foodpaths

Contributions to SRIA 2.0 and Science-Policy Interface

DELIVERABLE 6.1 – FIRST ELEMENTS

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foodpaths

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All Partners FOODPaths	Consortium FOODPathS and their networks regarding input to the SRIA survey
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1	04/04/2024	Hugo de Vries	Minor
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3	24/6/2024	Niels Halberg/ Anne-Luise Skov Jensen	First draft of consolidated version Interpretation of SRIA survey and reordering First version of SPI sections
4	26/6/2024	T6.1 and T6.2 participants	Input to first draft
5	27/6/2024	Niels Halberg/ Anne-Luise Skov Jensen	Final draft D6.1 for submission

Executive summary

This deliverable provides input in terms of topic suggestions to the SRIA final version and to the science to policy interface.

The SRIA has been published in January 2023 (https://scar-europe.org/images/FOOD/Main_actions/SFS_Partnership_SRIA_31012023.pdf). The input has been provided by FOODPathS partners, representing networks of very diverse public and private actors, via a survey (Annex A). Input has been given to the four R&I and four transversal activity areas. The received input provides suggestions for topics that can be taken into account in the implementation plan, scoping process and future calls. Moreover, the input provided from respondents suggested a number of policy relevant challenges and suggestions, which may be used by policy makers directly or in science-policy interaction. Whether or not these suggestions are considered is beyond the operation scale of FOODPathS, and in the hands of the future Partnership FutureFoodS. Next to suggested topics, also ideas for cooperation with other Partnerships and general comments have been provided.

The initial work on "science-based advice to policy makers" (science advice/science policy interface) builds on desk studies of relevant literature on science advice with a specific focus on food systems, experience gained by FOODPathS participants active in providing science advice at EU and national levels. Moreover, input from workshops/advanced learners' courses with exchange of experiences and principles used in science advice (integrity, independence, transparency, accountability, etc.) as well as real life challenges in this "metier" give overview of thematic areas and ideas for trans-European collaboration in science advice to policy makers for food systems transitions. The first ideas of developing new processes for co-creation of science advice (for example to account for the complex character of Food systems) were tested in a workshop co-organised with a number of European research organisations involved in science advice (the Ghent group). The work has resulted in a first version of training needs and ideas for further workshops and courses in science advice for food systems transformation.

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1. Introduction

This deliverable provides suggestion for (i) topics for the SRIA and (ii) developments needed in science-to-policy interface.

(i) Suggestions for SRIA topics (INRAE in the lead)

The SRIA (Strategic Research and Innovation Agenda) of the SFS Partnership was developed in a co-creation process led by SCAR FS SWG in 2022-2023, and with support of DG RTD of the European Commission. The SRIA ensures the strategic direction of the partnership and guides all its activities, identifies targeted impact of the partnership and measurable expected outcomes, resources and deliverables.

The SRIA has identified 4 thematic areas (**R&I Areas**) to address:

- R&I Area 1: Change the way we eat
- R&I Area 2: Change the way we process and supply food
- R&I Area 3: Change the way we connect in food systems
- R&I Area 4: Change the way we govern food systems

To achieve the objectives and implementation of the partnership strategy, 4 Transversal Activities (**Activity Areas**) have been defined:

- Activity Area A: Pooling R&I resources and programming
- Activity Area B: Launching a FS Observatory
- Activity Area C: Establishing a FS knowledge hub
- Activity Area D: Knowledge sharing and scaling

The FS is broad and quite complex; therefore, a tailored formulation of the Research needs is necessary, as well as a focus on most relevant themes. In this sense, it is foreseen to align and regularly update the SRIA in order to adapt it to new challenges, new research and political goals and contexts, but also to make sure that as many as possible aspects and elements of the FS have been included.

The CSA FOODPathS aims to design a '**Prototype Partnership for Sustainable Food Systems (SFS) for people, planet and climate**' by following a system approach and providing input to its establishment if requested by the future Partnership entitled 'FutureFoodS'.

As part of its Work Package 6, the CSA FOODPathS carried out an internal consultation to collect ideas and themes from the consortium partners, *representing networks of diverse public and private actors,* on relevant call topics for the 4 R&I areas and needed key actions for the 4 Transversal Activity Areas of the SRIA.

The objectives of the SRIA consultation are to provide suggestions from different actor networks for SRIA topics – as input to future implementation plan and first calls – and to support a possible update of the future SRIA by FutureFoodS. *It should be noted that the survey does not contribute to the scoping process; this is in the hands of FutureFoodS.*

The respondents have been invited to provide suggestions for each R&I Area and Activity Area.

The survey is structured into 5 sections. The first one (section A) includes general questions, the second and third sections (B and C) are dedicated to the 4 R&I Areas of the SRIA and the 4 Activity Areas. Connecting with other partnership is the subject of the fourth section (D) in order to seek complementary knowledge and avoid duplication with other partnerships. In the fifth section (E) final comments could be given.

(ii) Suggestions for the Science to Policy Interface (AU in the lead)

This deliverable presents first overviews and suggestions for further development of science-policy interfaces in support of food systems transformation. Further activities will seek alignment with the FutureFoodS consortium, and any other large initiative targeting FS transformations. AU has analysed the current state of science-to-policy advice based on literature, ongoing activities, co-organized workshops and internal feedback from FoodPathS partners and advisory group members. Based on this input, needs for development of trans-European collaboration in science advice, and new ideas for processes of co-creation in science-policy interfaces have been identified. This also includes training needs to be discussed during the next phase of FoodPathS.

2. Objectives of the Deliverable

The main objective of the deliverable is to provide suggestions for:

- SRIA topics – future implementation plan and first calls – and to support a possible update of the future SRIA by FutureFoodS. *It should be noted that the survey does not contribute to the scoping process; this is in the hands of FutureFoodS.*
- Trans-European collaboration of Science to Policy interface in support of FS transformations

These are listed below

	Objectives	Main actions
1.	Get input to SRIA priority areas, cooperation between partnerships and general comments	Survey send around to all partners and their networks of FOODPathS
2.	Short reflection on received input	Analysis of provided suggestions in terms of usefulness of provided feedback for future SRIA calls
3.	Get input to science-to-policy interface elements	At two sessions at the FoodPathS annual meeting in Seinajoki, the science-to-policy interface was discussed with participants and input was collected.
4.	Analyzing science to policy interface input	Reviewing literature on science advice, organising exchange of experiences and ideas for trans-European collaboration (with Ghent group and other fora including FoodPathS events and advisory board members)
5.	Online meeting with FutureFoodS to discuss the provided input	Organisation of an online meeting with the FutureFoodS coregroup, SRIA WP leader and S-to-P WP leader
6.	Reporting the deliverable with specific recommendations	D6.1 coordinator

Table 1 - Objectives and main actions implemented

3. Target audience

The main target group is the future Partnership Consortium 'FutureFoodS', the EC DG RTD and the SCAR SWG FS, as well as all actors and their networks involved in both the future Partnership, FOODPathS and any large initiative in SFS.

4. Activities / workplan to reach deliverable

4.1. Preparation of the survey

The survey was prepared following the structure of the SRIA of the Partnership on Sustainable Food Systems as published by the SCAR SWG on Food Systems. Since the open consultation in 2022 had provided a lot of comments on the SRIA itself, we have here focused on suggestions for topics under each Priority Area. Hence, the SRIA itself has not been modified.

In Annex 1, the questions for the survey are listed.

4.2. Diffusing the survey

The survey has been diffused among the FOODPathS partners representing networks of different actors. In addition, the following organisations have received the survey on request: BBSRC-UKRI; Brunel University London; University of Greenwich; University of Food Technology, BG; University of Heidelberg, DE; MASAF, IT; HDHL; International Centre for Research in Organic Food Systems, DK; CORE ORGANIC; TP Organic; IFOAM Organics Europe; LUKE, FI; TAGEM, TR.

4.3. Structuring the received input

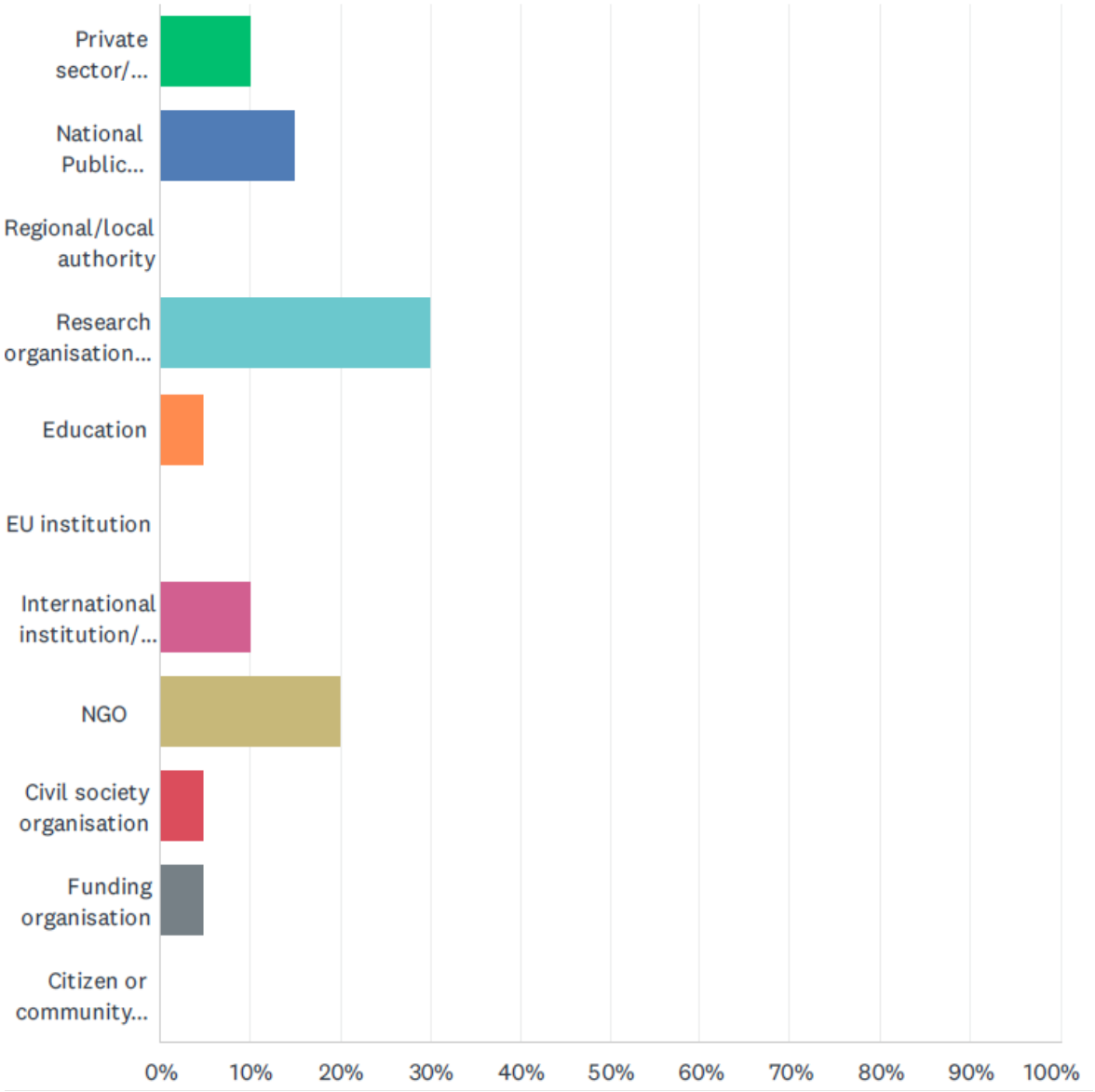
The received feedback has been structured following the list of posed questions. They are here presented, preceded by a list of abbreviations used.

Abbreviations:

AMR - Antimicrobial resistance
ATNI - Access to Nutrition Initiative
EPH Conference - European Public Health Conference
FBDG - Food-based dietary guidelines
GS1 2D - 2D Barcode
HFSS - High in Fat, Salt or Sugar foods
LCA - Life Cycle Assessment
MOOCs - Massive Open Online Courses
NFTP - National Food Technology Platforms
RD Center - Research &Development center
SAPEA - Science Advice for Policy by European Academies - is part of the European Commission's Scientific Advice Mechanism
SCAR - Standing Committee on Agricultural Research
SCAR FS SWG - SCAR Food Systems Strategic Working Group
SRIA - Strategic Research and Innovation Agenda

Section A. General Questions

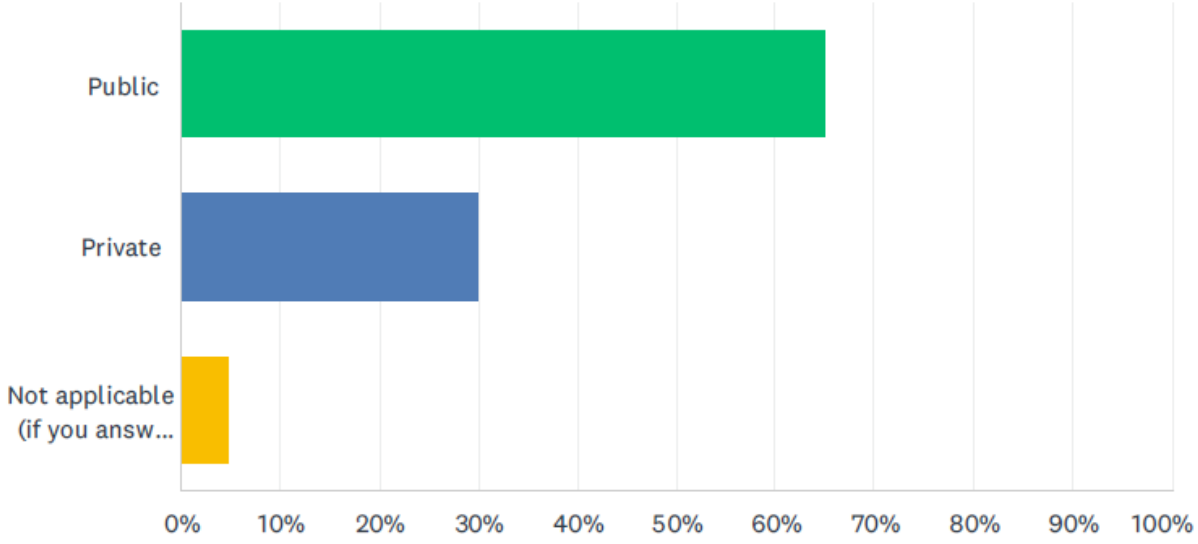
Q. Type of the organisation:



ANSWER CHOICES	RESPONSES
Private sector/ Industry	10.00%
National Public authority	15.00%
Regional/local authority	0.00%
Research organisation/ Academia	30.00%
Education	5.00%
EU institution	0.00%
International institution/organisation	10.00%
NGO	20.00%

Civil society organisation	5.00%
Funding organisation	5.00%
Citizen or community initiative	0.00%
Framer Confederation	
Network of European Public Funders	
TOTAL	100% (20 answers)

Q. Is your organisation :



Section B. Research and Innovation (R&I) Aria

Q 9. What are in your opinion the most important call topics that need to be included in the thematic R&I Area 1 'Change the way we eat'?

1	• Improve understanding of human **nutritional requirements** across the life course to inform Food-based dietary guidelines (FBDG) • Understand the impact of **dietary change** (towards lower ecological footprint/more sustainable foods) on nutrition and health as well as impact on agriculture/land-use, farmers/livelihoods • Increase understanding of **food consumption, dietary patterns,** and **dietary intake,** food handling/preparation/safety in different populations across the life course including development of standards and tools to quantify dietary intake and nutrient status in real-life settings. • Better understanding of the **link between diet, nutrition** and **health outcomes,** e.g., the influence of genetics/epigenetics, role of the microbiome etc.
2	• **Policy incoherence** – incoherence between policies related to food production, health & nutrition recommendations and sustainability persist, hampering and slowing the transition to healthy and sustainable food systems. • **Policy default** - lack of strong(er) regulation for healthy and sustainable food production and sales (industry still has a large operating space, even if this is detrimental to health and environment).

3	• The first topic includes **promoting more sustainable diet** that involves transitioning from meat consumption to more plant-based food, improving the quality of these plant- based options to make it more protein digestible and bioavailable. • The second topic is **reducing waste** and **reshaping of the consumer behavior** • The third topic involves **food security** with promoting more local and sustainable agriculture practices
4	• Call topics should **encourage the consumption** of **nutritious, accessible** and culturally **desirable foods** from nature positive production practices by addressing food environments, consumer behaviour, and priorities such as waste reduction. To this end, **multi-stakeholder action** research to overcome barriers for change and consider global consequences for vulnerable populations is key.
5	• Need to **adapt** and **customise diets** and how to compensate the individual lacks also with local/traditional raw materials.
6	• **Healthy** and **sustainable food** (more plant proteins, prevention of diseases, security of food additives)
7	• **Food** and **nutrition security to all;** Nutrition for sustainable and healthy diet; • **Alternative proteins** (insects); • Promotion of **plant-based food;** • **Personal nutrition** in disease prevention, • **3D food** integration.
8	• **Personalised nutrition;** • Food and human **microbiome studies;** • New approaches to tackle **food intolerance;** • Employing **new food resources** for product development - alternative protein sources; • New approaches for decreasing **food waste;**
9	• Exploring **adaptation** of the **LANCET Planetary Health Diet** to national FBDG (use what we have, do not develop new guidelines). At the European Public Health (EPH) conference in Dublin: "voluntary measures for industry are NOT working, regulation does "policy effect modelling and regulation effectiveness need to be explored to provide insight into what works, what doesn't.
10	• **Pricing, true cost** accountancy, governmental communication, international consensus, sugar/fat taxation for 'healthy' nutrition/food; • Organic and **less-processed food;** • Minimising **food waste;** • Enabling change to **healthy/sustainable diet;** • **Plant-based food;** • Reducing **use of primary plastics** and **carbon emissions** • Improve Life Cycle Analysis (**LCA)** (including biodiversity, water and pesticide use, animal welfare, soil health and nutritional value).
11	• **Local food** production • Promotion of **vegetarian food,** alternative proteins, especially hybrid product (mixture of meat and alternative protein product) research • **Nutrition in different ages,** especially the elderly • Compiling **nutritional recommendations/diet,** digital applications for monitoring dietary and health status (sustainability aspect) • Conflict between **sustainability goals** and **current consumer habits**
12	• (Re-)design of **food environments** to enable healthy and sustainable choices: • Develop **food labelling** assessment that reflects sustainability and health in a consistent way and thereby **Supports consumers** in their choice and change of diets;

	• Improve **LCA methodologies** from products to diets and add more sustainability criteria (e.g. biodiversity, water and pesticide use, animal welfare, soil health etc.) and nutritional value; • Develop **plant-based organic protein** products;
13	• Existing **FS status**: assessment for sustainable diets on EU, national and sub-national level; • **European FBDGs**: alignment and improvement with guiding principles for sustainable diets; • **Food Safety**: most pertinent challenges arising from transitions towards SFS; • **Consumer choices**: how can consumers be enabled and motivated to shift towards more responsible consumption, leverage points for dietary changes; • Know how for creating **enabling food environments**; • **Nutritional** and **sustainability recommendations** need integration and harmonization: **Labels on food products** should be standardized at European level and in line with the EU strategies. This implies harmonization between different countries and aiming at consistency. SUSFOOD2 supports the EU initiative on substantiating green claims but also integrating nutritional claims. In addition, it is important to integrate the nutritional and sustainability dimension un dietary recommendations
14	• Türkiye, one of the world's major food producing countries, feels responsible for shaping a global food system that is fair for everyone. The main theme here should be **Foods of the Future**. • The main goal is to help people switch to a **healthier diet** and **reduce the harmful impact of the food chain** on the environment. • Increasing our **plant-based food** options and reducing **food waste** from the production of the product to its arrival on the shelves; • Continuing to **reduce the amount of calories**, salt and sugar in different product groups; • **Reducing the use of primary plastics** and **reducing carbon emissions** in food production may be priorities.
15	Ensuring that everyone has an **equal opportunity to eat healthier** and more **sustainable food** -i.e. it is not just about the behaviour of individuals.
16	• **Personalised nutrition**; diseases related to food; 3rd and 4th age; • Pre-pro-para-post-b**iotic;** • **New sources** of ingredients including synthetics; clinic studies; food and pharma sector; nanotechnologies;

Q10. What are in your opinion the most important call topics that need to be included in the thematic **R&I Area 2 'Change the way we process and supply food'?**

1	• **Food processing** and reformulation to **develop healthy food products**: improve nutrient content, bio accessibility and bioavailability, and reduce HFSS foods (high in fat, salt and sugar) and what impacts this may have on palatability, shelf-life and upstream production (agriculture/land-use, farmers/livelihoods) • Understand **potential effects** and unintended **consequences** of **food innovation** and **dietary changes** on health and behaviour e.g., plant-based diets, food (bio)fortification, alternative/novel foods, food hypersensitivities, ultra-processed foods, fermentation, vertical farming, gene editing and food insecurity.
2	• How can we improve the **nutritional density of processed foods**, while maintaining food safety and reducing the sugar, salt and additive content?
3	• The first topic includes **promoting innovative technologies** for food processing to improve overall sustainability (improve energy efficiency and minimize waste). • The second topic is **acceptance of circular economy** to reuse waste and minimize environmental impact • The third topic **emphasize digitalization of the food supply chain** to improve communication among different stakeholders and engage consumers more effectively

4	• Research should respond to **local needs/challenges** and focus on **encouraging a diversity of diets** and handling **biodiverse materials** (agro-ecological resources). • Additionally, **shortening supply chains** and creating **fair market environments** for producers/processors of different sizes is critical. • **Key themes** to focus on include: fairness, climate-neutral, circular, healthy, zero-waste solutions.
5	• In the functional and personalized diets, it would be very important to save the **natural properties of the processed raw materials** and the technologies should limit the nutritional decay: it is the technologies that must be adapted to the ingredients.
6	• Lower the **carbon footprint** of food.
7	• Upskill and reskills **training actors**, • **Climate neutrality**, Co2 sequestration and adaptation to climate change (e.g., crop improvement), • **Digital solution** for food systems (e.g., traceability, shorten supply chain, blockchain), • **Alternative proteins**, promotion of plant-based food, cellular agriculture research, • **Sustainable packaging**
8	• **Re-formulating foods** in a healthy and sustainable way; • Employing **new food resources** for product development; • New **food processing approaches** for healthy and sustainable foods; • Development of **efficient technologies** for food waste utilization; • Preservation of **microbial diversity** related to fermented food production;
9	• Explore how to replace ultra-processed unhealthy food, to **mildly processed healthy food**. • **Food reformulation** towards less salt, less sugar, less fat and fewer ingredients and additives such as emulsifiers. Both in R&D as well as in regulatory sense.
10	• Using **systems approach in food processing** and **supply**, including climate, environment, biodiversity, socio-economics, and human health • Measuring and assess **effects of food production on climate**, **biodiversity** and **environment**. • Smart and efficient **production strategies** and **technologies** that increases circularity and prevents waste, including intelligent or zero packaging and the use of natural additives/preservatives.
11	• **Transparent technologies** in optimization, preservation and processing, with lower resource consumption, emissions and waste. • **Resource-saving** and **energy-efficiency**, • Optimisation of **packaging**, • Minimising **food waste** (increase shelf life) • Increase proportion of **organic food** in **out-of-home catering**; • **Traceability** of food production • **Efficient practices** and **breeding** • Reduction of **GHG emissions** • Minimal/mild **organic processing**
12	• **Fair transition**/treatment of farmers • **Regional adaptation** • **Reduction of intermediaries** in the **global food chain** (food chain simplification, like short food chains), Increase of **transparency** • **Food safety** in different stages of the process (especially including the sustainability aspect) • **Cell meat** and other **alternative proteins**, product texturing technologies and separation technologies, filtration, evaporation, drying - including energy efficiency and environmental perspective, as well as shelf life • Research of **fossil-free energy alternatives**, scalability (e.g. Equipment development, bio-gas possibilities, electricity availability)

	• **Carbon farming** (e.g. Carbon sequestration plants) and other soil matters
13	• Smart and efficient **food production strategies** and processing technologies that increase circularity and prevent waste, including intelligent or zero packaging and the use of natural additives/preservatives • Addressing consumer demand for **minimal** and **mild processing** and further developing **organic processing**
14	• The **systemic approach** in technological, logistic, organizational and social innovations to reach sustainable outcomes • The reconsidering of **processing and supply methods** for(re)valorising forgotten or underutilized crops or livestock species, saline-tolerant and drought-resistant species, alternative protein sources, micro-organisms etc. • A faster approval process of **novel foods** and **new technologies** is desired which can support the necessary steps in the transition towards increased food system sustainability. • A created forum therefore that would collect **the evidence** would also **facilitate dialogue** between food systems actors on the research needed to be carried out to get the evidence for food safety and other regulatory aspects. • A **more inclusively involvement of the food industry** • **Food side streams**, as any other biological resource, should be transformed step-by-step and wholly into new food, feed, bio-based chemicals and materials, including food packaging, and into more resources for the benefit of society and the environment. • **Food industry**, from SMEs to big companies, need incentives for the uptake of new sustainable technologies and products and policy must set the basis to facilitate reduction and reutilization of food waste. • The **interconnection between increased efficiency** and **resilience of a system**. While the global FS was developed to be more and more efficient and standardized in the last years with shorter and more linear supply lines, removing redundancies, the resilience of the system was reduced. How do we get an efficient food system that is at the same time a resilient food system?
15	• First of all, **food processing** and traceability from field to fork should be ensured. • **Innovative practices** and **breeding studies** that will increase efficiency should be emphasized. • Efforts should be made to **reduce the negative effects of climate change** and to **resist biotic** and abiotic stress conditions towards sustainable agricultural practices.
16	• Understanding **financial flows** and **financial engineering** that allows for **ultra processed food** to be so cheap: can these methods be adopted for healthier/more sustainable and less processed foods?
17	• **Food safe;** • **Food security;** • **Sustainability;** • **Contaminants**, bacteria in food; viruses in food; • **Global chain** values; **short chain** values; • **Digital twins**; big data; machine learning

Q11. What are in your opinion the most important call topics that need to be included in the thematic **R&I Area 3 'Change the way we connect in food systems'?**

1	• **Citizen science** and including a **diverse range of people** and **food producers** (e.g. farmers), including those with lived experience and in hard-to-reach groups in co-creating research questions. By targeting **people with the greatest inequalities** will deliver the most meaningful impact in improving population health.
2	• **Empowering citizens** - Consumers are faced with contradictory injunctions, on the one hand to spend less and less on foods, and on the other hand to buy more expensive healthy and sustainable foods.

3	• The first topic is **community engagement** to actively participate in food systems to straighten connection between producers and consumers. • The second topic is to **emphasize the importance of social sustainability** in the management of the food involving various stakeholders and consumers
4	• Research should focus on **community action, food justice, food democracy,** and **co-creation** • **Multi-stakeholder approaches** at multiple scales are important to prioritise, as are supply chain transparency and resilience, climate change mitigation and adaptation, and policy frameworks including subsidies, regulations, and international cooperation.
5	• We need more and more an **active citizenship** on **increased education** and **senility, scientific insight** information, stimulating a higher responsibility by the food industries and farmers.
6	• **Consumer communication;** • **Food education;** • Increase **food trust**
7	• Balanced **development of rural, coastal,** and **urban areas,** new agri-food entrepreneurship, • **Methods for measuring** the **biodiversity impacts** of economic activities; • **Observations systems** for global environmental change and prediction, • **Interdisciplinary research** to solve problems in biological systems and ecosystems • Sustainable use of **natural resources**
8	• Improving the **connection between stakeholders** in the food system; • Ensuring **transparent communication** and **information systems;** • New approaches to improve **food traceability;** • New approaches for preventing **food fraud** and **counterfeit.**
9	• Explore how **action research** and **lived experience** can play a much more prominent role in evidence-based science for food systems transformation. • Research implementation of **food environments policies** and **regulation**
10	• Methods that **support consumers** in their choice of healthy and sustainable food choices, including traceability from farm to fork, e.g. **labelling** • **Local** and **shorter** supply/value **chains** • **Transparent labelling** of health and sustainability properties (climate, environment, animal welfare etc). • Methodologies to **strengthen collaboration** and **knowledge exchange** between actors throughout the system
11	• Knowledge and perception regarding **food production across societies/cultures;** • **Consumer** behaviour and expectations; • **Communication strategies** on organic food/sustainable nutrition/waste reduction • **Support consumers** in choice of healthy and sustainable choices, including traceability, short supply chains, and labelling • Improvement **food literacy** e.g. Reduced sustainability, health, quantity and diversity of food components
12	• Strengthening of **living lab networks** • Supporting **cooperation** patterns that **cross sectors** (e.g. Farmers and industry) • Stronger involvement of **consumers** • **Data exploitation/transfer** and **transparency** (like GS1 2d code, two-dimensional symbols printed on a package, 2D barcodes) and increasing the availability of open information • Increasing cooperation between **legislators** • Increasing the capacity of **projects** directed **outside the EU**/continuous support of **local actors** (not as a single project), increasing cooperation, e.g. Training cooperation

13	• **Food literacy**: strengthening knowledge and innovation systems for sustainable and healthy food (through **education, training** and **capacity building** as well as awareness raising, e.g. through true cost accounting)
14	• Attention for **engagement** and **trust of stakeholders** as citizens and consumers • **Digitalization** as empowerment of consumers • Food systems are complex and there are conflicting notions of sustainability. An **integral approach to food sustainability** by policy makers, producers and retailers is recommended and needed and will increase the transparency of food supply-chain efforts. • Clear messages to consumers will increase the **trust in food.** There is no sustainable food choice without **affordability**, consumer **consciousness** and **business responsibility**. Distinctive, practical, and modern communication is required for **transparency** towards consumers about all aspects of sustainability.
15	• Enabling **procurement innovation, carbon neutrality, reshaping food production**
16	• Better understand the **money flows.**
17	• **Artificial intelligence**; social networks; communication; IT platforms; legal and technical compliance;

Q12. What are in your opinion the most important call topics that need to be included in the thematic **R&I Area 4 'Change the way we govern food systems'?**

1	• What works well (or has not): identify effective and learn from/improve previous or current **interventions/policies** which have generated positive outcomes to address inequalities and ensure sustainability of planet and people; • Incorporate **nutritional security metrics** into circular and bio-economics, e.g., nutritional Life Cycle Analysis from soil through the food chain, capturing impacts on environment and industry/food processors
2	• Explore (understand, identify the levers and actors of change) **how to change the 'status quo' mindset of society** as a whole (including policy makers, scientists, industry, other stakeholders, citizens), because the current mindset is not holistic and prevents us from enabling the transition to healthy and sustainable food systems.
3	• Developing and promoting **policies** that **support sustainable agricultural** and **food processing** practices.
4	• Call topics should prioritise mainstreaming a **food systems approach** and incorporating **food priorities across sectors.** • Emphasis should also be on **regulatory frameworks**, inclusive decision-making, and policy coherence across scales, labour rights, public procurement, and urban and regional planning.
5	• With the aim to achieve a **more consistent policy tools** we need to assess the impact and overlaps of them and to find a **good balance between top down and bottom-up approaches**. The policy game method with its simulations could be very effective
6	• **Foster links** between **all actors of food chain** (farmers, manufacturers, retailers).
7	• Revolutionary **governance structures** promoting sustainability and environmental monitoring, fostering **community empowerment** and **innovation**. • Implementing **progressive food policies** within major **urban centres**.

8	• **New technologies** to improve traceability in the food system; • **New approaches** for preventing **food fraud** and counterfeit; • Joint efforts in governing food systems to tackle the **food waste problem;** • **New approaches** to ensure **circular bio economy** and **sustainability** of the food system;
9	• **True cost** accounting and **pricing** to stimulate healthy and sustainable purchasing. • Exploring issues of **power imbalance** and in **transparency** and options for food actors to change business model (shares in foundation). • **Policy modelling** and **benchmarking**
10	• **Transformative policy** that creates environment long term transformation; • **Science/policy exchange** to create knowledge on governance, policies and actions needed to support system approach
11	• Reorganizing **production strategies,** taking into account consumer demands; • Fostering **common understanding** about sustainable food systems and required governance, policies and actions through **science-policy dialogue;** • Towards **transformative food systems governance:** promoting active participation of all stakeholders in decision-making about food.
12	• **European-level round table** for the **food sector** (combining research, education, industry, consumer, agriculture/farmers); • Corporate **social responsibility** (at the level of the food system), including in cooperation between food chain actors; • Increasing **regional money,** decision-making power for regions; • **Reduced bureaucracy,** long-term in decisions/projects/program funding
13	• **Integration and alignment of policies** from different administration sectors in the public domain and the alignment of several existing policies in the public, private and civil society domain; • Improvement of the **science-policy interface;** • **Policy measures** and their effectiveness in reaching the transformation;
14	• Better understand why the **food lobbies** are so powerful; the tactics they use to manipulate the food systems for their own benefits; and the means by which we can overcome this disruptive and harmful force.
15	• **Technological platforms; networks** that already exist; start-ups environment; research centres; universities; regional clusters; food valleys; talent attraction from abroad.

Q13. Do you have **other suggestions** regarding the four R&I Areas?

1	• Take a **One Health Approach for Nutrition Security:** to ensure nutrition security for a global population whilst preserving natural resources in a changing climate. An interdisciplinary approach (One Health) will provide a foundational framework to target multiple factors across the food chain and involve multiple disciplines and stakeholders such as researchers, health practitioners, farmers, industry, consumers and governments. • Need to include a stronger focus on **innovating food processing,** in particular the rising consumption and impacts of ultra-processed foods on human health and behaviour across the life course and population groups; • The **NOVA classification needs** to be refined and linked to nutritional content • Identify the key causal factors to **better understand the links between ultra-processed food consumption** and **poor health outcomes;** • Establish how **changes to food texture** and **matrix resulting from processing impacts on consumption levels and behaviour,** e.g., hyper palatability, energy density, speed of eating, dietary patterns, reduced/delayed satiety (gut-brain signalling), food behaviour (including potential addictive nature of UPF) and mental health;

	• Explore the **food safety impact of additives** and potentially **harmful compounds** generated during processing, and chemical contaminants (e.g., endocrine disruptors) from food packaging on long-term on human health.
2	• Emphasise the significance of **collaboration between academia, institutions** and **industry** in improving the food sector for the well-being of consumers and overall society.
3	• To take into consideration the **food culture** in the world with their best practices and local materials and combine different ingredients to maximise their benefits
4	• Implement a top-down and or bottom -up **awareness campaign** through key stakeholders in the food supply chain.
5	• **Education** in the food field - how to increase motivation, improve quality, meet the needs of stakeholders in order to prepare the new employees in the food system;
6	• In general, we need to move away from the narrative that it is a personal responsibility to eat healthily and sustainably and more towards a **systems approach** (food environments including product reformulation, product marketing etc). • With regard to Area 4 - Governance - we need to **increase action research and participatory research** to create stronger public systems such as citizens food policy councils at different levels. In addition, lived experiences research and experiential knowledge needs to have a prominent role. Also questions such as how R&I conserve these bottom-up citizens processes? • In addition, we need to venture out of the food systems domain and into the **social domain** and focus **research on fiscal measures** and their effect on food purchases/food accessibility (e.g. income support effects). • Also connect to spatial planning domain for **research in food environment transformation**. Applied research to be undertaken in: monitoring for accountability, deep understanding of the success stories, gathering evidence to counter common arguments of industry and taking into account the lived experiences of food environments to co-create strategies and actions.
7	• There is a need for **funding of longer projects** (beyond three year) in order to create transformative projects and (long-term) system change. It is important to create more continuity in research project. This can e.g. be done by: ○ **Stop/go system**: Where projects are evaluated after 2 years and if project reached satisfactory results, they may continue for another 4 years. ○ **Re-application**: Excellent project may reapply to continue the project ○ **Supplement and extension**: Better opportunity to apply for supplement (financial top-up) and extension of projects
8	• See TP Organics' SRIA: https://tporganics.eu/wp-content/uploads/2020/01/ifoam-sria-full-version-final.pdf • As well as our most recent Position Paper: https://tporganics.eu/wp-content/uploads/2023/10/TPO_RnI_HE_Position_Paper_WP2025-27.pdf
9	• Links with other countries/regions/areas out of UE such as UK, US, JP, KOR, SIN, and so on

Section C. Four Activity Areas

Q14. What are in your opinion the most important key actions that need to be undertaken in the **transversal Activity Area A 'Co-funding'**?

1	• **Co-creation** and **co-design of transnational** and **interdisciplinary projects** across disciplines, sectors and stakeholders including citizens. It is essential to include **social sciences** and **economics** in all projects. Different types of funding should also be considered and not the 'usual' consortia approach as a default.
2	• Funding of **multi- and trans-disciplinary knowledge hubs**, in connection or nor with the "knowledge hub of FS labs"
3	• **Accessibility of the co-funding opportunities** to a wide range of organizations, organising networking events, workshops and conferences to facilitate connections between potential co-funding partners.
4	• **Inclusive programming** and **funding actions;** • **Transnational collaboration;** • Reflexive and iterative **learning;** • Support the design and implementation of **evidence-based food policies** in the EU at all levels;
5	• To engage different kind of stakeholders we need **different financial tools** for different targets: depreciation costs, joint ventures, start-ups, lump sums, incentives, grants...
6	• Funding large **industrial investments**, especially private research demonstrators.
7	• Conduct **analysis** through focus groups, living labs, and workshops.
8	• Identify **resources** and **programmes** for **co-funding;** • Identify **partnerships** within the consortium with the potential of attracting co-funding from certain resources;
9	• Substantial **increase in R&I investment from public sources** to compete with private investment in this area. • Also move towards **real common pot funding** (or a hybrid model with percentage of for instance 20 % for real common projects funding)
10	• **Transdisciplinary** and **multi-actors approach** • Integration of **system approach in call mechanisms** especially in the evaluation criteria • Collaboration with **other HEU partnerships**
11	• **Different co-funding rates** depending on the conditions of the countries. • **Transdisciplinary** and **multi-actor involvement**, especially SMEs and civil society • Ensuring **food systems thinking** along whole funding cycle • Clear and **transparent agreements** and **guidelines** for funders and funded projects • **Outreach to other relevant Partnerships** and **programmes** within and beyond the EU
12	• Sufficiently large project entities, overlaps are avoided by directing funding.
13	• Co-funding with good integration of **systems approach;**

	• Strong **alignment among funders;** • Work on the **whole funding cycle** with the aim to work using a **systems approach,** e.g. also in preparing for funding activities
14	• It can be considered at **different rates** depending on the conditions of the countries. For example, EU member or non-EU member.
15	• Exploring **alternative** (non food industry) **sources** of funding could be powerful.
16	• **Diversity of funding**: grants, loans, capital investment, tax reduction, etc.

Q15. What are in your opinion the most important key actions that need to be undertaken in the **transversal Activity Area B 'Observatory'?**

1	• Improving **methods, metrics** and **tools for data collection, integration, interpretation and modelling** on food systems. • Use to capture/increase **understanding of the complexity of the food chain** and predict the impact of future events and interventions to improve nutrition security and health outcomes. • Use **AI to generate hypotheses** to test experimental approaches e.g., scenario modelling
2	• Engage with a **diverse range of stakeholders** like government bodies, research institutions, industry experts and the public.
3	• An approach of **continuous learning** and **improvement** • Development of both **qualitative and quantitative metrics** and **indicators** • Inclusion and development of **citizen science activities** • Improving the **methods, metrics and tools for data collection** for food systems in the EU • Defining a **clear vision** for which metrics and indicators can be identified • **Policy oriented results**
4	• The observatory needs some **added competences** on **impact assessment** (statisticians, lawyers, sociologies, economists) of different business models and different policy tools/bills
5	• Observatory of the **burdens/obstacles to the R&D**: financial, regulatory
6	• **Digital platform** for sharing data across all stages of the food supply chain. • Develop **advanced data analytics tools** and **visualization techniques** to interpret and communicate trends, patterns, and insights derived from food systems data.
7	• Define **responsible experts/organisations;** • Ensuring the lack of any **conflict of interest;**
8	• Work together with Access to Nutrition Initiative (ATNI) to **monitor operations of industry players.**
9	• Using **novel, harmonised data** for co-creating ideas and scenarios for FS transformation via policy, public engagement and business models; • Comparing **multiple food system configurations** on their sustainability performance and contribution to true cost/price;

10	• **Qualitative evaluation, effectiveness** as the evaluation criterion instead of exact /quantitative goals. • **Bad results** should also be included (not only best but also worst practices)
11	• Activity B needs **more clarity about the envisaged actions and actors** to implement the observatory
12	• **Observation of the project** is important.
13	• Less is more: important to hone in on the **metrics that matter** and will allow for better decisions must include **financial flows** within the food value chain!
14	• **Detailed observation of all existing and nearby structures** in Europe and interesting countries around us (UK, US, JP, KOR, SIN, etc.)

Q16. What are in your opinion the most important key actions that need to be undertaken in the **transversal Activity Area C 'Knowledge Hub of FS Labs'?**

1	• **Sustainable, nutritious, safe** and **affordable healthy diets** and **dietary shift,** mitigation of and adaptation to **climate change** of food system and **impact on nutrition security** and **health;** • Reducing **food loss** across the food chain pre- and post-farm gate to consumers; • Reducing **food poverty** – addressing inequalities;
2	• Create **platforms** that encourage **interdisciplinary research** with researchers from **various disciplines** in order to address complex challenges in food systems.
3	• Creating **interactive spaces** for **meaningful collaboration;** • Create **spaces for multi-stakeholder engagement and co-creation;** • Enable **systemic thinking** and **action;**
4	• More initiatives with **high degree of visibility** such as award of food Innovation, start-up incubator, young entrepreneurship
5	• **European mapping ok FS Labs** and actions to promote their partnerships.
6	• Utilize **living labs** and **focus groups** to **understand consumer behaviour;** • Ensure that the **knowledge hub provides open access to information,** research findings, and best practices, promoting transparency and inclusivity.
7	• Collect **expressions of interest** by the platform partners for **establishment of knowledge husband living labs;** • **Assess the fields of expertise** which will be covered by the living labs;
8	• **Build on what we already have** and experiment/pilot/use this!!! There are 72+ European initiatives working on food systems transformation, synthesize knowledge from these and do not establish more. Bring this **synthesises knowledge to the policy domain.**
9	• **Incorporation of EU platforms/hubs like ETPs** in the governance that can help with knowledge synthesis, communication, dissemination and outreach;

	• Developing and demonstrating **co-creation cases/living labs with private and public parties** at European and global level as well as in national and regional FS-Labs to share practical solutions
10	• Growing the **Living lab network**, facilitating access to information (map, etc.), user and target group orientation.
11	• What is the **role of research organisations in the living lab and knowledge hub**?; • Where is the **expertise of "classical" research** activities gathered? • Will there be other knowledge hubs as well?
12	• This activity should be merged with activity area 3. • **Categorisation/classification of knowledge** will be essential. • It will be important to **ensure that this platform survives and thrives** over the next 2-3 decades at least; it should not be something that is only maintained for the duration of a project (e.g. 3-4 years) otherwise it will be completely useless and a waste of time and money.
13	• **Good coordination** between and among different structures.

Q17. What are in your opinion the most important key actions that need to be undertaken in the **transversal Activity Area D 'Knowledge sharing'**?

1	• Evaluation of the **effectiveness of interventions, synergies and trade-offs** in designing policy instruments; • **Cost-benefit analysis of actions** and inactions should help to prioritise interventions, but need to balance short- vs longer-term impacts across the food system, human nutrition and health; • Using **Knowledge Transfer Fellows** is a good approach to ensure connectivity between projects.
2	• Create one or more **thematic training** and **information schools** or Massive Open Online Courses (MOOCs), shared between countries and aimed at university students in the various fields concerned by the food system, including marketing, business and the health professions;
3	• Promote **best practices across food supply chain** and **encourage knowledge exchange** and **collaboration** among individuals interested in food systems.
4	• Creating **inclusive spaces for knowledge sharing** including in the community of practice/learning network; • **Science-policy interfaces** that include **civil society organisations** and **philanthropic organisations;** • Development of **formal** and **informal education programs** that focus on **systemic transformation** aligned with the vision and values of the Partnership.
5	• **Interdisciplinary staffing** and **free access** to different **knowledge sources.**
6	• **Sharing of the mapping** and **successful use cases.**
7	• Creation of **digital passport** for food products increases the demand for sustainable and resilient food production; • Develop **platforms** that actively engage **local communities in the knowledge-sharing process,** encouraging the exchange of traditional and experiential knowledge.
8	• Make a **pool of expressions of interest** for knowledge sharing activities - seminars, training schools, research exchange, conferences;

	• Establish a **platform** where the possibilities for knowledge sharing will be presented and accessible in a transparent way; • Establish a **plan for supporting scientific publications** - books, research papers;
9	• **Systematic reviews** are needed as we already have a lot of scientific insights that are not used enough; • Focus on **science to policy**; • **Action research** and **implementation**.
10	• Create a **multi-actor knowledge exchange network** where actors representing different parts of the sectors can exchange ideas, news, concerns etc.
11	• Setting up a **community of practice/learning network** for exchanging insights; • Establishing **knowledge sharing** and **scaling actions** • **Science-policy interfaces** in the EU at various levels and giving voice to **civil society organisations**
12	• **Open learning materials**, project results - freely for further editing, adding open access to all information.
13	• **Open rules** to share info between and among entities

Q18. Do you have **other suggestions** regarding the four **Activity Areas**?

1	• **Strong coordination** and **collaboration across the activity areas** to identify areas of synergy, maximise impact and avoid duplication.
2	• Develop **effective strategies** for **disseminating knowledge** including publications, reports and policy briefs to reach the audience.
3	• **Foster partnerships between research institutions, universities**, and **private sectors** to conduct joint research projects addressing critical challenges in food systems; • Establish **partnerships with other regional and global observatories** to create a more interconnected and comprehensive understanding of global food systems.
4	• Please **use** Science Advice for Policy by European Academies **(SAPEA) recommendations**: ○ **Pricing**: There is clear evidence that direct measures are effective. This includes sugar taxes, meat taxes, and pricing products according to their environmental impacts, as well as lower taxes on healthy and sustainable alternatives. These policies must be delivered in a way that is fair, especially to people from disadvantaged backgrounds, for instance by returning tax proceeds to vulnerable citizens. ○ **Availability and visibility**: Healthy and sustainable food options are more frequently chosen if they are displayed in prominent places. The advertising of foods, which are unhealthy or unsustainable if consumed regularly should be restricted. Voluntary codes of conduct in this area have not been effective. ○ **Composition**: Reducing unhealthy fat, sugar and salt content, and adding more plant-based alternatives, can be helpful — but only if these measures are mandatory and comprehensive. The evidence shows that past voluntary agreements have had limited effect. ○ **Labelling:** Labelling foods to show their health impacts has a low to moderate effect. ○ **Social environment:** Peer and social influence has been shown to be effective in improving healthy eating. Digital technologies offer further possibilities, but also pose huge risks of stimulating unhealthy and unsustainable consumption, for example through industry marketing strategies.
5	• **Agroecology (AE):** It could be relevant to work with AE Partnership on creating **transparency** and **labelling** in order create a comprehensive overview, which includes pre and post farm gate perspectives; • Creation of **living labs across partnerships** in order to have a multidisciplinary approach and include various sectors when dealing with cross-cutting issues.

6	• Need to **better understand how private interests manipulate food systems;** • Need to **better understand how they can modify their business models** so they are not reliant on making populations sick in order to gain profit.

Section D. The Partnership SFS connected to other Partnerships and interaction with different stakeholders

Q19. Do you have suggestions on which topics Horizon Europe partnerships should particularly work together: AELLRI (Agroecology), Biodiversa +, Blue Economy, Agriculture of Data, Animal Health & Welfare,ERA4Health, Circular Bio-based Europe, Water4all, Chemical Risk Assessment etc.?

1	• As nutrition often fall between food systems and health programmes it would be pertinent to **collaborate with ERA4Health;** • the Partnerships should seek to work together to bring together **appropriate expertise** and build **stronger collaborations** to add value and increase impacts in the given topic areas.
2	• **AELLRI, Blue Economy, Circular Bio-based Europe, ERA4Health**
3	• Collaboration between **Circular Bio-based Europe** and **Blue economy** on sustainable agricultural practices, or **AELLRI** on sustainable water management.
4	• **Minimising trade-offs** and **maximising co-benefits** for all stakeholders, including nature/the planet, in order to transform our food systems • Incorporation of **relevant shared priorities** and **key themes across sectors** e.g. inclusivity, multi-stakeholder co-creation, biodiversity, zero-waste, climate mitigation and adaptation, and healthy and sustainable food systems
5	• **Circular Bio-based Europe, ETP Food for Life** with the National Food Technology Platforms (**NFTPs) network**
6	• **Food production:** processes and ingredients for a sustainable and healthy food
7	• **Carbon footprint** • **Water footprint** • **Supply chains** soil efficiency (food production, water, chemical risk, animal production) climate change • **Resilient system** net zero/carbon neutrality
8	• **Circular Bio-based Europe;** • **ERA4Health;** • **Biodiversa +**
9	• **Health and food systems;** health and agroecology (connection between pesticides and neurodegenerative disease); food systems, health and animal welfare/destocking -> topic of Antimicrobial resistance (AMR)

10	• Close collaboration with **AGROECOLOGY** required, especially in terms of adopting a 'whole supply chain' approach. Possibly also in terms of focusing on alternative proteins – production and consumption.
	• **SBEP**: seafood and diet; seafood and supply chain logistics.
	• **EUP AHW**: food safety; supply chain logistics
	• The **protection of biodiversity and genetic resources** is directly linked to sustainable agriculture. That's why we can collaborate with **Biodiversa +.**
	• **Microbiome:**
	  ○ Consolidating the evidence on the **link between the soil, plant** and **animal microbiome** and the human microbiome across sciences in an interdisciplinary way;
	  ○ Investigating **how this link is influenced by different food production practices**, as well as effects/potential health benefits of organic vs. conventional food/diets;
	• Enabling **developments, innovations**, and **co-benefits** in areas such as health, food and nutrition security, climate change, higher yield, and nutritious food.

11	• I don't know exactly the actions/contents of the networks, in principle everyone should cooperate, and according to the special skills, smaller groups of experts/pools should be created.
12	• General research on key topics as **(bio)diversity, circularity**, etc. • **Mobilizing tools** as **living labs** • **Communication** and **dissemination** • Connecting with the **RefreSCAR project** (starting Sept 2023) The following Partnerships are also of interest: • European Partnership – driving **urban transitions to a sustainable future (DUT)** Why: Sustainable cities need sustainable food supply to be sustainable, on the other hand the food environment is often influenced by city/urban environment; most people live in cities, most food is grown in rural areas, transport, logistics play a role in sustainable food systems. • **EIT Food KIC** • **PRIMA**
13	• You can broadly disaggregate to **land-based ones** and non-land based ones. not the best but could make things a bit easier
14	• All of them are interesting, mainly **Circular Bio-based Europe, Agriculture of Data.**

Section E. Final Comments

Q20. Do you have any **other comments**?

1	• Develop **greater understanding of the microbial ecology** and **functional relationships** along the food chain from soils to gut microbiota to ensure nutrition security and benefit human health and the environment. Soil, plant, animal and human intestinal microbiome are interconnected, constantly evolving in diversity and function and influenced by changes in the environment, food production and animal husbandry practices, and lifestyle. One key role of microbiome function is nutrient assimilation. Increasing use of agrochemicals, low plant biodiversity and rigorous soil management practices lead to soil degradation, negatively affect the soil microbiome. • **Understand the mechanisms by which nutrients**, and **their interactions**, **impact bioavailability** and uptake, and effect **health along the food chain** and **enhance nutrition security**. Also consider regional variation, type of breed/strain; food production environment (sun exposure, soil pH, fertilizer/antibiotic usage, quality/type of animal/fish feeds, welfare); harvesting (degree of ripeness; stem, leaf, flower or fruit); food storage, processing, cooking and consumption. • **Animal health and welfare**: Animal based foods provide essential sources of micronutrients, which are often difficult to obtain from plants. Unhealthy/poorly managed animals can affect the nutritional quality of products, e.g., lameness in dairy cows. Higher welfare animal products can have nutritional benefits including meeting

	dietary requirements foromega-3 fatty acids, vitamin E and iron, as well as reducing dietary intake of saturated fat.
2	• **Work closely with policymakers** to **integrate research findings into policy decisions**, ensuring that scientific knowledge informs the development of effective and sustainable food policies. • **Facilitate the integration of digital tools**, gather additional data, and address the knowledge gap among those external to ERA-NET/Partnerships. • **Raise awareness across all stakeholders** and **foster engagement**, particularly with older farmers, to enhance their production, skills, and understanding of sustainability in the food system.
3	• Integrate options for **involving people from underserved groups** in an equal manner to researchers and experts, based on their experiential knowledge. This would really help to transform food systems and the power relations within them.
4	• The partnership is supposed to encompass the entire food system. While this represents major challenge, much can be **learned from alternative, sustainable and holistic approaches**, in particular the well-established organic and agroecological systems. As mentioned in the Partnership SRIA, it is crucial to consider not only technological innovation but also organisational and social innovations to ensure sustainable outcomes; and the organic sector may serve as an example in this regard, as well as when it comes to sustainable diets, with organic consumption patterns being close to sustainable diets according to the FAO.
5	• Make **use of experience** and **connecting with GreenEraHub (GEH)**, a network of networks in Agri-food and Bioeconomy fields.

4.4. Short analysis of survey feedback suggestions

While reviewing the rich set of suggestions, some key issues are emerging:

- Except for citizens, all other stakeholder groups are represented in the answers. As suggested previously, especially the underserved groups should be well involved.

- For all four R&I areas and four Activity Areas suggestions for topics have been provided. This implies that all areas are still considered as of relevance.

- Also, the list of proposed Partnerships or large initiatives to connect with is substantial. It underlines to seek collectively sustainable outcomes and not operate as future P-SFS in isolation.

- In terms of general comments, the list is rather short, however, rich in content, ranging from topics, science-policy connections, utilizing digitalization, foster engagement and in particular include underserved groups, work holistically while learning from others and their experiences.

- Since a separate Partnership is targeting animal health and welfare, it is suggested that this domain will not be primarily tackled by the P-SFS.

- The connections to Refresh-SCAR and PRIMA-Mediterranee are also to be considered by FOODPathS; the latter became member of its Advisory Board in June 2024. The connection with Refresh-SCAR is proposed to be made via the SCAR Strategic Working on Food Systems, which is chairing the Advisory Board of FOODPathS.

Among the many comments to each of the four R&I themes, we have identified suggestions for actual researchable questions respectfully comments which points towards policy needs. Most comments to R&I need confirm the content already given under the themes in SRIA 1.0. In the following we present selected comments, which we interpret mainly as suggestions for R&I questions/topics in addition to the current content in the SRIA (not exhaustive):

- There is a general perspective, that existing voluntary measures targeted towards the industry focusing on a transition to more plant-based and healthy products, are not having the expected impact

    - It is therefore necessary to carry out more research into policy effect modelling and effectiveness of regulation, to provide more insight into which measures will have an effect

- Further exploration of taxation tools and labelling, which can support consumers in making the change towards a more healthy and sustainable diet

- R&D into food reformulation to support the development of food products with less sugar, less salt and less fat

- Traceability and food safety need to be explored further in relation to the transition towards sustainable food systems

- To reform European food systems towards more sustainability and healthy diets, it is necessary to research further into revolutionary governance structures promoting sustainability and environmental monitoring, fostering community empowerment and innovation.

The input received from the survey in relation to the four thematic areas, showed a wide array of inputs, which can be addressed, both in FOODPathS and in the Future Foods Partnership. The input relates to both policy level aspects and call integration aspects. In this section the input targeted at policy level is summarized.

- There is a need to harmonize nutritional recommendations across MS in particular taken into account the three sustainability dimensions (environmental, social and economic)
    - In general, there is incoherence in policies across the EU in nutritional recommendations

- Food policies and governance structures should promote sustainability across food systems in Europe
    - Increased integration of the sustainability aspect in regulation, support initiatives and food system strategies at national and/or regional level in MS could facilitate the development of sustainable food systems in MS

- Coherent policies across MS in terms of both nutritional recommendations and what defines a sustainable food system will increase transparency for the individual consumer
    - Consistency in terms of nutritional recommendations and guidelines for a sustainable food system, will make it easier for consumers/citizen level stakeholders to cooperate across MS with implementing sustainable and healthy diets

- It is important to implement sustainable food systems, where traceability and food safety levels can be maintained and/or further developed

- Due to the complexity and difference in scale in food systems across MS, it is important to strive for stakeholder involvement at multiple levels

- It brings value to the transition towards sustainable food systems to look outside the European Union for experiences and knowledge

From a general perspective, the provided answers confirm the general outline of the SRIA, and in those cases, where there are topics, which can be relevant in the future, these will be used as a basis for a future revision of the SRIA.

In the table below, the policy relevant answers are pooled for question 9 – 13, respectively. Such questions may inspire the future development of science-policy interfaces for FS transitions.

Policy relevant answers grouped according to Q9 – Q13 respectively.

Q9: What are in your opinion the most important call topics, that need to be included in the thematic R&I Area 1" Change the way we eat"? (Some of the listed answers also relate to thematic area 3).
Answer no. 2: - **Policy incoherence** – incoherence between policies related to food production, health & nutrition recommendations and sustainability persist, hampering and slowing the transition to healthy and sustainable food systems. - **Policy default** - lack of strong(er) regulation for healthy and sustainable food production and sales (industry still has a large operating space, even if this is detrimental to health and environment).
Answer no. 7:

- **Food** and **nutrition security to all**; Nutrition for sustainable and healthy diet
Answer no. 9: - Exploring **adaptation** of the **LANCET Planetary Health Diet** to national FBDG (use what we have, do not develop new guidelines). At the European Public Health (EPH) conference in Dublin: "voluntary measures for industry are NOT working, regulation does "policy effect modelling and regulation effectiveness need to be explored to provide insight into what works, what doesn't
Answer no. 10: - **Pricing, true cost** accountancy, governmental communication, international consensus, sugar/fat taxation for 'healthy' nutrition/food
Answer no. 12: - Develop **food labelling** assessment that reflects sustainability and health in a consistent way and thereby **Supports consumers** in their choice and change of diets
Answer no. 13: - Existing **FS status**: assessment for sustainable diets on EU, national and sub-national level - **European FBDGs**: alignment and improvement with guiding principles for sustainable diets - **Nutritional** and **sustainability recommendations** need integration and harmonization: **Labels on food products** should be standardized at European level and in line with the EU strategies. This implies harmonization between different countries and aiming at consistency. SUSFOOD2 supports the EU initiative on substantiating green claims but also integrating nutritional claims. In addition, it is important to integrate the nutritional and sustainability dimension un dietary recommendations

Q10: What are in your opinion the most important call topics, that need to be included in the thematic R&I Area 2 "Change the way we process and supply food?"
Answer no. 4: - Additionally, **shortening supply chains** and creating **fair market environments** for producers/processors of different sizes is critical.
Answer no. 7: - Upskill and reskills **training actors**
Answer no. 9: - **Food reformulation** towards less salt, less sugar, less fat and fewer ingredients and additives such as emulsifiers. Both in R&D as well as in regulatory sense.
Answer no. 11: - **Traceability** of food production
Answer no. 12: - Regional adaptation - Food safety in different stages of the process (especially including the sustainability aspect) - Carbon farming (e.g. carbon sequestration plants)
Answer no. 14: - A faster approval process of novel foods and new technologies is desired, which can support the necessary steps in the transition towards increased food system sustainability - Food industry, from SMEs to big companies, need incentives for the uptake of new sustainable technologies and products and policy must set the basis to facilitate reduction and reutilization of food waste
Answer no. 15: - First of all, food processing and traceability from field to fork should be ensured

Q11: What are in your opinion the most important call topics, that need to be included in the thematic R&I Area 3 "Change the way we connect in food systems?"
Answer no. 3: - The first topic is community engagement to actively participate in foods systems to straighten connection between producers and consumers
Answer no. 4: - Multi-stakeholder approaches at multiple scales are important to prioritize, as are supply chain transparency and resilience, climate change mitigation and adaptation, and policy frameworks including subsidies, regulations, and international cooperation
Answer no. 7: - Balanced development of rural, coastal, and urban areas, new agri-food entrepreneurship
Answer no. 9: - Research implementation of food environments policies and regulation
Answer no. 12: - Increasing cooperation between legislators
Answer no. 14: - Food systems are complex and there are conflicting notions of sustainability. An integral approach to food sustainability by policy makers, producers and retailers is recommended and needed and will increase the transparency of food supply-chain efforts
Answer no. 15: - Enabling procurement innovation, carbon neutrality, reshaping food production

Q12: What are in your opinion the most important call topics, that need to be included in the thematic R&I Area 4 "Change the way we govern food systems?"
Answer no. 1: - What works well (or has not): Identify effective and learn from/improve previous or current interventions/policies, which have generated positive outcomes to address inequalities and ensure sustainability of planet and people
Answer no. 3: - Developing and promoting policies that support sustainable agricultural and food processing practices
Answer no. 4: - Emphasis should be on regulatory frameworks, inclusive decision-making, and policy coherence across scales, labour rights, public procurement, and urban and regional planning
Answer no. 5: - With the aim to achieve a more consistent policy tools we need to assess the impact and overlaps of them and to find a good balance between top down and bottom-up approaches. The policy game method with its simulations could be very effective
Answer no. 7: - Revolutionary governance structures promoting sustainability and environmental monitoring, fostering community empowerment and innovation. - Implementing progressive food policies within major urban centers.
Answer no. 9: - Policy modelling and benchmarking
Answer no. 10: - Science/policy exchange to create knowledge on governance, policies and actions needed to support system approach
Answer no. 11:

- Fostering common understanding about sustainable food systems and required governance, policies and actions through science-policy dialogue
Answer no. 12: - European-level round table for the food sector (combining research, education, industry, consumer, agriculture/farmers) - Increasing regional money, decision-making power for regions
Answer no. 13: - Integration and alignment of policies from different administration sectors in the public domain and the alignment of several existing policies in the public, private and civil society domain - Improvement of the science-policy interface - Policy measures and their effectiveness in reaching the transformation

Q13: Do you have other suggestions regarding the four R&I areas?
Answer no. 1: - Take a One Health Approach for Nutrition Security: to ensure nutrition security for a global population whilst preserving natural resources in a changing climate. An interdisciplinary approach (One Health) will provide a foundational framework to target multiple factors across the food chain and involve multiple disciplines and stakeholders such as researchers, health practitioners, farmers, industry, consumers and governments
Answer no. 4: - Implement a top-down and/or bottom-up awareness campaign through key stakeholders in the food supply chain
Answer no. 7: - There is a need for **funding of longer projects** (beyond three year) to create transformative projects and (long-term) system change. It is important to create more continuity in research project. This can e.g. be done by: ○ **Stop/go system**: Where projects are evaluated after 2 years and if project reached satisfactory results, they may continue for another 4 years. ○ **Re-application**: Excellent project may reapply to continue the project ○ **Supplement and extension**: Better opportunity to apply for supplement (financial top-up) and extension of projects
Answer no. 9: - Links with other countries/regions/areas out of EU, such as UK, US, JP, KOR, SIN and so on

5. Science to Policy Interface development

T6.2: Articulated needs, best practice guidelines and training modules for science to policy advice at MS and trans EC level

FoodPathS objective (WP6): To prepare strategy and describe processes for best practice science-to-policy advice in the future Partnership

There is a clear need to enable knowledge sharing, and scaling - adapting knowledge systems, innovation platforms and science-policy interfaces for ensuring impact

The Vision of FutureFoodS partnership is that the coordinated European R&I program will create an environmentally friendly, socially secure, fair and economically viable healthy and safe Food System for Europe by 2030 and beyond. The objectives include "adapting knowledge systems, innovation platforms and science-policy interfaces for ensuring impact" (Operational objective 4) in support of improving the governance of food systems towards sustainable pathways. To implement the scientific findings of the funded R&I projects there will be efforts to reach end users, including civil servants and policy makers.

This chapter of D6.1 focuses on how to develop practices for improving this science-based advice to policy making: Science policy interfaces in Food systems transformation.

When tackling complex societal challenges, such as the ambitions to – at the same time – improve dietary health issues and environmental sustainability of food production, policy makers should be informed by rigorous science-based advice (Halberg & Westhoek, 2019; SAPEA, 2020; Webb et al., 2022; Singh et al., 2021; von Braun et al, 2021; EC, 2021, 2022)

Thus, to facilitate a Food Systems transformation there is a need to ensure efficient and coherent science advice to policy makers by existing and improved Science – Policy interfaces. The advice should support the design of coherent measures (regulation, support schemes, knowledge building, …) aiming at transforming Food Systems considering the national and regional policy goals. Because food systems are often not confined within national and regional boundaries, there is a need to develop practices for science-based advice targeting policy makers and civil servants at different levels, EC, MS and with a focus on improving trans-EU collaboration in providing science advice to the competent authorities. Part of this should be to develop a mutual understanding of how to define the borders (and playing field/context) of a specific food system as part of developing policies.

Due to the complexity of food systems, with interactions between actors and interdependencies in outcomes such as the link between nutritional health outcomes and climate impact of diets (Tilman & Clark, 2014, Halberg & Westhoek, 2019) there is a need to develop practices for science advice, which may allow for co-creation and interdisciplinarity between scientists, policy makers and – if possible – other actors/stakeholders, so-called science-policy interfaces and science-policy-society interfaces (Webb et al., 2022; Singh et al., 2021; von Braun et al, 2021).

The paper will discuss this objective from different angles based on literature and preliminary experiences obtained in FoodPathS with the aim of giving a first bid on options for trans-European collaboration in (i) science advice for food systems transformation, (ii) co-creation processes and (iii) subsequently training modules and processes between civil servants and scientists.

The current situation:

The global and EU level

Several High-Level Expert Groups and similar bodies put down by international organizations such as the EU, OECD and UN have provided valuable recommendations for strengthening the science-policy interfaces in support of transforming food systems based on evidence and improved transnational monitoring of Food systems related data (OECD, 2015; Webb et al., 2022; Singh et al., 2021; von Braun et al., 2021). This relates specifically to trans-national policy making in organizations with global mandate such as UN bodies, FAO, WHO, OECD and at EU level.

Science advice in support of agriculture and food policies is established in many EC MS (national and regional levels, including certain cities and "macropoles") and also at the EC level. The EC Science Advice Mechanism refers to an overall setup consisting of 16 appointed science advisors covering different disciplines and knowledge areas (EU SAM, 2019). They may in specific questions be supported by other mechanisms such as SAPEA, the collaboration between European national academies of science. For example, SAPEA has provided a report Sustainable Food Systems for the EU (SAPEA, 2020) and to the ECs FOOD2030 policy, uniting in particular experts from social sciences and humanities. The Joint Research Centre (JRC) of the EU also provides science advice to the EC in the area of sustainable food systems (Sustainable food systems - European Commission (europa.eu)) and is engaged

directly in collaboration with DGs in providing ".. systemic analyses, responses and tools that anticipate and respond to food systems policy needs and integrate climatic, environmental, social, health and economic perspectives" (under the "science for policy, JRC" banner, JRC Portfolio 11, 2023). JRC also participated in and promotes as science advice the so-called Food System Sustainability Compass (Food System Sustainability Compass - European Commission (europa.eu); Hebinck et al., 2021) with indicators for sustainability assessments of food systems.

Moreover, in preparation for the SFS partnership the EC received advice from SCAR SWG FS and over 200 FS experts on the strategic research and innovation needs and ideas for horizontal activities ending with the SRIA provided with assistance from FoodPathS (see section 1 of this deliverable).

National and regional levels

Food system challenges have a strong national importance, and policies and directives endorsed at EC level often need to be implemented by competent authorities at national or sub-national/regional levels. Therefore, there is a need for effective science-policy interfaces in EU MS. However, in their assessment from 2020, SAPEA found that only few European countries had adopted overarching food strategies or policies, but also that many countries have adopted more specific policies in areas related to food and health, food waste and public procurement (SAPEA, 2020).

At the national and sub-national (regions, cities, "macropoles",..) levels science advice should be responding to concrete knowledge needs of the civil servants preparing specific policy proposals for decision makers (i.e. the competent authorities). This relation should be based on specific principles and quality assurance procedures to ensure a scientific integrity and a high quality of the advice given in terms of relevance and the scientific merits. Pedersen (2023) in a review across several international institutions engaged in science advice defines such principles as those *designed for appointed officials and independent services tasked to advise government on science and technology related issues* and finds that little attention has been paid in the literature to the analysis of how such principles are used in practice. Principles for proper science advice serve as a code of conduct stating what is appropriate in the SPI, not what is the right advice. In his comparison of the principles mentioned by institutions Pedersen (2023) identified the following items:

Independence of the advice given in the sense of free from political influence and ensuring the integrity of the advisor when producing the advice. *Transparency*, in terms of ensuring the advisory processes are open to the public, including also the final advice given to a government. This is linked to *accountability* and *responsibility* on behalf of policy makers respectively science advisors towards the framing and content of the advice requested and provided. This may be defined as justification and explanation of who was involved in science advice and how this may have contributed to policy choices. Other principles adhered to explicitly by the reviewed organizations include *diversity* (involving the necessary disciplines and beliefs and declare important differences in views/interpretation of the scientific state-of-the-art); *Timeliness; rigour* (quality of the science advice) and *demarcation* of the science-based advice from the political process itself. Thus, such principles are explicitly a requirement for providing science advice to inter-governmental (e.g. EU and UN institutions) and probably also mentioned and/or adhered to by national providers of science advice (Universities, academies of science, …). The examples of science advice in a food systems context from Denmark (Box 2) all build on similar principles, formalized in an ISO9001certified quality assurance system by Aarhus University (Quality assurance - Faculty of Technical Sciences, Aarhus Universitet (au.dk)).

The SCAR SWG FS carried out a survey on (examples of) science advice practices in different EU MS (Turrini & McDonald, 2024) with the aim of "exploring the links between government ministries and independent research bodies where research outcomes are considered as part of the policy formation". The objective was to identify a set of best practices for SPI. Using the SCAR FS SWG members as the gateway to national science advice providers the survey group received in total 59 self-reported cases from 14 countries (of which 13 and 11 were from Belgium respectively Romania).

The cases cover a wide range of topics (and often more than one topic) from primary production (32), processing (26) and logistics/trade/catering (14) to food consumption/consumers (18) and food waste (22) and food safety (30). The cases are based on different models of the science-policy interface from supply driven policy briefs to demand driven use of scientific results in policy. Using the four models of research-policy relations coined by Boswell and Smith (2017 - although in a modified, normative understanding as opposed to the article's descriptive classification) the survey reports that 24 of the cases considered their SPI relation as examples of "knowledge shapes policy" (Research results provided by own initiative from scientists and having a perceived impact on policy making – although in another question 90% of responses declared the case was demand led). Another 35 cases self-reported they were examples of co-production SPI, which was linked to a high percentage of projects (80%) where "the evidence was basis for the policymaker decision-making" and – in average – shorter time-periods for implementation of policy based on the science advice.

Besides the variation in topics and processes behind the science advice, the report demonstrates that SPI within the Food Systems domain exist widely across Europe and within EU MS, whereas an adherence to an actual FS approach is not widespread. The survey did not reveal to which degree the processes behind the examples of

science advice followed a quality assurance scheme or in other ways ensured that principles for integrity etc. were followed as per Pedersen (2023).

Challenges in providing science advice

The review of Pedersen (2023) provides a good overview of the principles for sound science advice stated by international organizations, but there are more to the picture of actual science advice processes in practice. In their report, titled "**Making sense of science for policy under conditions of complexity and uncertainty**", SAPEA (2020) concluded (this authors selection):

- The purpose and significance of scientific advice depend on the issue and the context.
- Scientists, as well as policymakers, should be sensitive to various biases and interests
- Science advice is always affected by values, conventions and preferences.
- The effectiveness of scientific advice depends on the right composition of advisers and the quality of the dialogue between advisers and policymakers.
- The relationship between science advisers and policymakers relies on mutual trust.
- Stakeholders and citizens should be integrated into the process.

While these recommendations may seem straightforward, there are numerous challenges and pitfalls in the processes of providing science advice and in the science-policy interface, for example:

- The purpose and significance of scientific advice depend on the issue and the context.

  Who determines the real issue and defines the relevant context? Should scientists respond precisely to the knowledge demand from the policy makers, or can/should they add other angles and challenges they may find relevant – and where is the border vis-à-vis actual politization from the scientists?

- Scientists, as well as policymakers, should be sensitive to various biases and interests

  This should be guaranteed by principles and procedures for research integrity and for ensuring transparency in engaging stakeholders.

- Science advice is always affected by values, conventions and preferences.

  This is a challenge if scientists due to dedication to specific focus areas of their research risk (unconsciously) selecting and interpreting data, scientific literature (state-of-the-art) with a bias towards certain priorities/preferences. Moreover, science advice may be influenced by the framing of the questions requested by the policy makers, see below.

- The effectiveness of scientific advice depends on the right composition of advisers and the quality of the dialogue between advisers and policymakers.

  This is obvious but not easy to accomplish without institutional back up of individual scientists based on clear principles, procedures and quality assurance schemes

- The relationship between science advisers and policymakers relies on mutual trust.

  Very important as also stressed in the review of principles for science advice, but building up such trust requires long term relationships to build experiences of (on the one hand) scientists providing relevant, timely and scientifically sound advice while (on the other hand) policy makers demonstrate fair and technically correct implementation of the advice in their recommendations to the politicians/decision makers.

- Stakeholders and citizens should be integrated into the process.

  This is a valid ambition but entails a number of challenges in terms of selection of stakeholders, procedures for engagement and principles for transparency and scientific integrity.

As discussed by Turnhout et al. (2021 & pers comm), the values involved in providing science advice often play a strong role in the resulting SPI – because of values representing dominant regimes behind the requests for policy advice and because of values in science. Thus, even in situations where scientists seek to apply a neutral science-based approach based on integrity and other mentioned principles they risk contributing to confirming the "dominant frames" or regimes simply by accepting the paradigm behind the policy question (quoted from presentation by E. Turnhout at the Ghent workshop, Dec 2023, see more below). For this and other reasons, science

advice is a difficult "metier" and based on experiences in AU/DCA, the following list of challenges was presented at the AU-ESAF seminar in 2021 (https://conferences.au.dk/science-based-policy-advice-in-agriculture/)

- Pressure on researchers to produce "quick answers" to complex questions
- Politically motivated requests for Science Based Advice
- Requests for delaying our publishing of results to facilitate political processes
- Arena for political battles between agricultural organisations and NGOs resulting in different interpretations of the research results
- Stakeholder organisations trying to discredit researchers and research results

Since it appeared from the webinar reactions that similar challenges were widespread among science advice providers across Europe, it was concluded that there is a need for a European forum for sharing experiences in SPI. Even though the organization, funding and responsibility for providing science-based policy advice differs between countries and across subject areas/sectors shared experiences and aims at following principles motivated for developing trans-European collaboration. This resulted in a collaboration between 7 European knowledge institutions under the so-called Ghent group (Ghent Group - A community on Science-based advice in the fields of agriculture and environment (au.dk)).

The Ghent group (led by AU TECH) has organized two high level training courses with participants experienced in providing science advice on behalf of research institutions or organizations (list of participants and programs may be found at Ghent Group - A community on Science-based advice in the fields of agriculture and environment (au.dk)). Because the challenges – and potential future developments – in science advice are also valid for the Food Systems transformation, FoodPathS contributed – via AU/DCA – to these events. The events mainly focused on exchanging principles and practices behind the organizations' own science advice and providing experiences for discussion of challenges and options for improvement (See box 1).

The second Ghent group course included a workshop specifically dedicated to co-creation; this is described below.

BOX 1

(Advanced-training-course-co-creation-workshop-2023.pdf (au.dk)

Participants were primarily 51 scientists from 15 European knowledge institutions and representatives from Umbrella organizations and 4 MS Ministries.

A. Exchange of experiences

Participants considered a conceptual model on the policy cycle (from literature) including the stages of Agenda setting, policy formulation, decision making, policy implementation, policy evaluation to identify where in the process science advisors give input. Participants noted in an interactive session, that they have provided science to policy advice all along the policy cycle, although least in the policy evaluation phase. They mostly provided science to policy advice at the national or regional level.

From the perspective of providing (demand driven) science advice to policy makers (civil servants), at a phase where the actual political objectives are given, this may be surprising that science advisors also find they give input to the agenda setting phase. However, as also found in the SCAR FS survey, several advisory items were provided based on new research results, which scientists voluntarily provide as policy briefs, which may be considered supply driven – and therefore in the scientists' viewpoint be considered as (contributing to) agenda setting.

Using the four models of research-policy relations coined by Boswell and Smith (2017 - although in a modified, normative understanding as opposed to the article's descriptive classification), which were also used in the SCAR FS survey, the participants divided their input describing Problems/pitfalls respectively Good Practices. Generally, the understanding was that the idea that science defines/contributes to agenda setting in policy may happen when timing is right, and with either personal contacts or knowledge brokers, so that communication is aligned allowing for mutual learning process. These same factors may also determine that the process is an illusion. This is contrary to the demand driven science advice relation, where factors such as "Creativity in Scoping research & interpreting questions", Expectation management & "clear contracts" in combination with "Formalised procedures - Written documents – publication rights" may ensure a successful SPI. This is in accordance with the principles mentioned by Budtz & Brøgger. Pitfalls/problems related to this SPI type relates to risks of scientists "Pleasing – "keep the client happy" and "Under-reporting" (e.g. not respecting that "Zero is also a result") and risks that policy makers only prioritize "Funding for dominant research" and/or use the advice for "Offloading of responsibility" (for unpopular policies) or "misuse of results/delay of Action".

In the third typified SPI, which suggests that "knowledge and governance are co-produced through and on-going process of mutual constitution" (Boswell and Smith, 2017) Ghent participants found this would provide room for mutual learning, through "Deeper understanding", "Common agenda setting – collective vision", "Anticipation - Scoping" and "Co-creation of research questions (and methods)". Input under Problems/pitfalls in this SPI type circulated around the notions of (potential) misunderstandings, "Power imbalances", primarily between policy makers vs. scientists while also the engagement of stakeholders was questioned. In a fourth SPI type, suggesting there is no overarching causal relationship between science and policy, the participants this may give freedom and transparency of differences while reflecting "Different perspectives, goals and timing", "Internal differences in each sphere" due to "Cultural gap" and "Unawareness each other goals & perspectives".

Overall, the workshop on SPI types demonstrated the awareness of necessary dialogues between scientific and policy environments in order to produce science advice, which is relevant, timely and useful while still being independent and scientifically valid and with integrity. This requires experiences and building of mutual trust which again may lead to joint scoping and co-creation of research agendas based on deep understanding. This seems to be exactly the idea of the FutureFoodS partnership where the jointly developed SRIA ensures relevance for both policy makers (and their funding bodies) and the scientific organisations (RPOs of the partnership). Moreover, this points to a high potential for creating science-based knowledge which may be relevant and useful for policy makers, given the right dialogue, interpretation, synthesis and framing – and methods and principles to avoid pitfalls.

B. Workshop on Co-creation (research cycle/policy advice cycle)

Under the previous workshop on good practices and pitfalls in the science-policy interfaces some scientists declared a "illusion of co-production", arguing that power imbalances, lack of time for scientists and challenges in the form of legitimacy and stakeholder engagement risked a politization of science instead. In the workshop dedicated to co-creation other experiences were contributed, which gave a more varied perspective. Under the general questions on RISKS & AWARDS the workshop tried to answer to What are risks of co-creation; Which kind of awards do you know? And "In which way your institution provide support on the different science/policy interfaces?".

The participants mentioned especially that "Ambition levels can be increased voluntarily", which "Creates ownership and feeling of empowerment" and highlighted "The power of building a common vision". Again, under risks were mentioned **Power imbalances and risk of their reproduction including** "Conflicts of interest during process"; "Research is hijacked by other interests" and "Dominance of vested interests" as well as "Mismatch in timelines between research and policy cycle" and "Stuck in co-defining rules or concepts phase". Moreover, "**Stakeholder involvement consists of a tricky balance" in terms of** "Finding the "right people" for the objective", "Fake" stakeholder involvement and/or "The inclusion of too many stakeholders risks dilution of the process". It was also considered a risk that "Political debates are brought into the research" – which on the other hand actually could be the main objective for the co-creation process in SPI (seen from policy side).

In a second round of debate, a list of good practices was developed including:
Focus on similarities rather than differences to build a common ground, Frame the goals, Ensure openness and have attention for equity, Use the right methodologies (e.g., serious games, roleplaying, Create a creative space with room for failure) and/or a Skilled facilitator; ensure Transparency in interests and constraints of involved actors while All kinds of knowledge are put at the same level

In a first exploration of how to build the necessary understanding and mutual trust between divergent participants some methods were proposed: ""time out": one person talks, the others can only listen. Everybody gets a turn." And "Roleplaying and Serious Games: to challenge existing thinking frames". Moreover, practices to "Creating space to overcome conflicts and disagreements" include "Visioning the future (scenarios) and Theory of Change"

Limitations identified include questions of Time and resources and Finding and involving the "right" people and Managing cultural and language differences. Moreover, it may be questioned whether "they" (the other stakeholders) want co-creation?"; Human perspectives: different challenges and different cultures => how many can you bring together in one co-creation process?

Reviewing the notes at 6 months hindsight it seems, however, that the premises and focus on the specific SPI theme in co-creation was perhaps not shared by all participants. Some seem to have a focus on how to engage other stakeholders in a research project, which off course also is relevant, but perhaps requires different processes than co-producing knowledge for government/policy? The workshop results suggest that there is still some way to go in developing a viable practice for co-creation in SPI. This calls for specific activities under the FutureFoodS partnership, which FoodPathS may initially support.

Notes by Verhove, A. & E. Cronin, ILVO. Unpublished.

In parallel to the Ghent groups work, JRC has assisted EU member states to build capacity for evidence-informed policymaking in a two year program targeting seven specific MS individually (Reforms for Science for Policy in 7 Member States | Knowledge for policy (europa.eu)). While the topical focus was not on food systems there has been a collaboration with the JRC team and they have participated in and contributed to the Ghent group workshops.

The future goals:

Ensuring and improving quality and efficiency of science advice provided with a FS approach

The complex challenges of transforming FS and seek synergies between health and several sustainability objectives calls for a science advice, which goes beyond silo-thinking and mono-disciplinarity. Food systems models may assist in this, but a balance is needed between scientific models of complex systems aiming at including all nodes, actors and interdependencies vs. simplified models of sub-systems for specific challenges or innovations (von Braun et al 2021; Halberg & Westhoek, 2019), e.g. the actors/stakeholders around an innovative food processing technique (processor, consumers, authorities) or the so-called Food-environment where consumers meet the products as chosen by retail. A way forward towards integrated policy development may be to link individual science advice products from a holistic perspective of the food systems in target. To which degree this is a standard practice in European national or regional ministries of food and agriculture is not clear. Moreover, to the extent that national health agencies develop policies related to health implications from food intake (e.g. obesity, overweight, health of elderly, …) it could be considered how the policy making across the competence areas of food resp. health authorities may be supported in a consistent form of SPI.

In the SCAR survey there appear to be few examples – if any – of a food systems approach to science advice. Most self-reported cases characterized their science advice process as a form of co-creation, however with little documentation of how this was carried out (besides a preliminary dialogue on the topic). In a Danish case, several linked science advice requests/reports were described (shortened in the SCAR FS report) to present and discuss a case where a broad view of policy initiatives across the food system emerges (Based on the Danish position paper to the UN Food Systems summit, 2021 - using explicitly the term Food Systems). The case has been developed/documented by FoodPathS in more details as presented in Box 2. The purpose is to demonstrate how it is possible to consciously consider, which policies may positively interact by aiming at complimentary leverage points. For example, improved understanding of consumers' knowledge and aspirations towards healthy and climate friendly diets and their (lack of) knowledge in this area have pointed out policy initiatives in information campaigns and the potential for improved food labelling (illustration in box). However, other knowledge received via scientific advice points to the need for policies facilitating the increased production of plant-based proteins answering to consumer demands. And this again pointed to the need to ensure food processing of e.g. pulses and incentivize the development of innovative healthy foods while understanding consumers specific preferences.

BOX 2

EXAMPLE OF SCIENCE-POLICY INTERFACE ADRESSING A SUSTAINABLE FOOD SYSTEMS APPROACH – CASE FROM DENMARK

The Danish Agriculture and Food Agencies under the Ministry of Food Farming and Fisheries have together a broad set of policy initiatives addressing primary production (R&I support to organic farming, new climate mitigation, new/improved food crops incl. pulses), alternative proteins (pulses, insects, biorefined grass etc.), food quality, processing, labelling (animal welfare, climate), marketing and food claims, consumer acceptance and understanding of quality food, campaigns for increasing demand for pulses, etc.

The Ministry presented a Danish position paper to the UN Food Systems summit in 2021 – using explicitly the term "Food systems approach" with a five-point vision for highly prioritized innovation and policy pathways for food systems transformation. These points and related initiatives are considered part of an overall strategy of transforming food systems by changing diets, demand and production at the same time. Many of the initiatives have been supported by science advice under the Ministry's contracts with especially two universities, the Danish Technological University (DTU) and Aarhus University – Danish Centre for Food & Agriculture (AU-DCA).

For each of these five points, the Ministry has requested science-advice from AU-DCA as demonstrated in the following tables with specific science advice reports from AU-DCA. All reports (many only in Danish) are public from the time of delivery and are available on AU-DCA's publication website PURE.

The examples of science advice reports to the Ministry in the area of sustainable food systems illustrate the wide coverage of if topics for developing the Ministry's policies (support, regulation, campaigns) in the area.

In several cases the science advice was translated by the Agencies into different types of policies. As an example, the advice reports (table below) on consumers knowledge and approach to a more climate friendly and healthy diet (specifically focusing on including more pulses in diets) were used to plan campaigns targeting young consumers and for dialogue on further initiatives in the Ministry's partnerships with stakeholder organization (see the inserted slide below and table).

Moreover, the Ministry (based on a high-level political decision) set up a fund (grant budget approximately €60 M) to support the transition towards more plant-based food products to support initiatives from innovation to marketing within diets and product development.

It still remains to be seen, to which degree the science advice provided across the thematic areas are integrated into a sustainable food systems approach by the agencies of the Ministry as stipulated in the position paper, but a number of initiatives has been launched in this direction. In any case, the set of science advice products demonstrate the strategic width in the thinking of the Ministry and its agencies in addressing the challenges of transforming the Danish food system to a more sustainable production and healthier diets at the same time. Moreover, it is not clear to which degree the Food Agency's policy is aligned with similar/parallel science advice and policies under the responsibility of the Danish Health Authority and their work to e.g. alleviate overweight and other food related health issues. This could be a future focus point for improvement.

VISION FOR INNOVATION AND AREAS TOWARDS 2030
Reduction of food loss and food waste
Healthy and sustainable diets
Prudent use of antimicrobials and prevention of resistance
Deforestation-free value chains
Denmark's international engagement/global scale

FOOD LOSS AND FOOD WASTE – Science advice delivered
Insight into consumer behaviour in relation to food waste and assessment of the effect of specific tools for reducing food waste in the home – 2024 (ongoing)
Date labels – tools to improve consumer behaviour – 2024 (ongoing)
Consumer behaviour towards food waste in families with children (2022)
Date labels (2021)
Analysis of consumer behaviour in relation to food waste (2021)
Current knowledge on research results and research clusters within food waste and food loss (2020)
Food waste in the service sector (2019)

Business cases for reducing food waste within the individual elements of the food value chain (2019)

GAME CHANGER: FOOD-BASED DIETARY GUIDELINES WITH A FOCUS ON BOTH HEALTH AND SUSTAINABILITY – science advice delivered
Food health pyramid based on climate impact (LCA) values
Children's healthy eating habits – 2024 (ongoing)
Professional kitchens - the way to healthier and less climate-damaging food - 2024 (ongoing)
Nudging for products with nutritional labeling / The keyhole (2022)
Consumers' motivation to reduce sweet, salty and fatty foods (2022)
Consumer analysis for legumes and coarse vegetables (2021)
Tools to promote sustainability in professional kitchens, including nudging (2021)
Consumption of meat alternatives among veterinarians and others who have reduced their meat consumption (2020)
Quality Index 2020 focusing on sustainability, 2021 focusing on climate claims, 2022 focusing on dietary advice, 2023 focusing on climate-friendly dietary patterns, 2024 focusing on hybrid products as a possible way to a less climate-damaging diet (ongoing)
Study of protein types in demand by the food and feed sectors (2019)
Study of the functional properties of new protein sources, their feed efficiency and potential as new foods (incl. from biorefinery of grass-clover)

PLANT-BASED FOODS AND GREEN PROTEINS – policies implemented based on science advice
Plant-based foods and proteins is a future growth area focusing on growth, environment and climate; and increased crop production is a central part of the green transition
Fund for plant-based foods, 2023-2030 to support development activities in chain incl. marketing etc.
Eco-scheme (CAP) for plant-based foods, including a strategy for green proteins for animals and humans
Support for Biorefining of grass for feed, food and fibre

GAME-CHANGER: INTEGRATED SUPPLY CHAIN APPROACH – Science advice delivered
Evaluation of the impact of organic farming on ecosystem services (several reports over 10-15 years)
Synthesis of Life Cycle Assessment methods (2022, 2023, 2024- ongoing)
Advice on climate certification methods (business driven) (2022- onwards)
Mapping of existing data on "green" claims and measuring methods (2021)
In general, it is expected that this topic will have an increased focus in future requests for science advice

Organization and governance of Science-Policy interfaces

The review of the current state of SPI focusing on FS approach at MS levels suggests that there could be a need for improving the knowledge base and resource use efficiency via trans-European collaboration in science advice. Internationally, at global level, there has been focus on improving SPI (and SPSI) by improved collaboration between established high-level (semi-permanent) bodies (Webb et al., 2022; Singh et al., 2021; von Braun et al, 2021). While the global and macro-regional perspective is important in light of the coupled food systems and global trade, these papers do not address how to deliver specific science advice at national and regional level to feed concrete knowledge needs of e.g. EU MS, nor how to build collaboration between national science advice

providers at regional levels. However, since a significant proportion of SFS related policies in MS may be driven by EC regulations in the form of laws, directives etc. it is a hypothesis that efficiency may be gained by improved collaboration across Europe in these knowledge areas.

This approach has been driving recent developments in other knowledge areas, specifically as regards science advice in soil-climate management and implementation of EC directives in animal health and welfare. The first example relates to the EJP Soil (funded under Horizon 2020 as a European Joint Partnership with more than 20 European MS cofounding together with the EU). Having funded approximately 50 trans-European R&I projects in the broad knowledge area of soil management for mitigation of and adaptation to climate change the consortium realized there was a need for establishment of syntheses on policy relevant knowledge across the individual projects and for use in support of scientific advise at MS and regional level (Science to policy (ejpsoil.eu)). This approach may be inspirational for the coming FutureFoodS partnership covering an even more complex knowledge area. FoodPathS may therefore record experiences for use in support of the partnership.

Another example is the EU reference centre for Animal welfare in Pigs (EURCAW-Pigs) respectively poultry (https://eurcaw-poultry-sfa.eu/), which are EU funded collaborations in science advice. Thus, EURCAW-Pigs provides scientific and technical knowledge "**to Competent Authorities of EU member states, to animal welfare policy workers"** and to their support bodies based on a collaboration of animal welfare scientists from app. 5 European RPOs. The rationale for EU to support this body is supporting the enforcement of pig welfare legislation, which is one of the Commission's priorities. The center offers training and specific advice as well as **verification of compliance** with the European pig welfare legislation. The services are ***open to Competent Authorities and government policy workers of EU Member States.***

Partly based on these experiences, the agenda of FoodPathS is to present and discuss options for increased trans-European collaboration between scientists and knowledge providers in addressing knowledge needs with policy makers and civil servants in the areas relevant to FS transition. This may be organized in different forms and FoodPathS will provide first ideas to be further developed by FutureFoodS partnership. Collaboration with the Ghent group is also foreseen in the coming months and years.

Co-creation in SPI to address complexities and wicked problems

Most of the science advice reports requested by the policy makers/ civil servants (demand driven) in the Box/Danish case have started with a dialogue with relevant scientists prior to formally requesting the specific task. The idea is to align expectations and ensure a mutual understanding of the knowledge needs and the existing science-based knowledge to build the advice report on. However, under the quality assurance scheme of AU/DCA guiding the processes at the university further dialogues with policymakers and other stakeholders are limited during the actual production (i.e. writing and internal peer review) of the science advice reports (Quality assurance - Faculty of Technical Sciences, Aarhus Universitet (au.dk)). Thus, most often, the science advice follows a procedure, where dialogue between science advisors (as supply side) and the receiving civil servants (demand side) is limited to ensure transparency and integrity in the science advice reports. Following such general principles - as outlined above - has the purpose and advantage that the reports delivered may be declared as the scientists' (the universities) own, un-biased, advice based on the scientific state-of-art and assessments with no influence from the policy makers in the conclusions given. But it also carries a risk that the advice provided do not respond sufficiently to the questions and challenges facing the policy makers.

Consequently, the complex challenges of transforming food systems, may require a more flexible procedure for science advice, allowing for and organizing procedures of co-creation to ensure sufficient dialogues and accounting for potential positive and negative feedback from implementing policy initiatives based on the science advice. Such co-creation – and possibly stakeholder engagement – needs to be organized in a transparent manner, which allows for maintaining the scientific integrity of the scientific advisors and the content of the report ultimately delivered.

The need for developing principles and practices for co-creation in SPI (and subsequently in SPSi) is addressed by several of the reports mentioned above.

AU (DCA/DCE with colleagues) co-organized the second Ghent group Advanced learners event on Science advice 29/11- 1/12 2023 with the aim of exchanging experiences in science based policy advice and assessing co-creation methods (see program *Advanced Training course on science-based advice for policy in agriculture and environment:* Advanced-training-course-co-creation-workshop-2023.pdf (au.dk)). Outcomes of the workshop are given in detail in the box 1 B. Participants contributed with insights and good recommendations for how to carry out research for policy advice in a co-creation approach. However, the workshop results also suggest that there is still some way to go in developing a viable practice for co-creation in SPI. This calls for specific activities under the FutureFoodS partnership, which FoodPathS may initially support.

These first observations were presented to FoodPathS partners and the advisory board at the annual event June 2024 in Seinajoki, Finland. As described in Box 3, the comments recieved mainly supported the observations mentioned re. the need for clear principles and procedures in SPI, for strenghtening the focus and capacity for science advice in a FS approach and for developing trans-European collaboration in providing science advice in FS transformation including further development and critical assessment of co-creation processes for SPI.

Box 3

CASE: Validation of the science advice aspect in the transformation to sustainable food systems with FOODPathS advisory board and partners

To further validate aspects of science advice and how to implement the sustainable food systems approach in science advice across MS, it was decided to gather input on two occasions at the FOODPathS partner meeting in Seinajoki on Wednesday June 12th (World Market Session) and Thursday June 13th, 2024 (Cross WP workshop (WP2, WP3 and WP6).

At the partner meeting four central questions were presented and feedback to these questions collected from project partners and other stakeholders participating in the meeting. The four questions and the obtained input are listed below.

The four questions:

- Can you identify policy initiatives for which science-based advice is relevant and/or has already been provided to civil servants?
- Why are these topics/cases relevant for the transformation of the European food systems?
- In which situations would collaboration between scientists in trans-European science advice be relevant for transformation of the European food systems?
- How can scientists from different MS/AC collaborate on providing experience and knowledge to ensure efficient and aligned national level science advice in MS and AC – for the above-mentioned topics?

Summary of the received input:

It is important to make sure that the knowledge provided in science advice is state of the art, the newest scientific knowledge – this could be ensured with an international group
For some areas it is necessary to look outside the EU to collect scientific advice – an example could be cell-cultivated meat
It is difficult to integrate the food systems approach at policy level/civil servant level, because they often think in silos/their specific area
How do we keep the population engaged/feeling comfortable in the whole science advice sector?
To what extent can the civil servants/policy level implement the food systems approach?
Collaboration and co-creation can increase the speed of transformation/implementation of new regulations etc.
Mapping of compentece centres across MS could be beneficial – maybe for the different elements of the food system
How can we co-create with the civil servants, while still maintaining our scientific independency?

Preliminary proposal for training needs and development processes in science policy interfaces with a Food systems approach

Based on the above presentations of needs for coherent science-policy interfaces (SPI) from a FS approach and suggestions for increased transnational collaboration between science advisors a preliminary list of possible training and co-development topics may be given.

A preliminary list of training needs and options for co-development with European partners:

Topic	Target groups	Form	Setting/resources
Understanding Food Systems (in addition to "value chains")	Policy makers, Scientific advisors,	Seminars and web-courses	FoodPathS, FutureFoodS Autumn 2024

as overall concept for science advice	Other stakeholders		
Innovative science-policy interfaces: Living labs as SPI labs	Policy makers, Scientific advisors, Other stakeholders	Workshops, stand alone or embedded in specific LLs	Ghent group, W FutureFoods & Agroecology partnership, regional Living Labs autumn 2024
Integrity and quality assurance in science advice	Policy makers, Scientific advisors	Advanced learners' interactive courses, Web-based -Early career training	Ghent group, FoodPathS, partnerships
Developing understanding of co-creation in SPI: What, when and how?	Policy makers, Scientific advisors	Seminars/workshops	W FutureFoodS
Developing trans-European collaboration in SPI for Food systems transformation	Science advisors, RPO managers EC and MS reps	Seminars and web-meetings	w. FutureFoodS and Agroecology partnerships

6. An overall analysis with recommendations for FutureFoodS

1. Because of the overlap in timing between FOODPathS and the FutureFoodS partnership the SRIA 1.0 was handed over to the core group in preparation for the SFS partnership in first quarter 2023. The original plans for FoodPathS to prepare a full update into a SRIA 2.0 are therefore redundant and consequently the activities have centered around checking in the wide FOODPathS network of knowledge organizations and umbrella stakeholder organisations and NGOs whether the thematic areas and horizontal activities of SRIA 1.0 are still relevant and sufficiently comprehensive. As presented in section 4.4. this was basically confirmed: There is a wide support among the survey contributors to the content and structure of the SRIA 1.0, thus FOODPathS may recommend building the first calls of FutureFoodS partnership on this.

2. A list of additional/complementary topics is presented based on the survey with a recommendation that (relevant bodies of) FutureFoodS partnership considers these ideas at a point after the first calls for externally funded projects (in respect that these first calls may be based on the SRIA 1.0).

3. Moreover, the survey identified a range of policy related challenges, which were not formulated as researchable questions but recommendations for policy initiatives at national/regional and EU/international levels. It is not the role of FOODPathS to prioritize policy issues, but the input confirms the objective that FOODPathS may support the FutureFoodS partnership in developing principles and practices for efficient and high quality SPIs.

4. There are abundant recommendations at international/EU level of establishing science advice interfaces, which may assist in recommending policies in support of food systems transformation building on widely accepted principles for science advice. However, there are few examples of science advice provided at national or regional levels in EU based on a food systems approach. A few examples analysed by FOODPathS document that it is indeed possible to establish a Food systems approach and ambition at MS level to guide science advice and it is potentially valuable to strengthen and spread such ideas. FOODPathS will support and engage with on-going collaboration between European knowledge institutions on exchanging and further developing science advice in practice at MS/regional levels and recommend that FutureFoodS should become involved in this SPI forum.

5. FOODPathS and FutureFoodS may together engage in developing guidelines and governance for trans-European collaboration in science advice for policy makers at MS/Regional/cities level in support of FS transition. As part of this activity, FOODPathS recommends engaging in dialogues on options and pitfalls in science advice governance (SPI) and especially in using co-creation processes in acknowledgement of the complex challenges in Food Systems transformation.

6. A preliminary list of such training/workshop needs is provided to guide activities in FOODPathS and liaison with likeminded initiatives in the coming months (years).

7. Conclusions and next steps

1. There is still in 2023-2024 a wide support among the network of FOODPathS partners to the content and structure of SRIA 1.0, which was already delivered to the FutureFoodS partnership as part of the application process in first quarter of 2023. A list of additional challenges relevant to include in future updates of the SRIA and for future calls under the FutureFoodS partnership is provided and FoodPathS will enter into forthcoming dialogues with the relevant bodies of FutureFoodS to provide assistance over the coming year.

2. The survey by FoodPathS identified policy related challenges for a food systems transition, which confirms the idea that FOODPathS may support the FutureFoodS partnership in developing principles and practices for efficient and high quality SPIs.

3. Review of current practices – and relatively few examples of actual Food systems focus on science advice – at MS and regional level suggest that FOODPathS collaborate with other initiatives and the partnership on establishing workshops for trans-European collaboration in science advice in an FS approach and with a view to developing and critically assessing procedures for Co-creation in SPI. A preliminary list of such training/workshop needs is provided to guide activities in FOODPathS and liaison with likeminded initiatives.

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ANNEX I – Survey questions

Horizon Europe Partnership
Sustainable Food Systems for People, Planet & Climate 'Future FoodS'

Consultation of FOODPathS Partners and their Networks
Suggestions for future topics to be addressed

SECTION A: General Questions

1. First Name*
2. Last Name*
3. Name of the organisation/ institution*

4. Type of organisation*
   - Private sector/ Industry
   - National Public authority
   - Regional/local authority
   - Research organisation/ Academia
   - Education
   - EU institution
   - International institution/organisation
   - NGO
   - Civil society organisation
   - Funding organisation
   - Citizen or community initiative
   - Other , please specify:

5. Is your organisation *
   - Public
   - Private
   - Not applicable (if you answer this survey on your own behalf)

6. Your role in your organisation*
7. Email address *
8. Country*

SECTION B: Research and Innovation (R&I) Areas

9. What are in your opinion the **most important call topics** that need to be included in the thematic **R&I Area 1 'Change the way we eat'?** *(50 words)*

10. What are in your opinion **the most important call topics** that need to be included in the thematic **R&I Area 2 'Change the way we process and supply food'** ? *(50 words)*

11. What are in your opinion **the most important call topics** that need to be included in the thematic **R&I Area 3 'Change the way we connect in food systems'**? *(50 words)*

12. What are in your opinion **the most important call topics** that need to be included in the thematic **R&I Area 4 'Change the way we govern food systems'**? *(50 words)*

13. Do you have **other suggestions** regarding the **four R&I Areas**? (*max. 200 words)*

SECTION C: Four Activity Areas

14. What are in your opinion **the most important key actions** that need to be undertaken in the transversal **Activity Area 1 'Co-funding'**? *(50 words)*

15. What are in your opinion **the most important key actions that need to be undertaken** in the transversal **Activity Area 2 'Observatory'**? *(50 words)*

16. What are in your opinion **the most important key actions that need to be undertaken** in the transversal **Activity Area 3 'Knowledge Hub of FS Labs'**? *(50 words)*

17. What are in your opinion **the most important key actions that need to be undertaken** in the transversal **Activity Area 4 'Knowledge sharing'**? *(50 words)*

18. Do you have **other suggestions** regarding the **four Activity Areas**? (*max. 200 words)*

SECTION D: The Partnership SFS connected to other Partnerships and interaction with different stakeholders

19. **Do you have suggestions on which topics Horizon Europe partnerships should particularly work together:** AELLRI (Agroecology), Biodiversa +, Blue Economy, Agriculture of Data, Animal Health & Welfare, ERA4Health, Circular Bio-based Europe, Water4all, Chemical Risk Assessment etc.? (*max. 200 words)*

SECTION E: Final comments

20. **Do you have any other comments?** *(max. 200 words)*

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