HelpFood 4.0

Food Ecosystem Scalability

RIS program mar 2022 - dec 2022

Food Ecosystems Roadmap
HelpFood 4.0 Final report

Contents

1. FOOD ECOSYSTEM

HelpFood 4.0 project aims to study and test the importance of designing, sustaining and managing landscape and social infrastructure to make food circular sustainability more shared and practicable. The shortening of the supply chain could be a solution to improve the economic, social and environmental sustainability of the food supply chain. To promote these changes, it is necessary to work with a multiscale and multilevel approach. To do so, the project proposes the role of food as an element of reconnection between farmers, citizens and through the promotion of emerging food ecosystems (community supported agriculture, purchasing solidarity groups, food cooperatives) as sustainable examples of production, distribution, and consumption of food as well as care and enhancement of the landscape. The project is structured according to different incremental phases that embrace crosswise the idea of "scaling" intende as applicability and transferability of processes and methodologies. It is structured according to five work packages (WPs) intended as different developing steps: WP1 Scale Up, WP2 Scale deep, WP3 Scale Through, WP4 Scale Out, WP5 Management & Communication. The "Food Ecosystems Roadmap" collects the results of the project by offering an operational manual for supporting the activation of new food hubs based on: responsible and site-specific understanding, literature review, data analysis, good practices knowledge, innovative interactive interventions, sustainability matrix pillars. This document is targeted for a wider public, including all the active actors in the local food sustainable ecosystems (producers, consumers, citizens, public officers, associations, companies).

1.1 HelpFood 4.0 project

The HelpFood 4.0 project was created as a result of some experiences started by the University of Trento and the Municipality of Trento to promote more conscious consumption, to raise awareness for more sustainable production and to shorten the distance between consumers and producers, between urban and rural areas. The project was initially named Nutrire Trento, which evolved during the covid-19 pandemic in 2020 into the Nutrire Trento#fase2 with the implementation of an online platform for purchasing products from local producers. The project leads to the creation of a CSA active in the area. The project starts from the research developed during the pilot project HelpFood in 2021 and plans to scale up and replicate the socio-technical innovation experimented in other RIS countries (Italy, Spain, Portugal).

Now the Helpfood 4.0 project, as an evolution of the HelpFood project (EIT Food Poc 2021), aims to test and demonstrate the importance of designing and supporting social infrastructures to make food circular sustainability more practicable by scaling up and replicating the socio-digital innovation experimented into other RIS countries. The project explores the role of food as an element of reconnection between farmers, citizens and "eaters" (i.e. citizens more aware of sustainable food issues) through the promotion of Community-Supported Agriculture models as sustainable examples of production, distribution, and consumption of food.

HelpFood 4.0 aims to test and demonstrate the importance of designing, supporting and running social infrastructure to make food circular sustainability more shared and adopted in everyday life. The shortening of the supply chain could be a solution to improve the economic, social and environmental sustainability of the food supply chain. To promote these changes, it is necessary to work with a multiscale and multilevel approach. The project promotes the sustainability of high-quality food along the food value chain due to cooperation between research organizations and farmers and the promotion of short supply chains. The empowerment of eaters will be pursued by providing information on geographical traceability and nutritional information, with the development of an IT tool allowing eaters to directly visualize the origin of ingredients to be implemented in food labeling.

The project involves several European partners: Universities, companies and public administrations. HelpFood is coordinated by the University of Trento, by DICAM department and involves the DII department of the University of Trento, Hub Innovazione Trentino (HIT), Fondazione Edmund Mach (FEM), SpindoxLab (SPXL), Building Global Innovators (BGI), BioAzùl (BIO), Ruralia Institute - University of Helsinki (RI), City of Gothenburg (GK).

In terms of competitiveness and evolution of sustainable food system within the RIS countries, this project will: (i) enhance the competitiveness of the local ecosystems by identifying new production and market opportunities, with increased returns for the companies as already demonstrated by the EU Geographical Indications' system; (ii) support innovative value chain design that will improve the competitiveness of small-scale farmers and local distributors; (iii) optimize the local Agrifood supply chain with new digital functionalities and services; (iv) increase citizens' awareness and understanding of the benefits provided by alternative food systems; (v) improve the economical sustainability of local farmers and export the CSA model in other RIS countries; (vi) measure and monitor well-being and progress using both quantitative and qualitative research methods and techniques, (vii) engage local policymakers to make the distribution model more systemic.

The project collects the research developed in this report and concludes with operational guidelines to allow the activation of emergent food ecosystems such as the CSAs with a focus on the definition of food hubs. In order to do that, the project was structured to follow three incremental phases that embrace crosswise the different developing steps of the project idea within 3 years. However, due to funding constraints,it was possible to develop only the first phase within 12 months. This first phase coincides with the first year and it is structured according to five work packages (WPs): Scale Up, Scale deep, Scale Through, Scale Out, Management & Communication.

1.2 Emerging food ecosystems

The European Regulation n. 1305/2013 defines a "short food supply chain" as "a supply chain that has a limited number of economic operators, committed to cooperation, local economic development, and close geographical and social relations between producers, processors and consumers". The Short Food Supply Chain models can be mapped following different criteria, such as the number of intermediaries, geographical distance, and system management (individually or collectively managed). Finally they can be categorized as consumer-driven, farmer-driven or public-driven. The Community Supported Agriculture, the Purchasing Solidarity Groups and the Food Cooperatives can be considered as Short Food Supply Chains consumer-driven initiatives that are collectively managed.

Food Cooperatives are voluntary and autonomous associations of citizens who share their common economic, social and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise.
The first FoodCop was founded in 1973 in Brooklyn (NYC) in a disadvantaged neighborhood. Today, the Park Slope Food Coop counts more than 15 thousand products and 75% of the work is run by 17 thousand members.
The Park Slope Food Coop defines Food Coop as "Food Coop is a member-owned and operated food store – an alternative to commercial profit-oriented business." adding that "As members, we contribute our labor: working together builds trust through cooperation and teamwork and enables us to keep prices as low as possible within the context of our values and principles. Only members may shop, and we share responsibilities and benefits equally. We offer a diversity of products with an emphasis on organic, minimally processed and healthful foods. We seek to avoid products that depend on the exploitation of others. We support non-toxic, sustainable agriculture."
Differently from a traditional grocery, Food Coop's direct inputs concern food products and store offerings, and the net profits are recycled into the coop and the community via charitable

donations. Moreover, a food coop is a form of community that is wealth-building through local ownership and supports food security and local farmers.
The main purposes of a Food Coop are to distribute food products, mainly from organic farming, and other consumer goods of good quality at the best possible conditions; support production chains that respect the dignity and health of workers and protect the natural environment; promote social cohesion, promoting the inclusion of economically disadvantaged people and ensuring all members have full access to quality food; develop direct relationships between producers and consumers based on trust and mutual support; and contribute to the protection of the environment also by promoting waste reduction, energy saving, encouraging the reuse and recycling of durable goods.

Ethical or Solidarity Purchasing Groups (SPG) are groups of consumers who purchase collectively through a direct relationship with producers and usually share ethical principles. The system was developed in Italy in 1994 with the aim of "Changing the world by shopping". The SPGs are commonly informally organized groups that count about 30-80 households participants.
The concept of solidarity, between the members and between the group and local farmers, drives SPG in the choice of the products. Participants share a list of criteria for the producers' selection process, such as the farm size, distance, transparency, price, and production methods, etc. Producers and consumers use to define the rule through a participatory guarantee system.
The strength of GAS is also the direct contact with producers with whom a climate of dialogue and mutual trust is established with a beneficial effect for both parties. Consumers can enjoy high quality and competitively priced products due to the exclusion of intermediaries, producers are given a fair price for their product. The preference is then given to local products, reducing the environmental impact of transporting goods and, by dealing directly with the producer, paying attention to the company's working and management conditions.
The basic functioning of a SPG starts with the definition of a list of products on which they intend to make collective purchases; then the orders, placed by the members, are collected and added together to define a group order that is sent to the producer. Finally, the goods that arrive from the producer are divided among the families belonging to the group and everyone pays for their part.
Due to the complexity of management, the initiators have previous personal experience in other groups.

Community Supported Agriculture (CSA) is a direct partnership based on the human relationship between people and one or several producers, whereby the risks, responsibilities and rewards of farming are shared, through a long-term, binding agreement (European CSA Declaration).
• Teikei in Japan, mid '60s (Japan Organic Agriculture Association – JOAA)
• Members (or share-holders) anticipate the costs for cultivation operations and for the farmer's salary and get in return a part of the farm produce when the season comes (shared risks).

1.3 Good practices / Case studies

Each RIC country (Italy, Spain, Portugal) and other countries (Sweden, Finland) will be briefly presented through the description of the territory (context, food system in each region) and the description of local good practices (GP).

Trentino, Italy[1]

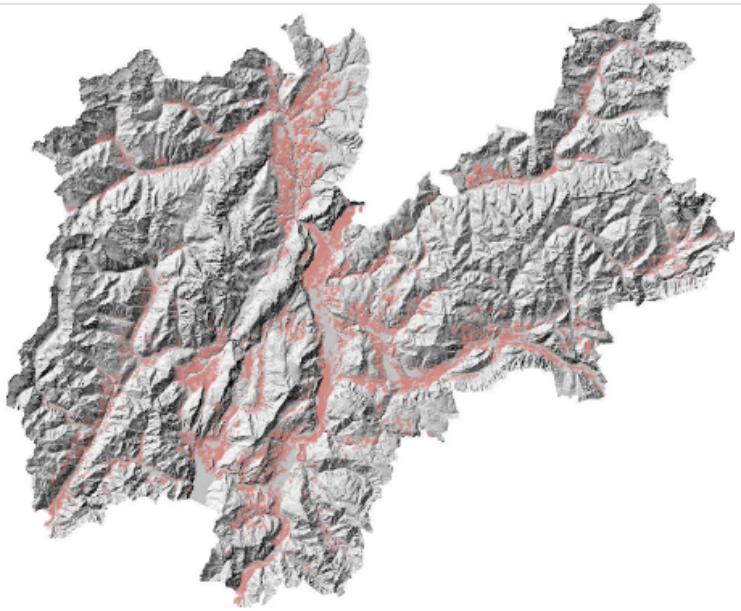
The Autonomous Province of Trento is an Italian Alpine Region located in Northeast Italy, covering about 620,000 hectares with a total number of inhabitants at around 540,000 and a population

[1] Part of the texts included in this section has been published in the scientific contribution: Andreola, Mattia; Pianegonda, Angelica; Favargiotti, Sara; Forno, Francesca, "Urban Food Strategy in the Making: Context, Conventions and Contestations" in AGRICULTURE, v. 2021, n. 11(2) (2021), p. 1-25. - DOI: 10.3390/agriculture11020177

density close to 90 people per square kilometer. Here, 88% of the Municipalities are located at an altitude of more than 600 m above sea level reflecting the peculiar topography of the province made up of valleys and high mountains with high percentages of steep slopes. Trentino region is internationally renowned for its mountains — such as the Dolomites — which are part of the Alps, and where the agricultural sector has maintained a rather central role also thanks to the cooperativism that has developed here, especially after WWII.

These topographical characteristics have always made cultivation activities difficult, and terraces were created to overcome this problem. Nowadays, the machinery used in agriculture is often not suitable for use in such areas, consequently, they have often been abandoned in favor of the flatter areas. Furthermore, most lands being located at high altitudes, where the climate is harsher than the valley floor, the cultivation of many plant and fruit species is not possible, therefore croplands are generally localized in the flatter areas, as reported in maps below[2]. These characteristics deeply influence the territory's dynamics and have favored the flourishing of villages and cities in the valley floors. Along the Adige valley—the main valley of the Trentino province—are located Trento and Rovereto, the two main centers of the region. In recent years, a phenomenon of abandonment of small villages occurred, in particular of those more distant from major urban centers. About 20% of the province's inhabitants live in Trento which is the capital, but 70% of the other inhabitants live in villages with less than 25,000 dwellers. Therefore, the Province of Trento is classified by Eurostat as an intermediate region[3]. In Trento, the overall density is 742 inhabitants per square kilometers and the pressure on urban and peri-urban areas is nine times higher than the rest of the province[4]. 20% of Trento's territory is classified as agricultural and 50% as forest or pasture land. About 70% of the territory is covered by silvopastoral -agricultural areas, the remaining 30% is categorized as urban. The repartition of the province's surface is similar to the one of the city of Trento: 61% of the territory is covered by forests, 33.6% by agricultural areas, and only 5% by other types of land use. The number of farms that have their shops shows another difference between the central areas of the region and the more peripheral ones. Indeed, in those areas located at the fringe of the province, there is a great number of on-site shops with agricultural products.

[2] References: Tarquini, S.; Isola, I.; Favalli, M.; Battistini, A. *TINITALY, a Digital Elevation Model of Italy with a 10 m-Cell Size*; Version 1.0; Istituto Nazionale di Geofisica e Vulcanologia (INGV): Roma, Italy, 2007; doi:10.13127/TINITALY/1.0. Available online: http://tinitaly.pi.ingv.it/Download_Area2.html (accessed on 16 September 2020).
Provincia Autonoma di Trento. Geocatalogo PAT. Sistema delle Aree Agricole—PUP. 2019. Available online: https://siat.provincia.tn.it/geonetwork/srv/ita/catalog.search#/home (accessed on 11 December 2020).
[3] Eurostat. *Urban Europe: Statistics on Cities, Towns and Suburbs*; Eurostat Statistical Books: Luxemburg, Luxemburg, 2016; doi:10.2785/91120. Available online: https://ec.europa.eu/eurostat/en/web/products-statistical-books/-/KS-01-16-69 (accessed on 8 June 2020).
[4] Istituto Nazionale di Statistica. Risultati del Censimento Permanente della Popolazione. 2020. Available online: http://dati-censimentipermanenti.istat.it/ (accessed on 5 December 2020).



Crops in the Autonomous Province of Trento compared to the Digital Terrain Model. Source: Andreola, Mattia; Pianegonda, Angelica; Favargiotti, Sara; Forno, Francesca, "Urban Food Strategy in the Making: Context, Conventions and Contestations" in AGRICULTURE, v. 2021, n. 11(2) (2021), p. 1-25. - DOI: 10.3390/agriculture11020177

The food system is a key sector in the province's economy with 15.6% of exports in food, drink, and tobacco in the second semester 2019[5]. Gross salable production (GSP) of the agricultural and forestry sector amounts to 698.4 million Euros, 95% attributable to the agricultural sector and 5% to the forestry sector [56]. Fruit growing is the main business, with 33% of the GSP of the agricultural sector, followed by zootechnics with 17%, and viticulture with 15%[6]. Apple production makes up to 82% of the GSP of fruit growing followed by small fruits (as berries) with 11%[7]. Apple orchards extend over 10,798 hectares and involve 5864 farms[8]. The organic sector is increasing in Trentino and areas devoted to organic production have been constantly growing since 2003, as reported in the graph in Figure 4. In 2017, the area cultivated adopting organic methods was 7146.04 ha corresponding to 1.15% of the entire province's surface, excluding forests, uncultivated lands, and hedges from the calculation[9].

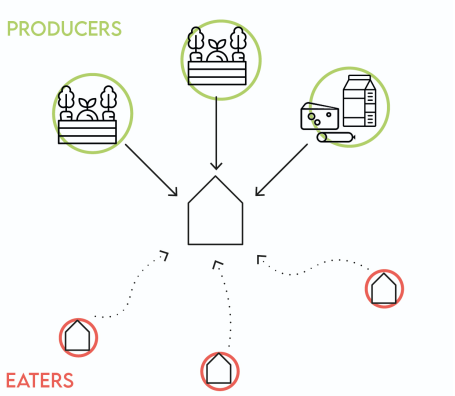
Compared to other case studies in Italy, Alternative Food Networks in Trentino seem to be much more "institutionalized" and linked to the action of the "Tavolo dell'Economia Solidale Trentina", a working group recognized and supported by the Autonomous Province of Trento. On the one hand, institutional recognition, which has also meant the availability of funding from the Autonomous Province of Trento, has enabled critical consumer organizations, in particular, to develop with a certain continuity. On the other hand, the Alternative Food Networks in Trento appear very limited

[5] Camera di Commercio Industria Artigianato e Agricoltura di Trento. Export: 2° Trimestre 2019: I Dati della Provincia di Trento. 2019. Available online: https://www.tn.camcom.it/content/export-2deg-trimestre-2019 (accessed on 14 September 2020).
[6] Programma di Sviluppo Rurale di Trento 2014–2020. 2018. Available online: http://www.psr.provincia.tn.it/Sviluppo-Rurale-2014-2020/Scarica-Materiale/PSR-2014-2020 (accessed on 10 October 2020).
[7] Ibidem
[8] Ibidem
[9] Provincia Autonoma di Trento. Trentino Agricoltura—Organizzazione dei Produttori. Available online: http://www.trentinoagricoltura.it/ (accessed on 1 December 2020).

to specific cliques of the population and less inclined to dialogue with other local entities in order to further spread sustainable practices among new producers or consumers. Therefore, they tend to take those closed and self-referential approaches, with little impact on the local food chain. This trait emerged over and over again during the meetings of the Tavolo di Nutrire Trento, the decision-making board of the city's participatory project. However, despite this necessary premise, the Trentino context is very active. In addition to the already mentioned "Tavolo dell' Economia Solidale," it is worth briefly mentioning Trento Consumo Consapevole, a non-profit association and Solidarity Purchase Group founded in 2017 — almost at the same time as Nutrire Trento — to promote and facilitate critical, conscious, and solidarity-based consumption in the province of Trento, as well as to create a "critical mass" and examine issues related to taxation, and discuss consumption styles and producers. Another well-established organization in the area is Trentino Arcobaleno, a social promotion association which collaborates with the "Tavolo dell'Economia Solidale" and which aims to create a new economy, more closely linked to its local area and respectful of the environment and workers. Finally, it is also worth mentioning the Biodistretto association of Trento, an organization founded in 2018 that involves both farms, wineries, and eco-restaurants.

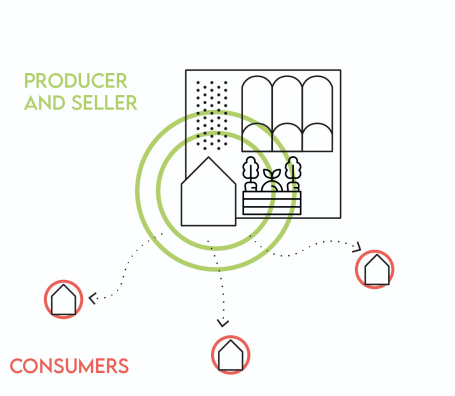
Good practices in Trentino (Italy)

CSA NATURALMENTE TRENTINO[10]
Trento, Trentino (Italy)



The CSA Naturalmente in Trentino is a "Community Supported Agriculture" born from the association of a group of active producers in the Trentino region. Currently, it is a community of 11 producers and 34 "eaters" — citizens more aware of sustainable food issues — who share risks, responsibilities and benefits of agriculture by subscribing to a binding long-term agreement. The producers receive pre-financing of part of their production costs from the members and can share their choices of crops and livestock with the communities. "Eating" members, therefore, have the opportunity to eat fresh, seasonal products that respect the environment, and know the products themselves and where they are produced.
The purchase and order by the eaters of the products are done weekly and an online platform where they can specify the producer, product and quantity is used.
The distribution of the products is organized on a specific day during the week and at a fixed time. The products are delivered to a specific location and previously separated according to family. Eating members must then reach the collection point at the specified times.

ORTO SAN MARCO - SETÀP[11]
Rovereto, Trentino (Italy)

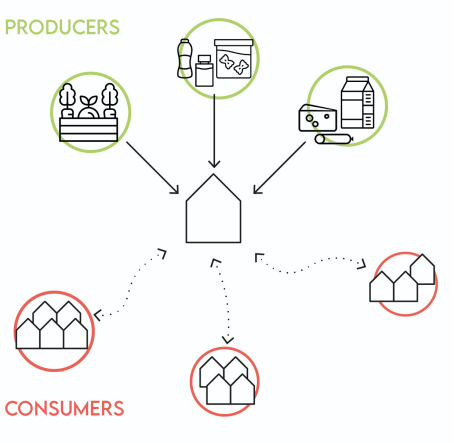


Orto San Marco - Setàp is an urban agriculture activity that has regenerated an abandoned piece of public land in the Municipality of Rovereto. The project was born from the participation of local realities such as MangioTrentino as a producer and the H2O+ association as a third-sector organization. The requalified land covers about 8000 square

[10] Official website: http://www.csanaturalmente.it/wordpress/
[11] Official website: http://www.ortazzo.it/blog/

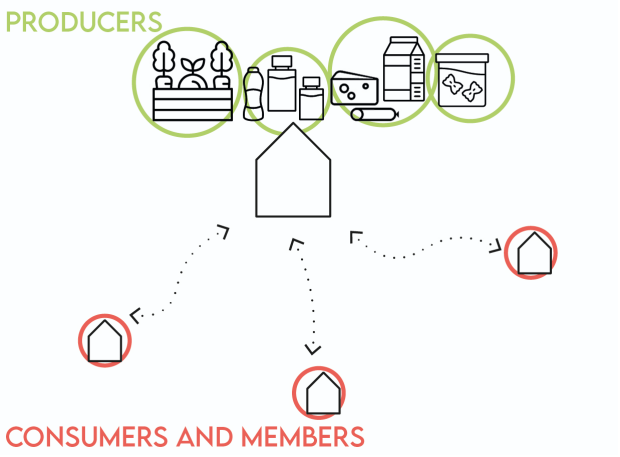
meters and is divided into the productive part, where we find greenhouses, the shop where the direct selling of the products, and a space for educational and social activities.
At the shop, you can buy the products grown in the urban agriculture space and other crops from the Trentino region. In addition, Orto san Marco is an open space where agricultural production can be observed and where social cooperatives can take care of spaces dedicated to them, such as the circular vegetable garden. The association also organizes many events such as show cooking, small concerts or presentations.
Orto San Marco - Setàp also cooperates with 14 other partners such as research institutions, universities, schools, the Rovereto Municipality, the social services of the Valley Community and the Municipality of Rovereto. In particular, with the project "Development of biomedical silk" which provides for the cultivation of mulberry plants in the Orto San Marco - Setàp plot for the production of silk, from silkworms, to be used in the medical field.

L'ORTAZZO[12]
Caldonazzo-Valsugana, Trentino (Italy)



L'Ortazzo was born 15 years ago from a youth project of community organic gardens. After a few years, with the idea of integrating a more informative and educational part, they founded an association and a Solidarity Buying Group (GAS) active in the upper Valsugana area. Today, the association counts 110 families with specific roles within the purchasing group, and also collaborates with the provincial association for minors with whom they manage the distribution of the purchasing group's products. L'Ortazzo association is active in the dissemination sector with events open to the public such as the *LunAdì* evenings, the cultural programme of the Fa la Cosa Giusta fair, and the Edecosol project.
The solidarity buying group supplies fresh products, processed products and also other categories such as hygiene products and clothing, and families place their orders once a week using an online platform. The products are picked up weekly and at a specific collection point and time, but the families organize themselves for these groups due to the widespread location of the members. Currently, the association does not have a physical location for distribution but relies on other locations on a temporary basis.

EDERA - EMPORIO DI COMUNITA'[13]
Trento, Trentino (Italy)



Edera Emporio di comunità was founded in 2022 as a cooperative. Edera was formed after a long participatory project process among the current cooperative members to understand and investigate what would be a fitting form for their project. They are organizing the structuring of a single point of sale where different types of products will be sold in order to reach more consumer categories. The point of sale structured as a

[12] Official website: https://ortosanmarco.eu/
[13] Official website: https://edera.coop/

shop will be self-managed by the members during opening hours and also for the choice of products and suppliers.

Malaga, Spain

Malaga is one of the eight Spanish provinces that make up the autonomous community of Andalusia. It is located to the south of the Iberian Peninsula, on the Mediterranean coast, between the provinces of Granada, to the east, and Cádiz, to the west. To the north it limits with the provinces of Córdoba and Seville. Its capital is the city of Malaga. The province is famous thanks to its entire coastline, known worldwide as the Costa del Sol, which enjoys the privilege of being the third in terms of tourism in the Iberian Peninsula, where the second most important city in Malaga, Marbella, is also located.

It has an area of 7,308 km² distributed in 103 municipalities, 9 counties and 12 judicial districts. Its population exceeds one million six hundred and ninety thousand inhabitants, according to the 2019 census, being the second province of Andalusia and the sixth in Spain by population.

The territory occupied by the province of Málaga has been inhabited since remote times, as evidenced by the group of dolmens of Antequera, the cave paintings of the Cueva de Nerja, the first known to humanity dating back more than 40,000 years,2 those of the Cueva de la Pileta in Benaoján and the Cueva del Tesoro in Rincón de la Victoria. Dominated by the first Mediterranean colonizers, the Phoenicians in Malaka and the Greeks in the Toscanos and Mainake, the province was an economic and commercial center for the Carthaginians, Romans and Byzantines, and had a historical background as the ancient Muslim kingdom of the Taifa of Málaga of the 11th century, being constituted in its current configuration after the administrative division of 1833,3 conforming to territories attached at that historical moment to the ancient kingdoms of Granada and Seville.

The relief is markedly mountainous, with maximum altitudes around 2000 m a.s.l. no. m. on the summits of La Maroma (2066 m.a.s.l.) and El Torrecilla (1919 m.a.s.l.). Approximately one third of the territory is between 0 and 400 m s. no. m. Another third, between 400 and 800 m s. no. m. And the last third, between 800 and 2000 m s. no. m. The predominant agricultural areas are olive groves, almond groves, citrus fruits and herbaceous crops, which extend mainly through the Antequera depression and the Ronda depression or in hilly reliefs.

The Guadalhorce Valley is one of the nine regions of the province of Malaga (Andalusia, Spain), made up of 8 municipalities, in a natural region formed by the Guadalhorce River. This valley is characterized by its fertility and the cultivation of vegetables, fruit trees and citrus, and is also known as the orchard of Malaga. Although, currently the urban expansion of the metropolitan area of Malaga is focused on that area, due to its proximity and good communications with the provincial capital. A series of factors come together in the Valle del Guadalhorce Agrarian Park that make it especially suitable for the development of organic farming. All these factors have conditioned the fact that in the Valle del Guadalhorce region there are currently some 1,500 ha of certified organic crops and many more in the certification process. Low-intensive agriculture predominates in the Guadalhorce Valley, conserving areas where cultivation is done using traditional methods very close to organic farming. The Guadalhorce Valley is a very heterogeneous area, in which a great topographic, soil and climatic diversity can be found which, together with little intensified agricultural management and other social and cultural factors, makes it possible for the region to cultivate a wide range of variety of species. The most abundant crops in the region (citrus and olive groves) are crops whose conversion to organic farming is relatively simple. Likewise, the low prices of these crops encourage many farmers to seek solutions and alternatives to differentiate their productions and make them more profitable.

Malaga is the province of Andalusia where there is a greater demand for organic products. This demand is mainly concentrated on the Costa del Sol and the city of Malaga, areas very close to the Guadalhorce Valley. Even though the consumption of organic products is increasing in the region,

most of the production is exported to other countries with a higher demand, where products can be sold at higher prices.

Good practices in Malaga (Spain)

GUADALHORCE ECOLOGICO[14]

The association integrates a group of farmers of organic products with small holdings located in towns close to the Valle del Guadalhorce region. One of the fundamental objectives of the association is to bring the people who grow closer to the people who consume; in such a way that the producers receive a fair price for the sale of their products, thus dignifying the work done in the rural world.

Organic agriculture is an integrated production management system that increases the health of ecosystems, biological diversity, biological cycles, and soil biological activity. The organic producers use traditional methods of cultivation free of the use of chemicals; respecting the biological production cycles and contributing to the maintenance of natural ecosystems. This form of production, in addition to contemplating the ecological aspect, includes in its philosophy the improvement of the living conditions of the participants in this type of production, in such a way that its objective is to achieve the integral sustainability of the ecological production system; or what is the same to build a socially, ecologically and economically sustainable agrosystem.

The associated producers enjoy a series of advantages, such as: discounts on training courses and conferences, as well as having personalized technical advice. The consumers are another of the fundamental pillars of the association, since with their support we manage to maintain development in rural areas in a sustainable way and contribute to the maintenance of nature and territorial balance. Their associates are committed to responsible consumption, demonstrating their growing concern regarding the issue of food production and its social, economic and environmental consequences on a planetary scale.

With the approximation of the people who consume to the people who produce, we eliminate intermediaries, providing a fairer price for both parties, promoting the development of the local economy. They have the opportunity to get to know the farmers who cultivate the land up close, have knowledge of the way in which they cultivate and learn about the nutritional properties of organic products compared to those obtained through conventional production. Their consumer members enjoy a 5% discount on all purchases made in the market, in addition to having great discounts on training courses.

HUERTA GAÏA[15]

Since 2012 cultivating and practicing Agroecology, and distributing baskets of vegetables from our farm in Coín (Málaga). Huerta Gaïa cares for the land with great care, considering food production as life processes, and differentiating themselves by maintaining a small scale, where rhythms are more respectful. Their project "*From werta to werta*" begins with the idea of "reoccupying" the house they call "La huerta", in which there is a family history. With this, the project to recover the land that their "grandfather" cultivated in his time and that after its abandonment was recovered for use as a community garden and garden of the transitional group of Coín arose together. Since the current owner granted them a transfer of the land, little by little, with a lot of effort, they have been recovering the farm as a whole, with the aim of creating a self-managed living space, as well as a place to share knowledge and experiences.

For their subsistence and as a self-employment project, the option of direct sale of vegetables arises through weekly baskets or through the Frutanga network[16]. The farm does not have any

[14] Official website: www.guadalhorceecologico.org/inicio
[15] Official website: https://huertagaia.wordpress.com/
[16] More information about the network are available here: https://huertagaia.wordpress.com/frutanga/

certificate of the current ecological certification system, since they believe in close relationships and trust, and through building these ties we can generate a real guarantee of their products. The management that they carry out in the orchard they try to make it as holistic as possible, taking into account all the interrelationships that exist in agroecosystems. They support Agroecology, beyond organic farming that is based exclusively on the substitution of inputs.

MERKAETICO EL CENACHO, ANDALUSIAN CONSUMER COOPERATIVE[17]

Merkaético El Cenacho is an attempt to change the order of things. It is a small attempt by small people. "Many small people, in small places, doing small things can change the world" (African Proverb). Merkaético El Cenacho is a non-profit Andalusian consumer cooperative. Their objective is to promote the values of local, ethical and sustainable trade, making possible a space where small local artisans and farmers find outlets for their products at a fair price, in decent working conditions, in gender equality and with the support of sensitized people. But they also want to support decent working conditions in Third World countries and fight against the exploitation of people and the overexploitation of resources. For this reason, they also offer Fair Trade products.

Their origin is in a 15M neighborhood assembly in Malaga. They had been working on an awareness-raising initiative at the neighborhood level for some time: Red Comercio Ético Cruz Humilladero with which they seek to involve merchants and neighbors in the need to modify our consumption habits, to begin to ask ourselves where what they buy comes from and in what way conditions are manufactured, to begin to stop being complicit and uncritical consumers to become proactive and responsible consumers. From the first moment they have the support of "La Cooperación" Neighborhood Association.

Today "Merkaético El Cenacho Cooperativa de Consumo Andaluza" is the first social market, the first embryo of a food coop in Malaga; It is made up of consumer members and is managed by volunteering (you can see the four volunteer programs below), although one of its priority objectives is the creation of stable and decently paid jobs. The Neighborhood Association is also part of the cooperative, as well as small local producers.

Portugal

Gothenburg, Sweden

Gothenburg has approximately 600 000 inhabitants (municipality) and is situated by the sea on the west coast of Sweden surrounded by a cluster of commuting oriented urban areas situated alongside the main roads and railways in the surrounding municipalities. The city of Gothenburg owns and manages 3000 hectares of farmland. has also a long tradition of allotments and for the last fifteen years modern forms of urban agriculture has grown in numbers. The city has many satellite suburbs with a lot of abandoned land in between. Recently, new projects for green infrastructures regarding land use, urban agriculture, sustainable green economic models, and solutions for flood protection have been launched. Like most cities, Gothenburg has a history closely related to local agriculture. In the 20th century, however, the importance of agriculture in and near the city gradually declined, explained by the efficient transport of fossil fuels, globalized trade, and thus comparative advantages of the agrarian low-wage countries. It was also related to the redefinition of urban green spaces as places for recreation and leisure, as well as the separation of urban cityscapes and rural landscapes in spatial planning and a changed attitude towards the contrast of town and country.

[17] Official website: https://www.merkaeticoelcenacho.org/

A recent trend has arisen where new ideas for agriculture come from urban communities and we see urban agriculture increase. Small-scale diverse and intensive farming practices have become trendy and just like these types of agriculture previously fed the cities with vegetables, they can do so again. At the same time, the farms and agricultural sector in Sweden are experiencing a decline in the number of farms that threatens future local food resilience.
Since 2011 the City of Gothenburg, through the Property Management Department, worked and developed methods and actions to create more opportunities for the citizens to farm, from farm box to hectares. Both through associations and through strengthening and encouraging new commercial farmers. The aim is to strengthen food self-sufficiency, enhance biodiversity, contribute to a vivid and lively peri-urban landscape that attracts visitors, creating jobs and bridging socio-economical and other gaps in the population. A recent study, made by SWECO, shows that Gothenburg can go from 1% self-sufficiency on vegetables to 40 percent in 10 years by using the municipal farmland available. The city has developed a "farming ecosystem" that includes; *a farming incubator, the model farm* (both at Angereds Gård and at Lilla Änggården), a model for *neighborhood pick-up places* (for CSA and other business models) and *testbeds for small scale market gardeners*.

Good practices (GP) in Gothenburg (Sweden)

FARMING INCUBATOR
Gothenburg´s farming incubator aims to increase the number of local/ecological farmers in Swedish Cities. The aim is achieved by gathering, creating, testing and sharing successful business models relevant to the farmers' context: low investment, small surfaces, direct sales and high sustainable values. It consists of a winter training program where new entrepreneurs per year get access to the network, training, workshops and support throughout the farming season. At the end of each season, feedback is given to the municipality to help in the selection process for land access.
Through increasing the number of entrepreneurs, we believe in boosting the number of farmers, make a better use of empty and/or farming land in and outside of the city and contribute to reduced transport and packaging, furthermore increase consumers knowledge about the environmental impact of the food system.

MODEL FARM
The Model Farm is a highly productive small scale farm unit, providing food and education. By showcasing a business model behind a sustainable and successful small scale farming enterprise run within a municipality, the Model Farm will serve as a driver for the integration of regenerative farming practices in the continuous evolution of urban and rural multifunctional landscapes.

NEIGHBORHOOD PICK-UP PLACES
The neighborhood pick up systems are an alternative to REKO-ring with the aim of creating a system that lowering thresholds for consumers to buy local food. By moving the interface between producers and eaters closer to where people live and make it more convenient: more people will consider buying local food instead of making the week to week supermarket purchase. The system has been piloted through the project CAGN (Circular business models with the green sector)[18] in Gothenburg 2021-2022 with two pick up places. These locations are fitted with lockers and a code lock. The producers deliver multiple bags to one place and don't have to stay. The consumers have a larger time frame, when compared to REKO, about 24 hours to pick up their vegetables. Four local producers and over 200 consumers took part in the pilot. There has been a lot of interest

[18] The project were financed by European Regional Development Fund.

TESTBEDS FOR SMALL SCALE MARKET GARDENING

Since its start in 2017 the city of Gothenburg has provided urban farmers access to land and necessary infrastructure in order to further the growth of local food production for local markets. On two sites situated on the outskirts of Gothenburg's northern and north-eastern parts, prime agricultural land was converted to allotments with necessary infrastructure such as access to water, fencing, access to toilets and safe storage for equipment. The initiative stems from the acknowledgement of financial restraints as a major inhibiting factor among prospective urban farmers. Through this initiative, urban farmers were given the opportunity to start up farming businesses without the need for large investments as well as the opportunity to scale up their businesses on larger plots of land if needed, within the municipality.

The city of Gothenburg owns 3000 hectares of farmland, and the city is constantly looking for ways to develop local food production as well as ensuring environmentally sound production by way of including environmental requirements in its standard lease contracts. The testbeds form an integral part of Gothenburg's "eco-system" of municipal support towards small scale organic food production.

Status and future development of the testbeds

Currently about thirty farming entrepreneurs are active on the testbeds and every year we receive many new applicants. Many have registered their farms as companies, and some have expanded beyond the testbeds and relocated their farms to larger plots and farms. During 2022 and continuing in 2023 a series of workshops are organized with the goal of adjusting the testbed model to fit the expressed needs of farmers as well as adhering to formal requirements from the municipality. One major change is that we go from having individual contracts towards setting up an organization for each testbed that will serve as the municipality´s sole counterpart, thereby removing much of the bureaucracy involved in managing changes in contracts as well as solidifying a common responsibility for the testbed among the farmers. In the workshops we seek to arrive at a list of adjustments in the model as well as determining at what cost adjustments could be made, thereby hopefully arriving at a balance in terms of cost and benefit. From the start until the present, the focus has always been to minimize the cost for farmers, but an increase in cost could be warranted providing benefits are considered important enough. Also, the established practices of market gardening include amenities not currently provided in the model. Examples include better irrigation systems, access to electricity, cooling containers, approved facilities for rinsing vegetables and social areas that are welcoming for visitors. The last of four workshops in this process is scheduled for early summer 2023 and the new model is set to be implemented in 2024.

Finland

In Finland, the first, and successful, attempt to organize local food markets through regular direct trading between consumers and farmers emerged in 2013 with a social-media based local food system called REKO (the acronym comes from the Swedish words "rejäl konsumtion" meaning "fair consumption").

Good practices (GP) in Finland

REKO

REKO shows an interesting example of a social media based farmers' market from Finland.[19] The founder Thomas Snellman, is a Finnish organic farmer who has been actively improving local and organic food markets in Finland since the 1990s. He was directly inspired by the French AMAP food

[19] Szymoniuk, B. and H. Valtari. 2018. The REKO system in Finland: A new model of a sustainable marketing channel. Probl. Ekorozwoju, 13(2):103–111.hapt

market (Associations pour le Maintien d'une Agriculture Paysanne), a joint network for consumers and producers described as a subscription-based marketplace where products are pre-ordered and await payment and pick-up by the consumer. Thomas' initiative was firstly also subscription based, and a Facebook group was established only for supporting the communication purposes. It was then within the Facebook group that customers started to express their direct demands and farmers could present their current stock.

First REKO ring was started in Swedish speaking Jakobstad, and the first product pick-up was held in a parking lot right outside the city center on Thursday June 6th, 2013. A handful of producers took part, selling potatoes, eggs, bread products, dill, coriander, lettuce, radishes, carrot bundles, yellow and red onion, strawberries, corn, Japanese cucumber, raspberries, beef, and homemade sausages. The second ring was started in neighboring Vaasa four weeks later and word spread quickly to other parts of the country.

Face-to-face meetings between farmers and consumers empower them both, which is aligned with the claims of the importance of the personal touch and face-work commitment in local food stems.[20]
Within REKO, consumers do not make official agreements to order food products from a specific farmer, as in the case of CSA,[21] nor do they shop totally without any obligations, as in the case of farmers' markets.[22] Instead, food purchases are organized through closed Facebook groups, where local farmers announce every week what they have for sale and consumers place their pre-orders. The actual exchange of products typically takes place once every two weeks in a settled location. Hence, REKO's social elements consist of three types of members — consumers, farmers and volunteering administrators — who interact in the physical marketplace and on the Facebook groups. The marketplace and Facebook account for the spatial agents of REKO.

The process behind the typical REKO ring purchase is as below:
i) REKO ring administrator announces in a private Facebook group only dedicated to the producers that the upcoming REKO ring is open.
ii) Producers make a post in the REKO ring closed Facebook group. The announcement states the product and its price and possible payment options (cash, card, Mobile Pay App etc.). Photographs of products are highly recommended but not obligatory.
iii) Consumers place an order under the postin the form of a comment stating the product and its quantity.
iv) Consumers and producers meet at REKO ring and the sales are finalized.

Both Facebook groups (REKO ring and the producers) are run by volunteers, called administrators, who do not receive payment for their contribution. Typically there are several administrators sharing the tasks in one REKO ring. The volunteers are often producers, also selling their products via REKO, or local food system researchers. REKO has grown in numbers within Finland and worldwide in the last 9 years. The number of Finnish REKO rings and the estimated net revenue is presented in the figure below[23].

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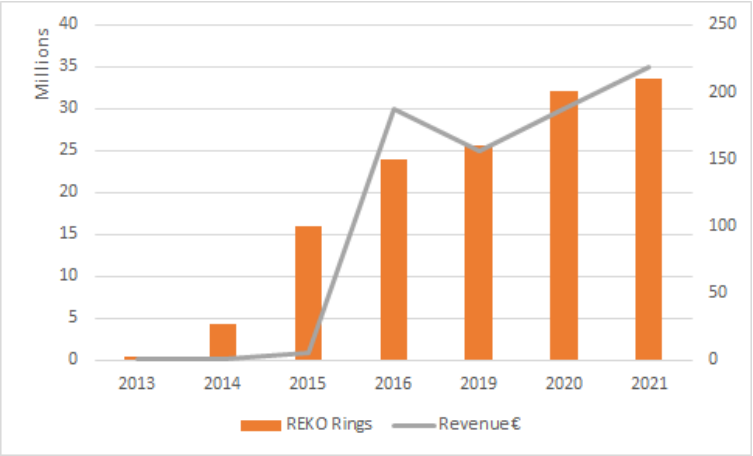
[20] Moore, M. (2006) Recognizing Public Value: The Challenge of Measuring Performance In Government (Cer 8). Harvard University.
[21] Galt, Ryan E., Julia Van Soelen Kim, Kate Munden-Dixon, Libby O. Christensen, and Katharine Bradley. 2019. "Retaining Members of Community Supported Agriculture (CSA) in California for Economic Sustainability: What Characteristics Affect Retention Rates?" Sustainability 11, no. 9: 2489. https://doi.org/10.3390/su11092489
[22] McEachern, M.G., Warnaby, G., Carrigan, M., Szmigin, I., 2010. Thinking locally, acting locally? Conscious consumers and farmers' markets. J. Mark. Manag. 26, 395–412.
[23] Source: REKO Fair consumption since 2013 brochure available at https://www.pedersore.fi/assets/Dokumentarkiv/Om-Pedersoere/REKO/Reko_engelska_komprimerad.pdf



The growth of REKO rings number in Finland and their estimated revenue.

REKO Lapua, author: H. Suvanto

REKO Seinäjoki, author: A. Trogen

1.4 Sustainable Matrix

Moving from the recognition and analysis of the already existing concept, e.g. Community Supported Agriculture (CSA) model, other Alternative Food Networks (AFN), or innovative socio-infrastructures, it has been deepened how novel approaches could be structured. In fact, it should be recognized that the main AFN in operation in the involved territories (CSA in Italy, REKO in Finland, mixed model in Sweden) should be compared according to specific elements.

The definition of the "development pillars" has been elaborated both moving from examples found in literature and other experience in Europe and beyond, as well as reflecting on the evidence collected on the running AFN. In particular, those one conducted in Italy as a quali-quantitative analysis of the CSA created in 2021 within the PoC EIT FOOD HELPFOOD. It emerges that any AFN should be evaluated, and relay for its potential success, on a "Sustainability Matrix" which considers economic, social, and environmental impact of AFN, as well other characteristics as mobility, access to digital system and spatial elements.

As hypothesized, the analysis of the key characteristics, criticalities, opportunities, and process of implementation occurred within the CSA in Trentino (Italy) can give guidance on how its scale up and scale out could occur in the RIS territories of Spain and Portugal. Already in the last months of 2022 near Malaga — the Spanish partner — has organized some activities and action of engagement moving from what has been learned during 2021 and 2022 in Italy.

From the conducted analysis it was also possible to target some specific needs in terms of education and training (in particular about nutrition, story-telling or creation of novel narratives, food waste and business development) as well as to deeply discuss some elements that are considered crucial for any AFN development (logistics, digitalization and spaces through an open innovation event). Disseminate the results reached so far, sharing information, and enlarging the potential interested individuals lead to the organization of three public engagements events which have occurred in Italy and Spain with different representatives from Public Administration, SME, Farmers, NGOs and citizens.

Sustainability Matrix Pillars

Reflecting and expanding from the widely recognized concept of sustainability, within the HelpFood 4.0 project it has been pointed out that a sustainable food system should rely on 7 different pillars, spanning from environmental to social and economic spheres. Below these pillars are briefly introduced, as with reference also to the specific evidence emerged by local good practices (GP).

1. **Inclusion**

Equitable access to resources and services is a global challenge that differently affects individuals by age, gender, status and place of residence. Most conditions are almost comparable within the involved countries (as considered all belong to European wellness level), but it should be emphasized which are the potential added value of inclusion. In Trentino this pillar is developed favoring the inclusion of people with disabilities and disadvantaged minors. The first group is periodically involved in cultivating and transforming vegetables and support in organizing catering activities in Rovereto. The collaboration between L'Ortazzo and APPM (Provincial Association for Minors Onlus) creates new pathways for inclusion through the engagement of young persons in managing the weekly products distribution. Orders are delivered each week by the producers to the APPM center where kids, young persons and educators sort and distribute products to the families who come to the center for the pick-up. This moment turns out to be highly inclusive as its strengths are in the engagement of the children, educators and members, providing for an educational path of social learning, and ultimately creating ties with the community. This activity represents an opportunity for exchange of experiences, skills development, and a moment for the

transition to adulthood for the kids.

2. Cooperation

The market logic usually does not refer to mutualistic or cooperative approach as the mainstream approach adopted in relations between producers and consumers. The direct link between individual decisions and attitudes is frequently related, in reverse, to specific strategies promoted by companies to increase the acceptance of their products. When down-scaling this logic to a more restricted and either rural connected realm, cooperative models also emerge. The small scale dimension of the farms and productions accompanied by a minor critical mass of potential buyers, often call to define models which are profitable to a group of actors. Cooperatives can be created by grouping of different producers, which share knowledge, tools and selling strategies, or between consumers who get together to obtain advantages and affordable prices to access items and services. Cooperative approaches occur also between both producers and consumers, as in various AFN. In the good practice (GP) of CSA Naturalmente Trentino, it is important and privileged the opportunity to be able to choose the food that consumers (aka “eaters”), since it allows them to know how it is produced and the impact that crops and farms have on local resources. The CSA in fact proposes an innovative cooperative system where all members take decisions together, support production, organize courses and training activities, and collective events. Although it is not an easy-to-deliver model, as for not being a professional activity, it should be referred to as an approach that can involve more people like-minded towards the environment preservation.

3. Awareness

In recent years, a lot of efforts have been made in Sustainable Food Systems Education and Critical Food Systems Education literature to employ education in ways that seek social and environmental transformation of food systems. But food systems education that are disconnected from awareness will be not capable to reply deploy a real transformation towards sustainability of the sector[24]. On the whole, awareness of the global problems generated by the food system is incredibly low. This indicates that more awareness of the problem could help create a strong consumer voice that could significantly shift behavior, influence governments to innovate policy, and prompt companies to establish a new set of business ethics that align human and planetary health[25]. As a key principle, awareness should be generated and circulated by local experiences related to food systems, giving them the opportunity to realize an easy understanding from all the individuals involved. Of course, global dynamics are operating and affecting the local scale too, but more concrete results can be reached on a small-dimension scale. The good practice (GP) of EDERA - Emporio di Comunità, a Community Emporium in Trento, is a participatory space for purchasing and relationships. Through a participatory design process, they developed an idea of emporium that can sustain a sustainable ethical supply chain, with products that come as much as possible from the territory where members live. EDERA - Emporio di Comunità is also a cultural laboratory: an inclusive space where raising awareness and bringing more and more people closer to critical and conscious consumption.

4. Innovation

To perform more sustainable food systems, innovation is playing a pivotal role. The development that occurred in the last decades in the agricultural and processing fields have been relevant, as well as the integration with other fields such as the digital sector. The role of social innovation is also crucial, in particular when referring to the individuation of novel approaches related to include the economic and social side with the production of food. The food-spaces and food-places which

[24] Dring C.C. et al (2022) - Ontological Awareness in Food Systems Education, Frontiers in Sustainable Food Systems, 6 : DOI=10.3389/fsufs.2022.750776

[25] WWF (2019) - We Don’t Know, but We Care. Understanding public awareness of the food system’s threat to nature; WWF Report, retrieve online https://wwfasia.awsassets.panda.org/downloads/wwf___we_don_t_know_but_we_do_care___public_awareness_of_the_food_system_s_threat_to_nat.pdf

HelpFood 4.0 aims to create could be the perfect location for realizing new cross-contaminating activities of innovation that goes beyond the food sector. At the good practice (GP) of Orto San Marco - Setàp, in Rovereto, the project “Development of biomedical silk” aims to produce locally high-quality silk that can be used within research laboratories and industries with bio-medical scopes, starting from the trees planted in the area and which are part of the agroforestry approach adopted.The high quality of the project is guaranteed by the standardization of the entire production process from the mulberry leaf, to the welfare of the silkworm, and to the silk. The next steps expect to characterize the silk to estimate its quality, to identify the requirements of research laboratories and industries, and to identify a product – a semi-finished silk-based product that would be of interest to laboratories and industries.

5. Nutrition

There is substantial scientific evidence that links diets with human health and environmental sustainability. Therefore, a great effort on improving people’s awareness about the impact of global food production is central to achieving climate stability and more ecosystem resilience.
As suggested by the EAT Lancet Commission, there are two “end-points” of the global food system: final consumption (healthy diets) and production (sustainable food production). These factors disproportionately affect society, culture, economy, and animal health and welfare[26]. Several scientific evidence have shown that a diet rich in plant-based foods and with fewer animal source foods can act on health and environment, providing positive benefits. These dietary models are considered “win-win” since they are good for both people and the planet. Therefore, policy actions and education at school can have a critical role in addressing people's food behavior through healthy dietary choices and minimizing food system environmental impacts[27].
In this frame, a farm aims to be an agricultural space that takes care of food; a place where both consumer and producer share the aim to acknowledge healthy food accessible for all and its sustainable production as commons by taking care of these ambitions and recognizing them as indispensable to their own wellbeing and identity.

6. Culture

Strictly connected with the pillar of Awareness is the one of Education and culture. In fact, the concept of food is inherently connected to the culture of individuals. Education itself, intended as a long-life learning process, plays an important role in shaping the approach to food. It can be related to processes of formal, informal or not-formal education but all of them are relevant. For the AFN the topic of education and creation of a proper “food culture” is usually the key and driving elements from which individuals have moved. It clearly emerges in one good practice (GP): the one of Association l'Ortazzo. Beside operating on the exchange of food products, during the last 15 years it has been promoting organic agriculture, agroecology, critical consumption and solidarity economy. The associated reached out to the whole population, and not only its members, with educational and informative activities. The most important events they organize on the side of education are the "LunAdì" evenings, a series of conferences on good practices, solidarity economy, and environmental challenges. As well as, yearly, workshops at the "Fa la cosa Giusta" fair in Trento, and attending festivals, markets, exchanges, workshops and conferences as an opportunity to circulate education and build culture.

7. Agroecology

Between the various productive approaches that can be used in the food systems, the most promising one when referred to the HelpFood 4.0 sustainability pillars is agroecology. It is the

[26] Willett, W et al. (2019) - Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems; The Lancet; 393: 447–92
[27] World Health Organization. Regional Office for the Eastern Mediterranean. (2020). World Health Organization annual report 2019 WHO Country Office Lebanon: health for all. World Health Organization. Regional Office for the Eastern Mediterranean. https://apps.who.int/iris/handle/10665/333249. License: CC BY-NC-SA 3.0 IGO

application of ecological concepts and principals in farming. Agroecology promotes farming practices that mitigate climate change (reducing emissions, recycling resources and prioritizing local supply chains); work with wildlife and put farmers and communities in strict collaboration to focus on specific social, environmental and economic conditions of the production area. The farmer of CSA Naturalmente in Trentino promotes mountain agriculture that is careful and respectful of the environment and the people living in the area, adopting an agroecological approach. This approach is tailor-made for the peculiarities of the good practice (GP) and is resilient to climate and social changes. The approach is realized through actively engaging consumers in a dialogue aimed at making them conscious of farmers' work. The farmers use ecological production methods, preferring plant synergy and crops rotation, thus operating for preserving the environment and the biodiversity.

A series of short videos (which duration is shorter than 1 minute) have been realized to represent how at local level these pillars have been deployed[28]. All of them were related to the good practice (GP) of Trentino (representing the most advanced within the territories represented in the Consortium), presented by the involved local actors and they also could be used for any dissemination activities both at local level (as been shooted in Italian) and international level (having english subtitles).

1.5 Features of a Food Ecosystems

The report aims to explain what a food hub represents for us in the area of food production and distribution within the short supply chain. The definition of a food hub that we want to give includes several expressions that will be used throughout the report.

As a hub, it represents a central focal point where a number of directions, people, and products related to the presence of food converge. Therefore, food hubs are represented by all those central physical or virtual points where producers and consumers are connected.

Food hubs have, therefore, a software component represented by virtual meeting points through online platforms, and a hardware component comprising the physical structure of connections such as distribution spaces and people.

The research focuses on the definition and characterisation of food hubs within the short supply chain defined by The EU's rural development regulation (1305/2013) as a supply chain involving a limited number of economic operators, committed to cooperation, local economic development, and close geographical and social relations between food producers, processors and consumers.

[28] The video serie is available at the HelpFood 4.0 website and youtube channel: https://www.youtube.com/channel/UCmQ8MZc4d9uzuHWKG4z1r7Q

2. FOOD HUB INNOVATION

In this chapter, the HelpFood 4.0 project team defines a food hub as a physical place (supported by a digital platform) characterized by being innovative; accessible; engaging; (in)formative; collaborative; and sustainable. An open innovation exercise organized within the project's context is also explained, from which problems to be addressed when designing a food hub were identified: poor flexibility; lack of traceability; lack of physical spaces; and accessibility. The project team also explored the creation of a platform to support the food hub activities by doing a benchmark analysis to existing options in the market and defining base-principles for the functioning of this hypothetical platform. An approach to the logistics of the ideal food hub was also undertaken, with the identification of three strategic objectives for structuring and locating a food hub ecosystem: people, planet, and profit.

2.1 Definition of innovative food hub

The food hub is broadly defined as a physical place where producers and consumers can meet and interact. In order to bring innovation and create value around the food hub, additional features should be envisioned. It should be:

Innovative both in terms of organization and governance, and by embedding state of the art technologies to optimize the impact and the user experience. Regarding organization, the hub should engage several producers in a collaborative effort and be aware of the consumers and community needs. According to local frameworks a polycentric approach for the hub should be evaluated, including food lockers with refrigeration capabilities or similar to be distributed in the city and surroundings. Food distribution optimization models should be applied to increase the efficiency of the hub from the economic, environmental and social point of view. A communication and engagement digital platform, also available as an app, can play an important role to manage the whole hub and enhance the interactions among the different actors.

Accessible. The food hub has no barriers, neither physical nor socio-economic. THe hub should be inclusive, easy to access and enjoy. In terms of accessibility, a study of mobility offer at local level is important to individuate collection (or drop off) points.

Engaging. The hub is an experiential laboratory where to build community, learn and share best practices. It should propose engaging activities such as social gastronomy and co-design events. The Food hub is a place where to collectively build new habits and kick behavioral educated changes. It is also a space for social integration projects.

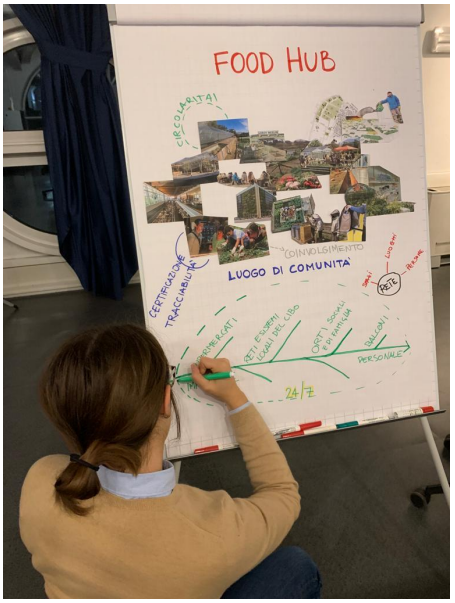
(In)formative. The hub is the place where information and concepts about food production, consumption and value can flow. Topics for information and training may include nutritional value of food, food systems, traceability and security, sustainable business models, food circular economy, organic agriculture, agroecology, critical consumption and solidarity economy

Collaborative. The food hub should incentivize the creation of formal and informal networks of stakeholders, enabling the creation of socio-economical ecosystems. Stakeholders include not only consumers and producers but also citizens, public officers, schools, hospitals, tourism, enterprises or organizations. It is important to catalyze the synergies among the different actors along the whole food value chain.

Sustainable. Sustainability has different meanings and implications. From the economic point of view, a strong business plan should be developed to maintain the hub activities and guarantee its existence. As an example the food hub can have the form of a local food market with small spaces that people or associations can rent. Also, land leasing model and micro-loan approach can be used to incentivize new entrepreneurship business models and virtuous use of the land. Other approaches can include the creation of paid recreation spaces such as a coffee bar or museum of local food landscape. The possibility to share common warehouses among different food organizations and/or producers should be proposed and discussed. The survival of the hub and its effective entrenchment in the urban fabric also depends greatly on political commitment and the involvement of public institutions. It is important to link and create synergies with existing strategic plan for urban food. The environmental sustainability cannot be neglected and it is important to encourage a circular economy and food waste management practices, to reduce the CO_2 emissions due to food transportation and production, to minimize the use of chemical fertilizers preferring organic agriculture. A manifesto of sustainable practices should be created and adopted by all the participants in the hub.

The open innovation exercise in Trento

On November 18, 2022 HIT organized an open innovation event in Trento with some representatives of the entities and Emerging Food Network involved in the project. The objective was to uncover the main issues related to the connection between local food producers and consumers and to start a co-design process for a local food hub. A total of 15 people participated in the in person meeting.



The first exercise allowed us to identify the actual local food distribution and consumption systems. What emerged is a scattered landscape of self standing initiatives including farmer markets, organized purchasing groups, local markets, alternative food networks, organic markets, direct sell till the goods exchange at the farmer's garden.

The main problems emerged during the analysis included:

- Poor flexibility for food pick-up in terms of opening hours and location
- Lack of traceability of the products and communication possibilities with the producers
- Communication platform (when activated) not optimized and with a bad user experience
- Lack of physical spaces for drop-off. When present they don't allow for aggregation and social interaction
- Accessibility problems to farmer markets usually organized in the city center in the morning.

Some improvement suggestions emerged, such as the larger use of **digital means** to improve communication, delivery options and to create an online farmer market. There is also a strong need of **aggregation multifunctional spaces** also exploiting unused or abandoned buildings. The

participants also suggested to put a lot of effort to **create awareness** and **improve competences and cultivation skills**. Finally, an important theme is the definition of **risk sharing** mechanisms among producers, consumers and communities to deliver even safer, tasty food without letting the producer take all the risk.

How to create an open innovation event

An open innovation event is a gathering that brings together a diverse group of people to generate new ideas and solve problems through collaborative problem-solving. Organizing such an event can be a complex process, but with careful planning and attention to detail, it can be a highly rewarding and successful experience.

The first step in organizing an open innovation event is to define the purpose and goals of the event. What problem are you trying to solve? Who is the event for? What do you hope to achieve? Having clear answers to these questions will help you focus your efforts and ensure that the event is successful.

Next, you will need to identify and invite participants. An open innovation event should bring together a diverse group of people with different backgrounds, perspectives, and expertise. This could include employees from different departments within your organization, customers, partners, suppliers, and external experts. You will need to decide on the size of the event, the format (e.g., in-person, virtual), and the duration (e.g., half-day, full-day, multi-day). You will also need to consider any logistical issues, such as transportation, accommodation, and catering.

Once you have identified the participants, you will need to plan the content and structure of the event. This will depend on the purpose and goals of the event, but it could include activities such as brainstorming sessions, problem-solving workshops, presentations, and networking opportunities. You will need to decide on the format of each activity (e.g., group work, individual work, panel discussions) and the length of each session. You will also need to consider any materials or equipment that will be needed, such as whiteboards, markers, and computers.

It's important to consider the overall flow and pacing of the event. You will need to strike a balance between structured activities and unstructured time, to allow for flexibility and creativity. You will also need to plan for breaks and refreshments to ensure that participants are energized and engaged throughout the event.

To facilitate collaboration and communication, you will need to ensure that the event space is conducive to the needs of the participants. This could involve setting up tables and chairs in a way that allows for easy movement and interaction, providing ample natural light and fresh air, and ensuring that the space is comfortable and well-ventilated. You will also need to consider any technical requirements, such as internet access, audio-visual equipment, and power outlets.

Throughout the planning process, it's important to communicate with the participants to keep them informed and to ensure that their needs are met. This could involve sending out regular updates, gathering feedback, and responding to any questions or concerns that they may have. You should also consider the needs of any special groups, such as attendees with disabilities or dietary restrictions.

On the day of the event, you will need to be prepared to manage any unforeseen issues that may arise. This could involve handling logistical problems, dealing with unexpected delays, or addressing any concerns or complaints from the participants. You will also need to ensure that the event runs smoothly and that the participants are able to engage with the content and activities.

Finally, after the event has ended, it's important to evaluate the success of the event and gather feedback from the participants. This will allow you to identify any areas for improvement and ensure that future events are even more successful.

Overall, organizing an open innovation event requires careful planning, attention to detail, and the ability to adapt to changing circumstances. By following these steps and keeping the needs of the participants in mind, you can create an engaging and successful event that generates new ideas and

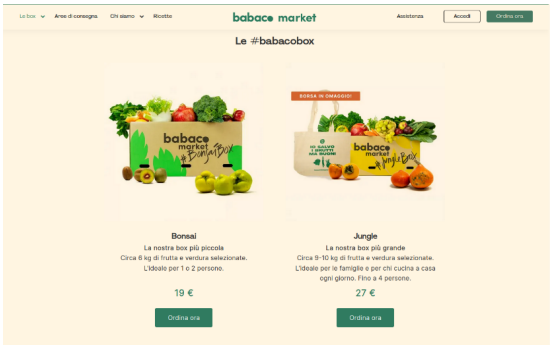
helps to solve complex problems.
Finally, open innovation workshops can be intended as important training moments for participants. For that reason it is important to sign with them a learning contract and verify the acquired competences. We suggest to use the EU frameworks for key competences in long life learning (ENTRECOP, DIGICOMP, GREENCOMP, LIFECOMP).

2.2 Platform

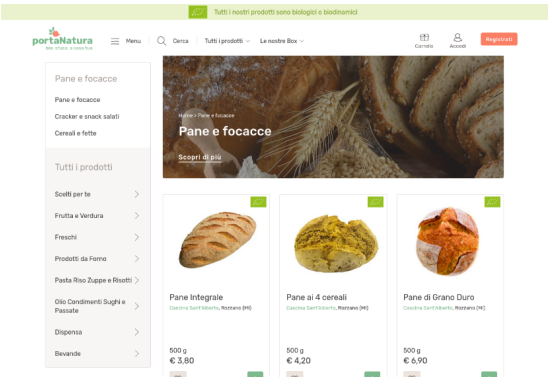
Online shopping has been growing increasingly in recent years, with the new generation of 'digital native' adults shopping online becoming common practice. While until a few years ago, online shopping was mainly for non-essential goods, in recent years, thanks also to the covid 19 pandemic, purchases for essential goods have increased greatly.
Research analysis from Mckinsey[29] suggests that the instant-delivery market in Europe reached between €3 billion and €6 billion in 2021, accounting for less than 1 percent of the total market but with three-digit percent growth annually. The research says that online revenues across Europe rose by 8.8 percent compared with 2020. The top 15 players in Europe had opened more than 800 dark stores by the end of 2021. Further, many traditional grocers formed partnerships with instant-delivery companies to extend their offerings beyond physical stores.
For these reasons it is important to understand that we can create a new proposition that supports the local agriculture economy and help people to buy local and organic food in a new way, using online ecommerce.
In this section, we analyze other solutions and we propose a mock-up version for the HelpFood 4.0 portal.

Case studies selection and analysis
As an inspiration to better customize our proposed new platform, we can see some selected cases from the market.

Babaco market
It allows to buy two types of different sized boxes by subscription. The products inside the box are chosen according to the season and it indicates for each product the origin and the producer. There are recipes with products from the boxes.



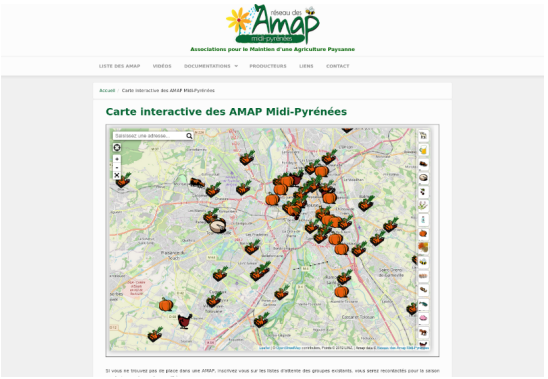
Portanatura
Offers boxes of fruit and vegetables, differently from Babaco market, it allows the products in the box to be substituted with other available products. It also allows the purchase of bulk products.



[29] References:
https://www.mckinsey.com/industries/retail/our-insights/state-of-grocery-europe-2022-navigating-the-market-headwinds

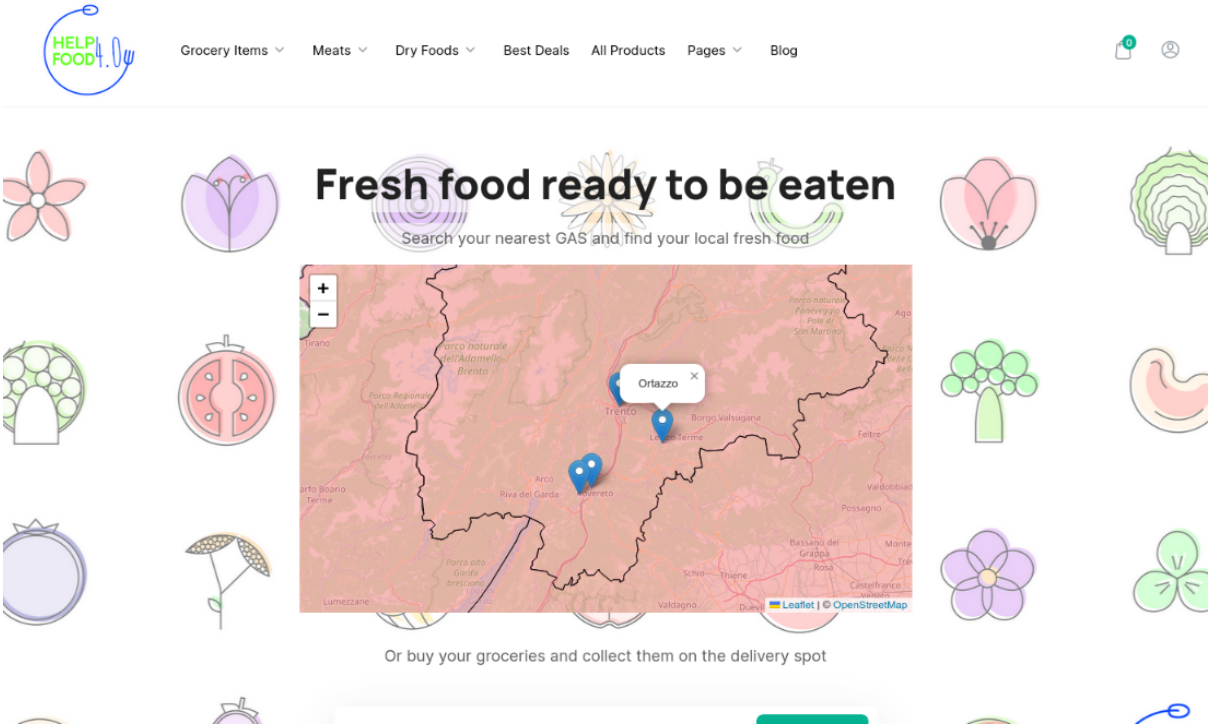
AMAP Midi-Pyrénées

The French site offers an interactive CSA map, it allows filtering by product type and displays the meeting point of the CSA with the product or products selected on the map. Selecting one of the shown CSA, there is information regarding meeting frequency and all the products that are sold.

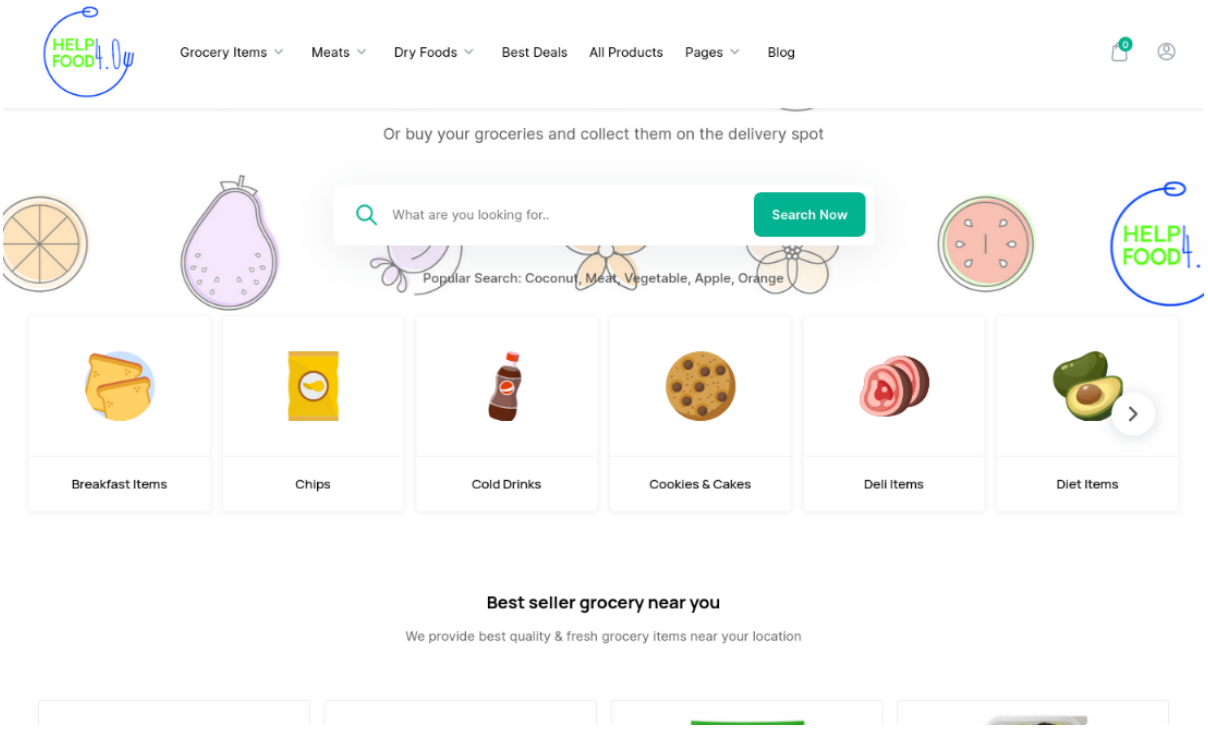


HelpFood 4.0 mock-up platform

Our proposal for the HelpFood 4.0 platform is a portal based on two main sections.



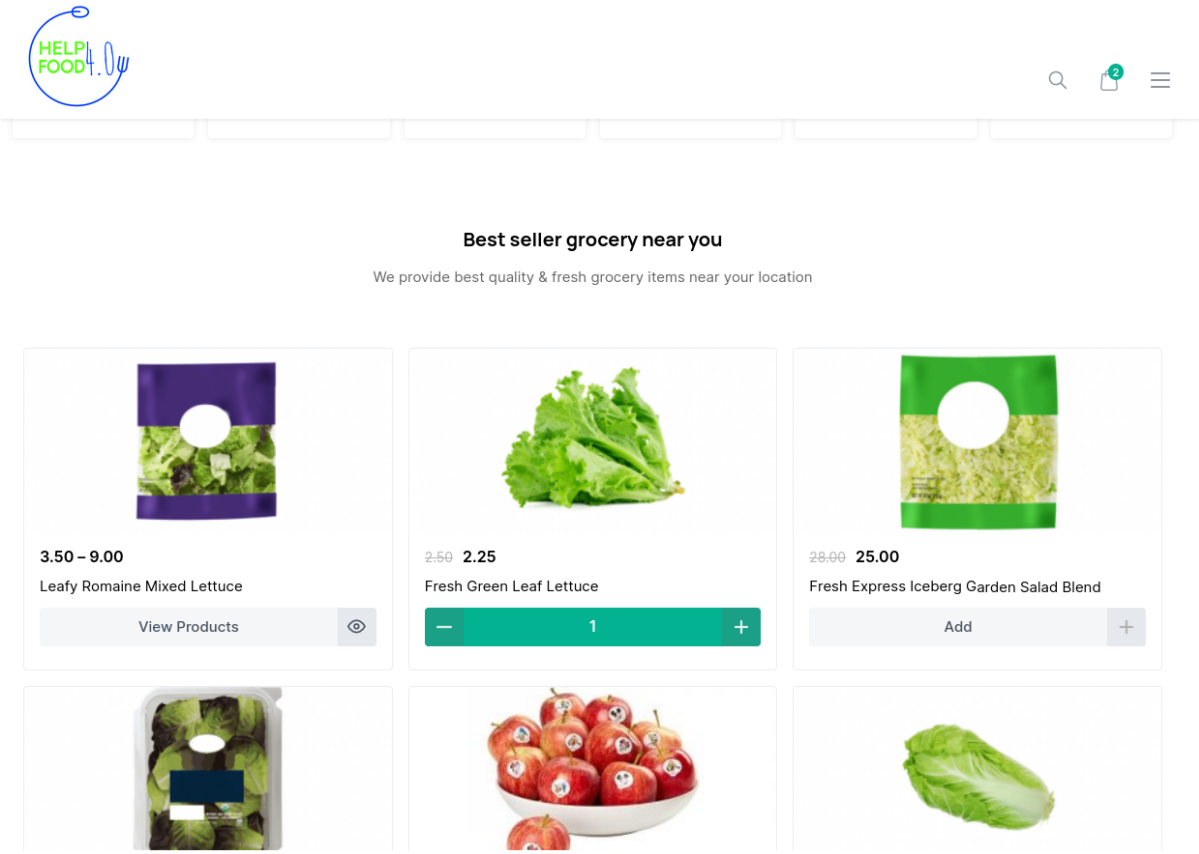
The first one shows a **large map** accessible from the homepage, where users can see locations and useful info about each GAS/CSA. Each CSA point of presence is clickable, once clicked you can see information such as the meeting point, times and days of the gathering, information about the group like the contact mail or, if the CSA has a site, the clickable link providing a quick access.



The second main section is **a web portal** where producers can sell their products.

We thought it might be helpful to make the HelpFood 4.0 portal available to those producers or CSA who do not yet have an online market, to provide the widest coverage and allow manufacturers without an online presence a simple and quick way to expand into a new market.
From our experience in the analysis, we put immediately below the map a search bar to instantly direct users who arrive at the site looking for a particular product. We must remember that on average, people stay on a website for less than one minute, with the first 10 seconds being crucial to capture the visitor's attention.

Right below we can see a selection of macro-categories, that can be customizable, which can point the visitor to a tailored view of his or her needs.



To follow there will be the best-selling products with a convenient quick section, we can also see how adding products to the shopping cart can be very quick and effective being done directly from the homepage.

The alternative will be, clicking on the product, to view the product details, that will include the origin of the product with a focus on the bio traceability. The nutritional values will also be on display here with best values, such as most present vitamins, highlighted.
Linked to this aspect, there will be a section with suggested recipes, giving a hint to users on how to use and make the best of the seasonal products that are available on the site.
The portal will also work in smartphone mode so that the interface will be as user-friendly and simple as possible.

2.3 Logistics

The issue of finding a suitable model for the distribution of food is an ongoing challenge in urban and periurban environments. In this sense, we consider a food hub not only a single physical place where food is exchanged, but, more at large, any configurations of facilities which can help the interaction between producers and eaters. The choice of the optimal hub for a place or a market has some elements of complexity. Among them, we recall the following ones:

1. It is a problem made of two subproblems. The first problem concerns the (strategic) choice of a general model which can be used. Urban features — such as morphology, density, land use, connections, conformations, services, open areas — can offer the ground for

understanding the social, environmental and economic dynamics of the city to develop the analysis and support the choices where the food hubs and which typology could be localized. A second problem, which follows, regards the logistic implementation of the solution, also with respect to the location and the use of satellite exchange places, such as food lockers.

2. A solution concept can be examined from a breadth of points of view: one alternative can be optimal for one and, at the same time, it could be judged badly for another one. In technical terms, the problem is necessarily a *multi-attribute* decision problem.
3. The expected performance of the chosen solution can, sometimes, be estimated quantitatively. In some cases, consider e.g. the social impact, such attributes can hardly be quantified on a precise numerical scale. This is due to the *intangibility* of some factors determining the choice of a hub.
4. A number of actors, with different agendas and possibly competing interests are involved in the decision process. Therefore, the problem is also *multi-stakeholder*.

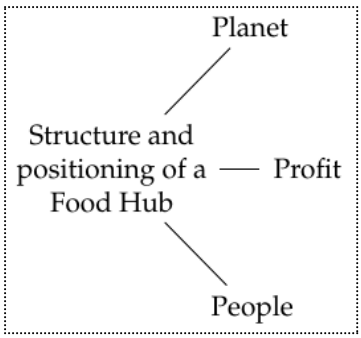
The first step concerns the involvement of stakeholders in Value focused thinking[30]. It is a way of approaching problems according to which the focus on a decision problem should not be the alternatives, but the objectives which need to be achieved. Alternatives, and their definition and generation too, is subordinate to a correct definition of the values. Use of meetings with stakeholders has been a necessary step in this phase.

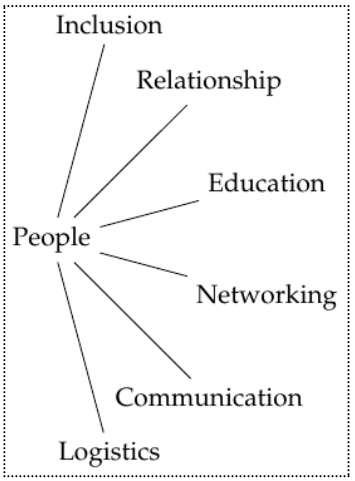
The outcome of Value focused thinking is a hierarchy of objectives. The objectives at the first level of the hierarchy are the *strategic* objectives of the decision problem. These are *essential* and all-encompassing objectives, meaning that they must be taken into account and they are used to frame the decision problem, but they are also too far from being controlled. On the second level of the hierarchy of objectives, there are *fundamental* objectives, i.e., those objectives that are both essential and controllable. A controllable objective can be influenced by all the considered alternatives in the decision context. Should one ask "Why is this objective important in the decision context?", the answer should simply be "because it is important", meaning that it is essential to the decision problem. At a lower level than fundamental objectives, there are objectives that are controllable in the decision context, and whose importance is related to the parent objective. For example, should one ask "why is it important that the food hub can be reached by public transport?", the answer might be because the possibility of accessing the venue increases. In turn, accessibility is important because it contributes to increasing social inclusion, which is important in its own right. Social inclusion is an essential objective and it is hard to be controlled directly, however it can be influenced by the accessibility to the food hub, which is something controllable and can be defined as a fundamental objective.

Building a hierarchy of objectives is an interesting exercise as it could unveil hidden objectives. When decision makers try to identify the important objectives in their decision problem for the first time, they often forget several important ones[1]. Identification of objectives was carried out during a focus group discussion that involved stakeholders with different backgrounds. Representatives of GAS, CSA, academia, companies, and municipalities were involved; they contributed to building the hierarchy with their expertise and needs. The values that stakeholders introduced in the discussion were organized in a hierarchy after the focus group in order to frame their contribution.

The fundamental **objectives for structuring and locating a food hub** can be organized under the **three strategic objectives**, that is pursuing the **benefit of people, planet, and profit**. Six have been highlighted and outlined as the most relevant **benefits for the <u>people</u>**.

[30] Keeney, R. L. (1996). *Value-focused thinking: A path to creative decisionmaking*. Harvard University Press.





Inclusion: the capacity, by means of positive actions, of involving fragile subjects in the food ecosystem and in the community at large. It can be divided into sub-objectives: the possibility to include fragile subjects in the organizational structure of the hub, and the sustainability of purchasing prices of the goods sold.

Relationship: the possibility of cultivating relationships between producers and eaters, hence to increase the trust in food distribution systems alternative to the large organized distribution. Not less important is the relationship between the management of the food hub, the municipalities, and territorial entities.

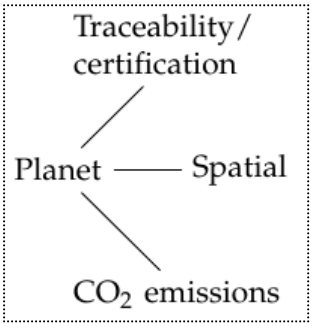
Education: the ability to increase awareness and knowledge of lay people and professionals about responsible production, distribution, and consumption of food.

Networking: the creation of a venue and events where people can meet and network, possibly organized by topics. For instance, the organization of a cooking class can be a networking opportunity for both lay people and professionals. However, it is enabled only by the availability of dedicated facilities and experts.

Communication: the ability to deliver the right information to the right stakeholders at the right time. Several different communication channels can be considered, e.g., institutional communications, newspaper, social networks, and messaging apps.

Logistics: the capacity to make the food hub ecosystem accessible. The location(s) of the food hub plays a relevant role and, similarly, the opening hours of the hub (or lockers) are crucial to ensure that eaters can access food easily. The accessibility of a location should be evaluated with respect to the presence of parking for cars, bicycle paths, and proximity to public transportation.

The **hierarchy for the planet** objective (see section 4) is depicted in Figure below, and it foresees three fundamental objectives.



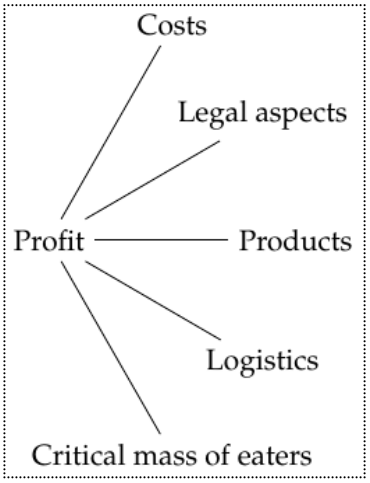
Traceability/certification: a peculiar characteristic of a food hub should be to offer high quality products. Products with a certification of organic origin contribute to a sustainable use of lans, whereas the possibility of tracing the origin of food (e.g., the origin of meat) enhances the consumer awareness.

Spatial: The capacity to be integrated in the surrounding environment. It can depend on the consumption of soil, i.e., the extension of

occupied areas, the ability to give a second life to abandoned, closed, or unused spaces. Not less important are the fitting of facilities with the landscape, and the quality of spaces, which is intended as the liveability of the centralized food hub.

CO2 emissions: The carbon footprint of the infrastructure, which should distinguish between C02 from fossil fuels and renewable sources of energy.

Economic sustainability (see section 4) of the food hub ecosystem can be evaluated in terms of **costs** related to the strategic value that received the most inputs from the stakeholders.



Costs: set-up, fixed, and variable costs were considered in the analysis. Setup costs are required to realize the whole infrastructure: the cost of building, renewal, and purchasing of land. Production costs can be split into fixed and variable costs; the former should account for the rent cost of spaces, employment of personnel, maintenance of the platform, whereas the latter should accrue for the cost of energy, and the cost of goods and services, e.g., the cost of packaging products and delivery to food lockers.

Legal aspects: the ease to obtain licenses for the use of spaces, and the juridical form of the entity that should manage the food hub ecosystem.

Products: the portfolio of products offered by the food hub. It should be evaluated with respect to the variety of products and the possibility to retrieve them from certified producers. In the case of fresh food, the seasonality of the offered goods is a fundamental value identified by all the stakeholders.

Logistics: the ability to make products flow between producers and eaters through the food hub or directly to the final destination. Logistics costs concern both pickup and delivery aspects, the location of the hub and satellite facilities, and the opening hours.

Critical mass of eaters: the capability of the food hub to reach a critical mass of producers and eaters that would lead to the financial profitability of the project; the economic profitability concerns not only the commercial department but also the organization of educational and networking events.

Nevertheless, at this point a legitimate question regards the existence and possibility to use analytic tools to exploit the hierarchy to rank potential alternatives and eventually choose the most favorable one. For this reason, a number of techniques have been developed in the literature to deal with multi-criteria decision analysis problems[31]. All these methodologies serve, to some extent, to operationalize hierarchies of objectives. The nature of this specific problem, however, seems to exclude some of these methods, especially those who can hardly cope with intangible criteria, and focus on a subset of them. In particular the Analytic Hierarchy Process (AHP)[32], with some variations, is a potential candidate method.

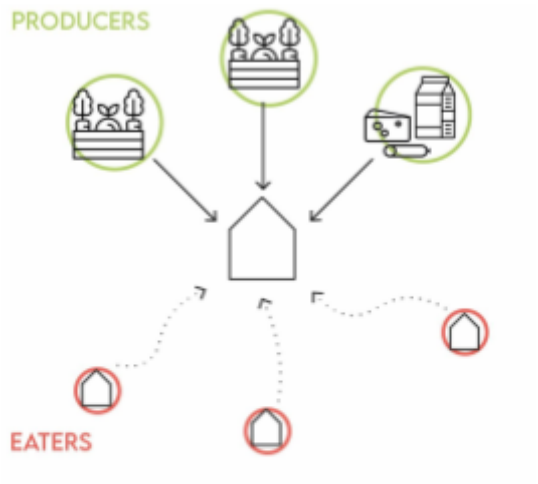
The AHP applies a divide and conquer approach to complex problems and it is based on pairwise comparisons between objectives§/alternatives. So, much smaller and more tractable problems are solved and then their solutions are aggregated into a global rating on a set of alternatives.

[31] Greco, S., Figueira, J., & Ehrgott, M. (2016). *Multiple criteria decision analysis* (Vol. 37). New York: springer.
[32] Saaty, T. L. (2013). The modern science of multicriteria decision making and its practical applications: The AHP/ANP approach. *Operations Research*, *61*(5), 1101-1118.

2.4 Food Hub Scenarios

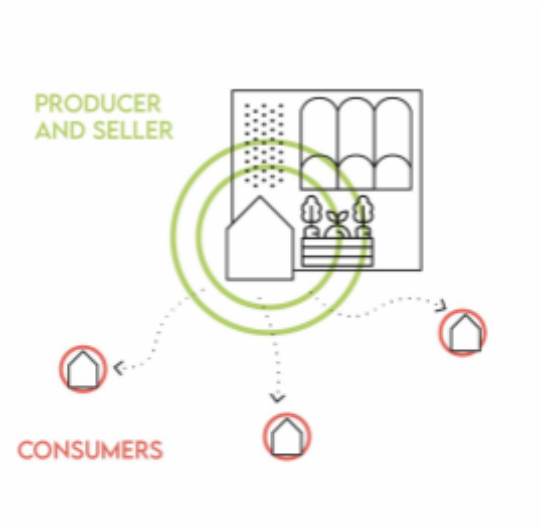
According to the studies above, the project proposes different scenarios of food distribution within short supply chain models. These scenarios emerged from the studies of the existing good practices involved in the project by proposing different alternatives of possible food hubs. As described above, the food hub represents a place (permanent or not) where the physical distribution of food takes place, bringing consumers and producers into direct contact.

Six scenarios with alternative physical configuration of a food hub have been proposed. Compared to the good practices analyzed, the scenarios have been developed with the use of distribution centers, such as lockers, that are more diffuse within the territory so as to connect with consumers and in such a way as to be more accessible. The figures below analyze and represent schematically how each scenario operates by generating different networks and connections among producers, consumers, the city and the landscape.



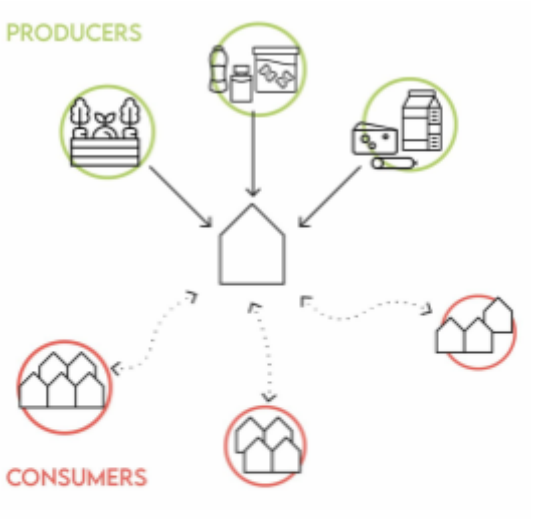
Community Supported Agriculture

This scenario involves the development of a single collection and distribution center where consumers meet directly. Producers and consumers move independently.



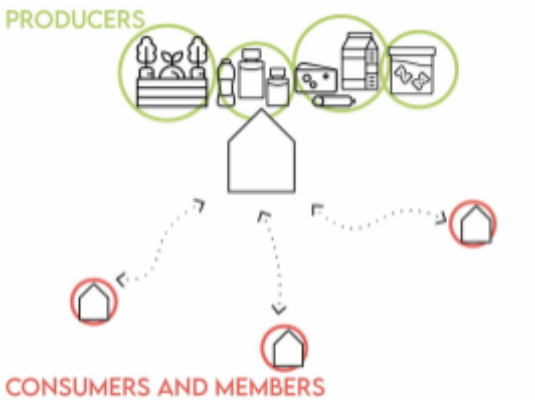
Urban garden

This scenario is based on a distribution center that is the same as the place of production. Consumers are independent to producers.



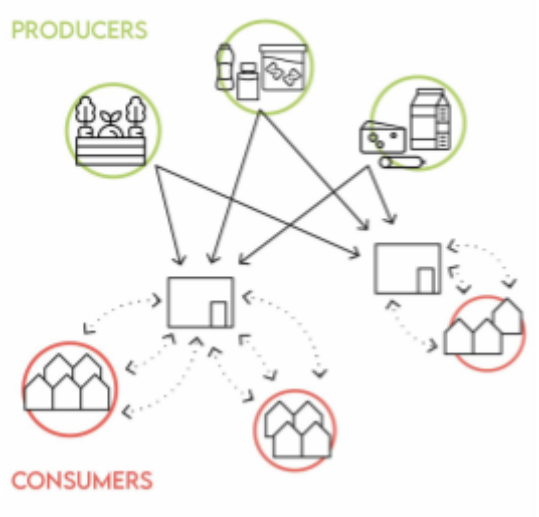
Solidarity purchase group

This scenario is developed as a solidarity purchase group. All the products ordered arrive at the collection point, which are divided by consumer and then distributed by neighborhoods.



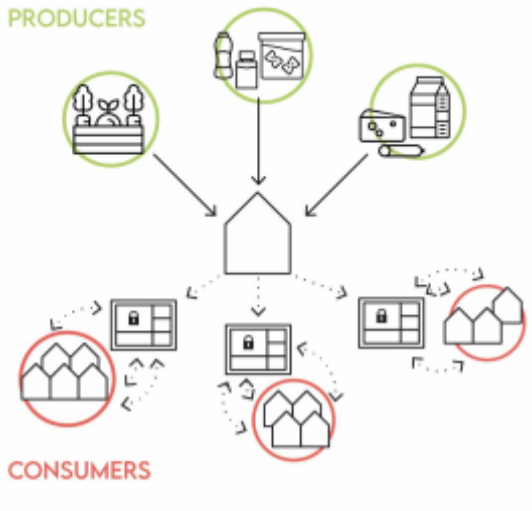
Food coop

This scenario is based on a distribution center organized like a store. Consumers and members of the project collaborate in product selection, buying, and working in the store.



Micromarket

This scenario involves the development of multiple micro distribution centres placed in existing social and collective spaces (such as companies, universities, gym) throughout the territory. Producers and consumers move independently.



Lockers

This scenario proposes the development of multiple independent distribution centers as lockers spread throughout the territory. Producers and consumers move independently.

3. FOOD TRACEABILITY AND NEW NARRATIVES

The process of commodification of many natural resources, crops and ingredients of food has led to a mis-valuing of the food itself. The increasing role of a consumerist approach towards food (its continuous availability, sometimes few informations about provenience and nutritional facts, etc.) diminishes the role of being informed about this pivotal element of human life. Food needs to be recognized by its origin, authenticity and healthiness and these values must be communicated and understood by any “eaters”.
Within HelpFood 4.0, FEM realized a robust activity of traceability in order to profile a set of products from the involved case studies. All of them were vegetables cultivated with organic approaches and representatives of the period of harvesting (September - October 2022). Samples of 22 different vegetables were collected and processed. Results from these laboratory activities were used to outline new characterisation of these products (namely nutritional facts and potential uses), that local producers can use to build a greater narrative around them. One activity of social gastronomy has been realized to combine nutrition, local products and transformation and other activities were released to stimulate a process of awareness raising and education (namely via public talks and round tables and exchange visits within project participants).

3.1 Traceability

The combination of stable isotope ratios of light elements is determined to objectively demonstrate the geographical origin traceability of raw materials and products. Isotopic fingerprints are characteristic of the climatic, geographic and pedological conditions of the production area, linking products objectively with their origin. It will allow producers to add specific origin labels for each food product or ingredient, leading to standardization and normalization at national/regional/international levels. Thus, recognising these labels will reinforce, guarantee and add value to the production of authentic products and will encourage start-ups to focus on these technologies and foods.
This approach, furthermore, will contribute to preserving the cultural heritage and increase SME/smallholder income through new products and food processing and production. The potential to determine the geographical origin of plant derived material using stable isotope signatures is well established in food authentication studies. As a first approximation, natural abundance measurements by Isotope Ratio Mass Spectrometry (IRMS) provide information on plant species (carbon and nitrogen isotopes) and geographical origin (hydrogen, oxygen and sulfur isotopes). The transfer of isotope signals from the bio-elements (H,C,N,O,S) present in local soil and water to plant tissue is understood and forms the basis of this approach.

The other aspect of the project was focused to provide information to fill regional/national nutritional profiling databases, which can be used by nutritionists and dieticians to personalize dietary suggestions within the treatment of obesity. Many studies have provided evidence that these products might ameliorate and/or slow down the progression of chronic diseases acting directly on oxidative stress or its activation of downstream events (inflammation, apoptosis, vascular dysfunction, dis-metabolic events, functional loss etc.). It has been suggested also that these natural products might activate tissue resilience and increase the probability to positively react to stressing events (Covid-19 included) (Stone et al 2018). The Nuclear Magnetic Resonance (NMR) and in particular that of the proton (^{1}H-NMR) allows to determine in a rapid and repeatable way the metabolomic profile (NMR-profiling) of a food, which is linked to its qualitative and sensory characteristics. In fact, ^{1}H-NMR profiling makes it possible to determine and quantify a series of metabolites (targeted approach) but also to provide the entire spectrum of a sample (untargeted approach), considering it as a real fingerprint of the food product. Once the characteristic profile of authentic samples has been determined, it can be used as a term of comparison to understand if

unknown samples have the same geographical origin, variety and/or if they have been adulterated. On the other hand, the same technique can be used to determine in a targeted way, the amount of metabolites contained in foods. The analysis of them is of great interest in food and nutrition research, where the aim is to decipher the links between food constituents and foods' health-promoting potential. Additionally, in primary food production there is an utmost need for efficient analyses to explore and identify the effects of production factors on the final characteristics of food products and in particular for the maintenance of healthy metabolites and the monitoring of the compounds generated during processing or through the addition of ingredients.

The samples were gathered from farmers representing the local pilot cases of Trentino, between the end of September and the first half of October 2022. A determined quantity of the various products were gathered in the plots located in the urban area of Rovereto (Orto San Marco) at an altitude of 200 meters; at the bio-dynamic farm located at Monte Terlago at 700 meters and at an organic farm located in Valsugana at 500 meters.

The complete list of the analyzed vegetables is shown below:

Red Curly Kale	Savoy cabbage	Bean
Green Curly Kale	Leek	Cherry tomatoes piccadilly
Black cabbage	Celeriac	Cherry tomatoes
Red Kohlrabi	Golden Onion	Red tomato
Green Kohlrabi	Lettuce	Yellow Cherry Tomatoes
Cauliflower	Green cabbage	Shallot
Delica pumpkin	Hokkaido pumpkin	Carrots
Jerusalem artichoke		

Selection of three vegetables that have analyzed: Black cabbage, Yellow Cherry Tomatoes, Red Kohlrabi

In order to guarantee varietal representativeness, vegetables, fruits, roots from different plants for each variety were collected. Fresh materials with uniform color, size and morphology were chosen. The samples were washed in water and baking soda, dried and cut in small pieces while frozen in liquid nitrogen. Then the samples were stored at -80°C, and freeze-dried completely in the dark.

The process performed followed the below listed steps:

1. NMR analysis
2. NMR sample preparation
3. 40 mg of the lyophilized vegetable mass was mixed with 900 ul of fresh deionized water (Milli-Q Advantage A10, Merck Millipore KgaA, Darmstadt, Germany) and 100 ul of deuterium oxide (D2O, 99.9% isotopic purity, with addition of 0.03 wt.% 3-(trimethylsilyl)propionic-2,2,3,3-d4 acid sodium salt (TSP) as a scale reference standard; Deutero GmbH, Kastellaun, Germany), the sample was subjected to shaking at 1000 rotations per minute (RPM) for 20 minutes using an orbital shaker, then centrifuged at 12000 RPM for 20 minutes, filtered through the 0.22-micron syringe filter with polyvinyl fluoride (PVDF) membrane (Millex Millipore, Merck KgaA, Darmstadt, Germany), and 600 ul of the resulting solution was transferred to the 5 mm NMR tube (509UP, Norell Inc., NJ, USA).
4. Spectra acquisition
5. NMR spectra were recorded on Bruker Avance Neo 600 spectrometer with a base frequency 600 MHz for 1H nuclei, equipped with a broadband Z-gradient probe for 5 mm sample tubes and refrigerated SampleCase autosampler with 24 positions (Bruker BioSpin GmbH, Rheinstetten, Germany). The spectra were acquired and processed using Topspin 4.1.3 software in the automation mode with Icon NMR 5.2.3. The deuterium lock signal was optimized for the 9:1 mixture of H2O and D2O (v/v). All proton NMR spectra were recorded using the following parameters: noesygppr1d pulse sequence with power level utilized for pulse of 13.07 dB (25 Hz suppression window) were used, the size of the spectrum (sweep width, SW) was 20.83 ppm, time domain (TD) consisted of 131072 (128K) data points, number of scans (NS) was 64 and the number of dummy scans (DS) was 4, the time for relaxation delay (D1) was 10 sec, receiver gain (RG) for all spectra was fixed at 36, and baseopt digitization mode was used.
6. Acquisition of each spectrum was preceded by automatic adjustment of the probe (ATMA

routine) and automatic shimming (TOPSHIM). Spectra were processed in the TopSpin software with the size of real spectrum (SI) set to 262144 (256K, 2xTD) data points, and apk0.noe phase correction au program was applied automatically to each spectrum.

7. NMR data processing
8. Quantitative analysis was performed using AssureNMR software[33] by an external standard method utilizing the so-called ERETIC technique (electronic reference to access in vivo concentrations[34]) which is in turn based on the principle called PULCON (pulse length based concentration determination[35]). Two liquid samples dissolved in the same solvent are measured: a compound of known concentration (a standard sample from the manufacturer, 2 mmol sucrose solution in water) and a sample of interest (not necessarily the same compound as in the standard) using the same experimental parameters.
9. Validation was carried out by periodically measuring one manufacturer standard (2 mmol sucrose in water) against another (20 mmol sucrose and hippuric acid in water each), again using the same experimental parameters. The accuracy of the external standard method is described as about 95%.[36]
10. Identification of metabolites was performed in automation mode in AssureNMR utilizing the Human Metabolome Database (HMDB)[37] and the BBIOREFCODE database of NMR metabolites (v.2.01, Bruker BioSpin GmbH, Rheinstetten, Germany).

Vegetable analysis conducted during Autumn 2023 included some varieties from the *Brassicacea* family and tomatoes. Several scientific studies have shown interesting positive benefits related to the consumption of these vegetables; in particular, some varieties of cabbage are rich in vitamin C, vitamin A and vitamin K. The latter regulates the synthesis of some important factors in blood clotting and is accumulated in the dark-colored leaves. In addition, vitamin K is not water-soluble and resists cooking, so even in some typical soup like the famous italian *ribollita*, which involves a long boiling of the vegetable, the amount is not reduced, unlike vitamin C, which degrades with heat[38]). In tomatoes, on the other hand, there are some bioactive compounds - carotenoids - responsible for their different shades of color. Research studies have shown that carotenoids are very resistant to high temperatures, indeed with cooking their ability to be absorbed by the intestines increases, especially when combined with fats such as extra virgin olive oil[39] [8]. So a dish such as pasta with tomato sauce represents an effective way of preparation to improve the absorption of these compounds, improving health status through knowledge of nutritional composition and cooking methods.

3.2 Narratives

Moving from the evidence of having newly responses about the quality of food, as delivered from

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[33] Colson KL, Hicks JM, Fischer C. Method and apparatus for automated raw material screening. US Patent. 8248072, 2012. Available: https://patentimages.storage.googleapis.com/c1/26/d9/65cbb13655277d/US8248072.pdf

[34] References: Akoka S, Barantin L, Trierweiler M. Concentration Measurement by Proton NMR Using the ERETIC Method. Anal Chem. 1999;71: 2554–2557.
Hong RS, Hwang KH, Kim S, Cho HE, Lee HJ, Hong JT, et al. Survey of ERETIC2 NMR for quantification. Journal of the Korean Magnetic Resonance Society. 2013;17: 98–104.

[35] Watanabe R, Sugai C, Yamazaki T, Matsushima R, Uchida H, Matsumiya M, et al. Quantitative Nuclear Magnetic Resonance Spectroscopy Based on PULCON Methodology: Application to Quantification of Invaluable Marine Toxin, Okadaic Acid. Toxins . 2016;8. doi:10.3390/toxins8100294

[36] Cullen CH, Ray GJ, Szabo CM. A comparison of quantitative nuclear magnetic resonance methods: internal, external, and electronic referencing. Magn Reson Chem. 2013;51: 705–713.

[37] Wishart DS, Feunang YD, Marcu A, Guo AC, Liang K, Vázquez-Fresno R, et al. HMDB 4.0: the human metabolome database for 2018. Nucleic Acids Res. 2018;46: D608–D617.

[38] Sikora, E., & Bodziarczyk, I. (2012). Composition and antioxidant activity of kale (Brassica oleracea L. var. acephala) raw and cooked. Acta Scientiarum Polonorum Technologia Alimentaria, 11(3), 239-248.

[39] van het Hof, K. H., West, C. E., Weststrate, J. A., & Hautvast, J. G. (2000). Dietary factors that affect the bioavailability of carotenoids. The Journal of nutrition, 130(3), 503-506.

the scientific analysis carried out in the frame of an augmented traceability of local food, there is an opportunity to support the creation of a novel narration around food. Scientific evidence, in fact, will sustain all the emerging elements of the "environment" were they are cultivated, transformed or sold. Elements that usually are not even considered by consumers when they buy food. A **novel narrative** is beneficial for producers, consumers and sellers and could grant and add value prior to its transformation and consumption. Within the short period of operation of HelpFood 4.0 (Between Spring and Late Autumn 2023) the consortium has been involved in planning, organizing and delivering a series of initiatives to targeting the original aim of creating a novel narration around food. The activities delivered were released in the 3 RIS countries with in presence activities, meanwhile a further by-remote activity was realized by the Swedish partner. The **interactive and engaging action and interventions** were realized in the RIS countries covering **a multiple scale of impact**: local, national and international. In fact the objective was not only to stimulate and generate a positive process within the inner-scale of the individuated pilot cases, but also to raise interest to the local peculiarities and the project itself (and the connected actions) at a wider scale. The international level was reached both with activities of exchanges between partners and local actors (mainly in Italy and Portugal) and divulgation of the project's activities to a larger audience (has happened in Spain and Portugal).
In the following paragraphs it will be explained in detail about the 3 main pillars around which the attempt **to design a novel process of food narrative** was carried out. These pillars were individuated in: s**ocial gastronomy, education and culture and awareness**.

- ## Social gastronomy

Food is a vector of values and emotions and is one of the most powerful media that society has. Where people do their shopping, what they cook is related to what they believe in, to which food production system they want to support: as an example, it is possible to express the link to the local area by shopping at local producers and spending time learning about food; otherwise, the link to foreign cultures can be described by choosing to cook exotic products coming from faraway.
In addition to its communication role, every food choice is inextricably linked to health and environmental consequences, as diet can have positive or negative effects on the immune system and the onset of certain diseases, and its production has a cost in terms of environmental resources.

A social gastronomy event connects values and emotions related to food in an inclusive and interactive environment, with the goal of improving knowledge about products, raising education and awareness on the impact of diet on health and on our planet.

FEM organized an event of social gastronomy held in Trento, inviting 20 individuals from local farmers, members of Public Authorities, representatives of NGOs and citizens from the HelpFood 4.0 project's pilot case. The activity included 3 different educational blocks: a lecture, a game and a practical cooking lesson. Before the event, people were asked to bring with them an apron and a rolling pin to access the cooking lesson.

Structure and purposes of the event:

The lecture: it was provided by a nutritionist contracted by FEM and it was focused on vegetables' nutritional composition, cooking techniques and effects of vegetables consumption on health. Some insights on specific ingredients were linked to the recipe to be prepared in the practical cooking part (length: 50 minutes).

The game: it involved all participants divided into 4 different groups that represent 4 different imaginary restaurants and kitchen brigades (formed by 5 roles: *Executive chef*, *Executive sous-chef*, *Chef de cuisine*, *Commis* and *Plonge*). A cooking quiz related to the contents' lecture was played to

make the learning process more efficient; each right answer represented a quantity of ingredients to be used by a brigade in the following activity (length: 30 minutes).

The practical cooking lesson: it was held by a local chef and it was meant to prepare a traditional dish by using only local products, bought by one of the farmers involved in the project, and exploring cooking techniques. The recipe procedure was first explained and shown by the chef and, secondary, each brigade worked on their portions. The recipe was for a unique portioned vegan meal of "*tortelloni di cavolo nero con pesto di nocciole*" (fresh filled pasta with black cabbage and hazelnuts) (length: 45 minutes).

In the last part of the event, food was collected, cooked and shared between participants.

The 3 different educational blocks contributed to create a social environment that has the role to grow a network between farmers and consumers, fostering more inclusive communities and inducing positive social change. Furthermore, participants increased their knowledge on vegetables' nutritional composition and cooking techniques, improving awareness of the role of plant-based food on health.
The recipe was given to participants and they had the opportunity to bring leftovers at home. The whole event lasted 3 hours. A satisfaction questionnaire was delivered the day after the event.

The results were really encouraging, and on a ranking-scale from 1 to 5 almost all the requests obtained a value of 4 or slightly higher, none perceived the event as an unpleasant activity which left them sad or disappointed. In particular it has been appreciated that the activity generated new relationships and exchange between people from different backgrounds (in some cases never met before). The format was appropriate and appreciated because it gave space to reflect on the key element presented by the speaker, in particular the nutritional facts and, with the support of the cook, how to maintain them during the preparation. Attendees have then been asked to formulate proposals on how to ameliorate the structure of the event: they suggested to give more visibility via social channels and media, to focus also on the production side and not only on transformation and to realize different recipes instead of an unique one.


Ziola

- **Education and culture**

The concept of food is inherently connected to the culture of individuals. Rooted in their traditions, beliefs, belongings and routines. Education itself, intended as a long-life learning process, plays an important role in shaping the approach to food. As an individual, group or community activity. Formal education is relevant to cultivate the skills and reinforce knowledge of those who will operate along the food value-chain: i.e. from farmers to culinary experts or involved in the HORECA sector. Beside the education that should be followed to reach a professional target, a pivotal role is played by informal education. Intended as the one to which everyday anyone is exposed when food is transformed, prepared and consumed. And usually it occurs within the most intimate place as the family or inner circle of relatives/friends. Along with the above-mentioned one, the not-formal education is relevant to create a proper “food culture” addressing sustainability.

Several methods and approaches have been developed and formalized in recent years. One of the most promising today is related to the "learning through playing" approach. Moving from the assumption that serious games are having an important impact on areas other than entertainment. In fact they have a potential of creating learning environments to better reach the educational and

training goals[40]. The approach fits very well with one objective related to the creation of a culture on food sustainability: to improve nutritional knowledge. This should be considered as the cornerstone of developing the individual approach on a conscious food culture. As an example, the integrated "learning through playing" approach, including the educational figures, tools and games, was successfully conducted in the Parma area (Italy) in improving children's nutritional knowledge. A stable integration of this method in primary school settings could prepare a new generation of citizens, better educated on health-promotion lifestyles[41]. The long-term objective in fact is to prevent specific diseases that could occur when not a proper dietary regime is followed through years. This methodology could be extended and personalized to different public targets and address problems that require a global intervention as part of a multi-sector commitment to a community, as done with the Social Gastronomy event realized within HelpFood 4.0. Novel professional figure, as the "Master of Taste" (in Italian "*Maestri del Gusto*") to be involved in various sector (namely in the primary school educational system) should therefore be considered advantageous and beneficial to reach the goal to rise the attention or preparing a new generation of citizens better educated on health-promotion lifestyles[42].

- **Awareness**

As above-mentioned activities of awareness raising cannot be easily distinct from educational or communicative ones. During the project several options have been adopted: from in-field visits, informal lunches, public talk and debate, workshops as for open innovation activities, participation to congresses and fairs and even the use of social media (rather than the traditional ones). As for the aim of the project, the key objective is to reach a wider audience formed by different actors and introduce them to the concept brought by HelpFood 4.0. Within September and Novembre 2022 there was the opportunity to reach some hundreds of individuals in Italy, Portugal and Spain through in-vivo activities and about a thousand via the digital channels (namely through the Instragam profile). The list below details the most important elements of each activity of awareness raising carried out.

  - **HelpFood 4.0 events**

The Consortium organized **three key events** between September and November in the three different RIS countries involved in the project (Trentino, Spain, Portugal), during which not only representatives of the consortium attended but also external participants were involved and invited (a more detailed description is presented below). As well in November 2022, **two other events** were organized in Trento (Italy), proposing inclusive and innovative activities to engage and create awareness on sustainable local food systems (Social Gastronomy and Open Innovation). Representatives of the consortium also attended other events by invitation from external institutions or organized by EIT Food. One was at the local level, organized in Rovereto (Italy), one national in Turin (Italy) and one internationally in Bruxelles.

THE TASTE OF EXPERIENCE. Co-design the food landscapes in Trentino
Dates: 15-16/06/2022
Place: Trento, Rovereto, Caldonazzo - Trentino (Italy)
The event in Trentino organized by the University of Trento and the Edmund Mach Foundation started with a visit to Orto San Marco - Setàp. The visit tour focused on the publicly owned land rented and redeveloped by MangioTrentino as an agricultural producer and H20+ as a third sector association. During the visit, participants visited the greenhouses, the mulberry orchard and the

[40] Cagiltay NE, Ozcelik E, Ozcelik NS. 2015. The effect of competition on learning in games. Comput Educ. 87:35–41
[41] Rosi A, Brighenti F, Finistrella V, et al. Giocampus school: a "learning through playing" approach to deliver nutritional education to children. *Int J Food Sci Nutr*. 2016;67(2):207-215. doi:10.3109/09637486.2016.1144720
[42] ibidem

shop where the products are sold. The participants were able to get to know other local realities such as the Amalia Guardini cooperative, which as a social cooperative welcomes differently-abled people by organizing workshops in the circular vegetable garden located in Orto San Marco.
During the afternoon, the group of participants visited the farm Ai Masi, which is a supplier of the association L'Ortazzo, a solidarity purchasing group operating in the Valsugana valley. Afterwards, the participants visited the distribution point and participated in a meeting with local community representatives to discuss the issues of local food distribution.
On the second day of the event in Trentino, the participants visited the farm Maso Canova as a representative of CSA Naturalmente in Trentino. The meeting allowed them to get to know other suppliers and the structure of the CSA and other realities such as EDERA - Emporio di comunità.
The event, that welcomed all representatives of the HelpFood 4.0 project partners finished with an open dialogue on CSAs and emergent practices of food culture with Paola Fontana,
Alessandra Piccoli, Silvia Gaiani, Urszula Ala-Karvia, Sara Favargiotti and representatives of
local food farms and moderated by Elisa Morganti.

TALLER HELPFOOD 4.0. Comunidades de productores y consumidores para una agricultura sostenible
Dates: 28-30/09/2022
Location: Smart Agrifood Fair - Malaga (Spain)
On September 29, Bioazul organized the HelpFood 4.0 workshop to create communities of producers and consumers for sustainable agriculture. A conference that took place within the framework of the Smart Agrifood fair in Malaga, the largest event of innovation and digitization of the agri-food chain in Europe[43].
The workshop was part of the HelpFood 4.0 project and support to deepen the role of food as an element of reconnection between farmers, citizens and prosumers through the promotion of agriculture models supported by the consumer community as examples of sustainable food production, distribution and consumption.
Until the event, different agents who work in the field of agriculture and irrigation in the region of Malaga attended to learn about new sustainable models of agriculture and share the concerns and worries that this sector faces. The workshop was presented by our colleague Sara Hernández who was in charge of introducing us to the HelpFood 4.0 project and leading the subsequent round table.
During the conference Sara Favargiotti, Associate Professor of Landscape Design at the University of Trento and P.I. of the HelpFood 4.0 project, talked about her experience in Trentino and the context of the area. She also presented in detail the different communities that currently exist in Trentino between farmers and consumers, such as Orto San Marco - Setàp, L'Ortazzo, Edera - Emporio di Comunità and CSA Naturalmente in Trentino; and how the HelpFood 4.0 project is going to work to support their developments.
Another of the speakers who accompanied the workshop was Ana Castillo, Professor of Economic and Business Sciences at the University of Malaga, who presented two projects in which the University of Malaga participates related to food and sustainable consumption, and whose contents serve as a tool to raise awareness and inform the population about it. These projects are FAIRFOOD on fair food for smart living and CARE dedicated to educating consumers about environmental responsibility.

Finally, the workshop proposed an interactive roundtable to discuss the current situation of farmers and consumers in the province of Malaga. At the table there were Alberto Jiménez, coordinator of the Research and Citizen Science line at Ecoherencia; Margarita Jiménez, coordinator of the

[43] Communication material available at:
https://www.bioazul.com/en/producers-and-consumers-meet-at-the-helpfood-workshop/

Agrifood Area of the Rural Development Group of the Guadalhorce Valley; and Manuel Giménez, secretary of the Guadalhorce Ecológico Cooperative. Thanks to them the public was able to learn about the reality of the producers and learn about some studies that are being carried out in the province of Malaga, about the agroecological synergies that exist in the different regions of Malaga or the project that there is in Ronda to recover the cereals and traditional flours and implement them in local bakeries, among others. Thanks to the public, we were also able to discuss the strengths that Malaga has to promote the consumption of its local products, such as its strategic location or its good climate throughout the year, in addition to commenting on the challenges it currently faces, such as the lack of support from the institutions.

In this workshop it became clear, therefore, that Malaga has enormous potential to continue developing responsible and sustainable agriculture, and that the support of the citizens and the administrations of the province is essential for this. With the aim of starting to make contacts to create a community of farmers and consumers in Malaga, during the two days that the Smart Agrifood fair took place we had a stand dedicated to HelpFood 4.0 where different curious people were able to get to know the Bioazul staff and discover all details about the project.

Other interactive activities were two guided tours: one at the "Mimex"[44] prototype with the representative of SpindoxLabs team; the second at the RichWater[45] treatment plant in Algarrobo, where, together with Rafael Casielles and David Frías from Biozul, more in depth knowledge regarding water and food production was addressed.

[44] See: https://spindoxlabs.com/mimex-progetto-ue-iot-retail/
[45] See: https://richwater.eu/

Urban farming eco-systems in Gothenburg Workshop
Dates: 5/10/2022
Location: online
The workshop was a targeted intervention offered to the consortium partner and open to the public. Martin Berg from the city of Gothenburg presented and disseminated through an interactive workshop good practice and lessons learned from the urban farming eco-systems in Gothenburg (for more detailed information see section 1.3). The activity was clever to offer to the project partner a common ground and background on sustainable food practices based on integrated perspectives on social inclusion, culture, economic and spatial transformations. This moment was fundamental to frame the first ideas and hypothesis of the project by the team.

Giulia Zantedeschi ADD 2 SCREESHOT?

I-DANHA FOOD LAB ANNUAL EVENT
Dates: 4-6/11/2022
Location: Idanha-a-Nova (Portugal)
HelpFood 4.0 was also showcased at i-Danha Food Lab, an event organized by BGI in partnership with the Idanha-a-Nova Municipality in Portugal. The event aimed at bringing together national and international agrifood stakeholders to discuss the food system revolution and its leading innovations. The scenery chosen for such discussion was one of the oldest and most traditional villages in Portugal: Monsanto.
Taking place between November 4 and 6, i-Danha Food Lab counted with around 160 participants and was a great opportunity to disseminate the work of HelpFood 4.0. Project representative Michele Urbani (Università di Trento) moderated the roundtable “How sustainability is shaping the future of regions”, in which Angelica Pianegonda (Università di Trento), also from our HelpFood 4.0 project, intervened. We held a conversation about local and regional level practices put in place to ensure a just green transition in the agrifood sector.

Moreover, the event was a good networking opportunity, in which project representatives were able to engage with local and national stakeholders from Portugal, giving them a more in-depth explanation of the HelpFood 4.0 project and our long-term goals. These networking actions are key to ensure potential future collaborations and therefore proved to be helpful in gathering interest from the Portuguese community.

On the last day of the event, HelpFood 4.0 partners and event participants had the opportunity to receive a guided tour to Monte da Silveira Bio, a 700 ha organic local farm. The goal of this field visit was to get to know the farm and its day-to-day operations, as well as to bring participants together and promote interaction/networking through some team building activities.

SOCIAL GASTRONOMY
Dates: 16/11/2022
Location: Trento (Italy)
The interactive event of social gastronomy was held in Trento, by inviting 20 participants from local farmers, members of Public Authorities, representatives of NGOs and citizens from the HelpFood 4.0. project's pilot case. The activity included 3 different educational blocks: a lecture, a game and a practical cooking lesson. Before the event, people were asked to bring with them an apron and a rolling pin to access the cooking lesson. The 3 different educational blocks contributed to create a social environment that has the role to grow a network between farmers and consumers, fostering more inclusive communities and inducing positive social change. Furthermore, participants increased their knowledge on vegetables' nutritional composition and cooking techniques, improving awareness of the role of plant-based food on health. The whole event lasted 3 hours. A satisfaction questionnaire was delivered the day after the event. The results were really encouraging, and on a ranking-scale from 1 to 5 almost all the requests obtained a value of 4 or slightly higher, none perceived the event as an unpleasant activity which left them sad or disappointed. For a detailed description, see above section 3.2.

OPEN INNOVATION. The open innovation exercise in Trento
Dates: 18/11/2022
Location: Trento (Italy)
The open innovation event involved representatives of the public administrations and of the Emerging Food Network involved in the project. A total of 15 people participated in the activity in person. Through an interactive exercise, the participants were guided to uncover the main issues related to the connection between local food producers and consumers and to start a co-design process for a sustainable local food hub. The main issues that have emerged during the process included: poor flexibility for food pick-up in terms of opening hours and location; lack of

traceability of the products and communication possibilities with the producers; communication platform (when activated) not optimized and with a bad user experience; lack of physical spaces for drop-off. When present they don't allow for aggregation and social interaction; accessibility problems to farmer markets usually organized in the city center in the morning. This event was clever to strengthen the collaboration with local practices as well as to test the hypothesis project by the project team. For a detailed description, see section 2.1.

EVENT ATTENDANCE AS INVITED SPEAKERS

- **24/09/2022 - Terra Madre Salone del Gusto**
  Presentation of HelpFood 4.0 GP to a public event.
  Title: Meetings co-organised by the PLC Network. Food-territories-landscapes. Research-action experiences in progress.
  Speaker: Giulia Zantedeschi (DICAM - Università di Trento)

- **02/10/2022 - Festival Moltiplicazioni**
  Presentation of HelpFood 4.0 GP to a public event.
  Title: Productive spaces, regenerated spaces. Green spaces, liberated spaces. Towards a network of urban gardens (lit: Spazi produttivi, spazi rigenerati. Spazi verdi, spazi liberati. Verso una rete degli Orti urbani)
  Speaker: Sara Favargiotti (DICAM - Università di Trento)

- **17-18/10/2022 - EIT Food Annual Event**
  Presentation of HelpFood 4.0 GP to an international event.
  Title: Let's get real about food
  Speaker: Angela Magno (Bioazul)

4. HOLISTIC SUSTAINABILITY

Agroecology involves a holistic approach to agriculture that takes into account the interactions between the different components of an agroecosystem, including the plants, animals, soil, water, and climate. It also considers the social and cultural aspects of farming, such as the needs and values of the people who depend on the land for their livelihoods.
One of the key principles of agroecology is the idea of "food sovereignty," which refers to the right of people to determine their own food and agriculture systems, rather than having them dictated by external forces such as globalization or corporate interests.
From this perspective, the sustainability of food hub must be evaluated from a holistic approach considering not only the journey of a carrot to the plate but also how the food system with food hubs as interfaces that feeds community building, empowerment, capacity building, knowledge production, small-scale entrepreneurs and contribute to local and regional self-sufficiency. Moreover how a disruptive system of food hubs creates biodiversity, protects and upgrades cultural heritage and how its implications can transform urban planning and re-establishing the relations between producers and eaters and re-unite urban and rural perspectives.

4.1 Agroecology

The proposes the agroecological approach as qualitative and quantitative perspectives to evaluate the sustainability of food hubs and, more in general, of local food ecosystems.

- **Economic: CSA business scenarios and capacity building plan for food hub**

There are a variety of ways to initiate a Community Supported Agriculture (CSA) model, where different types of food hubs can be developed. Different CSA models present different sets of economic advantages and disadvantages:

1. In the traditional CSA model, in which customers pay for a portion of the farm's harvest beforehand and then receive regular deliveries of produce throughout the growing season, there are plenty of economic benefits for both farmers and consumers. On the farmers' side, it guarantees a stable source of income and possibly higher profit margins on their produce. On the other side, customers get access to fresh local produce with more competitive prices given the lack of intermediaries.

2. In more flexible models, such as the ones in which customers have more flexibility in terms of what they receive and how often (they can tailor their boxes to their preferences and dietary restrictions), the income for farmers is not as stable, while the expenditure from the customers' side can be changed according to their floating financial availability.

3. A group CSA, where a group of customers come together to buy a share of a farm's harvest, allows customers to split the cost of a share, making it more affordable for individuals and families. This is a great option for people who want to support local farms but can't afford a full share on their own.

4. In an online CSA model, customers buy a share of a farm's harvest online and then either pick up their produce at a designated food hub or have it delivered to their home. This method enables farmers to reach a larger customer base and makes it more convenient to participate in a CSA. An online method that combines both a digital and a physical food hub might be the best option for

digital and "glocal" markets such as the one envisioned in the HelpFood 4.0 project.

However, regardless of the CSA model followed by a local food hub, there are undeniable regional-level economic benefits from creating such structures in local communities. A local food hub promotes the creation of communities in which their several members establish strong relationships and a sense of belonging. These activities and relationships are crucial for the creation of local-level economic synergies, promoting local businesses and boosting the local economy.

It is important for communities to weigh the advantages and challenges of each approach, as well as their own resources, target market, and goals, when deciding which model to use.

- ## Social: Community empowerment

Agroecology also promotes the idea of **agroecological transition**, which involves a shift away from industrial agriculture towards more sustainable and equitable food systems. This transition is often driven by grassroots movements and can involve the development of community-based organizations, cooperatives, and other forms of collective action.
In addition to promoting social and cultural values, agroecology also has the potential to build stronger and more resilient communities. HelpFood 4.0 has studied different methodologies and actions to understand how top-down and bottom-up approaches can work together to build stronger communities connected to local food and food hubs. Public organizations can promote and enable a local food system by setting up programs and land-lease models for future vegetable farmers. By creating prerequisites for farming careers and connecting the social farming community to a blueprint for building business models for small-scale peri-urban farming, a pathway to local food systems and food hubs can be established. Knowledge, experience, and interfaces for food communities to meet are key elements, and these can be provided by setting up neighborhood pick-up places, model farms, farming incubators, and testbeds for small-scale market gardeners (see Food Ecosystem).
To build knowledge and capacity about local food and its benefits, various educational activities, such as workshops and events, should be conducted through a multistakeholder approach. Examples include open innovation exercises and events using the methodology of Social Gastronomy, as well as programs like those at Orto San Marco in Rovereto, Italy, which bring multiple stakeholders together to revitalize an old farm and cemetery (Food Ecosystem).
Effective grassroots collaborations and cooperation, centered on community-building and connecting consumers with farmers, are also crucial for success. Such social movements, which often challenge the status quo, often rely on trust and commitment. Examples of good practices observed and interacted with within HelpFood 4.0 includes CSA Naturalmente in Trentino, REKO-ring, L'Ortazzo, and Edera - Emporio Di Comunità.

- ## Environmental: Carbon-Positive and circular territories

Because of the growing population around the world, a rise in the need for food is unavoidable in the coming years. Cities play a significant role in this context because they currently house more than half of the world's population and are projected to house more than 75% of it by 2050. Food from outside is frequently imported into urban areas. A significant obstacle to reducing the human ecological footprint is the decrease in the supply chain and the shift to a more sustainable food system. The food system has become highly industrialized in recent years[46], creating a lengthy and intricate food supply chain as well as having detrimental effects on the environment due to the usage of pesticides, herbicides, and fertilizers. Global starvation decreased as a result, but

[46] References: Barkema et al., 1993;
Steel, 2013

environmental problems and socioeconomic inequities were also brought about[47]. The public debate focuses on the dynamics of the urban food system, but less attention is paid to how cities affect the layout of agricultural areas and how foodscapes are designed. In fact, changing the current industrialized food system to a more sustainable one might encourage social innovation, re-establish a connection between residents and their local area, enhance a feeling of community, encourage local development, and improve the livability of cities. As a result, the entire food system may serve as an inspiration for regional planning, a catalyst for innovation in both urban and rural areas, and a means of increasing public participation.

To complete the circle, cities surrounded by natural areas would increase ecosystem services and hence improve the quality of life for residents. The added value of sustainable food production must be acknowledged in order to promote and call for the transition of the current industrial food system into one that is healthier and more considerate of both the environment and people, in order to accomplish this territorial configuration. Therefore, food-related participatory projects could serve as the means of fostering this strategic territorial vision. Urban and peri-urban agriculture's environmental and ecological functions, such as the creation of space barriers against urban expansion, water management, microclimate regulation, diversification of the natural environment and improvement of local biodiversity, and management of agricultural landscape structures, such as windbreak hedges, wells, canals, paths, vegetated and aquatic surfaces, are therefore related to the first benefit associated with these practices[48]. Urban and peri-urban agriculture thus fills the role of the public interest's green infrastructure. By reducing the dangers of climate change, minimizing soil erosion, and boosting soil nutrients and biodiversity, agriculture acts as a territorial presidium. The inherent quality of multifunctionality enables the growth of both productive-material and cultural-social dimensions. Establishing landscape eco-symbols requires good design and management of landscape elements such as hedges, watercourses, bridges, tiny forests, settlements, orchards, chapels, borders[49]. Through a new participatory approach to landscape planning, which must allow for joint planning between urban and agricultural policies, involving urban, peri-urban, and rural agricultural spaces, as well as the main actors in the landscape project: farmers, it is possible to establish a symbiotic link between the city and the urban and rural natural environment.

[47] Rosset, 2008; FAO 2011
[48] Donadieu, 2013
[49] Ibidem

5. POLLINATOR NETWORK

Abstract / Summary of the chapter > BIO (resp)
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5.1 Operational guidelines to activate a new CSAs >UNITN DICAM (resp) + BIO (co-resp) + ALL

[2000 characters with spaces > 2 pages + images]

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- **Inventory** > UNITN DICAM (resp) + BIO + ALL rev
  Study of physical, economic, social and productive context and resources
  [4000 characters with spaces > 2 pages + images]

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- **Community**

Before starting to work in a new area, we need to understand the already existing initiatives and activities, and furthermore, how they interrelate between them. The first step of this previous research is to know the stakeholders, and with this knowledge elaborate a stakeholder map. For this purpose we have created a **stakeholder identification questionnaire** to classify the different agents in the food ecosystem of the area that was distributed to be completed by the stakeholders.

The route to follow would be:

Desk research on relevant stakeholders in relation to the sustainable food value chain in the area.

Interviews/conversations with the main stakeholders in the area, to gather more information on the synergies between. Focus on pre-existing Community Supported Agriculture groups or consumer groups will give us an overview on what is missing in the current food ecosystem.

Organize face to face events inviting all relevant stakeholders in the area. This will have three main purposes:

1)To present the project;

2)To create an opportunity for the already existing initiatives to express their reality and their needs;

3)Creating a networking space in which synergies between the main stakeholders can be encouraged.

Collect information and **Letters of Support** from the stakeholders. The face to face event might also be a good opportunity to collect any missing information from the stakeholders as well as to collect Supporting Letters from the stakeholders to the project.

Cultivate the newly formed relation with the stakeholders to enhance **synergies**. A good way to do this is to keep in contact with stakeholders and together with them plan future follow-up actions

that would be interesting for them to do, like workshops on the topic of sustainable food chains, or field visits in which consumers could get to know the producers better. The nature of those activities will mostly depend on the needs and plans of the stakeholders, but always following the goals of sustainable agriculture communities that are shared with the project.

In our case we started researching in the different focus areas defined by the project, and then continued by having informal interviews with the main stakeholders of the areas. During these interviews we used the opportunity, not only to know them better, but also to understand which other stakeholders they interact more with and which initiatives they found to be more interesting in relation with food systems sustainability in each area.

The next step was to organize face to face events in Spain, Portugal and Italy, in which the different stakeholders in each community were able to interact and also present their main activities and goals. Those events served as a first contact with the food ecosystem both in Spain and Portugal, and a continuation of the previous work in the case of the Trentino region.

- **Food hub activation** > UNITN DICAM (resp) + BIO (co-resp) + ALL rev
  physical (a food hub is not only a physical space but it is based on multiple features) + cultural and relational features (structured according the Sustainability Matrix pillars)
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Lesson learned, limitations, outlooks > UNITN DICAM (resp) + ALL
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