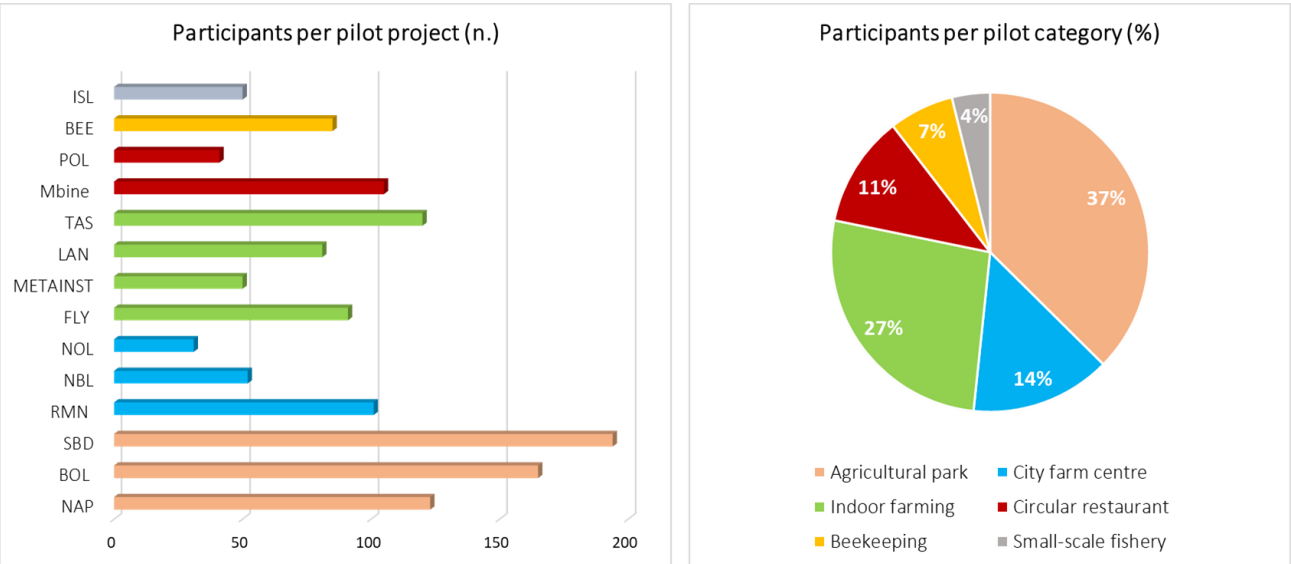

Figure 4. Number of stakeholders per pilot project involved in co-design process (left), and percentage of stakeholders involved per pilot categories (agricultural parks, food hubs, indoor farming, circular economic restaurants, urban beekeeping, small-scale fisheries) (right).

Each Pilot case pre-defined:

- which aspect(s) of the project were to be the target of the co-design activities;
- which type of activities best suited the project goals;
- which group of representative stakeholders to involve for the co-design and co-creation purposes.

All details are extensively explained in Section 3 of this document.

Overall, the main co-design targets can be summarized in the following general categories (Figure 5):

1. Design of sustainable solutions for growing systems (e.g. investigating the perception of participants regarding the sustainability of growing systems, co-generate solutions to improve systems' resource use efficiency).
2. Design of digital solution (e.g. development of user-friendly interfaces for visualizing pilot performance data, make data and their interpretation accessible to non-expert users such as citizens, students, etc.).
3. Identification of the biggest challenges with business models in CRFS project (e.g. provide education on the topic and co-generate solutions towards the creation of business models that are tailored to their community needs and their customers' desires).
4. Involvement and empowerment of local stakeholders (e.g. use of hands-on workshops, Do-It-Yourself and raising awareness activities to bring local stakeholders close to the CRSF initiatives, study them and identify their needs in order to adjust and fine tune future activities and services offered at the pilot site).
5. Beekeeping systems and equipment (e.g. co-generate technical and practical solutions for beehives and beekeeping equipment following criteria of functionality and in accordance with good practice of landscape architecture).
6. Identification of solutions for zero-waste CRFS (e.g. strategies and solutions to generate less waste and becoming a zero waste CRFS).
7. Identification of sustainability indicators for the CRFS (e.g. participants are asked to reflect on the concept of sustainability and propose sustainability measuring indicators that can be used to show the benefit of alternative strategies and actions possibly implemented within the pilot initiative).
8. Regeneration of multi-functional urban space (e.g. co-design agricultural, economic, social and architectural aspects of the pilot project. This includes re-development of the current space in an urban and peri-urban setting, design the production systems and its management, choose and motivate the crop production plan, focus on technological and social innovations, ensure circular resource and material flows, integrate recycle and upcycle strategies, where possible, propose innovative business models encompassing food production, environmental issues and social inclusion that can be applicable and scalable on similar contexts).
9. Selection of agricultural products (e.g. participants are asked to indicate their preferences in terms of agricultural products including vegetables species, fish species, develop methodologies for the selection of those products and related production plan).

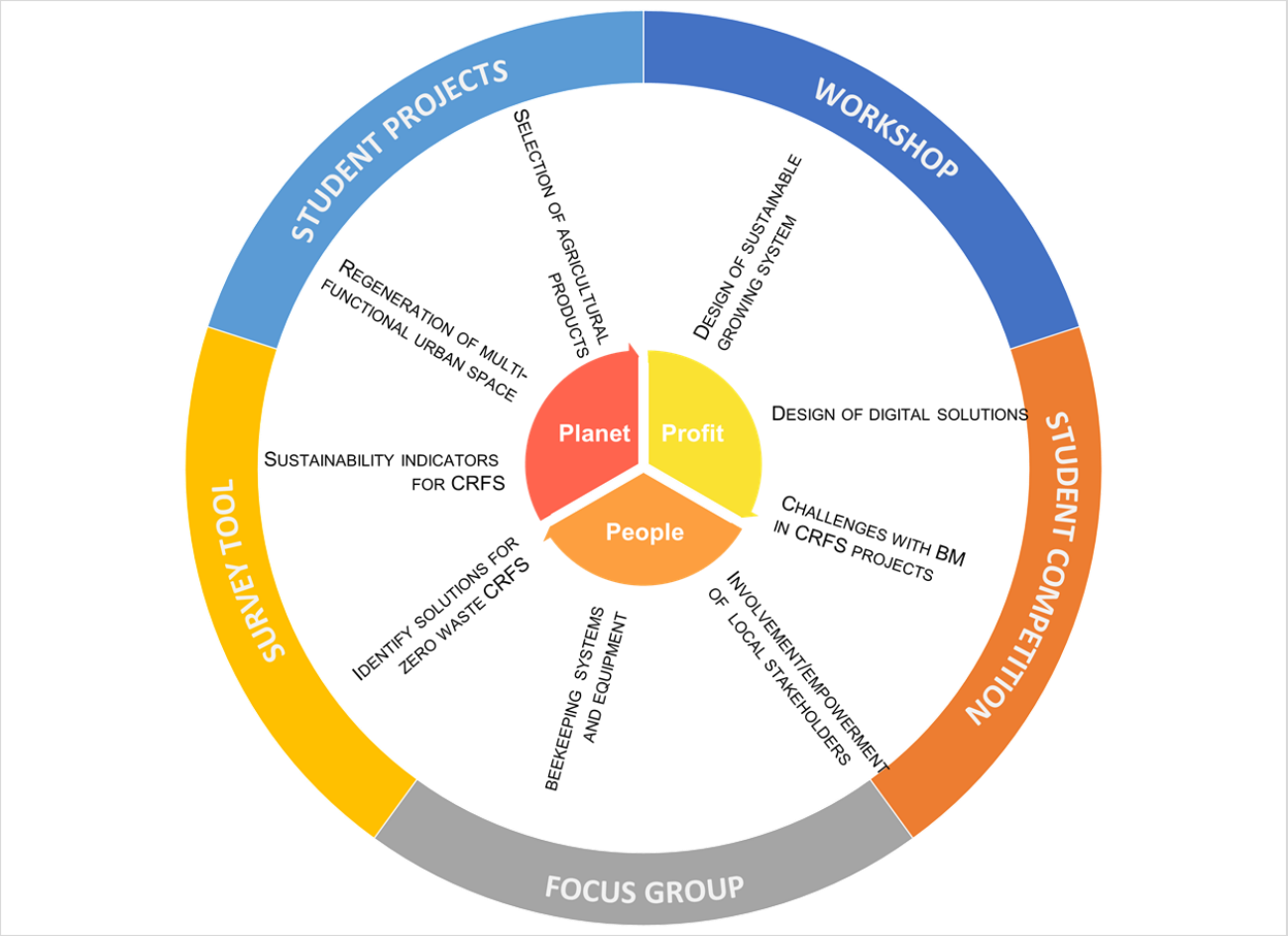

Figure 5. Main targets undergoing co-design process within FoodE Pilots.

The co-design targets can be linked to the "3Ps" of sustainability (Planet, People, Profit). In fact, the resulting proposed solutions and the criteria adopted by Pilot leaders to select them will contribute to improving one (or more) sustainability pillars of the CRFS initiatives: environmental (Planet), societal (People) and economic (Profit). Each of the FoodE Pilot prioritizes one (or more aspects) based on their vision, goals and community needs.

3. Co-design of FoodE Pilots: detailed section

This section describes in more details the co-design process carried out by each Pilot case. For each CRFS pilot initiative, the following information are reported:

- Aim of the co-design (aspects of the Pilot project to be target of the co-design activity).
- Participants (types, number).
- Method (description of the type of community-design activity (or activities) and tools, including opportunities for participants such as awards, benefits).
- Criteria (criteria used by FoodE Pilot leaders to evaluate, rank and select the best ideas, projects, solutions proposed by the participants).
- Outcomes (resulting projects, ideas, solutions, experiences, prototypes selected based on pre-defined criteria that show potentials to be further exploited for designing/improving the CRFS pilot initiative).
- Communication (digital and/or printed material to promote the participatory activities and disseminate their results).

Naples (IT)

FoodE Pilot- Urban agricultural park with farmers and fishery market

Naples, Italy

Municipality of Naples

In an area suffering from excessive population density and infrastructure of the built environment, an urban agricultural park with farmers and a local market is built. In both the greenhouses and open spaces a number of local horticultural products will be grown. The pilot aims to define sustainable cultivation protocols. It will involve local organizations and citizens while increasing their awareness of food production and security.

Activity 1: UrbanFarm 2021

Aim of the co-design

Regeneration of the area and structures of the Troisi Park (Naples) by bridging the latest innovations in urban farming design and technology with multi-functional planning of urban spaces as well as using cross sectoral knowledge, teamwork and intercultural dialogue.

Participants: more than 200

- A total of 166 international students taking part in Urban farm 2021 (Figure 15), of which:
  - 57 students competing for the co-design of Naples Pilot (Troisi Park), organized in 6 teams:
    - V-seed (12 members)
    - Mobius (11 members)
    - Green Rev – Napoli Green Revival (9 members)
    - Greenhood (8 members)
    - Campania Felix (7 members)
    - Agrivolution (7 members)
- 7 experts forming the International Jury.
- 48 members of the scientific committee 2021 (link).
- Others (stakeholders, citizens, researchers, professors, additional students) taking part in the mid-term and final events as well as in the public voting).

Method

The pilot case study in Naples was one of the target locations of UrbanFarm 2021 together with the pilot cases in Bologna (Salus Space) and Romainville (Cité Maraîchère). The cases should be studied and redesigned by different student teams, in order to propose the best strategies in the three pillars of sustainability (economic, environmental and social). The participants had to comply with the general objective, rules and guidelines defined within the framework of the open challenge.

The teams had to deliver a final project composed of 7 sections, encompassing the following aspects:

- General introduction of the project
- Agricultural section
- Environmental sustainability section
- Architectural section

- Economic section
- Social and educational section
- Annexes

The framework of the international student challenge has been described in D4.1 ([3]).

The student teams were expected to develop a project that covers:

- Requalification of four greenhouses (including structures, cultivation, management);
- Design of a farmer's market area;
- Education gardens for school activities;
- Plan for economic and social management for the entire area.

The regeneration of the Troisi Park targeted at the redesign of these structures and the surrounding spaces, with the aim of creating a system that, by producing food, would be able to improve the socio-economic condition of young people and families living in the area and, at the same time, create awareness over a proper, healthy food culture. As also recently requested by the local inhabitants, the integration of a farmers' market was foreseen.

Figure 6. Target elements of the co-design of the Troisi Agricultural park.

The funding that already exists and is dedicated to the project accounts for about 70'000€, which may be integrated with further funding through fundraising campaigns. Strategies for raising additional funding should also be identified by student teams.

Opportunities for the participants

- The winning team receives a prize of 4000 euros.
- The winning team may be involved in the executive design of the project.

Criteria

The international challenge was organized in different steps. Teams were expected to deliver several types of materials and could gain up to a maximum of 100 points (details are shown in Table 1).

Phase	Evaluated materials	Score	Assessors
Round 1	Abstract + Video 1	10	Scientific committee
Round 2	Full project + Video 2 + Proof of concept	60	Scientific committee + International Jury
Online voting	Summary + Video	5	General audience
Grand Finale	5' pitch + 5' questions + quiz	25	International Jury + General audience

Table 1. Urban farm 2021: phases, materials under evaluation, maximum points and assessors.

The criteria used by the Scientific committee and International Jury for the evaluation of the final projects are reported in Table 2.

The rules and evaluation methods are the same for the three target locations of the UrbanFarm challenge 2021.

Category	Sub-category	Explanation	Weight
Agricultural section	Greenhouse design and plant production system	Description of cultivation systems and technological innovations, nutrients and CO_2 management, greenhouse design, growing media, specifying the species chosen and the motivation for all the choices	6
	Circularity	Description of circularity by specifying energy sustainability, building materials and waste cycles	2
Environmental sustainability section	Energy	Description of energy efficiency, use of renewable energies	2
	Water	Description of water efficiency, use of non-conventional water - rainwater, grey water, reclaimed water	2
	Materials	Description of minimization of use, premises, low impact, reused, recycled, recyclable	2
	Emissions	Description of carbon footprint of the life cycle of the project focusing mainly on materials and their use	2
Architectural section	Concept and Innovation	The concept should exhibit innovative ideas, based on the context and the surroundings	1
	Architecture Quality and Green Transformation	The architectural design of the project should be aesthetically appealing and viable, and should have a vibrant and interwoven relationship with the surrounding urban environments	1
	Functionality, Novelty and Livability	The project should present the new functions responding to the current problems and create flawless and efficient circulations, yet manifest vibrant human spaces and achieve livability	1
	Site and Urban viability	The site and buildings should be well planned and integrated to be generative and create viability	1

	Integrated Architectural Solutions	The architectural design should illustrate how green and smart technologies are applied to solve existing and city problems	1
	Structure and Sustainable Materials	The proposed structure system should be viable and all materials used should be efficient, green and reflect sustainability	1
Economic section	Business plan	Completeness & coherence, competitiveness	3
	Value chain analysis	Resource use efficiency	3
	Market	Quantification of target consumers and users and a sales budget	3
Social	Description of social value creation, roles and interactions with citizens, the social embedding of neighborhoods.	-	4
Overall (Total Concept)	People	Convincing explanation of positive social impact of the total concept	5
	Planet	Convincing explanation of positive environmental impact of the total concept	5
	Profit	Convincing explanation of positive economic impact of the total concept	5

Table 2. Scoring tool for full project proposal.

Outcomes

Three teams out of 6 reached the Grand Finale and gave a pitch in front of the Jury and the general public. The team "Agrivolution" won with a total of 82.32/100 points (Figure 7) with their project named "AGRiS: Agricultural Growth and Regeneration inspired by Sustainability".

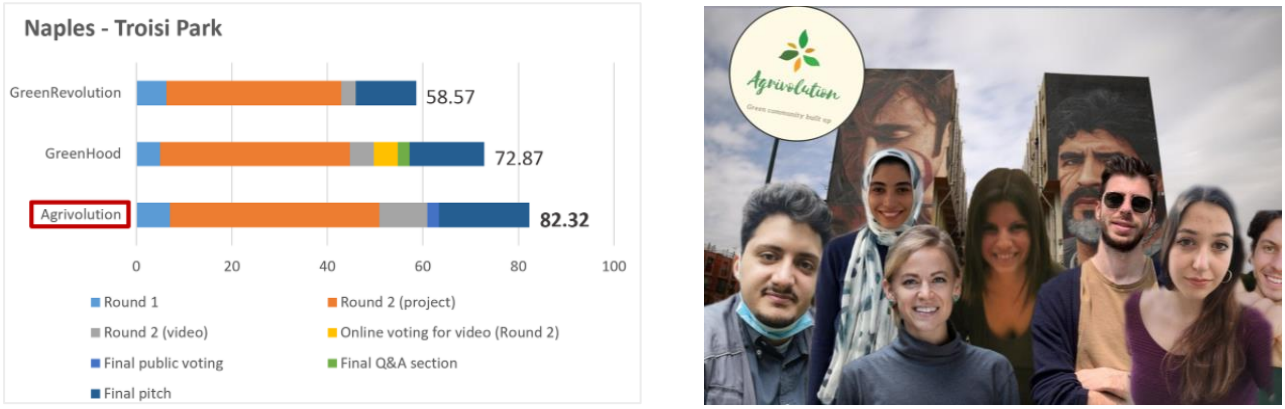

Figure 7. Finalist teams and scores of UrbanFarm 2021 for the co-design of Troisi Park (left) and the winning team (right).

Concepts and main innovations

Concept	Description
Multi-use space	The AGRiS project envisions Troisi Park as a multi-use space that serves many functions for a diverse group of stakeholders. The integration of these functions stems from the joint effort between experts from different fields and the local community, in order to produce a design solution that effectively addresses all the project's needs.
Financial feasibility	With the aim of enabling members of the local community to regain ownership of the Troisi Park site as soon as possible, the students propose an incremental approach to the renovation project that carefully addresses its financial sustainability, which is one of the main challenges for low-profit public initiatives. Furthermore, all the different design solutions are conceived considering this need for feasibility while focusing on sustainability
Respect	The AGRiS is a respectful project. It respects the environment in its effort to limit resource waste and to re-use existing materials. It respects the Troisi Park space by proposing a transformation project in continuity with its original design. Finally, rather than "community involvement" being just a label in the Troisi Park renewal, the AGRiS project respects people by putting them (and their needs) at the core of the design.

Table 3. Concepts and main innovations proposed by the winning team "Agrivolution" for the FoodE Pilot in Naples ([2])

Figure 8. Architectural design proposed by the winning team "Agrivolution".

The most important aspects of the students' design related to sustainability

Sustainability is realized in the AGRiS design in several dimensions: environmental stewardship, social integration, cultural celebration, and financial feasibility. The team based every design decision for the project on these dimensions, believing that they will create a lasting and meaningful role for the Troisi Park site in the community. First, the team developed a framework for a comprehensive sustainability assessment utilizing multi-criteria analysis techniques which considered the environmental, social, cultural, and economic criteria involved in the renovation of each of the four facilities on the Troisi Park site. The multi-criteria analysis guided the incremental approach to the site renovation, and established confidence in the financial feasibility of the proposed project plan. The environmental sustainability of the AGRiS design implements the operation of the greenhouse facility along with some growing strategies centered on minimizing resource inputs (e.g., energy, water, fertilizers, materials) and negative environmental impacts (e.g., emissions, waste, pollution) and maximizing desired outputs (e.g. fresh produce, social engagement, horticultural education and trainings, etc.). To accomplish this, the greenhouse facilities are designed with built-in passive climate control systems,

powered by on-site bi-facial photovoltaic arrays, and utilize a detailed inventory management system to optimize material cycles within the site.
In terms of social sustainability, the student got buy-in from the local community for the redesigned Troisi Park based on communication with community stakeholders throughout the design process, which involved feedback surveys, online meetings, and an interactive smartphone app for the Troisi Park project. The cultural sustainability of the project rests on the intentional incorporation of plant species native the region in the cultivation systems, as well as the cultural events and education opportunities that will be offered at the Troisi Park site (source: full proposal "Agrivolution" team).

Communication

- Official website Urban farm (Publication of the results: link)
- Urban Farm book 2021: Orsini, F., Frasnetti, E., D'Ostuni, M., Tamburrini, A., & Pennisi, G. (2021). UrbanFarm2021: Interdisciplinary knowledge for urban regeneration and sustainable food systems. ([2], Link)

Activity 2: Survey

Aim of the co-design

Survey the knowledge level and opinion of local stakeholders with respect to the park restoration plans, as well as their interest in actively participating in the implementation of the project.

Participants: around 700

- Citizens (Figure 9).
- Local entrepreneurs and farmers (Figure 9).

Figure 9. Educational level of the citizens interviewed (left) and type of business of the participants in the farmer survey (right).

Method

Two surveys were organized targeting at citizens and local entrepreneurs and farmers. This activity was organized in the occasion of MyLocalFoodE Initiative organized by local Partners (UNINA, NAP) in Naples.

Criteria

All responses were analysed, those with the most frequent answers were selected.

Outcomes

Citizens:

- Over 75% of the interviewees were unaware of the restoration plans envisaged for the Troisi Agricultural Park and 100% were in favor of it.

- In addition, 100% of the interviewees:
  - would be willing to contribute to the renovation of the greenhouses of Troisi park by purchasing "sustainability vouchers" (up to 20 euro voucher, Figure 10);
  - would be in favor of a local fruit/vegetable/fish market. The main drivers to become customers of the local market are 1) high quality and controlled origin of the products 2) willingness to be active contributors of the redevelopment of the Troisi Park 3) strategic position and accessibility (Figure 10). They expressed preference for fresh local products such as Friarielli, endive, broccoli, eggplants, tomatoes, peppers.

Figure 10. Some outcomes from the citizens' survey organized by the representatives of the Pilot project in Naples.

Farmers:

Almost 60% of the neighboring farmers were unaware of the presence of abandoned greenhouse (are of 0.5 ha) in the Troisi Agricultural Park and 100% would be interested in selling their products at the Troisi Park market.

Figure 11. Some outcomes from the farmers' survey organized by the representatives of the Pilot project in Naples.

Bologna (IT)

FoodE Pilot - ALMA VFarm: An Indoor Vertical Farm for growing Food, Competences and Innovation

Bologna, Italy

Flytech & University of Bologna

In this indoor vertical farm, you will find students, professors, technicians and other experts from the University of Bologna, working together on an innovative indoor growing environment. They study the use of light, irrigation, mineral nutrition, and climate management in order to maximize the resource efficiency within vertical farms. Hereby, they foster sustainable innovation in indoor farming technologies.

Activity 1: Survey and student hackathon

Aim of the co-design

The aim of the participatory activities was the co-design of a multi-functional space for research and education on Vertical Farming. The participants were asked to propose solutions on growing systems, equipment, crops' choices as well as on research and dissemination activities to be performed in the pilot site (ALMA VFarm).

Participants: 91

- Students (BSc, MSc, PhD).
- Professors.
- Researchers.

from the University of Agricultural and Food science (Bologna).

Method

The pilot facility is an airtight environment provided with artificial light only, with a dedicated section for aeroponic and hydroponic cultivation, for a total plant growing surface of 58 m^2, able to host more of 23.000 plants. Inside the Pilot, there will be the complete control of climate factors such as temperature, humidity and CO_2 (Figure 12). Continuous data collection on water, energy and nutrient use will allow the monitoring of the environmental footprint of the system.

For the co-design of the Pilot an **online survey** and a **student hackathon** have been organized to select innovative ideas to be implemented.

- The **online survey** involved researchers, students and professors from different departments of the University of Bologna, for a total of 64 participants (Figure 13), who were asked about their preference in terms of crop species to grow and their interest in the activities to develop within the Pilot project.
- The **students' hackathon** involved 27 students from the Master in Agricultural Science and Technologies (16) and in International Horticultural Science (11) who worked in groups to design innovative and sustainable solutions regarding the typology of growing systems and equipment, the crop species, the research and the dissemination activities.

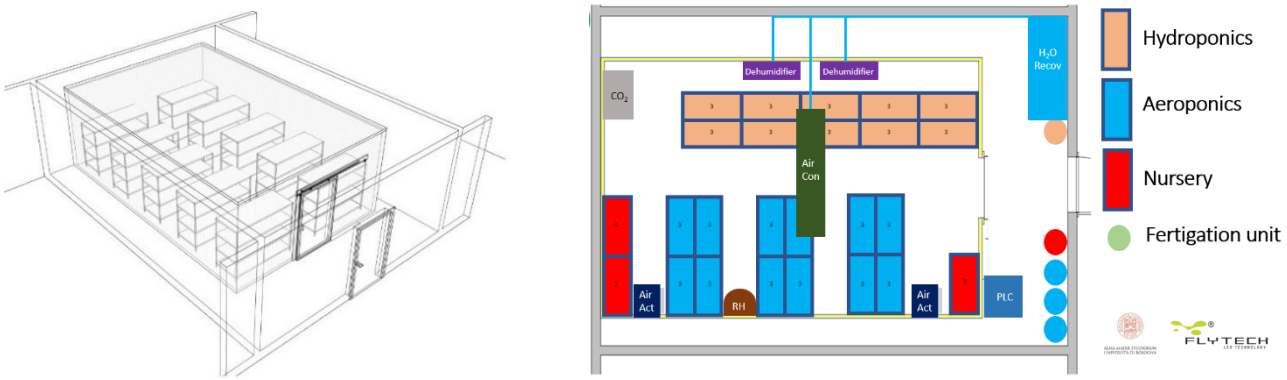

Figure 12. Perspective drawing (left) and plan (right) of the climate control chamber of ALMA VFarm.

Opportunities for participants:

- The students taking part in the hackathon could obtain up to 5 points to add to the final grade of the course and may take part in the executive design of the project.

Criteria

In the online questionnaire, the solutions with the most frequent answers were selected.
In the hackathon, the students' proposals were evaluated by the pilot managers based on the following 5 criteria:

1. equipment description and feasibility (max 1 point);
2. research activities (max 1 point);
3. educational activities (max 1 point);
4. visual quality (max 1 point);
5. presentation and Q&A (max 1 point).

The final score (up to 5 points) was assigned depending on the sum of the points collected for each evaluation criteria.

Outcomes

From the survey, a broad interest has emerged for vegetable crops (32%), aromatics (21%) and medicinal plants (20%). Among the most frequent open suggestions, the respondents indicated berries, cannabis or edible flowers. Workshops (21%), research activities (19%) and co-design activities (19%) were the activities for which participants showed the most enthusiasm (Figure 13).

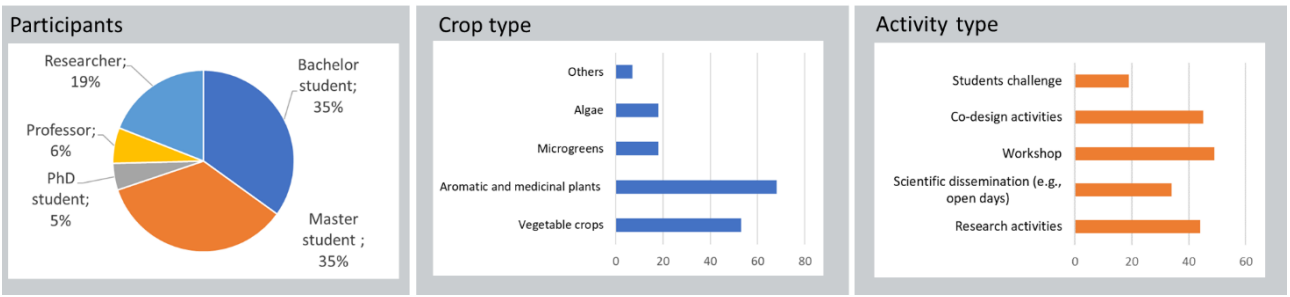

Figure 13. Participants and results from the online questionnaire (n=64)

In the student hackathon, a total of 14 projects have been submitted and 10 of them reached the final phase. The evaluation and ranking of the student projects are reported in Table 4. Solutions including aeroponics system, cultivation of vegetable crops, herbs and edible flowers were the ones most frequently envisaged and

that will be considered in the final pilot implemented. The possibility to cultivate with an aquaponic system was excluded from the pilot because it is not feasible in the current set-up.

Project ranking	Authors	Equipment (max 1)	Reserach (max 1)	Educational activities (max 1)	Visual quality (max 1)	Presentation and Q&A (max 1)	Total points (max 5)
1	Voulgaris, Blazevic, Magoni	0.7	1	0.8	1	1	**4.50**
2	Rossini, Zanetti	1	1	0.5	1	0.8	**4.30**
3	Bianco, Brussi, Confortini	0.9	0.7	0.85	0.85	0.9	**4.20**
4	Belfiore, Levantessi, Paradiso	0.9	0.65	0.65	1	0.93	**4.13**
5	Menestrina, Ascari, Nahri	0.7	0.6	1	0.7	1	**4.0**
6	Barinova, Cravino, Lopez de la Fuente	0.68	0.92	0.78	0.67	0.7	**3.75**
7	Lundborg, Gabelli, Napoli	0.67	0.58	0.75	0.67	0.7	**3.37**
8	Milardo, Metta	0.62	0.62	0.83	0.7	0.6	**3.37**
9	Balzano, Pellogia	0.6	0.53	0.32	0.53	0.57	**2.55**
10	Kiran, Hrutik, Vivek	0.7	0.4	0	0.5	0.6	**2.20**

Table 4. Evaluation and ranking of the student projects.

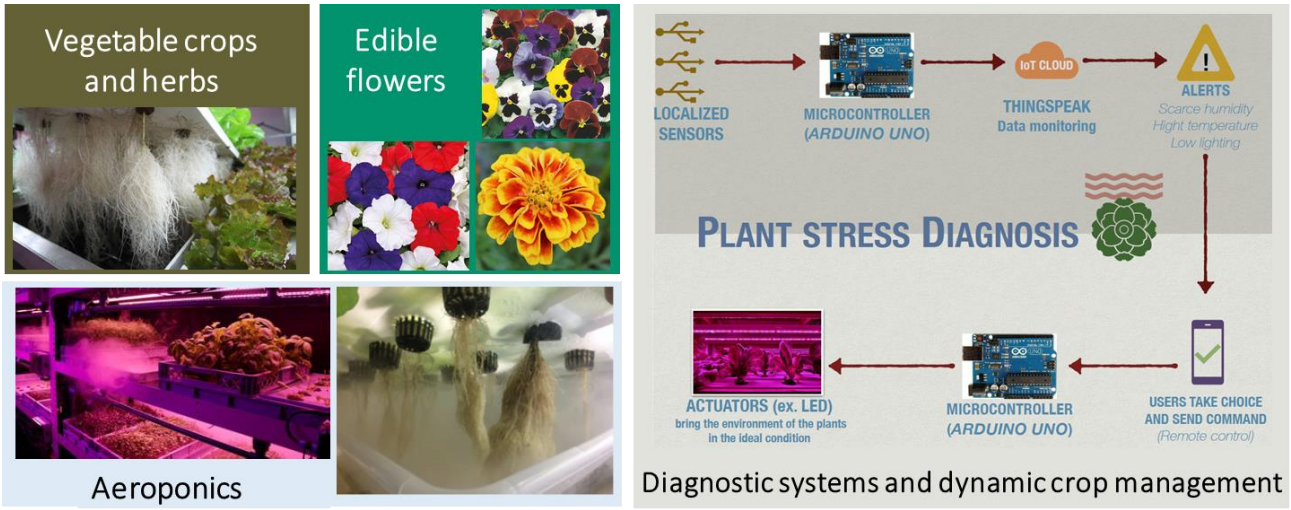

Figure 14. Some of the outcomes of the participatory activities for the Pilot ALMA Vfarm in Bologna.

Communication

- https://www.youtube.com/watch?v=0A6jbn34UTg
- https://www.youtube.com/watch?v=3iKbKBOfCaU
- https://www.youtube.com/watch?v=7Uzd_QylWe0

FoodE Pilot- Urban Farming at SALUS Space

Bologna, Italy

Municipality of Bologna

The Salus Space project is an ambitious urban regeneration plan of a peripheral area of Bologna (Savena district). The purpose is to give this space back to the community by creating a multi-functional center with several public facilities from residential buildings to cultural, recreational and work spaces. Citizens expressed their needs to create a place for active participation with cultural and social opportunities, environmental quality and recreational and aesthetic gardens for the community well-being. Part of the area is a rooftop area convertible into garden and climate-controlled shipping containers that can be adapted to host indoor farming activities. The rooftop will be used for demonstration activities on vertical farming systems.

Activity 1: UrbanFarm 2021

Aim of the co-design

Regeneration of the area and buildings of the former clinic Villa Salus (Bologna) by bridging the latest innovations in urban farming design and technology with multi-functional planning of urban spaces as well as using cross sectoral knowledge, teamwork and intercultural dialogue.

Participants: more than 200

- A total of 166 international students taking part in UrbanFarm 2021 (Figure 15), of which:
  - 74 students competing for the co-design of Bologna Pilot (Urban Farming at SALUS Space), organized in 9 teams:
    - Urban Modern Sustainable Agriculture (Urban MSA) (6 members)
    - Urban bees (3 members)
    - Successive Solution (4 members)
    - Soul farmers (11 members)
    - Salus Green Growth (SG2) (14 members)
    - ReLeaf (9 members)
    - Pachamama (7 members)
    - EcoSalus (16 members)
    - Co-farm team (4 members)
- 7 experts forming the International Jury.
- 48 members of the scientific committee 2021 (link).
- Others (stakeholders, citizens, researchers, professors, additional students) taking part in the mid-term and final events as well as in the public voting).

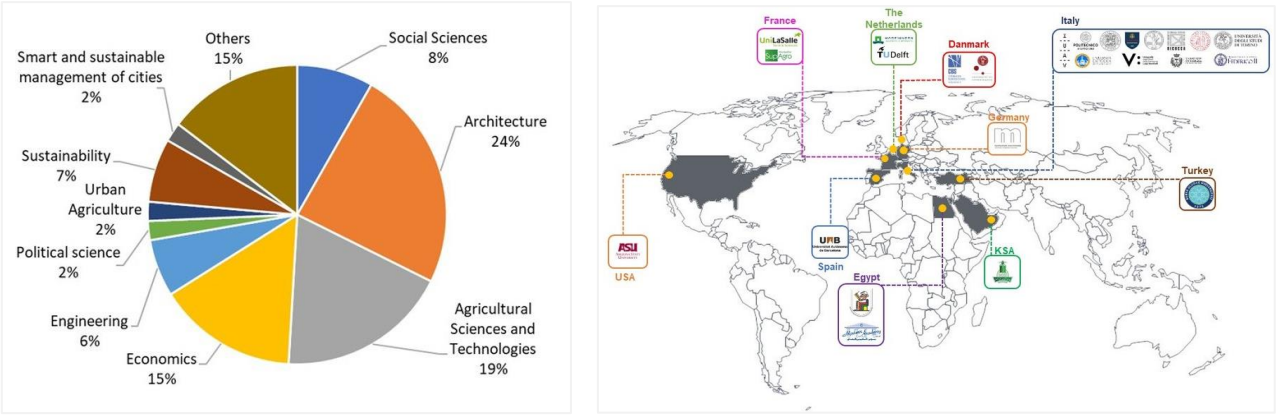

Figure 15. Participants' study sectors (left) and participants' home universities (right) at UrbanFarm 2021. A total of 166 students (28 teams) were involved from 26 universities in the world (Urban farm official website, link).

Method

The pilot case study in Bologna was one of the target locations of UrbanFarm 2021 together with the pilot cases in Naples (Troisi Park) and Romainville (Cité Maraîchère). The framework of the international student challenge has been described in D4.1 ([3]).

Student teams were expected to develop a project that should include the following elements:

- A rooftop multifunctional vegetable garden on the top of the building called "Camera Iperbarica";
- Community gardens in the greened space within the SALUS complex;
- A management model that fosters social, environmental and economic functionalities of the proposed activities.

Among all potential solutions, new agricultural methods could be considered, such as hydroponic or aquaponics systems, to be placed in a new container/ functional module or greenhouse, nearby the productive garden or on the rooftop garden of the former hyperbaric chamber. All solutions should be thought as part of Salus Space ecosystem and provide an economic, social and environmental sustainability.
The funding that already exists and is dedicated to the project development accounts for about 120'000€.

Opportunities for the participants

- The winning team received a prize of 4'000 €.
- Winners of the challenge may be involved in all phases of project implementation, supporting the local stakeholders, project partners and the citizens in the executive planning and implementation phase. The management system should also be co-designed, and it aims to create at least 2 job positions for refugees or disadvantaged people, but may also engage students.

Criteria

The criteria used for the evaluation of the final projects are reported in Table 2.

Outcomes

Three teams out of 9 reached the Grand Finale and gave a pitch in front the Jury and the general public. The team "Soul Farmers" won with a total of 80.85/100 points (Figure 16).

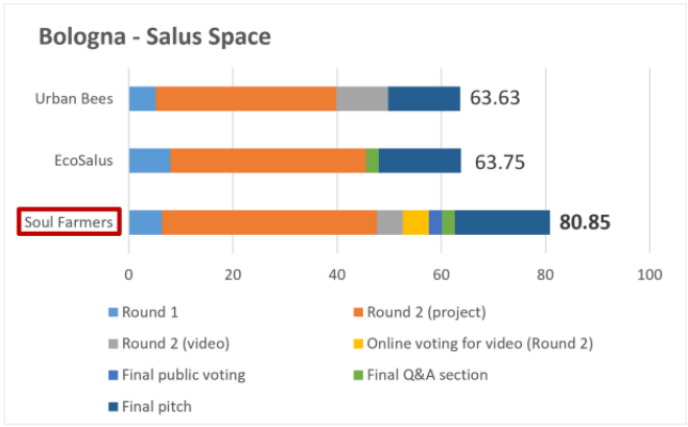

Figure 16. Finalist teams and scores of UrbanFarm 2021 for the co-design of Bologna Salus space (left) and the winning team (right).

Concepts and main innovations

Concept	Description
Technology addiction prevention	Nowadays, the issue of addictions related to technology is spreading in a worrying way. The students aim to implement a prevention program for people who suffer from this kind of addiction, tackle the problem before it becomes serious, and use it to serve the community. To reach this aim, the pilot beneficiaries will be engaged in agricultural tasks, and digital skills will be used to serve the community. Moreover, the students created a space where people can restore mental and physical health through yoga, meditation, and Art Therapy.
Multipurpose market stalls	To sell the products, the team designed multipurpose market stalls for Salus Space, and started a collaboration with an extremely rooted farm in the territory of Bologna that will deliver goods to final consumers. The company carries out its activity through the values of social and environmental sustainability.
Insect farming	Insect farming is becoming a reality in urban areas where space for food production is limited and organic waste generation is elevated. Some insect species have a key role in connecting these two processes, converting organic material into protein rich body mass. Insect flour is a valuable resource to replace soybean in the poultry, bovine and swine diets and fish meals in aquaculture. While waiting for the Italian and EU regulation of this activity, the team planned a rearing facility to be installed in Salus Space in the near future.
Tree-like structures for rainwater collection	Two tree-like structures harvest rainwater from the surface and store it in a rain curtain water feature to be used later for irrigation. They also act as shading devices and provide a comfortable atmosphere
New crops	Ginger market trends show investments in research technologies to produce this crop in foreign countries like Asia and South America, to shorten the delivery chain up to the customer. This was one of the main reason for adding this crop to the cultivation plan.

Table 5

The most important aspects of the student design related to sustainability

Concept	Proposed solution
Materials	Materials' life cycle and carbon emissions are important aspects nowadays. The students focused on responsible production and consumption, therefore they chose upcycled and recycled materials as WPC and straw panels or durable

	materials that can make up for their embodied energy. For example, the "precious plastic project" has the objective to recycle the plastic waste generated in Salus Space. They could replace spare parts of buildings and machines, or cast gadgets to be sold in the weekly market and at the same time raise awareness about the importance of recycling.
Water	Water plays a crucial role, especially in an agricultural-urban system. In this regard, rainwater is collected by the innovative tree-like structures. Furthermore, the team implemented a phytoremediation system that allows the greywater reuse and does not require energy to operate, thus no CO_2 emissions. Wetlands as well provide a particularly good environment for carbon sequestration
Zero waste	Zero waste is the lifestyle the team wants to follow in Salus Space, so biogas generated form organic and crop waste can be used to partially substitute LPG/methane in the residence heating, that alongside the photovoltaic panels reduce the energy demand
Cultivation system	The Italian ginger is pesticide free and highly sustainable because the heat from the biogas unit is directly conveyed into the greenhouse. Moreover, the team used a dropwise micro-irrigation system, also for the hydroponics production of aromatic plants, of which they have a whole year-round production that requires low maintenance. These goods can be processed with the available tools to obtain valuable products.
Economic sustainability	The team thought to undertake collaborations with public and non-public bodies willing to contribute in the long term. Doing so they can minimize costs and create links with organizations well-rooted in the territory.

Table 6. Concepts and main innovations proposed by the winning team "Soul Farmers" for the FoodE Pilot in Bologna ([2])

Figure 17. Design of Salus Space, as proposed by the winning team "Soul Farmers".

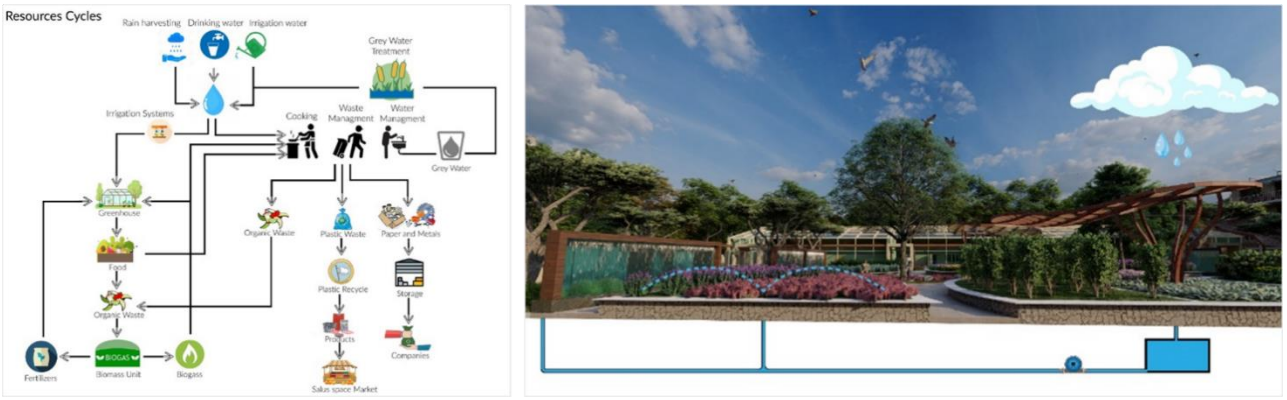

Figure 18. Resources cycles' scheme (left) and tree-like structures for rainwater collection (right).

Communication

- Official website Urban farm (Publication of the results: link)
- Orsini, F., Frasnetti, E., D'Ostuni, M., Tamburrini, A., & Pennisi, G. (2021). UrbanFarm2021: Interdisciplinary knowledge for urban regeneration and sustainable food systems. ([2], Link)

Activity 2: Focus group

Aim of the co-design

Propose ideas to contribute to the design of the FoodE pilot project in Bologna.

Participants: 25

- Citizens.
- Students.
- Civil-society.
- Local decision-makers.
- Salus Space inhabitants.

Method

First, there has been a presentation on the FoodE pilot followed by an open debate where participants could propose ideas and points of reflection by interacting with the speakers.

Figure 19. Poster of the event with the activity program.

Criteria

All the ideas were considered and will be proposed and further discussed in a participatory activity with the residents of Salus Space in the phase of executive project plan (T4.2).

Outcomes

- Dedicate a space in the garden to growing lavender;
- Think about educational activities for the youngest children to be carried out in the garden;
- Think about including a rainwater harvesting system;
- Collaborate with other neighborhood gardens to create a seed bank;
- Create a network that involves different urban gardens and similar realities;

- Provide more information about the functioning of containers (advantages and disadvantages, taste of the products grown in containers, functioning of pollination, soil preservation and enrichment).

Communication

- https://saluspace.eu/la-sostenibilita-in-agricoltura-urbana/
- https://www.facebook.com/photo.php?fbid=10165122756290104&set=p.10165122756290104&type=3

Sabadell (SP)

FoodE Pilot - Urban agricultural park for participatory agricultural test spaces

Sabadell, Spain
Municipality of Sabadell

In two peri-urban agricultural test spaces and 1 urban space, citizens are able to participate in experimental tests on traditional local varieties grown in organic production systems. The project brings together local consumer cooperatives, schools, and farmers in order to collect information about organic production and to boost local food production and consumption.

Activity 1: Focus group

Aim of the co-design

Involvement and empowerment of local stakeholders in shaping the activities and plan for FoodE Pilots in the city (Sabadell).

Participants: 25

- Citizens organizations.
- School organizations.
- NGOs for organic farming.
- Local traders.
- Students (from agricultural professional school).
- Other UE H2020 project members.
- Local administration.

Method

A series of online meetings were organized to discuss the following topics:

- Introduction to FoodE project and the concept of City Region Food System;
- Description of Stakeholder Board objectives;
- Dissemination of CRFS survey to identify initiatives in the region of Catalunya;
- Introduction of the Stakeholder Board members;
- Definition of the activities of FoodE for the academic year 2020/2021;
- Exploring the past and present activities in the selected school;
- Proposal of exchanges among schools from different partners in the FoodE project to organize cross pollination activities in English/French;
- Co-creation to define the FoodE App output and provide a survey to explore the functionality and information that the actors want to include;
- Introduction to Focus Video: gather proposals and relevant information for the presentations;
- Update to MylocalFoodE event: objective and output.

Outcomes

- Establish contacts with local representatives of other projects that have FoodE-like purposes to find synergies and joint activities.
- Get in touch with other actors who may be potential participants in the FoodE project panel. Especially with Ecological Dining Rooms and Sustainable Restaurants' Association.
- Involve the FoodE Project in the next congress in 2021 that will be focused on sustainability in the kitchen framework.

Activity 2: Student competition

Aim of the co-design

The aim of the participatory activity is to design a cultivation plan for the ecological production of vegetables in the "Can Gambus" experiment plot while ensuring reduction of food waste and efficient use of resources.

Participants: 15

- University Students (8).
- Students (from agricultural professional school) (7).

Method

The challenge (or "Collabathon") was organized by the City Council of Sabadell and the Institute of Science and Environmental Technologies (ICTA-UAB) of the Autonomous University of Barcelona within the European project FoodE. The target of the activity is the pilot experimental plot of Can Gambús.

The objective of the challenge was to carry out a cultivation plan for the ecological production of vegetables in the Can Gambús experiment plot with the aim of obtaining proposals that allow reducing food waste and efficient use of resources. The cultivation plan should cover a rotation cycle (minimum 4 years) and the project should present the following characteristics:

- Agronomic aspects: sowing and harvesting calendar, irrigation system, integrated pest management plan, fertilization, field operations and total production.
- Resources used: water, electricity, diesel or other fuels (working hours of agricultural machines).
- Economic costs and profit generated after 4 years.
- Proposed strategies for reducing food waste in primary production.
- Margin management plan (intended as a comprehensive approach and strategy to manage the net profit margins of agriculture operations by addressing the risks of variability in both input costs and output prices).

The challenge also aimed at training schools for professionals in the agricultural field, in its different levels (professional training, university) located in the Catalonia region. The activity was supported by 3 webinars, 1 on-site visit to the open air plot.

Criteria

The evaluation of the projects was performed by a panel of experts in urban agriculture and sustainability of agricultural production of the Institut de Ciencia y Environmental Technology and by the Sabadell Town Hall, as well as external experts (stakeholder board). There won't be a single winner project, but the best ideas of all projects will be considered. The best valued ideas were disseminated in person/online within the final event.

Figure 20. Municipal Farm of Can Gambús, located in El Parc Agrari de Sabadell where the pilot project will take place (area: 1.5 ha) (left), online meetings with universities and agricultural schools (center) and final participatory process (right).

Outcomes

3 projects have been submitted. The following aspects have emerged from the proposals:

- Test spaces must include production with local varieties.
- It is necessary to quantify the waste produced in order to reduce the food waste.
- Organize training for testers. Cooperatives and other key institutions to support the project.
- It is also necessary to consider a training area where demonstration activities can be developed for schools and cities in Sabadell and other places in Catalonia/Spain. The activities must include traditional crops, input reduction techniques, reduction of food waste, etc.
- The involvement of local businesses, restaurants, and associations by ecological and local school managers in the design of the project should be activated.
- Solutions related to vertical farming will be discarded as they are not part of the pilots (due to their location and characteristics)
- Solutions concerning soilless systems were also discarded since the Can Gambús estate produces under ecological certification.
- It is not necessary to contemplate the construction of an agricultural warehouse. The city council has it planned.

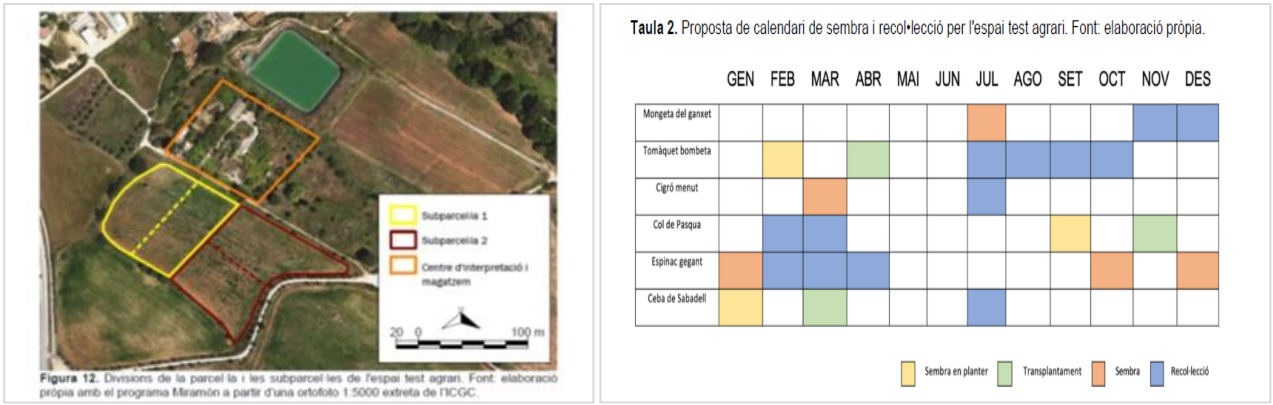

Figure 21. Design proposed for the plots of the test space of Can Gambús and crop rotations for the 4 years contemplated.

Communication

- https://web.sabadell.cat/actualitat/notis/tag/FoodE
- https://www.elperiodico.cat/ca/sabadell/20210311/arrenquen-tres-projectes-pilot-programa-11572204

Activity 3: Student project

Aim of the co-design

The activity aims to involve students and local stakeholders in co-designing an urban agriculture project in "Horta de la Ceba", in the center of Sabadell. The space wants to mobilize citizens on the issue of local and sustainable consumption by creating a space for social activities and requalifying an underused area.

Participants: 187

- 179 students (University Students, high school and secondary school students).
- 8 from NGOs for organic farming, associations for agriculture, local traders, chefs and consumer cooperatives.

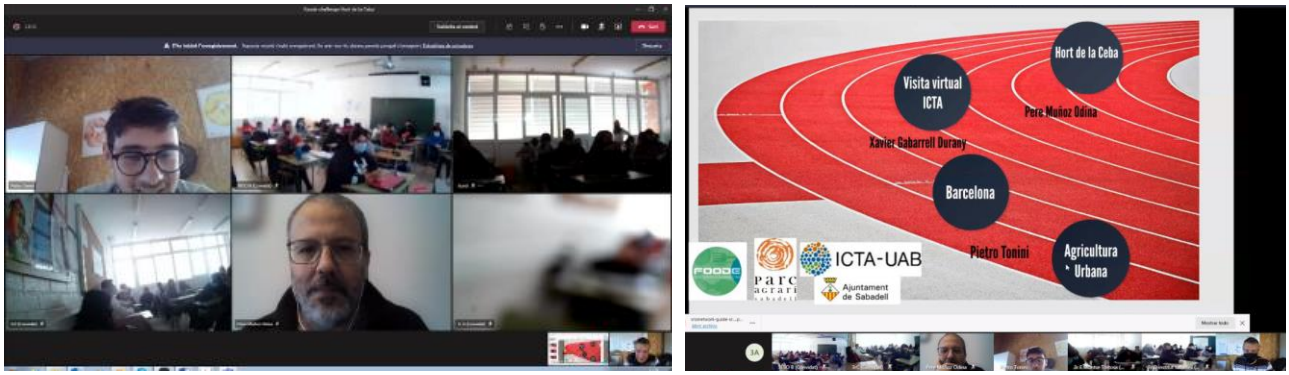

Figure 22. Online meeting with schools for the co-design of Horta de la Ceba.

Method

A student project activity was launched and supported by online meetings and on-site visits:

- for University Students: weekly meetings have been held with University students as part of the elaboration of the projects;
- for High School Students: field visits and online meetings were organized to co-generate solutions;
- for the other stakeholder panel: two field visits were organized to study the urban plot and discuss the possibilities.

Horta de la Ceba is an area of approximately 2000 m^2 located on Borrell street in the center of Sabadell that will be allocated to the creation of an urban agriculture activity.

The project wants to organize an education workshop on urban agriculture directed to high school and secondary schools for the idea of a project of urban agriculture in the Horta de la Ceba.

During the on-site visit there were presentations of urban agriculture and its impact on the city of Barcelona and Sabadell presenting examples of local projects that have been developed during these years given by the tutors from the Institute of Environmental Science and Technology of the University of Barcelona together with the technicians of the City Council of Sabadell bringing his own experience in this sector. At the end of the visit the assignment for Horta de la Ceba was presented and a draft for the ideation of the project was delivered.

The students worked on the project during a period of three months.

Opportunities for participants

- The high school students presented their projects in an activity held at the school itself in May 2021, which was attended by teachers and technicians from Sabadell City Council. During the event students presented the project and received comments from the event participants.

- The rest of the projects have been evaluated through a participatory process carried out in July 2021 in which experts from various areas have taken part: Universities, Town Councils, schools of agriculture, marketers of agricultural products and NGOs.

Outcomes

In total, the following proposals were submitted:

- 1 project from the stakeholder panel (including citizens, entrepreneurs, NGOs for organic farming, chefs, consumer cooperatives students).
- 1 project from University students.
- Several proposals from high school students.

Among the main outcomes of this activity:

- The orchard must be both social and for consumption and production.
- Areas without edible crops may be included.
- A space to promote social interactions is needed.
- It is necessary to study the possibility of cultivating without soil, due to the characteristics of the space.

Solutions to discard:

- Construction of permanent infrastructure as not permitted by regulations.
- Design of an orchard by a professional producer for the necessary investment with the possibility that in 8 years the space will have another type of use.

Figure 23. "Horta de la Ceba" (area 2000 m^2), located in Calle Borrel, in the center of Sabadell.

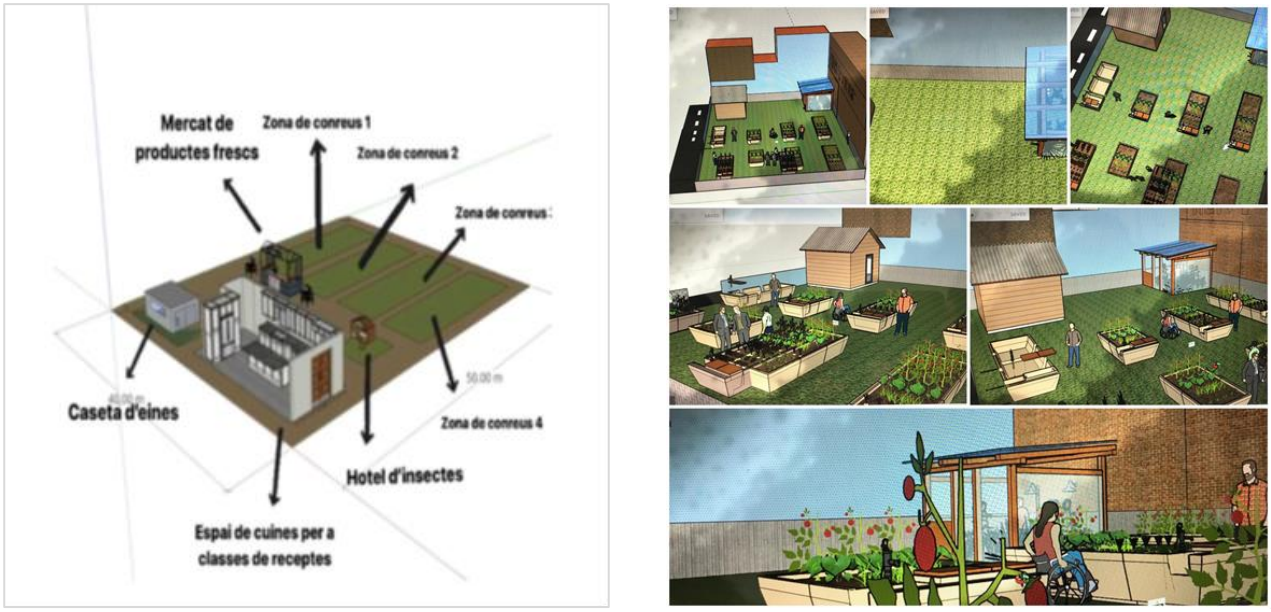

Figure 24. Different designs proposed for Horta de la Ceba.

Romainville (FR)

FoodE Pilot - Vertical farm, educational garden, short food chain, social agriculture, mushrooms production, circular innovation and community rooftop gardens

Romainville, France

Municipality of Romainville

The Cité Maraîchère is a systemic and multifunctional space located in the heart of the Marcel-Cachin district, Romainville, and is the culmination of a vast urban renewal program operated between 2007-17 in accordance with the principles of sustainable development. Its aim is bringing together in one place the activities of gardening (greenhouses and mushroom growing, composting, catering, sales, educational activities, experimentation and training).

Through diversified proposals and audiences, the project seeks to strengthen the social and cultural diversity of the area and allow exchanges between farmers, food industry professionals, consumers, residents, researchers, students, and all the actors operating in the district.

Activity 1: UrbanFarm 2021

Aim of the co-design

Co-creation of multi-functional space the Cité Maraîchère (market gardening, education, coffee-canteen and entertainment) by building on the ecological principles to which the original project refers and creating a solidarity-based food ecosystem centered on circular economy, re-employment logic and social inclusion.

Participants: more than 200

- A total of 166 international students taking part in Urban farm 2021 (Figure 15), of which:
  - 15 students competing for the co-design of Romainville Pilot (the Cité Maraîchère), organized in 3 teams:
    - UniLaSalle MSC Urban Agriculture (6 members)
    - GrowPro (4 members)
    - E-Bug (5 members)
- 7 experts forming the International Jury.
- 48 members of the scientific committee 2021 (link).
- Others (stakeholders, citizens, researchers, professors, additional students) taking part in the mid-term and final events as well as in the public voting).

Method

The pilot case study in Romainville was one of the target locations of Urban Farm 2021 together with the pilot cases in Naples (Troisi Park) and Bologna (Salus Space). The framework of the international student challenge has been described in D4.1 ([3]).

Student teams were expected to develop a model for activities within the Cité Maraîchère, towards the creation of territorial public food and social justice services. Main target elements were:

- Territorial integration: creation of a sustainable solidarity-based food ecosystem.
- Economic sustainability: implementation of an economic model that integrates multiple activities.
- Social inclusion: targeting different social groups and involving local inhabitants in the project towards engagement and space appropriation.

Opportunities for the participants

- The winning team received a prize of 4'000 €.
- The competing projects could be presented to the inhabitants in the form of an exhibition. Students may elaborate up to 3 exhibition panels. The winning project could also serve as a basis for discussion and presentation to the new municipal representatives, elected in June 2020.

Criteria

The criteria used for the evaluation of the final projects are reported in Table 2.

Outcomes

All teams reached the Grand Finale and gave a pitch in front the Jury and the general public. The team "GrowPro" won with a total of 69.62/100 points (Figure 25).

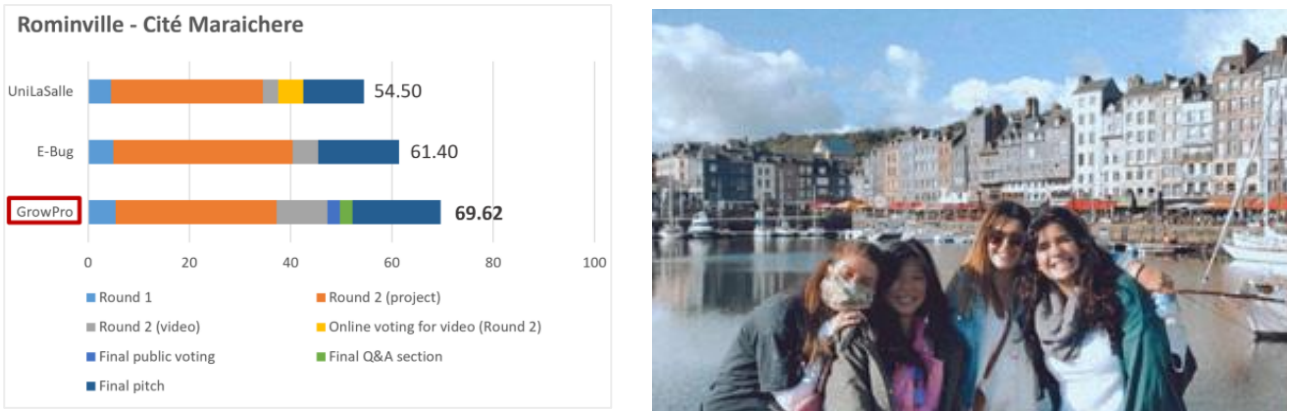

Figure 25. Finalist teams and scores of UrbanFarm 2021 for the co-design of the Cité Maraîchère (left) and the winning team (right).

Outcomes

Concepts and main innovations

The Cité Maraîchère is a special place that promotes local and international ethnic food, bringing nature closer to citizens, both French and from all over the world.

Concept	Description
Promote biodiversity	With its variety of outdoor plants and an active collaboration with the neighborhood, the team aims to increase biodiversity through the provision of host plants for pollinators and, at the same time, to improve the quality of food consumed in the area by producing fresh local and internationally consumed vegetables to make immigrants and foreigners feel more at home.
Empower local community	The local community will be empowered to grow its own food and will have priority access to diversified fresh produce. A special feature of the space concept is that the outdoor gardens provide a safe space for exploring food and herbs,

	encouraging people to interact with the soil and learn about plant cycles in a hands-on environment. In addition, as the plants grown will include ethnic crops, to make these products more attractive to customers they will be sold together with recipe books to enhance home cooking with the new foods.
Menu	Recipes will be created by chefs and nutritionists supported by the incubator, and customers can try the dishes also in the restaurant.
Food tales	Moreover, the "Tale of Food" section, different from traditional infographic presentations in museums, may immerse visitors in the hunter-gatherer experience by prompting them to collect edible plants from the soil in different areas showing regionalized global specialties
Raising awareness	In order to strengthen the food system within the city and beyond, conferences will be held for farmers from different areas to share insights on crop diversity and farming techniques, encouraging conventional producers to apply regenerative techniques such as nutrient recycling, biological control, sylvan grazing, etc.

Table 7. Concepts and main innovations proposed by the winning team "GrowPro" for the FoodE Pilot in Romainville (Orsini et al., 2021)

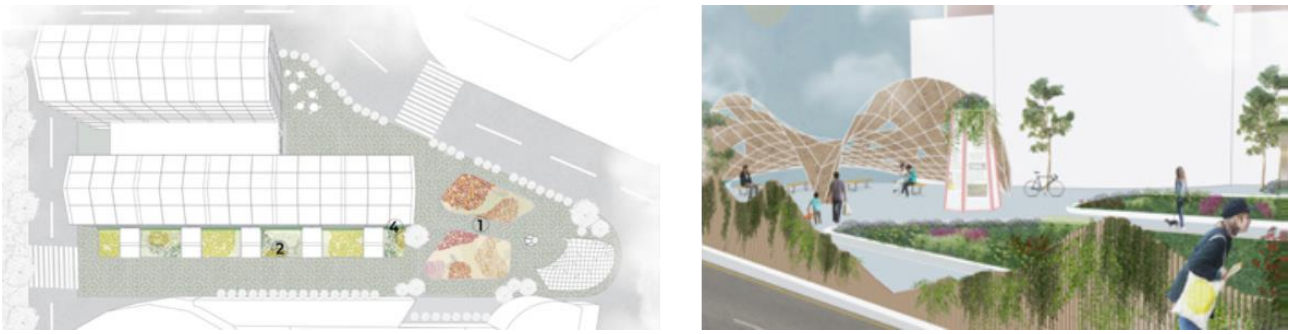

Figure 26. Architectural design proposed by the winning team for the FoodE Pilot.

The most important aspects of the student design related to sustainability

Considering that Cité Maraîchère is already using several sustainable methods, the students decided not to eliminate or change most of the practices, but rather to complement them with additional ecological and energy efficient applications.

- From an **architectural point** of view, the material design of the "Natural Pergola" contrasts degradability and sustainability with responsibility. The sustainable materials chosen are lumber for the grid shell and plywood for the inner panels. The inner panels are intended to withstand a low level of soil for semi-intensive weeds. The choice of these materials was made so that their lifespan will not exceed the expected life of the structure, that is, once the pavilion has served its purpose it can easily return to nature without leaving behind any heavy building materials.
- A further **ecological solution** are permeable pavement grids. They are made of recycled and environmentally friendly materials, thus reducing the amount of waste in the system and limiting the energy needed to purchase new products. The decision to design natural sound barriers made of wooden grids overlaid with vegetation and accompanied by dense shrubs was another eco-conscious approach. Nest is the implementation of motion sensors that will reduce electricity consumption by eliminating the possibility of lights being left on unnecessarily. As energy consumption requires fossil fuels and produces environmentally damaging CO_2 emissions, a small step such as switching to a motion sensor switch will add to the efforts already underway and reduce carbon emissions.

- With a view to **environmental sustainability**, the solutions envisaged are minimizing energy inputs and metering the water system in order to control the daily use of proximity and not lead to over-consumption. To limit water usage and contamination of the water supply in general, the Cité Maraîchère will use low-flow taps and toilets, as well as organic, chemical-free and biodegradable soaps and detergents.

Communication

- Official website Urban farm (Publication of the results: link)
- Orsini, F., Frasnetti, E., D'Ostuni, M., Tamburrini, A., & Pennisi, G. (2021). UrbanFarm2021: Interdisciplinary knowledge for urban regeneration and sustainable food systems.(Link)

Activity 2: Student project

Aim of the co-design

The aim of the activity was to involve students in defining sustainability assessment indicators for the CRFS pilot initiative.

Participants: 5

- 2 students (from AgroParisTech).
- 1 professor.
- Representatives of the municipality.

Method

A student project activity was organized. The students were asked to analyze the multi-functional pilot, propose strategies to reconcile economic stability and to the develop an ecological and social project and sustainability indicators to assess the alternative strategies.
The assignment was a compulsory part of their curriculum. The pilot managers ensured regular meetings and exchanges with the students to discuss the topic, redirect their work and clarify doubts. The final project proposal was the subject of an oral presentation and an evaluation by the Town Hall and the teacher.

Opportunities for participants

- The students taking part in the activity have received partial grades for university course.

Outcomes

The students approached the pilot project by functional area (horticulture, catering, educational workshops) (Figure 27). For each division, they developed indicators to measure the results of their recommendations. A summary of the student concept is shown in Figure 29.

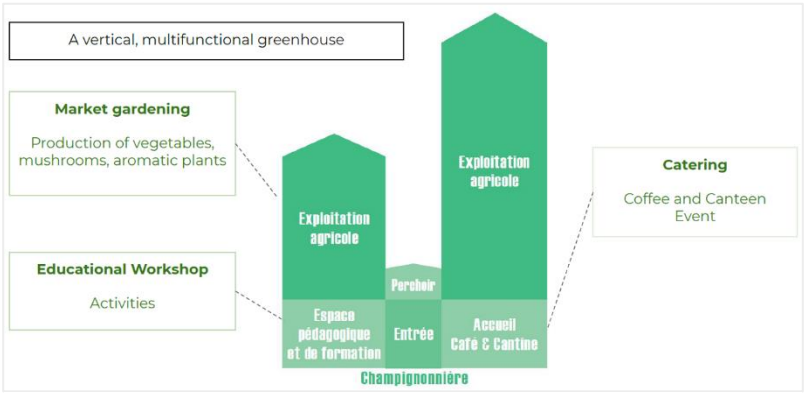

Figure 27. Cité Maraîchère multi-purpose greenhouse and functional areas approached by the students.

Market gardening

The Cité Maraîchère is a complex composed of two buildings, which are used as greenhouses where vegetables

and fruits are grown for the habitants of the city. The main issue is that most urban agriculture projects are unprofitable. The students proposed different ways of diversifying the revenues, via high value products and different purchasing methods. An example is the installation of a mushroom processing workshop for the diversification of production.

Catering

The Cité Maraîchère includes a restaurant, which will be managed by an external operator. The students suggested hiring an operator who 1) respects the core principles of Cité Maraîchère, 2) embraces the integration of unemployed who have difficulties in finding a job and 3) integrates most of the Cité Maraîchère products into the menu.

Educational workshops

The Cité Maraîchère, as a place of exchange, organizes workshops, hosts speakers, and sets up a farmers' market. This division has the biggest potential for economic and social development. To boost its potential, the students made some propositions about the communication, the pricing and the most relevant workshops/clients. Finally, they proposed the implementation of a regular marketplace.

- **Gardening workshops:** that target individuals, companies and schools and are focuses on gardening and decoration activities. Locals should have preferential prices and should be provided with all necessary equipment and materials.
- **Events**: such as corporate events, external service, celebrations (e.g. birthday parties) organized at the available spaces (greenhouses, Café', outdoor garden). Prices should be preferential for locals and modulated according to the duration of the event.
- **La Cité as distribution center**: some existing systems are given as examples ("La Ruche qui dit Oui", "Kelbongoo", "AMAP").
- **Communication:** is essential in order to attract new members. The students suggested the creation of an ergonomic website. The content should gain the reader's trust and engaging the reader's interest.

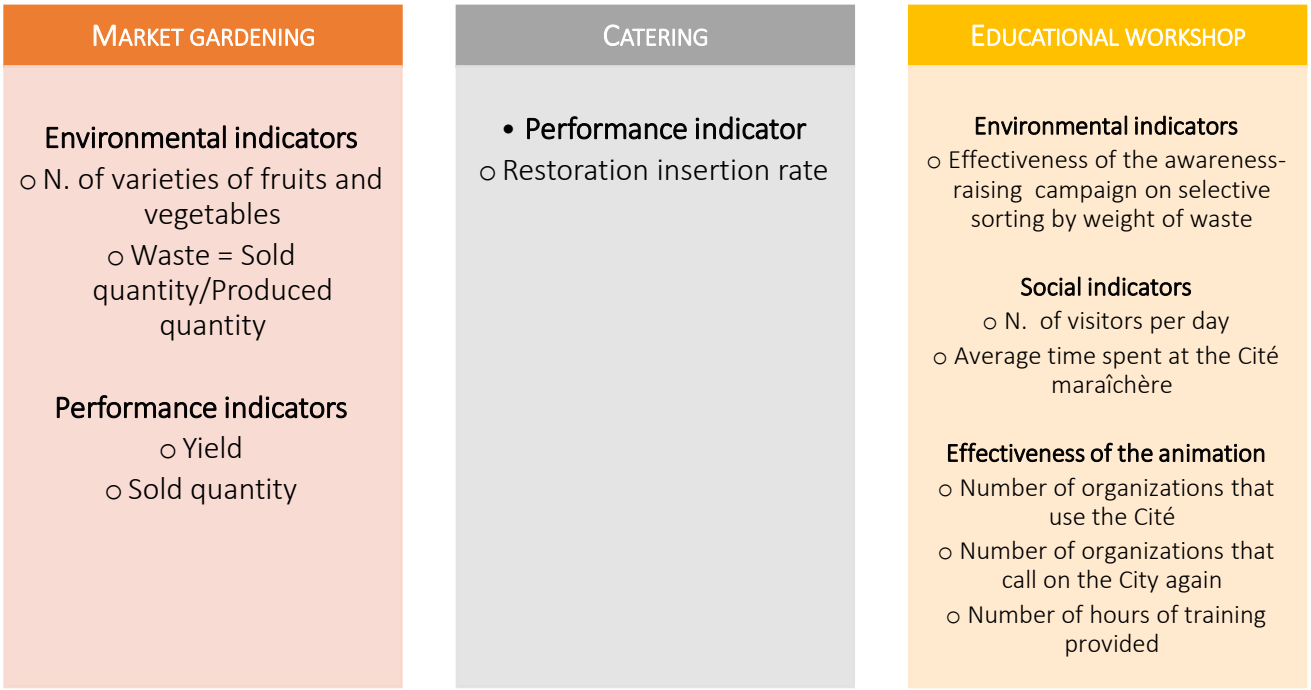

Figure 28. Summary of indicators identified per each pilot division.

Final consideration

The Cité Maraîchère is a place with high social and environmental potential. In order to reconcile it with economic stability, its activities should be diversified and include in its target not only the habitants, but also some external clients like companies who want to become more involved in sustainability and environmentally friendly initiatives. By diversifying its activities, the Cité Maraîchère could reach the maximum of people.
In addition, the students highlighted the following suggestions for the future development of the pilot:

- Create a mushroom processing workshop for the diversification of the gardening production.
- Ask the manager of the café-canteen to work with the people in jobs integration of the Cité Maraîchère.
- Implement a regular marketplace.
- Modify the opening hours of the Cité Maraîchère.
- Diversify the activities and selling's ("goodies", plants, etc.).

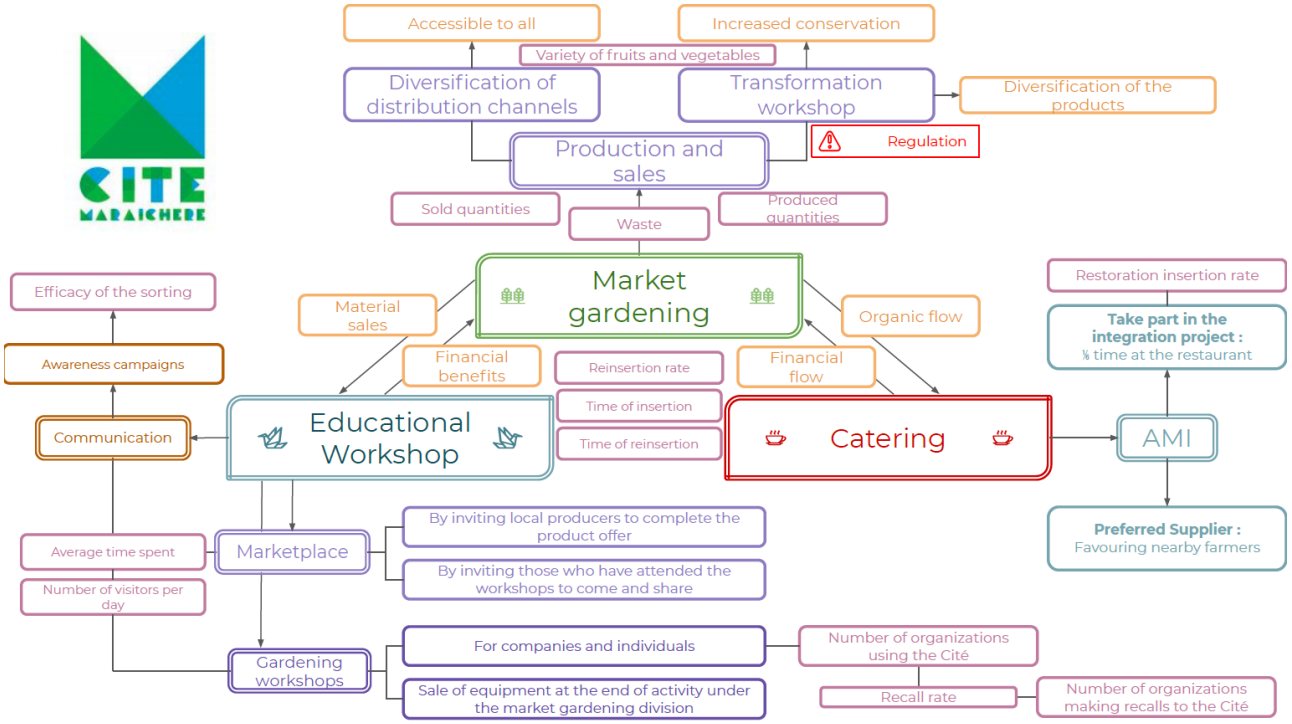

Figure 29. Summary of recommendations and related-measuring indicators proposed by the students of AgroParisTech for the pilot the Cité Maraîchère. The measuring indicator are marked in pink.

Activity 3: Workshop

Aim of the co-design

Participatory workshops were organized for the co-design and the construction of outside spaces of the Cité Maraîchère.

Participants: 82

- 50 citizens.
- 16 workers of the Cité Maraîchère.
- 1 public administrator.

- 15 partners (local beer factory, compost association, art association, architect, an association for kids' workshops to mention a few).

Method

One online and one on-site participatory workshops were organized together with local stakeholders (Figure 31). The on-site activity was combined with a tour around the pilot location (the Cité Maraîchère) and by a tasting session of locally made cakes from spent grain.

Outcomes

The workshops led to the following outcomes:

- set up a collective composter for the Cité Maraîchère and for neighborhood;
- create gardens cultivated by inhabitants;
- organize participatory workshops for the creation of a "edible table" (Figure 30).

Figure 30. Project, prototype and realization on- site of the "edible table" concept at the Cité Maraîchère.

During the on-site activity, the participants were practically involved in the:

- construction of small furniture and wooden objects;
- design barley and hop plantation;
- planting of the wild garden with seed bombs;
- re-use of mushroom cultivation waste.

Figure 31. Participatory workshops at the Cité Maraîchère with local stakeholders.

Communication:

- https://www.facebook.com/LaCiteMaraichere/posts/1922026801279574
- https://www.facebook.com/LaCiteMaraichere
- https://www.lacitemaraichere.com/

- https://www.ville-romainville.fr/actualite/4019/895-chantier-participatif-de-la-cite-maraichere.htm
- https://www.lacitemaraichere.com/visite-virtuelle-cite-maraichere-pxl-42_41.html

Bleiswijk (NL)

FoodE Pilot - Plant factory for demonstrational purposes

Bleiswijk, Netherlands

WUR & Municipality of Lansingerland

In one of the largest greenhouse areas in Europe, you will find the Wageningen Research Centre.
This center investigates aspects of resource efficiency, sustainability, and public appeal of horticulture products in its 7'500 m^2 of greenhouses. The project will provide trainings and educational activities to local growers, enabling them to adopt innovative greenhouse technologies themselves.

Activity 1: Survey and focus group

Aim of the co-design activity

The aim of the participatory activities was to identify, together with internal and external pilot stakeholders, needs, interests, perceived innovations and challenges of vertical farming projects. The results will contribute to give an overview of the general direction within Vertical Farming, the most pressing topics, the important variables, as well as the future research and outreach activities to be organized at the pilot site with the engagement of different stakeholders (e.g. local producers, suppliers, students, citizens).

Participants: 71

- 45 internal stakeholders (WUR researchers, technicians, employees) were involved in an **online focus group.**
- 26 external stakeholders in both public and private sector were surveyed via an **online questionnaire:**
  - Private firms (58%)
  - Research/educational institutes (15%)
  - Start-ups (12%)
  - Public authorities (8%)
  - Producers/Producer organization (4%)
  - Cooperative (4%)

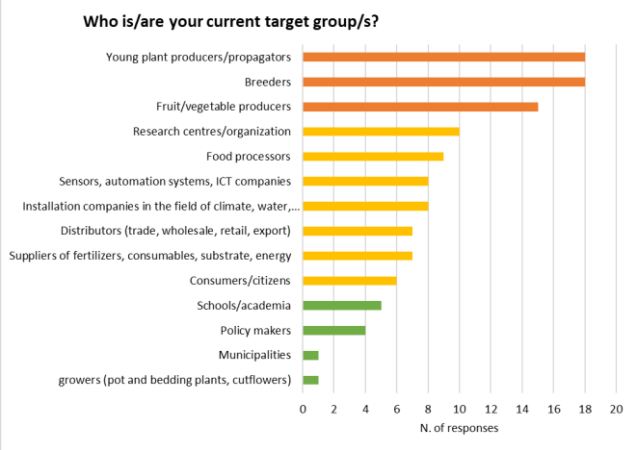

Figure 32. Type of organizations (right) and target groups (left) of the online survey participants (n=26).

Method:

Wageningen University & Research (WUR) and Municipality of Lansingerland involved relevant food-chain stakeholders in a co-creation process towards the implementation of the pilot case.

45 internal stakeholders took part in an **online focus group**. The activity included:

- an informative session: the attendees were introduced to the topic of vertical farming (VF) and to the newly built VF facility of WUR, in Bleiswijk (FoodE Pilot).
- an interactive session: the attendees were surveyed on several VF-related aspects via open and closed questions (tool: ahaslides.com). The answers were displayed on the screen and commented by the moderator in order to further stimulate discussion.

26 relevant food-chain stakeholders in both public and private sector were surveyed via an **online questionnaire** with the aim to identify needs, interests, perceived innovations and challenges in vertical farming.

Participants of both activities were asked to give their opinion based on their current experience on the sectors. The aspects investigated are described in **Table 8**.

Question	*Description*
VF contribution: where will the VF contribute most in the future?	- Value (produce high added value crops) - location (produce food locally in cities) independence (produce food without the (changing) climate) - quantity (produce more food for more people) quality (produce fresher, tastier crops) - diet (produce healthy, nutritious food) - continuity (produce consistent crops) - sustainability (produce with less energy/water/CO_2) transport (minimize transport) - nothing (other systems are better).
VF research: how can VF enhance future plant research? For which type of research would you enlist VF?	-
VF market: what are the most important current developments in industry?	What could help with forming the VF market, what are the industry partners and what do you see them asking you more? Which type of systems do you see them implementing or how do you think they can become interested in something like VF? It can also be VF as a service, so that we investigate new types of crops that will be produced in a greenhouse.
VF experiment: what is the most challenging data to track in a VF experiment?	How can we approach VF experiment better, to have more consistent and precise results and results that can be used across different disciplines?
VF innovations: which aspects of vertical farming do you find innovative?	-
VF challenges: What do you see as the biggest challenge(s) in VF?	-

Table 8. Main aspects on which the participants were surveyed.

Outcomes

➢ VF contribution

For most of the respondents, production of added value crop (Value: 22/43) and the ability to produce anywhere (Independence: 17/43) are the main contribution of vertical farm in the future.

➢ VF research

From focus group: performing trials under closed and controllable environment will allow 1) reproducibility 2) more understanding on crop physiological mechanisms 3) improve robust and versatile crop yield models (by relevant extreme conditions for productivities of several crops) 4) more accurate quantification of resource use (e.g. water, CO_2, energy) compared to open or semi-closed cultivation systems 5) less risk of pest and diseases.

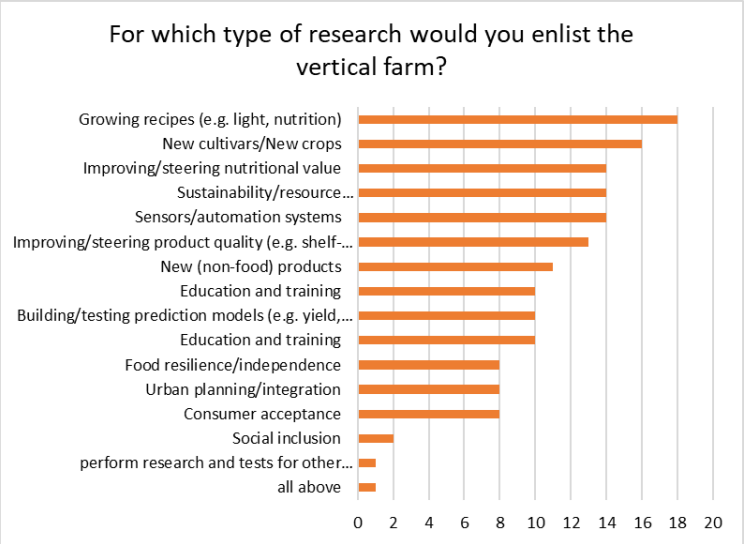

Figure 33. Questionnaire's responses on vertical farm research topics.

In addition, VF allows to monitor crop traits using sensors while having control over growing conditions.

From questionnaire: growing recipes (e.g. for light, nutrition), new cultivars/crops, improving steering nutritional value and product quality, quantification of resources and environmental impact, implementation of sensors and automatic systems (Figure 33).

➢ VF market

From both focus group (Figure 34) and questionnaire:

- Breeding: there is an increasing demand for improved varieties, specifically for closed controlled environments, which will play an important role in the further development and growth of the vertical farming market.
- Growth recipes: investigate optimal growing recipes to achieve higher product yield and quality.
- LED lighting: is the leading technology in Controlled Environment Agriculture (CEA).
- Autonomous growing (mechanization, automation, robotics, AI): the vertical farm, in its modular structure and vertically stacked layers of crops, offers opportunities for technological innovations (e.g. AI, sensors) and automated systems.

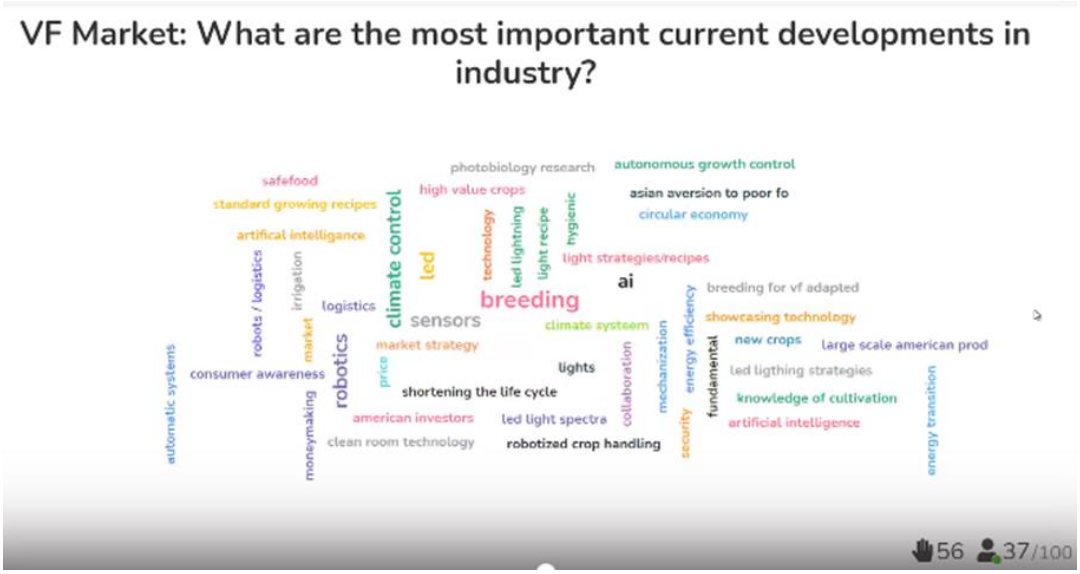

Figure 34. Outcomes of the focus group concerning most important VF market developments.

- **VF experiment (data collection)**
  Focus group: among the most challenging data to track and monitor in experiments, the most frequent answers were: product quality, nutrient uptake, root zone conditions and root development, microclimate.

- **VF challenges**
  From focus group and questionnaire (Figure 35): energy consumption/efficiency, capital and operational costs, knowledge requirements, find feasible business model.

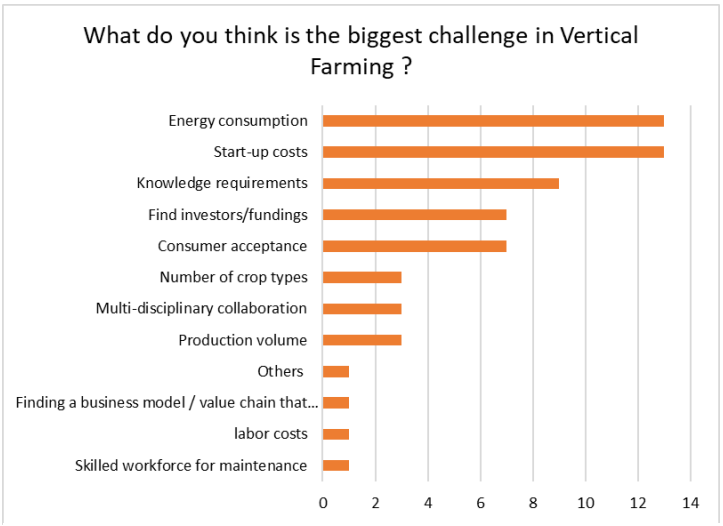

Figure 35. Questionnaire's responses on VF's main challenges.

- **VF innovative aspects: in general, which aspects of vertical farming do you find innovative? (Open question)**
  From focus group and questionnaire:
  - Full climate control/location independence;
  - Reduced waste during and after production;
  - Production on demand;
  - Standard product quality and quantity;
  - Modularity;
  - Full automation;
  - Disease free/reduces pesticides;
  - Efficient use of (some) scarce resources (e.g. land, water);
  - Controlled production for young plants;
  - Photobiology research;
  - Integration of technology - physiology – marketing;

- Short-chain;
- Production of functional food.

Activity 2: Student project

Aim of the co-design activity

Crop selection in vertical farming identifying criteria that are required for urban growers to select vegetables and fruits.

Participants: 14

- 6 (MSc) Students (Dwipok Deb Nath, Fana Woldetsadik, Olivia Park, Siqi Duan, Sok Ian Lai, Su-Mari Marx, Figure 36).
- 7 experts interviewed.
- 1 Academic coach (dr. Francien de Jonge, Docent Science and Society and Human Animal Relationships)
- ACT (Academic Consultancy Training) project recruiter of Society Based Education.
- ACT period coordinator (dr. Susan Okoth).

Figure 36. Student team "NutriLeaf" working on the assignment within the ACT program of Wageningen University & Research.

Method

A student project was issued through Wageningen University via the program Academic Consultancy Training (ACT). The ACT program has been introduced and described in D4.1 ([3]). Its main aim is to connect real-life questions from society to courses at the University. Companies, governmental bodies, non-profit organizations, education- and research institutions can submit real-life projects to the Education Project Services to work on them with students.

A team of MSc students (team name: "NutriLeaf") with background in horticulture, human nutrition and sustainable agriculture worked on the development of a customizable methodology for selecting nutritious crops suitable in urban cultivation systems. This includes the definition of evaluation criteria that will enable urban growers to select fruit and vegetables, not only based on their profitability, but also considering nutritional, technical and resource aspects. The final proposal contained results from literature studies and expert interviews (n=7) as well as a methodology and a tentative list of crops.

Opportunity for participants:

- The ACT is a mandatory course for different Master's programs within the "green" domain Food and Living Environment of Wageningen University and Research, therefore the students received a grade based on their work.
- The students will receive a tour at the Vertical Farm facility and may be involved in the executive plan of the Pilot project related to crop selection.

Criteria

For the assessment of the students' output, 13 elements have been considered, categorized into academic quality, consultancy quality and transdisciplinary quality, and of the team process. Each level includes a score 1, 4, 6, 8, or 10 that gradually improves going from the lowest to the highest.

Outcomes

The students outlined a methodology that takes into consideration resource use efficiency, crop traits (e.g. growth characteristics) and cultivation system constraints, by weighting their relative importance. Among the crops that scored the highest there were: Swiss chard, Mizuna, Fenugreek leaves, Petra leaves. Among the suggestions deriving from the expert interviews, duckweed is one of the most interesting novel crops that can be further considered, as an alternative to plant-based protein source.

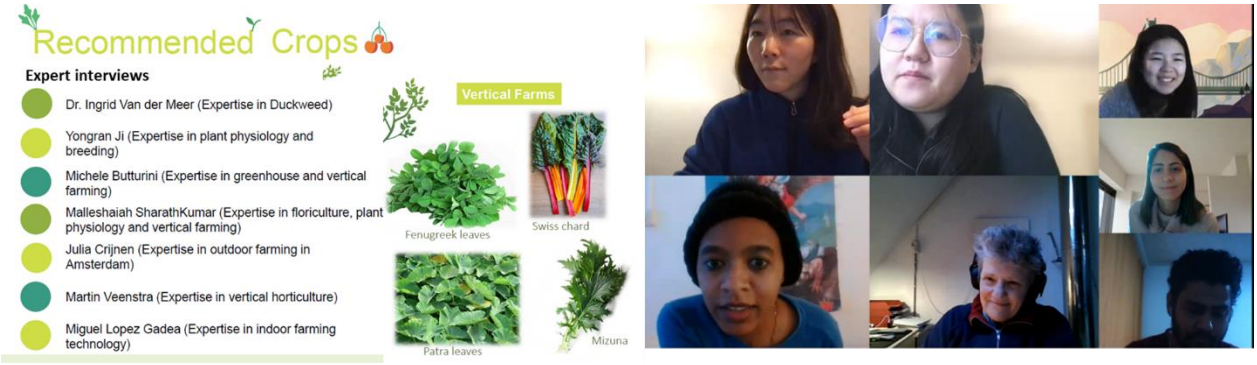

Figure 37. Expert interviewed and selected crops (left), one of the online coaching sessions with "Nutrileaf" team (right).

Ljubljana (SL)

FoodE Pilot: "PRISON HONEY" - Urban beekeeping for rehabilitation and social inclusion

Ljubljana, Slovenia

Urban Beekeepers Association of Slovenia

This urban beekeeping project promotes a greener, healthier environment, enables its citizens to be in touch with bees and raises awareness about the importance of beekeeping and honeybees for the whole food system. This will enhance pollination in the city, promote environmental sustainability and enable customers to get their own locally produced honey. Prisoners in Ljubljana are the first to try these newly installed beehives, while they receive trainings on beekeeping to provide the prison with honey and other bee products.

Activity 1: Student competition

Aim of the co-design

The goal of the participatory activity was to directly support the realization of the pilot project, which is beekeeping in one of Ljubljana's prisons.

Participants: 85

- Students (Faculty of Design).
- Professors (Faculty of Design).
- Architects.
- Journalists.
- Head of the open Department Prison.

Method

The Urban Beekeeper Association organized two student competitions in collaboration with the Faculty of Design of Ljubljana with the aim to place the beehives in the prison's garden functionally, aesthetically and in accordance with good practices of landscape architecture.

The **first competition** involved a total of 42 students of the study program "Interior Design" who were challenged to find a suitable solution on how to place 4 individual beehives in the prison garden. In particular, the students were asked to:

- take into account specific landscape factors when placing the hives in the environment (such as sun/shade, trees, uneven ground, distance to main building);
- design appropriate stands/holders for the beehives (since they can't be set on the ground directly)
- provide original solutions for the beekeeper's comfort (e.g. height of the hive stand for back comfort, a case for beekeeper's equipment) while providing not only design but also suggestions for suitable materials and the like.

The students could join in groups or work individually on the project.
In addition, they attended a series of online classes given by their mentors, a professor from the Faculty of Design (prof. dr. Jasna Hrovatin) and the manager of the pilot project "Prison Honey" (Gorazd Trušnovec).

Criteria

From a total of 15 submitted projects, 6 passed to the final round and were evaluated by a Jury of experts[1] according to the following criteria (score to be assigned per criterion: 0/0.5/1):

1. Feasibility in terms of price and materials
2. Aesthetic value
3. Replicability in different environments
4. Functionality

Outcomes

Project ranking	Authors	Score per criterion	Final score
1	Amadej Brezovsek	1) 1.0 2) 1.0 3) 1.0 4) 1.0	4
2	Katarina Klim, Matic Pestot, Gašper Runovec	1) 0.5 2) 1.0 3) 1.0 4) 1.0	3,5
3	Kaja Štucin, Tjaša Furlan	1) 1.0 2) 0.0 3) 1.0 4) 1.0	3
4	Mojca Rožič	1) 1.0 2) 0.5 3) 1.0 4) 0,5	3
5	Katarina Hudelja, Neja Ferenc, Jaš Kranjc	1) 1.0 2) 0.5 3) 1.0 4) 0.5	3
6	Nik Andolšek, Maja Rabič	1) 0.5 2) 1.0 3) 0.5 4) 0.5	2,5

Table 9. Evaluation of the 6 finalist projects performed by the jury of expert.

[1] Dr. Jasna Hrovatin (Professor at the Faculty for Design), Dr. Andreja Zapušek (Landscape architect), Nina Granda (Landscape architect & editor of the magazine Outsider), Hermina Androjna (Head of the open Department Prison), Gorazd Trušnovec (Pilot project manager, Landscape architect and beekeeper).

Figure 38. The winning project realized by Amadej Brezovsek (score: 4/4).

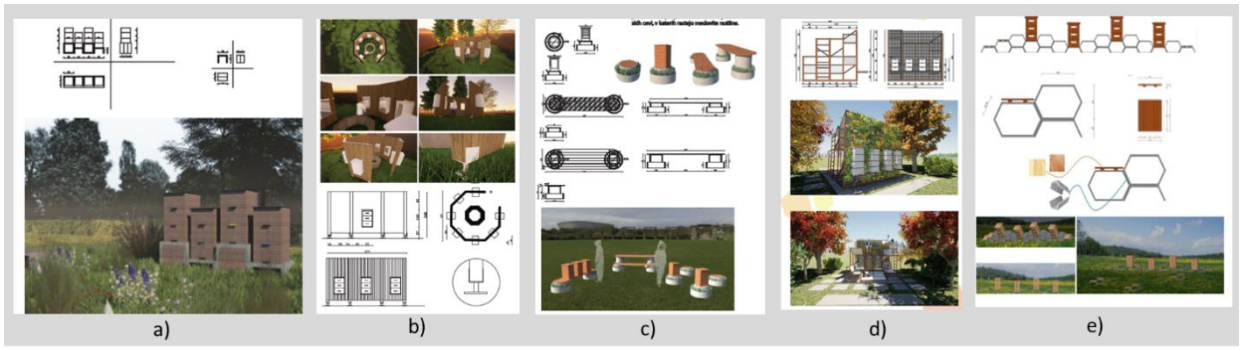

Figure 39. All finalist projects for the design of beehives' stands.

The **second competition** involved a total of 35 students from the study program "Visual communication" of the same University. As for the previous activity, the students attended a series of online seminars and worked under the mentorship of Asst. Nataša Šušteršič Plotajs. The activity aimed at creating suitable decorations of the hives in order to make them aesthetically pleasing. In particular, the students had to create stencils for painting the beehives taking inspiration from color scales and shapes of the artwork of a Slovenian painter and designer (Helena Vurnik) who has been a pioneer in the use of folklore elements and ethnological motifs in design (Figure 40).

9 proposals were selected from the set of students' assignments (Figure 40). The inmates will choose the decorations they like best and will use them to paint the beehives in a future activity.

Figure 40. Left: artworks by the Slovenian painter and designer Helena Vurnik. Right: one of the stencil sets proposed by the Interior design students during the second challenge organized for the pilot project "Prison honey".

Figure 41. Final beehives stand and decoration according to the outcomes of the co-design activity.

Opportunities for participation

The student taking part in the activities have received partial grades for university course. In addition, all projects presented to the competitions were:

- featured in the Outsider magazine (available here);
- shown in a poster exhibition at the Faculty for Design;
- exhibited on the Urban Beekeeping Association's website.

As for the winning solution:

- will be included in the executive pilot project (D4.3) in order to be realized on site;
- will be made available as a Creative Commons (CC) license;

- the authors received a gift-kit by Urban Beekeeping Association.

Communication

- Video “Urban beekeepers: “From the sketch to the bee stand” (link);
- Outsider magazine (link);
- Urban Beekeeping Association’s website.

Amsterdam (NL)

FoodE Pilot - Aquaponic educational farm

Amsterdam, The Netherlands
Metabolic Institute

On a former shipyard you will find an educational urban greenhouse. The aim of the project is to be an educational center for sustainable urban food production in the city of Amsterdam and to enlarge the existing aquaponic unit. This will enable a stable and marketable production of fishes, edible flowers, herbs, and vegetables for local customers.

Activity 1: Student competition(s)

Aim of the co-design

Within the framework of FoodE, the project partner Metabolic Institute organized two online student hackathons to solve crucial challenges in urban farming initiatives. Metabolic invited young students, based in the Netherlands, to join them in exploring tangible solutions in urban agriculture: 1) focus on solutions to closing the local nutrient loop for the aquaponics system 2) develop a user journey and a conceptual user interface design (conceptual UI/UX) for the current aquaponics software.

Participants: 50

- Scientific Community (e.g. researchers, scientists).
- Industry (e.g. farmers, food & feed processing companies, retailers).
- 2 speakers, 6 jury members from industries.
- Civil Society (e.g. NGOs and civil society organizations).
- General Public (e.g. consumers).
- Master and PhD Students – 37 participated during the 2 events.
- Policy Makers (e.g. national, regional and European decision-makers).
- Media (e.g. journalists).
- Investors.
- Customers.

Method

The Metabolic institute organized two student hackathons:

- The **first student hackathon** concerned closing the local nutrient loop for the aquaponics system. Although fish waste is a key fertilizer for the plants, most aquaponics and other urban food systems still rely on additional sources of fertilizers, often from synthetic sources. An advantage of urban aquaponics systems is their location close to an important nutrient sink – the sewers system. The nutrients present in urban wastewater flows can be recovered and used as a valuable fertilizer. The struvite reactor is the pilot leading technology to tackle this challenge. It has been developed in close collaboration with the local community, who provides the wastewater flows for nutrient recovery. The struvite reactor has undergone multiple iterations over the last few years. The next step in its development is the complete automation of the struvite crystallization process to facilitate its use by other communities. The hackathon teams were tasked with developing a detailed blueprint for this automation process based on the current struvite reactor.

The hackathon was hosted on a Zoom platform, the students had to use the Miro collaborative online platform to design new concepts to improve the struvite reactors and prepare a presentation.

- The **second student hackathon** targeted the aquaponics management software to be used at the pilot location, which will be entirely open source. The main goal of this software is to make it easier to run and adopt the aquaponics system in other urban communities, which have no particular expertise in this urban production technology. The hackathon teams were tasked with developing a user journey and a conceptual user interface design (conceptual UI/UX).
  The hackathon was hosted on a Zoom platform, the students used the Miro collaborative online platform to design the user interface and develop the wireframe of the software user experience to support the development of the aquaponics software.

Opportunity for participants

- Guided visit of the farm (for the winning teams) and De Ceuvel (Pilot site).
- The winning team may be involved in the executive project plan of the project to further develop the proposed solutions.

Criteria

In the **first hackathon**, an expert jury evaluated the student proposals based on the following criteria (see also Figure 42):

1. Solution-problem fit (30% of the total score)
2. Comprehensiveness (20%)
3. Realism (20%)
4. Sustainability and circularity (10%)
5. Innovation (10%)
6. Visuals and presentation (5%)
7. Coolness (5%)

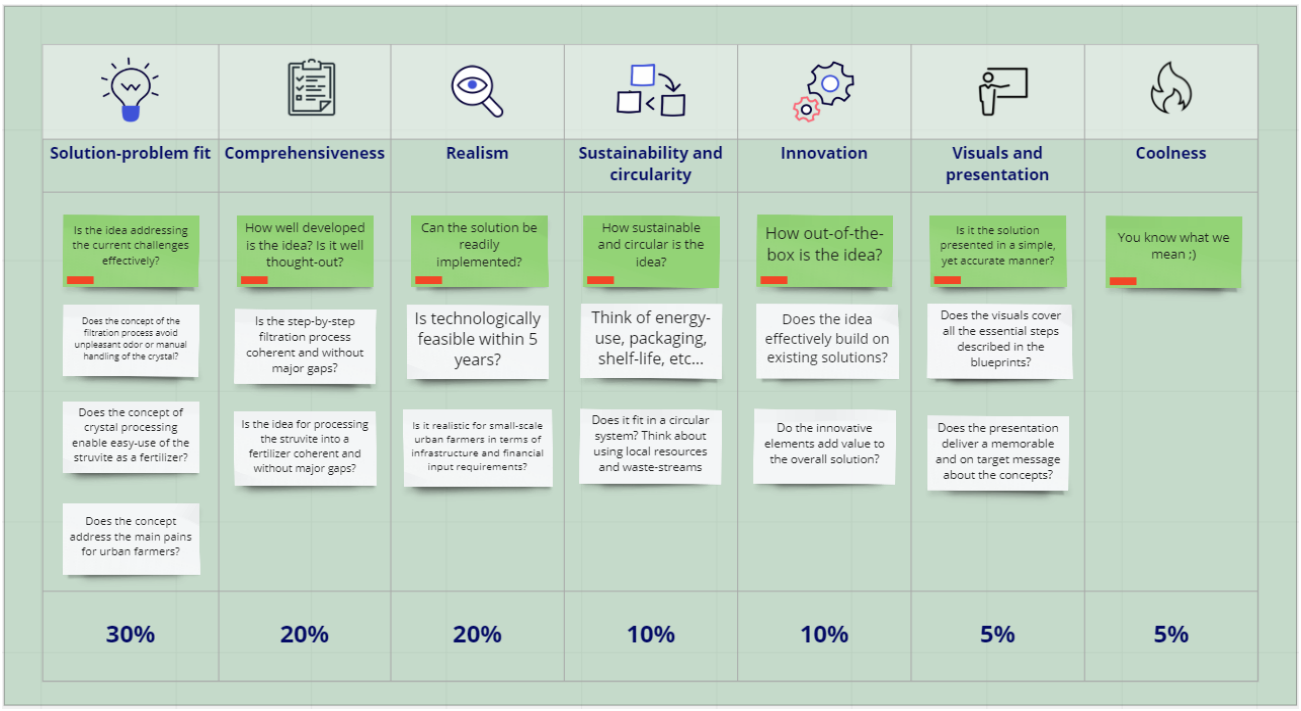

Figure 42. Details on evaluation criteria used during the first hackathon.

In the second hackathon, an expert jury evaluated the student proposals based on the following criteria (See also Figure 43):

1. Design criteria (30%)
2. Comprehensiveness (25%)
3. Feasibility (20%)
4. Visual and presentation (20%)
5. Bonus (5%)

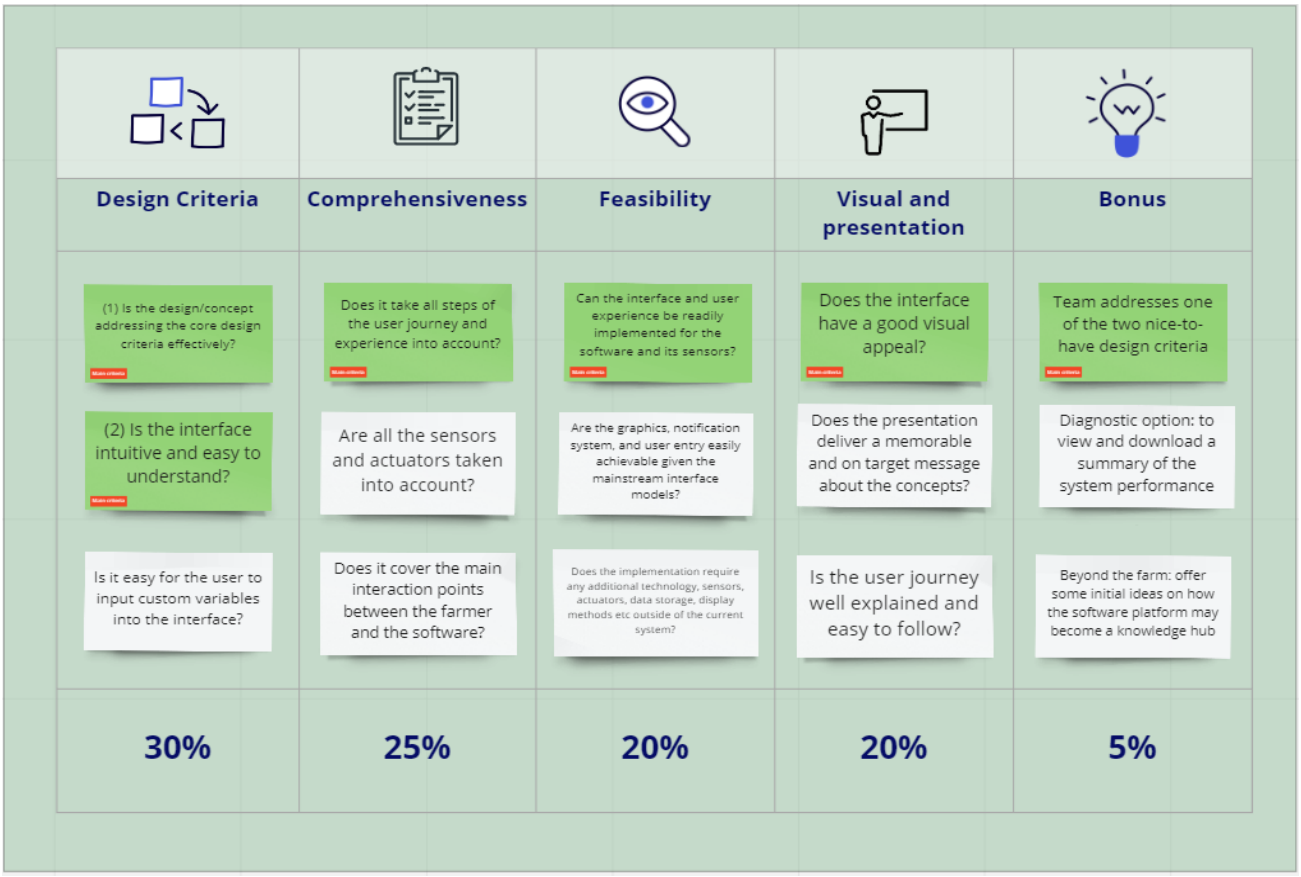

Figure 43. Details on evaluation criteria used during the second hackathon.

Outcomes

The final scores of both Hackathons are shown in Table 10.

During the first hackathon ("closing the nutrient loop"), the students realized visuals that summarize the concept design and the proposed solutions to improve the struvite reactors. The schemes in Figure 43 and Figure 44 present the winning concepts for a struvite reactor for the aquaponics system. The winning team's design will help create the blueprint of the automation of the current struvite reactor, to increase the local nutrient cycling in the aquaponic farm, a key ambition of the farm within the FoodE project.

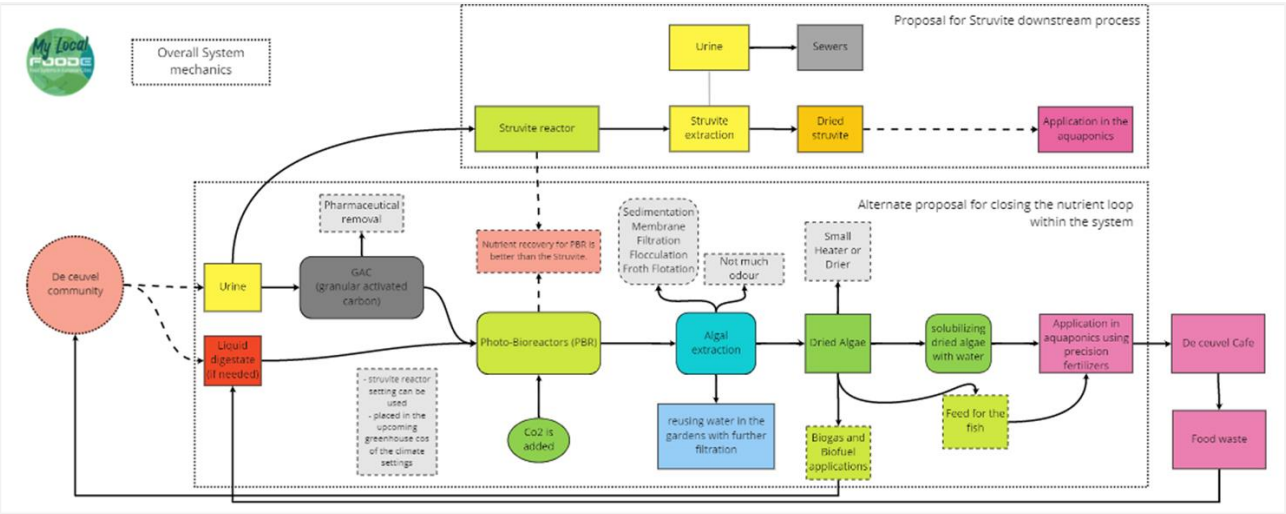

Figure 44. Winning concept for a struvite reactor for the aquaponics system proposed during the first hackathon event, hosted by Metabolic institute.

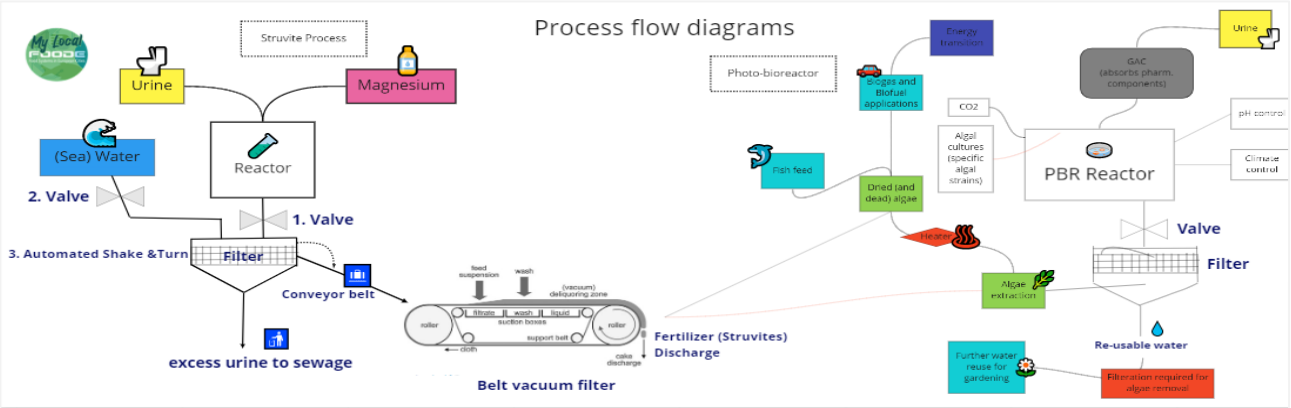

Figure 45. Winning concept for a struvite reactor for the aquaponics system proposed during the first hackathon event, hosted by Metabolic institute.

During the **second hackathon** the students designed the user interface and develop the wireframe of the software user experience to support the development of the aquaponics software. The outcomes included wireframes and user journey maps.

Figure 46 and Figure 47 show some of the winning concepts for the User Interface of Metabolic Institute aquaponics software.

The development of the interface will be built on the best user journey developed by one of the winning team and the best interface design. Several user journeys will be developed to address different audiences, such as the farm manager (operational interface) or the researcher/student (educational interface).

Figure 46. Winning concept for the User Interface of Metabolic Institute aquaponics software.

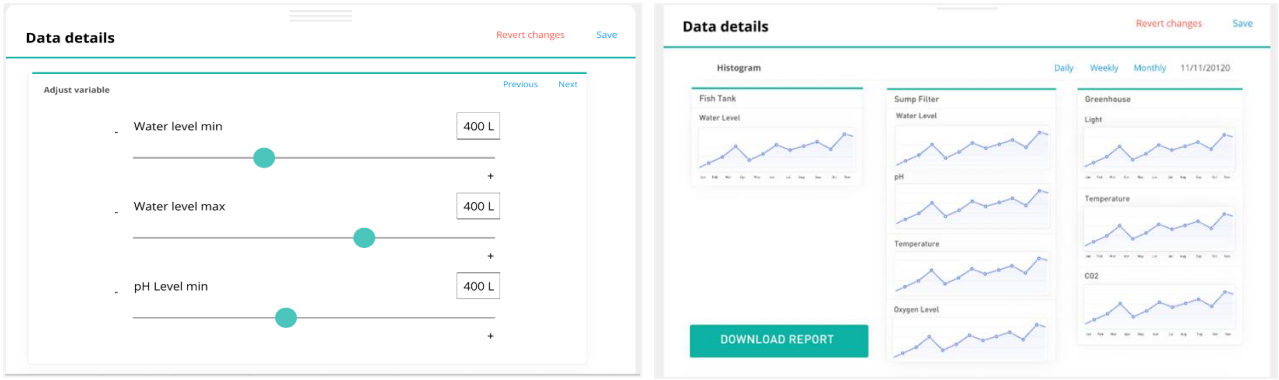

Figure 47. Winning design concept of the aquaponic software data visualization.

Project ranking	Team	Partial scores	Final score
1	Team 3	83 51 56 73	263
2	Team 2	79 47 56 75	257
3	Team 1	79 47 56 75	222

Project ranking	Team	Partial scores	Final score
1	Team C	85 78 75.5 60	298.5
2	Team E	71 76 86 64	297
3	Team D	77 68 85 61	291
4	Team B	64 55 76 41	236
5	Team A	71 60 66 21	218

Table 10. Final scores of participating teams in Hackathon #1 (left) and Hackathon #2 (right).

Communication

- https://www.metabolic.nl/news/two-urban-farming-hackathons-with-foode/
- https://foode.eu/event/foode-and-metabolic-hackathons/

Iasi (RO)

FoodE Pilot - Restaurant with local products

Iasi, Romania

Asociatia Mai Bine

Founded in 2013 as a social enterprise, this project has grown to be the most sustainable bistro in Romania. Through FoodE it will advance towards its vision of capacity building for sustainable development and its objectives of decreasing the environmental negative impact while increasing the social positive impact. Il will become the first zero-waste unit within the Romanian HORECA sector by integrating a closed-loop economy model in its operational activities. As well, the pilot will integrate strategies for a transition to lower energy consumption, recovery of heirloom plant varieties, reducing the proximity distance towards km0, the founding of the first local food bank, and doubling the number of vulnerable beneficiaries.

Activity 1: Workshop

Aim of the co-design

The aim of the activity was to co-generate solutions for combating and/or reducing the food waste in Iasi with the support of Mai bine and CUIB.

Participants: 24

- representatives from the quadruple helix sector - civil society - national pioneers and activists in the field of food waste prevention and zero waste;
- professors from the local Agronomy University and Veterinary Medicine;
- entrepreneurs in the field of food production and distribution;
- representatives of the public administration.

Method

The activity adopted the "forum method": three sessions that bring the participants to go through different psychological stages. Groups of 3-5 people are formed who work together in break-out rooms in each session after which they change to allow the best interactions and socialization of the participants and the diversity of opinions.

The three stages were:

a) strengths and weaknesses of the food waste problem;
b) dreams/ ideals: the participants communicate the ideal image of problem management in their city, through the experience / institution they represent;
c) concrete proposals: after people get rid of frustrations, they become more creative; this is the longest stage and it is important to do it after providing a very clear framework and after a very clear communication on what can and cannot be done with support/with minimal financial/human resources.

The groups were divided according to the expertise/ background of the participants for the different stages:

- Formal, legal, bureaucratic, collection and redistribution
- Entrepreneurial, financial, business wise
- Education, awareness, bringing everyone on board, general public, consumers, customers.
- Compost / Increasing the impact with minimal resources

The participants mainly worked on predefined boards on the MIRO platform.

Criteria

All solutions and answers were considered. Pilot managers prioritized them according to their relevance and a cost-benefit analysis, feasibility within existing resources and in the short-medium term.

Outcomes

Online Conclusions session I: Opportunities and Local Threats related to food waste (in Iasi)

Figure 48. Online Conclusions session I: Opportunities and Local Threats related to food waste, in Iasi

Conclusions session II + III: Proposals and solutions co-generated to be piloted through CUIB and Better FoodE

how much, how and where do we collect (only plant foods)?	How do we get income?
• Prioritize the collection from small local producers and processors of natural foods; ideally, surplus growers should bring vegetables and fruits to the bistro; a campaign to inform local producers about the waste and benefits of redirecting surplus; from food platforms and hubs; a mutual promotion campaign. The bistro collects and reduces waste but do not compromise on product quality in terms of production as naturally as possible; The bistro do not collect from food courts and canteens as they are generally of poor quality products; Recovery of plant products from agri-food markets; • Partnership with the Agricultural High School from Iași and USAMV; collection from USAMV and other agricultural research stations (see also demonstration lots) but also research for new products; Global Gap certification. • Partnerships with other NGOs with a social mission to solve the problem of possible surplus;	•Ideally, from multiple interdependent sources: •Short and closed circuit •Introducing dishes with saved / recovered ingredients in the menu •Collaboration with the Tummy app •collaboration with the mayor's office, as facilitators •catering for events and deliveries - the ideal market for this •larger niche: gluten-free / lactose-free - in addition to local, natural / controlled sources •a growing market for ingredients from controlled sources and product and quality assurance •Restaurant to sell to DAC, etc •Preservation, drying, marinating - production line and sale in the CUIB store and in other partner spaces; circular products with their own label: salvaged vegetable zacusca - black coffee grounds, shell snacks, etc. •Sale / barter of compost produced by CUIB •A local marketplace like InStock •Membership system to support the business model; - Cooking workshops but also facilitation of active visits to producers - the box with ugly delicacies, delivered through CUIB https://www.oddbox.co.uk/ - "warehouse of good deeds" / food sharing station- for collecting food waste for own consumption, but also for other local partners active on the same food-saving activity
How do we generate a positive impact?	**How do we capitalize on organic waste?**
• Hot food, free to vulnerable groups • The current social impact of the above future project proposals is implicit • Community and educational garden for schools and kindergartens education	• Vermicompost • anaerobic digestion • biogas plant

Figure 49. Dilemmas and related answers

Activity 2: Survey

Aim of the co-design

The aim of the activity was to find as many solutions as possible in order to generate less waste and become a zero-waste bistro.

Participants: 73

- Citizens.
- Entrepreneurs.

Method

The questionnaire included questions from different areas that CUIB would like to improve: organic waste and compost, reduce all type of supplies (like hand paper towels, napkins, dishwashing sponges) and reuse different packages (bottles, metal cans etc.), use of eco-friendly detergents. Table 11 reports the list of questions. The questionnaire was built on "Survey Monkey".

Area	Topic	Questions	Proposed solutions
Composting of organic waste	Composting system	What is the best composting solution you know? CUIB is looking for a ready-to-use composting system	- Vermicompost - Indoor Composter Oklin - (http://oklininternational.com/small-scale-composters/) - Hermits / beneficiaries from the area - Garden composter
Reduction of disposable napkins and towels	Hand cleaning	Do you think a hand dryer is more environmentally friendly than using disposable wipes? - If so, do you have recommendations for such a dryer (best value for money, where the quality indicator includes the life of the appliance and energy consumption)? Which are these? - If not, what other recommendations do you have for giving up disposable wipes that we use after washing our hands?	41 % yes, 59% no. The proposed solutions were: - Textile wiping - Napkins - Hand dryer (link) - Drying hands (link)
		What do you think about the possibility of having only reusable handkerchiefs available to you when you eat in the city, without the option of being able to use disposable paper towels?	- 43% strongly approved - 28% Approved - 12% disapproved - 10% strongly disapproved - 7% could not decide
		Do you consider disposable napkins that come "ex officio" with every cup of coffee or cup of tea you order to be indispensable?	- 100% no - 0% yes
Non-recyclable discount: Consumable	Toilet paper	What is the most environmentally friendly toilet paper option you know? Please also send us the name of the manufacturer and distributor and / or a link where we can find the recommended product.	- Toilet paper made of recycled paper, but it is more expensive (e.g. from Lidl)
	Sanitation showers	If you had sanitation showers available in the toilets, do you think you would use them and thus reduce the consumption of toilet paper?	- 32% yes - 68% no (respondents do not see towels as a hygienic solution. Sanitation should be guaranteed after each user and this would still lead to resource consumption).

	Washing tools	What are the most environmentally friendly washing / sponge washing options you know?	- Washing machines with sterilizing and disinfecting functions are the most efficient. In addition, environmentally friendly detergents can be used.
	Wiping floors	What do you advise us to use for wiping floors instead of classic mops?	- The majority of respondents could not answer this question.
	Household bags	What are the most ecological variants of household bags that you know?	- For the collection of vegetable waste biodegradable and compostable bags can be used (e.g. from Biodeck) and can be disposed directly in the compost bin. For recyclable waste, plastic bags can be chosen and can be reused after emptying.
	Gloves	We use disposable gloves made of non-recyclable material, do you know recyclable variants?	- Biodeck company sells gloves made of compostable materials, which, if they have not been infected with toxic substances, can be put in a decomposition process.
	Food packaging	What is the best solution we can adopt to give up plastic wrap? We use it to cover containers / food storage and to pack certain dishes requested by customers.	- Biodegradable and compostable foil. - Zip-lock bags that can be reused.
	Anti-COVID-19 protective masks	What do you consider to be the most sustainable anti-COVID-19 protective masks, produced and available in Romania?	- Reusable textile masks, if they are periodically changed and properly sterilized. - A Vietnamese company started the production of a biodegradable mask (https://www.greenqueen.com.hk/vietnamese-company-creates-world-first-biodegradable-coffee-face-mask/)
Non-recyclable discount: Logistics	**Food packaging**	Packed food: we reuse packaged food boxes and jars, which consist of borscht, soups and main courses, but we still use plastic wrap to pack sandwiches, cakes and burgers.	- The majority of respondents could not answer this question.
	Zero plastics	What solutions do you recommend to have zero plastic and zero waste food?	- Reusable pans, with the possibility of sterilization and disinfection before use.
	Menu	What are the most ecological, but also aesthetic and practical variants of menus that you have encountered in cafes, restaurants, bars?	- A board on which to write down the menu of the day - Online menu with access based on a QR code.
	Crockery and cutlery	We use cutlery produced in Romania and ceramic and / or porcelain crockery, either made in the country or bought from used	- Example: "VES ("https://www.ves.ro/)

		stores (reused). We intend to replace plates, bowls, maybe even cups and cups with enamel products, made in Romania.	
	Decorations	Who are the Romanian producers of beautiful enamel vessels that you know of?	- The majority of respondents could not answer this question.
Recyclable reduction and / or reuse	Packaging for drinks	We generate over 200 kilograms of glass waste per month. Although they are recyclable and although they are taken over by Salubris to be transferred to a recycler, the recycling process of this material is very energy consuming. We want to introduce in the menu drinks whose packaging can be reused. Who are the producers of natural juice, natural syrup, beer and wine that you know reuse bottles or sell their products in large returnable containers?	- The majority of respondents could not answer this question. - Among the solutions: Consider the possibility to serve draft beer only. This needs to be arranged with the suppliers (to deliver in barrels, return it and refill).
	Do-it-yourself cleaning products	Consumables: Most of the packaging that ends up in our yellow trash cans for recyclable plastic waste comes from cleaning and disinfection solutions and products. We intend to self-produce some of these solutions, from environmentally friendly ingredients and thus reduce plastic containers. Please write us what solutions for cleaning windows, floors, furniture, etc., for washing dishes, disinfecting hands and recommended surfaces, which are made with ingredients produced in Romania and which comply with the norms of the Public Health and Sanitary Directorate - Veterinary?	- A steam mop for the floor and furniture - Vinegar and cloth for the windows. There are cloths for washable windows and do not need extra cleaning solutions. They just need to be watered. - For dishes, dishwasher is more efficient. Consume less water, and the high temperatures helps in sterilizing dishes. In addition, homemade detergent pills can be used (also eco-friendly)

Table 11. List of questions included in the online questionnaire and solutions proposed by the participants.

Criteria

All solutions were considered and priority was given to most frequent responses and to those that best fit and integrate with the CUIB conditions.

Outcomes

The summary of the proposed solutions is reported in Table 11.

The solutions that will be implemented soon:

- Use of natural dishwashing sponges;
- Use of electric hand dryer;
- Use of a composter for the organic waste;
- Buy from a traditional producer for pots and plates.

Activity 3: Student project

Aim of the co-design

The activity aimed to identify environmental sustainability indicators to assess the contribution of different strategies/choices at the pilot bistro.

Participants: 8

- 6 students
- 1 supervisor
- 1 tutor

Method

A **student project** was issued through Wageningen University via the program Academic Consultancy Training (the details were extensively described in deliverable D4.1, [3]).
Environmental Project Studies is a mandatory course for BSc students in the study program Environmental Sciences. In this course students work on a current environmental issue in groups of about 5 - 7 students, for 8 weeks. Based on an assignment from a real commissioner, students write a research proposal and carry it out. The students are supervised by a coach from the university. The coach takes care of the team's process and monitors the scientific quality of the product.

The research addressed the choice between serving locally produced food versus eco-friendly or naturally produced food in a restaurant. The aim was to reflect on the environmental implications of CUIBs food supply chain, in order to inform the "natural versus local" debate for CUIB. From this objective the students derive the following general research question (GRQ):

GRQ. *"What are the environmental implications of CUIB's food supply chain?"*
To answer the general research question, the following secondary research questions were formulated (SRQ's):

- SRQ1. TRANSPORT DISTANCE: *To what extent does distance from the supplier to the restaurant contribute to mitigate climate and ecosystem impacts on the environment? And how does this link to the sustainability of CUIB?*
- SRQ2. MODE OF PRODUCTION: *How does the mode of food production contribute to counteract climate and ecosystem impacts on the environment? And how does this link to the sustainability of CUIB?*

Criteria

For the assessment of the students' output, 13 elements have been considered, categorized into academic quality, consultancy quality and transdisciplinary quality, and of the team process. Each level includes a score 1, 4, 6, 8 or 10 that gradually improves going from the lowest to the highest.

Outcomes

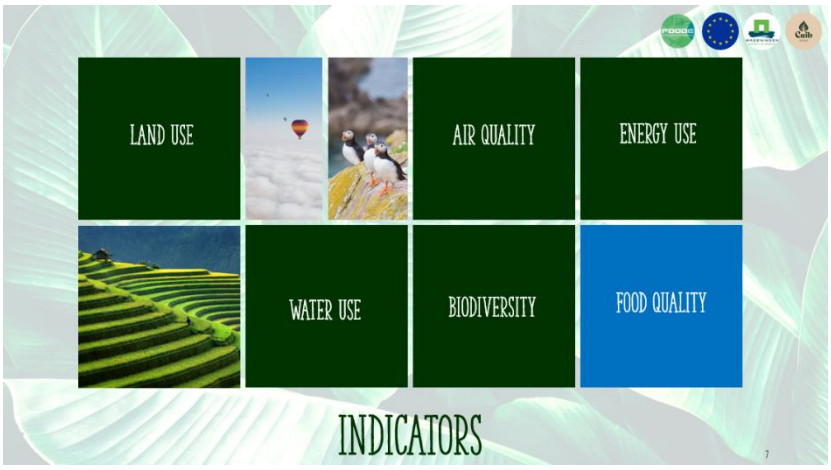

Figure 50. Five environmental indicators and one health indicator were used to compare conventional and organic farming methods

Being one of Europe's most eco-friendly restaurants, CUIB is looking for solutions to improve its sustainability. Overall, the best option for CUIB would be to get their products from a local farm that produces organically, however this is not always possible. Therefore, the focus is on the choice between serving food that is produced locally, or in an eco-friendly manner (e.g. organic farming), with the aim to have the least environmental impact possible. This is referred to as the "natural versus local debate". The student project assesses CUIB's supply chain, more specifically the environmental implications of the mode of production and the transport distance. Also, a comparison has been made with on the one hand the organic production system at larger distance, and on the other hand the local and conventional production system. For the production method, research shows that organic farming has more advantages than conventional farming, to both human health and to the environment. The one evident advantage of conventional farming is related to economic aspects as both profit and yield are higher. An important side note is that a farm does not need to be labelled to adopt eco-friendly practices. The findings for the transport distance were clearly showing that a shorter travel distance from the suppliers has a less harmful impact on the environment, as the CO_2 emissions and the amount of TRWP (tire road wear particles) generated are smaller. Furthermore, a switch to biodiesel can reduce the CO_2 emissions substantially. The information provided by the student report can be used by the restaurant to decide what they want to further improve on.

Figure 51. Comparing advantages and disadvantages of 2 scenarios: organic farm far away from the restaurant and conventional farm close to the restaurant.

Berlin (DE)

FoodE Pilot - Urban farm with hydroponic greenhouse and greywater pilot plant

Berlin, Germany

Nolde & Partner

This 'Water House' collects the greywater of about 250 residents. The treated greywater is fed back into the building, where it will be re-used used for gardening and toilet flushing. With clean water becoming increasingly scarce, this project rethinks the way we can use wastewater as a resource for new water, energy, and nutrients. During the FoodE project, the old plant will be dismantled and replaced by a newly developed version, which will integrate all technical and efficiency improvements made during the past 14 years. The new plant will have the capacity of treating 10'000 liters of greywater per day, also providing irrigation water to the connected hydroponic greenhouse.

Activity 1: Workshop

Aim of the co-design

The aim of the activity was to raise awareness about challenges of urban transformation and involve local community in the co-creation and co-design of blue-green infrastructures, DIY Hydroponics ("Do It Yourself"-Hydroponics) and their use, discussing about water-sensitive design and data-driven urban innovation.

Participants: 15

- Citizens.
- Students.

Method

A workshop was organized on site, at the pilot facility, including practical activities and roundtable discussion on several topics.

Outcomes

The workshops served to evaluate the impact of DIY-Workshops, prototyping for home hydroponics, measurements via simple digital tools. The information will be used in order to adjust and fine-tune future activities at the pilot location.

Communication

- https://www.citylab-berlin.org/docs/SummerSchool_Programm.pdf
- http://www.roofwaterfarm.com/neuigkeiten/

Activity 2: Focus group

Aim of the co-design

The aim of the activity was to raise awareness on regional food production and resources showing the potential of water, nutrients and thermal energy available in domestic wastewater.

Participants: 16

- Students from Landesstelle für gewerbliche Berufsförderung in Entwicklungsländern (regional office for the promotion of industrial careers in developing countries) Secondary School Centre for Agricultural Science (https://landesstelle.org/de/)

Method

The pilot leader prepared a lecture for the participants. The contents of the lecture and the plant tour were discussed at length.

Outcomes

The students were made aware of the topic. Lots of questions were raised about what the students could use in their home countries and how they could implement it in their own countries.

Points of discussion: how safe is it to produce food with recycled water? How expensive is it? How does water treatment work?

Figure 52. Plant tour at the Berlin FoodE pilots.

Oslo (NO)

FoodE Pilot - Educational rooftop farm for school pupils (NBL)

Oslo, Norway

Nabolagshager

In collaboration with Hersleb upper secondary school, with the highest drop-out rate in Oslo, this project explores the synergies of social innovation and urban farming through participatory processes. In doing so, the project aims to create sustainable, long-lasting green jobs for vulnerable groups while enhancing CRFS sustainability. Minority youth will have the opportunity to develop a more holistic curriculum to start their own sustainable food businesses through the work at the rooftop farm and the linkages with a public urban incubator space (Linderud Gård, an old farm) as well as other places in the city including a makers-space (which will be turned into a commercial kitchen).

Activity 1: Workshop

Aim of the co-design

The principal aim of the participatory activity was to identify the biggest challenges with business models around urban agriculture towards the creation of business models that are tailored to their community needs and their customers' desires. This has been done together with local stakeholders while also providing education on this topic.

Participants: 52

- Aspiring Entrepreneurs.
- Public sector employees.
- Entrepreneurs.
- Students.

The activity was organized by the FoodE Partner Nabolagshager within the workshop series 'Growing jobs in urban agriculture' that aims to facilitate exchange among urban agricultural experts, students, supporters, on a major challenge urban farmers are facing: develop business models that are tailored to their community needs and their customers' desires.

The aim was to discover the biggest challenges with business models around urban agriculture projects while also providing education on this topic. In addition, the goal was to bridge theory with practice and see where practitioners and potential practitioners were in terms of knowledge and challenges.

The workshop was highly interactive with short sessions of knowledge transfer from experts in the field accompanied by space to work in groups through real-life cases. The workshop covered key topics for developing a relevant, successful, tailored business model (Figure 53). This gave the opportunity to participants to understand deeply how to develop their own business model for an urban agriculture enterprise, becoming equipped with the necessary tools to do so.

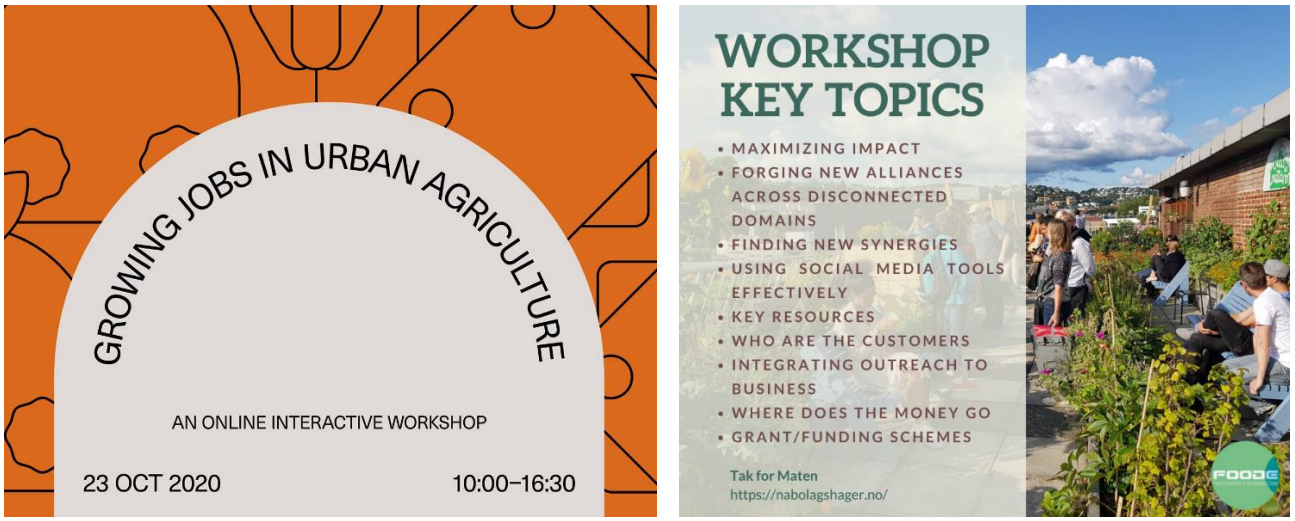

Figure 53. The interactive workshop organized by Nabolagshager (left) and the key topics of the event (right).

The participants were split into 4 groups, with each group led by a group leader.
The online platform "Miro" was used to develop business model canvases within these groups, working through each stage of the business model canvas. After the online session, the leaders of each group went to the pilot location to discuss the main outcomes of the activity, highlighting the most challenging parts of the business model canvas.

Opportunities for participants

No prizes were awarded. The exchange of information was the primary reason participants attended.

Criteria

All the outcomes were considered and the analysis focused on the primary challenges of the majority of participants, instead of simply looking at every challenge every participant had.
This was done over conversation with group leaders as well as with assessment of the Miro boards created during the event.
The pilot managers looked for patterns among the 4 case studies and discussed which ones were the biggest challenges during the exercises completed in the workshop.

Outcomes

The primary takeaway was that urban agriculture projects were experiencing challenges around both pricing models to reflect true costs as well as communication of a clear value proposition to recruit the correct "customers" to their projects or businesses. The pilot managers found this extremely important in terms of creating the curriculum for the incubator program - noting that the pilot needs to focus on establishing clear communication around value with participants as well as clear tracking on price to ensure financial sustainability.

Communication

- https://www.facebook.com/events/1720876024757763

FoodE Pilot - Plant factory for social inclusion

Oslo, Norway
Tåsen Microgreens

This pilot project implements a sustainable system for indoor production, packaging, and distribution of already cut microgreens, baby leaf and salads. The pilot project aims at creating job opportunities and training activities for disadvantaged population groups and promote active citizen participation in the organization of events. Hereby, it targets the issues of social inclusion, plant cultivation and resource management at once.

FoodE Pilot - Educational hydroponic garden prototype

Oslo, Norway
Tåsen Microgreens

In this micro-hydroponic system for schools, children can learn how to grow salads and herbs themselves. The system gives the user information about the basic principles of plant requirements. The aims of the project are to raise awareness among students on how food is produced, train urban farmers and educate children on food production methods.

Activity 1: Workshop(s)

Aim of co-design

The aim of the activities was to create awareness of food safety, locally produced food, indoor vertical farming without pesticides and GMO free.

Participants: 120

- Students (Bjørnsletta skole 7a, Oslo restaurantskole, Montessori skolen).
- Entrepreneurs (AvisimoFioriblomster, Dyrket.no, Dagen.no, Pier X, Arctic landscape hotels).

Method

In particular, during the lockdown imposed by the Covid-19 pandemic, the general objective was aimed at raising awareness of the positivity of indoor agriculture and analysing how consumer behavior has changed. The following aspects were investigated during a series of workshops (2) and online focus groups (8):

- Where does our food come from? Are you happy with that?
- How much knowledge do you have about international and local food production?
- What is the CO_2 footprint of herbs and other vegetables?
- How can local communities contribute positively to the food waste in developed countries?
- What will be the impact of Covid-19 on the agricultural sector?
- How will the Covid-19 lockdown situation reshape the way we grow and consume our food?
- What do we want in our diets?

Figure 54. On-site participatory activities organized at the FoodE Pilot location.

Criteria

The Pilot managers prepared several materials to support the activities, such as PowerPoint presentations and quiz (tool: Kahoot). The workshops were divided in cohorts taken to different zone/areas with activities followed by a series of roundtable discussions. All responses and comments were considered.

Outcomes

Main outcomes are summarized in Table 12.

Aspect under investigation	Participants' responses
How can local communities contribute positively to the food waste in developed countries?	- Small-scale indoor vertical hubs in schools, hotels, restaurants and institutes for growing own supply and supplying the neighborhood. Together contributing to lower waste.
What will be the impact of Covid-19 on the agricultural sector?	- We have to rely more on local produce. Shutdown causes importations to halt. - Covid-19 influenced the supply chain and the food lack presses us to indoor farming, especially for cold countries such as Norway. - We will eat less meat due to unknown viruses - We want food without pesticides. - We want organic food.
How will the Covid-19 lockdown situation reshape the way we grow and consume our food?	- We want more locally produced food. - We want to know where our food comes from. - We want nutritious healthy food. - We want more greens in our diet. - We want to explore new food.
What is the CO2 footprint of herbs and other vegetables, and how can we change our ways?	- Norway's biggest online grocery shop imports all their herbs from Africa. - We can have indoor farms providing all of Norway with the same herbs and vegetables they import today. - ONNA (https://www.weareonna.no/#About-us) will produce 350 tons of salad a year in Norway, which is 2 % of the importations of salads to Norway today.
What do the consumer want in their diets?	- More greens and vegetables. - New food such as insects and flowers. - Local produces. - Colors.

Table 12.

Opportunities for participants

All the participant had microgreens and eatable flowers of their choices.

Communication

- Social media posts (link1, link2)
- https://oslofjordhage.no/
- Educational workshop, episode 1: https://youtu.be/yn6-8naPfws
- Educational workshop, episode 2: https://youtu.be/CRSvPLFSAkk
- Educational workshop, episode 3: https://youtu.be/vb0xi5R6J0g
- Educational workshop, episode 4: https://youtu.be/geVG8E6egdc

Tenerife (SP)

FoodE Pilot: Sustainable small-scale fishery in school canteens

Tenerife, Spain

Organización de Productores de Túnidos y Pesca Fresca de la Isla de Tenerife (ISL), Instituto de Investigación Social y Turismo (Universidad de La Laguna)

School managers, cooks, fishers, and researchers jointly try to create new ways to process and distribute fresh fish on the Canary Islands. Their aim is to make better use of local fish catches instead of relying on imports, starting with the implementation in school canteens. Hereby, they support local fishers and provide school pupils with healthy meals.

Activity 1: Focus group

Aim of the co-design

The activity aimed to exchange ideas about the pilot development and fine-tune the processes and the fish distribution, together with local stakeholders, by taking into account the actual and future challenges.

Participants: 50

- 13 school managers.
- 15 cooks/ canteen staff.
- 6 teachers.
- 2 parents association representatives.
- 7 fishers association representatives.
- 7 mothers.

Method

The aim was the fine-tuning of the Ecotunidos Pilot Project in order to improve the results and adjust the processes to the reality of the stakeholders and the current and future scenario, considering the actual and future challenges related to the pandemic. For this purpose, a series of focus groups were organized with local stakeholders and organized as follows (**Figure 55**):

- 27 on-site meetings (with school managers, cooks/canteen staff, teachers, parents' association representatives).
- 2 on-site meetings (with 4 fishers' association representatives).
- 3 online meetings (with 3 fishers' association representatives).
- 1 online meeting (7 mothers).
- 1 telephone meeting (1 cook).

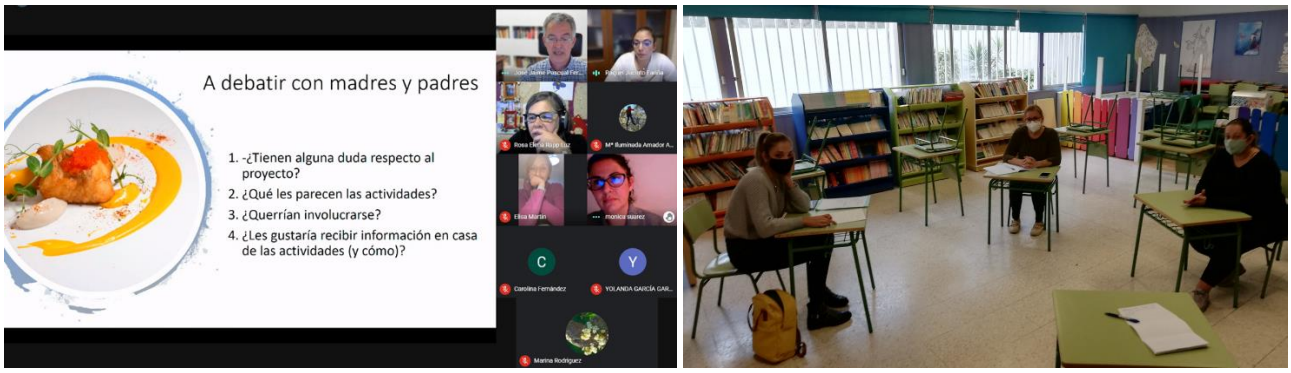

Figure 55. Online meeting with parents of pupils involved in the pilot (left), on-site meeting with school manager and parents' representative CEIP Guayonge (right).

Criteria

The main drivers of the choice of fish species are summarized in Figure 56.

The following aspects are considered:

- Fish with bones, dangerous for kids, are not accepted adequately by pupils nor by the canteen staff, at least without proper training.
- Most of the schools do not accept horse mackerel or small pelagic with bones. To be improved with interchanges with those schools where the consumption of these species is habitual.
- Fish consumption is somehow rejected by kids from 6 to 12 years old, and better accepted by younger kids. This means the pilot with young kids is essential to improve their future diet.

Figure 56. Main criteria for fish selection.

- Fish with fish shape is not accepted among pupils (Burgers, meatballs and steaks are better accepted). Pupils trained to consume small pelagics accept much better fish with shape.

However, at this stage, all ideas were taken into consideration and discussed. The pilot is already working efficiently. Most of the suggestions and ideas were placed on the table to develop improvements and facilitate its expansion. There was a consensus on the fundamental challenges for the pilot and the need for some improvements. In general, the most demanded improvement is to expand, secure and diversify local fish supply.

Outcomes

In 2018 the Ecotunidos Pilot project was launched in 9 schools in Tenerife. The starting point was a step zero analysis to define the marine products consumed and the needs of fish supply of the schools. From that initial point, the distribution of fish to school canteens started.

One year after, in 2019, an assessment of the pilot implementation was undertaken at schools. The main findings were:

- The pilot launching was successful in all schools.
- The importance of a balanced diet and fish consumption should be efficiently communicated to pupils.
- Communication with families is fundamental.
- Training programs and knowledge exchange has to be done among the main stakeholders involved.

- New fish species should be included, including some species of white fish and small pelagic
- Ecotunidos Pilot TIC´s should be developed: Facebook, Instagram, Web, App.

In 2020, the 34 focus groups organized within FoodE project, led to the following results and considerations:

- Schools' managers & cooks are accepting enthusiastically small-scale local fisheries (SSF) and SSF products;
- Pupils are accepting SSF products properly;
- Schools´ managers & cooks are willing to widen the range of SSF products;
- The canteen staff needs specific training, for instance, to help pupils learn how to consume fish with small bones.
- Suppliers are involved in the project, but there have been some difficulties related to the fish supply, related to the incertitude of the pandemic and the functioning of schools' canteens (planning has been hazardous).
- Main demand: increase the diversity of fish supply. The scope of suppliers and the variety of species served to the schools has been diversified from previous years. This is an ongoing task. Furthermore, diversifying fish suppliers may help to expand the pilot to other islands. Some fisher organizations in other islands are interested in joining. The scheme in Figure 57 shows some of fish species that were enthusiastically accepted by pupils and cooks and the main reasons behind these choices.

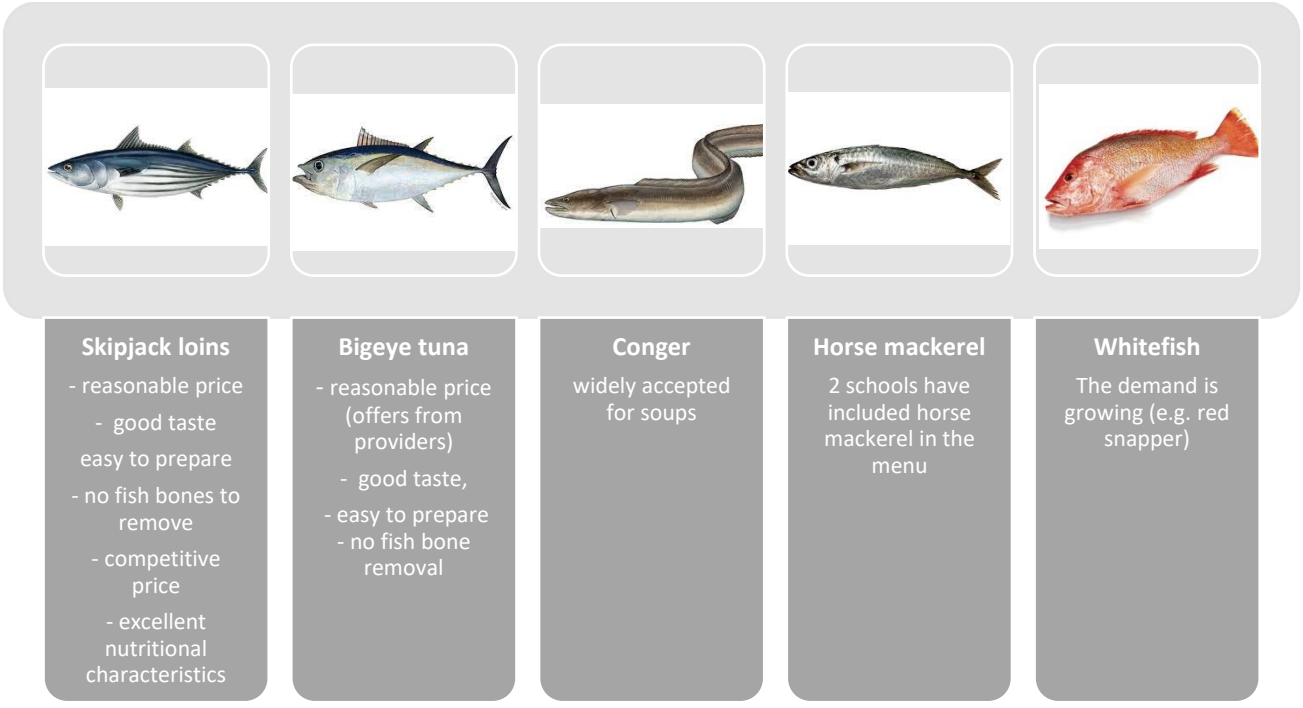

Figure 57. Fish species widely accepted by schools, cooks and pupils.

- Continuous feedback with cooks and canteen managers via WhatsApp groups (14 cooks-canteen managers involved) has been beneficial to improve the delivery process and maintain continuous contact with key stakeholders.
- An online Purchasing Platform is currently under development to connect demand from schools and supply from fisher organizations.

Longyearbyen (NO)

FoodE Pilot - Circular economy restaurant

Longyearbyen, Norway
Polar permaculture

A circular restaurant, connected with a food production unit, processes the waste from the restaurant and other local activities into compost and energy for the food unit. The project stimulates the social inclusion of citizens in activities associated with food production, by integrating local fishermen and organizing events related to sustainable food. Eventually, the project seeks to integrate principles of a circular economy and use waste products as resources for the farm.

Activity 1: Workshop

Aim of the co-design

The purpose of the activity was to stimulate the students' creativity and engage them in deep reflection concerning the challenges of sustainability and the perspective of the various relevant stakeholders, in relation to Svalbard in general and to the restaurant business.

Participants: 14

- 12 students (PhD and bachelor students at the School of Business and Economics, UiT-The Arctic University of Norway, campus Tromsø).
- 2 professors.

Method

The workshop "The arctic capital of Norway" adopted Design Thinking (DT) to stimulate the students' creativity and engage them in deep reflection concerning the challenges of sustainability and the perspective of the various relevant stakeholders.

- First, the students were presented with the food-related challenges of Svalbard.
- Then, two activity-based sessions were arranged centered on: 1) values and disvalues, and 2) possibilities for the future.
  Typical DT methods and tools were used (brainstorming, empathy, posters, persona, post-its).
- The workshop ended with the presentation by Polar Permaculture Solutions and an open discussion about the challenges, possibilities and future plans.
- After the workshop, the students were provided with the power point presentations by professors at the School of Business and Economics in Tromsø (Giovanna Bertella and Sara Lupini) about sustainability and business models, including literature suggestions and by the pilot leader (Benjamin Vidmar from Polar Permaculture Solutions project).

Outcomes

Values/disvalues session: among the values, the following were identified as relevant for the residents as well as the tourists: the **pristine nature**, and a **unique community**. For local people, **job opportunities** were also mentioned in several post-its and during the discussions (Figure 58).

Possibilities for the future: the second part of the workshop was dedicated to reflections about the future. To stimulate empathy and creative thinking, personas representing various stakeholders (local community, tourists/customers, investors/shareholders, natural environment, employees, suppliers and partners) were used (Figure 59). The participants were asked to reflect on what the stakeholders might wish for the future. A theme perceived particularly relevant across the stakeholder categories was the **protection and the management of the natural environment**. With regard to this, the personas representing:

- the tourists were used to express the desire for wilderness experiences
- the residents (including tourist operators) were used to highlight the need for safety and the desire to respect and protect the nature.
- the nature was used to express the desire for a **clean environment**, in particular the ocean. In some cases, the **risk of pollution** was associated to tourism.

Other prominent themes that emerged as particularly important for the future of the local community concern **job/educational opportunities** (including starting a business), **safety and social security, a lively community** (cultural offer).

- The personas representing the investors and some personas representing employees were represented **wishing for more customers and profit**. With regard to the restaurant business and food, the personas were used to indicate the wish for **fresh and healthy food** (in particular vegetables and fish), the possibility to have locally produced food (for both residents and tourists), and to **experiment with environmentally-friendly production systems**.

The workshop continued with the presentation of the Polar Permaculture Solutions project and an open discussion about possibilities and challenges. Among the aspects commented on in the final part of the workshop there were:

- the tension between a pristine nature and the human presence (related to tourism but not only)
- the importance of supporting the local businesses in their efforts to develop sustainably (for example: funding projects, helping with project applications, context-specific regulations, guidelines/regulations as facilitating elements and not barriers to business development).

Opportunities for participants

- The students did not receive prizes, but they now have the chance to enter a collaboration and learning program with Polar Permaculture and other sustainable enterprises in Svalbard.

Criteria

All answers and solutions were considered and ranked them according to **feasibility**, which is how the wheel was structured in the first place. Values, challenges and future possibilities were crossed to evaluate what was feasible in the near future.

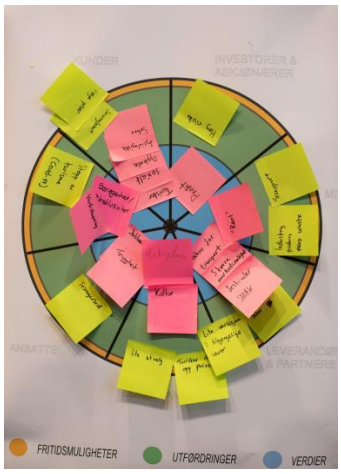

Figure 58 The value/disvalue map with the post-its elaborated by the workshop participants (left) and final presentation discussing the ideas elaborated by the groups (right).

Figure 59. The personas representing the various stakeholders used to elaborate on the future.

Figure 60. Discussing opportunities and challenges.

Activity 2: Workshop

Aim of the co-design

The aim was to have the perspective of students from a non-academic schooling system on how sustainability standards will affect their life directly (access to food variety, low-skill jobs and leisure offers).

Participants: 27

- Students (from different 'lines' of a folk high school).

Method

The workshop was organized in Oslo, at the pilot location together with folk high school. The program included an introduction to Longyearbyen's past, the unsustainable practices in town and how they plan on changing them and tasting session of local arctic food and plant microgreens. The aim was to have the perspective of Norway's less academic youth **on how sustainability standards will affect their life directly** (access to food variety, low-skill jobs and leisure offers).

There were 4 groups which rotated across stations (Longyearbyen past, Longyearbyen future, arctic food, planting station), the first two being tours of the town to show them where things happen and the last two practical activities inside the zero-waste restaurant location (Figure 61). There was a tour scheduled for showing the town's workings, traditional and sustainable arctic food was prepared for the event, as well as a planting station.

Opportunities for the participants

- In addition to the guided tour, the students received food and could bring home microgreens.

Figure 61. On-site workshop together with folk high school students.

Criteria

Feasibility of the ideas for the arctic and how fast they can be implemented in a politically charged period in town.

Outcomes

This experience showed that not all solutions should be so focused on specialized jobs that require a high education or many hours of reading. Making environmentally positive practices and the circular economy a

natural thing - as one could argue was the case in small communities up to the mid-20th century - is the secret to changing society without sharp job loss or decline in living standards. In addition, there were interesting suggestions for more industry integration and cooperation (i.e. fishery to factory to farm to table to farm concept).

Communication

- https://www.polarpermaculture.com/foode

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Figure 6. University of Naples. (2021). Target elements of the co-design of the Troisi Agricultural park [Figure].

Figure 7. (left) University of Bologna. (2021). Finalist teams and scores of UrbanFarm 2021 for the co-design of Troisi Park [Graph]. https://site.unibo.it/urban-farm/en/teams/teams-2021/view

Figure 7. (right) Amitrano, C., Coppola, G., El-Naggar, N., Iovane, M., Menichini, G., Waller, R., Rossitti. (2021). Team picture "Agrivolution", winners of UrbanFarm 2021 for the co-design of Troisi Park (Naples) [Image]. https://site.unibo.it/urban-farm/en/teams/agrivolution/view

Figure 8. Amitrano, C., Coppola, G., El-Naggar, N., Iovane, M., Menichini, G., Waller, R., Rossitti. (2021). Architectural design proposed by the winning team "Agrivolution" [Image]. http://amsacta.unibo.it/6707/1/UrbanFarm2021.pdf

Figure 9. University of Naples & Municipality of Naples. (2021). Results of the local stakeholders' and citizens' survey organized by the representatives of the Pilot project in Naples. [Graph].

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Figure 12. (left) University of Bologna. (2021). Perspective drawing of the climate control chamber of ALMA VFarm (Bologna) [Drawing].

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Figure 17. (left) Aziz, M., Bellini, B., Buldrini, G., Coluccia M., Cravino, M., El Kady, M., Mehrad, K., Monticelli, M., Mosaad, S., Radwan L., Signoroni, L. (2021). Architectural design proposed by the winning team "Soul Farmers" for the FoodE Pilot Salus Space (Bologna) [Image].

Figure 17. (right) Aziz, M., Bellini, B., Buldrini, G., Coluccia M., Cravino, M., El Kady, M., Mehrad, K., Monticelli, M., Mosaad, S., Radwan L., Signoroni, L. (2021). Architectural design proposed by the winning team "Soul Farmers" for the FoodE Pilot Salus Space (Bologna) [Image].

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Figure 18. (right) Aziz, M., Bellini, B., Buldrini, G., Coluccia M., Cravino, M., El Kady, M., Mehrad, K., Monticelli, M., Mosaad, S., Radwan L., Signoroni, L. (2021). Concept design of the tree-like structures for rainwater collection proposed by the winning team "Soul Farmers" for the FoodE Pilot Salus Space (Bologna) [Image].

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Figure 25. (left) Municipality of Romainville. (2021). Finalist teams and scores of UrbanFarm 2021 for the co-design of The Cité Maraîchère [Graph]. https://site.unibo.it/urban-farm/en/teams/teams-2021/view

Figure 25. (right) Hani, J., Sansom, M., Vasilevska, M., Fung Janice Wong, C. (2021). Team picture "GrowPro", winners of UrbanFarm 2021 for the co-design of The Cité Maraîchère (Romainville) [Image].

Figure 26. Hani, J., Sansom, M., Vasilevska, M., Fung Janice Wong, C. (2021). Architectural design proposed by the winning team "GrowPro", winners of UrbanFarm 2021 for the co-design of The Cité Maraîchère (Romainville) [Image]. http://amsacta.unibo.it/6707/1/UrbanFarm2021.pdf

Figure 29. Krenenou, S., Ringler., E. (2021). Summary of recommendations and related-measuring indicators proposed for the pilot the Cité Maraîchère (Romainville) [Scheme].

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Figure 31. (center) Municipality of Romainville. (2021). Participatory workshops at the Cité Maraîchère with local stakeholders at the Cité Maraîchère (Romainville) [Photograph]. https://www.lacitemaraichere.com/en/

Figure 31. (right) Municipality of Romainville. (2021). Participatory workshops at the Cité Maraîchère with local stakeholders at the Cité Maraîchère (Romainville) [Photograph]. https://www.lacitemaraichere.com/en/

Figure 32. Wageningen University & Research. (2021). Results of the stakeholders' questionnaire on Vertical Farming for the co-design of the FoodE Pilot in Bleiswijk (Netherlands) [Graph].

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Figure 37. (left) Dwipok, D.B., Woldetsadik, F., Park, O., Duan, D., Ian Lai, S., Marx, S.M. (2021). Crop selection for vertical farming proposed by "Nutrileaf" team for the co-design of the FoodE Pilot in Bleiswijk (Netherlands)) [Image].

Figure 37. Righini, I. (2021). Online coaching session with “Nutrileaf” team [Photograph].

Figure 38. Brezovsek, A. (2021). Winning project for the design of beehives’ stands in Ljubljana prison (Slovenia) [Image].

Figure 39. (a) ŠTucin, K., Furlan, T. (2021). Finalist design for beehives’ stands in Ljubljana prison (Slovenia) [Image].

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Figure 40. (right) Fakulteta za dizajn. (2021). Artwork proposed by the Interior design students during the second challenge organized for the pilot project “Prison honey”. [Artwork].

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Figure 47. Stichting Metabolic Institute. (2020). First-prize sensor data visualization frame of the aquaponics software – developed by Team C during the second hackathon: “design a user-friendly/user-expert interface for the aquaponics software” organized by Metabolic Institute for the co-design of the FoodE Pilot in Amsterdam (Netherlands) [Image].

Figure 50. van den Boogaard, Y., Bosch, N., Broens, S., Monterosso, L., Van Der Steen, A., Wu, Y . (2021). Indicators proposed by Wageningen students to compare conventional and organic farming methods [Image].

Figure 51. van den Boogaard, Y., Bosch, N., Broens, S., Monterosso, L., Van Der Steen, A., Wu, Y . (2021). Extract of Wageningen student final presentation [Image]. Final presentation of the Academic consultancy training (WUR): “CUIB: Eco-Friendly Restaurant in Europe”.

Figure 52. (left) Nolde, E. (2021). Participatory activities at the Water House in Berlin (Germany) [Photograph].

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Figure 61. On-site workshop together with folk high school students. [Photograph].