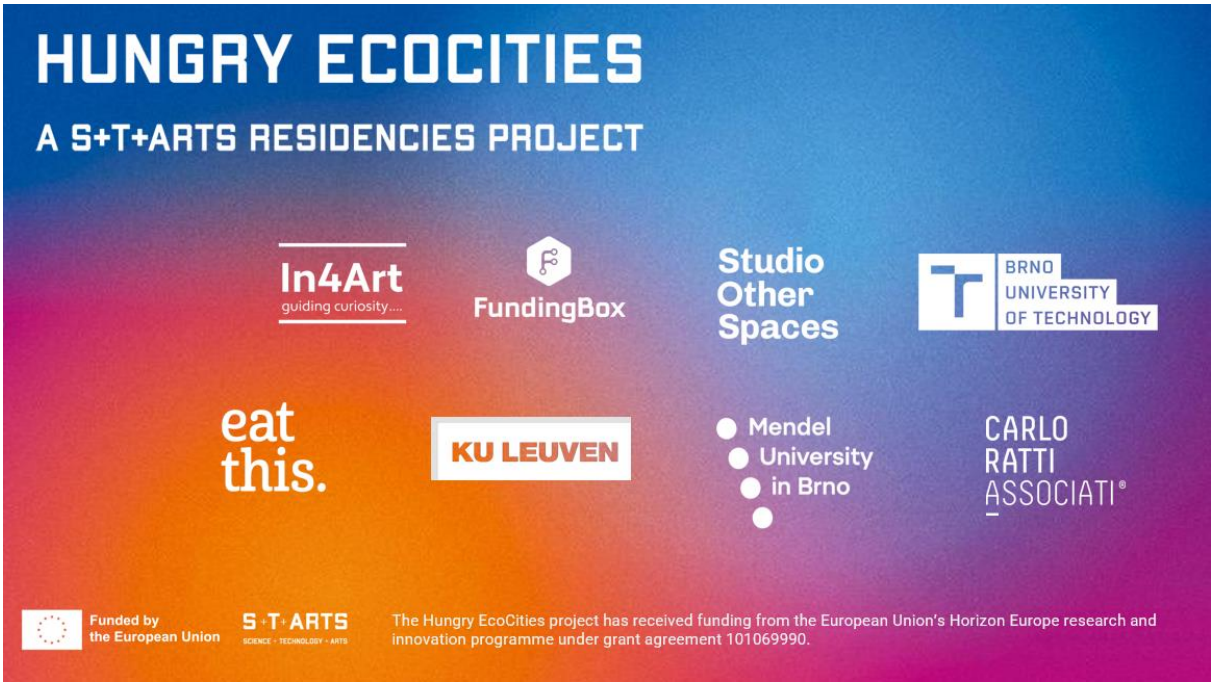

Deliverable 4.8 Application Experiments scale up plans – version 1

Version 1.0

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Objective of the deliverable

To define a development/commercialisation plan for the Humanizing Technology Experiments and the Paths to Progress Experiments addressing three main aspects: (i) commercial application for the first time user of the technology, (ii) new products, service or technology development with guidelines to identify potential users/user groups of the technology, their capabilities and needs; (iii) assessing technologies characteristics in relation to their adoption and commercialisation: Recommendations on the path for commercializing the developed technologies by taking them further from TRL 4 (HTE) to TRL 7 (PPE). Written in the form of success stories from the HTEs and the PPEs.

This deliverable will have two versions: version 1 at the end of the HTEs (August 2024) and version 2 at the end of the PPEs (M40, with the number D4.9)

History of changes

Date	Version	Author	Comment
13.06.24	0.1	Klara Kaluzikova	Setup of deliverable
15.08.24	0.2	Rodolfo Groenewoud van Vliet	Full draft text
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Abstract

This deliverable overlaps with several other deliverables coming out of Hungry EcoCities, most notably D5.11. In that deliverable, also delivered in August 2024, we applied the PESETABS diffusion model to identify the most promising outcomes of the Humanizing Technology Experiments. This resulted in 15 high potential outcomes, including 7 artistic outcomes and 8 application outcomes. All of these outcomes have been thoroughly analysed and provided with 'impact opportunities' for further development towards application. An overview of the 23 application plans is included in below table. Where D5.11 concludes with this list, in this deliverable we pick it up and report on the potential user groups for commercialisation.

Project name	Art-driven Innovation outcome	#	Impact opportunities we can pursue
Future Protein	Remote Sensing Predictive Model	1	development of reliable prediction model for aquaculture production location assessment.
		2	model expansion to land based predictions for agricultural SMEs
MVPxFFF	Food Forest Flavors Computer	3	development of real-time data incorporation functionality for food forests
		4	user interface design criteria assessment for agricultural SMEs
		5	scientific research case study for guided prompting with KU Leuven
Ecoshroom	Rhizome Sensor Box	6	development of the interface components with In4Art and Mendel U
		7	scientific research replication study with Mendel U
		8	mycorrhizal inoculation exploration for agricultural SMEs
Council of Foods	Policymaker Learning Platform	9	a pilot program to test the platform as a policymaker learning tool
		10	cooperate with agricultural SMEs to expand the knowledge base
		11	a pilot program to test the platform as a form of informative entertainment for public education
		12	scientific research case study for LLM memory issues with KU Leuven
WTFood	Food System Glitches App	13	a pilot program with HEC stakeholder to test the system for usage
		14	cooperate with agricultural SMEs to test the suitability for direct producer-consumer communication
		15	explore collaboration opportunities with EU institutions and NGOs to improve consumer awareness of their glitch activities
Vegetable Vendetta	Vegetable Food Marketing Model	16	development of the system to work with SME food marketeers directly in serving them to create content
		17	scientific research on integrating real product imagery with AI generated scenes with Brno University of Technology
		18	pursue a public campaign for desirable vegetables with national food authorities.
Acoustic Agriculture	Transducer Growth Box	19	20 scientific research continuation with Mendel University
		20	cooperate with agricultural SMEs to test the system for different plants, including seeds and seed sprouts.
Symposio	Dedicated Eating Space Lighting	21	scientific research through a master thesis on light changing AI with KU Leuven
		22	disseminate to spatial designers to raise awareness on the opportunities in designing dedicated eating spaces
		23	cooperate with agricultural SMEs on the link between tasting and mindful eating and the tasting experience of food products

Table 1: Overview table from D5.11

Future Protein – Remote Sensing Predictive Model

Future Protein is a **prototype location scouting and assessment tool for sustainable food production**, starting with mussels. A micro simulation tool for true food production value.

The development plan contains three actions we will pursue:

1. Development of a reliable prediction model for aquaculture production location assessments
2. Model expansion to land based predictions for agricultural SMEs
3. Connecting the model to windfarm design initiatives at CRA

In this section, we focus on action [1] for the purpose of mussel food production.

Identified potential user groups of the technology, their capabilities and needs:

A location scouting and assessment tool for sustainable food production, focusing initially on mussels but potentially expanding to other food sources, would be valuable to several user group: existing mussel farmers looking to expand or optimize their operations, new entrants to the mussel farming industry, regulatory bodies overseeing licensing and permitting, environmental agencies monitoring ecosystem health and biodiversity, seafood processors, distributors and retail chains looking to secure sustainable supply chains, environmental consultancies advising on aquaculture projects, NGOs focused on sustainable food production, software developers in the agri-tech and aqua-tech sectors, municipalities planning economic development, chefs interested in sustainable sourcing and policymakers working on aquaculture and food production policies.

Out of all of these potential user groups, we highlight the following three for their short term potential and relevance:

Mussel Farmers

The value proposition of a location scouting and assessment tool for mussel farmers would be significant, the tool would help mussel farmers make more informed decisions, increase their chances of success, and potentially improve their profitability while ensuring sustainable practices. This comprehensive approach to farm planning and management could be particularly valuable in an industry where environmental conditions play a crucial role in success. The most important value drivers of this tool for mussel farmers would likely be:

A. Increasing productivity by **prediction potential yields** and optimizing farm layout and mussel density for maximum sustainable production.
B. Risk mitigation by assessing potential environmental risks and **evaluating long-term viability** considering climate change projections
C. Cost reduction by minimizing expensive trial-and-error site selection and **reducing operational costs** by choosing sites with favorable conditions.

In an industry with tight margins, the ability to reduce costs through better planning and site selection can significantly impact profitability. This is especially important in the initial stages

of setting up a farm, where decisions can have long-lasting financial implications. These three value drivers are likely to be the most compelling for mussel farmers because they directly impact the core aspects of their business: productivity, risk, and costs. They address both short-term operational concerns and long-term strategic planning, which are crucial for sustained success in mussel farming.

Seafood processors, distributors and retail chains

The core concerns of these actors further down the value chain are to ensure a steady supply of high-quality product while meeting sustainability requirements. The tool would help them make more informed decisions about sourcing, support their sustainability initiatives, and potentially give them a competitive edge in the market:

a. Improving **supply chain reliability and stability** to meet customer demands consistently
b. Quality assurance, if the tool supports in **maintaining consistent product quality**, that is important for brand reputation and customer satisfaction.
c. Sustainability Credentials: With increasing consumer and regulatory focus on sustainability, the ability to verify and **demonstrate sustainable sourcing** is becoming a key differentiator and requirement in the seafood industry.

Chefs interested in sustainable sourcing

The core concerns of chefs are to serve high-quality, flavorful food; creating engaging dining experiences; and meeting the growing demand for sustainable options. The tool would help them make more informed sourcing decisions, enhance their menu offerings, and potentially attract and retain customers who value sustainability and quality:

a. The **ability to source the best mussels consistently** for their quality and taste is important to chefs
b. Storytelling and **Menu Marketing**: In the competitive restaurant industry, the ability to create compelling narratives about ingredients can significantly enhance menu appeal and justify premium pricing.
c. The ability to **verifiably claim sustainable sourcing** can be a major differentiator and attraction for environmentally conscious diners.

Conclusion:

In the development of the location scouting and assessment tool for sustainable food production we should concentrate on three value drivers that inform how the model should work in order to be valuable to the target user groups:

1. Being able to **predict potential yields effectively** will also provide reliable supply chain information.
2. Being able to assess and **demonstrate sustainable sourcing** will be a major differentiator for all user groups.
3. **Reducing operational costs for farmers** by choosing sites with favorable conditions can make a large impact on the whole industry.

MVPxFFF – Food Forest Flavors Computer

The MVPxFFF Food Computer (current name) is a **prototype recipe generation tool based on the expected harvest data of food forests and alternative protein producers**, generating ecologically-minded and nutritionally-complete recipes based on what is available in combination with user preferences.

The development plan for the food forest flavors computer that came out of MVPxFFF contains three actions we will pursue:

4. development of real-time data incorporation functionality for food forests
5. user interface design criteria assessment for agricultural SMEs
6. scientific research case study for guided prompting with KU Leuven

In this section, we focus on actions [4] and [5] for the benefit of food forest produce.

Identified potential user groups of the technology, their capabilities and needs:

A recipe generation tool like the Food Forest Flavors Computers could be valuable to several user groups: food forest owners including small-scale farmers, urban food forest managers and community garden organizers, environmentally conscious consumers, vegetarians and vegans, meal planners, schools with food forests or gardens, dietitians, restaurants and catering services, insect farmers or cell-cultured alternative meat companies, eco-tourists.

Out of all of these potential user groups, we highlight the following three:

Small-scale farmers

The recipe generation tool could help small-scale farmers maximize the value of their diverse harvests, reduce waste, expand their market reach, and adapt to changing consumer preferences and environmental conditions. This could lead to improved profitability and sustainability for their operations. The key is that the tool would need to be user-friendly, adaptable to local conditions, and regularly updated to reflect current market trends and nutritional insights. It should also integrate well with existing farm management tools to provide maximum value. The most important value drivers of this tool for small-scale farmers would likely be:

a. Suggesting ways to **create value-added products from surplus produce** that can't be sold or stored.
b. Opening new markets because the tool could educate consumers about using less commons ingredients, help farmers tap into niche markets of **cater to specific dietary needs**, and pairing with alternative proteins.
c. **Aid in crop planning** by showing potential uses for different crop combinations across seasons, encouraging crop diversification and with that improve soil health.

The tool could improve the economic viability and resilience of small-scale farming operations because it can support a diversification strategy through food forest principles.

Schools with food forests or gardens

The recipe generation tool could address educational, nutritional and practical needs of schools. It turns the school garden or food forest from a standalone project into an integrated, multi-purpose educational tool that enhances various aspects of the school experience. The most important value drivers of this tool for schools would likely be:

a. Encourage **experiential learning** by linking gardening, nutrition and cooking in a tangible way
b. Providing **practical tools for teaching** about balanced meals, portion sizes, and healthy eating
c. Efficiently **using harvests** from school gardens or school food programs, reducing waste, and providing **a framework for year-round engagement with the garden**.

Although the tool could benefit schools, it is doubtful whether value drivers identified are strong enough to convince schools to adopt the tool.

Insect farmers

The recipe generation tool could help insect farmers (as representatives of the alternative protein providers) address their core challenges on consumer acceptance, market development and product innovation. For insect farmers, normalization of the idea to consume insects is the most important barrier to market development.

a. Addressing the challenge of **consumer acceptance** by positioning insect proteins as a normal, desirable food ingredient. This is often the biggest hurdle.
b. The tool would help **introduce insect proteins** to new consumer groups
c. The tool would **inspire new product ideas**, helping insect farmers diversify their offerings.

Conclusion

In the development of the recipe generation tool for food forests and alternative protein producers, we should concentrate on three value drivers that inform how the food computer should work to be valuable to the defined target groups:

1. By **aiding in crop planning**, small-scale farmers as well as schools or other communal food forest gardens can better apply crop diversification, leading to year-round production at their sites.
2. By **catering to specific dietary needs**, not only can small-scale farmers be offered a niche market to tap into, also schools could use this functionality for teaching and insect farmers to inspire new product ideas.
3. By **suggesting ways to create value-added products** from either surplus produce, or alternative proteins like insects, consumer acceptance for residue foods and alternative foods could be increased.

Ecoshroom – Rhizome Sensor Box

The Ecoshroom Rhizome Sensor Box is a **hardware interface measuring electrical stimuli originating from the plant, mycorrhizae and the plant/mycorrhizae interface**. Aside from the electrical signals, various ambient measurements are taken: light intensity, soil moisture, CO2 concentration and relative ambient humidity. These signals are written periodically to an SD card for later post-processing and analyses.

The development plan for the Rhizome Sensor Box that came out of Ecoshroom contains three actions we will pursue:

7. development of the interface components with In4Art and Mendel U
8. scientific research replication study with Mendel U
9. mycorrhizal inoculation exploration for agricultural SMEs

In this section, we focus on action [9] for the benefit of agricultural SMEs.

Identified potential user groups of the technology, their capabilities and needs:

This technology could revolutionize mycorrhizal research and application. It could lead to more effective inoculants, optimized agricultural practices, and a deeper understanding of soil ecology. This could contribute to more sustainable farming practices, improved crop yields, and potentially enhanced carbon sequestration. The development of such a system would likely require collaboration between experts in mycology, plant science, soil science, AI, and sensor technology. While challenging, the potential benefits make this an exciting prospect for advancing our understanding and application of mycorrhizal symbiosis.

Based on the potential applications and benefits of mycorrhizal inoculation through an AI-enabled hardware interface for measuring plant-mycorrhizae interactions, this technology could support agricultural researchers and scientists, commercial inoculant producers, large-scale agricultural operators. In the longer term, and once the technology becomes more accessible, potentially also smaller farmers, forestry operators and even home gardeners might become potential users.

Out of all of these potential user groups, we highlight the following three:

Agricultural Researchers

The Rhizome Sensor Box could help researchers accelerate research on plant-fungi relationships by conducting more complex and detailed studies, providing precise, real-time data on mycorrhizal interactions and developing and testing hypotheses for new inoculant formulations quickly because of the small scale size of the setup. The most important value drivers of this technology for researchers would likely be:

a. Investigating and testing **new inoculant formulations**.
b. Exploring the potential for **enhancing crop resilience** and nutrient uptake.
c. Studying the effects of environmental conditions on **mycorrhizal colonization**.
d. Investigating the **genetic factors** influencing symbiosis.

Commercial Inoculant Producers

For inoculant producers, this technology could have the potential to improve product development and testing, demonstrate product efficacy more clears, and develop more targeted and effective products pending crop types, climate types, soil types, etc. The most important value drivers for inoculant producers would likely be:

a. **Rapid testing** and optimization of new inoculant formulations.
b. Developing **species-specific** or **condition-specific** inoculants.
c. Gathering **data** to support regulatory approvals or claims.
d. Providing **personalized inoculation strategies** to customers.

Small-scale farmers

Even though they might not be the primary users of such an advanced technology, we do believe that small-scale farmers should ultimately be able to benefit from such technologies. For this to happen, not only does the technology need to advance further, also additional challenges and considerations play a role: understanding inoculants, initial costs, an holistic approach to soil and crop management is required, local testing and adaptation is important to increase effectiveness. However, with affordable, easy-to-use formulations, clear and accessible information, local demonstration pilots and broader support programs, the most important value drivers of this technology for small-scale farmers could be:

a. **Increasing crop yields**, especially in nutrient-poor soils
b. Saving costs by **reducing the need for fertilization** without sacrificing yields.
c. **Improving drought resistance** to cope better with dry and inconsistent rainfall periods.
d. Improving plant's natural defences, potentially **reducing the need for pesticides**.

By making the benefits of advanced mycorrhizal research accessible to small-scale farmers, there's potential to significantly improve agricultural sustainability and livelihoods in many parts of the world.

Conclusion

In the development of the Rhizome Sensor Box for measuring plant-mycorrhizae interactions, we should concentrate on three value drivers primarily:

1. By making it a suitable technology for **testing new inoculant formulations**, we believe this technology can have the highest impact, both scientifically and commercially.
2. If it can contribute to **studying the effects of environmental conditions on mycorrhizal colonization**, the technology can be a useful tool in scientific research and knowledge production.
3. Through gathering and structuring data efficiently, the technology can support **regulatory approvals and claims** concerning the effects on plants and soils over time.

Council of Foods – Policymaker Learning Platform

The Council of Foods is an **interactive website built to create a space to discuss the food system with food representing AI avatars**.

The development plan for the Policymaker Learning Platform that came out of Council of Foods contains four actions we will pursue:

10. a pilot program to test the platform as a policymaker learning tool
11. cooperate with agricultural SMEs to expand the knowledge base
12. a pilot program to test the platform as a form of informative entertainment for public education
13. scientific research case study for LLM memory issues with KU Leuven

In this section, we focus on the potential benefits for policymakers, agricultural SMEs and public education of the Council of Foods.

Policymakers

The Council of Foods as a learning platform could have significant potential to enhance policymaker learning about food systems. Its interactive approach can make complex food system topics more accessible and memorable for policymakers, the AI-powered council members could adapt their discussions to the policymaker's knowledge level and specific interests, thereby personalizing to help address individual knowledge gaps more effectively. The multi-perspective discussions with food avatars can help policymakers understand the diverse and sometimes conflicting interests within food systems, through on-demand expert knowledge access. The platform could also be used to simulate policy impacts, with food avatars representing different outcomes or stakeholder responses, helping policymakers better understand the potential consequences of their decisions. The ability to add new council members and topics allows the council to stay current with emerging food system issues, supporting ongoing learning as the landscape evolves. The council could facilitate group sessions, encouraging peer-to-peer learning amongst policymakers. The built-in note-taking and reporting features help retain and apply the knowledge from their interactions. The instant accessibility as an online platform provides flexibility to engage in learning when convenient. From all of these potential values to policymakers, we identified the, in our perspective, most important ones:

a. The **adaptability to policymaker's knowledge levels** through AI avatars representing different foods/stakeholders could help policymakers gain holistic understanding of complex food system issues.
b. The **instant access to up-to-date, expert-level information** on food system topics through the flexibility to add new council members and topics.
c. The ability to **simulate scenarios of policy impact** is invaluable for policymakers.

Agricultural SMEs

For Food SMEs, the Council of Foods could also be of benefit, be it in different ways that for policymakers. SMEs could use the platform to gain up-to-date insights on food industry trends, consumer preferences, and regulatory changes when the AI avatars represent different

market segments or consumer types, or regulatory bodies. Moreover, SMEs could use the platform to explore potential new product ideas, using the council members to represent different ingredients or food types to discuss combination, nutritional profiles or health benefits. Thirdly, the platform could simulate different parts of the supply chain, helping SMEs understand logistical challenges and opportunities. For SMEs looking to enter new markets, the council could simulate different market conditions and consumer behaviors. From all of these potential benefits to Food SMEs, the most important value drivers would likely be:

A. With **council members representing ingredients, food types or market segments**, SMEs could be helped in understanding market receptiveness of innovative concepts, thereby reducing time and cost for new product development and increasing the likelihood of successful product launches.
B. With **council members being knowledgeable about their regions of origin**, SMEs could be supported in navigating challenges and opportunities to expand to new markets.
C. With **council members being knowledgeable about their own sustainability footprints** (e.g. water usage, carbon foodprint, packaging, etc), they could serve SMEs in understanding aspects of sustainability and how to implement sustainable practices in their operations.

Public education

The key to success would be maintaining the balance between entertainment and education. The council discussions should remain funny and engaging while delivering meaningful insights and prompting critical thinking about food systems. The council could have discussions around curriculum-relevant topics, implement gamification elements, offer discussions at various complexity levels, present case studies of hypothetical scenarios for users to solve using council insights, allow to create own food avatars or suggest discussion topics (hosting competitions for the best-user generated content), suggest personalized learning paths based on interests and previous interactions with the council. The council of foods could be implemented as a classroom tool, homework helper, lifelong learning platform, virtual field trip simulator, or debate preparator/trainer. From all of these potential benefits as a tool for informative entertainment, the most important ones to consider when thinking about the goals of the council and the broader Hungry EcoCities project are:

A. If the council is flexible enough to serve **different educational levels and learning styles**, this could be useful to both professional educators as well as casual learners.
B. Content should be **aligned with educational standards and curricula** to make it a valuable classroom tool.
C. Incorporating **case studies and problem-solving scenarios** can help bridge the gap between theoretical knowledge and practical understanding, for professional and casual learners alike.

Commercializing the Council of Foods for public education could make complex food system topics more accessible and engaging for a large audience, encouraging critical thinking through a flexible, adaptable tool that offers a memorable way to learn about food systems.

Conclusion

In the development of the Council of Foods as a tool, a platform, a space to discuss the food system with food representing AI avatars, we should concentrate on three value drivers primarily:

1. By **prompting various types of knowledge for council members** in the tool, from foods to stakeholders to ingredients or market experts, the council can serve all target user groups in their own desired ways.
2. By using the council discussions to **simulate scenarios or case studies**, the council can serve various of the described target groups.
3. By building in **adaptability to knowledge levels, educational levels and learning styles**, either preset or through feedback learning of the council members, the tool becomes useful on personal level to both policymakers and educators alike.

WTFood – Food System Glitches APP

WTFood is a user tool to **explore food system glitches and learn about the actors working on solving these glitches**. Primarily a tool to improve consumer awareness of food system glitches and learn about the farmers, the NGOs, and other initiatives working on them. The development plan for the Food System Glitches APP that came out of WTFood contains the following actions we will pursue:

14. a pilot program with HEC stakeholder to test the system for usage
15. cooperate with agricultural SMEs to test the suitability for direct producer-consumer communication
16. explore collaboration opportunities with EU institutions and NGOs to improve consumer awareness of their glitch activities

In this section, we focus on actions [15] and [16] for the benefit of those food system actors that actively work on tackling food system glitches.

Identified potential user groups of the technology, their capabilities and needs:
The WTFood app is mostly interesting for user groups interested in the ability to obtain location-specific information about food systems challenges and solutions quickly. The app's combination of AI technology, visual engagement (through the morphing images and movie clips), and local relevance makes it a potentially powerful tool for a wide range of users. This could serve environmentally conscious shoppers and ethical consumers, food bloggers and activists, local food enthusiasts, curious shoppers looking to make more informed choices, tech-savvy early adopters of new apps active on social media, parents or caregivers teaching children about food choices, eco-friendly retailers and sustainable restaurants and cafes.

Out of all of these potential user groups, we highlight the following three:

Sustainability-Focused Food businesses

Businesses like retailers, grocery stores, markets, restaurants or cafes could engage with the app is various ways. Eco-friendly grocery stores or markets could encourage customers to use WTFood while shopping, perhaps even providing devices with the app installed for customer use. The apps ability to provide quick information about food system challenges related to specific products could help verify the claims of suppliers by businesses or find new, more sustainable sources for their products (supply chain verification). Sustainable restaurants or cafes could use insights from WTFood to educate their customers about the sourcing of their ingredients. They might even incorporate information from the app into their menus or promotional materials. By using WTFood to learn about local initiatives working on food system challenges, businesses could discover potential partners for sustainability projects or local sourcing. The main challenge for this group might be integrating WTFood into their existing business processes and ensuring that all staff are trained to use and promote the app effectively. The most important value drivers for food businesses would likely be:

A. Verifying claims or checking the **sustainability credentials** of suppliers
B. Highlight their **inclusion in WTFoods database** of initiatives, using it to support sustainability claims

C. **Discover (local) sustainability initiatives** for potential collaboration

Curious shoppers

Curious shoppers are a key demographic for WTFood because they represent the potential for significant impact. While they may not be actively seeking out information about food systems, the app's ease of use and in-store functionality make it accessible to them. The quick 30-second reward of a movie clip, statement text, and local initiative links fits well with their shopping habits. For this group, the app could serve as a gateway to greater food system awareness. Over time, as they use the app more, they might become increasingly conscious consumers. The challenge with this group is maintaining their interest and encouraging regular use of the app.

A. Use the app to **fulfil a desire to make better choices** without significant lifestyle changes.
B. Use the app to learn **interesting facts** about their food
C. Use the app to learn about **local food initiatives** they weren't aware of

Even though this would be a key use group for WTFood, they are also very hard to engage and could be deterred if the app slows down their shopping process, overwhelms them with too much complex information, or simply doesn't deliver instant reward when using the app. It is a question whether an app like WTFood could overcome these difficulties in retaining this user group.

Parents and Caregivers

Parents and caregivers are another crucial user group for WTFood. They're often making food choices not just for themselves, but for their entire families. They could use the app as an educational tool to teach their children in an engaging way through the image morphing video clips. They could also use it to teach their children to think critically about their food choices from an early age. Finally, they could be interested in being exposed to local initiatives to support or source their food from in a very efficient and simple way. The main challenge for this group might be finding the time to engage with the app during busy shopping trips, especially with children present.

A. Use the app to educate their children and themselves in a child-friendly, engaging way through the image morphing videos
B. Use the app to teach critical thinking about food system glitches
C. Use the app to scout local initiatives to support or source from

Conclusion

In the development of the WTFood Glitches APP, we should concentrate on these value drivers primarily:

1. If the app is a valid way **to check sustainability credentials**, it could be useful to businesses and consumers alike.
2. The feature that links foods and their glitches to **local initiatives** working on these glitches is the most innovative and powerful feature for all potential user groups. Further optimizing this feature could lead to interest from businesses and shoppers alike.

Vegetable Vendetta – Vegetable Food Marketing

Vegetable Vendetta is **a tool to shift the perception of vegetables from mere side-dishes or obligatory foods to exciting, desirable components of a fulfilling lifestyle** through AI generated food marketing content.

The development plan for the Vegetable Food Marketing tool that came out of Vegetable Vendetta contains the following actions we will pursue:

17. development of the system to work with SME food marketeers directly in serving them to create content
18. scientific research on integrating real product imagery with AI generated scenes with Brno University of Technology
19. pursue a public campaign for desirable vegetables with national food authorities.

In this section, we focus on actions [17] and [19] for the benefit of food marketeers interested in promoting healthy foods.

Identified potential user groups of the technology, their capabilities and needs:

Vegetable Vendetta could serve different user groups through its vegetable recognition capabilities and emotional marketing techniques. The tool's potential to democratize high-quality food marketing for vegetables could have a significant impact on promoting healthier eating habits across various sectors and communities. SME vegetable producers could use the tool as a cost-effective marketing solution. Farmers markets to highlight the appeal of fresh, local produce. Nutritionists and Dietitians to make healthy eating more appealing to clients. Health and Wellness influences to generate engaging content about healthy eating. School food providers to make vegetables more 'cool' and desirable to young people. Restaurant owners and Chefs to help position vegetables as gourmet ingredients. Grocery stores and organic markets to differentiate their product offering. Community health organisations to promote healthier eating habits. Subscription box services to showcase the vegetables in their boxes and help built anticipation and desire for upcoming vegetable selections.

Out all of these potential user groups and their identified needs, we highlight the following:

SME vegetable producers

Vegetable Vendetta addresses core challenges faced by SME vegetable producers: limited marketing budgets, difficulty in standing out in a crowded market, and the need to reach customers through multiple channels in an increasingly digital world. The food marketing content generation tool could create value for this user group by:

a. providing **access to high-quality marketing content** at a fraction of the cost of traditional methods.
b. Help producers develop a **distinctive brand identify**, moving beyond generic vegetable offerings.
c. Have an active, engaging **presence on multiple channels** could expand SMEs reach.

Grocery stores

For grocery stores, Vegetable Vendetta could generate visually appealing and emotionally engaging content for in-store displays, signage, and point-of-sale materials. This could transform the produce section from a purely functional area to an attractive, inviting space that encourages exploration and purchases. By making vegetables more visually appealing and connecting them to positive emotions or experiences, grocery stores could see increased foot traffic in the produce section and potentially higher sales of vegetables. They could use the tool to quickly produce high-quality, emotionally resonant content featuring vegetables. By making vegetables a focal point of advertisement, stores could position themselves as promoters of healthy eating, potentially attracting health-conscious consumers.

a. Using the content it can create to **improve the visual appeal of the vegetable section**
b. Using the content to make **vegetables a focal point in advertising**

Community Health Organizations / perception of vegetables at schools

By changing perceptions and creating positive associations with vegetables from a young age, community health organizations could potentially influence lifelong eating habits, contributing to better long-term health outcomes in the community. This could lead to reduced healthcare costs, improved academic performance due to better nutrition, and a culture of healthier eating that children carry into adulthood. This can best be done by combining the visually appealing and emotionally engaging content of Vegetable Vendetta with storytelling and narration. For example, by creating a series of 'Veggie Superheros', each highlighting a vegetable's superpower in a way that resonates with children. Or through developing character-based vegetable campaigns: mascots that children can relate to and enjoy. For instance 'Brocolli Ben' or 'Tommy Tomato'. This approach taps into children's natural affinity for characters and storytelling, potentially changing their emotional associations with vegetables from negative or neutral to positive and exciting. The value here is in creating positive emotional connections to vegetables, which could lead to long-term changes in food preferences and eating habits. Finally, Vegetable Vendetta could generate images and descriptions for vegetable dishes to make them look and sound more appetizing. Turning 'Steamed Broccoli' into ' Forest Explorer's Green Trees' for example.

A. Combining **visually appealing content with narratives and characters** could be a good way to help community health organizations promote vegetable coolness at schools.

Conclusion

In the development of Vegetable Vendetta, we should concentrate on these value drivers primarily:

1. Making the application **easily accessible and useable for marketers** against reasonable costs will allow producers, retailers and health promotors alike to choose the tool over traditional marketing methods for vegetables.
2. Allowing the **development of storylines, narratives, background stories and identities** in the tool could serve producers to develop a brand identity and health organizations to develop public campaigns.
3. Being able to **generate still images and content** will support the adoption in stores, in marketing materials across multiple channels.

Acoustic Agriculture – Transducer Growth Box

The **transducer plant hydroponic growth box** is a new process to study the effects of sounds on plants at scale in a controlled setting. It is a setup of 100 individual boxes, each prepared with their own transducer, connected to a central system which orchestrates which plants are exposed to which sounds. The box contains sensors to measure the effects of the sounds on the plant health, nutrient uptake and growth.

The development plan for the Transducer Growth Box that came out of Acoustic Agriculture contains the following actions we will pursue:

20. scientific research continuation with Mendel University
21. cooperate with agricultural SMEs to test the system for different plants, including seeds and seed sprouts.

In this section, we focus on action [21] for the benefit of agricultural SMEs.

<u>Identified potential user groups of the technology, their capabilities and needs:</u>
Research on the effects of sounds on plants, seeds and seed sprouts is still limited, but some studies have provided interesting insights. What we currently know is that some studies suggest that seed germination rates could be enhanced through sound frequencies and that urban sounds (in particular low-frequency sounds) influence the timing of the germination. We also expect that sound vibrations can potentially affect the root growth direction, as well as faster initial growth in sprouts. Urban noise may trigger stress responses, leading to changes in gene expression related to stress tolerance. There are also indications that sound vibrations affect the distribution of nutrients in plants and sprouts.

However, much of the research in this topic is still in early stages. Not only do we know little about the isolated effects of urban sounds on plants, seeds and sprouts, we also do not understand the combined effects with other environmental stressors like pollution or heat nor the species-specific effects which distinguish not only between species, but suggest to be different within species populations as well.

Conclusion
It is too early to consider any form of commercialization development on this topic, we conclude that the best we can achieve is continued scientific research, possibly being informed by the species grown and cultivated by SMEs in the Paths to Progress Experiments.

Symposio – Dedicated Eating Space Lighting

Symposio is a **design for a dedicated eating space for mindful eating through light cues**.

The development plan for the dedicated eating space light design that came out of Symposio contains the following actions we will pursue:

22. scientific research through a master thesis on light changing AI with KU Leuven
23. disseminate to spatial designers to raise awareness on the opportunities in designing dedicated eating spaces
24. cooperate with agricultural SMEs on the link between tasting and mindful eating and the tasting experience of food products

In this section, we focus on actions [23] and [24] for the benefit of consumers and agricultural SMEs.

Identified potential user groups of the technology, their capabilities and needs:
The Symposio system is an innovative approach to addressing overeating through environmental design. It encourages awareness and created a dedicated space, possibly leading to better portion control. It improves the dining experience by creating an ambient atmosphere conductive to enjoyment and appreciation of food. It encourages slower eating and better mealtime conversations. It is customizable and can be implemented in various home environments. It creates a calm, dedicated space for meals, potentially reducing stress-related overeating. In particular health-conscious individuals actively seeking to improve their eating habits, families wanting to create meaningful family mealtimes, busy professionals to tend to eat quickly or while distracted, people seeking to lose weight, to reduce stress and create calming rituals, elderly people that need encouragement to have regular, mindful meals and companies who are looking to promote employee health and well-being could be potential user groups of Symposio.

Symposio is developed as an open-source, openly accessible system, hence with this outcome we do not seek to develop the system further ourselves, but to make it known and adopted by user groups who may benefit from it. In particular, we are thinking about interior designers advising many of the above mentioned groups on how to design their home spaces, and food producers who are interested in knowing how consumers experience the taste of their food product in different scenarios.

Spatial designers / Interior designers

We are exploring how Symposio could be integrated into an interior design strategy to enhance its functionality and appeal. By integrating Symposio into a comprehensive interior design strategy, it is possible to create a cohesive, wellness-focused living space that enhances the system's effectiveness and appeal. This approach could be particularly attractive to interior designers, architects, and homeowners looking to create mindful, health-promoting environments in the following ways:

A. By creating a **Symposio-centered space that doubles as a relaxation or meditation area** could maximize the utility of Symposio while addressing modern living trends.

B. **Integrating Symposio with other smart home features** could extend the reach of those systems, creating a cohesive tech-enhanced living space.
C. Adapting the design to **incorporate cultural sensitivities** could make it suitable for different cultural aesthetics.

Food producers

This service-oriented approach for food brands / tasting companies could position Symposio as a valuable tool in the food industry, bridging the gaps between consumer wellness, product development, and marketing.

Considering Symposio as a food brand service, there is potential in using it to analyse the tasting experience, develop metrics on mindful eating, provide data on real-world setting consumption experiences and help brand validate claims about their products' impact on eating behavior.

A. **Extending existing tasting methodologies** with data on eating speed, paused and indicators.
B. Creating a scoring system to complement existing tasting methodologies with metrics on **mindfulness level of eating**
C. Provide data to food brands on how their products are **consumed in real-world settings**, distinguishing between Symposio enabled eating vs distracted or rushed etc.

Conclusion

In the dissemination and adoption of Symposio, we should concentrate on these value drivers primarily:

1. Towards interior designers: addressing **modern living trends with healthy eating trends** by creating a Symposio-centred space
2. Towards smart home technology developers: extending the reach of **smart home systems** with Symposio
3. Towards food tasting companies: **extending their methodologies** with sound data, mindfulness level metrics and real-world consumption data

Conclusions & Learnings

We expect the main conclusions and lessons to arrive in the follow -up deliverable, when we can report on the actions and implications described in this deliverable. The PPEs will be an excellent test case to test various of the HTEs and discuss their implications with agri-food companies. In that process, we will also get in contact with potential other stakeholders.

About Hungry EcoCities

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Hungry EcoCities aims to explore one of the most pressing challenges of our times: the need for a more healthy, sustainable, responsible, and affordable agri-food system for all enabled by AI. More info: starts.eu/hungryecocities.nl