cities 2030

WHITE PAPER

RESPONSIBLE RESEARCH AND INNOVATION (RRI)

RRI in city regions food system Labs
Voices of Change: 12 Inspiring Stories for innovating food systems

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000640

ABSTRACT

Interviewing each of the 12 Cities2030's pilots revealed inspiring stories of local initiatives trying to break through barriers to food innovation. Examining and sharing these food stories can foster collaboration and let innovation and research further flourish. For each story, we ask ourselves: what were the specific 'drivers of change' that helped to overcome local challenges?

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1. Executive Summary

The main goal of Cities2030 is to create a future-proof sustainable City Region Food Systems (CRFS) via a connected structure centered on the citizen, built on trust, with partners encompassing the entire value chain. Responsible Research and Innovation (RRI) can and must be instrumental in achieving the goals of creating a future-proof sustainable CRFS within the framework of Cities2030. The concept of RRI emphasizes the active involvement of various stakeholders, including citizens, in the research and innovation process. By integrating RRI principles into the development of a food system, cities and regions can ensure that the system is designed and implemented in a way that aligns with societal values and needs:

- Public Engagement: Engaging the public in research and innovation activities supports the goal of a citizen-centered structure. By actively involving citizens, Cities2030 can gather their input, consider their concerns and aspirations, and build trust with the community. This engagement can help shape the CRFS in a way that meets the specific needs and preferences of the citizens.
- Science Education: Fostering scientific literacy and promoting science education directly supports the goal of a citizen-centered structure. By increasing the public's understanding of research and innovation, Cities2030 can empower citizens to actively engage in decision-making processes and contribute to the sustainable development of the CRFS.
- Governance: Involving various stakeholders in decision-making processes aligns with the goal of creating a connected structure centered on the citizen. By incorporating inclusive and transparent governance mechanisms, Cities2030 can ensure that the CRFS design and implementation reflect the perspectives and values of all relevant stakeholders.
- Gender Equality: Promoting gender equality in research and innovation aligns with the overarching goal of creating an inclusive CRFS. By addressing gender imbalances and ensuring equal opportunities, Cities2030 can foster diversity and inclusivity within the CRFS, empowering individuals of all genders to participate and contribute to its development and operation.
- Open Access: Emphasizing open access to research results and data supports the goal of a connected structure. By facilitating the sharing and accessibility of knowledge, Cities2030 can promote collaboration and information exchange among partners in the CRFS value chain, enabling more efficient and effective solutions to sustainability challenges.
- Ethics: Addressing ethical considerations aligns with the goal of creating a future-proof, sustainable CRFS. By integrating ethical principles into the design and operation of the CRFS, Cities2030 can ensure responsible conduct, safeguard the well-being of individuals and communities, and promote sustainable and equitable outcomes.

Incorporating the six dimensions of RRI can contribute to achieving the objectives of Cities2030, establishing a framework for responsible and inclusive research and innovation practices. Integrating an RRI baseline in all project activities can establish synergies with major RRI initiatives at the EU level. This White Paper aims to identify, explore and characterize the challenges for RRI encountered in the food systems of 10 European cities and two regions. The continuous and fruitful exchange between CRFS Labs of different case studies is undoubtedly a valuable aid in implementing innovations at the local level.

While all six dimensions of RRI contribute to the overall goals of Cities2030, this white paper focuses on highlighting the first three RRI dimensions. Insights gained from data collection and analysis indicated that emphasizing those three dimensions allowed for a more targeted approach, enabling the white paper to delve deeper into specific innovative areas. Meanwhile, synergies between different work packages in the Cities2030 project allow for the remaining three dimensions to also be addressed. Through RRI, similar labs can find common ground and interact to overcome obstacles and difficulties by devising innovative and original solutions that can be adapted to the different cases in the Cities2030 project.

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White Paper: Responsible Research and Innovation (RRI)

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CO-CREATING RESILIENT AND SUSTAINABLE FOOD SYSTEMS TOWARDS FOOD2030

The EU-funded Cities2030 project will bring together researchers, entrepreneurs, civil society leaders, cities and all agents of urban food systems and ecosystems (UFSE) to create a structure focused on the transformation of the way systems produce, transport, supply, recycle and reuse food.

RRI-oriented CRFS in Cities2030

The purpose of this White Paper is to identify, explore and characterize the challenges for RRI encountered in food systems of 10 European cities and 2 regions.

Interviewing each of the 12 Cities2030's pilots revealed inspiring stories of local initiatives trying to break through barriers to food innovation. Examining and sharing these food stories can foster collaboration and let innovation and research further flourish. For each story, we ask ourselves: what were the specific 'drivers of change' that helped to overcome local challenges?

All these stories are unique, yet share commonalities. Three common elements of RRI will be used as themes to group together these energizing stories:

- Public Engagement
- Science Education
- Government and Policy

2. Introduction

Innovation is taking two things that exist and putting them together in a new way. Cities 2030 is taking 10 European cities and two regions together, documenting all the local innovation and research that already exists, so it becomes easier to put them together in new ways. Responsible Research and Innovation in Cities2030 ensures that the research and innovation outcomes of this project address local societal challenges and improve people's lives.

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The main goal of Cities2030 is to create a future-proof sustainable CRFS via a connected structure centered on the citizen, built on trust, with partners encompassing the entire CRFS value chain. Cities2030 result-oriented consortium commits to working towards the transformation and restructuring of the way systems produce, transport and supply, recycle and reuse food in the 21st century.

INNOVATION

The term "innovation" is used in the Cities2030 project in its broadest sense, referring to *anything* new or existing *that is being used successfully* to improve and contribute to the sustainability of urban food systems.

RRI can and must play a crucial role in accomplishing the goals of creating a future-proof, sustainable CRFS within Cities2030. By incorporating RRI principles, cities can ensure the active involvement of citizens, consider ethical implications, and foster collaboration across stakeholders, thereby building a resilient and inclusive circular resource system for the future. This framework for RRI-oriented CRFS identifies, explores, and characterizes those different RRI challenges in food systems and ecosystems within the 10 projects' thematic, from production to inclusion and equity.

Cities2030 vision is to connect innovators and visionary thinkers through short food supply chains, gathering consumers, strategic and complement industry partners, civil society, promising start-ups and enterprises, leading universities, and research across the vast diversity of disciplines addressing CRFS, including food science, social science, and big data. Europe's rich food culture results from a combination of historical, geographical, cultural, and innovative factors. The diverse and dynamic nature of European food culture continues to be a source of inspiration and pride for people across the continent and around the world.

Europe has a long and diverse history, with many different cultures and civilizations developing and interacting with each other over time. This has led to a **rich and varied culinary heritage** influenced by many different cultures and regions. The diverse geography in Europe, including a range of climates and landscapes, has resulted in a rich diversity of agricultural products and culinary traditions. Different regions and countries have developed unique food cultures based on the local climate, soil, and other environmental factors. Food has played an important role in European culture throughout history, with many traditional dishes and ingredients considered important cultural symbols. Food is often tied to cultural celebrations and plays an important role in social interactions and identity.

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Europe has a long history of food innovation across all stages of the food system, from production to consumption and inclusion and equity, with a wide array of stakeholders and food enthusiasts constantly pushing the boundaries of what is possible. This has led to the development of new techniques, ingredients, and flavor combinations and has helped to keep Europe's food culture fresh and dynamic. While **Europe's food culture is** vibrant and diverse, it is also **incredibly scattered**. Sharing different local stories is important for building on Europe's cultural heritage and boosting innovation and sustainability in the food system. Today, the European Union is recognizing food-related issues as urgent. It has promoted programs to make the food system more compatible with the environment, more resilient to climate change, and more equitable in relations between actors and between territories. The Cities2030 project, financed by the European Horizon 2020 program, brings together more than 40 partners involved in various ways in the food system. **The main objective is to develop new food systems** capable of reorienting existing systems toward more sustainable, resilient, and fair models.

The methodology envisages the involvement of all interest groups and actors in the food system arena through the installation of urban Policy and Living Labs in order to work on the construction of new urban policies and pilot projects able to activate innovation processes in the food system.

So, how can small-scale place-based experiments aimed at solving the pressing and complex problems of the food system become more widely adopted and lead to transformative impact? To do this, Cities2030 aims to **create a network for action among different city regions that** – because of their diverse richness– will come up with a plethora of solutions.

RRI in a nutshell

Responsible Research and Innovation is:

- Involving society in science and innovation 'very upstream' in the processes of R&I to align its outcomes with the values of society.
- A wide umbrella connecting different aspects of the relationship between R&I and society: public engagement, open access, gender equality, science education, ethics, and governance.
- A cross-cutting issue in Horizon 2020, the EU Programme for Research and Innovation 2014-2020.

The exploitation is about creating value, making sense, and reaching good arguments for where and how CRFS can be used as a valuable approach to transformation of urban food systems. In this effort, we need to balance the structured approach with an open and creative mindset. Balance the consciousness of our different starting points

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with readiness to see similarities in our cultural relations to food rather than differences in what -or when we eat. And to balance the systemic understanding of food as systems with a personal experience of food as much more – as living organisms, wonders of nature, sensible experiences, and building blocks of life. The project's ambition remains to improve value in local places and to facilitate cross-city uptake and international collaboration at the solution level. And to scale the best solutions in the framework of incubation and acceleration. Like any entrepreneur with a great idea, we set out to "think big, start small, fail fast, and scale quick".

Interviews have been conducted with the following 12 pilots (10 cities and 2 regions):

1. Quart de Poblet, Spain
2. Seinäjoki, Finland
3. Bruges, Belgium
4. Vejle, Denmark
5. Troodos Region, Cyprus
6. Velika Gorica, Croatia
7. Vidzeme Region, Latvia
8. Iași, Romania
9. Bremerhaven, Germany
10. Murska Sobota, Slovenia
11. Haarlem, the Netherlands
12. Vicenza, Italy

INNOVATION

Innovation as used in the most comprehensive way **applies to any innovative or already existing product, service, approach, policy, process, mechanism or system** that is currently implemented with successful results to enhance and contribute to the sustainability of urban food systems. This RRI White Paper aims to more **identify such successful results** hiding across 12 different cities, regions and cultures and shine light on such local elegant best practices.

Cities2030 result-oriented consortium commits to working towards the transformation and restructuring of the way systems produce, transport and supply, recycle and reuse food in the 21st century. **RRI is a critical instrument in achieving the goal of creating a future-proof sustainable CRFS** via a connected structure centered in the citizen, built on trust, with partners encompassing the entire CRFS value chain.

Cities2030 vision is to **connect innovators and visionary thinkers** through short food supply chains, gathering consumers, strategic and complement industry partners, the civil society, promising start-ups and enterprises, , leading universities and research across the vast diversity of disciplines addressing CRFS, including food science, social science, and big data.

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Figure 1: Illustrations of the 10 cities and 2 regions (Troodos and Vidzeme) in Cities2030

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3. Background of the RRI policy framework of the European Union

3. 1. Why RRI?

Rationale

- Approaching societal challenges: The term "Responsible Research & Innovation" and its acronym RRI have been used by the European commission since 2010 to describe a framework **to approach societal challenges.**
- Aligning R&I with values and needs of society: The core idea of RRI is "that societal actors work together during the whole research and innovation process in order to **better align both the process and its outcomes,** with the values, needs and expectations of European society."
- Involve all stakeholders: The aim is to **bring research & innovation into the open** and involve societal interest groups such as citizens, governments, industry and NGOs. We cannot predict but we can anticipate, reflect, engage and act to minimize potential negative impact of science and technology.

In Horizon 2020, the European Union's framework program for research and innovation, Responsible Research and Innovation **(RRI), is a central cross-cutting theme** that runs across various funding calls and initiatives. RRI is closely related to the Science with and for Society (SwafS) program, which specifically **focuses on engaging citizens** and ensuring that science and research activities are conducted with the **active involvement of the public and stakeholders.** The alignment between RRI and SwafS is vital to achieving a more citizen-centric approach in research and innovation, where the involvement and perspectives of citizens and stakeholders are valued and integrated from the outset. By combining these two concepts, Horizon 2020 aims to ensure that citizens are on board with addressing societal issues and that research and innovation efforts are genuinely beneficial for society as a whole.

The main objective of the SwafS program is to foster a more inclusive, participatory, and citizen-centric approach to research and innovation. It recognizes that addressing societal challenges effectively requires engaging citizens, understanding their needs and concerns, and involving them in shaping research agendas, as well as the co-creation and co-design of research projects and solutions. SwafS initiatives seek to create opportunities for citizens to be directly involved in various stages of the research process, such as identifying research priorities, contributing to data collection, providing feedback on research outcomes, and participating in dialogue with researchers and policymakers. By doing so, the program aims to ensure that research and innovation are more responsive to societal needs and have a positive impact on the well-being of citizens.

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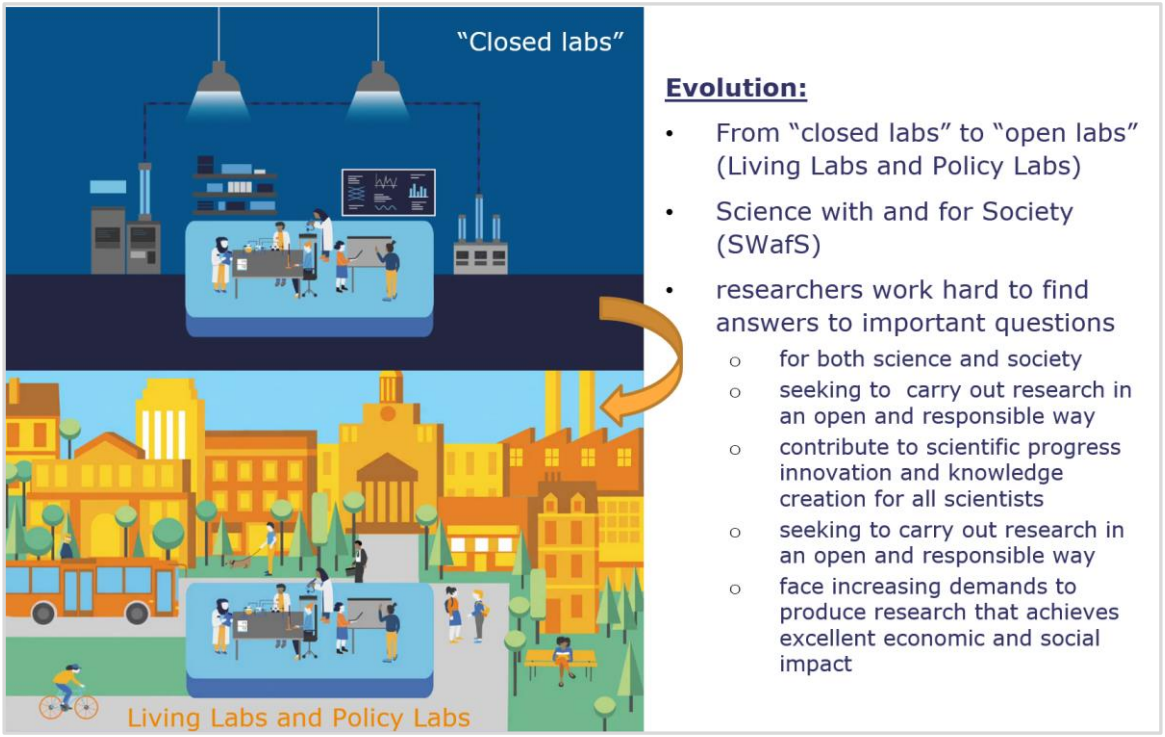

Figure 2: Why RRI?[1]

RRI, as an overarching concept in Horizon 2020, complements the objectives of SwafS by providing **a framework for integrating societal considerations throughout the research and innovation** lifecycle. RRI encourages researchers to proactively engage with stakeholders, including citizens, and consider ethical, social, and gender aspects in research and innovation processes. This integration of RRI principles into research projects supported by Horizon 2020 ensures that the outcomes are not only technologically and scientifically robust but also socially relevant and acceptable.

3. 2. Background, history, and future of RRI

The foundation for discussing how science and technology interact with society was laid in 2000 by the working paper "Science, Society, and the Citizen in Europe" (European Commission, 2000). The establishment of these foundations paved the way for the subsequent progression of the following steps.

[1] https://www.fosteropenscience.eu/learning/introduction-to-responsible-research-and-innovation/#/id/5d8dc624f8aa28b011a1645c

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- European research ministers adopted a resolution on "science and society and on women in science[2]" on June 26, 2001. The resolution calls on EU Member States and the European Commission to take more initiative in bridging the gap between science and society. In response to the call from June 2001, the "Science and Society" Action Plan was introduced in December 2001 to define a shared approach to strengthen the relationship between science and European citizens.[3]

- The Sixth Framework Program (FP6) "Science and Society"[4] topic became the first undertaking on a European level. Its objectives were to improve gender disparities in research and society's acceptance of and engagement with science. In themes like gender, ethics, young people, and scientific involvement, the Science and Society initiatives supported various studies and participatory events. Science and Society was renamed Science in Society (SiS) in 2007 as part of the 7th Framework Program (FP7) to foster public participation and an ongoing two-way conversation between science and civil society.

- Lessons learned at the end of FP7 gave rise to the Responsible Research and Innovation (RRI) approach, incorporated in the Rome Declaration[5] on November 21, 2014. To better match scientific and innovative processes and outcomes with European society's values, needs, and expectations, all social players (researchers, citizens, policy makers, corporations, and civil society organizations...) work collaboratively throughout the entire research and innovation process. RRI was implemented as a package to improve society's participation in R&I activities, facilitating more accessible access to scientific findings, encouraging a better uptake of the gender and ethics dimensions in R&I content, and disseminating best practices in formal and informal science education.

- Future Framework Programs should significantly involve individuals and civil society organizations, according to the ex-post review of FP7. They should encourage science communication, support more strategic measures of communication addressing different audiences, and strengthen the connections between researchers, citizens, and policy makers. They should also engage citizens and stakeholders in a dialogue about the goals, benefits, and research methods. It acknowledged that including citizens in European research, initiatives strives to improve the trust, acceptance, and ownership of research, a good perception of science, greater adoption of new information and innovations, and better relevance and inventiveness of research findings. In addition to this, Horizon 2020 has a section specifically devoted to "Science with and for Society" (SwafS).

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1576255497968&uri=CELEX:32001G0714(01)
[3] https://op.europa.eu/en/publication-detail/-/publication/582ef256-cbcc-11ea-adf7-01aa75ed71a1
[4] https://cordis.europa.eu/programme/id/FP6-SOCIETY
[5] https://digital-strategy.ec.europa.eu/en/library/rome-declaration-responsible-research-and-innovation-europe

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- Citizen science is flourishing across various scientific disciplines, offering a multitude of potential benefits to researchers, individuals from diverse socioeconomic and cultural backgrounds, policy makers, and society as a whole throughout the research and innovation process.
  - For instance, it has the capacity to expedite and sometimes even enable the generation of new scientific knowledge.
  - Additionally, it can foster innovations that cater to the needs of marginalized communities while also contributing to active citizenship, civic education, and empowerment of both individuals and society.
  - By stimulating social networking and knowledge exchange, citizen science can help build social capital within communities and enhance society's capacity to generate knowledge, thereby aiding policy makers in formulating well-informed and targeted policies.
  - Furthermore, it can assist policy makers in monitoring the implementation and compliance with regulations, raise public awareness about science, foster a sense of ownership over policies, and facilitate quicker and evidence-based responses to events with broader territorial coverage.

- Horizon 2020 continues with a section devoted to "Science with and for Society (SwafS)". Its overarching goals are to foster productive collaboration between research and society, to find fresh scientific talent, and to combine scientific brilliance with social responsibility. To put RRI and its dimensions into practice in Europe, mainly through "institutional transformations" in research and innovation organizations. SwafS has grown significantly to reach EUR 462 million[6]. Parallel to this, the cross-cutting themes of gender, RRI, social sciences, and humanities were emphasized across the entire Horizon 2020 initiative. For Europe to remain competitive internationally, new inventions are crucial.

- **The competitiveness of Europe on the global stage depends on innovations**. Without involving citizens in ensuring the best possible match between science's enormous potential achievements and society's needs and aspirations, Europe cannot thrive. In the European Research Area (ERA) and Innovation Union context, realizing a societally robust science and innovation policy is imperative. The interim Horizon 2020 evaluation clarifies that "Science with and for Society" is highly relevant to the significant challenges that Europe is currently facing and calls for more funding for user-led innovation and citizen science. In response, Horizon Europe prioritizes the needs of its citizens.
  - Researchers work diligently to find answers to important questions for both science and society. They contribute to scientific progress, innovation, and knowledge creation for all. Scientists strive to conduct research in an open and responsible manner. However, they are increasingly expected to produce research that achieves excellent economic and social impact.
  - Responsible Research and Innovation (RRI) aims to create an environment where science meets the needs of society. The EU is dedicated to developing the right conditions for the practical implementation of responsible research concepts. The goals aim to enhance interaction among different interest groups and foster greater openness and inclusivity in research.

[6] https://op.europa.eu/en/publication-detail/-/publication/582ef256-cbcc-11ea-adf7-01aa75ed71a1

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- To cultivate a responsible and innovative research environment, the RRI process should be diverse, inclusive, anticipative, reflective, open, transparent, and responsive to change. So, how can research be conducted according to the principles of RRI?
- It is essential to consider the potential impacts of our work at every step of the research lifecycle.
    - Engage a wide range of societal actors early on to ensure the social relevance of your research questions.
    - Collaborate with citizens to collect data and share early results with various stakeholders to gather valuable input.
    - Publish your findings in open-access journals and opt for open peer reviews to ensure transparency and access to knowledge.
    - Engage the public and disseminate knowledge to bridge the gap between science and society.
- **Responsible Research and Innovation is more than just a set of norms and guidelines; it is a process that encourages interaction among different societal actors** and provides flexible tools to overcome conflicting interests and maximize innovation.
- Researchers diligently strive to address **significant questions that benefit both science and society**. Their contributions drive scientific progress, innovation, and the creation of knowledge for everyone. Scientists are committed to conducting research in an open and responsible manner, with increasing expectations to achieve notable economic and social impact. Responsible Research and Innovation (RRI) endeavors to establish an environment where scientific endeavors meet societal needs.
- To cultivate a research environment that is both responsible and innovative, the RRI process should embody diversity, inclusivity, anticipation, reflection, openness, transparency, and adaptability.
- It is crucial to **consider the potential impacts of our work** throughout the research lifecycle. Engaging a wide range of societal actors early on ensures the social relevance of your research questions. Collaborating with citizens to collect data and share preliminary results with various stakeholders allows for valuable input. Publishing findings in open-access journals and opting for open peer reviews guarantees transparency and accessibility to knowledge. Engaging the public and disseminating knowledge bridges the gap between science and society.

Horizon 2020 and **Horizon Europe** are funding programs of the European Commission that support research and innovation activities. Horizon 2020 was the eighth framework program for research and innovation that covered the period from 2014 to 2020, while Horizon Europe is the ninth framework program that covers the period from 2021 to 2027. The link between Horizon 2020 and Horizon Europe is continuity and evolution. Horizon Europe builds upon the successes and lessons from Horizon 2020 and aims to advance the European Union's research and innovation agenda. While **Horizon 2020** and **Horizon Europe** share similarities in terms of RRI principles, there are some **differences in their RRI approaches**. While both Horizon 2020 and Horizon Europe emphasize RRI principles, Horizon Europe emphasizes Open Science, Open

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Innovation, gender equality, social sciences, and humanities, alignment with SDGs, and the development of responsible innovation ecosystems. It aims to foster more inclusive, transparent, and sustainable research and innovation practices that address societal challenges and promote the well-being of society.

- Emphasis on Open Science and Open Innovation: Horizon Europe places a greater focus on Open Science and Open Innovation, which involves making research outputs and data openly accessible, fostering collaboration and co-creation with stakeholders, and promoting transparency and inclusiveness. Open Science and Open Innovation are essential for responsible and sustainable research and innovation practices in Horizon Europe.
- Integration of the Gender Dimension: Horizon Europe reinforces the integration of the gender dimension in research and innovation. It emphasizes the need to address gender equality and gender-related issues in all stages of the research and innovation process, including project design, implementation, and evaluation. This is to ensure that research and innovation activities take into account gender perspectives and promote gender equality.
- Increased Focus on Social Sciences and Humanities (SSH): Horizon Europe recognizes the importance of social sciences and humanities (SSH) in addressing societal challenges and promoting responsible research and innovation. It encourages the integration of SSH expertise in research and innovation projects to ensure that social, ethical, and human aspects are adequately considered and integrated into project outcomes and impacts.
- Alignment with the United Nations' Sustainable Development Goals (SDGs): Horizon Europe aligns with the United Nations' Sustainable Development Goals (SDGs) and emphasizes the contribution of research and innovation to achieving these goals. It encourages projects to demonstrate how they align with relevant SDGs and contribute to addressing global societal challenges, such as climate change, health, and social inequalities.
- Enhanced Focus on Responsible Innovation Ecosystems: Horizon Europe promotes the development of responsible innovation ecosystems, which involve engaging stakeholders from various societal groups, including civil society, industry, academia, and policymakers, in the research and innovation process. It encourages projects to adopt inclusive approaches, engage with stakeholders, and integrate diverse perspectives to ensure that research and innovation outcomes are relevant, inclusive, and responsible.

3. 2. Definition of key terms

Cities2030 partners developed a Prototyping Guidelines & Toolkit[7] that gives an overview of the main concepts and definition for the development of City Region Food Systems (CRFS) Labs and innovations and provides guidelines and tools for developing CRFS Policy & Living labs and mapping most prospective innovations.

[7] The Cities2030's Prototyping Guidelines & Toolkit is available in the project website at the link https://cities2030.eu/results/

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RRI Tools[8] is a project funded under the Horizon 2020 program and aims to **support the implementation of RRI in research and innovation projects** by providing resources and tools related to RRI on an online platform. As an outcome of Horizon 2020 funding, it aims to promote and support RRI in research and innovation projects. It serves as a resource hub for researchers, innovators, policymakers, and other stakeholders interested in incorporating RRI principles and practices into their projects and activities, aligning with the goals and objectives of Horizon 2020 in promoting responsible and accountable research and innovation. The website offers a wide range of information, tools, and best practices related to RRI, including guidelines, case studies, training materials, and practical tools for integrating RRI into research and innovation processes.

RRI in Horizon 2020 emphasizes the active engagement of stakeholders throughout the research and innovation process, aiming to incorporate diverse perspectives and feedback into decision-making. The interaction of stakeholders in the context of innovation within Horizon 2020 projects can take various forms, depending on the specific project and its objectives. It's important to note that the particular methods for stakeholder engagement and interaction can vary depending on the project and its objectives. The level and extent of stakeholder involvement may also differ. However, the overarching goal of RRI in Horizon 2020 is to foster meaningful engagement and dialogue among stakeholders throughout the research and innovation process to ensure that the outcomes are aligned with societal needs and values.

In the context of Cities2030 and its living and policy labs, stakeholders include a wide range of actors, such as citizens, policymakers, business and industry representatives, researchers, educational professionals, civil society organizations, and other relevant stakeholders.

[8] https://rri-tools.eu/

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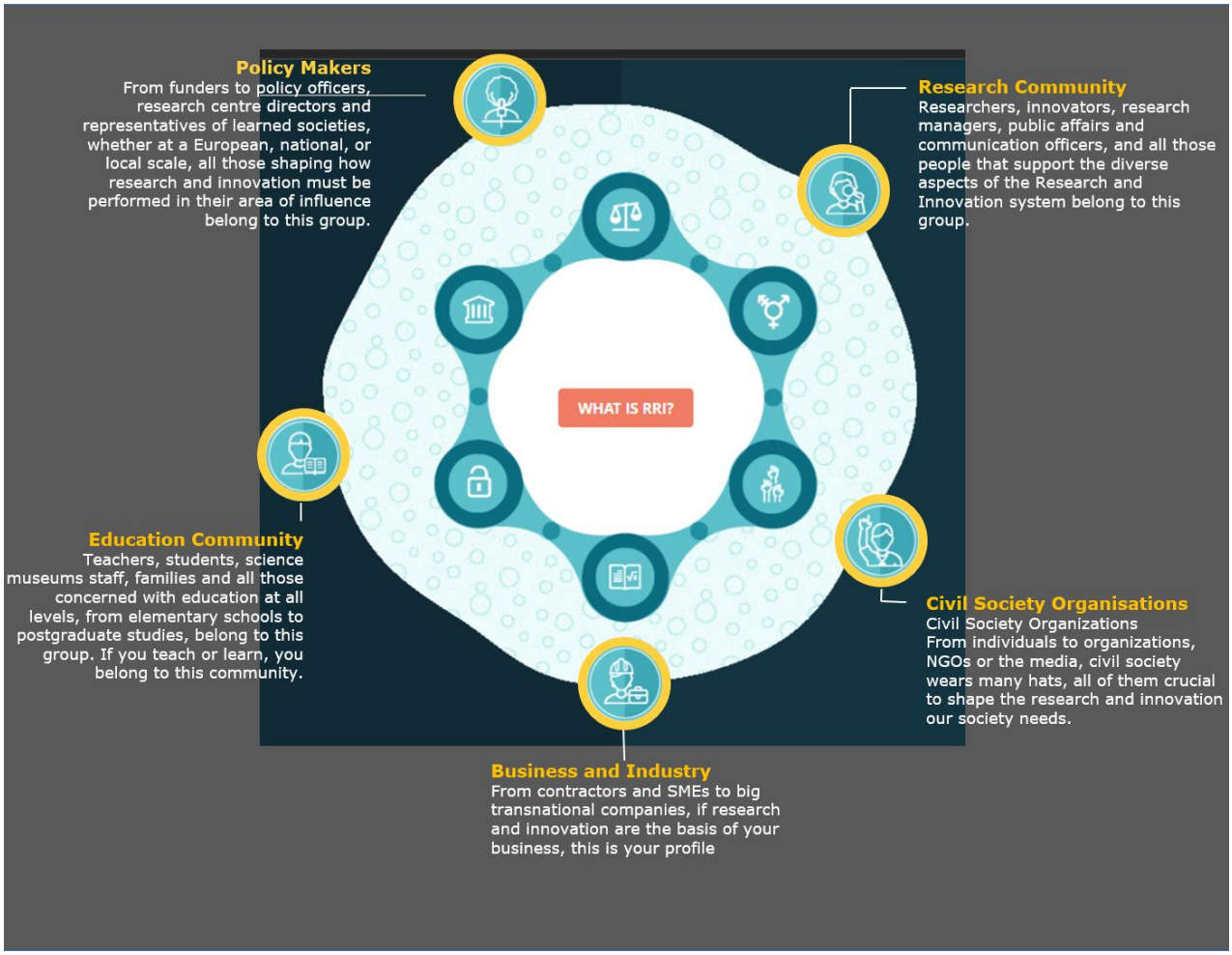

Figure 3A. Food System innovation (Source: https://www.systemsinnovation.io)

Incorpora Cities2030, establishing a framework for responsible and inclusive research and innovation practices. Integrating an RRI baseline in all project activities can establish synergies with major RRI initiatives at the EU level. This White Paper aims to identify, explore and characterize the challenges for RRI encountered in the food systems of 10 European cities and two regions. The continuous and fruitful exchange between CRFS Labs of different case studies is undoubtedly a valuable aid in implementing innovations at the local level.

While all six dimensions of RRI contribute to the overall goals of Cities2030, this white paper focuses on highlighting the first three RRI dimensions. Insights gained from data collection and analysis indicated that emphasizing those three dimensions allowed for a more targeted approach, enabling the white paper to delve deeper into specific innovative areas. Meanwhile, synergies between different work packages in the Cities2030 project allow for the remaining three dimensions to also be addressed.

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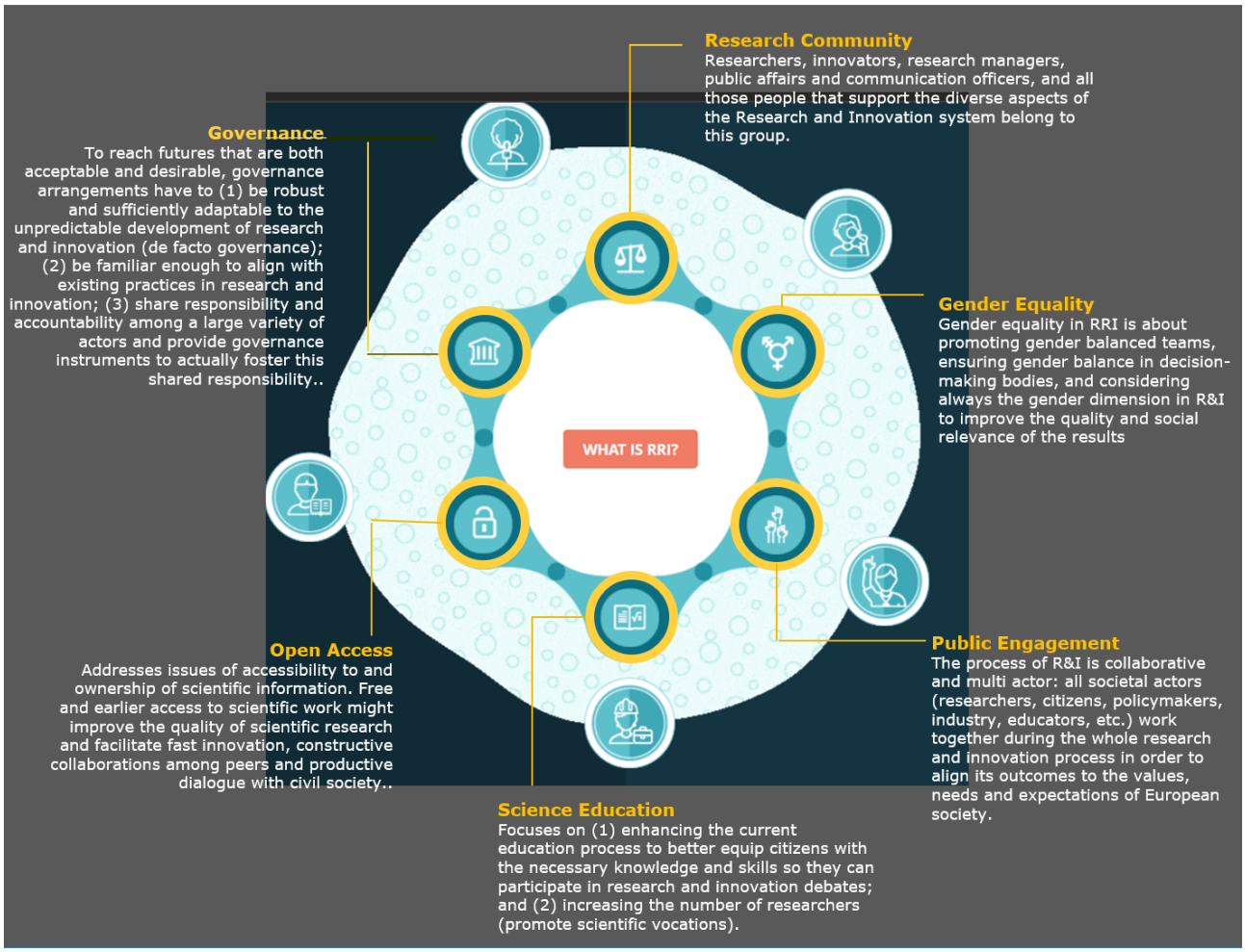

Figure 3B. Food System innovation (Source: https://www.systemsinnovation.io)

3.1.1 Public engagement: lowering barriers

The main goal of Cities2030 is to create a future-proof, sustainable CRFS through a connected structure centered on the citizen, built on trust, with partners encompassing the entire CRFS. Every initiative to encourage societal engagement occurs in a different setting, including a complicated web of elements that may promote, obstruct, or prevent engagement. The 'ambiguity' of R&I in today's modern society increases the public's scientific misgivings. Aside from specific ramifications, this mistrust serves as a catalyst for including public opinion and public (social) needs in the design and execution of R&I policies. Regarding communities in Europe, the European Commission (EC) has funded several initiatives that aim to capitalize on the idea of responsible research and innovation (RRI) and the RRI "key" of Public Engagement (PE) to involve the public in R&I, improve a human-centric and inclusive R&I approach, and ultimately foster a relationship between science and society that is mutually responsible.

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The main document from the European Union (EU) that defines Responsible Research and Innovation (RRI) and public engagement in Horizon 2020 is the "Guidelines on Responsible Research and Innovation," published by the European Commission in 2014[9]. These guidelines provide a framework for integrating RRI principles into research and innovation activities funded under Horizon 2020. The guidelines outline **the principles of RRI**, which include anticipation, reflection, inclusion, and responsiveness, and provide guidance on how these principles can be applied in practice to foster responsible and inclusive research and innovation practices, including public engagement. The document serves as a reference for researchers, innovators, and project managers involved in Horizon 2020 projects, guiding how to incorporate RRI and public engagement considerations into their research and innovation activities.

1. Inclusiveness: the need to include diverse perspectives and stakeholders, including civil society organizations, citizens, and end-users, in the research and innovation process. It advocates for engaging a wide range of stakeholders who may be affected by the research or who can contribute valuable insights and expertise.
2. Transparency: the importance of being transparent about the aims, methods, and outcomes of research and innovation activities. This includes providing clear and accessible information to the public about the purpose, progress, and potential impacts of research and innovation projects.
3. Accessibility: the need to make research and innovation activities accessible to the public in meaningful and understandable ways. This involves using clear and jargon-free language, providing information in different formats and languages, and ensuring that opportunities for engagement are open and accessible to a diverse range of people.
4. Dialogue and deliberation: the importance of fostering meaningful dialogue and deliberation between researchers, innovators, and the public. This involves creating opportunities for two-way communication, actively seeking input and feedback, and incorporating public perspectives into the decision-making processes related to research and innovation.
5. Mutual learning: the importance of mutual learning between researchers, innovators, and the public. This involves recognizing that engagement is not a one-way communication process but an opportunity for the mutual exchange of knowledge, insights, and perspectives that can contribute to better research and innovation outcomes.

Several factors exist that can negatively impact the willingness of citizens and third-sector actors to participate in societal engagement in research and in research and innovation policy. Six societal engagement barriers were identified (Bauer et al., 2016) (lack of legitimacy, lack of impact, lack of trust in others and critical opinions, lack of knowledge and skills, lack of time and resources, lack of time and money, and lack of relevance) and provided new insights regarding the critical role of issues of **trust**: trust and preconceived ideas of others (in contrast to one's own ideas) can act as strong barriers both to the engagement of third sector actors and citizens.

[9] https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5a2f4838b&appId=PPGMS

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Cities2030 partners provide a Prototyping Guidelines & Toolkit[10] that gives an overview of the main concepts and definition for the development of City Region Food Systems (CRFS) Labs and innovations and provides guidelines and tools for developing CRFS Policy & Living labs and mapping most prospective innovations.

CRFS Labs is an umbrella term for multi-sectoral and multi-disciplinary collaboration that takes place to develop different types of innovation and increase the ability to tackle complexity and challenges in different environments. The goal of the CRFS Labs is to generate CFRS knowledge and make an impact by developing innovation in CRFS practices - new products, services, processes (CRFS Living labs), and sustainable policy frameworks (CRFS Policy labs) on a small scale and to find solutions that can be implemented on a larger scale.

3.1.2 Science education (formal, informal, and non-formal)

Science education was to better equip students with skills and knowledge to tackle complex societal challenges and foster active citizenship in democratic societies to ensure science-knowledgeable people at all levels of society. This was seen as an opportunity to expand science learning opportunities in formal, non-formal, and informal settings. Evidence indicated that European citizens, young and old, appreciated the importance of science and wanted to be more informed and that citizens wanted more science education.[11] More than 40% believed science and technological innovation would positively impact the environment, health and medical care, and basic infrastructure in the future.[12] Therefore, a collaboration between formal, non-formal, and informal science education providers, enterprises, and civil society should be improved to ensure meaningful and relevant engagement of all societal actors with science and increase the uptake of science studies, citizen science initiatives, and science-based careers, employability, and competitiveness. By making science more attractive to young people, it aims to increase society's appetite for innovation and open up new or existing avenues for research and innovation activities.[13] Promoting science can be achieved through innovative pedagogies and increasing scientific literacy.
Creating new partnerships in local communities was mentioned to foster improved science education for all citizens. This would allow supporting a range of activities based on collaboration between formal, non-formal, and informal science education providers, enterprises, and civil society to integrate the concept of open schooling in science education, including all educational levels. Here are a few concepts it focused on:

- Open Schooling: **schools** in cooperation with other stakeholders to **become agents of community well-being**.

[10] The Cities2030's Prototyping Guidelines & Toolkit is available in the project website at the link https://cities2030.eu/results/
[11] http://ec.europa.eu/research/swafs/pdf/pub_science_education/KI-NA-26-893-EN-N.pdf
[12] https://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-swfs_en.pdf
[13] http://ec.europa.eu/research/swafs/pdf/pub_rri/rri_indicators_final_version.pdf

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- families should be encouraged to become real partners in school life and activities;
- professionals from enterprises and civil and wider society should actively be involved in bringing real-life projects to the classroom.
- Relevant policy makers should also be involved to encourage policy buy-in and the mainstreaming of good practices and insights into policies, hence sustainability and impact beyond the lifetime of funding.
- Partnerships that foster expertise, networking, sharing, and applying science and technology research findings across different enterprises were to be promoted.

- Science education outside the classroom:
  - Science education **outside the classroom**, which refers to **informal science education to students of all ages**, and the science education effects of non-educational activities, were to be explored more in terms of their nature and effects
  - Acquiring knowledge, and in particular, evaluating knowledge, often with the help of the Internet, is happening in reality frequently and should be recognized for what it contributes in terms of more sophisticated consumers and scientific citizenship. Considering what is available and what is being learned would be helpful to understand how science education outside the classroom influences today's citizens. Scope: The available knowledge on science education outside the classroom and its impact on citizens was to be analyzed.

3.1.3 Governance

To reach futures that are both acceptable and desirable, governance arrangements have to (1) be **robust and sufficiently adaptable** to the unpredictable development of research and innovation; (2) be **familiar** enough to align with existing practices in research and innovation; (3) **share responsibility and accountability** among a large variety of actors and provide governance instruments actually to foster this shared responsibility.

Governance of RRI is any form of coordination designed to foster and mainstream RRI within an organization or in the interaction with other stakeholders. Govern R&I, according to RRI principles, aims to be inclusive, transparent, reflective, and adaptive.

The prospects of emerging technologies are fundamentally uncertain. Some of these technologies enable transformative innovations that may have profound societal consequences. The uncertainty and the potential of these food technologies require timely and critical reflection on the role we want these emerging technologies to play in our shared future. Governance structures that promote Responsible Research and Innovation (RRI) reduce unintended and unforeseen practices and impacts of research and innovation, as well as tensions, conflicts, mistrust, and opposition that are more difficult to deal with downstream. Future orientation is key to good governance tools. Future-oriented governance is fundamental to safeguarding the creation of effective and innovative solutions to social issues. Anticipatory governance encompasses the elements of foresight, engagement, and integration. A study in eight different European countries (Khan et al., 2016)

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describes existing gaps between the ideas of innovation under the terms of RRI and innovation as conceptualized by those involved in its governance.

3.1.4 CRFS Labs and drivers of change within innovation

- CRFS Labs is an umbrella term for multi-sectoral and multi-disciplinary collaboration that takes place to develop different types of innovation and increase the ability to tackle complexity and challenges in different environments. The goal of the CRFS Labs is to generate CFRS knowledge and make an impact by developing innovation in CRFS practices - new products, services, processes (CRFS Living labs), and sustainable policy frameworks (CRFS Policy labs) on a small scale and to find solutions that can be implemented on a larger scale.
- To address the problems identified by FAO Director-General da Silva in the fall of 2017 at the Milan Urban Food Policy Pact (MUFPP) meeting, a radical conceptual change was proposed. The City Region Food Systems (CRFS) approach aimed to improve insights into the flows of resources (food, waste, people, and knowledge) from rural to peri-urban to urban and back again (Blay-Palmer et al., 2018). This would allow to improve the policies and processes needed to enable sustainability.

- In order to be able to upscale these solutions and innovation, it is important to **understand how and why an initiative works** (Weiss,1997) and explain how these activities should be understood to produce results contributing to the final intended impact. In RRI, in order to bring about changes with such solutions that are socially desirable, there needs to be a concerted drive for the engagement of different stakeholders, including industry, academia, the public, and government (Jiya, 2021).

- The aim of CRFS Labs is to design solutions (actions or policies) not only for citizens but also to design these solutions with them. This way, user involvement is not limited to passive feedback gathered through different voice-of- the-customer methods.

- The approach is rather co-creative and encourages all relevant stakeholders to work together. According to a site-specific case, CRFS Labs partners can develop different forms, roles, and activities for Policy Labs and/or Living Labs.

- CRFS Labs aim to generate novel policy frameworks and experiment, test, and improve innovation and best practices through a process that focuses on **identifying the specific drivers of change:**

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- to understand and explore CRFS recognizing the paths of change
- to set up CRFS Lab organizing resources and time available
- to co-create, co-design, to experiment with real-life testing of proposed innovative activities
- to evaluate results, monitor the experiments, and learn from them.

One of the key elements for the open innovation ecosystem in CRFS Labs is the involvement of different stakeholders because the innovation co-creation process in the Labs depends on which food systems actor drives their activities. Monitoring and evaluation are fundamental in the work of CRFS Labs because all the experimentations and innovations must be not only put in place and tested locally but also analyzed for their potential effects on the food system.

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4. Methodology and Data Collection

4.1. Timing of data collection

Seven points of data collection were used for collecting and triangulating data:

1. A preliminary literature study was conducted about RRI being mainstreamed into Horizon 2020 projects (Sept 2021)
2. Attending six academic RRI Workshops outside the Cities2030 context (Sept 2021 – April 2022)
    - Formation of a network of RRI experts
3. RRI survey (Jan 2022)
4. RRI Workshop 1: Co-operation with the other Cities 2030 work packages (Feb 2022)
5. 12 Pilot Interviews (Dec 2021 – May 2023)
6. RRI Workshop 2 (March 2023)
7. Gathering draft feedback for triangulation limiting interviewer bias (March -July2023)

4.2 Drivers of change: Identity, explore, and characterize

CRFS Labs aim to generate novel policy frameworks and experiment, test, and improve innovation and best practices through a process that focuses on **identifying the specific drivers of change**. In order to identify these drivers of change, the following steps are proposed.

- Contextual Analysis: This component focuses on analyzing the contextual factors that shape CRFS and the narratives surrounding them. It involves understanding the socio-economic, cultural, and environmental dynamics within city regions that influence food production, distribution, consumption, and waste management. The framework considers the influence of policy frameworks, urban planning, market dynamics, and social norms to identify barriers and opportunities for responsible change. As the term "innovation" in Cities2030 is used in its broadest sense (referring to anything new or existing that is being used successfully to improve the sustainability of CRFS), context is crucial. If innovation is taking two things that exist and putting them together in a new way, it is important to understand those two things in more depth. By adopting a broader perspective, contextualization can encompass diverse societal angles, thereby facilitating a more profound comprehension of the underlying drivers of change for innovation within the CRFS.
    - Analyzing Proposal and Grant Agreement in order to understand the specific context and configuration of each pilot and recurring topics.
    - Introductory meetings and workshops.

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- Storytelling and Co-creation: This component emphasizes the power of storytelling and co-creation processes in capturing practical stories from diverse stakeholders in CRFS through explorative interviews (structured or semi-structured). It involves engaging with farmers, consumers, policymakers, researchers, and community organizations to collect narratives that illustrate real-life challenges, successes, and transformative practices. The framework encourages participatory approaches that foster dialogue, shared learning, and the co-creation of knowledge and solutions.
    - The data necessary for a comprehensive understanding of the food systems and ecosystems arena was collected through 12 meaningful conversations (one per pilot) conducted via semi-structured interviews, as well as through online interactions in workshops and emails involving engaged partners.

- Drivers of Change: This component explores the key drivers that facilitate or hinder responsible practices within CRFS. It involves identifying and analyzing the factors that motivate stakeholders to adopt sustainable and inclusive approaches, such as policy incentives, community empowerment, technological innovations, market demands, and social movements. The framework emphasizes understanding how these drivers interact and influence decision-making processes within CRFS.
    - Based on this data, the challenges (and solutions to unlocking them) in food systems and ecosystems present for RRI were Identified, explored, and characterized.
        - The RRI White Paper grouped together the three most relevant RRI themes Public Engagement, Science Education, and Governance. While all six dimensions of RRI contribute to the overall goals of Cities2030, this white paper focuses on highlighting the first three RRI dimensions (Public Engagement, Science Education, and Governance).[14]
        - Insights gained from data collection and analysis indicated that emphasizing those three dimensions allowed for a more targeted approach, enabling the white paper to delve deeper into specific innovative areas and highlight the connections and synergies between them and the project's objectives.
    - Through RRI, labs were deemed more likely to find common ground and design interactional experiments to overcome obstacles and difficulties by devising innovative and original experiments that can be adapted to the different pilots in the Cities2030 project. This was deemed to be able to better allow to:

[14] During the preparation of this work, the author utilized Open AI to proofread interview transcription further aligned with the context and assist in some of the qualitative analysis. Following the use of this tool, the authors thoroughly reviewed and edited the content as necessary, assuming full responsibility for the publication's content.

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        - Ideate, co-create, implement, and pilot RRI mechanisms under WP4, 5, and 6 to structure an RRI framework for the co-creation, pilot, and deployment of innovation.
        - Create an RRI baseline in all project activities whilst establishing synergies with major RRI initiatives at the EU level.
        - Co-create, pilot, and deploy RRI mechanisms to structure a framework for innovation.
    - The idea of grouping together similar innovations within Cities2030 and allowing for more meaningful dialogue is a part of this process of co-creation and pilot testing. It involves examining the innovations being implemented across different cities and identifying the similarities and differences between them.
    - This process can help to structure a framework for RRI-oriented CRFS that can be implemented across different cities and regions.
    - Gathering feedback on White Paper:
        - A first draft of the RRI White Paper was sent by email to all pilot interviewees to gather more feedback and clarification of what was discussed during the interviews. Feedback on the draft was incorporated.
        - To facilitate meaningful feedback, a workshop was organized to present preliminary findings.
            - This included an interactive digital whiteboard session designed for collaboration and brainstorming, and it allowed users to create and share ideas in real-time.
        - Drafts of the White Paper continued to be sent by email to different stakeholders in order to gather feedback.
    - Based on the feedback from all stakeholders and WP2 team members, there seemed to be a demand for more targeted workshops, forums, or other events where different stakeholder innovators could come together to discuss their work, learn from each other, and collaborate on common challenges. After producing the RRI white paper on innovation within Cities2030, the next steps could include grouping together similar innovations based on common RRI themes.

- This approach was deemed to better allow later for

    - Design Multi-Stakeholder Experiments: This component highlights the importance of fostering multi-stakeholder collaboration and partnerships in driving responsible change in CRFS. It involves identifying and engaging relevant actors, including government bodies, research institutions, community organizations, businesses, and consumers. The framework promotes dialogue, knowledge exchange, and the co-development of solutions through collaborative platforms and networks.

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- Maximize Learning and Feedback Loops: This component aims to open up avenues for iterative learning processes, paving the way toward increased sustainability. It involves capturing lessons learned from practical stories, analyzing their impact, and providing feedback to stakeholders involved in CRFS. The framework encourages continuous monitoring and evaluation to ensure adaptive management and the refinement of strategies and interventions over time.

  This could involve analyzing the various innovations and identifying commonalities and overlaps, such as shared goals or approaches, similar technologies or methodologies, or similar social, economic, or environmental contexts.
  - Once common ground amongst different innovations has been found, and it would be important to facilitate meaningful dialogue between the different groups to share experiences, best practices, and insights.
- This could involve organizing workshops, forums, or other events where innovators can come together to discuss their work, learn from each other, and collaborate on common challenges.

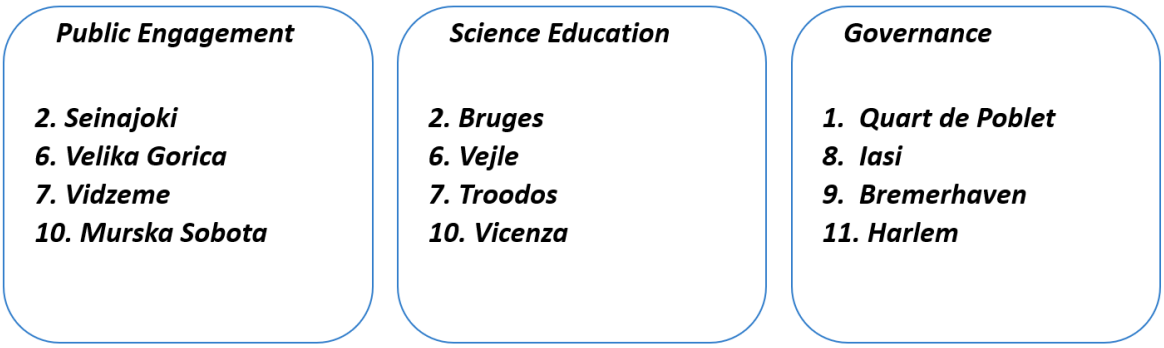

Figure 4. Suggested grouping of pilots according to common ground in RRI themes between to facilitate meaningful dialogue and leverage best practices

The idea of grouping together similar innovations within Cities2030 and allowing for more meaningful dialogue is a part of this process of co-creation, pilot testing, and increased future-proofing. It involves examining the innovations being implemented across different cities and identifying the similarities and differences between them. This process can help to structure a framework for RRI-oriented CRFS that can be implemented across different cities and regions. Overall, the next steps described in the previous answer support the broader goal of the RRI White Paper, which is to create a framework for RRI-oriented CRFS that can promote more sustainable and equitable food systems.

The dialogue could also involve other stakeholders, such as policymakers, industry experts, researchers, and civil society representatives, who can provide valuable perspectives and insights on the innovations and their potential impact on society. This would enable a more inclusive and

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participatory approach to innovation, where different voices and perspectives are heard and incorporated into the design and implementation of new solutions.

Prior to delving into the analysis of each lab, it is crucial to establish that the information being presented is sourced from interviews and various other sources. All quotations used in this analysis have been obtained with the required consent. The data necessary for a comprehensive examination of the food systems and ecosystems arena was collected through 12 meaningful conversations (one per pilot), conducted via semi-structured interviews with an average duration of 64 minutes, as well as through online structured observations involving engaged partners.

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5. Analysis and contextualization

5.1 Quart de Poblet (Spain)

The integrated sustainable urban development strategy used by the municipality of Quart de Poblet attempts to integrate the local urban and natural environments. Urban gardening can be a great way for citizens to reconnect with nature and its food systems in several ways. The purpose of the pilot is threefold.

Public engagement
Science education
Governance

Urban gardening: Sowing the seeds of tomorrow

- *"Quart de Poblet is not too big a city, and it's also close and very well connected to Valencia by bus, subway, and bike."*
- *"The concept [of the integrated sustainable urban development strategy] is to transform the food system into an **inclusive food system**. We have this program where **the unemployed** go to a workshop every day for six months, and then they work for the municipality restoring parks and streets. We want to do the same but work in eco gardens. The biggest challenge? Getting the license (from the government)."*
- *"And people's engagement in buying healthy and sustainable food from food gardens. They are used to buying in supermarkets. People are not so aware of the importance of local eco gardens. They are still buying in big supermarkets, and people are unaware of the origin of fruits and vegetables. (Science education). The idea is to create a space for leisure for families, food trucks for the weekends, and a space to walk."*
- *"Maybe when we have to arrange a campaign for kids, we have to prepare some content. We don't know yet."*

- Firstly, the city council and residents constantly plan events **to raise the public engagement** in ecological agriculture and sustainability.
    - Exposure to greenery: Urban gardening allows people to create green spaces in their city environment, which can help them to reconnect with nature. It provides a chance to interact with plants and soil, even in a small way, which can be a refreshing break from the concrete jungle of the city.
        - A study (Freeman, 2012) revealed that gardens are important for physical and mental health. Freeman highlights the multifaceted and idiosyncratic ways in which householders connect with nature, emphasizing the importance of people's relationship with nature in promoting positive ecological change in urban environments. In this way, urban gardening can be seen as a way for citizens to engage publicly with nature, promoting sustainability and biodiversity conservation.
    - Encourages outdoor activity and community connection: Gardening encourages people to spend more time outside, which can lead to increased physical activity and fresh air, both of which are beneficial for our health. Urban gardening can be a fun and enjoyable way to spend time outdoors while engaging in physical activity, connecting with nature, and building social connections with others in the community.

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- Gardening involves physical activity (digging, planting, weeding, and harvesting) that can provide a low-impact workout.
- Gardening usually takes place outdoors and often involves exposure to sunlight.
- Gardening can be a relaxing and therapeutic activity that can help reduce stress and anxiety. Spending time outside in nature has also been shown to have a positive impact on mental health.
- Urban gardening can also be a social activity that encourages interaction with others in the community. This can lead to increased social connections and a sense of community involvement.
- During urbanization, when people moved from villages and farms to cities, urban agriculture expanded from income-earning and food-producing to ecological, social, educational, and even "therapeutic" aspects. The multifunctional role of agriculture and horticulture (vegetable and fruit production) in most of the European urbanized areas is beautifully documented in **the case of Bologna,** where 3,000 spot gardens are assigned mainly to older people (Gasperi et al., 2012). An inclusive aspect to be found in the management aspect involves a diversified group of young (and usually unemployed) people, immigrants, women, and several social associations. Community gardens in Bologna have become a great example of where people meet, discover old and new production techniques, and exchange traditions and cultures.

- Secondly, the city set up a Municipal Ecological Garden (MEG) to **encourage environmental science education** by encouraging **citizens of all ages** to be involved in the practical, sustainable development processes.
    - A campaign for children with educational content would be a great way to share the responsibility to solve a social challenge trying to make food production more locally sourced.
        - If such campaigns are embedded in schools, and the children have a good time, they would be likely to share the story with the family and perhaps steer towards coming back for a second visit, thereby bringing in more generations of people to come to visit the urban garden.
        - Urban gardening can be a great way to engage youth in science education and promote environmental awareness. Here are a few examples of how urban gardening has been used in youthwork to promote science education:
            - STEM learning: Urban gardens can provide a hands-on opportunity for youth to learn about science, technology, engineering, and math (STEM) concepts such as soil science, plant biology, and ecology.
            - Nutrition education: Urban gardening can also provide a platform for nutrition education, as youth can learn about the importance of healthy eating and the benefits of growing their own food.
            - Responsibility learning: Urban gardening can encourage youth to get involved in their communities, promote civic engagement, and foster a sense of responsibility for the environment.

Quart de Poblet CRFS

> We have this program where the unemployed would go to a workshop every day for six months, and then they work for the municipality as urban gardeners in eco gardens. The biggest challenge is getting the license from the government.

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- Career development: Urban gardening can also provide youth with opportunities to learn about potential career paths in science, agriculture, and environmental sustainability.
- Increases biodiversity: Urban gardening can help to **reconnect people with traditional and indigenous horticultural species**. Many traditional and indigenous plants have been passed down through generations and have important cultural and medicinal significance. By growing these plants in an urban setting, people can learn about and appreciate the cultural and historical significance of these species.
- Preserves biodiversity: Urban gardening can also provide a home for many different types of plants and animals. This increased biodiversity can help to create a more vibrant and natural ecosystem within the city.
  - A study points out that gardens (domestic or urban) have enormous promise as locations for the preservation of native biodiversity. They give an accessible and immediate option for city inhabitants to connect with nature and to support and improve native biodiversity because they frequently make up the majority of the land usage in urban areas (Freeman et al., 2012).

- Here are a few examples of how urban gardening can be used to involve people in science education:
  - STEM learning: an example in the EU is the "UrbanGreenTrain" project, which was funded by the European Union under the Horizon 2020 program. The project aimed to provide STEM (science, technology, engineering, and mathematics) education to young people through urban gardening and agriculture.
    - The project involved the development of an urban agriculture training program for young people, which included classroom instruction on STEM topics related to agriculture and hands-on experience in urban gardening. Participants were taught about topics such as plant biology, soil science, and hydroponics, and they were able to apply this knowledge through practical gardening activities.
    - The "UrbanGreenTrain" project was successful in providing STEM education to young people through urban gardening and agriculture while also promoting sustainable agriculture practices and contributing to the local food system.
  - Nutrition education: an example in the EU is the "EdiCitNet" project, which was funded by the European Union under the Horizon 2020 program.
    - The project aimed to promote sustainable urban farming and nutrition education through the development of innovative, multi-level, and multi-stakeholder urban food production systems.
    - The project involved the development of a series of urban farming modules, including vertical farming, aquaponics, and community gardens, which were implemented in several European cities.
    - The modules were used to provide hands-on education and training on sustainable urban farming practices, as well as nutrition education and healthy eating habits. The "EdiCitNet" project was successful in promoting sustainable urban farming and nutrition education in Europe while also contributing to the local food system by increasing access to fresh, locally grown produce.

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        - The project also involved various stakeholders, including local communities, policymakers, and educators, to ensure the long-term sustainability and impact of the project.
    - Responsibility learning:
        - The "WeObserve" project is an example in the EU that focuses on responsibility learning in the context of urban farming and citizen science. This project was funded by the European Union under the Horizon 2020 program and aimed to promote responsible and sustainable urban farming practices through the engagement of citizens in citizen science activities.
            - The project involved the development of a citizen observatory platform that enabled citizens to collect data on urban farming practices and their impact on the environment and society. The platform also provided education and training materials on responsible and sustainable urban farming practices, as well as opportunities for citizens to participate in community-led urban farming initiatives.
            - The "WeObserve" project was successful in promoting responsibility learning among citizens, as well as promoting sustainable and responsible urban farming practices. The project also contributed to the local food system by increasing access to fresh, locally-grown produce and involving various stakeholders, including policymakers, educators, and researchers.
    - Career development:
        - The "URBAN GreenUP" project is an example in the EU that focuses on career development in the context of urban farming and sustainable urban development. This project was funded by the European Union under the Horizon 2020 program and aimed to promote sustainable urban development through the implementation of nature-based solutions, including urban farming and green infrastructure.
            - The project involved the development of several pilot projects in cities across Europe, including Nantes, Valladolid, and Izmir, which aimed to provide hands-on education and training on sustainable urban farming practices and green infrastructure development. The project also involved the development of career development opportunities for individuals interested in pursuing a career in sustainable urban development, including urban farming.
            - The "URBAN GreenUP" project was successful in promoting career development in sustainable urban development, including urban farming, and contributed to the local food system by increasing access to fresh, locally grown produce. The project also involved various stakeholders, including policymakers, educators, and researchers, to ensure the long-term sustainability and impact of the project.

- Thirdly, more MEGs will be used to **promote and train local unemployed people** to work in the food. An exciting feature of the urban garden in Quart de Poblet is the policy perspective to try to reactivate unemployed people by offering a continuation of benefits and a chance to get involved in outdoor

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activities in Spain. Research previously documented the healing and soothing components of being outdoors as an activity. Urban gardening can provide opportunities for unemployed individuals to develop new skills, gain work experience, and improve their job prospects.

- Here are a few examples of how urban gardening has been used to involve unemployed individuals:
    - Job training programs: Urban gardening can be incorporated into job training programs that aim to provide individuals with new skills and work experience.
        - An example in Europe is the Brussels Urban Farming (BUF) project. The BUF project is a social enterprise that aims to create job opportunities and promote social inclusion for unemployed and socially vulnerable individuals through urban agriculture. The project operates several urban farms across the city of **Brussels**, where individuals can receive training and employment in various aspects of urban agriculture, including crop production, sales, and marketing. In addition to job training and employment opportunities, the BUF project also provides social support and community engagement activities to its participants. For example, the project runs cooking workshops and other events that promote healthy eating and community building. The BUF project has been successful in providing job opportunities and promoting social inclusion for unemployed individuals in Brussels while also contributing to the city's sustainable food system.
        - For example, the Urban Farming Apprenticeship program in **Detroit** provides job training in sustainable agriculture and urban farming to low-income individuals and formerly incarcerated individuals.
    - Community gardening initiatives: Community gardening initiatives can provide opportunities for unemployed individuals to volunteer and gain practical experience in gardening and horticulture.
        - The "Growing Communities" project in **London**, UK, is a social enterprise that operates a community-led box scheme, which delivers fresh, locally grown produce to households in the city. The project also runs a market garden, where participants can receive training and support to start their own small-scale food-growing businesses. The project provides employment and training opportunities for unemployed individuals and others who face barriers to employment. Participants receive training in various aspects of urban agriculture, including crop production, marketing, and distribution. They also have the opportunity to gain experience in other areas of the business, such as customer service and business management.
        - For example, the GreenThumb program in **New York City** provides support and resources for community gardens, and many of these gardens offer volunteer opportunities for unemployed individuals.
    - Entrepreneurship opportunities: Urban gardening can also provide opportunities for unemployed individuals to start their own small businesses.
        - Community Land Trust Bruxelles (CLTB) in Brussels, Belgium. The CLTB is a non-profit organization that supports the development of affordable, community-owned housing projects and has recently incorporated urban agriculture into its approach. The organization has launched an urban agriculture program called "Le Champ des

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Cailles" which provides training and support to low-income residents in the community to start their own small urban agriculture businesses. Through the program, residents are able to access shared garden plots and other resources to start their own urban agriculture businesses. Participants receive training in various aspects of urban agriculture, including crop production, marketing, and business management. In addition, the program provides access to mentors and other resources to help participants grow and scale their businesses. The "Le Champ des Cailles" program has been successful in providing entrepreneurship opportunities for low-income residents in Brussels while also contributing to the city's food system and promoting sustainable agriculture practices.

  - For example, the GROW **East Palo Alto program in California** provides resources and support for low-income individuals to start their own urban agriculture businesses.

- Promotes sustainability: Urban gardening can also promote sustainability by reducing food waste and promoting locally-grown produce. This can help to promote policies to reduce the carbon footprint associated with the transportation and packaging of food.

For each Lab, a subsequent overview will be provided to showcase the findings of the analysis pertaining to the elements of Responsible Research and Innovation (RRI) within each of the three dimensions. It is important to note that this overview should not at all be regarded as a scoring system but rather as a means to identify shared areas of interest with other Labs, with the potential to collaboratively design interactive experiments that address challenges and obstacles. This approach aims to facilitate the generation of ideas, co-creation, implementation, and piloting of RRI mechanisms for the collaborative development, testing, and deployment of innovations.

A. Public engagement
   1. Enhancing and widening participation at all R&I stages
   2. Leading to new and profitable partnerships
   3. Guaranteeing a transdisciplinary approach
   4. Advancing towards collaborative decision-making and shared responsibility
   5. Promoting Citizen Science and Open Innovation

B. Science education
   1. Promoting innovative problem-solving and critical thinking
   2. Embedding social, economic and ethical principles
   3. Promoting engagement and an entrepreneurial mindset
   4. Empowering citizens to participate in science policy making
   5. Sharing responsibility while solving social challenges
   6. Facilitating a strong interdisciplinary approach, and stakeholders' involvement

C. Governance
   1. Collective responsibility for the impact of R&I
   2. Participatory governance to cope with new and unexpected challenges
   3. Transparent and reflective procedures
   4. Accountability and responsiveness towards society
   5. Anticipation of unintended consequences

Figure 5. Overview best practices in RRI in Quart de Poblet

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Figure 6. Public Engagement through a Governance initiative setting up urban gardens providing opportunities for the unemployed in Quart de Poblet

This project has received funding from the European Union's Horizon 2020 research and Innovation program under grant agreement 101000348.

5.2 Seinäjoki (Finland)

The themes "Nutrition for sustainable and healthy diets" and "Innovation and empowerment of communities" are put into practice by the Seinäjoki pilot. The Healthy Kids of Seinäjoki concept is an important focus of the pilot. The activities aim to have an impact on the younger ones. The goal is to create a generation of savvy, educated, and capable food consumers who place value on healthy food and, in particular, its place of origin. Additionally, the events seek to improve young people's health and wellbeing. Children and the people who work with them (their families, schools, kindergartens, etc.) are the target audience.

- ☑ Public engagement
- ☑ Science education
- ☑ **Governance**

Free meals at school: in Finland, no one is left behind

- **"In Finland, children get free meals in schools. *It has much to do with the equality we want for Finland as a society. This is based on the idea that no one is left behind,* and we want** *everyone to have the same possibilities to go on and move forward in their life."*
  - *"Education, even at the university level, is free for everyone. That's the basic idea also behind free food served in schools."*
  - *"The idea of equality also comes from the **history of poverty** in Finland… [that became more of a relevant public topic] **after the second world war. We were really poor in Finland**, and we rose into a welfare country really fast. For the children to study, they needed food. So they [the government] provided different kinds of porridge and oatmeal in school for the students to survive. **For quite a long time after the second world war, pupils were obligated to work a little for this free school food. They had to work in the potato fields at the school and pick berries to bring to schoo**l. I don't know when this stopped. In Finland, you are allowed to go to any forest and pick berries from anybody's forest without needing permission from anybody, and berries are free to pick for everybody, while in America, for example, you might get shot by a shotgun."*
  - *"One of the ministers in Finland [Skinnari] is now trying to find different organizations to export these free school lunches abroad. We're getting a pretty big notice in international media by our level of dropped obesity."*
  - *"We see **strong entrepreneurship and really strong collaboration between the companies, the city**, and then the funding officials. [This represents] Finnish values of safety and supporting the climate in a way that Is supposed to be pure (free of antibiotics and too many pesticides)."*

- **It's almost unheard of for a child in Finland to show up hungry to school.** According to a study on why Finnish schools are successful (Hancock, 2011), this can be ascribed to a set of educational and social policies provided by the Finish government (such as three years of maternity leave, subsidized daycare to parents, and preschool for all five-year-olds state monthly parent subsidies). However, Finnish schools were not always a wonder. Only the wealthy had access to top-notch education during the first half of the 20th century. Nonetheless, the Finnish Parliament made the bold choice in 1963 to prioritize public education as the most effective strategy for advancing the economy and escaping the Great Recession.

- **Finland was the first nation in the world to pass legislation requiring free school lunches in 1943**, following up on a 1913 policy subsidizing school meals offered to disadvantaged children. In 1948, all primary school pupils were expected to receive a free meal each school day. Also, the law mandated that for the school canteen to have ingredients, the students had to harvest and cultivate food in

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their free time. Each student was required to bring 2 liters of lingonberries to school as one example of their contribution to school meals. The berries were subsequently utilized in a traditional dish, a rye and lingonberry porridge. The availability of school meals differs amongst European member states and other nations, and different aspects such as funding, prices, caterers, take-up, and dining experiences play a role. A comparative study on schools (Harper, 2008) concluded that these features mainly differ nationally because of cultural and economic factors. Although Finish schools offer significant differences in meals for boys and girls and between classes (Tikkanen et al., 2009), countries with well-established government funding for school meals appear to have **more advanced meal systems** with more excellent rates of uptake. Hancock (2011) also concludes that nations must spend money on high-quality ingredients, with a focus on organic and regionally sourced goods.

- [x] Public engagement
- [x] Science education
- [x] **Governance**

In Finland, school lunches helped tackle COVID-19 lockdowns.

- *"We had a closure at the beginning of 2020 for two months. But the kids were able to go and get food from the school and were able to have takeaway for the entire family."*
  - *"We had to brief the school before if we're going to go and get food next week. The school knew the amount that they needed."*
  - *"Because it's in the law in Finland that schools have to provide lunch to the kids, it was really quickly taken care of. We are quite strict about that."*
  - *"I didn't have my child in [primary] school at that time yet. But one of my friends had [placed] school food orders for their children. Something came up, and she couldn't get it, so I went and got it for her. School [staff] just opened the window and delivered food packages from the window based on the kids' name that was mentioned."*

Seinäjoki CRFS

In Finland, children get free meals in schools. It has a lot to do with equality that we want for Finland as a society. No one is left behind

A big issue is that at home kids are eating what the parents are buying. We had to find ways to influence the families. In Cities2030, we work with sport clubs pop-up canteens. serving wraps and smoothies with local seasonable vegetables and fruits.

- After World War II, Finland's efforts to combat hunger led to the formal enshrinement of the right to free school lunch in the constitution. This food innovation allowed the government to create collective responsibility taken up by schools to address the impact of unexpected challenges such as the COVID-19 pandemic.
- In April 2020, during the height of the COVID-19 pandemic, nearly all European member states suspended their schools. This deprived many schoolchildren of their one reliable meal a day. Several member governments established an international School Meals Coalition to guarantee that every kid has the chance to develop, learn, and flourish. The World Food Program (WFP) of the United Nations has started to assemble a coalition of interested parties to assist governments in restoring and expanding access to school nutrition for the most disadvantaged children. The Finnish government played a leading role in establishing the School Feeding Coalition to promote activities amongst a new range of partners to quickly restore, enhance, and expand food and educational systems, help pandemic recovery, and promote Sustainable Development Goals (SDGs). A "big tent" approach is taken where all stakeholders interested in school feeding can converge.
- Minister for Development Cooperation and Foreign Trade Ville Skinnari was appointed the founding member of a high-level steering committee to

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support a global scale-up of school meal programs. School meals are considered an integral part of the Finnish education system's success story that has transformed Finnish education and literacy levels over the past 70 years.

☑ Public engagement
☑ Science education
☑ **Governance**

Keeping it healthy

- ***"Finland has always had free lunches, and kids [today] take it for granted."***
  - *"When they get bigger, like teenagers, they no longer eat school food and have unhealthy snacks. … It's a big discussion now: how do we improve school food so kids would want to eat it?*
  - *"**It is a really big social event to eat lunch together** while having a nice peaceful conversation. This [realization] allows appreciating food and free school lunches [again]."*
  - *"**In schools, we have those ugly, noisy big halls** where students eat, … it's not comfortable and cozy. **We wanted to improve that** so it's more like a restaurant with smaller spaces and plants and other elements of (sound) interior design."*
  - *"It [rebuilding appreciation for free school lunches] starts already from **kindergarten.** My kids there **do lots of walks in the forest and parks identifying different plants to understand where food comes from** and how everything is produced, and how they get lunches from school."*
  - *"Kids can bring their own snacks, but teachers are quite stiff (rigorous). They have to be healthy snacks and not potato chips or Coca-Cola. **We used to have a candy machine in our school [back in my day], but they cannot be found anymore**. In my daughter's kindergarten, even if there's a candy-free policy, and unhealthy snacks are not allowed."*
- *"The problem behind bigger central kitchens is leftovers […], but in Finnish culture, you eat everything on your plate. **Through environmental education, recycling becomes quite obvious for Finnish people."***
  - *"In my previous job (at the university of applied sciences), we had a project that measured the leftovers from the plates of school pupils. There are actually not many leftovers on the plates."*
  - *"Even the little kids, when they can, take the food themselves. They can for themselves decide how much they take. … And they can get some more later if they're still hungry."*

- School meals are an essential part of nutrition and food education and health promotion (Finnish National Board of Education, 2008). The early living environment is indeed important for children's development and may lay the foundation for lifelong eating patterns (Helle, 2017). School meals are pedagogical tools to teach good nutrition and eating habits as well as to increase the consumption of vegetables, fruits, berries, whole-meal bread, and skimmed or low-fat milk (Sarlio-Lähteenkorva et al., 2010).

- These school lunches allow to embed social (food sharing), economic (free lunch at school), and ethical principles (nobody is hungry and left behind, and minimize food waste by responsibilizing children in letting them choose their personal food intake).

- Recent studies (Onur et al., 2021) showed beneficial and positive results in nutrition education. A positive focus on what to eat (rather than highlighting what not to eat) seems crucial. To avoid more pressure on teachers having to resort to negative information ("don't eat candy") about nutrition, candy machines have been removed from schools. Another crucial element is that this system avoids focusing only on outcomes (e.g., candy from mobile vendors increases obesity) but rather engages kids to connect with food and some of the natural environments such as forests and fields. Nutrition education poses a crucial key role

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in all scales of the education system in terms of the prevention of the global obesity epidemic.

- A qualitative study documents the impact of multisector activities to prevent childhood obesity in the municipality of Seinäjoki (Koivusilta et al., 2022). Several successful policies targeted **physical activity** and **healthy eating** as integral parts of children's lifestyles.

    - A successful long-term strategy in schools to prevent childhood obesity was to create environments where **physical activity** was accessible to every inhabitant and build and renovate school and day-care centers' interiors and yards.
    - The **healthiness of meals** was increased progressively in combination with implementing an intervention targeting children at risk of obesity.
    - The success in obesity prevention was attributed to the **systematic coordination** and the **involvement of many crucial sectors** in work, whether in collaboration or independently (Koivusilta et al., 2022). Also vital to success was the emphasis on the importance of **promoting children's health among the public and various actors** and how results were communicated in the municipality. Also, the nutritionist's input in the hospital district directly served in obesity prevention, and in these cases, pre-existing structures and policies were of great importance. This collective approach to public engagement, science education, and governance to involve many stakeholders and industries to work towards healthy food is remarkable in Seinäjoki.

☑ Public engagement
☑ **Science education**
☑ Governance

Public engagement through sports clubs and celebrities

- *"Lunch is served at 11, and kids are in school until 3 PM, so that is quite a long time [for kids to bridge without food]. Schools don't provide snacks in the afternoon or in the morning; it's just lunch."*
    - *"In Cities2030, we also work with sports clubs and football club canteens where all the teams from other towns come to and have hundreds of children. We'll have ten pop-up canteens for sports clubs serving wraps, a smoothie, and a loaf of bread with a healthy spread (like peanut butter). We also want to use seasonable fruits and vegetables as locally as possible."*
    - *"Another big issue is that the kids are eating what the parents are buying for them. The biggest problem is when kids want to eat a healthier snack, but the parents' food choices and culture don't move forward. The school meal is the only meal kids have during the day.* ***We really had to find ways to influence the families and what they serve kids to eat at home.*** *"*
    - *"Kids have really big power in different family decisions and can influence daily decisions related to food. If parents are wise enough, they are trying to make good choices with the kids, yet they are discussing with the kids all the time increasing their awareness on top of what they pick up from social media and friends. They can bring different suggestions for the family's daily menu if they want.* ***If the kids' information is good, maybe the parents will try to implement that."***
    - *"We don't reach all families through sports clubs. But those kids who aren't so into sports, they usually have some kind of activity club [with canteen]. Football is really popular in Finland."*
    - *"It's amazing that you can involve sports celebrities and environmental education.* ***Children like to copy celebrities, and the kids tend to pick the same food as the famous ones.*** *It's amazing that you can involve these celebrities.* ***For environmental education, these social media have so much potential.*** *Celebrities with healthy snacks on social media … it affects not only environmental education for children but [more age groups] nationwide."*
    - *"But of course, there are families we don't reach, but in those families, there might be bigger problems we have to solve before we go and address food problems."*

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B. Science education
   1. Promoting innovative problem-solving and critical thinking
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   3. Promoting engagement and an entrepreneurial mindset
   4. Empowering citizens to participate in science policy making
   5. Sharing responsibility while solving social challenges
   6. Facilitating a strong interdisciplinary approach, and stakeholders' involvement

C. Governance
   1. Collective responsibility for the impact of R&I
   2. Participatory governance to cope with new and unexpected challenges
   3. Transparent and reflective procedures
   4. Accountability and responsiveness towards society
   5. Anticipation of unintended consequences

Figure 7. Overview Best Practices in Seinäjoki

Figure 8. Left: Pop-up food stalls at sports clubs in Seinäjoki
Right: School vending machine with healthy options only

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5.3 Bruges (Belgium)

The sustainable food strategy aims to include that inhabitants pursue a right to a healthy, qualitative, and sustainable diet. This is why we want to pay extra attention to the elderly in, specifically as a vulnerable target group. Exploring new paths in meal preparation and delivery through co-creation allows trying to improve the elderly's meals and thus health. The city of Bruges and its food lab provide expertise on developing a bottom-up food strategy and how to work with local stakeholders.

☑ Public engagement
☑ Science education
☑ Governance

The threats of mass tourism to Bruges' sustainable food system

- *"[Local] culture and tourism seem like separate universes. One is where you have projects for the local people and aim more for sustainability. Bruges [as a city] is also very socially committed. The other one is the tourist sector. To put it in a cliche, maybe they [tourists] are more interested in chocolate and beer."*

- One of the issues with Public Engagement within RRI in Bruges is the touristy interest in this UNESCO-designated World Heritage city, creating a divide between local people's and tourists' food consumption. A ban on the opening of new tourist shops, beer palaces, and chocolate shops is being looked at currently by the city of Bruges to keep the interest of local inhabitants at heart and the range of shops diverse. In this way, the city council wants to follow the example of Amsterdam banning new cheese shops and safeguarding the diversity of the type of shops. More tourist shops are settling in Bruges's main shopping streets because rental prices fell due to the increased vacancy rate after the corona crisis. However, the city council planned to halt this process to prevent monotonous shopping offers and preserve the city's original charm for tourists to some extent. The measure could also protect local chocolatiers and filter out imported chocolate, trying to get its piece of the pie to make money for mass tourism. The minister for Economy and Consumers is investigating national measures to protect the label "Belgian chocolate" to safeguard it from branding misuse.

☑ Public engagement
☑ Science education
☑ Governance

It's not too late: engage the elderly's food habits through grandkids' school.

- *"We can talk about **science education** and activation [**public engagement**] and changing food habits... But imagine when you're older, you're also less interested in changing in ways that you're losing some of your abilities. Probably you want to keep the old things you already know. Or do you still have this kind of hunger and curiosity for new things?"*
- *"Last week, we had a food challenge where people could taste a free dish from a well-known restaurant at the Wednesday market, where there's more of an older public."*
  - *"I was really surprised to see a lot of the older people there in contradiction to a few years ago. In the past, they wouldn't want to go, but now they said: "**My grandchildren learned about it at school,** and they let them taste something. **Me too. I want to taste it!"** Oh, that was really a pleasant surprise last week. So yeah, it's changing."*
  - *"Many people in their 80s and 90s are still in good shape and can participate in those [food tasting] activities. We always think people are old, so they can't do anything. But that's not true. Try to see it this way: "When I'm 90, I'm signing up for this and that." So yeah, contact those people."*
  - *"We should use the knowledge that's there and make them [the elderly] feel useful. Because that's a problem that many elderly people feel: "We are not useful anymore. We do not work anymore."*

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- The elderly target group in Bruges seems to be more challenging at times to publicly engage in changing their food habits. The increasing proportion of the elderly in the European Union highlights the importance of more studies focusing on food preferences and health behavior with more focus on cultural factors (Koehler, 2008) to understand nutrition behavior and food choices better.

- It seems indeed logical that the closer one gets to the end of our lives, the more one may feel like fighting a losing battle to remain healthy (through food) forever. However, previous research (Shifflett et al., 1987) suggests that **the elderly are more likely to change their food habits if they hold a positive outlook on their future**. This positive time perspective associated with food habit changes also needs to be seen in specific demographic and social conditions (such as living companionship, recent widowhood, health status, and gender).
    - Bruges beautifully builds on this by engaging the elder successfully through an outdoor food festival where food can be shared. But perhaps more importantly, there seems to be a threefold intergenerational effect of combining science education and public engagement: involving younger grandchildren in changing food habits for the youth, parents, and grandparents.
    - Perhaps the enthusiasm of the younger can shape a positive time perspective for the elderly by reminding them of the beauty of life in; which one perhaps does not live forever, but their legacy can. Instead of seeing life as a linear line with an abrupt ending, it is perhaps more helpful to see it as concentric circles that form naturally when one throws a stone in a rustic pond. Through this example, Bruges seems to be aligned with a changing paradigm in the science of later life. Popular and scientific images of the elderly can be out-dated and unduly, and a positive reconstruction of older people's societal position seems appropriate (Jones, 1986).

The dying habit of taking the time to (learn how to) cook

- *"I realized that many people don't know how to cook anymore. Maybe you can make sandwiches or a quick meal like pasta… but the real attitude to cooking?"*
    - *"Even when you have lettuce, what can you do with it? Or you have a leak, what can you do with it and how? And you can use the white part, but also the green part. People don't know that anymore."*
    - *"I was a bit shocked that even in schools here [in Bruges], they teach that you can't do anything with the green part of the leak and that you should just throw it away. Even this year [in 2022], I didn't think it was possible, but it still happens."*
    - *"A lot of those elder people experienced the war [World War 2]. […]. Maybe they can help, or they can pass on their knowledge for further use."*

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- [x] Public engagement
- [x] Science education
- [x] Governance

Old people are forgotten seasonal food libraries.

- *"When I look at my sister, she buys strawberries all year as they're [available] in the shop. People do not [always] know which are the seasonal products and what are local products. I think elderly people have more knowledge about that. We should use the knowledge that's there."*
- *"On our Facebook page of Foodwinners (a project with subsidies from the Flemish Government), people who joined share."*
  - *"We have more trendy recipes from the younger people with smoothies and stuff like that."*
  - *"And older people are more likely to use leftovers from bread and cauliflower. So I think (through our Facebook page) they can learn a lot from each other."*
    - *"Maybe our Senior Advice Council can make a separate recipe book with tips; why not?"*

Hidden food poverty

- *"Food poverty is very hidden [in Bruges]. There is bad food, cheap food. I think you want to invest in the long term and need to study this [in more depth]."*

- Research during COVID-19 lockdowns confirms that the consumption of seasonal foods is healthier in contrast to the consumption of junk and ultra-processed food, contributing significantly to developing more chronic diseases. (Di Renzo et al, 2020)
- Evidence shows that seasonal food intake depends on age (and gender) in Southern Brazil. More specifically, this study shows that age interacted with the seasons for leafy vegetables, beans and lentils, lean beef, lean poultry, low-fat milk, and light yogurt. It remains to be confirmed if this is also true in Bruges.
- A recent study (Horning et al., 2017) confirms that **lack of time** (57%) and family preference (49%) were the most frequently cited **reasons for buying ready-made meals**.
  - Five of the six reasons for ready-made meals were related to poor parental self-efficacy in cooking and poor meal-planning ability. In other words, cooking skills are the main factor why resort to these ready-made meals, but planning skills also matter. It's more complicated than a simple "I don't have time".
  - Planning skills might also be related to parental occupation and social class. A three-city study (Roy et al., 2004) found that low-income families constantly had to improvise daily rhythms to survive.
    - On a more general level, complaints about time shortage seem to permeate contemporary Western societies. Research in psychology (Szollos, 2009) proposes that there is an objective component of time shortage but that the **subjective-emotional part of feeling rushed may lead to the perception of a time shortage.**
  - Other studies (Collinson, 2001) on learning to change (incl. learning to change your cooking behavior) suggest that it is a crucial first step to better understanding what people mean when they say, "I don't have enough time." It also offers suggestions for rethinking time in ways that encourage meaningful participation in individual and organizational learning.

Bruges CRFS

In our elderly community centers, we're doing more intergenerational activities now.

We had a food challenge where people could taste a free dish from a well-known restaurant at the Wednesday market where there's more of an older crowd. I was really surprised to see a lot of the older people this year. They said: "My grandchildren learned about it at school and they let them taste something. Me too I want to taste it!"

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☑ Public engagement
☑ **Science education**
☑ Governance

Can a 4-year-old set a higher bar for an entire family in its cooking tradition?

- *"At my daughter's school, they have chickens. They have learned about seeds and plants and grow their own carrots and tomatoes.*
- *"We are trying to have more vegetarian dishes in schools in Bruges. We notice that many teachers incorporate it [these vegetarian dishes and the underlying sustainability message] into their(classroom) teachings."*
  - *"My kids eat things [in school] I've never heard of. It seems to be something vegetarian. Sometimes my daughter also comes home and says, "today we learned about Coca-Cola. It's not healthy. There's a lot of sugar in it." When we go to McDonald's, she says, "You shouldn't take cola"; it's not healthy." And she's four years old. Wow!"*
  - *"Apparently, the kids then also take it [this knowledge] to their grandparents."*
    - *"Every weekend, she goes to my mother-in-law, who makes tomato soup. And then she says: "You can't always eat the same thing; you have to eat something different." In that way, it also reaches the grandparents. Like, okay, we have to do different things [need more food variation]. The same happened with my husband, who used to make spaghetti balls on Wednesdays and Saturdays. So I think it's good that we [are reminded that we] have to do something different and you can't eat [the same] spaghetti every Wednesday and Saturday. But today it's spaghetti and carbonara, yes [laughter]!"*
    - *"At my daughter's school, of my daughter, we have a Grandparents Day. She goes to the woods with her grandparents, and that's nice. But if every year, that day might be something about cooking and learning. If we do learn from grandparents to grandchildren and the other way around, there could be great returns. Also, in our elderly community centers, we're trying to do [intergenerational] activities that way."*

- There are existing programs to explicitly **train teenagers as food** (and fitness) **ambassadors** for out-of-school programs in New Jersey. The curriculum uses experiential and research-based activities to promote healthy eating and physical activity habits for children. The teenage trainers themselves also benefitted from improved valuable life skills and teaching skills (Ripberger et al., 2009). However, the study does not mention any results in terms of healthy eating and physical activity habits for the target audience of children.
- In line with previous chapters on Science Education, there is evidence suggesting that early socialization is substantial and that Intergenerational influences impact children's food preferences and eating styles (Moore, 2018). However, there is less evidence to be found at this point on the intergenerational impact of children's food preferences and eating styles on parents and grandparents. This approach shows a lot of potential to be applied in other CRFS through a governmental policy of implementing food education in national school curricula.

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   6. Facilitating a strong interdisciplinary approach, and stakeholders' involvement

C. Governance
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   2. Participatory governance to cope with new and unexpected challenges
   3. Transparent and reflective procedures
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   5. Anticipation of unintended consequences

Figure 9. Overview best practices in RRI in Bruges

Figure 10. Public Engagement through Science Education in Bruges: After receiving free samples in class, grandchildren attract a higher turnout at food fares of grandparents who don't want to miss out.

This project has received funding from the European Union's Horizon 2020 research and Innovation program under grant agreement 101000348.

5.4 Vejle (Denmark)

By providing kitchens and other infrastructure for living labs, the city hopes to bring a wide variety of stakeholders together, leading to increased food innovation. Fermenting a certain urban resilience and community engagement through food infrastructure (such as shared or mobile kitchens) can facilitate the exchange of trendy food concepts. Vejle builds from established capacity as one of 100 Resilient Cities globally and brings deep experience and a global network for city resilience.

Michelin-star coach showcasing plant-based food: start-up hipsters in the kitchen

- *"The Food Innovation House (here in Vejle) is a large building with a lot of different companies."*
    - *"You can rent the kitchen with the coach and leader of the Culinary Institute, previously a Michelin-star chef."*
        - *"[the cooking training sessions] focused a lot on **plant-based food.**"*
        - *"He shares a lot of knowledge with small businesses, how we can change our products and make them better… and share knowledge about new trends."*
        - *"We combine knowledge [scientific food insights] with practical aspects [cooking]. We tell [educate] people things and show them how they have to do it as well."*
        - *"The most important thing for us [to promote] is the **taste**. Vegan products. There are many of these that don't taste good; then you don't get people to eat them."*
        - *"In the holistic cooler culinary experience, **sound, color, and light are used to change people's perception of food**. Yeah, I think they can have a huge effect on how people eat and their food experience. We experiment with light and how the **atmosphere** can have a part in the tasting."*

- The focus on taste seems like a critical approach that can drive further food innovation.
    - In 2020, studies indicated that consumer acceptance of Plant-Based Meat Alternatives remains unsatisfactory but continually improves (He et al., 2020).
    - Future research opportunities mentioned in the study include finding more suitable protein sources to improve the quality of the final products, improving the appearance and flavor, and developing methods and standards for a quality evaluation of Plant-Based Meat Alternatives.
    - Denmark has a strong tradition of food science and technology education and research, with several universities offering programs in this field.
    - Two billion humans already consume insects, but none in the Western world. In Europe, the idea of using insects as food is still relatively new, and some companies are experimenting with it. However, it is not yet a widely accepted practice. The first EU permit for insects as a "novel food" was issued in mid-2020. This ended the legal uncertainty about breeding insects for human consumption in Europe.

This project has received funding from the European Union's Horizon 2020 research and Innovation program under grant agreement 101000348.

Cooking with a TV celebrity

- *"Next to the **big food festival for the whole city, w**e also have two [creativity] potato competitions in the Culinary Institute: one for students and one for professional chefs. We have a lot of TV programs on food competitions that are popular with children. [Is your chef also famous on TV that kids already know?] Yeah, some of them do. He has a huge network - a celebrity, you could say [laughs]."*
    - *"It greatly affects students when a Michelin chef comes into the classroom and talks about taste and how to make a great dish. It is Pierre and me that do the lesson. I think it is something when it's not only the teacher but when people from an institute [or organization] come into the school and teach the student."*
    - *"We had a smoothie event where they had to make a smoothie on a bicycle, one yellow smoothie, and one green smoothie. There we focused on the color [and not the taste]."*

- There are documented opportunities (Collins, 2019) for insect food to develop further in terms of product types (ingredients, whole insects, ready-meals) and price categories (gourmet items, medium or low-end products as farming costs decrease). Market dynamics can be expected to change in Europe as confidence grows, and different marketing strategies will have to be used attuned to local food cultures. **One of the study's main recommendations is to educate consumers and use social dynamics** to promote products. As access to products is further expanding, the 'disgust factor' may prove to be less intense than initially expected.

No joke: A chef and a food innovator walk into the classroom…

"On Saturday, June 13th [2022], we have the Vejle hot dog championship. It's a competition for students where they have to make the most climate-friendly hot dog in Vejle".

- *"It's **part of a big food festival for the whole city** championship. Before we visit the schools and do a course with the students talking about climate-friendly food: How can we [be part of the] change? How can we change the normal hot dogs so they are getting more climate-friendly? And we have some small tasters made by larvae, the small animals providing a lot of protein."*
    - *"It has a huge effect on students when a Michelin chef comes into the classroom and talks about taste and how to make a great dish. It is Pierre and me that do the lesson. I think it is something when it's not only the teacher but when people from an institute [or organization] come into the school and teach the student."*
- *"If you are a good storyteller about things, it can have a great effect. Showing people what you think [about all the advantages of eating insects]… but if you bring a good story and talk about the insect's positive things, you get the student interested in the work. And they [the kids] also think: "Okay, I'm quite cool [because I dare to eat insects]". Yeah. It was a great experience.*
    - *Students have to bring up some food and tell me great stories." Why do you really like strawberries?". "Oh, it's because I always eat strawberries with my grandma in the sun with whipped cream on it" They have to be reflective of why they really like this food."*
- ***"Actually, I didn't see any students that don't want to taste it."***
- *"I see a lot of children who go home [after a class on nutrition and health] to the parents and say: "Oh, I learned this today; I want to make it at home so you can taste it." In Danish culture, a lot of children are in the kitchen, helping the parents with making food, and some have their own cooking day. This is one day a week when they cook. It's also quite popular here in Denmark that the children go to food summer schools in the holidays."*

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Vejle CRFS

We* have a championship for students to make the most climate friendly hot dog in Vejle as part of a big food festival for the whole city. Before, we do courses in schools and we have small tasters made from larvae.

It has a huge effect on students when a Michelin chef come into the classroom and talks about how to make a great tasty dish. If you bring a good story, you get the student really interested. And the kids go: "I'm cool because I dare to eat insects".

- It is important to note that cultural and societal factors can also play a role in children's attitudes toward eating insects. In Western cultures, there may be a stigma associated with eating insects, which could impact children's perceptions of this type of food. Blending the workshop with the Danish practice of thoughtful choices and an overall desire to reduce the impact on the climate seems like a good approach.
- By focusing on education, allowing people to make the right food choices when buying ingredients to cook, science education within RRI ensures that research and innovation activities are responsive to society's concerns and needs and contribute to Europe's sustainable development and the world.
- Science education in primary schools in Denmark aims to ensure that innovation and research activities are carried out in a way that is aligned with the Danish cultural value of being reflective.
- The participatory social process of the cooking sessions allows tailoring the transfer of knowledge and practical skills to the needs and likes of the audience while supporting them in their food quest to limit environmental impact.
- The Danish Agency for Science and Higher Education guides and supports Horizon 2020 projects in integrating RRI principles into their activities. They also promote awareness and understanding of the importance of responsible research and innovation within the Danish research and innovation community.
- The intentional use of insects as a primary ingredient in hot dogs is not widespread.
- In some countries, such as Mexico and Thailand, insects are already consumed as part of traditional cuisine. Europeans are generally not accustomed to eating insects as a regular part of their diet, and some may feel hesitant or uncomfortable about trying insect-based foods. However, attitudes towards insect consumption are gradually changing, and there is growing interest in the potential of insects as a sustainable and nutritious food source. Embedding it into a workshop at primary schools with free tasters for those keen to try seems like a great approach to changing attitudes and setting healthy habits from a young age.
- Several European countries, such as the Netherlands and Belgium, have already legalized the production and sale of insect-based foods. Insects are also increasingly used as an ingredient in various food products, such as protein bars and pasta, which are becoming more widely available in supermarkets and health food stores.

It is interesting to review some evidence suggesting that children may be less afraid of eating food made from insects than adults. One reason for this may be that children are generally more open to trying new things and may not have preconceived notions about what is considered acceptable or not when it comes to food.

- Some research (Caton et al., 2016) has shown that children are more likely to try new foods when presented familiarly or appealingly, such as through fun packaging or, in this case, by being incorporated into a hot dog dish that they already enjoy.

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- Researchers conducted a randomized controlled trial with 78 preschool-aged children to test whether presenting vegetables in a visually appealing way would increase children's willingness to try them. The researchers found that children who received visually appealing vegetables were more willing to try them than children in the control group. Additionally, children in the group that received vegetables incorporated into a familiar food (a quesadilla) were even more willing to try them than children in the other two groups. Presenting new or unfamiliar foods familiarly or appealingly can increase children's willingness to try them. Some companies create kid-friendly packaging and incorporate insects into familiar snack foods to make them more appealing to children. This concept is applied to the presentation of insect-based hot dogs to children.
- One study (Nekitsing et al., 2019) specifies how to increase the intake of unfamiliar vegetables in preschool children by learning to use storybooks and sensory play. A successful strategy is repeated taste exposure involving (at least 5 to 10 exposures) increasing intake of a specific unfamiliar ingredient in preschools and at home.
- The **emphasis on fun for kids is crucial** as a study (Decosta,2017) shows that controlling strategies for changing children's eating behavior in a positive direction appear counterproductive. Instead, hands-on approaches such as cooking programs (or gardening) may encourage environmentally friendly consumption and have a more significant effect than nutrition education.
- This is confirmed by another study with a total of 43 French children aged 8–13 years, indicating that **insect-eating is considered fun and challenging when part of an experiential context in a peer group of kids** (Hémar-Nicolas et al., 2022). Also, this study adds that the context of the family can offer a protective and reassuring setting that allows kids to overcome obstacles to eat it.
- This is perhaps even more relevant to cultures with no stigma but a continuation of eating insects. The findings of this study advocate changing children's sensory perception of insect-eating food through sensory and participatory activities. Vejle's approach can be considered innovative, playing into a children's peer culture to associate insect-eating with positive social experiences and foster peer influence.
- Insect consumption is a practice found in many cultures worldwide, including some European countries.
    - In Nordic countries, such as Sweden and Finland, there is a tradition of eating moth larvae called "mämmi". These larvae are typically eaten boiled, fried, or baked. Although there is no known tradition in Denmark of eating moth larvae as a food source, insect-based foods could become ubiquitous in Europe in the next decade, according to Lars-Henrik Lau Heckmann, a biologist at the Danish Technological Institute (DTI) in Aarhus. He believes young people will find it natural to make pasta and wok dishes with insects today as they eat sushi" (Win, 2019). The DTI is leading a three-year project called inVALUABLE, one of Europe's most extensive research programs on the industrial-scale production of insects as a more environmentally friendly food for both people and animals.
    - In some parts of Italy, consuming dried and seasoned crickets, known as "grilli," is a traditional practice. In some areas of France, eating escargots, a type of land snail, is

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considered a delicacy. The consumption of grilled crickets is still relatively uncommon in Italy, but it is gaining popularity as a novelty food item. Some Italian restaurants have started experimenting with insect-based dishes, including grilled crickets as a topping for pizza or a garnish for salads. It is worth noting, however, that the consumption of insects as food is not currently regulated in Italy, and there are no specific rules or guidelines in place for the production and sale of insect-based products. As a result, the market for insect-based foods in Italy is still in its early stages, and it remains to be seen whether it will become a mainstream food trend in the country. This seems to be a massive opportunity for governmental policy to allow food innovation.

- Additionally, there is a growing interest in entomophagy (the practice of eating insects) in many parts of Europe, as it is a sustainable and nutrient-dense source of protein. Several European companies are now producing insect-based food products, such as protein bars, snacks, and even burgers …or hot dogs.

- Overall, some evidence suggests that children may be less afraid of eating food made from insects than adults. Individual attitudes and cultural factors can play a significant role in shaping these perceptions. Vejle's approach is aligned with this new innovative strategy to target the interested child segment early while educating them about the benefits of insect food.

- While some Europeans may still be reluctant to try insect-based foods, others are open to the idea and may see it as a way to reduce their environmental footprint or incorporate more diverse protein sources into their diet. Ultimately, attitudes towards insect consumption will likely continue to evolve as more people become aware of the potential benefits and learn new and innovative ways to incorporate insects into their meals.

Summer Food camps: intergenerational cooking for free

- *"When students are 15, they have to choose between food science, working with wood, or handcrafting. Many students actually choose the food sciences in the secondary school curriculum in Denmark. Actually [only] one year ago [in 2021], food sciences became an exam subject [on its own] in Denmark. The Food Sciences at **school are really theory-packed,** and there's a lot of focus on sustainability and chemical processes of food."*
- *"The food summer school is focused on the food **experience**. Just making some great food and eating [enjoy] together most of the school summer schools are voluntary. The grandparents share recipes and teach children [how to make] and experience the food. This is voluntary, and nobody needs to pay for summer school. The grandparents come because they want to."*
- *"We collaborate at the university with some professors who come to us and talk to us about the science behind holistic sensory food experiences."*

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- There are several summer food schools for children in Denmark. Various organizations organize these, such as local municipalities, cooking schools, and food education organizations. The summer food schools are designed to teach children about healthy eating habits, cooking, and nutrition in a fun and engaging way.
    - One example of a summer food school in Denmark is the "Madskoler" program, which the Danish Agriculture and Food Council organizes. This program offers week-long summer food schools for children between 7 and 14 in various locations throughout Denmark. The program is designed to teach children about healthy food choices and basic cooking skills and inspire them to be more interested in food and cooking.
    - Other examples of summer food schools in Denmark include the "Sommerkokkeskole" program, which is organized by the Danish Chef Association and offers cooking classes for children during the summer months, and the "Køkkenklar" program, which is organized by the Danish Heart Foundation and teaches children about healthy eating habits and cooking skills.

Figure 11. Overview best practices in RRI in Bruges

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Figure 12.
Top: Public student championship to make the most climate friendly food in Vejle as part of Vejle city's food festival
Bottom: Science Education and a Michelin-star celebrity chef sharing knowledge how to cook tasty plant-based food

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research and Innovation program under grant agreement 101000348.

5.5 Troodos (Cyprus)

People in Troodos' rural and mountainous regions live longer and lead healthier lives than those in other parts of the island. This can be attributed to a unique traditional culture and lifestyle with distinct characteristics (climate, less polluted environment, local food, agriculture, and processed agricultural products). However, industrialization and diaspora after World War II resulted in a 50% reduction in the regional population. To revert migration into the Troodos region, the government wants to promote sustainable development and further explore the unique diet and lifestyle of the Troodos region. Such good practices could then be exported back to the urban areas and support sustainable development while simultaneously boosting the economic environment and livelihood of the Troodos region.

That's what is unique about the region.

- *"The local government tried massive urbanization and cities' industrialization approach, but it failed."*
  - *"They updated these plans and realized that the strength of Troodos is the interconnectedness requiring good roads."*
  - *"Today, a clustered approach to development in agricultural communities is trying to preserve and maximize the benefits of the **traditional** strengths and **best practices**, capitalizing on the cultural capital residing within the people. So today, Troodos seems to be successfully shifting to a regional perspective (more than a city perspective) if they find continuity in policy implementations regardless of the outcome of elections."*

- World War II significantly impacted the government development strategy in Cyprus, including the development of the Troodos Mountains region. Before the war, Cyprus was a British colony, and its economy was primarily based on agriculture and mining. However, during the war, the island played a strategic role in the Mediterranean, and the British military built numerous military bases and facilities on the island.
  - As a result of the war, the British government shifted its development strategy for Cyprus, focusing on modernizing the island's infrastructure and promoting industrialization. This included the development of the Troodos Mountains region, which was rich in copper and other minerals.
  - In the post-war period, the British government established the Cyprus Mines Corporation, a joint venture with private companies, to oversee mining operations in the Troodos region. The government also invested in constructing roads, railroads, and other infrastructure to support the development of the mining industry.

Troodos CRFS

The Technical University of Cyprus has different centers in different villages involved with agriculture, food processing and quality. The University of Cyprus has invested in a huge farm of carobs. There is a school training people how to produce halloumi and wine as a government initiative at technical schools at secondary and post-secondary level. Each different area is taking advantage of what is available locally. Some of these products are protected by certification of the EU.

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- Over time, however, the government's approach to development in Cyprus shifted again. In the 1950s and 1960s, there was a growing demand for Cypriot independence. The government began to focus more on promoting local industries and agriculture rather than relying on foreign investment and mining. The mining industry in the Troodos region declined, and today the area is primarily a tourist destination known for its natural beauty and traditional villages.

- By the time of the independence of the island back in the 1960s, the government decided to move fast towards industrialization of the economy. They brought policies encouraging people to leave their villages and go and work in the big cities where the factories were built. When you have lots of people [in one place with density], it's easier to provide services, schools, hospitals, and all sorts of services instead of having this dispersed network all over the island. Over the years, they realized that this was the wrong policy, but it was too late.

Back to the Troodos mountains!

- *"The diaspora in Cyprus led to a reduction of over 50% of the population. Is it possible that this was a defining moment in Cyprus?"*
  - *"It was a defining era. It's been a slow process going on for the past nearly 50 years. And part of it has to **do with government policy."***
- *"What they're trying to do now is*
  - ***build a road network so people can access the area and the urban areas within 30 minutes to an hour** because Cypress is not a big island."*
  - *"The other thing they are trying to do is **introduce sustainable projects** that will help revive the area. And for that, they have a reasonable budget of 500 million euros over five years. I don't know if this will continue next year when we might have a new administration. This year is an election year."*

- Several government policies and initiatives in recent years have been aimed at improving the road infrastructure in Cyprus, particularly in rural areas, to facilitate easier access to urban centers.
  - One such initiative is the "Integrated Rural Mobility Master Plan", which was launched in 2017 to improve transport links between rural areas and urban centers. The plan includes measures to upgrade existing roads, build new roads, and improve public transport services, such as bus routes, to make it easier for people living in rural areas to access essential services in urban centers.
  - In addition, the government has also announced plans to invest in the construction of new highways and expressways, which will connect major urban centers and reduce commuter travel times.
  - These initiatives are part of a broader effort to promote sustainable and inclusive economic growth in Cyprus by providing greater access to education, employment, and other essential services for people living in rural areas.

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Bringing back youth: Lockdowns & digital nomads working from Troodos

- *"What is good is that the quality of the internet in the area is as good as anywhere else on the island. That's a huge opportunity."*
    - *"My nephew came from London for nine months on a stretch. Because of the lockdown, there were restrictions in London. So he was able to work from a distance for a sustained period. He and his fiancé wouldn't stay in Nicosia or Limassol. They prefer to stay in Troodos. They worked from home both of them. They are engineers, and their home office is in London. They had to go back at least a couple of times for meetings, but for the most part, he was working out of the area. Maybe tax systems are not fully aligned. But that is the thing that Europe needs to look at."*
    - *"There are some tax breaks and rebates for people living there. Or some subsidies for building houses that are more energy efficient. Some things [government policies] are available to people who try to go back and redo homes on their own."*

- The European Union (EU) has not adopted a specific policy on tax for EU citizens working from abroad in the EU during lockdowns. Taxation is primarily a national matter, and each EU member state has its tax laws and policies.
- However, in response to the COVID-19 pandemic and the resulting lockdowns and travel restrictions, some EU member states have implemented temporary measures to address the tax implications of remote work. For example, some member states have introduced temporary tax exemptions or reduced tax rates for individuals who work remotely due to the pandemic.
- The EU has also guided member states on tax issues related to COVID-19, including advice on how to avoid double taxation for individuals who work across borders or have been temporarily relocated due to the pandemic.
- Overall, the tax implications of remote work during lockdowns will depend on the specific circumstances of each individual, including their country of residence, country of employment, and the nature of their work. EU citizens working from abroad during lockdowns are advised to seek guidance from a tax professional or national tax authorities to understand their tax obligations.

Local halloumi science education and other local products

- *"EU certification for traditional rural halloumi versus mass-produced halloumi next to cities."*
    - *"The Technical University of Cyprus, with different centers in different villages, is involved with agriculture, food processing, and food quality."*
    - *"Then you have the University of Cyprus, which has invested much into some cultural properties regarding carobs. It is a local fruit used to make sometimes sugar and sometimes food for animals. Crops in their seeds are called carobs."*
    - *"People in the Mediterranean area use them as food in different shapes and forms."*
    - *"So the University of Cyprus has invested in a huge farm of these carobs trying to produce crops and then try to research how to make more products out of them. Each of us in our different areas is trying to take advantage of what is available locally, study it, and then promote it in both commercial and intellectual ways."*
    - *"Some of these products are protected by certification of the EU, so they can only be produced in particular areas of Cyprus. For example, halloumi some of the sausages."*

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Open Halloumi innovation during high school?

- *"Is it easy for new people to join communities focusing on producing halloumi? For younger people in Cyprus that are interested in being part of a booming industry or euro project?"*
  - *"No, **there is little innovation in these industries;** there is limited technology, and most of it is done manually. Most of the people involved in this industry are not very educated."*
  - *"However, **there is a school that trains people how to produce dairy products and how to produce wine at this point**. It's more of a government initiative at a technical school for secondary and post-secondary level students."*

- **Carob farming** is present in the Troodos mountain range of Cyprus, as it is a popular crop in many parts of the island.
  - Carob trees (Ceratonia siliqua) are well suited to the Mediterranean climate and are commonly grown in Cyprus. The carob fruit grows on the tree and is used for various purposes, including as a natural sweetener, a chocolate substitute, and animal feed. In the Troodos area, carob trees are often grown alongside other crops, such as olives and citrus fruits. The carob pods are typically harvested in late summer or early autumn, and the fruit is then processed to remove the seeds and pulp, leaving behind a sweet, chocolate-like powder.
  - **The University of Cyprus** has been working on a brand-new project that is both ambitious and genuinely possible. The goal was to bring in foreign capital, secure European funding, and open up employment and research opportunities. The university planned to **create the most extensive natural carob forest in Cyprus** by cultivating 40.000 thousand locusts on state land to be leased.
  - Making local crops of Cyprus a flagship project in research and innovation can be expected to create a tighter link between citizens and science. Facilitating a robust interdisciplinary approach and stakeholders' involvement.
  - Citizen Science Besides creating carob forests, the University of Cyprus established **a research center called "Black Gold,"** which will be interconnected with the carob forest.

- There is an **EU certification for traditional rural halloumi**, known as "Halloumi/Hellim" or "Halloumi/Hellim cheese" under PDO (Protected Designation of Origin) status.
  - This certification guarantees that the cheese is produced using traditional methods in the specific region and meets certain quality standards. The PDO for Halloumi/Hellim was granted by the European Commission in 1998 and applied to the traditional cheese produced in Cyprus. The certification defines the specific production methods, ingredients, and geographic origin required for a cheese to be labeled "Halloumi/Hellim."
  - To receive the PDO certification, the cheese must be made from a specific combination of sheep, goat, and cow milk using traditional production methods. The cheese must also be made in designated Cyprus regions, including Nicosia, Limassol, Larnaca, Famagusta, and Pafos.

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Once a Troodosian., always a Troodosian

- "They keep their roots. When you go and visit these communities, they are very united. They know each other; they have been there forever. It's the strengths of all these different communities. They are linked there. Even my colleague here will say he is from this village in the mountains, even though he's lived in Nicosia forever."
- "Yes, I am an economic refugee [laughs]."

- Troodos is a mountain range located in the center of the island of Cyprus, and it includes several villages and communities scattered throughout the area. While some locals live in Troodos year-round, the population fluctuates depending on the season. During the winter months, Troodos is a popular destination for skiing and snowboarding, and many people from nearby cities and towns come to the area to enjoy the snow. During this time, there may be more visitors than permanent residents. During the summer months, many locals and tourists come to Troodos to escape the coast's heat and enjoy the cooler mountain temperatures. During this time, there may be more permanent residents than visitors. Overall, the population of Troodos varies depending on the season, but there are certainly locals who live in the area year-round.

- The communities in Troodos, like in many small towns and villages, can be relatively close-knit. Many people who live in Troodos have close relationships with their neighbors and other community members, sharing a sense of connection and belonging. There may be a strong sense of camaraderie and mutual support among residents. Such a network can be an advantage for public engagement, cooperation, and transferring knowledge related to food innovation.

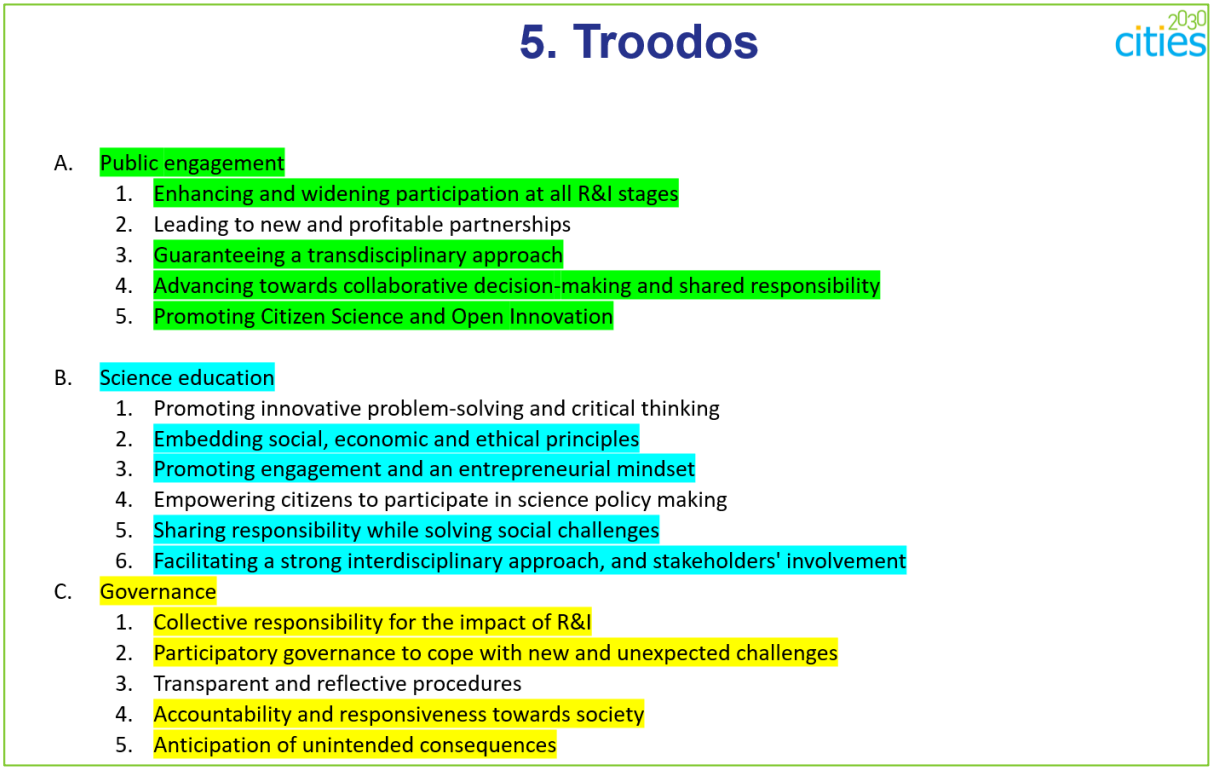

Figure 13. Overview best practices in RRI in Troodos Region

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Figure 14.

Top Left: The food processing cottage industry in the Troodos region is run mostly by women. In Agros (Limassol), also described as the home of roses and cured meat, a number of small business are run by women.

Top right: A small coterie business that employs mostly local women to produce traditional sweets and preserved fruit and marmalade. Their Production has been expanded from traditional products to also to a wider pallet of agricultural products beyond.

Bottom: Traditional products are registered as EU-protected geographic indications (PGIs) (such as pork sausage and prosciutto Pitsilias) can only be produced in the area. A small business started off by a couple back in 1978 and now managed by their daughters who studied food processing and marketing respectively.

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5.6 Velika Gorica (Croatia)

The city builds on its legacy as a self-governed district (for seven centuries) to promote a healthy diet for the younger generation by better knowing their local food **producers** (food selection and traceability). To realize this, different pathways are explored, such as organically grown food and environmentally friendly supply chains. Various governmental policy measures target a wide array of stakeholders (e.g., the schooling sphere, sports clubs, etc.). Local media, study-visits to local producers are essential to support these initiatives.

VEGORA is a local business support organization offering SME training, financial and legal counseling, technical assistance in preparing business plans/investment studies for local businesses and rural development, support in EU project management, individual consultations, etc. This mission is underpinned by the continuous development of various supportive schemes such as a mini MBA program for young entrepreneurs, a second chance program for companies in distress, free-of-charge legal advising (ongoing), e-commerce counseling, design-thinking support (planned), etc. VEGORA is dedicated to the target group of about 1.500 existing companies and 900 artisans but also addresses young and adult citizens willing to start their own businesses. Services feature universal design, where all SMEs and individuals aiming to become an entrepreneur can find their benefit. By doing so, end users receive a clear message from the local community that every entrepreneurial endeavor, especially when it comes from young people, reflects courage and deserves public support. VEGORA is also supporting other neighboring municipalities which don't have appropriate infrastructure for supporting entrepreneurial activity and rural development. VEGORA is a partner of the City of Ivanić Grad, and as such, it has the role of organizing SME training and advising beneficiaries of newly established business incubators).

In recent years VEGORA shifted its **focus on family farm businesses** due to their growing number and potential and growing demand for advisory services, providing them with advisory services and technical assistance. VEGORA also supports and connects stakeholders (NGOs, elementary schools, high schools, the university of Velika Gorica, entrepreneurs, and local governance) in STEM, digitalization, and smart technologies. VEGORA is the coordinator of development strategy for the City of Velika Gorica, the coordinator of the Smart City of Velika Gorica, and the focal point for all ICT-related activities.

Food as a social fabric: tradition is getting traditional again

- *"In the last two to three decades, we started to recognize the value again of some old food products we forgot about. We almost lost some of those. Now we are trying to remain very aware of our traditions and culture."*
- *"In our culture, food is very important. There is no event without food. It's all about the food. The life and the love for food. We have a lot of food festivals locally. … All of them are linked to tradition. … We have a lot of local restaurants getting food for people offering local delicacies, and cakes. And it is really all based on food. In a bean contest, who made the best sausage [competition], it's normal to cook for three hours and make a goulash [at a food festival].*
    - *It's not really a competition between the regions, because we all have such a variety of foods. If you go down the coast, you'll have more fish."*

COVID-19 made us more local?

- *"We do have a tradition of buying local foods. During COVID, it got a little more used. People started using a lot more local products. I think there's an awareness that was raised."*
- *"We have a lot of space, and the soil is pretty good. We have plenty of water, because cool. All this area of Europa is sitting on the water. It's like a water reservoir. All this total per region. The conditions are really good."*

This project has received funding from the European Union's Horizon 2020 research and Innovation program under grant agreement 101000348.

The Croatian city of Velika Gorica is known for its gastronomic tradition and food festivals. The city has a rich culinary tradition and hosts many other food-related events throughout the year. Here are some examples of the food festivals held in Velika Gorica:

- Velikogorički kaj - This festival is dedicated to a traditional local pastry called kaj, a type of pastry filled with various sweet or savory fillings. The festival takes place in May.
- Ribifest - This festival is dedicated to fish and seafood dishes in June.
- Gastrofest - This festival showcases the best of Croatian cuisine, focusing on local ingredients and traditional recipes. The festival takes place in September.
- Tatarski biftek festival - This festival is dedicated to the famous Tatar steak, a dish made from raw beef that is popular in Croatia. The festival takes place in August.
- Čobanacijada - This festival is dedicated to the traditional Croatian stew called čobanac, made with various meats and spices. The festival takes place in October.

Food festivals are an excellent tool for increasing public engagement and can build bridges between people and communities by bringing people together to celebrate food and culture.

- Food is a universal language that can help break down barriers and unite people from different backgrounds.
- Festivals that showcase the food and traditions of different cultures can help to promote understanding, respect, and appreciation for cultural diversity.
- Food festivals also allow people to learn about and experience different cuisines and cultures, which can help break down stereotypes and misconceptions.
- They offer a platform for local businesses and farmers to showcase their products, which can help to boost the local economy, support small businesses, and lead to new and profitable partnerships.
- Moreover, food festivals can create a sense of community and pride and help to bring people together around a common interest opening doors to a transdisciplinary approach. They can promote social cohesion and provide a platform for people to connect, share ideas, and form new friendships.

Food as a social fabric:

- *"If you had a meeting in Croatia, you would probably be stuffed every single lunch break."*
    - *"We make a big effort that everybody's fed more than they need to be. It really is a lot of food."*
    - *"if your neighbor or a friend passes by, it's likely you will prepare something for dinner or lunch or anything to eat. If you follow the culture and want to be a good household, then you will you will host your guest and offer meat when entering. God forbid if your guests are hungry {laughter}! The worst thing, if you have food, would be that your guests leave your house hungry. It's incredible. It is unimaginable. You would have to move, right? Just because of the shame [more laughter]."*
    - *"I'm surrounded by neighbors that I have known my whole life, and we're all sharing and caring. And it's a normal thing."*
        - *"People who have an extra product [they do not need] need to exchange it with somebody."*
        - *"For example, just last week, we found out about this application where people are getting together on one spot and exchanging products, a group food exchange. They're exchanging products [that they have in abundance] so it doesn't become waste."*
- *"Croatia is not a rich country; we have poor citizens. I think that [relatively speaking] we don't have so many homeless, and we don't have so many hungry ones, so sharing is something traditional, especially in those small cities and small regions like here."*

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- *"We have a big culture of having our own [vegetable] gardens. I don't think, and not many [places in] Europe have this tradition [to the same degree]."*
    - *"Many people in this area have their gardens at home, at least [somewhere close] on some level."*
- *"You can see many young people now just trying to redo the gardens because they don't know how to do it anymore. But I think that things are changing."*
    - *"The city somewhat promotes awareness raising amongst young people keeping the tradition of vegetable gardens."*
    - *"Healthy food trends and [popular] science talk [publicly engage people with] healthy food, and that has a bigger impact."*

Throughout history, Croatia has experienced periods of economic hardship and political instability, which have profoundly affected the country's food culture.

- Traditional Croatian cuisine is characterized by simple, hearty dishes that are often made from inexpensive and readily available ingredients. This is reflected in dishes such as čobanac, a meat stew traditionally made with whatever meat was available, and sarma, a dish made from cabbage leaves stuffed with a mixture of rice and meat.
- The **tradition of food sharing** is also deeply rooted in Croatian culture and is often seen as a way to build community and foster social connections. In rural areas, it was common for families to share their food with neighbors and visitors, often in the form of hearty stews and soups that could feed

Velika Gorica CRFS

If your neighbor or a friend passes by, it's likely you will prepare something for dinner or lunch or anything for to eat. There is no event without food. It's all about the food. The life and the love for food.

We have a lot of food festivals locally all of them are linked to tradition. We have a lot of local restaurants getting food for people offering local

- However, the history of poverty in Croatia has also led to a culture of **resourcefulness and frugality**, where every scrap of food is valued, and nothing goes to waste. This is reflected in dishes such as pašticada, a slow-cooked beef dish traditionally made with leftover meat and vegetables.
- This culture of resourcefulness and frugality in Croatia is likely a contributing factor to the return of vegetable gardens in the country.
    - In recent years, there has been a growing trend towards sustainability and healthier lifestyles in Croatia, which has led to a renewed interest in growing vegetables at home. Vegetable gardens offer a way for people to produce their own fresh, healthy food and can also be a cost-effective way to supplement their diet.
- Moreover, **growing vegetables at home** can be a way to connect with nature and promote a sense of well-being. Gardening has been shown to have physical and mental health benefits. These studies have found that gardening can positively impact various health outcomes, including reducing stress, improving mood, and promoting physical activity (Van Den Berg et al., 2011; Soga et al., 2016).
    - In addition to cultural and health-related reasons, the return of vegetable gardens in Croatia may also be driven by the changing paradigm of food production and consumption. People are becoming more aware of the environmental impact of industrial agriculture and are seeking alternatives that are more sustainable and eco-friendly.

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   2. Leading to new and profitable partnerships
   3. Guaranteeing a transdisciplinary approach
   4. Advancing towards collaborative decision-making and shared responsibility
   5. Promoting Citizen Science and Open Innovation

B. Science education
   1. Promoting innovative problem-solving and critical thinking
   2. Embedding social, economic and ethical principles
   3. Promoting engagement and an entrepreneurial mindset
   4. Empowering citizens to participate in science policy making
   5. Sharing responsibility while solving social challenges
   6. Facilitating a strong interdisciplinary approach, and stakeholders' involvement

C. Governance
   1. Collective responsibility for the impact of R&I
   2. Participatory governance to cope with new and unexpected challenges
   3. Transparent and reflective procedures
   4. Accountability and responsiveness towards society
   5. Anticipation of unintended consequences

Figure 15. Overview best practices in RRI in Velika Gorica

Figure 16. Public Engagement in Croatia: Annual Food event called „Gastro Turopolja“. It is known for its competitive character with lots of involvement from local Firemen

This project has received funding from the European Union's Horizon 2020 research and Innovation program under grant agreement 101000348.

Figure 17. Public Engagement involving all stakeholders including producers in Croatia

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research and Innovation program under grant agreement 101000348.

5.7 Vidzeme (Latvia)

The location and natural vastness of the Vidzeme Region in the North East of Latvia allowed for building a reputation as an international transport corridor to Estonia, Lithuania, Belarus, and Russia. The high concentration of natural resources provides the region's economic competitiveness (agriculture, forestry, and food manufacturing). Natural resources and beauty facilitate tourism and a spirit of health. A vast number of public and private research bodies are located in Vidzeme, including the Latvian High Added Value and Healthy Food Cluster, concentrating on products, technologies, and services developments.

Natural resources ampleness facilitates tourism, health, and rehabilitation services. Diverse bioeconomy areas shape the region's economic development. Many public and private research bodies are located in Vidzeme, including the Latvian High Added Value and Healthy Food Cluster, concentrating on products, technologies, and services developments sustained by natural resource abundance.

Borderless forests: the roots for growing active, resilient entrepreneurs

- *"We have lots of foods and fresh, higher and a lot of cultural heritage who are located in our region, the touristic region actually just be in nature and spend time."*
- *"It feels like a big park. We have a lot of land, most of it covered by forest and agricultural land. We don't have a lot of people here. The national park is the second most visited destination after our capital Riga. It's a very beautiful landscape… and nature as cultural heritage."*
- *"So as an area, it's [inspiring to be] very entrepreneurial."*
- *"Actually, I think it also comes from Soviet Union times. You were in a certain frame and needed to figure out how to deal with the situation. And you always find a way how to do it. … looking for different kinds of business ideas, creative business ideas, to be better as others to find a way to [make it] work. This kind of creativity."*
- *"You can find a lot of really active and creative people here. I really enjoy their power to move on (resilient). They have a very developed business sense (entrepreneurial)."*

Brother countries…and the impact of the Russian-Ukrainian Conflict

- *"We have a border and the most intense cooperation with Estonia. We share a twin city, which is just located on the border. The city is divided into two parts. One part is in **Estonia**, and one part is in Latvia. So we really feel like we have a **brother country**, more with Estonia."*
- *"Less maybe with **Lithuania** (because they are located in the southern part)."*
- *"Before the war started in Ukraine, of course, we also had some cooperation with **Russia."***

The abundance of natural resources in the region, such as forests, rivers, and fertile land, may have provided a foundation for entrepreneurship in agriculture, forestry, and related industries. Additionally, the need to find creative solutions to problems during Soviet rule, such as shortages of goods and resources, may have fostered a culture of resourcefulness and innovation among the people of Vidzeme.

- Entrepreneurship can be influenced by various factors, including cultural values, social norms, and economic conditions. In the case of Vidzeme, the region's natural resources and historical experiences

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may have contributed to a culture of entrepreneurship that values resilience, creativity, and innovation. However, it is essential to note that entrepreneurship is a complex phenomenon that is influenced by a wide range of factors.

Vidzeme CRFS

> We put together food providers and food producers. Restaurants would meet our local food producers, and they finally could talk about what kind of products are really needed for restaurants. And this shortened the food chain. We're working with bottom-up with local action groups.

- A study (Hedberg, 2014) found that natural resource endowments, such as forest resources, were positively associated with entrepreneurial activity in rural areas of Sweden. More specifically, they found that natural resource endowments, such as forest resources, were positively related to the number of new firm start-ups in these areas. The authors suggest that this relationship may be due to the availability of natural resources as inputs for new firms and the potential for resource-based entrepreneurship in forestry and related industries. (Vázquez et al, 2015).
- One study (Scrieciu, 2008) argues that entrepreneurship in post-communist countries (including Latvia) has been shaped by a combination of institutional factors, including the legacy of Soviet-era planning, centralization, and reforms aimed at promoting market-oriented economic growth. The legacy of central planning in these countries may have contributed to a culture of resourcefulness and improvisation among entrepreneurs, who were forced to find creative solutions to shortages and other challenges. The institutional environment, the weak rule of law and corruption, and a lack of access to finance in post-communist countries must be challenged actively by entrepreneurs.
- The effect of this legacy of Soviet-era planning on entrepreneurship becomes more apparent when some papers even describe the notion of violent entrepreneurship (Volkov, 1999).

Bottom-up bridges: local products, restaurants, and tourists

- "We were the first region in also in Latvia to develop this Food Innovation Cluster. And now it's been renamed and spread out over several regions. It involves a lot of entrepreneurs and bigger businesses in the food sector, and also research institutions."
  - *"Our initiative originated bottom up. I'm representing a Latvian food forum. It's an umbrella organization for local action groups. And we're working with local action groups."*
  - *"We've had quite a lot of educational seminars, workshops, and masterclasses and also organized together some joint markets for local food producers."*
  - *"We knew that we had good restaurants, and we knew that we had good local [food] products."*
  - *"We put together food providers and food producers. Restaurants would meet our local food producers, and they could finally talk about what kind of products are really needed for restaurants. And this shortened the food chain."*
  - *"We applied for this European award of gastronomy region and got it!"*
  - *"This region started ten years ago. We never thought that [we would have such a big impact on] outside perceptions of tourists. Now they come to our region in relation to our food [reputation]."*

The Food Innovation Cluster is an organization based in Vidzeme that aims to support the growth and development of the local food industry. The cluster brings together businesses, research institutions, and other stakeholders in the food sector to collaborate on research and development, innovation, and market development.

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- The Food Innovation Cluster was established in 2015 as part of a broader initiative to promote regional economic development in Vidzeme. The European Union's European Regional Development Fund, the Latvian Ministry of Agriculture, and other local partners supported the cluster.
- One of the key objectives of the Food Innovation Cluster is to foster innovation in the food sector through research and development. The cluster works to support the development of new products, processes, and technologies that can help local businesses to become more competitive and expand into new markets.
- In addition to its work on research and development, the Food Innovation Cluster also supports local businesses through networking events, training and education programs, and other initiatives aimed at building the capacity of the local food industry. By bringing together a range of stakeholders from across the food sector, the cluster aims to create a dynamic and innovative ecosystem that can help to drive economic growth and create new opportunities for the region.

Bottom-up innovation: Kids teach us the importance of harmony with nature

- *"Our initiative originated bottom up. I'm representing a Latvian food forum. It's an umbrella organization for local action groups. And we're working with local action groups."*
- *"Before this project, we had a living lab that understood how amazing it is to involve small players from bottom to top, really everyone who is involved in the food system."*
    - *"We started with kids. You see how enthusiastic and inspired they are to connect with food, understand how the food is produced, how it comes to them, and enjoy this process. Then you understand that it's not only about what we are eating but also more about how we are living in general with nature […] like a philosophical way as well."*
    - *"The idea was that kids are not eating healthy at school or at kindergarten, so we wanted to show them what it is and how it grows. To make it like a game for them and to understand so they will eat healthily. It was like an education in the shape of an [practical] experiment."*
    - *"I have a kid, and she's 14 and acting like a teenager already. In school, it's about healthy food and healthy eating. But what I see in reality is this was ditched [by teenagers]. It doesn't work in the real world, you know? Everybody's talking about theories, you know, and then there is the practice."*
        - *"How do you let them [kids] get in touch with food? We went to producers and to a field where they have seen how it [food] grows, how they can pick it and clean it, how they can make themselves something, you know, to understand the entire process."*

Children are often enthusiastic and inspired to learn about where their food comes from for various reasons. Here are a few possible reasons:

- Children are naturally curious and love to explore the world around them.
- Many children have a strong connection to nature and the outdoors, and learning about where their food comes from can help them to develop a deeper appreciation for the natural world.
- Children are often interested in learning about health and nutrition and understanding where their food comes from.
- Many children enjoy hands-on learning experiences, and learning about where food comes from can provide a fun and engaging opportunity to explore the world around them. Activities like visiting a farm, planting a garden, or cooking a meal can be exciting and enjoyable for children, ng about health and nutrition and understanding where their food comes from.

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Figure 18. Overview best practices in RRI in Vidzeme Region

Figure 19.
Left: food courses for staff in public kitchens in Vidzeme, focusing on climate-friendly diets.
Right: Science Education in Vidzeme
Under: Citizen Participation in Vidzeme

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5.8 Iași (Romania)

Food system transformation through local partnerships and projects has been part of the food strategy of the city of Iaşi. By investing over 4 million euros to structure the agri-food system, the city aims to overcome existing barriers and develop sustainable and resilient urban food system policies. By creating partnerships between public and private entities across regions and nations addressing, the city aims to address food-related needs. This happens in the form of several initiatives such as Green Weekend Market (promoting local products), Made in Moldova (promoting the potential of local products internally and internationally), and Slow Food Youth Network (debates on local products and traditions).

Different foods for different generations?

- *"The older generation is not concerned with the provenance, or the welfare aspect... The taste is the main trigger."*
- *"The young generation wants better food: healthy and nutritious food for their children."*
    - *"They empower the short supply chains; they want […] organic, ecological food."*
    - *"They want **healthier things, but they don't trust the local supplier:***
        - *We try to put them together to build and regain this trust in the food system.*
        - *We want to keep engaging with a group of stakeholders consisting of different people. We have a stakeholder network of about 50 or 60. Two examples:*
        - *During the pandemic, we did the meetings online, yet we gave away free products to prove [the quality to] consumers and then discussed with them online. This was a successful activity. We try to do all kinds of activities to show them which producers are very serious in this (guaranteeing the quality of products)."*

These stories from Iași's involvement in Cities2030 indicate a paradigm shift for younger people in food, with an increased emphasis on healthy food choices. This shift can be considered to be driven by a variety of factors.

- These factors include concerns about the rising rates of obesity and chronic diseases such as diabetes and heart disease, as well as a growing awareness of the impact of food choices on the environment.
- Another factor driving this shift is the rise of social media and the internet, making it easier for younger people to access information about healthy eating and connect with others who share their interests. This has led to the emergence of online communities focused on healthy eating and the popularity of food blogs, cooking videos, and other online resources promoting healthy eating.

People often tend to trust local food producers more than sizeable industrial food companies because they believe that locally-produced food is fresher, healthier, and safer. Additionally, people may feel more connected to their local community when they support local food producers. They may have more opportunities to build personal relationships with the producers and learn more about the food production process.

- However, there may also be cases where people in Iași may have concerns about the safety or quality of locally produced food, particularly if there have been incidents of contamination or other issues in the past. In these cases, people may be more likely to turn to larger food companies or to imported food, which they perceive as being safer and more reliable. The following quote can provide more insights into the distrust of local products.

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Better citizen-producers and governance dialogue to tackle fake products

- *"We want to keep engaging with a group of stakeholders consisting of different people."*
  - *"We had some mafia [corruption in the supply chain] on the agriculture market in cities [selling fake local products]. Consumers began to mistrust the [local] producers. They were part of a mafia network [selling fake local products]. Things are getting better, but it is a problem of the administration [quality labels]. Local food markets are managed by the local administration, and sometimes, they don't know what to do."*
    - *"We want more transparency and*
    - *we are building a serious [reputed] brand recommending local producers. This is a form of gaining trust, and we recommend it based on many factors."*
    - *"Making a connection between administration, local businesses, and local producers. The **main barrier** in our food system is **between governance administration and producers**. They share common problems: bureaucracy, the lack of digital tools, the lack of [public] interest, and others."*
  - *"They want to solve this problem. This is our foremost satisfaction [accomplishment]."*
    - *"We have a platform with 100 producers to guarantee [the quality to the consumers]. We know how the local producers work, and we know their products. We do [organize] meetings between them and local consumers."*
  - *"Within Cities2030, we did the biggest fair in organic food with the participation of about 12,000 people. We can break down barriers to consuming local products."*
    - *"The municipality of Iași saw the potential of this action. This year, this fair will now take place at least once every three months."*
    - *"We gathered 40 producers, and we had [product] demonstrations and workshops with children because they are triggering their families. We presented organic products and traditional products. The urban consumers were very pleased. [After the first purchase,] they kept buying from these [local] producers after the event."*

RRI in Horizon 2020 emphasizes the importance of considering societal values and ethical principles in research and innovation processes. In the context of removing governance-related barriers to trust in local products, RRI in Horizon 2020 recommends that stakeholders **engage in a dialogue** to identify and address concerns related to **governance** and trust in the production and consumption of local products.

Iași seems to be a wonderful example of success in engaging with local communities, civil society organizations, and other stakeholders to understand their needs and concerns and involving them in the design and implementation of research and innovation projects. Specifically, the process seems to match the RRI agenda for Horizon 2020, recommending the following actions to remove governance-related barriers to the trust of local products:

- Foster transparency and accountability in the production and supply chain of local products, including labeling and certification mechanisms that provide clear information about the origin and quality of the products.
  - **Made in Moldova** (promoting the potential of local products internally and internationally)
- Encourage the participation of local communities and civil society organizations in the design and implementation of research and innovation projects (such as Cities2030) related to local products to ensure that the needs and concerns of local stakeholders are taken into account:
  - **Green Weekend Market** (promoting local products)
- Foster collaborations between researchers, policymakers, and other stakeholders to co-create governance frameworks that support the production and consumption of local products responsibly and sustainably.
  - **Slow Food Youth Network** (debates on local products and traditions).
- Promote the use of open data and open science practices to enhance transparency and accessibility of information related to the production and consumption of local products.
  - Also, in terms of open data and open science, Iași seems like an interesting case to look at citizen science based on the following interview quote:

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Restore public trust through transparency in citizen science

- *"**We work only with open science**. One of our websites offers the databases publicly. I want them to be public.*
- *When you are talking about innovation, I forgot to tell you there are two other main actors. That is our institution, Romanian academia's branch, with the 12 Institutes of research."*
- *"We also have a component of knowledge transfer. As researchers, we do that with scientific articles but also through reports for the public reports [like this White Paper]. We have a lot of public reports, mostly on organic food; we do training and workshops. These activities are a part of the Cities 2030 project, and our living lab is kind of an umbrella for all our actions [incl other projects]."*
- *"We work in **Quadruple helix,** focusing on administration, education/academia, business, and society."*
    - *"We put local actors and stakeholders together in a series of a series of workshops to discuss the problems within our food systems."*
    - *"We have this hypothesis that **local stakeholders have tacit unknown knowledge**. They have ideas they don't [even realize they] know about, and they're putting it all together. These ideas come to life and give us precise data to analyze the problems within this food system. Then we analyze the problems and meet with them again to discuss and discover possible results, and maybe we will discuss policies and strategy or put together a White paper or report."*

What better place to promote RRI …than a university city?

- *"**A university city is more dynamic**. Look at Edinburgh. **Iași is the cultural capital of Romania,** where we had the first university. We are a university town with maybe 60,000 students. The food system is huge. We have 500,000 people in the metropolitan area."*

Local tradition in science education: Honey bee workshops in high schools.

- *"Some of the producers trained [special] personnel to present in workshops with children because they know if they convince the kids they come, they will convince the parents. For example:*
    - *"A big honey producer brought a honey bee structure and showed children how honey is made."*
    - *"Other producers taught the children to make pasta, eat healthily in the morning, and so on."*
    - *"They also go to schools for other actions inspired by the Finish Living Lab [in Cities2030]."*
    - *"At the same time, in Romania, we have a national project. Students go to meet businesses and cultural institutions in extracurricular learning sessions. For two weeks a year, schools have to do [organize] extracurricular activities with businesses."*

Ukrainian-Russian war and its impact on a student city in Romania

- *"We are a little **isolated** because of the infrastructure. Our region is the only region in Romania where we don't have good motorways and trains, but it is a city that is developing very fast. We were a little lucky with the airport because the Americans needed the bigger airport here in 2014 when Crimea was taken by Russia. So many businesses came to Iasi. Also, the IT sector is very important here."*

- Iași is considered an important cultural center locally, with a rich history dating back to the medieval period. It is home to many museums, theaters, and cultural institutions, including the Palace of Culture, the National Theater, and the Moldova State Philharmonic. The city also hosts several annual cultural events and festivals, such as the Iasi National Theater Festival and the International Poetry Festival. We can find more evidence of university cities being more vibrant.
    - Authors in one study (Grodach et al., 2013) surveyed 52 US cities to examine the relationship between cultural development strategies and urban revitalization. They found that cities with a strong focus on cultural development tend to be more vibrant and diverse and that university towns often have a particularly strong cultural scene. The authors argue that universities can contribute to the cultural vitality of their host cities by attracting creative

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individuals and resources, providing cultural and educational programs, and promoting collaboration between the university and the community.

- Another study (Rappaport et al., 2003) confirms that metropolitan areas with higher levels of college graduates tend to have more diverse and dynamic economies. The authors argue that this is due to the positive spillover effects of universities, such as increased innovation, entrepreneurship, and cultural exchange.
- As a university city, Iași is home to several prestigious universities, including Alexandru Ioan Cuza University, one of Romania's oldest and most respected universities. With a large student population, Iasi has a vibrant and dynamic atmosphere, with many cafes, bars, and restaurants catering to the student community.
- Iași's reputation as a cultural capital and a university city are closely intertwined, with the city's cultural institutions and events benefiting from the energy and creativity of its young, educated population.

- One of the ultimate goals of RRI is to ensure that scientific research and innovation respond to a society's needs and aspirations of a society, while also promoting sustainable and ethical practices aligned with local values and traditions. By **incorporating beekeeping education into the high school curriculum**, Romania is preserving its cultural heritage and promoting sustainability and environmental awareness among its future generations.
  - Honey is a traditional product of Romania and has been produced in the country for centuries. Beekeeping traditions have been passed down through generations. The country is known for its high-quality honey, which comes in various flavors and types, depending on the region and the type of flowers from which the bees collect nectar.
  - Romanian honey is often characterized by its natural, raw, and unprocessed form, with many beekeepers using traditional methods and avoiding chemicals or antibiotics. Some of the most popular types of honey produced in Romania include acacia honey, linden honey, and sunflower honey. In recent years, Romanian honey has gained international recognition for its quality and thus becoming a popular export product.
  - The municipality of Iași saw the potential of this action, and this year, this fair will take place at least once every three months.
  - Aligned with RRI principles, this educational policy can encourage students to engage in responsible practices in beekeeping, including sustainable land use, proper hive management, and safe harvesting techniques. Students can learn about the importance of pollinators in ecosystems, the threats they face, and the role they play in maintaining biodiversity.
  - Furthermore, this educational policy can foster social innovation by allowing students to develop entrepreneurial skills and explore potential career paths in the honey industry. Students can learn about the marketing, distribution, and branding of honey products and the importance of quality control and food safety standards.

Iași CRFS

The main barrier in our food system sits between governance admin and producers. Bureaucracy, the lack of digital tools, a lack of public interest. We put stakeholders together in workshops. Within Cities2030 we do organic food fares every 3 months with 12,000 people breaking down barriers for consuming local products. Producers do workshops with children. If the kids come, the parents will come. A big honey producer brought a bee structure to show children how honey is made.

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- Some schools in Romania may choose to collaborate with businesses to provide their students with experiential learning opportunities. It is also possible that there may be regional or local policies that vary from the national standard.

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   5. Anticipation of unintended consequences

Figure 20. Overview best practices in RRI in Iași

Figure 21. Public Engagement at Iași through organic food fares up to 12,000 people breaking down barriers to consuming local products

This project has received funding from the European Union's Horizon 2020 research and Innovation program under grant agreement 101000348.

5.9 Bremerhaven (Germany)

Bremerhaven traditionally played a significant role as a port and is known in the food industry as Germany's most important location for fish processing and handling. Today, the local fishing industry comprises different parts of the entire value chain in the industry. To further build on this, the city provides a broad range of food-related expertise in research, education, marketing, and product quality. Research institutes such as TTZ can be considered innovative providers of applied research and development, customer-oriented training, and technology transfer services. TTZ also has experience in various projects linked to process optimization, resource efficiency, and circular economy nationally and internationally.

There is a strong culture of seafood and fish dishes in the city, and seafood is an important part of the local cuisine. The city has several seafood restaurants and fish markets where visitors can sample various fresh fish dishes. Some popular seafood dishes in Bremerhaven include smoked eel, herring, and plaice. In addition, the city hosts an annual fish festival called the "Bremerhaven Fish Festival," where visitors can taste a wide range of seafood specialties.

Turning a crisis into an opportunity: sustainability as a bridge between food & tourism

- *"If you eat fish fingers in Germany, you can be sure that they were produced in Bremerhaven. Most of the people in Bremerhaven like to eat fish. It's part of the eating culture. We have a lot of fish restaurants and fish."*
- *"In the 60s or 70s, when the EU regulation on fishery kicked in and Bremerhaven used to be the most extensive fishery fleet in Germany [and today], there is no fishery anymore."*
- *"We have a very close connection to the sea. Historically Bremerhaven was built because Bremen, our big Sister City, wanted a harbor close to the sea. And we had a big shipbuilding industry until the 1970s and 1980s when we had the steel crisis."*
    - *"This is why the fishery industry in Bremerhaven had to find new solutions to survive."*
    - *"We renovated the old fish harbor into a kind of 'fishery world' with one fish restaurant next to the other as a tourist destination."*
    - *"You get a lot of people on the weekend from Bremer who want to get out of the city. I think most of our tourism comes from around 200 kilometers away, not just from Bremen but from the whole area. We get short and long stays."*
    - *"At the moment, we can see a change towards a better quality of fish. People are ready to pay for better quality. It became a quality product more than a volume product. Healthy food is a mega trend at the moment in society. Everybody talks about food and health issues."*

While **the closure of fisheries in Bremerhaven was undoubtedly a challenge** for the local fish processing industry, **it also spurred innovation and changes in the sector towards more sustainable and innovative practices** that highlight the local fish food culture to tourists and locals.

- In the late 20th century, the fishing industry in Bremerhaven and other ports in Europe faced challenges due to overfishing and declining fish stocks. As a result, many fisheries in Bremerhaven were closed or met strict regulations to prevent further depletion of fish populations. This had a significant impact on the local economy and the fish processing industry.

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- However, the closure of fisheries also led to new opportunities for innovation and sustainability in fish processing. In response to the decline of wild fish stocks, there has been a growing focus on aquaculture and fish cultivation in more sustainable ways. Many fish processors in Bremerhaven have shifted their focus to **sustainable aquaculture** and have developed new methods for raising and processing fish. The closure of fisheries has led to the development of new markets for alternative seafood products, such as seaweed and other marine plants, which can be harvested sustainably and processed into various food products.
- The renovation strategy for the old harbor in Bremen was designed to preserve the area's historic character while modernizing its infrastructure. The public was engaged by making it more attractive for visitors leading to new and profitable partnerships.

Bremerhaven CRFS

> We have a big science community but the challenge at the moment is actually getting it in the policy. With Cities2030, we do a policy lab where we include politicians and we hire a moderator.

• The renovation project ("Haven Höövt") was carried out between 2006 and 2011. The project's main goal was to preserve the historic character of the harbor while modernizing the infrastructure and making it more attractive for visitors.

- Preserving historic buildings: The renovation project focused on protecting the historic buildings in the harbor area, such as the old warehouses and the customs house. The former Maritime Board of Inquiry is one of the few landmark buildings which is a testament to the city's history as a port of emigration and is a valuable building in architectural terms at the entrance area of the Havenwelten tourism facility.
- Restoring the waterfront: The waterfront area was restored to its original appearance, with new paving stones, benches, and lighting that were designed to be in line with the historic character of the harbor.
- Integrating modern elements: The renovation project also included integrating modern elements into the harbor area, such as a new marina and a water taxi service designed to be in harmony with the historic character of the harbor.
- Creating a cultural (and touristic) destination: The renovation project also aimed to create a cultural destination in the harbor area by integrating museums, galleries, and other cultural institutions into the site.

CRFS policymaking: Cities2030 bridging the gap between citizens and politicians

- *"The challenge at the moment is to involve us [citizens] in the policy. The food topic is something they [politicians] don't want at the moment. It comes last on their agenda. We have a huge amount of long-time unemployment in Bremerhaven. We have the war in Ukraine and migration."*
- *"They [politicians] don't see that CRFS could be a key solution to all the current problems we are facing. … We forgot climate change. It is important to make them realize how important this [long-term] topic is. We are working on that. Is there a gap between the citizens who feel it's urgent to address climate issues and CRFS, but the politicians are less prepared to work on it? Definitely, yes!"*
    - *"There is no responsibility [commitment] for sustainability; we don't have a sustainability office [or city climate plan], and we don't have it integrated into our tourism. Nothing. This is just the beginning."*
    - *"With Cities2030, we are planning a policy lab that includes politicians, administration, and a food board involving people from the area, not only the city. Schools and kindergartens, talking to farmers and local food producers to regularly look at sustainable food purchases [short chain] and organic food from the region. The municipality and politicians will also be brought in, and we hired a moderator, an agency specialized in coaching municipalities through this whole process of creating a sustainable CRFS."*
    - *"If we didn't have this project (Cities2030), we wouldn't have a food board anymore because there was no funding and commitment."*

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- As local governance needs to cope with new and unexpected challenges, such as COVID-19 and the Ukrainian war, there is little time left for tackling long-term challenges in the field of sustainability and CRFS. There is a lack of a more specific city strategy for sustainable CRFS and a separate office to follow up. This needs to be integrated into the city department to be transparent and reflective in its procedures. Once this is the case, the policy will be able to be more responsive towards society again, where healthy food is one of the main topics on citizens' minds.

Bremerhaven is getting ready for vegetarian bratwurst: Joyfully whistling pigs (ich glaube mein Schwein pfeift!):

- *"The Technology Transfer Centre of Bremerhaven connects the municipality and the University of Applied Sciences Bremerhaven to …Bremerhaven [the citizens and companies]. They are researching food and food processing topics. It's an association with the University of Applied Science. They transfer technology [science] and innovation to the people [and food industry]."*
- *"TTZ has a big food laboratory with eight vegetarian bratwurst and experiments with different kinds of bread. They develop food for the market and look at market readiness. "*

Constant innovation requires new knowledge and requires a strategy that makes each player unique in the market. The Technology Transfer Center (TTZ in German) Bremerhaven is an independent research service provider conducting applied research and development in the areas of food and resource efficiency. It aims to be an engine for innovation by bringing together research and local businesses.

- TTZ was founded to facilitate technology transfer from the research of Bremerhaven University of Applied Sciences based on the needs of the regional economy in this way, facilitating a strong interdisciplinary approach, and stakeholders' involvement
- TTZ Bremerhaven aims to optimize the composition of existing products and/or modify process technology. In this way, the goal is to achieve a new level of quality, streamline processes and resources to be used more efficiently, and produce better products while costs are to be reduced.
- Small and medium-sized companies, in particular, are not always up to date on the latest technologies and insights available and thus outsource research and development tasks to TTZ Bremerhaven, promoting innovative problem-solving and critical thinking.
    - It is amazing to see initiatives aligned with the German food culture of bratwurst (typical German sausage) and bread (yet not fully aligned with Bremerhaven's more local fish food culture as a port city).
- By offering access to expert knowledge for highly specialized issues, obstacles to opening up new markets are more easily overcome. TTZ Bremerhaven is closely linked locally and regionally with the economy and the scientific institutions of the region. Their technical center of 1000 square meters technical center allows them to offer the latest plant and laboratory technology for tests and industrial upscales.

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A. Public engagement
   1. Enhancing and widening participation at all R&I stages
   2. Leading to new and profitable partnerships
   3. Guaranteeing a transdisciplinary approach
   4. Advancing towards collaborative decision-making and shared responsibility
   5. Promoting Citizen Science and Open Innovation

B. Science education
   1. Promoting innovative problem-solving and critical thinking
   2. Embedding social, economic and ethical principles
   3. Promoting engagement and an entrepreneurial mindset
   4. Empowering citizens to participate in science policy making
   5. Sharing responsibility while solving social challenges
   6. Facilitating a strong interdisciplinary approach, and stakeholders' involvement

C. Governance
   1. Collective responsibility for the impact of R&I
   2. Participatory governance to cope with new and unexpected challenges
   3. Transparent and reflective procedures
   4. Accountability and responsiveness towards society
   5. Anticipation of unintended consequences

Figure 22. Overview best practices in RRI in Bremerhaven

Figure 23. Public Engagement Action Week in Bremerhaven with Keynote speeches on the topics of sustainability and nutrition, tasting of products with regional and novel proteins, exhibition of the project "Bremerhaven University for Future", and exhibition of regional initiatives and food pioneers.

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5.10 Murska Sobota (Slovenia)

By incorporating more than 70 local farmers, food producers, and cooperatives, the Slovenian city of Murska Sobota aims to innovate the production process in a greenhouse and open-air fields with logistics from distribution centers. The city wants to promote local cuisine by implementing different events to increase visibility and raise awareness of local/healthy food. Also, short-chain innovation and innovative business models and technologies aim to increase the proportion of local and safe food. Different means of sales in public (schooling sphere, retirement homes) and private bodies (restaurants, health resorts, local retail and online stores, and organizations such as Green Point and Short Food Supply Chain) to further expand the local food transition.

Public engagement and community consumer trust: is everybody happy?

"We are a rather small region. In the Cities2030 project, we are a region [and not a city]. But on the regional [city] level, everyone knows everyone in the food system."

- *"Perhaps the smallness is our strength as people can be more together and connected. This is how it works, and a good thing, […] You know everybody."*
- *"We discussed with another Cities2030 partner how they connect and build a network. For us, it's a usual thing [already in place] because we are so small that usually everyone knows everyone when you're visiting a workshop. Being small on this scale is, in this case, it's good because you can easily get connected [publicly engage] with others."*
    - *"The strategy is that everyone in the value chain should be happy. This is hard to achieve because you have farmers on one end and consumers on the other. And everything in the middle. We are working on both ends."*
        - *"Consumer awareness [is important]. We are trying to say it's good to buy locally and support [the community]. It's better [for the community], of course, and it's more healthy."*
        - *"We are trying to help farmers with new technologies and so on to produce more or to produce healthier with less."*

The quotes provided highlight several themes related to public engagement within RRI in the context of the Cities2030 project within Horizon2020.

- Enhancing and widening participation at all R&I stages:
    - The small city (and region) size in the Cities2030 project allows for easy connection and engagement among stakeholders, as everyone knows each other in the food system at the regional level. This creates a sense of community and encourages collaboration and knowledge sharing among farmers and other stakeholders.
    - The project aims to achieve happiness and satisfaction for everyone in the value chain, including farmers and consumers, by working on both ends of the chain. This implies that different stakeholders are actively involved in decision-making processes, and their needs and perspectives are aimed to be taken into consideration in the context of a win-win.
- Leading to new and profitable partnerships:
    - The smallness of the region in the project allows for building networks and partnerships quickly, as everyone knows each other in the food system. This promotes collaboration and cooperation among stakeholders, leading to the formation of profitable partnerships.

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Murska Sobota CRFS

> In the value chain everyone should be happy. This is the whole idea of building cooperatives and working with farmers. Everyone knows everyone in the food system.

- The support mechanisms within the group of farmers, where they suggest and share innovations, demonstrate how partnerships and collaborations can lead to the developing and implementation of new ideas and technologies.

Guaranteeing a transdisciplinary approach:

- The project involves various stakeholders, including farmers, consumers, public schools, and larger organizations as clients. As a result, a transdisciplinary approach is used that incorporates different perspectives and expertise.
- The focus on consumer awareness, promoting buying locally and supporting the community, and helping farmers with new technologies to produce healthier with less indicates a holistic approach that considers the food system's social, economic, and environmental aspects.

Advancing towards collaborative decision-making and shared responsibility:

- The strategy of working on both ends of the value chain to achieve happiness and satisfaction for everyone implies a collaborative decision-making approach where different stakeholders are involved in decision-making processes and share responsibility for the outcomes.
- The idea of building cooperatives and working with farmers to offer competitive prices for their products reflects a shared responsibility approach, where stakeholders work together to achieve mutual benefits and create a more sustainable and resilient food system.

Promoting Citizen Science and Open Innovation:

- The support mechanisms and knowledge sharing among farmers within the community, where they suggest and use innovations to help each other out, demonstrate the promotion of Citizen Science and Open Innovation principles, where stakeholders actively participate in generating and applying knowledge.
- The involvement of public schools and bigger organizations as clients for the distribution of vegetables implies the engagement of citizens and organizations in the food system, promoting Citizen Science and Open Innovation approaches.

United we continue to stand: A community and its advantages of scale

- *"There's it's an interesting support mechanism in this big group of farmers. It's nice that you can suggest innovation, and then they actually use it, and you can help each other."*
- *"Do you feel there is a community that helps each other also amongst the farmers, or is it more like secrecy? Like I have a secret weapon, I'm trying something new, and it's working really well. I'm not telling anybody else. "*
- *"Yeah, it is opening a little bit, probably now because they see that they cannot do it alone, of course. And yeah, sharing is caring."*
- *"It's easier if you are already involved in some public schools [bigger organizations as clients] where you distribute the vegetables [in higher volume], so it's easier to survive as you get bigger with the distribution."*

Some elements of public engagement within Responsible Research and Innovation can be observed:

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- Enhancing and widening participation at all R&I stages: New farmers coming to Murska Sobota are welcomed as a good option because the region lacks farmers. This indicates that there is a need to widen the participation and involvement of farmers in the region's agricultural activities. This theme emphasizes the importance of inclusivity and involving diverse stakeholders, including newcomers, in research and innovation processes.
- Promoting Citizen Science and Open Innovation: Younger farmers may search for niche products, indicating their potential interest in exploring innovative and sustainable farming practices. This aligns with the theme of promoting open innovation and citizen science, which encourages the active participation of farmers in co-creating solutions to societal challenges through research and innovation.
- Leading to new and profitable partnerships: Younger farmers are joining the region, which can lead to new partnerships and collaborations in the agricultural sector. This aligns with the theme of fostering partnerships among different stakeholders to promote research and innovation that can result in profitable outcomes for all involved parties.
- Advancing towards collaborative decision-making and shared responsibility: Decisions about farming activities and business models are being made collaboratively, as older farmers are quitting due to the perceived lack of a future in the existing business model.

Building a blockchain food system community: singling out the cheaters and rallying national support

- *"We are collaborating mainly with the University of Maribor."*
- *"We are developing this blockchain-based traceability system within the supply chain."*
- *"We are doing this with the help of the university. They are the technological partner in this one, and we are implementing it. We have our own technical team behind it because, without it, this is impossible."*
- *"Basically, the customer can scan the QR code of the product, and he can see the whole process of growing per phase. So from the beginning to till the end and to do the distribution with the dates with pictures. So and, of course, the certificates behind the product and so on."*
    - *"So this blockchain allows creating more visibility that allows you to protect your brand and to detect malpractice and corruption or people that try to freeride and ride your brand. This is a way to protect local products and to make sure people understand what is certified and what is not to show evidence of sustainable processes."*
        - *"It's evolving, and it's developing. Of course, all this has to be able to prove to the customer that this is really local food and justify the price."*
        - *"You still have some bad practices in the region that make things negative and not always trustworthy. You have lots of examples where food is being sold on the market as regional. There has been some news on this."*
        - *"Some guys were coming to our food farmers' shop to buy. The other part [of their products] was basically imported vegetables from Italy and Greece, mixing everything together. He was a little bit outside [our community]."*
    - *"Politicians and the mayor see this work you're doing with blockchain and with the whole part. This is a good thing because our former mayor is now a minister, it gets posted in WordPress [media], and there is support from the [national] government."*

The Cities2030 project incorporates governance principles of RRI, such as collective responsibility, participatory governance, transparency, accountability, and anticipation of unintended consequences, in building a blockchain-based traceability system for the food supply chain to improve local food production and address challenges in the region.

- Collective responsibility for the impact of R&I: There is a collaborative effort between different stakeholders, such as the University of Maribor, the technical team, and the local food farmers, in

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building a blockchain-based traceability system for the food supply chain. Different actors come together to work towards improving the impact of research and innovation in the region.

- Participatory governance to cope with new and unexpected challenges: The work being done with blockchain and the traceability system is seen by the local government, and there is support from the national government. This indicates the involvement of participatory governance processes where decision-makers at different levels are engaged in the project.
- Transparent and reflective procedures: The quote mentions that the blockchain-based traceability system allows for more visibility and transparency in the food supply chain, including information about the process of growing, distribution, and certifications. Openness and reflection must be promoted in research and innovation processes to ensure accountability and trustworthiness.
- Accountability and responsiveness towards society: The need to protect local products and ensure that customers understand the certified and sustainable processes reflects the theme of accountability and responsiveness towards society. In this way, research and innovation efforts are aligned with societal needs and expectations, and stakeholders are held accountable for the outcomes of their actions.
- Anticipation of unintended consequences: There are still some bad practices in the region, such as the covert selling of imported vegetables as regional products. This indicates the need to anticipate unintended consequences, such as potential fraud or misrepresentation, and to address them through blockchain technology to ensure the accuracy and reliability of the traceability system.

The same interview also touches upon several themes within Science Education:

- Promoting innovative problem-solving and critical thinking: Developing a blockchain-based traceability system for the food supply chain requires innovative problem-solving and critical thinking. It involves using technology to address issues such as detecting malpractice, corruption, and fraudulent practices in the food market and ensuring that local products are certified and sustainable. It also requires continuous improvement and evolution of the system to adapt to changing needs and challenges.
- Embedding social, economic, and ethical principles: The use of blockchain technology in the food system aims to create more visibility and protect local products. By ensuring that customers can access information about the entire process of growing and distributing food products, including certificates and evidence of sustainable operations, social, economic, and ethical principles are embedded in the system. This promotes transparency, trust, and accountability in the food supply chain.
- Promoting engagement and an entrepreneurial mindset: The project involves collaboration with the University of Maribor as a technological partner and using QR codes and other innovative technologies to engage customers and empower them to make informed choices. This promotes an entrepreneurial mindset by leveraging technology to create new opportunities for local food producers, protect their brands, and justify prices based on provenance and sustainability. It also involves engagement with policymakers and government officials, further promoting stakeholder engagement's importance in science policymaking.
- Empowering citizens to participate in science policy-making: The mention of politicians, mayors, and government support in the quotes indicates that the project has an impact on science policy-

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making at the national level. This suggests that citizens, including local food producers, are empowered to participate in science policy making through the use of blockchain technology and traceability systems, which provide evidence-based information and insights for decision-making.

- Sharing responsibility while solving social challenges: The development of a blockchain-based traceability system for the food supply chain involves sharing responsibility among various stakeholders, including the University of Maribor, the technical team, food producers, customers, policymakers, and government officials. This collaborative approach reflects the importance of shared responsibility in addressing social challenges related to food fraud, malpractice, and mistrust in the food system.
- Facilitating a strong interdisciplinary approach and stakeholders' involvement: The collaboration with the University of Maribor, the involvement of technical teams, food producers, policymakers, and government officials, and the interdisciplinary nature of the project that combines technology, policy, and sustainability aspects, reflects a robust multidisciplinary approach. This approach promotes stakeholder involvement and engagement and underscores the importance of interdisciplinary collaboration in addressing complex challenges in the food system.

A. Public engagement
   1. Enhancing and widening participation at all R&I stages:
   2. Leading to new and profitable partnerships
   3. Guaranteeing a transdisciplinary approach
   4. Advancing towards collaborative decision-making and shared responsibility
   5. Promoting Citizen Science and Open Innovation

B. Science education
   1. Promoting innovative problem-solving and critical thinking: blockchain as a solution for more transparancy
   2. Embedding social, economic and ethical principles: building cooperatives, no corruption
   3. Promoting engagement and an entrepreneurial mindset: volume product and tipping point
   4. Empowering citizens to participate in science policy making: implement technology from university
   5. Sharing responsibility while solving social challenges: sharing blockchain team
   6. Facilitating a strong interdisciplinary approach, and stakeholders' involvement

C. Governance
   1. Collective responsibility for the impact of R&I
   2. Participatory governance to cope with new and unexpected challenges
   3. Transparent and reflective procedures
   4. Accountability and responsiveness towards society
   5. Anticipation of unintended consequences

Figure 24. Overview best practices in RRI in Murska Sobota

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Figure 25: Science Eduction and producers in Murska Sobota's living lab fully aware that they do not have to do it all alone

Figure 26: Public Engagement at Murska Sobota living lab: Public engagement: Everyone knows everyone, and community consumer trust

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5.11 Haarlem (The Netherlands)

The municipality of Haarlem initiated an extensive sustainability program that focuses on climate adaptation, energy transition, and circular economy. Several living labs have been created to test new concepts in a practical urban setting. Close cooperation between the municipal government, local business and business organizations, educational institutions, and NGOs has developed an easily accessible network of expertise. Actual living labs, active over a period of two years now, include projects focusing on zero-emission city logistics and combatting food waste. The Haarlem municipality plays a coordinating role for living labs, stimulating an innovative new multi-level working method promoting governmental cooperation between EU Member States, cities, the European Commission, and other stakeholders to stimulate growth and liveability while also tackling social challenges.

Public engagement in democracy: inclusivity through public engagement

- *"The main thing for RRI is how crazy it is that we have COVID-19, we have a war in Ukraine, and our lives continue. But they do affect public engagement, and they do affect CRFS initiatives."*
- *"I'm working for a city, and what has a city do with food? The role is really not that big. There's not just one actor who can turn the wheel and make the decisions. We are living in a house with different doors you can open, and you can have some influence. You are looking for some places where you can interact."*
- *"Inclusivity, public awareness, and public engagement are very important. To step out of little [vocal] groups [echo chambers] and also include (the bigger and) other socioeconomic groups is very important. If we don't do it, we will have many problems."*
- *"Last week, our discussions with the **Eldermen** [public council] made it very clear that we have to keep a good eye on this, not only in our [Cities2030] project but also in general."*

Cultural capital and innovation

- *"Innovation is also happening because we have quite a large part of highly educated people in our city."*

The **culture of public engagement** and dialogue with local government is an important part of Dutch society. It can help promote transparency, accountability, and responsiveness in government decision-making processes. In the Netherlands, there are several mechanisms in place to ensure that citizens are informed about government policies and have the opportunity to provide feedback and input. There are public hearings, town hall meetings, and other forms of consultation where citizens can voice their opinions and concerns.

- In the Netherlands, the "Eldermen" (College van Burgemeester en Wethouders in Dutch) refers to the executive board of a city or municipality. The Eldermen are responsible for the day-to-day management of the city and its affairs, and they work closely with the Mayor.
- In many cities and municipalities in the Netherlands, including Haarlem, the Eldermen hold regular meetings or office hours where members of the public can voice their opinions, ask questions, or seek advice. These meetings can provide a valuable opportunity for residents to engage with their local government and have their voices heard.
- In addition, many cities and municipalities in the Netherlands have established formal advisory councils or other forms of citizen participation to encourage public engagement in local government decision-making. These councils may provide advice and feedback on various issues, from sustainability, urban planning, and development to social welfare and public safety.

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From a comparative perspective, there is a relatively strong culture of public awareness and public engagement through transparent dialogue in the Netherlands. The Dutch government places a high value on transparency, openness, and citizen participation in decision-making processes. In **building environmental citizenship**, a crucial role is played by cultural politics and environmental communication (Burgess et al., 1998).

- A comparative analysis details how representatives from the public, private, and voluntary sectors of cities responded to the challenge of communicating more effectively with citizens about sustainability issues.
- The Dutch environmental education strategy (in Eindhoven) proposed greater **rigor, clarity, and authority** from the local state compared to the UK strategy (in the city of Nottingham).
    - To avoid skepticism and mistrust, there is a need to widen participation in determining local policies and formulate more inclusionary communication forms in sustainability planning and politics.
    - The content and styles of media reporting are crucial in attributing responsibility for public alienation and resistance.
    - Responding to evidence of public resistance to calls for more sustainable practices, workshop participants in both cities focused on what institutions themselves can and should do to progress environmental goals. Workshop participants in both countries acknowledged the urgent need for public, private, and voluntary sector organizations to match their own practices to their environmental rhetoric.
    - Top-down approaches do not work, and mass communication is the main way forward toward creating more sustainable societies. This is done by acknowledging the need for public, private, and voluntary sector organizations to match the city's practices to its environmental rhetoric. In other words, the city engages the public bottom-up and leads by example in its own practices.

Haarlem CRFS

> How crazy is it that we have COVID-19, we have a war in Ukraine and our lives continue. We have to fix this connection [with the citizens] and open our eyes in the cities 2030 Project: Focus on the access to affordable healthy food.

- In the Cities2030 project, political culture and public engagement differences remain fundamental. The **trajectories** each **city** (and nation) will take for moving in the direction of sustainable development **will be negotiated in different ways**.

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Not just the happy few: healthy, sustainable food for all the citizens

- *"The biggest challenge is having access to **healthy, sustainable food for all the citizens in all socioeconomic parts of our city**. That's the bigger challenge."'*
- *"Protocols [policy] cannot be only working for a small part of the citizens or Parliament. Last Friday, we had a meeting with the whole of Haarlem and the Mayor. People are stating that we really have to find the answer to that [issue of inclusion]. So that's it for me; the biggest thing in the Cities 2030 project."*
    - *"A lot of challenges were mentioned. Some are more driven by how to be more innovative or how to promote [communicate] this. But some challenges mentioned were more about the policy-making around it."*
    - *"We can't produce local, sustainable healthy food and have it available only for "the happy few"… We have loads of people in our city that don't have access to it."*

- Collective responsibility for the impact of R&I: The idea is emphasized that society as a whole has a stake in the outcomes of research and innovation and that all stakeholders are responsible for ensuring that R&I has a positive impact on society.
- Participatory governance to cope with new and unexpected challenges: The issue of inclusion was raised at a meeting with the whole of Haarlem and the Mayor. This highlights the importance of involving a diverse range of stakeholders in the governance of R&I to ensure that their perspectives and concerns are taken into account.
- Transparent and reflective procedures: Some challenges mentioned were more about the policy-making around promoting sustainable food and innovation. This indicates the importance of openness and transparency in R&I processes and the need for ongoing reflection and evaluation to ensure that R&I is conducted ethically and responsibly.
- Accountability and responsiveness towards society: Policies cannot work only for a small part of citizens, and the issue of access to healthy, sustainable food is a concern for many people in the city. The importance of ensuring that R&I is conducted in a way that is accountable to society and responsive to its needs and concerns is being highlighted.
- Anticipation of unintended consequences: Producing local, sustainable healthy food and having it available only for a select few is not a viable solution, and many people in the city do not have access to it. This theme is relevant to the interview because it emphasizes the need to consider the potential unintended consequences of R&I and to take steps to mitigate or prevent any negative impacts that may arise.

Science education: start early

- *"We do a project where we try to **teach children about food**. If people go to this school in a certain part of Haarlem and they start telling them about making food from 'lost greens'."*
- *"We also have some **gardens** where the children can **grow their own food** in this in this season. They do education on energy or environmental issues and also food."*
- *"We already have a system for **nature and environmental education**. We would have to plug this into our project. But that's not the case because of the current excessive workload for the students. You only have a certain amount of time you can spend with your students. The kids have to learn to read, write, and do all these things. And then all these initiatives add up."*

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Don't teach people how to fish for tomorrow when they are hungry now.

- *"However, If the children in the classroom didn't even have breakfast that morning because they couldn't pay for it, then you're doing it wrong. Sometimes this happens."*
- *"Some groups don't have access to this healthy natural food locally and say, "**You are trying to educate me on this, and I even I cannot pay for it**" You can foresee that there will be some distress. So we have to be very careful with this."*

Cultural capital and innovation

- *"Innovation is also happening because our city has a large population of higher educated people."*

- Having gardens where children can grow their own food and learn about energy and environmental issues promotes engagement and an entrepreneurial mindset:
  - This is achieved by encouraging children to take an active role in their own food production and learn about energy and environmental issues in the process.
  - Such type of hands-on learning encourages a sense of ownership and responsibility among children and also fosters a deeper understanding of the relationship between food, energy, and the environment. This approach is aligned with the principles of science education, which emphasize the importance of active learning and real-world application.
- The project called 'Forget-me-not' ('Vergeet mij niet' in Dutch) aims to reduce food waste and promote healthy, sustainable food choices in Haarlem.
  - The project focuses on using "forgotten vegetables" in cooking, which were once commonly used but have fallen out of favor in modern diets. The project is a collaboration between various organizations in Haarlem, including the city government, schools, and local food businesses facilitating stakeholders' involvement in an interdisciplinary setting.
  - Teaching children about food and promoting the use of "lost greens" promotes innovative problem-solving and critical thinking: this activity teaches children about the importance of healthy eating and also introduces them to a broader range of vegetables beyond the typical top 12 crops. Encouraging them to use "lost greens" in their cooking teaches them to think outside the box and create creative solutions to problems. This innovative problem-solving and critical thinking is a crucial aspect of science education and is also central to RRI in Horizon2020, as it encourages researchers and citizens to collaborate and find new ways to address societal challenges.
  - The project involves several activities, including cooking workshops for children and adults, distributing "forgotten vegetable" recipe books, and creating community gardens where people can grow their own vegetables. The project also includes a campaign to encourage local restaurants and food businesses to use "forgotten vegetables" in their dishes and reduce food waste by using all vegetable parts.
  - The project is part of a larger initiative in Haarlem to promote sustainable and healthy food choices to reduce greenhouse gas emissions and improve public health. The initiative is also intended to address food insecurity and social

Haarlem CRFS

We have a system for nature and environmental education. However, if the children in the classroom didn't even have breakfast that morning because they couldn't pay for it, then you're doing it wrong.

This project has received funding from the European Union's Horizon 2020 research and Innovation program under grant agreement 101000348.

inequality issues by promoting access to healthy, affordable food for all city residents.

- The need to plug the 'lost greens' project into the existing system for nature and environmental education and the involvement of stakeholders in finding solutions facilitate a strong interdisciplinary approach and stakeholder involvement: By plugging the project into the existing system for nature and environmental education and involving stakeholders in finding solutions, the project is promoting a strong interdisciplinary approach and stakeholder involvement. This type of approach is essential to RRI in Horizon2020, which seeks to ensure that research and innovation are responsive to the needs and concerns of society. By involving stakeholders from a range of disciplines and perspectives, the project is fostering a more holistic and integrated approach to research.

- It is tragic to teach kids how to eat healthy when they cannot afford food because it highlights the inequality and systemic issues in society. Food insecurity and malnutrition can have serious health consequences, especially in children. The ability to access healthy and nutritious food should be a fundamental human right. The focus on access to affordable healthy food, especially for underprivileged groups, embeds social, economic, and ethical principles. These principles are core to Science education in RRI in Horizon2020, which seeks to ensure that research and innovation are inclusive and accessible to all, regardless of social or economic status.

- The emphasis on resolving the connection to the underprivileged and addressing their lack of access to healthy food shares responsibility while solving social challenges: By emphasizing the need to fix the link to the disadvantaged and address their lack of access to healthy food, the project is promoting a sense of shared responsibility among (educational) researchers, policymakers, and citizens. This type of collaborative approach is central to RRI in Horizon 2020, which seeks to ensure that research and innovation are responsive to the needs and concerns of society. By sharing responsibility and working together to address social challenges, the project promotes a sense of collective ownership and responsibility among stakeholders.

Teachers, leave our kids alone?: from a kid with farmer's cow milk to a career in CRFS

- *"I grew up in the countryside, and one of my earliest memories was taking my bike and cycling up to the neighbor's cows. We had agreed with the farmer that we could fill our buckets [for our own use] at the tank with raw milk. I would go with those buckets,* ***and I just felt like I was cheating the system****. We're not paying the supermarkets, and there was no [professional] logistics involved. We got it straight from the farmer. And it was great."*
- *"It was a good way to grow up, and I didn't know it back then, but that was really like local food production and a short supply chain. That was actually one of the things that subconsciously kind of drove me into the career that I'm pursuing now [in CRFS]."*

This beautiful anecdote about the interviewee's childhood experience of local food production and the short supply chain serves as an example of how informal science education outside the classroom and early experiences can shape one's career and promote the values of local and sustainable food production.

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A. Public engagement
   1. Enhancing and widening participation at all R&I stages
   2. Leading to new and profitable partnerships
   3. Guaranteeing a transdisciplinary approach
   4. Advancing towards collaborative decision-making and shared responsibility
   5. Promoting Citizen Science and Open Innovation

B. Science education
   1. Promoting innovative problem-solving and critical thinking
   2. Embedding social, economic and ethical principles
   3. Promoting engagement and an entrepreneurial mindset
   4. Empowering citizens to participate in science policy making
   5. Sharing responsibility while solving social challenges
   6. Facilitating a strong interdisciplinary approach, and stakeholders' involvement

C. Governance
   1. Collective responsibility for the impact of R&I
   2. Participatory governance to cope with new and unexpected challenges
   3. Transparent and reflective procedures
   4. Accountability and responsiveness towards society
   5. Anticipation of unintended consequences

Figure 27. Overview best practices in RRI in Haarlem

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5.12 Vicenza (Italy)

The stunning and internally acknowledged **Library La Vigna** is one of the libraries in the city that provides a home basis for the Living Lab "ORTOBOOK". The name refers to "Orto", e.g., "vegetable garden" in Italian, to cultivate a culture of innovation in the urban region food system. This space seems well-suited for **awareness-raising activities** and training to stimulate entrepreneurship within the food value chain. This can enhance biodiversity in sustainable business and urban agri-food system innovation (food distribution, food waste management for school canteens).

Public Libraries as "citizen cocoons" for innovational acceleration

- *"The "La Vigna" International Library-Centre of Rural Culture and Civilization is a documentation institute specialized in the field of agricultural and wine studies, and is considered one of the most important reference point for ampelographic research worldwide. In Cities2030, it is the associate third party of the Municipality of Vicenza."*
- *"When you come, it's not just about exploring traditional books, which are undoubtedly significant and fascinating.* ***This library space also offers the opportunity to exchange ideas, engage in conversations about diverse topics****, and that's what makes it truly captivating."*

Citizen-led agenda: Bringing more people together for bottom-up innovation

- *"The project aims to* ***expand the scope of engagement with the city,*** *including stakeholders from various sectors such as industries in the food sector, schools, and policymakers.* ***By enhancing the visibility of all stakeholders, they can better collaborate and leverage their knowledge*** *to pursue innovative opportunities. By connecting with citizens and the general public, all stakeholders are provided with the opportunity to understand the existing cultural heritage rooted in traditions and to foster innovation based on these food traditions, ultimately working towards a more sustainable and progressive food system."*
- *"During sessions in the library, participants discussed their aspirations for the future in terms of food and sustainability. This presented an opportunity for the library to gain more visibility and engage with individuals who are different from the typical stakeholders involved in their initiatives."*

The utilization of La Vigna library as a venue for public engagement represents a remarkable and imaginative implementation of the city's cultural heritage. As a welcoming space, it actively encourages citizens to fully immerse themselves in its autonomous and distinctive atmosphere. Recognized as a public service, librarians are generally often entrusted with the responsibility of serving the entire public professionally, equitably, and impartially, irrespective of their moral convictions or political perspectives (Branum, 2008). For a library (and its librarians), a central role is that of a mediator, ensuring the public's unrestricted access to information and knowledge, **enabling the dissemination of information to a broader audience**. It aims to be an institutionalized sanctuary untouched by the ebb and flow of city politics, consistently perceived by citizens as a symbol of neutrality and hope **representing the convergence of the best elements from the past and offering a captivating vision of the city's future**. Within its walls, a welcoming timeless refuge emerges, providing an invitation for individuals from all walks of life to engage, come together and exchange ideas fostering a sense of inspiration and optimism among its visitors. Embracing this role, the library becomes a safe space where individuals can seek stability, solace, explore knowledge, and engage in meaningful discussions without fear of political entanglements. Its doors are open to all, fostering an environment of inclusivity and understanding where diverse perspectives are

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celebrated and cherished. It exists to cater to the diverse needs and interests of the people it serves, untainted to a certain degree by biases or affiliations. With this reputation, **the library assumes an umbrella role of utmost importance in the community**, embodying an oasis of good-intended expression for ideas to come together meaningfully.

The interview provides insights into how the "La Vigna" Library, as part of the Cities2030 project and in close cooperation with the Municipality of Vicenza, is incorporating several dimensions of RRI public engagement. They strive for inclusiveness, transparency, accessibility, dialogue and deliberation, and mutual learning in their initiatives, with a focus on engaging a wider range of stakeholders and promoting knowledge sharing and collaboration in the context of food research and innovation.

- Inclusiveness: The library aims to expand its reach beyond professionals and includes various individuals interested in food cultures, such as researchers, food bloggers, and people interested in gastronomic culture or history. The goal is to create a space where anyone, regardless of their background, can find knowledge and participate in discussions and collaborations related to food.
- Transparency: By being transparent about its activities, the library wants to inform more people about its role as a hub for knowledge, innovation, and ideas related to food. By organizing workshops, events, and initiatives, they make the library more visible and accessible to the public. The library also aims to provide clear and reliable information to address the need for transparency in research and innovation activities.
- Accessibility: The library seeks to make its activities and knowledge accessible to everyone by using clear and understandable language, providing information in different formats and languages, and ensuring that opportunities for engagement are open to a diverse range of people.
- Dialogue and deliberation: The library focuses on fostering meaningful dialogue and deliberation between researchers, innovators, and the public. The aim is to create participatory events to share ideas and discuss future collaboration related to food and sustainability.
- Mutual learning: This two-way communication actively seeking input and feedback can better incorporate public perspectives into decision-making processes related to food research and innovation.

The bottom-up nature of innovation and the invaluable richness that arises from embracing a wide array of topics and differences in opinions are being highlighted. Such **bottom-up food innovation through wider public engagement** creates a sense of shared responsibility and ownership among citizens and communities, fostering a stronger connection to their local food systems. Empowering individuals to actively participate in shaping their own food environments can foster more resilient, inclusive, and sustainable solutions.

The concept of bottom-up food innovation emphasizes the significance of starting at the grassroots level, where the interests, needs, and aspirations of citizens and communities are at the forefront. Instead of imposing top-down solutions, this approach recognizes the importance of listening to and understanding the voices of the people directly affected by food systems.

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Following the interests of citizens and communities can tap into their local knowledge, traditions, and cultural practices related to food.

- This not only fosters a sense of ownership and empowerment but also allows for the identification of unique opportunities and challenges specific to each community.
- When we bring together the energy and expertise of individuals and communities, we create a collaborative environment that encourages innovation.
- By actively involving citizens, local businesses, policymakers, and other stakeholders, we can leverage their collective knowledge and skills to develop creative and sustainable solutions.
- This bottom-up approach to food innovation promotes inclusivity, diversity, and participatory decision-making. It recognizes that no single entity or expertise has a monopoly on knowledge and that meaningful change often emerges from the collective efforts of a community.
- Furthermore, by engaging citizens and communities in the innovation process, we ensure that the solutions developed are contextually relevant and address the real needs of the people. This participatory approach leads to more effective and sustainable outcomes, as it takes into account the social, cultural, economic, and environmental factors that shape local food systems.

Wider public engagement that embraces a wide array of topics and differences in opinions **can facilitate more bottom-up food innovation**. When a diverse range of individuals, communities, and stakeholders are actively involved in the innovation process, a platform for the exchange of ideas, perspectives, and expertise can be created.

- By encouraging open dialogue and creating spaces for meaningful conversations, we enable the exploration of various food-related topics, including traditional practices, cultural preferences, sustainable farming methods, local food production, and more. This inclusive approach allows for a greater understanding of the unique challenges and opportunities present in different communities.
- Through wider public engagement, we tap into the collective wisdom and experiences of people from diverse backgrounds, each bringing their unique perspectives and knowledge to the table. This diversity of opinions helps to challenge assumptions, inspire creative thinking, and identify innovative solutions that may have otherwise been overlooked.
- Moreover, by actively involving the wider public in decision-making processes, we foster a sense of ownership and empowerment among individuals and communities. When people feel that their voices are heard, and their opinions matter, they are more likely to actively contribute to the development and implementation of bottom-up food innovations.
- This inclusive approach to public engagement also promotes social cohesion and builds trust between different stakeholders. By creating spaces for dialogue and collaboration, we encourage cooperation and the sharing of resources, expertise, and ideas. This collaboration allows for the pooling of collective energy and resources, leading to more impactful and sustainable food innovations.

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A five-generational culinary innovation cycle: from classroom to family food habits

- *"Involving families as stakeholders is one of our main goals In the living labs being developed in the framework of Cities2030 in close collaboration between the Municipality of Vicenza and La Vigna library. There is a sort of [generational] circularity of ideas dedicated to changing food habits in families through school.*

Student asssignments interviewing grandparents: the collection of sustainable recipees

- *"Younger children (from 6 to 11 years old) school interview their grandparents to collect and rework some recipes which are traditional and now use sustainable local products in one initiative. "These results in bundling a selection of local recipes in e-books to a wider public so that everyone could then use these and see the beautiful work the students have done, also adding some information about what is sustainable, ecologic, and resilient in terms of human food [lab2]."*
- *"[In another initiative], there are the CRFS Student Ambassadors (15 to 18 years old). These food ambassadors make the project and marketing come more alive. They can also be a sort of food ambassador in their own families [lab1]."*
- *"In another , our Living Lab includes these recipes in what we call our "Cities2030 Menu". We then approach restaurants with this menu and local recipes [lab 5]."*
    - *"Also, the new generation of Italians is included in the shape of migrant women that have been here for some years now that are supported by social services of the municipality of Vicenza. We have organized five ethnic sustainable dinners."*
        - *"Women from Morocco, Iran, Pakistan, Lebanon, and Ecuador prepare their traditional recipes [with some potential fusion elements with changed ingredients that are local and more sustainable]. In this initiative developed in collaboration with local restaurants and involving migrant women is presented to something around 40 people per dinner.*

The following analysis highlights **the significance of public engagement in relation to food innovation, particularly through intergenerational interactions**. It emphasizes that families are important stakeholders in the research and innovation process and suggests that involving all generations can lead to more comprehensive and effective approaches to addressing food-related challenges and promoting responsible food practices.

- Public engagement in research and innovation (RRI) involves involving different stakeholders, including the public, in the process. Families are considered important stakeholders, and their involvement can contribute to addressing food-related challenges and promoting responsible food practices. The quote highlights the importance of involving families in changing food habits through school and connecting various stakeholders, including the municipality, government, and families.
- The intergenerational event of involving grandparents brings together multiple generations, including kids, students, parents, and grandparents, in a Living Lab setting. This event serves as an opportunity for different stakeholders to interact, learn, and collaborate on food sustainability assignments.
- Younger children interview their grandparents to collect traditional recipes that incorporate sustainable local products. This activity helps in preserving culinary heritage while promoting sustainable food practices.
- The collected recipes are compiled into e-books that are made available to the wider public. These e-books not only showcase the students' work but also provide information about sustainable, ecological, and resilient food practices, promoting awareness and knowledge sharing.

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- The initiative involves the engagement of individuals from diverse cultural backgrounds in the food community of Vicenza. Just as a diverse mix of ingredients in a kitchen can create new tasty dishes, engaging individuals from various cultural backgrounds in the food community of Vicenza and organizing dinners with diverse ethnic themes can perhaps offer a fresh perspective and open doors to spark innovation.

Italian cuisine is known for its rich culinary heritage, and food is deeply intertwined with Italian culture and family life. Meals are often considered important social events and are typically enjoyed with family and friends. Italian cuisine is characterized by the use of fresh, high-quality ingredients, simple cooking techniques, and a focus on bold flavors. Many traditional Italian dishes, such as pasta, pizza, risotto, and various regional specialties, are beloved staples in Italian family meals. Food is often used to express love and hospitality, and Italians can be considered to take pride in serving delicious, homemade meals to their families and guests.

Vicenza CRFS

Children (6-11) interviewing their grandparents allows for the bundling and sharing of lost local recipes in books. Also, a new generation of Italian migrants showcase their ethnic dishes with a chance to fuse in local ingredients. These "sustainable ethnic dinners" allow for intergenerational food circularity to raise awareness and promote inclusion.

- Individual families need to make choices related to food, including discussions about healthy eating, junk food, family dynamics, and parental influence on children's food choices. Food choices can be considered to be influenced by multiple factors, including individual preferences, personal beliefs, societal norms, economic factors, and environmental influences. Cultural factors, including family food culture, can certainly be one of the many influences on food choices for children, but it may not be the sole determinant.
- Parent nutrition and physical activity patterns significantly influence their preschool-age children's consumption of fruits/vegetables, junk food, and level of sedentary behavior (Natale et al., 2014).
    - Another study (Sutherland et al., 2008) confirms that the healthfulness of children's total purchases was significantly predicted by their parents' purchasing categorization, suggesting that children begin to assimilate and mimic their parents' food choices at a very young age, even before they are able to fully appreciate the implications of these choices.
    - There is overwhelming evidence (Birch et al., 2001; Skinner et al., 2002) that parents play a critical role in shaping early dietary and sedentary, and physical activity patterns in their young children through their own behaviors, role-modeling, parenting styles, and feeding practices.

Food health in school class: "No, this is junk food, Mom. Please change"

- *"I think that a great role is also played by schools where a cantina is providing food for children, but also a because of the school subjects science or physical education. It depends on the ideas that they are taught. What is unhealthy food? What is an unhealthy choice of lifestyle?"*
- *"School is always very important to educate kids as a multiplier effect. Also, their family. There was a case of my friends' son coming back from school after a specific lesson on healthy food health of the planet, and the health of the environment. He came back home and said, "No, this is junk food, Mom, please change. We have to change."*

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Food plays a significant role in Italian intergenerational family traditions that change over time. Public engagement in RRI refers to involving different stakeholders, including the public, in the research and innovation process to ensure that it aligns with societal needs, values, and expectations. The following analysis underscores the importance of public engagement, intergenerational interactions, and cultural diversity in driving food innovation and fostering responsible food practices. Families, as part of the broader public, can be important stakeholders in various contexts. The interplay between public and private engagement can contribute to a more comprehensive and effective approach to addressing food-related challenges and promoting responsible food practices.

Families, as members of the local community, provide valuable input on the needs and aspirations of their families and communities in the context of public engagement in Italy.

- Families and individuals choose their food based on their personal beliefs, values, and health considerations. The influence of family members, particularly parents, on their children's food choices is discussed, showing how participation in decision-making about food and health can occur at the family level, which makes private engagement interact with several forms of public engagement.
- Decision-making about food can involve negotiation and collaboration among family members with different roles and responsibilities. This emphasizes the importance of shared responsibility and collaborative decision-making in shaping food choices within families and communities.

There is no innovation without failure: the power of change to making sense

- *"When I started analyzing the context when I joined this project, I found that, in a sense,* ***there were lots of different initiatives*** *that somehow could be included in the general umbrella of food-related initiatives,* ***but they were not very coordinated,*** *data-driven or specifically tailored towards a public and a private audience. Despite the prevalence of mass communication in today's era, it is surprising that* ***people often struggle to find information about local initiatives****.*

- *In order to enhance public engagement, citizens have expressed a desire for the establishment of a communication center dedicated to food-related initiatives. This center would address that challenge and bridge the information gap."*
    - *"So I tried to bring some new ideas, some new possible issues of interest, some good practices in other cities so that there could be some fresh air for the different stakeholders and some new possible things or ideas."*
    - *"It was important to find a good synergy between the policy Lab and the Living Lab so that we had the opportunity to implement something useful for the city from a wider and more coordinated perspective."*

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A permanent CRFS office: How to make sustainability …sustainable through governance?

- *"We now have a project manager at the Lavigna Library, and I am the project manager within the municipality of Vicenza. We work as a team."*
- *"I don't have a more general mandate [budget]. So what I am doing, I'm doing in the framework of Cities2030. I don't know if, after the project, the municipality will establish a dedicated [permanent] office. OK, it's uncertain about the future,* ***but if you have the willingness to restructure around what makes sense,*** *that is a great place [how to create an environment] that* ***can lead to further innovation."***
- *"A lot of time, you notice that* ***the link between citizen and governance is not so flexible when it comes to food****. I think it is much more a* ***cultural problem*** *in the sense that this is not part of [Italian] business culture. So it is related to the lack of awareness and lack of knowledge about the fact that food could be profitable. If you talk about sustainability, it is not something related only to public policy and public money, but it's something that could be profitability also for other stakeholders and, of course, for businesses. This is something that has to change."*
- *"Here [in this project], it seems very flexible.* What we would like to do is give the possibility to everyone to understand that there is a cultural set of traditions to promote innovation in order to build a more sustainable new food system."

The library not only fosters wide community engagement but also **facilitates a heightened level of professionalism in public outreach**. Within its walls, public engagement takes on a newfound professionalism, empowering individuals with the necessary tools, resources, and expertise to effectively communicate their message. The library invests in the professional development of those involved in public engagement, ensuring that ideas and information are presented in a compelling and accessible manner. Through workshops, seminars, and interactive exhibits, the library nurtures the skills of individuals, elevating the quality of public engagement and amplifying the voices and perspectives that might otherwise go unheard. By investing in the professional development of those involved in public engagement, the library ensures that ideas and information are presented in a compelling and accessible manner. Through strategic partnerships in Vicenza with two collaborating project employees (one working for the library and one for the municipality) and innovative programming, the library harnesses the power of effective communication, bridging the gap between experts, advocates, and the public at large. In this way, the library not only serves as a neutral urban safe space but also acts as a catalyst for societal progress. By elevating the quality of public engagement, it amplifies the voices and perspectives that might otherwise go unheard. It becomes a platform for empowerment, where individuals can refine their skills, share their expertise, and ultimately reach a broader audience, enriching the collective discourse within the community.

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Figure 28. Overview best practices in RRI in Vicenza

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6. How does RRI relate to other fields

Responsible Research and Innovation (RRI) in the field of food encompasses a wide range of topics that address ethical, social, economic, and environmental aspects of food research, production, distribution, and consumption. RRI in food is a dynamic and evolving field, and the specific topics of focus may vary depending on the context, region, and stakeholders involved in food research and innovation activities. Some of the most popular topics in RRI in food include:

- Sustainable Food Systems: This includes research and innovation efforts aimed at promoting sustainable food production, reducing food waste, improving resource efficiency, addressing climate change impacts on food systems, and promoting sustainable agricultural practices.
- Food Safety and Quality: Ensuring the safety and quality of food products is a crucial aspect of RRI in food. This includes research and innovation in areas such as food safety regulations, food traceability, foodborne disease prevention, food testing and analysis, and food quality improvement.
- Nutrition and Health: RRI in food also encompasses research and innovation efforts aimed at understanding the relationship between food, nutrition, and human health. This includes areas such as personalized nutrition, functional foods, nutritional labeling, and strategies to promote healthy eating habits.
- Food Equity and Access: RRI in food also focuses on addressing issues of food equity and access, including topics such as food poverty, food justice, food sovereignty, food distribution systems, and strategies to improve access to safe, nutritious, and culturally appropriate food for all populations.
- Consumer Engagement and Involvement: Engaging consumers and stakeholders in the research and innovation process is an important aspect of RRI in food. This includes efforts to involve consumers in food-related decision-making, fostering consumer trust, promoting transparency and communication about food products, and addressing consumer concerns about food safety, labeling, and sustainability.
- Social and Ethical Considerations: RRI in food also encompasses addressing social and ethical considerations associated with food production and consumption. This includes areas such as animal welfare, genetic modification, food sovereignty, food security, cultural aspects of food, and ethical considerations in food-related technologies and innovations.
- Innovation in Food Processing and Packaging: RRI in food also encompasses research and innovation efforts in food processing and packaging, including areas such as novel food processing technologies, sustainable packaging materials, food packaging safety, and reducing environmental impacts associated with food packaging.
- Circular Economy and Sustainable Food Value Chains: RRI in food also includes efforts to promote circular economy principles and sustainable value chains in the food sector. This includes topics such as reducing food waste, promoting sustainable packaging and labeling, optimizing food distribution and logistics, and fostering sustainable practices throughout the food value chain.

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Growing concern about how to cope with **Grand Societal Challenges** has earned the RRI literature a prominent position, especially within policy spheres (Jakobsen et al., 2019). Grand Societal Challenges refer to complex and persistent problems that affect society at large and require interdisciplinary, innovative, and collaborative solutions. These challenges are typically multifaceted and often involve social, economic, environmental, technological, and cultural dimensions. They are recognized as significant societal issues that need to be addressed in order to achieve sustainable development, societal well-being, and global prosperity. Examples of Grand Societal Challenges:

- Climate Change and Environmental Sustainability: Addressing the impacts of climate change, preserving biodiversity, protecting natural resources, and promoting sustainable resource management.
- Health and Well-being: Improving global health outcomes, addressing health disparities, ensuring access to quality healthcare, and addressing health challenges such as infectious diseases, aging populations, and mental health.
- Poverty and Inequality: Reducing poverty, inequality, and social exclusion, promoting social cohesion, and addressing issues such as income disparities, discrimination, and social justice.
- Food Security and Agriculture: Ensuring access to safe, nutritious, and sustainable food for all, addressing issues such as food waste, agriculture sustainability, and food production and distribution systems.
- Energy and Sustainable Mobility: Transitioning to renewable and sustainable energy sources, promoting energy efficiency, and developing sustainable mobility solutions.
- Education and Skills Development: Ensuring access to quality education and skills development opportunities, addressing issues such as education inequality, skills gaps, and lifelong learning.
- Digitalization and Technology Impact: Managing the ethical, social, and economic implications of emerging technologies such as artificial intelligence, big data, and biotechnology and ensuring responsible technology development and use.
- Migration and Social Integration: Addressing challenges related to migration, refugees, and social integration, including issues such as cultural diversity, social cohesion, and human rights.

6.1 RRI in the Grant Agreement

Task 2.4 expands on the White paper focused on RRI-oriented CRFS by offering additional details. The deliverable is described as presenting a comprehensive compilation of information gathered in a digital format, which incorporates a dynamic set of data.

- A framework for RRI-oriented CRFS identifies, explores, and characterizes the challenges food systems and ecosystems present for RRI within the ten projects' thematic, from production to inclusion and equity.
- Ideate, co-create, implement, and pilot RRI mechanisms under WP4, 5, and 6 to structure an RRI framework for the co-creation, pilot, and deployment of innovation.

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- Integrate an RRI baseline in all project activities whilst establishing synergies with major RRI initiatives at the EU level, e.g., RRI Tools, GRACE, LANDSUPPORT, BigPicnic, SKIN, and PROTEIN2FOOD.
- Activities are embedded in data collection and examination, the realization of structured interviews with agents of the food systems and ecosystems arena, the production of structured observations, and the implementation of 12 online meetings between engaged partners (3 per year).
  - Lead partner role: VIVES (P4) coordinates the activities (same framework as task 2.1).
  - Role of participants: IAAD (P5), SLEAN (P14), AGRIA (P13), SINNO (P19), GGP (P26)

Methodology: Lean, agile, and result-driven production approach

- To design, develop, and future-proof integrated CRFS models proposed by CITIES2030, the work plan delivers a set of practical activities for policy framework development and innovation action which engages and activates all agents of the urban food supply chain.
- **WP2 is a central component of the structure and provides a comprehensive framework to secure project development, and results are aligned with the European Union's idea of an inclusive, innovative, and reflective society.**
- It is also practiced to deliver a structured environment to unlock cities' innovation potential, driven by the same comprehensive and diverse set of agents of the UFSE, to future-proof food systems.

WP2: CRFS PHILOSOPHY: ethics, RRI and gender approach RRI General Approach.

- The activities run within the project should have in view the societal impact on urban life and ecology and rural socioeconomics and ecology too, as the latter is the main source of agri-food suppliers for the urban environment.
- Therefore, the following courses of action will be taken under consideration: CRFS beneficiaries, CRFS key players, and the academic environment will need to realize the responsibilities that lie on their shoulders on matters such as environmental impact, transparency of economic and non-economic activities, possible negative effects of research on societal environment concerning alimentation.
- The same awareness/ responsibility should be embraced by the urban communities on matters such as the rights of rural food suppliers, stimulation of open access behavior in directing information about food phenomenon, and supporting the women's role in the food socioeconomics.
- Gender considerations. CITIES2030 is a gender-neutral initiative. CITIES2030, through the activities, run, will bring contributions to gender discrimination reduction both in the rural and rural environments. Although the urban environment has come up with solutions for gender discrimination, and it is on a solving trend, rural women are not fully recognized for the significant part they played as creators of agri-food knowledge, food production, food security, and food distribution (Nyeleni Declaration).
- The project activities will forever support the women's assertion and their role played in the urban food supply chains.
- Within WP2 will be organized workshops with women entrepreneurs involved in urban food supply chains.
- Based on the cooperation of all partners involved in the project, a guide of good practices will be made for reducing and, hopefully, eradicating gender discrimination. It will be important to ensure

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that men and women are equally represented within groups of stakeholders and to ensure that their respective needs and interests are taken into account. The partner countries within the project have different experiences with CRF ethics, RRI, and gender approaches. For this purpose, there will be exchanges of good practices concerning the insurance of the project ethics framework. Therefore, constant communication among partners is necessary as it will enable sharing of cultural experiences of their own countries. That will provide a solid framework for the project and allow to formulate models of good practices and possible directions for implementing these principles. Open Science. Open Science can be firstly viewed as Open Access. The concept of open access is directly linked to the following purpose: "make the primary outputs of publicly funded research results — publications and the research data — publicly accessible in a digital format with no or minimal restriction as a means for accelerating research.

- Integrate key learnings from H2020 "PROSO" (2016-2018 ID: 665947) to support WP2 development towards RRI frameworks for CRFS. Foster societal engagement under the terms of RRI in the research and innovation systems in Europe through the generation of a policy guide for developing governance for the advancement of societal engagement under RRI in relation to three fields of R&I.
- In terms of expected impact, Cities2030 aims to
    - create new and sound evidence for **policymakers** concerning urban food systems in support of policy development (CEI- 1)
    - Improve **social inclusion and equity** of all actors in the food systems (CEI-6)
- CITIES2030 is citizen-driven and therefore secures a solid and extensive citizen engagement, globally led by the cities via commonly practiced channels (e.g., public information boards, local Media, etc.). The project develops a framework for inclusiveness and diversity in societal engagement under the header of food-related ethics, gender balance and equality, and RRI. Citizens are engaged and involved in all pertinent activities to develop anticipated outcomes, particularly under WP2 to WP7. In broad terms, the targeted audience incorporates the unorganized public globally.
- The unorganized public is subject to information campaigns and educational measures per the programmed activities such as the capacity building programs (WP3, WP4, and WP5), the system thinking working groups under 10 anticipated thematic to secure more dialogic procedures.
- When activating the unorganized public, a balanced representation of principles, education, and cultural background is ensured via socio-demographic diversity. Partners practice a layered random selection strategy in formal engagement activities and processes to account for gender, seniority, occupation, education, and geographical diversity.
- Measures taken to engage citizens are covered by "Task 3.1 – Engage agents and stakeholders of the food system arena" under WP3, where detailed information on processes, strategies, and activities can be found.

6.2 RRI in relation to the MUFPP (Milan Urban Food Policy Pact)

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In the context of Cities2030, the link between RRI and the Milan Urban Food Policy Pact (MUFPP) becomes particularly relevant:

- Cities2030 seeks immediate action to improve urban food systems with **consumers** at the core of solutions through a connected structure centered on the citizen, built on trust.
- The MUFPP is a global agreement (initiated in 2015) that promotes sustainable and equitable food systems at the urban level and is primarily driven by **cities**, with local governments playing a central role in its implementation. It recognizes the crucial role of cities in achieving food security, promoting healthy diets, and fostering sustainable agriculture. The connection between RRI and the MUFPP lies in their shared objectives of engaging the public, advancing scientific education, and implementing effective governance strategies.

By integrating the dimensions of RRI, including public engagement, scientific education, and effective governance, into their activities, Cities2030 can contribute to the objectives of the MUFPP and promote sustainable and equitable urban food systems. This collaboration between RRI and the MUFPP underscores the importance of responsible and inclusive approaches in addressing the complex challenges of urbanization and food security in the 21st century.

- Public engagement is a vital aspect of both RRI and the MUFPP. RRI emphasizes the inclusion of diverse stakeholders in the research and innovation process, ensuring that the public's concerns, values, and aspirations are taken into account. Similarly, the MUFPP encourages citizen participation in decision-making processes related to urban food policies. By involving the public, both initiatives promote democratic deliberation and foster a sense of ownership and shared responsibility.
- Scientific education is another dimension where RRI and the MUFPP intersect. RRI advocates for the integration of scientific knowledge and methods into educational curricula, making science accessible to a broader audience. It promotes science literacy and the understanding of the societal implications of scientific advancements. Similarly, the MUFPP aims to raise awareness and educate urban dwellers about sustainable food practices, including issues such as food waste reduction, urban farming, and healthy eating. By incorporating scientific education into their activities, both RRI and the MUFPP empower individuals to make informed choices and actively participate in shaping sustainable urban futures.
- Effective governance is a critical element for achieving the objectives of both RRI and the MUFPP. RRI calls for transparent, inclusive, and accountable governance structures that enable the responsible development and deployment of research and innovation. It emphasizes the importance of considering the ethical, legal, and social aspects of emerging technologies and scientific practices. Similarly, the MUFPP advocates for effective governance mechanisms that foster collaboration between various stakeholders, including local governments, civil society organizations, and the private sector. By promoting participatory decision-making and multi-stakeholder partnerships, both initiatives aim to create policy frameworks that address the complexity of urban food systems.

The link between RRI in Horizon 2020 projects in Cities2030 and the MUFPP is a symbiotic one. RRI provides a conceptual framework and guiding principles for responsible and inclusive research and innovation, which can be applied to urban food system projects within Cities2030. By adopting RRI principles, Horizon 2020, projects can ensure that their activities align with the goals of the MUFPP, thereby contributing to the development of sustainable urban food systems. Similarly, the MUFPP provides a practical platform and

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policy framework that can inspire and guide Horizon 2020 projects in integrating responsible practices in urban food-related research and innovation.

6.2 RRI in relation to the MUFPP (Milan Urban Food Policy Pact)

- The synergies between **RRI Tools** and Cities2030 have already been extensively incorporated into this White Paper.

- **GRACE**[15] and Cities2030 share several synergies in their goals and objectives, particularly regarding inclusivity, diversity, and gender equality in research and innovation. Among the various synergies between GRACE and Cities2030, one synergy that has significant potential to integrate into Cities2030 is the promotion of gender equality and the integration of gender perspectives.

- The synergy of **BigPicnic**[16] that showed the most potential to integrate into Cities2030 was the engagement of citizens and communities in decision-making processes related to urban development and addressing societal challenges.

    - BigPicnic is an EU-funded project that focuses on using food and botanic gardens as platforms for **public engagement** on topics such as food security, biodiversity, and sustainability. It emphasizes the participation of diverse stakeholders, including citizens, local communities, and policymakers, in shaping the research and innovation agenda. This shows potential for Public Engagement experiments in Cities2030 working on urban gardening, e.g., such as Quart de Poblet and Bruges.
    - BigPicnic emphasizes **science education** and awareness-raising around food security and sustainability. Science Education experiments in Cities2030 can leverage this aspect by incorporating educational programs, campaigns, and events to raise awareness among citizens about the broader challenges facing cities, such as climate change, resource management, and social inequality. By fostering a sense of ownership and shared responsibility, Cities2030 can inspire citizens to actively participate in sustainable urban development initiatives.

- The synergy of **PROTEIN2FOOD**[17] that has the most potential to integrate into Cities2030 is the promotion of sustainable and alternative protein sources for urban food systems. VIVES' Agro and Bio department has already played a substantial role in integrating their extensive knowledge and expertise on this topic.
- The synergy of **LANDSUPPORT**[18] that has the most potential to integrate into Cities2030 is the utilization of geospatial data and decision support systems for sustainable urban planning and land management. LANDSUPPORT is an EU-funded project that focuses on providing integrated geospatial information and tools to support sustainable land use and natural resource management. It aims to

[15] http://grace-rri.eu/
[16] https://rri-tools.eu/-/big-picnic-big-questions-engaging-the-public-with-responsible-research-and-innovation-on-foodsecurity
[17] https://www.landsupport.eu/

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enhance decision-making processes by incorporating data-driven approaches and advanced geospatial analysis

6.3 RRI vision: The House of CITIES2030

The House of RRI encompasses three fundamental elements: the bedrock foundation, the supporting columns that uphold the pinnacle of achievements symbolized by the dome, and the sheltering roof that provides a vantage point to observe (and evaluate) the outcomes.

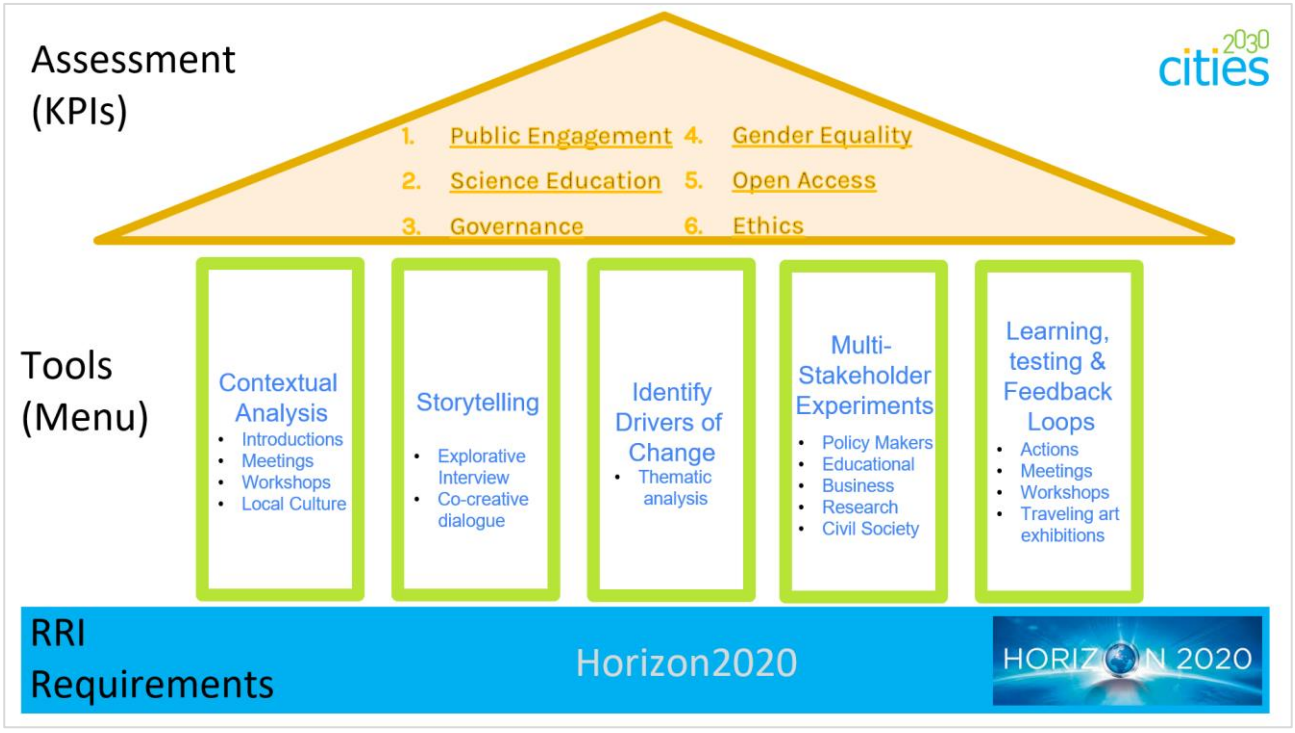

Figure 4. The House of RRI

6.3.1 Basement of the House

- Horizon 2020 can be considered as the basement for RRI involving active engagement with society, incorporating gender and ethical dimensions, ensuring accessibility to research outcomes, and promoting both formal and informal science education.
- Responsible Research and Innovation (RRI) will continue to play a significant role in Horizon Europe, the research and innovation program succeeding Horizon 2020. Horizon Europe aims to further integrate RRI principles and practices throughout its funding and support activities.

6.3.2 Pillars of the House: Actions

The actions undertaken and their practical application in the development of this white paper have already been described in section 4.2. However, for the purpose of presenting a comprehensive overview and

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encompassing all its components that could potentially be applied for RRI to other projects, we will now list all five actions in sequential order.

- Contextual Analysis: This component focuses on analyzing the contextual factors that shape CRFS and the narratives surrounding them. It involves understanding the socio-economic, cultural, and environmental dynamics within city regions that influence food production, distribution, consumption, and waste management. The framework considers the influence of policy frameworks, urban planning, market dynamics, and social norms to identify barriers and opportunities for responsible change.

- Storytelling: This component emphasizes the power of storytelling and co-creation processes in capturing practical stories from diverse stakeholders in CRFS. It involves engaging with farmers, consumers, policymakers, researchers, and community organizations to collect narratives that illustrate real-life challenges, successes, and transformative practices. The framework encourages participatory approaches that foster dialogue, shared learning, and the co-creation of knowledge and solutions.

- Drivers of Change: This component explores the key drivers that facilitate or hinder responsible practices within CRFS. It involves identifying and analyzing the factors that motivate stakeholders to adopt sustainable and inclusive approaches, such as policy incentives, community empowerment, technological innovations, market demands, and social movements. The framework emphasizes understanding how these drivers interact and influence decision-making processes within CRFS.

- Multi-Stakeholder Experiments: This component highlights the importance of fostering multi-stakeholder collaboration and partnerships in driving responsible change in CRFS. It involves identifying and engaging relevant actors, including government bodies, research institutions, community organizations, businesses, and consumers. The framework promotes dialogue, knowledge exchange, and the co-development of solutions through collaborative platforms and networks.

- Learning and Feedback Loops: This component aims to open up avenues for iterative learning processes, paving the way toward increased sustainability. It involves capturing lessons learned from practical stories, analyzing their impact, and providing feedback to stakeholders involved in CRFS. The framework encourages continuous monitoring and evaluation to ensure adaptive management and the refinement of strategies and interventions over time.

The Narrative Framework for Understanding Practical Stories and Drivers of Change in RRI for CRFS offers a comprehensive approach to capturing and analyzing future narratives, identifying key drivers, and fostering responsible change within CRFS. By embracing storytelling, co-creation, and multi-stakeholder collaboration, this framework enables a deeper understanding of the complexities of CRFS and paves the way for transformative practices that enhance food security, sustainability, and social equity in urban environments.

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Implementing this framework aims for increased contribution to the advancement of responsible practices and the development of resilient and inclusive CRFS.

6.3.3 The Dome: Results, Outcomes, Impacts

The six dimensions of RRI have already been highlighted in this White Paper previously (including in the Executive Summary).

6.4 A Narrative Framework for Understanding Practical Stories and Drivers of Change in RRI for CRFS

The original goals of the RRI White Paper aimed to create a framework for RRI-oriented CRFS. This section describes the creation of a framework for RRI-oriented CRFS that can promote more sustainable and equitable food systems.

CRFS plays a crucial role in ensuring food security, sustainability, and equitable access to nutritious food within urban areas. RRI approaches are essential for addressing complex challenges and driving positive change in CRFS. To better understand and leverage the practical stories and drivers of change in RRI for CRFS, a Narrative Framework is proposed here. This framework aims to capture and analyze the narratives that emerge from real-world experiences and to identify the key drivers of change for advancing responsible practices within CRFS. This narrative framework consists of the following components:

1. Contextual Analysis
2. Storytelling
3. Drivers of Change
4. Multi-Stakeholder Experiments
5. Learning and Feedback Loops

Application of the narrative framework in this White Paper on RRI

-

- Cities2030 faced numerous challenges due to the cancellation of physical meetings caused by the COVID-19 lockdowns, greatly affecting its progress. However, the creation of the white paper and the shift to digital meetings proved instrumental in overcoming these obstacles.
  - The digital meetings provided a platform for deepening the process of dialogue and storytelling, which was particularly crucial in light of the canceled physical meetings during the COVID-19 lockdowns. This digital engagement allowed participants to continue sharing ideas, insights, and experiences despite the limitations imposed by

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the pandemic. The virtual environment fostered collaborative discussions and facilitated the exchange of knowledge and expertise, ultimately enhancing the overall effectiveness of Cities2030, taking an open-minded attitude to see local bottlenecks, and, most importantly, visualizing creative workarounds for innovation.

- The creation of the RRI White paper played a significant role in accelerating the formation of experiments and uncovering synergies between projects. By focusing on their respective projects within the local context and examining local bottlenecks specific to their own culture and geography, participants were able to engage in a co-creative dialogue that had been lacking until then. This platform provided an opportunity for meaningful conversations among participants who previously felt like strangers, fostering a deeper understanding and a more impactful exchange of ideas. The White paper served as a catalyst for aligning diverse perspectives and bridging the gap between different projects, enabling participants to collaborate more effectively towards common goals. It created a sense of shared purpose and enhanced the overall coherence of the initiatives within Cities2030.
- By sharing their stories and experiences, participants felt a sense of validation and recognition for their unique perspectives and contributions. This enhanced communication and understanding within the project, fostering a supportive and inclusive environment for the pilots involved.
- The creation of the RRI White Paper, in some way, can be considered to have played a role in fostering an attitude of improvement and continual learning among participants. By encouraging individuals to tell their own stories within the paper, they were welcomed to step out for a bit and gain a deeper understanding of the unique beauty, opportunities, and challenges of their respective projects. This process allowed participants to see the totality of their pilots within the broader challenges faced by the CRFS in Cities2030. By reflecting on their experiences and sharing their insights, participants developed a greater appreciation for the collective efforts and complexities of the larger initiative. The White paper served as a catalyst for self-reflection, enabling participants to identify areas for improvement and learn from the experiences of others, thus promoting a culture of continuous growth and learning within the Cities2030 project.

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7. Conclusions

Quart de Poblet (Spain)

The Quart de Poblet (Spain) pilot focused on creating a more sustainable and equitable food system by involving citizens in the co-creation of initiatives, promoting food-related education in schools, and establishing a food policy council to improve collaboration and coordination between stakeholders. The integrated sustainable urban development strategy used by the municipality of Quart de Poblet shows how urban gardening can be a valuable tool for promoting sustainability, community engagement, and environmental education. Urban gardening can provide numerous benefits, including increased access to fresh produce, improved mental and physical health, opportunities for job training and entrepreneurship, and increased biodiversity in urban areas. By promoting urban gardening initiatives and supporting community-led efforts to develop sustainable food systems, cities can help to build more resilient, equitable, and sustainable communities.

- In Public Engagement, the pilot aimed to involve citizens in the co-creation and co-design of food-related initiatives, such as urban gardens and community kitchens. The goal was to foster a sense of ownership and pride among the community members while improving access to healthy food.
- In Science Education, the pilot sought to integrate food-related education in schools, promoting sustainable and healthy eating habits among students. Additionally, the pilot aimed to foster a better understanding of food systems and their impact on the environment, promoting an overall culture of sustainability.
- In Governance, the pilot aimed to establish a food policy council to improve collaboration and coordination between stakeholders involved in the food system, including citizens, local authorities, and businesses. The council would also work towards creating a food system that is more equitable, sustainable, and responsive to the needs of the community.

Seinäjoki (Finland)

The case of Seinäjoki (Finland) provides an excellent example of how nutrition and food education can be integrated into a community's culture to create a generation of savvy and capable food consumers who value healthy food and its place of origin. Finland's policy of providing free meals at school is rooted in its history of poverty and is based on the idea of equality. Finland's commitment to free school lunches was also evident during the COVID-19 pandemic when schools provided takeaway meals to students to ensure they did not go hungry. Finland's free school lunch policy has created a culture of appreciating healthy food and has contributed to the prevention of childhood obesity. To sustain these efforts, Finland has engaged various stakeholders, including sports clubs and celebrities, to promote healthy eating habits among children and their families. Despite the challenges of reaching all families, Finland's approach to food education and nutrition provides a valuable lesson on how collective engagement can help address complex societal problems such as obesity.

- Public Engagement: The Seinäjoki pilot emphasizes the importance of public engagement in food innovation. The Healthy Kids of Seinäjoki concept aims to create a generation of educated and capable food consumers who place value on healthy food and its origin. The pilot also collaborates with sports clubs and celebrities to promote healthy eating habits and influence families to make better food choices.
- Science Education: The Seinäjoki pilot integrates science education into its approach to food innovation. Children in kindergartens are taught about different plants and how food is produced, and nutrition education is a key part of the school curriculum. The pilot emphasizes positive messaging about nutrition, rather than negative information, and encourages children to connect with food and nature.
- Governance: Governance plays a key role in the Seinäjoki pilot's approach to food innovation. The pilot involves collaboration between different sectors, including schools, businesses, and government officials. Policies and interventions are implemented to target children at risk of obesity and promote healthy eating habits. The success of the pilot is attributed to the systematic coordination and involvement of various sectors, and the emphasis on promoting children's health among the public and various actors.

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Bruges (Belgium)

The pilot interview of Bruges for the Cities2030 project highlights several key themes related to food innovation from an RRI perspective. The sustainable food strategy aims to ensure a right to a healthy, qualitative, and sustainable diet, with a particular focus on the elderly as a vulnerable target group. However, there are threats to the city's sustainable food system posed by mass tourism, which can create a divide between local people and tourists' food consumption. To address this, the city is looking at a ban on new tourist shops and safeguarding the diversity of the type of shops. The interview highlights the importance of engaging the elderly and intergenerational learning in changing food habits and the need to consider cultural factors in understanding nutrition behavior and food choices. The interview also emphasizes the importance of planning skills and cooking skills in reducing the dependence on ready-made meals and the need for more studies on food poverty.

- In terms of public engagement, Bruges is exploring new paths in meal preparation and delivery through co-creation to improve the meals and health of elderly people, who are considered a vulnerable target group. Bruges and its food lab provide expertise in developing a bottom-up food strategy and working with local stakeholders. However, there are threats of mass tourism to Bruges' sustainable food system, creating a divide between local people and tourists' food consumption. The city is considering a ban on the opening of new tourist shops, beer palaces, and chocolate shops to keep the range of shops diverse and preserve the city's original charm for tourists to some extent.
- In terms of science education, Bruges is successfully engaging elders through an outdoor food festival where food can be shared, and combining science education and public engagement to involve younger grandchildren in changing food habits for the youth, parents, and grandparents. The enthusiasm of the younger generation may shape a positive time perspective for the elderly by reminding them of the beauty of life. Bruges is also considering the possibility of creating a separate recipe book with tips for elderly people.
- In terms of governance, Bruges is trying to have more vegetarian dishes in schools, and many teachers are incorporating sustainability messages into their classroom teachings. There are also programs to train teenagers as food and fitness ambassadors for out-of-school programs, which can promote healthy eating and physical activity habits for children. However, there are still challenges, such as hidden food poverty and the dying habit of taking the time to learn how to cook. Overall, the interview suggests that Bruges has been successful in using public engagement, science education, and governance to innovate and promote sustainable food practices.

Vejle (Denmark)

The city of Vejle in Denmark is using food innovation as a way to promote urban resilience and community engagement. One of their approaches is to provide kitchens and infrastructure for living labs, where different stakeholders can come together and exchange food concepts. By bringing together various stakeholders and promoting responsible innovation, Vejle hopes to foster increased food innovation and community engagement while reducing the environmental impact of food production. The city is also showcasing plant-based food through a Michelin-star coach, with a focus on taste as a driver of food innovation. Additionally, Vejle is exploring the potential of insect-based food as a sustainable and nutritious protein source. To promote the acceptance of insect-based food, Vejle is using a participatory approach that includes education, sensory perception, and fun activities, particularly targeting children. The city is leveraging existing science education programs in primary schools to promote responsible research and innovation (RRI) principles and align innovation and research activities with societal needs. Furthermore, Vejle is encouraging innovation and research activities to be aligned with Danish cultural values of being reflective and thoughtful. To increase the acceptance of insect-based food, the city is also using a peer influence strategy, where children are encouraged to try insects in familiar and appealing forms, such as in hot dogs. Finally, Vejle is using summer food schools to teach children about healthy eating habits, cooking, and nutrition in fun and engaging ways. Several organizations, such as the Danish Agriculture and Food Council, the Danish Chef Association, and the Danish Heart Foundation, organize these summer food schools throughout Denmark.

- Public Engagement: Vejle aims to engage the public in food innovation through the use of living labs and shared or mobile kitchens. By bringing together various stakeholders, including citizens, businesses, and researchers, Vejle hopes to foster increased food innovation and community engagement. Additionally, Vejle has plans to introduce insect-based foods to primary school children through workshops and tastings, with the aim of changing perceptions and reducing the environmental impact of food production.
- Science Education: Science education in primary schools in Denmark emphasizes the importance of being reflective and making responsible choices, which aligns well with the principles of RRI. Additionally, the Danish Agency for Science and Higher Education promotes RRI principles and awareness among the research and innovation community. Vejle plans to incorporate science education into their food innovation initiatives, including workshops for primary school children.
- Governance: Vejle recognizes the importance of governance in ensuring responsible and sustainable food innovation. They have established partnerships with various organizations, including universities and research institutes, to promote responsible innovation and ensure that research and innovation activities align with societal needs and concerns. Additionally, Vejle has plans to work with governmental policy makers to promote food innovation, including the production and sale of insect-based foods.

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Troodos region (Cyprus)

The Troodos region of Cyprus has a unique traditional culture and lifestyle that contributes to the health and longevity of its residents. However, industrialization and diaspora after World War II led to a 50% reduction in the regional population. To promote sustainable development and revive the area's unique diet and lifestyle, the government is investing in infrastructure and sustainable projects. This includes improving road networks, introducing sustainable projects, and investing in traditional crops like carobs and halloumi cheese. The University of Cyprus is involved in research and innovation projects related to local crops, and there are government initiatives to train young people in dairy production and wine making. Despite challenges, the communities in Troodos are close-knit, which could be an advantage for public engagement and knowledge transfer related to food innovation. The region's interconnectedness requires good roads, and a clustered approach to development in agricultural communities is trying to preserve and maximize the benefits of traditional strengths and best practices, capitalizing on the cultural capital residing within the people.

- Public Engagement: The Troodos region is working to preserve and maximize the benefits of its traditional strengths and best practices by capitalizing on the cultural capital residing within the people. The government has a reasonable budget of 500 million euros over five years to introduce sustainable projects that will help revive the area. They are also trying to improve the road infrastructure in rural areas to facilitate easier access to urban centers. Moreover, the region is trying to attract digital nomads who can work remotely while enjoying the natural beauty and healthy lifestyle in the Troodos mountains.
- Science Education: The Technical University of Cyprus and the University of Cyprus have different centers in different villages in the Troodos region, where they are involved with agriculture and food processing and quality. There is a school that trains people how to produce dairy products and wine, and it is a government initiative at a technical school for secondary and post-secondary level students. The University of Cyprus has invested in a huge carob farm, trying to produce crops and then research how to make more products out of them.
- Governance: The government's previous approach to development in Cyprus focused on modernizing infrastructure and promoting industrialization, which resulted in the decline of the mining industry in the Troodos region. Today, the government is investing in sustainable and inclusive economic growth in Cyprus by providing greater access to education, employment, and other essential services for people living in rural areas. Additionally, the EU has provided guidance to member states on tax issues related to COVID-19, including advice on how to avoid double taxation for individuals who work across borders or have been temporarily relocated due to the pandemic. The EU has also granted PDO certification for traditional rural halloumi produced in specific regions in Cyprus, which guarantees that the cheese is produced using traditional methods and meets certain quality standards.

Velika Gorica (Croatia)

The city of Velika Gorica in Croatia promotes healthy diets for the younger generation by increasing awareness of their local food producers and exploring pathways such as organic food and environmentally friendly supply chains. The city government has implemented various policy measures that target different stakeholders, including the schooling sphere and sports clubs. Local media and study-visits to local producers also support these initiatives. VEGORA, a local business support organization, offers training, financial and legal counseling, technical assistance, and support in EU project management for existing companies and artisans, as well as young and adult citizens who want to start their own businesses. The organization also focuses on supporting family farm businesses, promoting STEM education and digitalization, and coordinating the development strategy and smart city initiatives for the city. Velika Gorica is known for its rich culinary tradition and food festivals, which can promote public engagement, cultural understanding, and economic growth. The city also has a strong culture of food sharing and vegetable gardening, which is rooted in the country's history of poverty and resourcefulness. The return of vegetable gardens in recent years may also be driven by the changing paradigm of food production and consumption, as people become more aware of the environmental impact of industrial agriculture and seek more sustainable and eco-friendly alternatives.

- Public Engagement: The city hosts numerous food festivals throughout the year to celebrate local gastronomic traditions and bring people together. The culture of food sharing is deeply ingrained in Croatian culture and is often seen as a way to build community and foster social connections. The city promotes awareness-raising amongst young people to keep the tradition of vegetable gardens alive. The city is also using an application where people can exchange excess food products to reduce waste.
- Science Education: The city supports and connects stakeholders in STEM, digitalization, and smart technologies. VEGORA, a local business support organization, provides training and technical assistance to SMEs, including family farm businesses, and connects them with EU project management. The city is also promoting healthy food trends and science talks to engage people with healthy food.
- Governance: The city is coordinating the development strategy and the Smart City of Velika Gorica, and serves as the focal point for all activities related to ICT. Various governmental policy measures target a wide array of stakeholders, such as the schooling sphere and sports clubs. VEGORA is supporting neighboring municipalities which don't have appropriate infrastructure for supporting entrepreneurial activity and rural development. The city is promoting environmentally friendly supply chains and organically grown food.

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Vidzeme Region (Latvia)

The Vidzeme Region in Latvia has a wealth of natural resources, including forests, rivers, and fertile land, which have supported the region's economic competitiveness in agriculture, forestry, and food manufacturing. The region's entrepreneurial spirit may have been influenced by the need to find creative solutions to problems during Soviet rule and a culture of resourcefulness and innovation fostered among the people of Vidzeme. The Food Innovation Cluster is an organization based in Vidzeme that aims to support the growth and development of the local food industry through research and development, innovation, and market development. The cluster brings together businesses, research institutions, and other stakeholders in the food sector to collaborate on developing new products, processes, and technologies. The region's natural resources and beauty facilitate tourism and a spirit of health, and a living lab involves small players from bottom to top, teaching kids the importance of harmony with nature and understanding how food is produced. Overall, Vidzeme's approach to food innovation is grounded in the natural abundance of the region and a culture of entrepreneurship and innovation.

- Public Engagement: The Food Innovation Cluster, a bottom-up initiative that brings together local food producers and providers, has been successful in fostering innovation in the food sector by shortening the food chain and creating a reputation for the region's food quality. The Latvian Food Forum, an umbrella organization for local action groups, has played a significant role in organizing educational seminars, workshops, and masterclasses to promote public engagement and collaboration.
- Science Education: The Living Lab, a research and development organization that involves small players from bottom to top, has played a significant role in promoting science education in food innovation. The Living Lab has been successful in inspiring and involving children in the food system through education programs that teach the importance of harmony with nature and healthy eating.
- Governance: The European Union's European Regional Development Fund, the Latvian Ministry of Agriculture, and other local partners have supported the Food Innovation Cluster to promote regional economic development. The governance structure has been instrumental in providing the necessary resources and support to facilitate innovation in the food sector.

Iași (Romania)

The city of Iași in Romania is investing in transforming its agri-food system to create sustainable and resilient urban food system policies. This is being achieved through partnerships between public and private entities, initiatives such as the Green Weekend Market, Made in Moldova, and Slow Food Youth Network, which promote local products and traditions. The city is addressing the different food choices of different generations, with the older generation emphasizing taste while the younger generation prefers healthy and nutritious food. As a university city, Iași is home to several prestigious universities, which contribute to the cultural vitality of the city by attracting creative individuals and resources, providing cultural and educational programs, and promoting collaboration between the university and the community.

- Public Engagement: The city of Iasi has been investing in local partnerships and projects to transform its agri-food system by creating partnerships between public and private entities across regions and nations. The city has also been involved in initiatives such as the Green Weekend Market, Made in Moldova, and Slow Food Youth Network, which promote local products, traditions, and healthy food choices. The city engages with local communities, civil society organizations, and other stakeholders to understand their needs and concerns and involve them in the design and implementation of research and innovation projects.
- Science Education: The city has been incorporating beekeeping education into the high school curriculum to promote sustainability and environmental awareness among future generations. Students learn about responsible practices in beekeeping, including sustainable land use, proper hive management, and safe harvesting techniques. This educational policy can foster social innovation by allowing students to develop entrepreneurial skills and explore potential career paths in the honey industry.
- Governance: The city aims to remove governance-related barriers to trust in local products by fostering transparency and accountability in the production and supply chain of local products, encouraging the participation of local communities and civil society organizations in research and innovation projects related to local products, fostering collaborations between researchers, policymakers, and other stakeholders to co-create governance frameworks that support the production and consumption of local products responsibly and sustainably, and promoting the use of open data and open science practices to enhance transparency and accessibility of information related to the production and consumption of local products. The city also aims to build a serious and reputed brand recommending local producers to gain trust and to put local actors and stakeholders together in a series of workshops to discuss problems within the food systems

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Bremerhaven (Germany)

The city of Bremerhaven in Germany has a strong seafood and fish industry, with a focus on sustainable aquaculture and fish cultivation. The closure of fisheries due to overfishing and declining fish stocks led to the development of new markets for alternative seafood products, such as seaweed and other marine plants. The city has also renovated its old fish harbor to create a cultural and tourist destination, integrating museums, galleries, and other cultural institutions into the site. However, the city faces challenges in involving citizens in policymaking related to sustainable food systems and climate change. There is a lack of specific city strategy for sustainable CRFS and a separate office to follow up on sustainability. The Technology Transfer Centre of Bremerhaven connects the municipality and the University of Applied Sciences Bremerhaven to research food and food processing topics and promote innovative problem-solving and critical thinking. Cities2030 is planning a policy lab that includes politicians, administration, and a food board involving people from the area to regularly look at sustainable food purchases and organic food from the region. The goal is to make policymakers realize the importance of sustainability and engage citizens in policymaking related to sustainable food systems

- In terms of public engagement, the renovation project of the old harbor was designed to preserve the area's historic character while modernizing its infrastructure, with the public engaged by making it more attractive for visitors leading to new and profitable partnerships. The city is also planning a policy lab that includes politicians, administration, and a food board involving people from the area to regularly look at sustainable food purchases and organic food from the region.
- In terms of science education, the Technology Transfer Center of Bremerhaven connects the municipality and the University of Applied Sciences Bremerhaven to conduct applied research and development in the areas of food and resource efficiency. It aims to be an engine for innovation by bringing together research and local businesses.
- In terms of governance, there is a lack of a more specific city strategy for sustainable CRFS and a separate office to follow up, which needs to be integrated into the city department to be transparent and reflective in its procedures. The city is also working on making politicians realize the importance of addressing climate issues and involving citizens in the policy-making process.

Murska Sobota (Slovenia)

The pilot interview of Murska Sobota for the Cities2030 project in Slovenia aims to innovate the production process of local and safe food by incorporating over 70 local farmers, food producers, and cooperatives. The project aims to promote local cuisine by increasing the visibility of local and healthy food and implementing different events. The project also focuses on short chain innovation, innovative business models, and technologies to increase the proportion of local and safe food. The following are the key highlights of the interview from an RRI perspective highlighting the roles of public engagement, science education, and governance:

- Public engagement: The small city size in Murska Sobota allows for easy connection and engagement among stakeholders, which creates a sense of community and encourages collaboration and knowledge sharing among farmers and other stakeholders. The project aims to achieve happiness and satisfaction for everyone in the value chain, including farmers and consumers, by working on both ends of the chain. Consumer awareness is an essential aspect of public engagement, and the project tries to promote buying locally and supporting the community. The idea of building cooperatives and negotiating with farmers to offer competitive prices for their products reflects a shared responsibility approach, where stakeholders work together to create a more sustainable and resilient food system.
- Science education: The project involves various stakeholders, including farmers, consumers, public schools, and larger organizations as clients. As a result, a transdisciplinary approach is used that incorporates different perspectives and expertise. The focus on consumer awareness, promoting buying locally and supporting the community, and helping farmers with new technologies to produce healthier with less indicates a holistic approach that considers the food system's social, economic, and environmental aspects. The involvement of public schools and bigger organizations as clients for the distribution of vegetables implies the engagement of citizens and organizations in the food system, promoting Citizen Science and Open Innovation approaches.
- Governance: The development of a blockchain-based traceability system for the food supply chain involves collective responsibility for the impact of R&I, participatory governance to cope with new and unexpected challenges, transparent and reflective procedures, accountability and responsiveness towards society, and anticipation of unintended consequences. The project involves collaboration with the University of Maribor as a technological partner and using QR codes and other innovative technologies to engage customers and empower them to make informed choices. The development of the traceability system involves sharing responsibility among various stakeholders, including the University of Maribor, the technical team, food producers, customers, policymakers, and government officials.

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Haarlem (The Netherlands)

The municipality of Haarlem in the Netherlands has initiated a sustainability program focused on climate adaptation, energy transition, and circular economy. Living labs have been created to test new concepts in a practical urban setting, including projects focusing on zero-emission city logistics and combatting food waste. Inclusivity, public awareness, and public engagement are emphasized in the Cities2030 project. The municipality plays a coordinating role, stimulating a new multi-level working method that promotes governmental cooperation between EU Member States, cities, the European Commission, and other stakeholders. The issue of access to healthy, sustainable food for all citizens is a significant challenge for Haarlem, and inclusivity is key. The Dutch have a strong culture of public engagement and dialogue with local government, which promotes transparency, accountability, and responsiveness in decision-making processes. In the Cities2030 project, political culture and public engagement differences remain fundamental.

In Haarlem, science education starts early, and initiatives like community gardens and teaching children about food promote engagement and an entrepreneurial mindset. The focus on access to affordable healthy food, especially for underprivileged groups, embeds social, economic, and ethical principles. An anecdote about the interviewee's childhood experience with local food production and short supply chain serves as an example of how informal science education outside the classroom and early experiences can shape one's career and promote the values of local and sustainable food production.

- From a public engagement perspective, inclusivity, public awareness, and public engagement were seen as very important. The city's Eldermen played a crucial role in promoting transparency, accountability, and responsiveness in government decision-making processes.
- From a science education perspective, there was a project aimed at teaching children about food, which included growing their own food and learning about energy and environmental issues. The emphasis was on active learning and real-world application.
- From a governance perspective, the importance of ensuring that R&I is conducted in a way that is accountable to society and responsive to its needs and concerns was emphasized.

Vicenza (Italy)

The pilot interview of Vicenza for the Cities2030 project aims to explore food innovation from an RRI perspective, focusing on three components: Public Engagement, Science Education, and Governance. The interview showcases the Lavinia Library's efforts to engage the public, provide science education, and establish effective governance mechanisms within the Cities2030 project. The library aims to create a living book (Orthobook) that serves as a knowledge hub and a space for collaboration and innovation around food. Through their initiatives and collaborative approach, they strive to promote public involvement, scientific understanding, and effective governance in shaping a more sustainable urban food system.

- In terms of Public Engagement, the interview highlights the efforts made by the Lavinia Library to engage a wider audience beyond professionals and academics. The library aims to involve different stakeholders, including industries, schools, policymakers, and the general public. They organize various initiatives and events, such as workshops, awareness-raising sessions, and participatory events, to increase visibility and create opportunities for people to participate, collaborate, and share ideas. The library also responds to citizens' requests by considering their input and incorporating their suggestions into their activities. This demonstrates a commitment to inclusivity and democratic engagement, allowing the public to have a say in the library's initiatives and contribute to the development of a more sustainable food system.
- In terms of Science Education, the Lavinia Library focuses on providing reliable and scientific information to the public. While the library has traditionally focused on gastronomic culture, traditional products, and historical aspects of food, they are expanding their scope to include new areas of interest, such as policy-making and innovation. By introducing these new topics, they aim to attract a wider audience and offer opportunities for learning, collaboration, and the exchange of ideas. The library recognizes the importance of scientific knowledge in addressing food-related challenges and aims to bridge the gap between research and the public by creating a space where people can access reliable information and collaborate with experts.
- Regarding Governance, the interview emphasizes the collaboration between the municipality of Vicenza and the Lavinia Library in the Cities2030 project. Initially, there was a separation between the municipality's focus on the Policy Lab and the library's focus on the Living Lab. However, they recognized the need for a more coordinated approach and decided to work together to address food-related initiatives in a comprehensive manner. The municipality's role is to provide governance and coordination, ensuring that different stakeholders are involved, and facilitating the implementation of initiatives. The library, as an associated party of the municipality, plays a key role in driving innovation, organizing events, and connecting with various stakeholders. This collaborative governance approach allows for a more holistic and effective implementation of the project's objectives.

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8. Annex

8.1 List of topics covered in the 12 pilot interviews

The goal of this document is to set a direction in sketching topics to be addressed in a 1-hour interview.

- Does the section in the proposal of Cities2030 describe your local context well?
    - Is it still up to date?
- Which elements of the following definitions do you think describe RRI well, and which others do not fit your pilot's context?
    - Responsible Research and Innovation (RRI) is a novel approach to the governance of science, research, and innovation (R&I) that seeks to broaden decision-making processes to realize ethically acceptable, societally desirable, and sustainable R&I. Although the concept is still debated, the following shared characteristics of RRI have been distinguished:
    - RRI describes a new approach to research and ethically acceptable and sustainable innovation that aims to align the outcomes of scientific and technological advances with the values and needs of society by co-creation (involving diverse groups of people, including citizens, researchers, policy-makers, and businesses, throughout the entire process).
    - For H2020, "Responsible Research and Innovation (RRI) implies that societal actors (researchers, citizens, policymakers, business, third sector organizations, etc.) work together during the whole research and innovation process in order to better align both the process and its outcomes with the values, needs, and expectations of society". RRI, as a key action of the 'Science with and for Society' objective of H2020, is promoted by actions on public engagement, open access, gender, ethics, and science education [2]. But what is the potential impact of these five RRI drivers on the metrics of innovation?
- How are the outcomes of the City2030 project aligned with the values and needs of society?
- Can you share a food story that has personally inspired you?
    - Outside the C2030 project
    - Within the C2030 project
- What is your city's "superpower"?
- Can you describe the main challenges and achievements
    - Can you share your perspective on the promotion of environmental education?
    - Can you share your perspective on the promotion of citizen participation?
- Within your CRFS, how do you make sure that different stakeholders come together?
- How do you align different, sometimes conflicting perspectives and interests of different stakeholders within your CRFS?
- In setting up or running your CRFS, have you ever encountered public or other reluctance or resistance to your actions?
    - How do/did you cope with these difficulties?
- Do the public and the stakeholders within your CRFS trust that what you are doing is right and good?
    - What is the role of trust in your CRFS, and how do you build this?
- Do you feel that the values of your CRFS are in line with societal values and expectations about food?
    - Or do you feel that you have to trigger changes in the mentality/culture of the public?
    - How do the following dimensions of RRI provided in the Commission's guidelines for H2020 manifest themselves in your pilots?
    - The thematic elements of RRI provided in the Commission's guidelines for H2020 – ethics, gender, open access, public engagement, and science education
        - Equality & non-discrimination
            - Promotion of equality and non-discrimination in all EU policies, acknowledging unconscious bias
        - Ethics
            - Guidelines on research integrity for responsible conduct of research
        - Inclusiveness and public engagement
            - Openness and transparency of partnerships & public engagement of citizen
        - IPR & GDPR
            - IPR rules and GDPR respected
        - Open Innovation
            - Open Innovation - as open as possible
        - Open Science
            - Openly available research outputs: Open access to Publications & Open Data

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- Responsible evaluation & decision making
  - DORA & responsible use of research metrics, no bias in the evaluation
- SDGs & EC priorities
  - Taking into consideration UN Sustainable Development Goals and European Commission priorities 2019-2024

- Which elements of the RRI think to apply the best to your pilots' context? And which fits less in your pilot's context?

1. *Public engagement in RRI* is about co-creating with citizens and civil society organizations and also bringing on board the widest possible diversity of actors that would not normally interact with each other on matters of science and technology. There is wide literature on user engagement and innovation, starting from the work of Von Hippel on democratizing innovation [4]. Also, there is plenty of evidence that user engagement positively affects all metrics of innovation highlighted by San Diego University, both at the creativity (innovation pipeline) and the market side of innovation (sales, customer satisfaction, market share).

2. *Open science in RRI* is mainly about 'open access' publications and making research findings available free of charge for readers. It is illustrated by the general principle for open access to scientific publications in Horizon 2020 and the pilot for research data. Open access is just a small step towards open science. It is a state-led business model for academic journals in which the producer and then the consumer undertake the publication costs. Has open access had any impact on the seven most important innovation metrics presented in Fig. 1? There is little evidence for this, and as Borzacchiello and Craglia point out, "The causal link between accessibility to resources and economic development is frequently claimed, but not always supported by evidence-based studies". Open science, thus scientific production without Intellectual Property Rights, would have a cataclysmic impact on innovation and all its metrics. But clearly, the intention of RRI does not go that far.

3. *Gender equality in RRI* and Horizon 2020 is promoted in all parts of the Work Programme, ensuring a more balanced approach to research and innovation. But how is gender equality placed with respect to innovation performance? Could an equal gender composition of research and innovation teams improve those seven metrics of innovation? Based on a review of the current literature on gender and innovation, Alsos, Hytti, and Ljunggren argue that innovation is a gender-biased phenomenon. There is research studying differences between individuals and how gender is embedded in processes, meanings, and experiences. For example, studies have shown that male researchers are more likely than female researchers to engage in industry cooperation or "academic mothers" are less likely to patent, implying that gender and family responsibilities impede women's ability to innovate [8]. Much depends on the meaning of "gender equality". If it is interpreted as gender quotas (50-50 percent of men and women in research and innovation teams), then it turns into a constraint, which is negative to innovation performance and metrics. On the contrary, if it is understood as equal opportunities for men and women, selecting the best regardless of gender, equality becomes a propeller to innovation, equal to skills, competence, and qualifications. Many interviews on this subject highlight that "competence matters more than gender,"; "competence and knowledge are more important than gender,"; "competence must be the most important thing"; selecting researchers should be gender-neutral, depending on roles and industry.

4. *Ethics* for all research funded by H2020, ethics is an integral part from start to finish, and ethical compliance is considered essential to achieve research excellence. For some current topics in AI and robotics, ethics are very important and critical, such as algorithm bias, lethal autonomous weapon systems, research with humans, and data privacy. However, when it comes to innovation metrics, ethics works as a constraint rather than a propeller.

5. *Science education* is about building capacities and developing innovative ways of connecting science to society. It is a priority under Horizon 2020, expected to make science more attractive, increase demand and open further innovation activities. This is somehow a common sense and self-fulfilling prophecy; that science education is a driver of research and innovation, and the challenge is to define the best science education mix to improve research and innovation performance.

6. Research and innovation for democracy and governance: The European Union is founded on the values of respect for human dignity, freedom, democracy, equality, the rule of law, and respect for human rights, including the rights of persons belonging to minorities (Article 2 of the EU Treaty). Yet, democratic institutions have been under threat in recent years, a situation that was aggravated by the Covid-19 crisis and Russian aggression in Ukraine. One of the European Commission's priorities is to give a new push for European democracy by reconnecting European citizens with democratic institutions and by protecting our democracy from threats such as external interference, disinformation, and online hate speech, and promoting democracy globally and in the EU. High-quality, pan-European research and innovation are needed to address these objectives.

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- In your context, are these considered the basis for European partnerships?
  - Have other potential elements been addressed to shape the optimal entity of RRI guidelines needed in partnerships?
  - 1. Diversity and inclusion/2.Anticipation and reflection/3.Openness and transparency/4.Responsiveness and adaptive change/5.Ethics/ 6.Social utility

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8.2 Preliminary Survey Questionnaire Cities2030

Cities2030 (WP2): Ethics, Gender, and RRI (Responsible Research & Innovation)
1. Do you think gender matters to some degree in your City Region Food System (CRFS)? 0
Comment
2. Are women that are involved in food-related jobs in your CRFS in a better position than men? 0
Never Always
Do you think this is fair? (please specify)
3. Are men that are involved in food-related jobs in your CRFS in a better position than women? 0
Never Always
4. Are the food-related home tasks evenly divided between men and women in your CRFS? 0
Mostly women, Mostly men
Other (please specify)
5. Are gender issues taken into consideration in strategies and development programs that are targeted to your city region's food systems? 0
6. Describe one situation (or more) within your city region's food system where gender has some obvious effect(s). 0
7. RRI is defined by the European Union as "Science by the citizens for the citizens". There are times when science can seem to lose its connection to society and its needs, and sometimes its objectives are not fully understood, even if they are well-intended. Do you feel this is the case in your city/region 0

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8. There are five areas of "Science with and for Society (SwafS)" in Horizon 2020. Rank them in order of relevance within your pilot. Drag and drop the following areas in order of priority: 0

- Ethics
- Science Education
- Open Science (Open Access)
- Public engagement in Responsible Research and Innovation (RRI)
- Promoting Gender Equality in Responsible Research and Innovation (RRI)

9. Protecting EU citizens and defending European values is at the heart of the European Union. Research and innovation play a key role in tackling emerging threats and improving crisis preparedness. Do you feel you will be able to successfully involve all local stakeholders within your pilot?
Not at all Fully
Has the COVID-19 pandemic significantly affected involving stakeholders (if yes, please specify)
10. What current developments (from production to inclusion and equity) in your CRFS do you feel confident about?
11. What current developments (from production to inclusion and equity) in your CRFS do you feel confident about?
12. What current developments (from production to inclusion and equity) in your CRFS are you worried about?
13. What do you think is the most important question of your CRFS that Responsible Research and Innovation should deal with in the future?

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