D4.1

Five backcasting scenarios for place-based interventions with citizens

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Executive Summary

This report presents the outcomes of Task 4.1 of the Horizon Europe CUES project, which focuses on co-creating community-led interventions that promote healthy, sustainable food choices, particularly among vulnerable populations such as children, older adults, and individuals with a migrant background.

Through a participatory process, four backcasting scenarios were co-designed in close collaboration with consumers and local stakeholders, such as social workers or educators. The fifth scenario has been delayed due to a change in the consortium composition. As a result, D4.1 will be updated upon completion of the backcasting process with respect to the football club interventions (expected: early 2026).

A backcasting scenario starts from an envisioned and preferred future, and designs the steps that need to be taken to achieve that future. These scenarios present concrete transition pathways toward 2050, informed by insights from Work Package 2.

These scenarios explore:

- Factors influencing consumer behaviour and decision-making around food
- Niche strategies with potential to scale
- Local food environments, including barriers and opportunities for change

Each scenario is grounded in a co-creative methodology designed to facilitate inclusive and long-term transformation. The deliverable provides an overview of the backcasting framework, synthesizes key scenario insights, and evaluates the feasibility and associated risks of the proposed interventions.

OpenDot is developing an intervention targeted at primary school children, with special attention to migrant-background children. The intervention will focus on providing children with the necessary knowledge and skills to understand food sustainability. Nevertheless, the intervention will include elements of gamification to attract sufficient engagement from children.

OpenDot is also developing an intervention targeted at elderly people (65+). For this intervention OpenDot has opted to investigate a digital intervention given the lack of trust in digital information by this target group. OpenDot is hosting a European hackathon in 3 countries (Italy, Hungary and the Netherlands) in the fall of 2025 to further design the intervention. Upon completion of the hackathon, this backcasting reporting for the digital intervention will be updated. The update will be submitted together with the update of the football club interventions (expected: early 2026).

Banco Alimentar (FBPA) focuses on low-income families which are supported by social workers. One essential insight gained from the backcasting process, is the need to work with the social workers to indirectly affect the low-income families due to the strong relationship between the low-income families and the social workers. As such, the intervention will focus on training the social workers and providing them with easy-to-use tools and understandable information to help the low-income families make more sustainable food choices.

Tudatos Vásárlók Egyesülete (TVE) focuses on elderly people (55+) with their redesign of the Conscious Consumer app. It was clear from the participatory back-casting scenario that TVE needs to focus on easily understandable information.

By synthesizing the process, insights and outcomes of the backcasting methodology, this report serves as a starting point for the testing and refinement of the intervention. It will guide future research efforts, and as such, contributes to the transition to a more sustainable food system through cultural change.

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1. Introduction

This deliverable presents the development and demonstration of the backcasting scenarios created as part of the efforts within Work Package 4 -Co-designed solutions for Cultural Change. This work package aims to empower people to make changes in their perceptions, attitudes and behaviours with respect to sustainable food consumption, with a specific focus on more vulnerable populations (e.g., children, elderly, people with migratory background). The work is informed by research and insights gathered in WP2 (see deliverable 2.1 and deliverable 2.2), which provided input for the co-design of scenario-based interventions.

These scenarios were developed in close collaboration with citizens and local stakeholders, using a backcasting approach to articulate desirable futures and actionable pathways to 2050. In line with the objectives of WP4, the scenarios focus on three key areas: (1) identifying how various cues, as well as behavioural, psychological, and contextual factors, can contribute to the development of sustainable food choices, (2) exploring niche strategies and bottom-up initiatives within the food value chain that hold potential to scale into more widespread practices; and (3) identifying specific characteristics of local food environments, along with their barriers and opportunities, to support behavioural change at the community level.

Each scenario hence outlines a transition pathway grounded in co-creation, aiming to foster long-term, inclusive change. The following sections detail the backcasting methodology used in Task 4.1, present the scenario-specific insights derived from WP2, and summarize the outcomes of each backcasting step. The deliverable concludes with a synthesis of the co-designed intervention pathways and a reflection on their feasibility and transformative potential.

2. Participatory backcasting approach

Backcasting is a strategic approach that starts by envisioning a desirable future (Dreborg, 1996). Next, it works back from that vision to present and design steps to accomplish that vision (Davies & Doyle, 2015). This makes it inherently different from forecasting which extrapolates current trends to predict the future. In doing so, this forecasting falls short when long-term problems and solutions are necessary (Quist & Vergragt, 2006). Backcasting, however, is not a fixed method but rather it is an approach. As such, it can vary in terms of the actors involved, and the extent to which they are involved, as well as the steps, methods or instruments employed (Quist & Vergragt, 2006).

Nevertheless, it is clear that the success of this backcasting approach can be enhanced by employing a participatory, or co-design approach. Due to the difficult nature of changing food habits, it is essential to have the support of those stakeholders who are involved. Therefore, a participatory backcasting approach is fitting. Stakeholders can provide their input with regards to the design of the intervention, and can continuously provide feedback throughout the process (Quist & Vergragt, 2006). In addition, stakeholders should also be involved in assessing the interventions (Green & Vergragt, 2002).

Figure 1 presents an overview of the backcasting approach employed in CUES. First, all intervention leads oriented towards their specific intervention case. Nevertheless, all interventions are being developed in alignment with CUES objectives. This involved the creation of a stakeholder mapping per intervention (see Appendix 1) as well as identifying drivers and barriers for the three most powerful and/or interesting stakeholders (see Appendix 2).

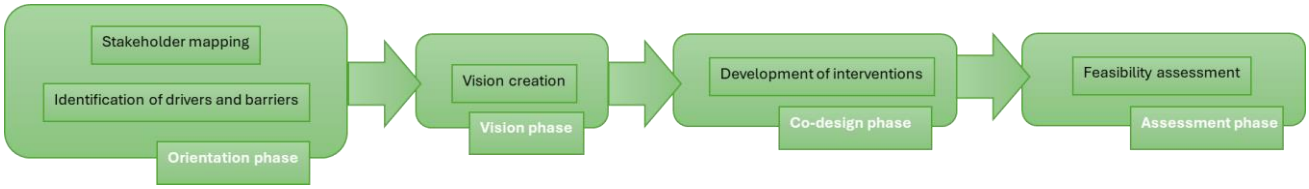

Figure 1 Co-design backcasting approach of CUES

Next, the creation of a vision for their intervention was required. In order to do so, it was important to reflect on the type of change that was essential for their intervention building upon the Theory of Change. The Theory of Change is read backwards from the desired future to map the outcomes, activities and inputs that must be in place, together with explicit assumptions. Then it is monitored forward during implementation by assigning indicators, targets, and review moments to each link in the chain. This makes the pathway testable, supports continuous monitoring of change, and enables timely course-correction within the participatory co-design cycles to maximise societal impact[1].

In the co-design phase, all partners employed their own method – aligned with their expertise and their target groups – to develop their intervention. This was an iterative process, meaning that there were different rounds and/or different stakeholders involved for each round. For each developed intervention, the created vision was the red thread throughout, and the intervention leads ensured that the intervention developed would match their vision.

Finally, the intervention was assessed by partners and key stakeholders, for example educators and pedagogists or social workers, in terms of its feasibility. Several potential opportunities as well as threats for the intervention were identified in order to set up a risk mitigation plan in the next steps.

2.1 Ethics, GDPR and Inclusiveness

The different interventions are developed in line with EU ethical standards, GDPR and inclusiveness principles, under the approval of the ESHCC Research Ethics Review Committee (RERC). The backcasting approach involved general populations and vulnerable groups such as children, older adults (65+), low-income families, and minorities with migration backgrounds, often requiring tailored safeguards.

For OpenDot's physical intervention in Italy, parental consent was mandatory with mediators assisting where parents could not read the Italian forms. Children also gave simplified assent and were provided the opportunity to opt out independently.

For OpenDot's digital intervention development, up to now, involved 65+ Italians. When approaching these adults, plain-language materials were used and the procedure was made as simple as possible.

The development for TVE's intervention in Hungary involved focus group meetings with both internal stakeholders, experts (adults) and potential users (adults). All were able to provide consent for their participation in the co-creation activities.

[1] Erasmus University Rotterdam. (n.d.). Theory of Change. Retrieved July 10, 2025, from https://www.eur.nl/en/research/research-services/societal-impact-evaluation/impact-toolbox/theory-change

The FBPA intervention in Portugal will work with vulnerable families. However, the development, using the backcasting approach, involved the social workers in the charities (who work with the vulnerable families). As a result, a standard approach was used for the development activities.

As such, for all activities informed consent was required, and requested. This includes informing the participants of their rights (access, correction, withdrawal) and of complaint channels. For vulnerable groups, dual consent (guardian and participant) was secured, with mediators ensuring comprehension. Workshops and co-design sessions were recorded depending on the intervention lead's needs, with transcripts anonymised and only reported in aggregate. In case personal identifiers were collected, they were removed once transcription is complete, after which withdrawal was no longer possible.

Aligned with the Data and Quality Management Plan (D7.1) of CUES, data collection followed GDPR and anonymised outputs follow FAIR principles. Data minimisation principles are followed in which only information necessary for the backcasting was gathered.

Inclusiveness is fostered through accessible language, mediation where needed, and adjusted formats to suit literacy and digital literacy levels. For children, procedures are explained in simple terms while for older adults and low-income families, activities are designed to be short and practical, reinforcing transparency and respect.

3. OpenDot – physical intervention

3.1 Description of OpenDot

OpenDot is an innovation hub and Fab Lab[2] based in Milano, founded in 2014 by the multi-disciplinary design studio Dotdotdot and has always been committed to social innovation. Adopting co-design methodologies - based on active listening, research and participation - and exploiting the potential of technology and digital manufacturing, OpenDot has always involved people and communities, with a special focus on the most vulnerable. Through collaborative projects, OpenDot provides training, open source tools and tailor-made solutions, ensuring inclusiveness and accessibility.

Thanks to a network of global and local partners and participation in European projects, OpenDot imagines desirable futures and develops concrete solutions to strengthen the most fragile communities, working in the areas of health and care, active and aware citizenship, and environmental and social sustainability.

In the context of sustainability, OpenDot has worked on a large number of projects related to food sustainability, focusing on both the system and people. For example, OpenDot co-created with the Municipality of Milan in making the food flow of the city more circular (Horizon 2020 - Reflow) and in reducing food waste in school canteens, through design and educational storytelling (Horizon 2020 - Food Trails). Furthermore, OpenDot supported the creation of social impact solutions for healthier and more sustainable diets, through Hackathons and mentorship (Horizon Europe - Feast). Finally, they engaged students in rethinking the future of urban agriculture, imagining futuristic scenarios and

[2] A Fab Lab is short for fabrication laboratory and is a small-scale workshop offering open access to digital fabrication tools and machines.

innovative urban agriculture systems for the Milan of 2025 (Urban Innovative Actions project - Openagri project).

3.2 Foundational insights from work package 2

With regards to different psychological variables that potentially affect consumers, T2.1 identified (see D2.2) that a stronger perceived social influence supports sustainable food attitudes, intentions and behaviours. Moreover, the source of this influence seems to play a role with family influences being potentially stronger compared to peers or colleagues. This might provide support for the potential of both consumer socialization and reverse socialization previously mentioned. Furthermore, in order to establish sustainable food behaviour consumers need to be able to perform the behaviour. As such, focusing on food literacy provides an interesting pathway for an intervention. Food literacy entails both knowledge about sustainable products, general sustainability and consequences of food choices as well as food literacy skills such as cooking abilities. Therefore, based on T2.1 these are all potential avenues for OpenDot's intervention.

In T2.2 a number of surveys and focus groups were conducted in various European countries, including in Italy. As a result, the findings of these studies (see D2.1) provide interesting input for the OpenDot intervention. Respondents in the surveys reported positive attitudes toward sustainable food consumption. However, the actual frequency of consuming sustainable food was lower, suggesting an attitude-behaviour gap. Nevertheless, in Italy, sustainable food consumption seemed already well-embedded (scoring as one of the highest among the surveyed countries). As a result, it seems that there might be a general openness to an intervention targeting sustainable food consumption. Moreover, the focus groups confirmed that food choices are often shaped within a family tradition and cultural norms and practices.

With this information in mind, OpenDot has set out the objective to create an educational toolkit for its physical intervention. The toolkit aims to target primary school children and to create primarily cognitive and attitudinal changes. More specifically, OpenDot aims to improve **knowledge on food sustainability** by embracing concepts such as seasonality and food origins while taking culture and tradition into account. The latter is especially relevant to engage with children from minority and migrant backgrounds.

3.3 Stakeholder mapping

OpenDot has created a stakeholder map (Figure 2) which showcases a number of potential stakeholders that affect the target group (i.e., children) within the context of food. With a focus on primary school children, it is essential to use a systemic approach to their consumption behaviour. Children learn essential consumption competencies from their parents[3]. However, parents also learn from their children[4]. Thus, equipping children with knowledge about sustainable food consumption can also affect

[3] John, D. R., & Chaplin, L. N. (2022). Children as consumers: A review of 50 years of research in marketing. In L. R. Kahle, T. M. Lowrey, & J. Huber, *APA handbook of consumer psychology* (pp. 185–202). American Psychological Association. https://doi.org/10.1037/0000262-007

[4] Singh, P., Sahadev, S., Oates, C. J., & Alevizou, P. (2020). Pro-environmental behavior in families: A reverse socialization perspective. *Journal of Business Research*, *115*, 110-121. https://doi.org/10.1016/j.jbusres.2020.04.047

their parents. This might be especially important in the case of minority and/or migrant families, where it is often harder to reach parents due to e.g., language barriers.

The closest stakeholders, besides parents, are babysitters and caregivers, afterschool animators, sport/cultural/religious organizations. These have a close contact with the children on a daily (or at least regular) basis. Moreover the school context is also very close to the children. In this context, we see teachers and educators and canteen staff/providers. Finally, we see that media and influencers, stakeholders within the food context (e.g., nutritionists, food experts), and policy makers can be considered stakeholders that might affect the children.

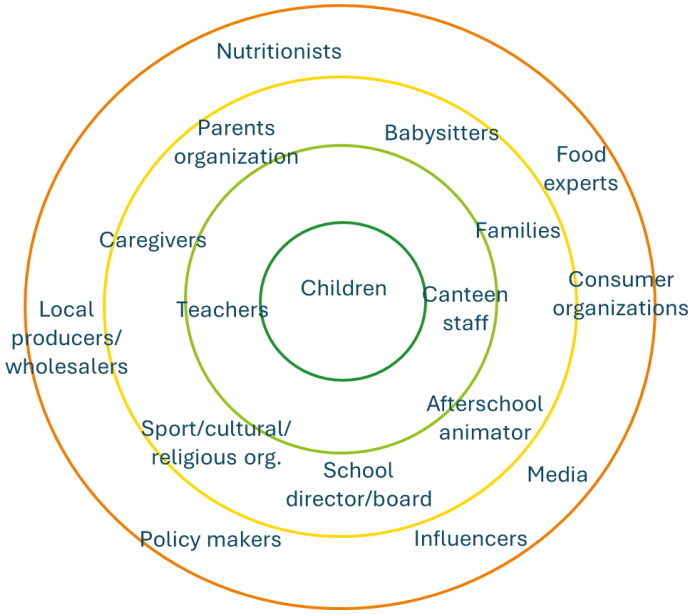

Figure 2 Stakeholder map for the physical intervention developed by OpenDot

In addition to creating the stakeholder map, OpenDot has plotted the different stakeholders based on their potential influence on the success of the intervention, as well as the interest they would have in the intervention (see Figure 3). Based on this exercise, it becomes clear that the different stakeholders that affect children are highly interconnected. As a result, OpenDot aims for an intervention in which these different stakeholders can work together.

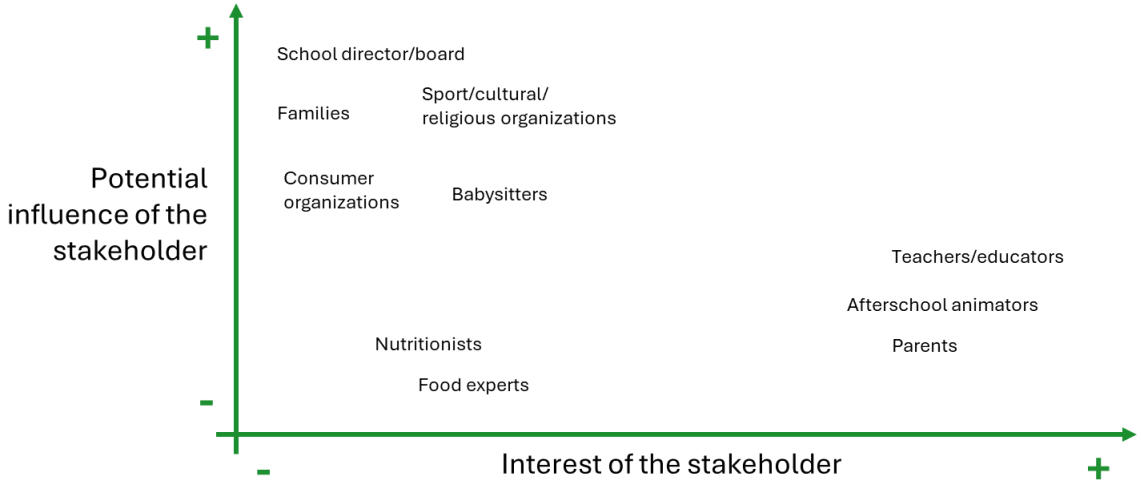

Figure 3 Plot of the potential influence and interests of the identified stakeholders for OpenDot's physical intervention

3.3.1 Refining the target group

Building upon the stakeholder mapping, OpenDot has partnered with the Community Education Pact of Valdilana - an educating community of local organizations, associations and institutions that interact with children in Valdilana (Italy). This collaboration will allow for a broader implementation and dissemination of the intervention.

Valdilana, a mountainous valley near Biella (Piedmont), thrives thanks to local associations and public entities. These efforts led to the Community Education Pact ("Patto educativo di Comunità") initiated by the Valdilana-Pettinengo Comprehensive School, uniting over thirty stakeholders focused on education, wellbeing, autonomy and community involvement. Despite mobility challenges between villages, the region offers opportunities around food sustainability: many residents grow their own vegetables and access local food sources promoting healthy diets.

Initial discussions with the Community Education Pact highlighted that: 1. There is existing engagement with children around food topics; 2. previous school-based sustainability projects provided valuable insights; 3. the Pact's collaborative nature makes it ideal for an intervention.

To reach minority and migrant children, OpenDot opted to work with the Pettinengo primary school, part of the Valdilana-Pettinengo network. The school hosts 22 pupils aged 6 to 11, with seven of them from migratory backgrounds from outside the European Union. Due to the low enrolment, classes are multi-age, and students are supported by Pacefuturo - an organization that works with families with migration backgrounds.

3.4 Future vision

Together with the Pact Opendot developed a vision for the future using a creative visioning exercise. During this exercise, the members of the Community Education Pact were asked to create a collage to envision the future of Valdilana in the context of sustainable food. The end result can be seen in Figure 4.

The vision statement reads as follows: **Understanding the valley, to nourish its future.**

Figure 4 A collage representing the vision of the intervention, based on insights provided by the Community Education Pact

According to the Community Education Pact and OpenDot, it is fundamental to know more about the valley in order to support and nourish its future generations, since they depend on it. As such, a deep understanding of the inhabitants of Valdilana and their culture is crucial to achieve change.

The vision can be further understood as follows:

- **Understanding** is to dig below the surface: it is crucial to bring out inner features of the region, to test in order to fully know, and to experience new adventures.
- **Valley** refers to the landscape and the environment – both natural and architectural. They define the identity and the values of the inhabitants of Valdilana and how they live together, and it encompasses the sense of community.
- **Nourishing** refers to providing food for growth and for wellbeing. In this sense growth can be understood as growth for physical growth, but also to grow the community by making individuals collaborate with each other.
- **Future** includes current young generations and those generations that are to come.

3.5 Analysis of past drivers and constraints

Together with the Pact, OpenDot has made an assessment of the potential drivers and constraints of the vision, and the intervention to be developed. These are essential to understand since they provide boundary conditions for the successful implementation of the intervention.

3.5.1 Drivers

In Valdilana there is a strong ecosystem collaborating around children education with complementary roles and competences. This ecosystem has been formalized in the Community Education Pact, and has developed a common strategy and long-term goals. Using this established ecosystem, the CUES

intervention can benefit within specific tasks. More specifically, the organizations within the ecosystem have worked together before and are willing to collaborate. Moreover, the organizations involved in the Pact expressed their interest and motivation to collaborate on the CUES intervention and look forward to new activities.

Food is a top priority for the local development. This results in the region aiming to enhance assets such as its products, its knowledge and its employment. Therefore, food is also an important topic within the school system.

Pacefuturo is an organization that works with families with migration backgrounds. They operate in three main areas: 1) culture and peace (promotion of paths of peace and the future by meetings, exhibitions and events), 2) reception and solidarity (activation of solidarity and generative welfare projects aimed at vulnerable people, in particular those seeking international protection, facing unemployment or homelessness) and 3) territory and economy (rediscovery, recovery and valorisation of craftsmanship, artistic heritage and local landscaping. Since 2014, in collaboration with the Ministry of the Interior and through the Prefecture of Biella, Pacefuturo has designed and implemented the project 'Pettinengo, un paese che accoglie' (Pettinengo, a village that welcomes) intended for international protection applicants. To date, they are one of the main reference centres in Italy and abroad for reception using the diffused method. Throughout their activities, Pacefuturo works closely with the target group and like OpenDot they have a good understanding of the needs of this target group.

3.5.2 Constraints

For the CUES intervention to be successful, it is important to involve parents and families. Only in this regard, the CUES intervention can have a real impact on what children eat. This is a lesson the Pact learned from previous food-related projects in Biella. In those projects, the parents were not always involved and the activities children participated in at school did not always transfer to the parents. Nevertheless, due to parents' busy schedules it might also prove difficult to engage them in the activities.

In addition, teachers and educators play a fundamental role in sharing knowledge and engaging with the children on a daily basis. They might, however, lack the knowledge, skills and tools to educate children on the topic of food sustainability.

3.6 Development of intervention

To co-design the intervention, OpenDot has organized multiple activities (see Figure 5). Prior to these activities, OpenDot spent a day visiting and observing the main stakeholders who would be involved in the development of the intervention. These organizations are Pettinengo primary school, Oltre il giardino, Valdilana Hub, Piccola Fata and PaceFuturo. This helped to understand the relationship they each have with the children, to learn about the people, the meaningful spaces for the local community as well as past and active projects they are engaged in with regards to food.

Pettinengo primary school was selected by OpenDot for its high number of migrant-background children. Observing the school's daily dynamics helped tailor the intervention. Children are well-integrated, and the peer-to-peer learning approach works well for them. In addition, OpenDot learned

about their school food environment and the fact that not all children attend the school canteen since it is a cost that not everyone can afford.

Oltre il Giardino, a Biella-based non-profit cooperative, develops innovative and experimental projects with a focus on well-being and educational support. For this intervention's development, their 2022 food education project "Pensa che mensa!" is relevant. It raised awareness among children, families and institutions about the ethical problem of waste and the delicate issue of eating disorders by promoting food awareness and a healthy and sustainable lifestyle in primary schools. OpenDot learned from their challenges: low institutional adoption, parental scepticism about diet recommendations and children's reluctance to try new foods.

Valdilana Hub fosters community regeneration through creativity, crafts and vocational training. Although it targets adults, and not children, they have a laboratory designed for educational activities and they participate in the Community Educational Pact to strengthen their relationship with the area and to create synergies.

Piccola Fata promotes youth education through community activities and initiatives since they believe in the value of education as the key to lifelong change. Piccola Fata offers laboratories to the children from the Pettinengo school and helps these children with their homework. Their "learning by doing" approach includes helping Pettinengo pupils and maintaining strong ties with Pacefuturo.

As mentioned before, **PaceFuturo** works closely with migrant families and asylum seekers. OpenDot's visit deepened their understanding of how children and families with migrant backgrounds are engaged in school and local activities, as well as what kinds of approaches to engage this target group is more feasible.

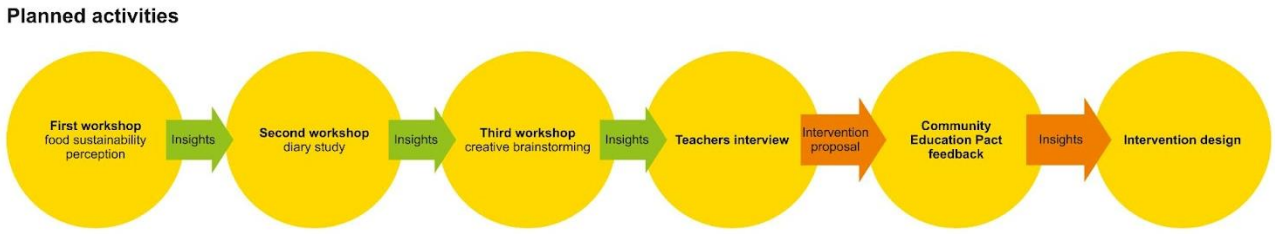

Figure 5 Overview of planned activities by OpenDot for the development of the physical intervention

The co-design process involved the primary school of Pettinengo and Piccola fata. During three workshops, the aim was to explore the children's understanding of food sustainability by means of a speculative design approach where children were asked to project themselves in the imaginary city of Fruttalù.

Each workshop was designed to:

- build a relationship with the target groups to make them more engaged with the project and its future activities;
- allow the children to explore the topics of food from various perspectives;
- understand specific aspects of sustainability that are relevant for the children and useful to design the intervention;
- empower children to learn what sustainable diets are.

3.6.1 First workshop: food sustainability perceptions

Objective: Understand children's perception on food sustainability and their openness to new approaches.

Method: Storytelling to engage them throughout all the workshops. For this purpose, children were introduced in the magical world of Fruttalù.

> *Every corner of Fruttalù is full of colours, sounds and scents that made anyone who came there smile. The trees are laden with extraordinary fruit: apples as golden as the sun, which if you ate them made you feel instantly happier, and grapes that shine like little gems, sweet and fresh enough to make you want to eat them by the spoonful! In the fields, vegetables are growing in a very special way. There are carrots as blue as the night sky, which taste like mint and have a hint of magic. And then, tomatoes as red as hearts, which when you slice them, inside are full of tiny rainbow-coloured seeds, ready to bring happiness to whoever ate them. The people of Fruttalù have found their own way to grow food in a sustainable way: they plant with gentle hands, without damaging the soil, and use water so that nothing is wasted. Each plant grows healthy and strong, just like the ideas that are born among the people of the village: ideas for a better future, made of good, healthy food that help the Earth and make everyone happy. And today, dear children, we are going to explore this extraordinary world, discovering together the secrets that make the fruits and vegetables of Fruttalù grow. Are you ready to set off on this great adventure?*

Outcome: Food environments were found to be important, for example their home or the association they spend time with. There is curiosity towards the 'new', but the discovery needs to be guided (e.g., in educational setting, with a booklet, by caregivers). Children are not aware of what is truly local or seasonal, but they would like to know. Most of their knowledge comes from what they learnt or experienced at home, or is based on their parents food behaviour.

3.6.2 Second workshop: Diary Study

Objectives: Understand how children approach new foods, with the aim of making them skilled tasters/explorers. A skilled explorer is able to describe food using their senses (similar to a wine sommelier). In addition, a skilled explorer does not just want to perform (in terms of grades), but they want to feed their curiosity by working on their observations skills. However, this needs to be guided and for this OpenDot aimed to test a tool that children can use to investigate a new food.

Method: A diary study in which children were asked to describe food through different sensory aspects. To make this as easy as possible for the children, they were asked to check tick boxes. The children used a booklet (see Figure 6) to help them discover new foods. The booklet was to be filled in anywhere the children encountered food, including at school and at home. They could enter what the shape, the colour, the smell of the food was, but also whether it brought any feelings or memories. A gamification approach was used to check which dynamics work the best to have the children engaged with the activity. In order to stimulate the children for their participation, the children received a sticker prize for each completed session.

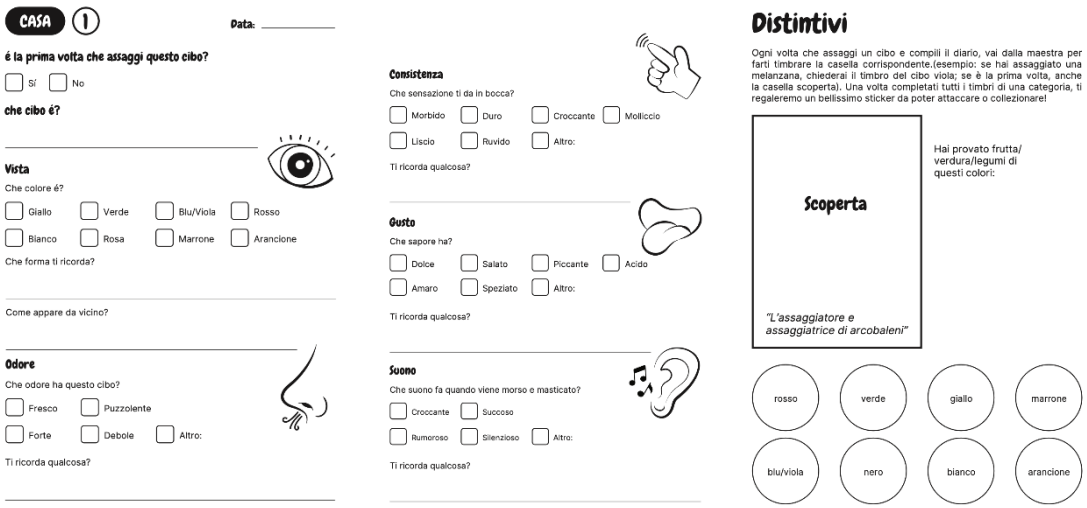

Figure 6 Booklet for children to record their food experiments

Outcome: There seems to be confusion around food sustainability topics (e.g. seeing sushi as local food because they had a sushi restaurant in their town) that needs to be addressed. The diary study generated positive feedback when an adult or the class was involved. The gamification element was effective to engage the children. Due to this element children seemed more interested to record their food experiments.

3.6.3 Third workshop: Creative brainstorming

Objectives: Generate ideas for the product design of the intervention.

Method: Children where asked to explore five food sustainability topics through a set of cards which explained the content of each topic (to ensure all children understood the content, the content was read out loud). Children were invited to express opinions and insights on each topic.

Using a creative framework, children were then asked to brainstorm about an object (represented as a magical tool) which could help them and others to get access to information on these topics. The creative process was facilitated by two dice that introduced different design elements. One dice focused on the physical form of the object (e.g., small, wearable). The other dice focused on the type of user interaction that would be useful (e.g., touch-activated, requiring collaboration).

Outcome: The activity revealed children's interest in food sustainability, though they lacked full understanding and vocabulary. In the creative phase, some responded enthusiastically, while others needed peer support. Most ideas focused on interactive objects that made sustainable food information more accessible—such as smart accessories like a talking watch that answers questions on the go.

3.6.4 Additional development activities

In addition to the co-design process, OpenDot engaged in additional activities to support the design of the intervention.

First, **desk research** was conducted in order to identify and learn from other food sustainability projects targeting primary school children. The objective was to get inspired as well as to understand the success factors of other projects. Some relevant projects that were identified are: Taste Education[5], Curious Gastronaut[6], Promozione della Salute[7]. OpenDot was inspired by the sensorial approach in these projects, and learned from their methodologies and tools to engage children.

Second, **interviews with three Pettinengo primary school teachers** were conducted to understand the school dynamics with a special focus on the didactic and pedagogical approach used in the school. The objective was to understand what would work within the Pettinengo school context and what would not. For example, teachers were asked about :

- past examples of kits/objects used in the classroom, what features did they have? What worked and what didn't?
- which dynamics work best? Group vs. individuals vs. small mixed groups?
- children living at home or at school or both? (care and commitment to be required from parents)
- what works best for the involvement of all boys and girls (language and skills)?
- the best supports for the child? What should the dynamics of the intervention looks like? Should it grow with the child and be continuous (like a diary) or more on-the-spot (one week per year) or more challenge-like within other classes (gamification)?

As a result of these interviews, OpenDot learned that:

- A simple repository of best practices is not enough for teachers to engage with these interventions. While the content might be valuable, without guidance or context, teachers often feel unsure how to apply this information which makes them lose interest. In their past experiences, storytelling works better. Narratives convey information, build continuity and makes the learning feel more connected to their experiences.
- Starting with the group activities before moving onto individual tasks has proven to be effective in their environment. This ensures the children are confident enough to tackle the individual tasks.
- Collaboration with other associations is key. Families are stretched, and children are extremely busy. The teachers shared that if they would be open all day, there would be children all day. Providing additional homework would be complicated because of these packed schedules and overwhelmed parents. In the Pettinengo school they do not give homework. The goal is to nurture curiosity in such a way that children are free to explore topics that interest them with autonomy and playful learning (like gamification) in mind.
- Peer-to-peer learning is a powerful asset (especially in this school) because older students can explain things to younger students and students help classmates who were absent.

[5] https://www.tasteeducation.com/what-do-we-do/

[6] https://curiousgastronaut.com/

[7] https://www.promozionedellasalute.it/progetto/137-crea-menu

- Finally, continuity is important. Ongoing projects with regular feedback keeps the children engaged and invested. Culminating events, such as an end-of-year showcase, can give visibility to their efforts and can help to provide relevance to what they accomplished.

Thus, these interviews suggest that the level of learning is very different depending on the age and the children's knowledge level. As a result, OpenDot decided to proceed developing the intervention for 8 – 11 year old children, but not younger. Importantly, it became clear that the children require adult follow-up of their experiments. However, teachers also indicated that parents seem to be overwhelmed already which makes it more difficult for them to follow up.

Third, **interviews with experts** (i.e., nutritionist, psychologist) were conducted to understand the content and dynamics of the cases studies identified during the desk research.

3.6.5 Intervention design

In conclusion of the research activities, OpenDot created a first intervention design. The intervention will include three phases, namely:

Phase 1: Introduce children to plant-based food and food sustainability using playful "sustainability cards." The goal is to spark cause-and-effect thinking.

Phase 2: Explore food production, transportation, and waste management. Encourage reflection on collective responsibility and the environmental impact of food.

Phase 3: Apply the knowledge in real-world contexts and share insights with local stakeholders, such as families and community associations.

3.7 Initial evaluation of intervention

The aforementioned activities generated a number of lessons learned for the intervention.

Opportunities:

- Children are interested in the food topic and have a basic understanding of the meaning of sustainability in this context (e.g., the use of pesticides and the impact on the environment).
- Children enjoyed getting involved in the activities planned by OpenDot and were happy to participate and showed a sense of curiosity throughout the activities.
- The children from minority and/or migrant backgrounds are well-integrated in the classes. As such, children readily support each other.
- The children are accustomed to peer-to-peer learning activities, and they learn by doing.

In sum, there is growth potential for children's food literacy skills. In addition, due to the nature of the educational approach in the school the children have a preference for group activities, which helps with engaging them in addition to the gamification aspects.

Threats:

- There is a literacy gap: the level of communication skills depends highly on the age and language level of the children. The type of engagement with the children needs to vary depending on their age in order for the intervention to be successful.

- Parents did not seem to have sufficient time to track the children in after-school activities. This might have to do with the fact that children in the Pettinengo school usually do not have homework, and as such the diary study was unusual for the parents.
- Engaging teachers and involved associations might prove difficult. It will be essential to ensure they are welcoming the intervention prior to the implementation. In addition, as indicated earlier, teachers might lack the necessary literacy to discuss sustainable food with the children. As such, they need to be facilitated in providing content and activities to the children.
- Due to the school and the associations' own programs there might be delays in the implementation. It will prove essential to discuss this well in advance with the school and the associations.
- Not all children have lunch at the school canteen. Especially the more vulnerable children do not lunch at the school, because their family does not have the means.

In sum, the intervention needs to be designed in a way that children engage with it in terms of time and method. If not all of the children have their lunches at the school canteen, the intervention should not be focused on that particular time and location. If they need to be supported by an adult, but parents are too busy, other adults in their lives should be involved, for example, school teachers or associations representatives. The design of the intervention will focus on how children, during/after the intervention, can indirectly influence their parents, or others who were not involved in the intervention.

In addition, the initial intervention design was presented to the members of the Community Education Pact. The objective was to generate feedback on this initial design. The Community Education Pact provided positive feedback on the planned activities and offered valuable suggestions for engaging additional partner organizations in the intervention. They emphasized the critical importance of securing active teacher involvement, as educators are key facilitators of any initiative involving children.

Finally, in terms of technical feasibility of the design and development of the intervention, OpenDot can rely on its infrastructures and equipment, comprising e.g. laser cutter, CNC, 3D printers, and a team with diverse skills and competences, including product designers, digital fabrication experts, UX-UAI experts, developers.

3.8 Intervention pathway

For the future of the Fruttalù intervention, an intervention pathway to 2050 is presented below. This pathway presents key elements of the intervention impact, potential barriers and drivers for this impact.

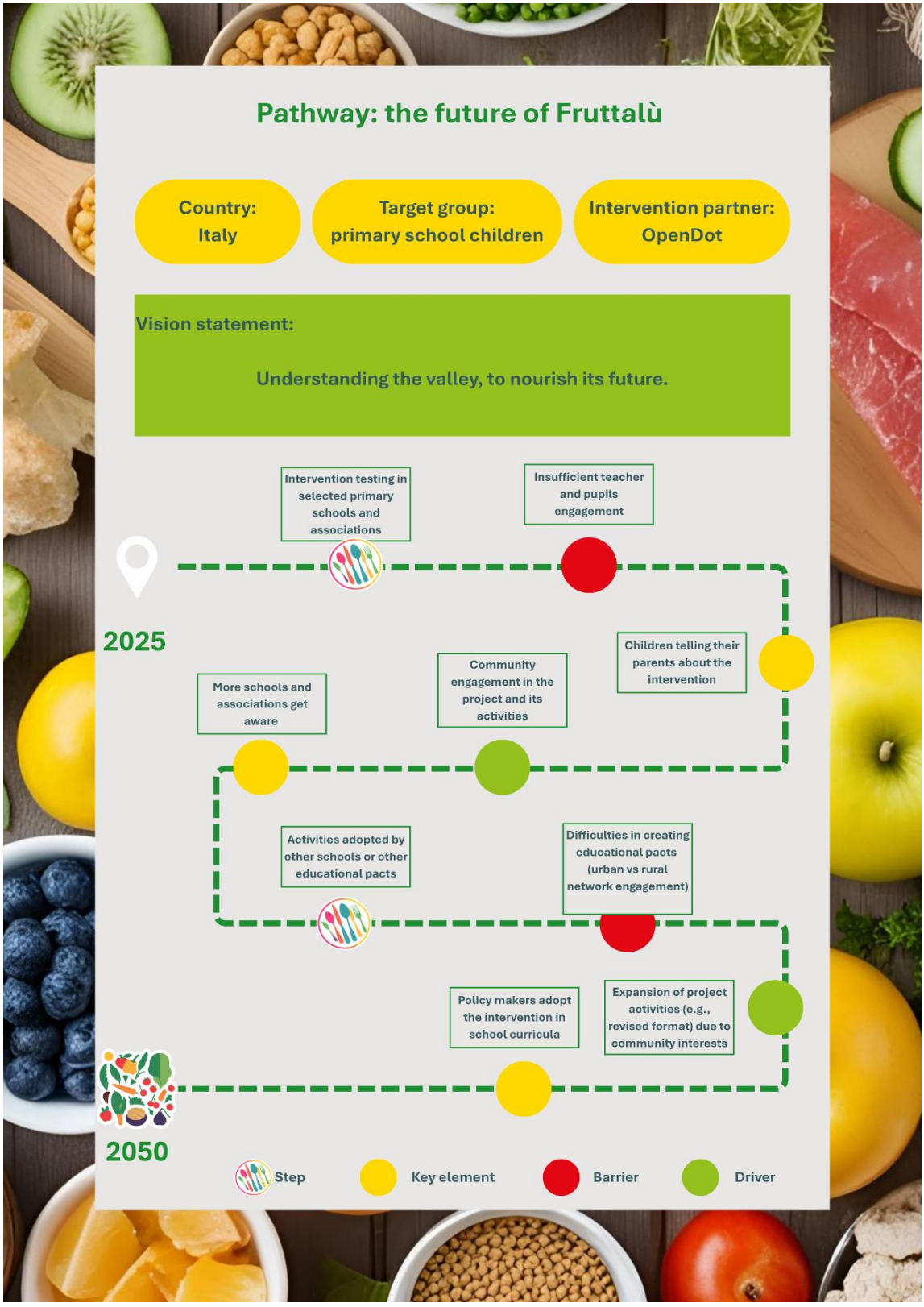

Figure 7 Intervention pathway: the future of Fruttalù

4. OpenDot – digital intervention

4.1 Description of OpenDot

This intervention is also designed by OpenDot, as such for the description of OpenDot we refer to 3.1.

4.2 Foundational insights from work package 2

With regards to a digital intervention, T2.1 includes a systematic literature review on the relationship between the digital food environment and consumers' sustainable food outcomes (see D2.2). This review indicates that social media is often studied, next to e-commerce platforms. Marketing strategies incorporating informative and interactive content improve consumers' perceptions and trust in sustainable food products. Marketing efforts focusing on customization (tailoring content to user preferences) had less impact on consumers' attitudes toward sustainable food, and even less on behaviours. Moreover, positive word-of-mouth, such as reviews or recommendations, generally improved perceptions of sustainable food, but not the actual purchase intentions. As such, word-of-mouth seems to be effective to raise awareness, but not action. Finally, influencer endorsements played a significant role in shaping attitudes and intentions. Specifically, sharing personal experiences, creating a perceived personal connection and the influencer's credibility played a critical role in affecting consumers.

Other digital media were less studies but still might be considered interesting avenues. For example, live broadcasts where sustainable foods are discussed have the potential to affect consumers through interactivity and authenticity, although the positive effect of authenticity is not consistently found. Mobile apps can help guide consumer to more sustainable food choices through customizability, eco-rankings and filter functions. However, the effectiveness seems dependent on the consistency of information provided and the trade-offs consumers face when making choices.

In T2.2, one of the surveys was tailored to older adults and was, among other countries, distributed in Italy. The aging Italian already seems to incorporate sustainable food consumption into their diet. Moreover, the frequency of sustainable food consumption is also affected by perceived income sufficiency (+), household size (+), gender (female report higher frequency compared to men) and pre-existing health conditions (people without pre-existing health conditions report higher frequency compared to those without). Unfortunately, aging individuals did not commonly use digital media. Consumers reported (on a scale from 1 = never to 5 = often) using news websites (M = 2.32, SD = 1.26), social media (M = 2.04, SD =1.23), mobile apps (M = 2.00, SD = 1.22), e-mail newsletters (M = 1.99, SD = 1.21) and podcasts (M = 1.52, SD = .97) fairly little. Building upon these insights, OpenDot has developed their intervention.

4.3 Stakeholder mapping

OpenDot's digital intervention focuses on adults 65+, living primarily in urban environments, with a medium level of digital literacy. Throughout initial conversations with 65+ adults and the director of a local community centre (see below for more details), these individuals are generally comfortable using digital devices such as smartphones, tablets, or computers, and are familiar with everyday apps like messaging platforms and web browsers.

They may not be digital experts, but they are capable and often motivated to use technology, especially when it helps them stay informed, maintain social connections, or manage daily tasks. Many of them are already interested in healthy eating, personal wellbeing, and making responsible choices—though they may not always identify these habits as part of "sustainable" practices.

Despite their digital skills, they may still face challenges when it comes to finding trustworthy and relevant information about food and sustainability, understanding technical language or navigating complex platforms as well as knowing where to start or whom to trust when looking for guidance.

In order to understand the context in which these older adults operate, OpenDot has identified a number of stakeholders (Figure 8).

First of all, closest to the older adults are their family members, their caregivers and health associations as well as the cultural and religious organizations they are part of. Moreover, the older adults also are affected by what they are exposed to in the media and different technologies they interact with. Other stakeholders that are further from the target group but that could be interesting stakeholders to engage with for the intervention are food experts and nutritionists, consumer organizations, food value chain stakeholders, such as producers or wholesalers at local level as well as the municipalities or regional or national entities.

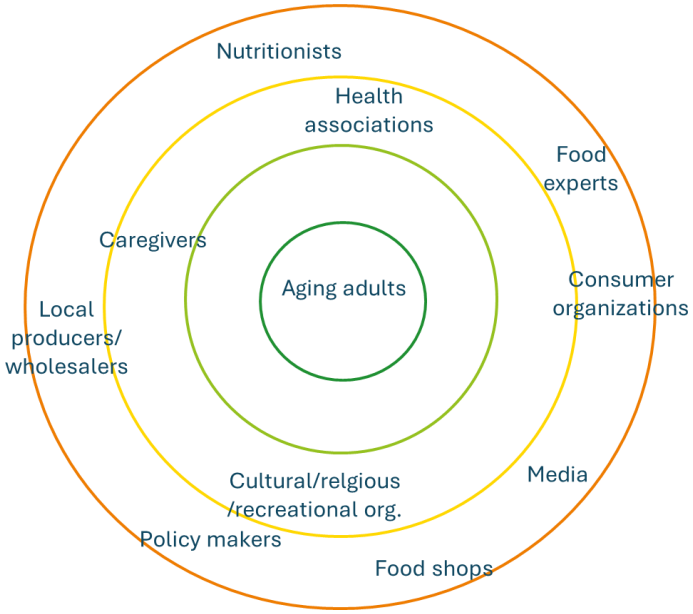

Figure 8 Stakeholder map for the digital intervention developed by OpenDot

In addition to the stakeholder map, OpenDot plotted the different stakeholders based on the influence they would potentially have on the success of the intervention, as well as the interest they would have in the intervention (Figure 9).

Figure 9 Plot of the power and interests of the identified stakeholders for OpenDot's digital intervention

4.4 Future vision

Digital technology and sustainability are reshaping daily life, but older adults risk being left out. Though people aged 65+ hold valuable knowledge—especially around food, health, and environmental care—digital platforms often overlook their needs. Many live sustainably but struggle to access or relate to food sustainability information.

Access to digital tools also varies by location. Cities may offer infrastructure but foster isolation, while rural areas have stronger social ties but fewer resources. In both settings, tech barriers can limit older adults' ability to stay informed, engage, or pass on their wisdom to younger generations.

During a visioning exercise, OpenDot created a vision statement for their digital intervention together with the target audience. In this exercise, participants were asked to explain what sustainable food meant to them using a collage of images and words. They had to choose one of the three sustainability dimensions (social, economic and environmental) and associate it to their selection of images and words which were important to them. Upon completion of the creative task, each – in turn – described their collage and, in doing so, discussed what sustainable food meant for them. As a result, the vision for the digital intervention reads as follows: **Accessible Knowledge, Shared Futures.**

With this statement in mind, OpenDot aims to build a culture where digital access and food sustainability are not distant concepts, but everyday practices shared across generations—and where no one is left behind. We believe that sustainable change starts with understanding.

The vision can be further understood as follows:

- **Knowledge** refers to listening and creating opportunities for older adults to share what they know and learn what they need, using digital tools that are simple, respectful, and adapted to real lives.
- **Accessible** reflects the need to have spaces—online and offline—where people over 65 feel included, valued, and heard. It means making information truly accessible, not just available: clear language, meaningful content that supports people's daily choices, especially around food. Therefore, digital content should be created so that it welcomes those who are not already experts, and helps people understand, use, and share what they learn perhaps with and for the

future generations. The knowledge provided should also help older adults feel like active contributors in the digital world and in sustainable practices. In doing so, the intervention can bring a shift not only in knowledge but also in attitudes.

- **Shared future** mirrors the deep concern older adults feel towards vulnerability, and their wish that anyone - regardless their ethnicity, age, income - is able to afford basic food items like bread.

Figure 10 Collages created by participants in the visioning exercise

4.5 Analysis of past drivers and constraints

4.5.1 Drivers

When it comes to food, older adults tend to make decisions with their health in mind. As people age, they often become more mindful of how their diet affects their well-being—choosing meals that support longevity, manage chronic conditions, and promote overall vitality.

One unique advantage of the 65+ age group is time. Many are retired or no longer working full-time, which gives them the freedom to engage in activities that support healthier and more sustainable lifestyles. Whether it's gardening, cooking from scratch, or attending community food programs, they have the flexibility to participate in ways that younger, busier generations often cannot.

Moreover, this generation brings a wealth of practical knowledge to the table. Many older adults grew up learning how to cook, preserve food, and minimize waste, skills that align closely with today's sustainability goals. Their ability to prepare nutritious meals from basic ingredients not only benefits their own health but also contributes to more environmentally conscious food practices.

Perhaps most importantly, older adults often feel a strong sense of responsibility toward younger generations. They are eager to pass down their wisdom by sharing recipes, traditions, and values that promote healthier living and deeper connections to food. In doing so, they want to help shape a future that is not only more sustainable but also rooted in care and community.

4.5.2 Constraints

Food is deeply tied to culture, identity and tradition. Especially in Italy, this connection is highly important. Culinary preferences and practices are not just national, but they are regional, even local.

Something considered authentic in one region, might not be in another. This shapes not only what people eat, but also how they perceive it and whether or not they are open to try new foods.

Education plays a major role in people's choices and access to information. People have diverse backgrounds, and not everyone has had the same educational training or career paths. These differences affect how individuals engage with technology, interpret information and make decisions, especially relating to health, food and sustainability.

Trust is another potential constraint. Especially in the digital word there is a lot of scepticism. People question the accuracy of the online information as well as the platform delivering it. For older adults, especially those who are less familiar with digital communication, this mistrust might be even stronger. As such, the medium itself might affect whether or not someone trusts the message.

4.6 Development of intervention

OpenDot develops its projects based on listening and active participation of people and communities, co-designing solutions that aim to answer everyone's needs and to achieve a positive impact for all. They have experienced that it is through sharing and collaboration that solutions not only offer tangible answers, but also strengthen collective awareness and generate lasting benefits for individuals and communities.

OpenDot organised different types of activities in order to shape the intervention (see Figure 11).

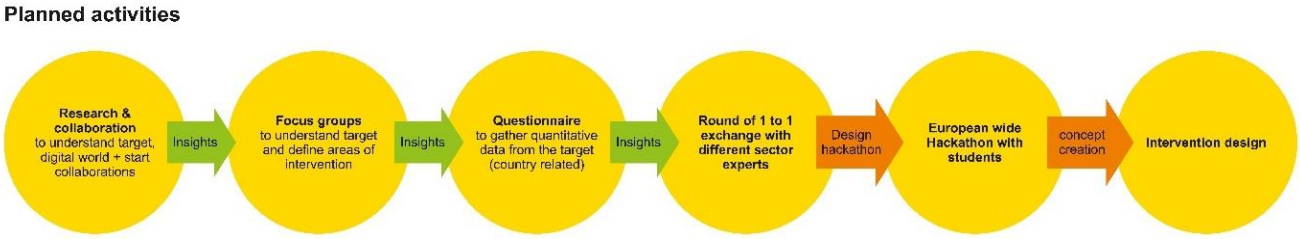

Figure 11 Overview of planned activities by OpenDot for the development of the digital intervention

4.6.1 First activity: Generating initial engagement through the Centro Socio Culturale Acquabella (Socio-Cultural Centre)

Objective: engage with the target audience where they spent their leisure time regardless of socio-economic background or health status. As such, OpenDot got in touch with the Centro Socio Culturale Acquabella, a recreational centre for seniors.

Method: An informal meeting with the director of the centre to better understand how to engage with the target audience.

Outcome: In order to engage this target group, it is important to be perceived as trustworthy and reliable. If not, they are not eager to get on board with any kind of intervention. Signalling this, was the participants initial reluctance to sign the informed consent form, since they are very much aware of scams and as such, tend to not trust anyone with their personal data. Nevertheless, participants were curious and interested in knowing more about the OpenDot activities and what it was for. In the context of the Centro, the visitors are generally sociable people who like to engage in small-group activities.

4.6.2 Second activity: two focus groups

Objective: Understand the food sustainability topics that are relevant to 65+ adults. As such, OpenDot aimed to get insights into the target group's needs, beliefs, drivers and barriers when it comes to food sustainability.

Method: two focus groups in order to create sufficient trust between the participants and OpenDot to generate additional insights in how to engage the target group. The first focus group used the Polak game, as well as a collage session in which participants were asked to select pictures and words that represented their idea of sustainability. In the second focus group, OpenDot directly asked about their attitudes and the factors that affect them when making food-related purchase decisions.

Outcome: The issue of trustworthiness came up again in the first focus group since initially participants were reluctant to share their habits, their opinions and insights to avoid being judged or feeling unsafe. In addition, it became clear that depending on the channel, the perceived trustworthiness of the information can vary. When it comes to choosing food, the target audience is primarily driven by health, as well as by wellbeing. In that regard, participants acknowledge that fried food is bad for their health, but once in a while they would enjoy it and it would lift their spirits. In addition to that, the Italian food culture (with its traditions, local production and seasonality) is important for them to make food choices.

4.6.3 Third activity: short survey

Objective: Gaining additional insights from the target audience on seeking information online and their perceived trust in that information.

Method: Questionnaire with 68 respondents living in urban and rural areas.

Outcome: Most participants look for food-related information on websites (76.4%), social media (38.2%) and apps (18.2%). In addition, 57.6% of participants indicate they try to combine information they read with other materials and/or advice from experts. Trust in online information is rather low: only 22.7% say they trust online information, and only from certain sources, and 17.6% indicate they do not trust online information.

4.6.4 Fourth activity: individual expert meetings

Objective: gather insights from experts in different fields (i.e., interaction and digital design, food design, communication and sustainability) on how to better plan the European-wide Hackathon.

Method: individual expert meetings (with expertise on e.g., elderly, food sustainability and food chains, sustainability in general, sustainability communication, food design and hackathon dynamics and interaction design).

Outcomes: OpenDot learned that aging consumers in different countries share habits and personality traits. In addition, OpenDot learned about a serious game approach used by another expert, which could be helpful during the hackathon. Other experts shared insights on food sustainability, logistics of organizing a hackathon and digital design considerations with regards to the target groups.

4.6.5 Fifth activity: European-wide Hackathon

Objective: Generating ideas and concepts to enhance access to and availability of food sustainability-related information in the digital world for 65+ adults.

Method: A hackathon will be organized in three different cities (Milan, Budapest and Wageningen). This hackathon will bring students from various backgrounds (e.g., design, communication, sustainability) together to work on a set of challenges. Each city will have one winner. The cities will be in contact with each other as well in order to create a sense of cross-European atmosphere.

Outcome: To be added later.

4.6.6 Intervention design

To be updated after the Hackathon

4.7 Initial evaluation of intervention

Opportunities:

To be updated after the Hackathon.

Risks:

To be updated after the Hackathon.

4.8 Intervention pathway

The pathway needs to be updated after the Hackathon.

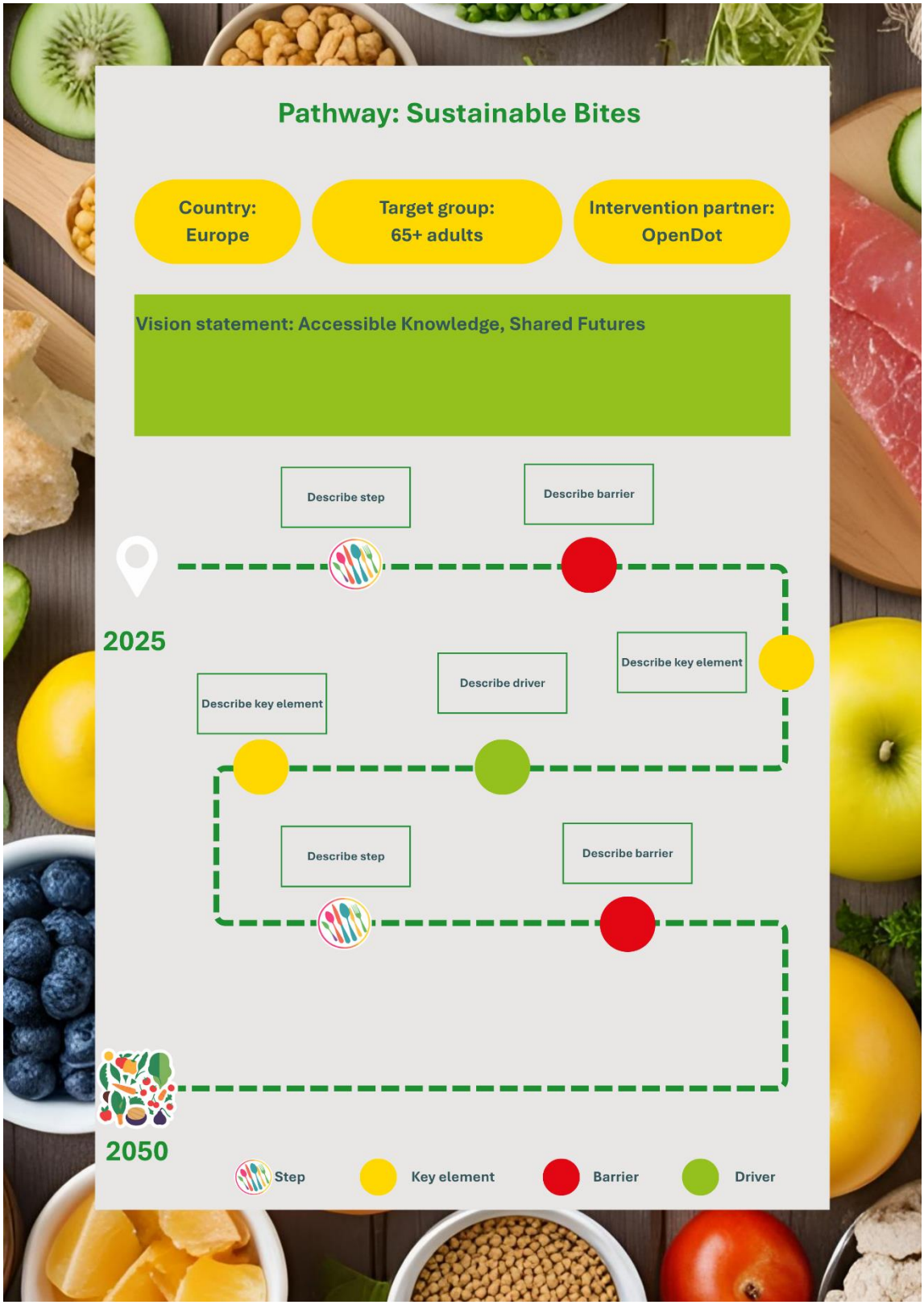

Figure 12 Intervention pathway: Sustainable Bites

5. Banco Alimentar

5.1 Description of Banco Alimentar (FBPA)

Banco Alimentar (the Portuguese Federation of Food Banks - FBPA) is a private solidarity organisation that fights food waste and distributes food, free of charge, to social institutions (charities) that deliver it to the people in need they support. The idea is to recover food surplus and contribute to support healthy livelihoods by feeding people in need. Food distribution is based on the network and expertise of each charity and the characteristics of the people helped. The charities work very closely with those who need support. A partnership based on trust is established with each institution supported: the institutions know and accompany the families they help and try to ensure that they become independent and not dependent on food support.

FBPA was created in 1991, in Lisbon, and helped the creation of Portuguese Food Banks, 21 in total, all over Portugal. The model of management was also shared with several other countries. FBPA brings together the activities of all the Food Banks and represents them at a national and international level.

FBPA currently distributes food to 382 social institutions, which reach more than 67,000 people with baskets of food products or prepared meals, served in several social services. This translates to 40 tons of food that are distributed every day. 80% of this would probably go to waste because of commercial reasons or because of overproduction. The partners consist of the Agri-Food Industry, Distribution Chains, the Supply Market, farmers and others donators.

5.2 Foundational insights from work package 2

The intervention aims to positively influence food literacy knowledge and skills, and a sense of community cohesion. Building upon the literature reviewed in T2.1, food literacy knowledge has been shown to increase consumers' sustainable food outcomes. More mixed findings can be observed in the literature on food literacy skills. A significant link to sustainable food choices was reported in only a limited number of quantitative studies. However, findings of qualitative studies suggest that food literacy skills can contribute to the adoption of more sustainable diets. Moreover, food literacy skills are likely to lead to higher levels of perceived behavioural control, which in turn has been found to positively predict sustainable behaviours.

It can be argued that targeting a stronger sense of community cohesion might facilitate the development of social norms within the community. This perceived social pressure to engage in sustainable consumption behaviour has been shown to promote more sustainable outcomes among consumers. It is important to note that low-income populations have rarely been examined in the literature on sustainable food consumption.

In T2.2, a survey was conducted among low-income populations in four countries, including Portugal. Descriptive statistics showed that seasonal and local food products represented the most often consumed sustainable food category in Portugal among low-income individuals. The focus on visiting farms and a wholesale market as part of the intervention therefore aligns with Portuguese consumers' expressed food preferences, thereby reducing the likelihood of encountering a potential barrier towards behavioural change.

The findings of the T2.2 low-income survey also showed that social norms were a key predictor of sustainable dietary habits. People were more inclined to have sustainable dietary habits when the social environment held a shared expectation that sustainable food consumption is a norm. The aim of the intervention is to enhance social and community cohesion through engaging 10 charities in joined activities in the Lisbon area. In doing so, FBPA, with the help of the charities, will engage 40-50 low-income families in order to facilitate the construal of a social norm with regard to sustainable food consumption, potentially also promoting a trickle-down effect.

The inclusion of cooking classes and workshops to learn consumers how to cook fresh products and food surplus relates to another key finding in the T2.2 low-income survey. Specifically, the impact of socioeconomic and environmental factors on low-income individuals' sustainable dietary habits was driven by self-efficacy (a person's belief in their own ability). This indicates that developing sustainable food competences through cooking classes and workshops can promote more sustainable dietary habits.

5.3 Stakeholder mapping

In order to create an impactful intervention, FBPA created a stakeholder map in which they identified three main stakeholders: the low-income families, the social workers, as well as the food value chain stakeholders (i.e., producers, distributors, retailers and others such as FBPA donors).

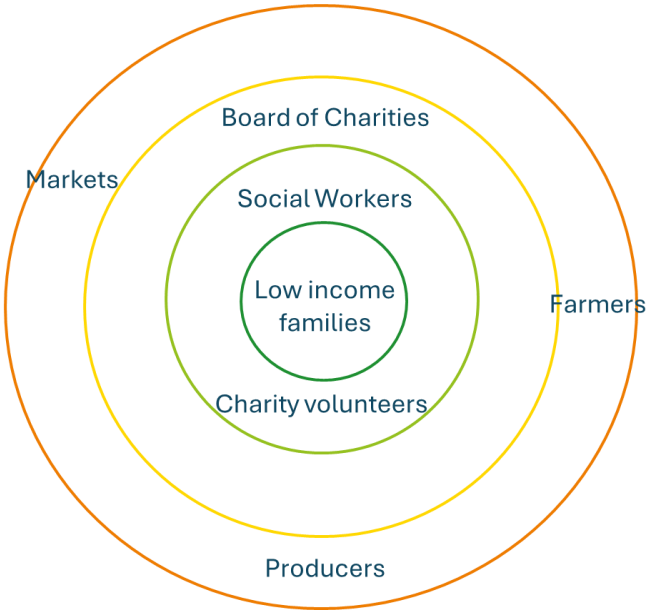

Figure 13 Stakeholder map for the intervention developed by FBPA

In addition to the stakeholder map, FBPA plotted the different stakeholders based on the influence they would potentially have on the success of the intervention, as well as the interest they would have in the intervention (Figure 14).

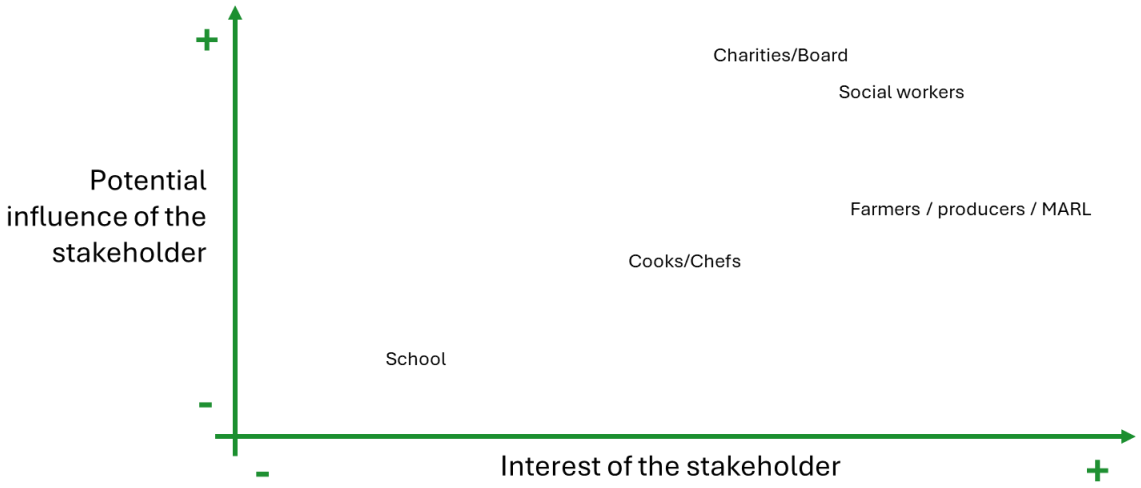

Figure 14 Plot of the potential influence and interests of the identified stakeholders for FBPA's intervention

As a result of these two maps, FBPA decided that more impact could be achieved by involving the social workers who already support and know the low-income families closely. The social workers are professionals that build trust-based relationships and are considered key actors in communicating and promoting sustainable food habits within each unique family context. As such, the intervention will focus on the social workers directly in order to affect the low-income families indirectly benefitting from the established relationships between the social workers and the low-income families.

5.4 Future vision

FBPA formulated the following vision for their intervention: **to change low-income families' food behaviour by empowering social workers to help create a food system that benefits the environment, society and the economy**. This vision can be further understood as follows:

- Change food behaviour: in order to change behaviour FBPA will provide guidance on how to cook sustainable meals. As such, the idea is to change attitudes and perceptions by providing the resources (e.g., distribution of recipes with the food baskets) to cook sustainable meals.
- Empowering social workers: by informing, motivating and engaging social workers we can reach low-income families through people these families already know and trust. This will increase the likelihood of successful impact. This empowerment will be established by raising awareness and providing information.

5.5 Analysis of past drivers and constraints

5.5.1 Drivers

For the low-income families, the main drivers would relate to practical skills that can help them manage their daily resources. By providing knowledge and skills on how to manage their resources, the intervention is likely to become successful. In addition, by empowering them to use the goods donated in the best way possible way might add to the success of the intervention. Finally, for these low-income

families it is important to be seen and feel unique in a sense. They need to know that people care about them in order to have them on board for the intervention.

The social workers know the most effective strategies to communicate with and to translate knowledge to the low-income families. In addition, they have a strong and close relationship with the families they work with. Therefore, they seem the most fitting stakeholder to deliver the intervention. These social workers could understand the possibility of truly breaking the cycle of poverty and to promote health by conveying the importance of consuming sustainable (and therefore healthy) food options.

Finally, the food value chain stakeholders are looking for innovative ways to generate new products from what otherwise might be wasted. More and more food value chain stakeholders are aware of Sustainable Development Goals and aim to align with those Goals. Their alignment is also reflected in sustainability reports and as such the innovations of these stakeholders brings value to their sustainability performance. In addition, they are aware of the impact of their activities on society. As such, the topic of sustainability and food waste is already high on their radars.

5.5.2 Constraints

For the low-income families, one of the main barriers is that they lack practical skills to manage their daily resources. This is why it is important for the intervention to focus on enhancing skills. Moreover, individuals in low-income families are often overwhelmed with their lives – trying to get by on a day-to-day basis – as such they might not be mentally and/or emotionally available to change their behaviour. In that regard, it is essential that the intervention is simple and does not require a lot of mental and emotional effort. Finally, it is hard to accept strategies for changing habits and behaviours – even more so for low-income families who regularly face stigma and judgment. As such, the people delivering this message should already have a close tie to the low-income families. In addition, the tone of the delivered messages is key for the success of the intervention.

This is why the social workers are essential for the success of the intervention. Nevertheless, FBPA also identified potential constraints for this stakeholder group. First of all, this group of people might not have sufficient knowledge and expertise on the topic of sustainable food. In addition, they might not be fully aware of how crucial it is to change consumer behaviour towards more sustainable food consumption. Finally, the social workers typically have very busy schedules. As a result, they sometimes feel overwhelmed which might result in lower interest and not considering this intervention as a priority.

With regards to the food value chain stakeholders, the food waste reduction requires either financial investment or adaptation of their current practices. In addition, although there are companies that are aware of the food waste problem, this does not go for all companies. Finally, these food value chain stakeholders are distanced from the realities in which low-income families live. Therefore, awareness of both the realities of low-income families, as well as the impact of food waste needs to be raised for the intervention to be successful.

5.6 Development of intervention

5.6.1 Short survey to charities supported by FBPA

Objective: explore current practices and perceptions of sustainable food among social workers and volunteers and the charities which are supported by them.

Method: Questionnaire with closed and open-ended questions to capture both quantitative and qualitative trends from 59 charities.

Outcome: The majority of charities already apply sustainable practices (e.g., local partnerships, food surplus recovery, community gardens). Moreover, sustainability is widely seen as compatible with saving money, especially through simple recipes and practical guidance. The results confirm that social workers are seen as key agents for behavioural change, but they require training and support to address food sustainability effectively. Finally, time and resource limitations were a major concern. This underscores the need for simple, low-effort strategies that can be integrated into daily routines.

5.6.2 Focus group with social workers

Objective: FBPA had three main objectives for this focus group: 1) to understand the social workers' perception of sustainable food products, 2) to identify the drivers and constraints of changing behaviour of the low-income families and ideas on how to overcome constraints and 3) to understand what strategies can be created to communicate to low-income families and to change their behaviour.

Method: focus group with 10 social workers from different types of charities that provide food to low-income families.

Outcome: The social workers are interested in promoting food sustainability but report lacking time and confidence to do so. The social workers would value simple, practical tools (e.g., recipes, workshops, visual aids) rather than theoretical materials. Behaviour change, according to the social workers, would work best when linked to immediate personal benefits like saving money or improving meal quality. The message of the intervention must be adapted to each family's context and delivered in a respectful, non-paternalistic way.

5.6.3 Individual interviews with low-income families

Objective: FBPA had three main objectives for these interviews: 1) to understand the perception of sustainable food products, 2) to understand the obstacles for consuming more sustainable food (compared to less sustainable food) and 3) to gather suggestions for the intervention.

Method: Individual interviews with eight low-income families from different target audiences (e.g., socially challenged neighbourhoods, rural areas).

Outcome: Food sustainability was mainly associated with avoiding waste and using all food available, often based on traditional family habits. Financial constraints are the main drivers for food choices: price and promotions guide food purchasing decisions. Many families already report practicing sustainable food behaviours, such as freezing leftovers, planning portions, and reusing ingredients, even if they do not label these practices as sustainable. Families are open to practical suggestions (e.g., simple recipes,

growing their own herbs), but the messages must be clear, useful and respectful in order to avoid perceptions of paternalizing and judgment.

5.6.4 Intervention design

For raising awareness and providing information so that social workers can get in touch and know more about sustainable food consumption and influence the behaviour of low income families and for changing attitudes and perceptions, including providing guidance on how to cook sustainable meals, the suggested activities are:

1) connecting with farmers to learn about sustainable production methods;
2) visit a wholesale market, connecting with sellers and learn about food surplus challenges;
3) cooking classes/workshops in food bank premises, to learn how to cook fresh food products and food surplus;
4) information campaigns to all the social workers to create awareness in sustainable food consumption

To make sustainable food more convenient, the activities are:

5) distribute recipes with food baskets delivered by the Food Bank (fighting food waste and showing different ways to use/cook the goods donated)

5.7 Initial evaluation of intervention

Opportunities:

- The co-design process of the intervention design increases the likelihood of a successful intervention.
- Both the social workers and the low-income families report openness to an intervention to change their behaviour towards more sustainable food practices. The social workers indicated to welcome simple and practical tools and training to support the low-income families. The low-income families indicated to be open to change when the suggestions are perceived as useful, respectful and will help them manage their resources more effectively.

Threats:

- A major threat is that the social workers might not consider the intervention as a priority due to their day-to-day activities. To mitigate this risk, FBPA will carefully select the participating charities based on established relationships, interest and capacity (incl. internal resources). In addition, FBPA will opt for a phased implementation in which activities will be introduced gradually to avoid putting excess pressure on the already heavy workload for the social workers.
- Another threat seems to be the risk of being perceived as paternalizing or judgmental. To overcome this threat the involvement of the social workers – who already have a strong connection to the families – seems essential. Moreover, the intervention, and its tools, should be simple and efficient in order to facilitate understanding by all actors, but also to avoid too much effort from the families and the social workers.

- In addition, cultural and religious diversity of the supported population will require a great deal of adaptability from the social workers.

5.8 Intervention pathway

For the Farm to Fork intervention, an intervention pathway to 2050 is presented below. This pathway presents key elements of the intervention impact, potential barriers and drivers for this impact.

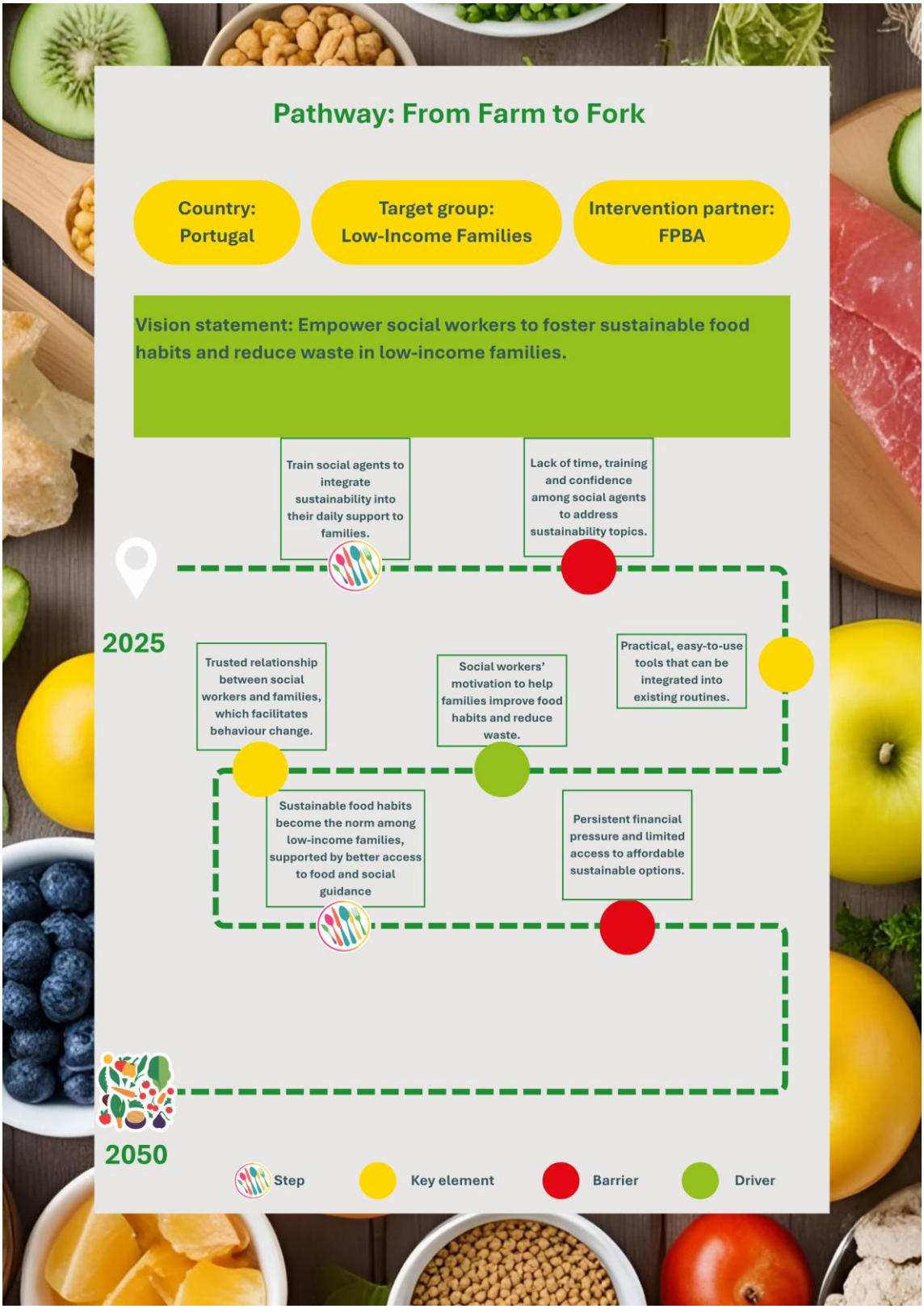

Figure 15 Intervention pathway: From Farm to Fork

6. Tudatos Vásárlók Egyesülete

6.1 Description of Tudatos Vásárlók Egyesülete

The Association of Conscious Consumers (ACC) or in Hungarian Tudatos Vásárlók Egyesülete (TVE) has been promoting sustainable, circular, ethical, fair and just consumption and lifestyle choices since 2001. Their team is dedicated to helping environmental and social issues make more of an impact in the personal decision making of consumers. Besides campaigning and informing consumers since 2009, they put increasing emphasis on facilitating behaviour change for decreasing the ecological footprint of consumers and maximizing their social impact.

Flagship activities:

- science-based information to consumers to make more sustainable choices (free and subscription-based product and service tests);
- own consumer media contents and calls for action related to sustainable consumption, consumer engagement and behaviour change (tudatosvasarlo.hu);
- behaviour change programs;
- promoting local, sustainable and fair food supply chains, especially community supported agriculture and other local solidarity based food systems, and the expansion of markets for real green and fair products;
- digital innovations for sustainable and fair consumer choices: Conscious Consumer phone app. The Conscious Consumer phone app, initially launched in 2021, will undergo a significant upgrade. Originally, the app allowed users to scan barcodes of household cleaning products and analyse their sustainability and health profiles based on safety data sheets and eco-certifications. It later expanded to include food products, offering information on palm oil content and various social and environmental certifications. The most recent enhancement was the addition of an inventory of ecolabeled products.

Sustainable food consumption is a cross-cutting issue covered by all the above mentioned activities. The main target audience of TVE is the general public, consumers at different life stages, who are already open to sustainable lifestyles, at least a bit. Nevertheless, for the intervention – as will be discussed later – the target group will be an elderly audience.

6.2 Foundational insights from work package 2

The intervention will aim to promote a better understanding of food labels, more positive attitudes towards sustainable diets by promoting the consumption of local and seasonal foods, and higher food literacy knowledge among adults aged 55+ through a mobile application. Based on the literature reviews that were conducted for T2.1, trust in food labels, food-related attitudes, and food literacy knowledge have all been shown to be significant positive predictors of sustainable food consumption behaviours. Furthermore, while only a few studies focused on the use of mobile applications, findings indicated that such applications could be effective in promoting sustainable choices if the information provided was consistent, and potential trade-offs were addressed clearly. Although it should be noted

that vulnerable populations—including older adults—were underrepresented in the literature, targeting these factors in the intervention aligns with the available empirical evidence thus far.

To address this literature gap, a survey among the aging population has been conducted in T2.2 in several countries, including Hungary. The focus of the intervention on local and seasonal food was supported by the findings of this survey. Within the different categories of sustainable food products, the category consisting of seasonal vegetables and fruits, and regional and local food products was rated as the most frequently consumed among this target population. This could therefore reduce the potential barrier that some consumers might experience to engage in or increase this behaviour.

The intervention can also contribute to promoting a better understanding of how selecting sustainable food products can reduce consumers' environmental impact, thereby enhancing environmental friendliness perceptions. Based on the survey outcomes, motivations related to environmental friendliness were one of the strongest predictors of sustainable food consumption.

Individuals aged 55+ did not commonly use digital media to gather information on sustainable diets. Yet, the use of mobile applications seemed to be relatively accepted among this population, and thus a better choice than—for example—a podcast (for which frequency of use scores were the lowest).

6.3 Stakeholder mapping

To ensure an effective intervention, TVE has conducted a stakeholder mapping. Key stakeholders for this intervention include the app's target users: individuals aged 50 and above, specifically the 55+ age group. Beyond the users, other powerful stakeholders are the media and social media influencers, who can significantly boost user engagement.

The technical developer company and data providers are crucial as they impact the app's ability to address barriers and drivers of sustainable food consumption. App stores, though not interested in sustainable food consumption, act as gatekeepers to users. On the other hand, CSOs, certifying bodies, and producers are highly invested in promoting this topic and their own involvement, especially when they own relevant data. Internal stakeholders at TVE are also vital, providing data for the app through their ongoing food-related projects, such as lists of sustainable food access points.

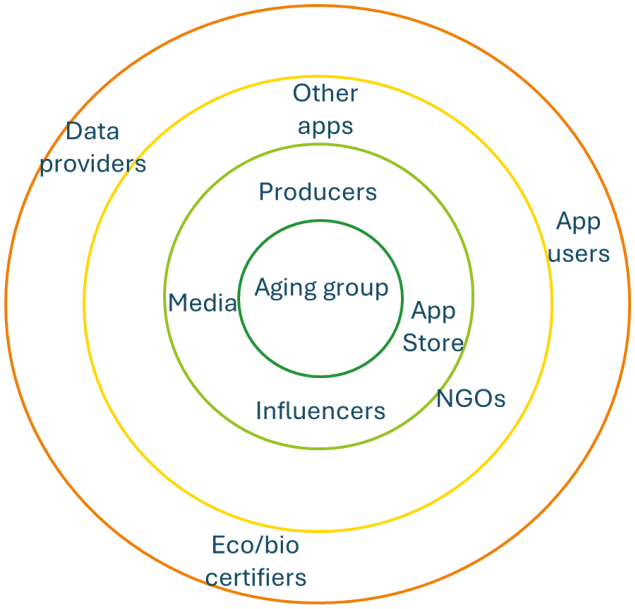

Figure 16 Stakeholder map for the intervention developed by TVE

In addition to the stakeholder map, TVE plotted the different stakeholders based on the influence they would potentially have on the success of the intervention, as well as the interest they would have in the intervention (Figure 17).

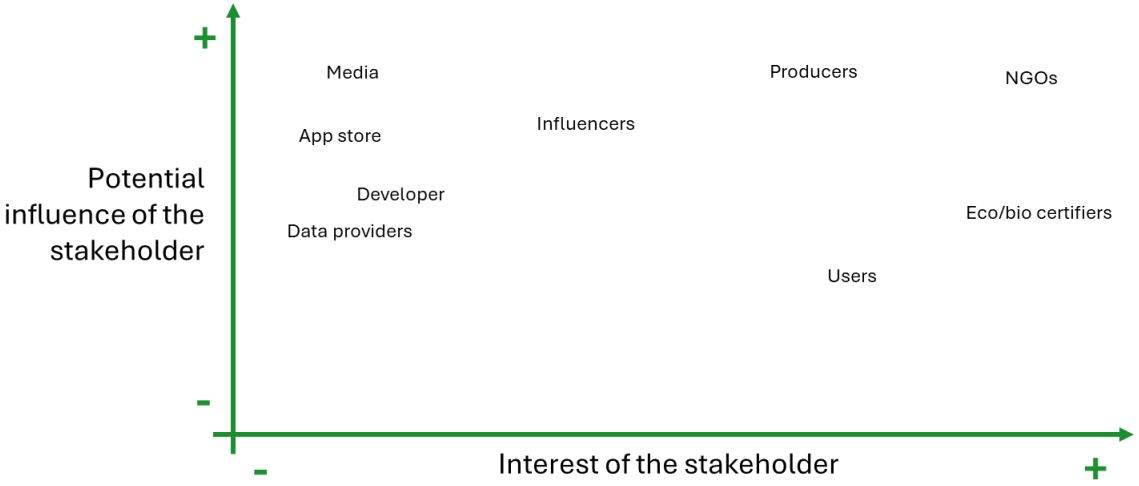

Figure 17 Plot of the potential influence and interests of the identified stakeholders for TVE's intervention

6.4 Future vision

TVE envisions a future where 65+ consumers are **able to make more sustainable food choices** and, as such, adopt more sustainable and healthier eating practices. This vision can be further understood as follows:

- **Abilities**: 65+ consumers need help with understanding the various green and sustainability labels
- **More sustainable food choices**: 65+ consumers need assistance to reduce their consumption of animal-based food, avoid ingredients that are harmful to the planet and their health (e.g., certain additives, or palm oil) and increase their consumption of plant-based food, as well as local and seasonal produce.

6.5 Analysis of past drivers and constraints

6.5.1 Drivers

TVE identified several key drivers that influence how people make decisions about sustainable food. One of the strongest motivators, especially among older adults, is health. For many, personal well-being takes precedence over environmental concerns. That means when health information is clearly presented, it can be a powerful tool to encourage more sustainable choices, even among those who are not primarily focused on sustainability.

Another major driver that emerged, is the importance of convenience. For sustainable eating to become a lasting habit, it needs to fit seamlessly into everyday life. People appreciate practical tools like meal planners, smart shopping lists, and simple reminders, such as alerts to bring a reusable bag. These small nudges make it easier to stick with sustainable habits.

Clarity also matters. Consumers might become overwhelmed or confused by labels and terminology. They prefer clear explanations for what ingredients mean, what certification logos stand for, and what "organic" really implies. Clear, digestible information helps people make informed choices without having to decode jargon. Similarly, guidance on how to reduce food waste, especially tips that are easy to implement, can drive toward more sustainable food consumption.

Affordability is another major driver. For many, price is the deciding factor in their food decisions. Thus, transparency around pricing and tools that help track or compare costs are highly valued. People need to feel confident that they are making smart financial decisions while also supporting sustainable practices.

Finally, community support plays a vital role. When people feel connected to local initiatives or see others around them making sustainable choices, they are more likely to do the same. Information about community efforts and peer collaboration can foster a sense of shared purpose, and make sustainable food consumption feel more achievable.

6.5.2 Barriers

TVE identified a number of barriers which could be addressed using a digital intervention/mobile app.

One major barrier is the accessibility and availability of sustainable food. Local markets are disappearing, rural areas often lack sustainable choices, and even in cities sustainable products can be hard to access.

Moreover, consumers are sceptical, indicating a lack of trust and transparency. Consumers worry about greenwashing. There is confusion about the authenticity of organic labels and a lack of clarity about how

food is produced. Aligned with that, consumers often do not have enough information about where there comes from, or its environmental impact. Even aspects, such as interpreting expiration dates or knowing how to store properly can be unclear, leading to increased food waste.

Finally, food choices are deeply ingrained in our routines and habits. Trying something new, especially if it is perceived as less convenient, triggers resistance. As such, it becomes challenging to adopt new, sustainable eating habits due to the fact that it is easier and more convenient to stick to familiar routines and products.

In addition, TVE a number of barriers that are harder to resolve using a mobile app, but they still shape the landscape of sustainable food consumption:

Sustainable food options, especially organic food or package-free options are perceived a premium. Their higher prices make them inaccessible to a group of consumers.

There is additional effort required to source, transport, and store sustainable food, which decreases convenience. In that regard, arranging logistics for direct purchases from local producers can be complicated and time-consuming.

There is a decline of community-based food systems (e.g., community gardens, food purchasing communities) and when they do exist, it can be difficult to access those systems. In addition, without peer support, it is hard to commit to changing toward sustainable food habits.

Large retail chains control the food market, making it difficult for small, sustainable producers to compete and reach consumers.

Excessive packaging, especially in organic products, contradicts sustainability which increases the struggle for consumers to manage and dispose packaging waste.

6.6 Development of intervention

6.6.1 Internal stakeholder group discussion

Objective: The main objectives were to 1) define sustainable food characteristics, 2) identify additional barriers and drivers of sustainable food consumption, and 3) understand the specific design, content, and functionality needs of the target group

Method: two consecutive group discussion with 13 TVE board members, project managers, and the digital and communication teams.

Outcome: This group, along with others, discussed the drivers and barriers of sustainable food consumption and outlined possible solutions based on past experience and organisational knowledge. Internal stakeholders also mapped the organisational resources, including available and future datasets at TVE's disposal, and created a harmonisation plan with other ongoing sustainable food projects. Potential technical solutions were also discussed, particularly the advantages and risks of using artificial intelligence.

After synthesizing the findings from the first wave, TVE developed a draft plan for the app's main functionalities. This plan was further refined during a second internal stakeholder meeting. TVE then sought feedback on these refined plans from potential users and the expert group through online meetings

6.6.2 Focus groups with potential users

Objective: The main objectives were identical to the internal stakeholder discussion, but this time to learn from the users' point of view.

Method: two group discussion with 17 potential users. Users were recruited via the TVE's communication channel and personal networks to meet the specific age group criteria.

Outcome: The users describe sustainable food characteristics as follows:

- Local and Short Supply Chains: proximity and direct producer relationships.
- Biodiversity and Seasonality: diverse crops and seasonal products.
- Environmental Impact: Focusing on reduced footprints, carbon neutrality, and waste minimization.
- Natural products, minimal processing: chemical-free, additive-free, and less processed.
- Packaging: less, but recyclable, reusable, and compostable packaging.
- Health and nutrition: healthy, flavourful, and minimally processed.
- Ethical and fair: fair trade, ethical treatment of animals, and transparency.
- Users also suggested app functions that may help them to make more sustainable food choices.

6.6.3 Focus group with experts

Objective: The main objectives were identical to the internal stakeholder discussion, but this time to learn from the experts' point of view.

Method: a group discussion with 8 experts representing research organizations, CSOs, certifying bodies, and authorities focused on sustainable food consumption.

Outcome: The expert group put strong emphasis on reducing animal-based food, and resultingly increasing plant-based food, as a priority.

6.6.4 Additional development activities

Benchmark research: TVE conducted benchmark research on similar apps which indicated that these apps generally focus on empowering users to make informed choices about food by providing detailed product information. Many include barcode scanning capabilities to quickly access data like ingredients, allergens, nutritional values, and environmental impact scores such as Nutri-Score and Green-Score. Several apps offer personalized features, including dietary preference filtering, health tracking, and suggestions for healthier or more sustainable alternatives. Beyond product analysis, some applications extend to broader sustainable living by linking to relevant articles, tests, and maps of eco-friendly locations.

Based on the benchmark research, the following features will be integrated: information on ingredients, personalisation, dietary preferences (a choice between vegan or vegetarian), and highlighting health-related information from the label. The app will also apply a more holistic approach, offering various opportunities to progress towards more sustainable eating. Label scanning, which our app will employ, is less popular.

Literature review: TVE conducted a literature review on elderly user experience design. The main findings were that designing for elderly user experience primarily focuses on addressing age-related physical and cognitive challenges such as declining vision, hearing, manual dexterity, and memory. Key elements of effective user experience (UX) design for seniors include simplifying interfaces, using large fonts and high contrast colours, and ensuring clear, unambiguous language. This aligns with the suggestions from the user group discussions. Furthermore, mobile app design should favour simple interactions, provide clear, multisensory feedback to confirm actions. The app will aim for consistent and predictable navigation patterns to reduce cognitive load and anxiety for older users. These requirements have been communicated towards the programming company.

Testing potential AI use: TVE tested the potential use of AI for providing data and content for the app using Firebase Studio, Google's new tool for app development. This tool proved very suitable for testing AI features within a prototype version of the app. The quality of label scanning and the evaluation of scanned ingredients were both satisfactory.

Potential use of nudging techniques: TVE looked into various nudging techniques and the potential to integrate them in the app's design. As a result, TVE plans to embed four nudging techniques in the application. To encourage sustainable eating habits, the app can leverage choice Architecture and Defaults by setting plant-based or seasonal options as default recipe suggestions, while also featuring "underutilized grains and legumes" as primary recommendations in relevant searches, allowing users to easily explore other categories. Through Information Provision and Salience, clear labelling and prominent display (visibility, position, and size) can highlight the environmental and health benefits of sustainable choices, making this information readily accessible. Feedback and Personalization can be implemented with actionable pop-up reminders and messages that provide tailored feedback on the health benefits of sustainable choices and potential cost savings (in general only). Finally, Social Norms can be utilized through dynamic norm messaging, such as "more and more people are reducing meat consumption".

6.6.5 Intervention design

In summary, the intervention design which consists of the addition of a number of features in the existing Conscious Consumers' app, will include the following:

- Providing geographical information on available, sustainable short supply chain supply options (map)
- Real life photo scanning and advice on seasonal vegetables and food
- Providing information on ingredients (health, sustainability and source)
- Personalisation
- Vegan or vegetarian recipe recommendations according to dietary preferences
- Health-related information from the product label
- Label scanning and the evaluation of scanned ingredients (using AI)
- Label scanning and the evaluation of sustainability labels/certifications
- Reduce cognitive load for the user by providing a consistent and predictable navigation
- Nudging techniques including Choice Architecture and Defaults, Information Provision and Salience, Feedback and Personalization, Social Norm messaging

Nevertheless, it is important to note that the final intervention and the features are dependent on further (technical and financial) discussions with the developer.

6.7 Initial evaluation of intervention

After the initial design of the intervention, TVE went back to the stakeholders for evaluation and feedback. First, they organized an internal stakeholder meeting with the same participants. Then they sought feedback from potential users and the expert group through online meetings.

Opportunities:

These meetings clarified the following opportunities for the success of the intervention:

1) Although the initial emphasis of the users was initially not on promoting plant-based food, they do agree that it would be necessary to include the promotion of plant-based food to make a shift toward a more sustainable food system.
2) Users generally praised the presented functionalities, especially those that would provide insights into the ingredients. The AI support was considered progressive. No functionalities were opposed by the user group.
3) The expert group were positive about the functions that enable analysing and evaluating ingredients, although the group also discussed the potential risk of simplifying information. That discussion showcases the tension between simple and easily accessible information and the decisions in narrowing down complex background information. However, according to the experts, providing positive and supportive information should be prioritised, in addition to avoiding the perception of being judgmental about less sustainable food consumption.

Threats:

TVE has identified a number of potential threats for the success of the intervention:

1) The information that should be presented in the app should be available for use by TVE. TVE will partially obtain this data from external owners (e.g., legumes, grains, cereals and neglected and underutilized crops, or food additives). This access is still under discussion with the external parties. If this access becomes limited or unavailable, then the update of the app will need to be revisited.
2) The budget for revising the app is limited and, at this point, the budget required is still under discussion with the app developer. The intervention plan might need to be downsized based on these discussions.
3) Based on the users' feedback, TVE aims to implement a number of new functions to support sustainable food choices. These will use various technological solutions, and this development will mark TVE's first attempt to incorporate AI in the app. Since these functions will be added on to an existing app, this will create a technical complexity. Nevertheless, TVE considers this complexity as manageable.

6.8 Intervention pathway

For the Conscious Consumer App intervention, an intervention pathway to 2050 is presented below. This pathway presents key elements of the intervention impact, potential barriers and drivers for this impact.

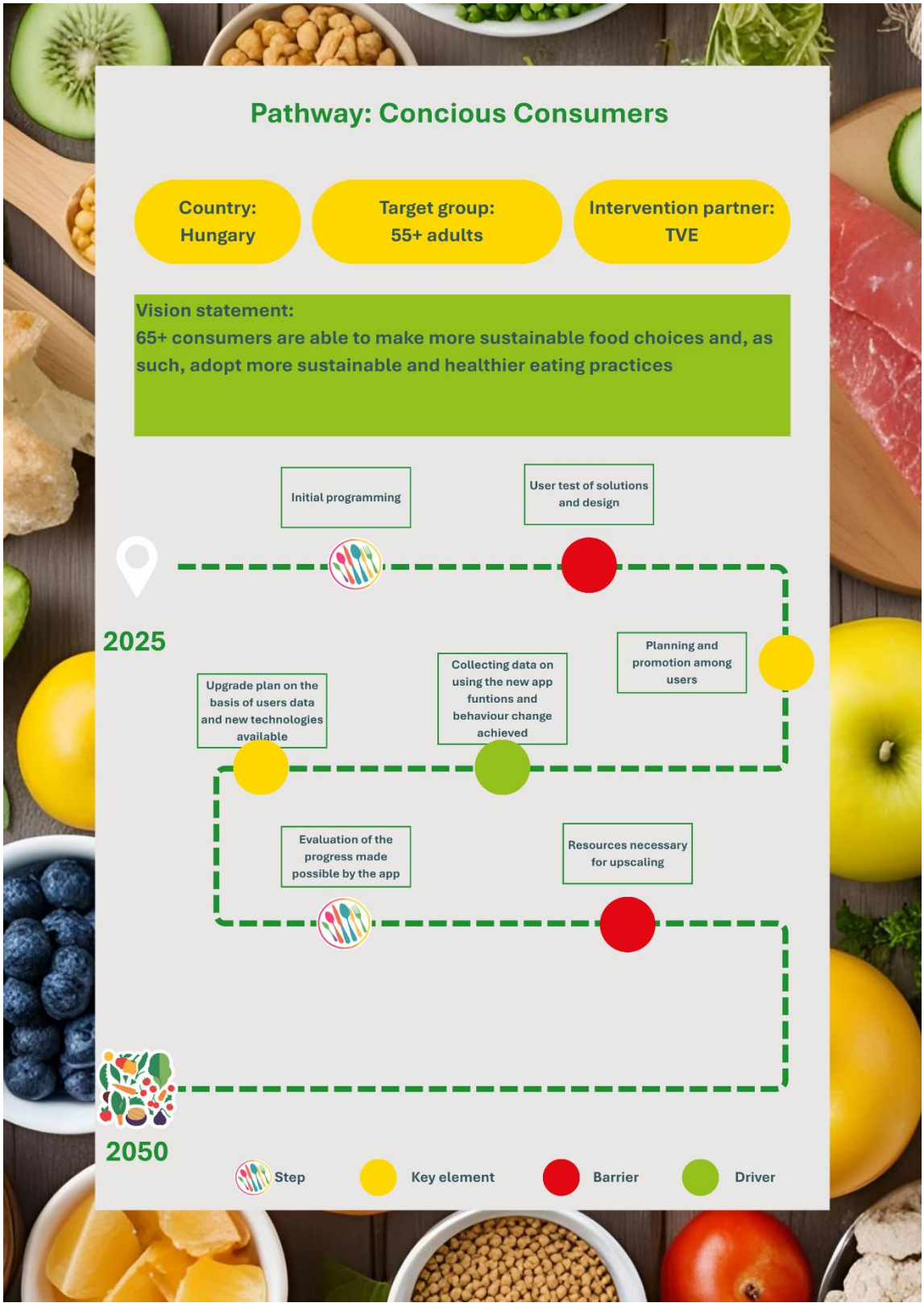

Figure 18 Intervention pathway: Conscious Consumer

CUES

CONSUMERS' UNDERSTANDING OF EATING SUSTAINABLY

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