SCAR FOOD SYSTEMS SWG

And

FIT4FOOD2030

JOINT WORKSHOP

Prioritising future R&I breakthroughs for food systems via scenarios

Full Meeting Report

28th and 29th of October 2020, Online

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Table of Contents

1. INTRODUCTION

The European **SCAR FOOD SYSTEMS Strategic Working Group (SCAR FS SWG)** and **FIT4FOOD2030 Project Consortium**[1] jointly organised an online workshop on **working with and utilizing scenarios to prioritize future R&I breakthroughs in Food Systems**. The workshop took place on **October 28th** and **October 29th 2020.**

Global food systems are facing challenges including a growing and aging population, climate change, diet-related chronic diseases, food waste and biodiversity loss. In addition, the recent COVID-19 pandemic highlighted the vulnerability of food systems. The transformation of our food system, that has been initiated for some years, is more necessary than ever. Resilient, environmentally friendly and socially just food systems, able to respond to shocks and avoid other crises, are urgently needed. The Farm to Fork strategy explicitly expresses the need for integrated approaches towards safe, healthy and sustainable food systems. However, to accelerate food system transformation and achieve the goals of sustainability, strong commitment from and involvement of all stakeholders is required on an ongoing basis.

In this context, the joint workshop has brought together FIT4FOOD2030 partners and SCAR FS SWG members as well as representatives of various EU-wide networks, to learn about a scenario methodology and its utilization for prioritizing R&I options.

Scenarios are descriptions of potential futures, not predictions of the future, using a set of multiple stories. They are plausible, relevant, divergent and challenging. It should be recognized that the "real" future will not be any of the scenarios, but that it will contain elements of all of the scenarios.

Exploring scenarios will allow us to have critical views on the current situation, and enable understanding the dynamic of the food system and of interdependencies of the actors. They should be contrasting in order to consider alternative futures and to avoid being biased by only searching for positive options. They should trigger us to step out of our comfort-zone and provoke thinking rather than providing answers per se.
Scenarios should also be evidence-based and hence thoroughly discussed. This kind of reflection enables the identification of possible pathways and the prioritization of options for R&I programs and policy measures that contribute to achieving sustainable and resilient food systems. They thus attempt to structure our thinking and help decision makers in a wide variety of organizations to make informed decisions[2].

The objectives of the workshop have been:
- Objective 1: to obtain some insights and experience in working with scenarios;
- Objective 2: to understand how scenarios can be utilized to prioritize possible future R&I breakthroughs in FS;
- Objective 3: to check the relevance of the prioritized R&I breakthroughs for 4 scenarios in the home contexts (countries) of participants.

The objective has NOT been to develop evidence-based, robust, scenarios in full detail. This would have taken much more time (over 1 week) that was available in the workshop. The reason is that it requires in-depth and time-consuming discussions of trends and challenges, selection of the most relevant core question, and obtaining experience with feedback thinking next to feedforward exercises, etc. (see annex 3 for a full overview of the of the full scenario development process as

[1] See https://scar-europe.org/index.php/food-mission-and-aims and https://fit4food2030.eu/, respectively
[2] More details are given in e.g. the report of the 5th SCAR Foresight Exercise Expert Group 'Natural resources and food systems': Transitions towards a 'safe and just' operating space' https://scar-europe.org/images/FORESIGHT/FINAL-REPORT-5th-SCAR-Foresight-Exercise.pdf

developed by Shell and Wageningen UR, p.28); it should be noted that detailed discussions about trends, challenges and breakthrough pathways have resulted in several reports in the FIT4FOOD2030 project[3]. Hence, the below described scenarios, prioritized R&I breakthroughs and their relevance in the different countries are thus to be taken cautiously; and consequently merit a disclaimer. They merely serve as appetizer for those who want to thoroughly explore the methodology in their home country or regional context.

2. DEFINING AND WORKING WITH SCENARIOS

Both in the FIT4FOOD2030 project consortium and the SCAR FOOD SYSTEMS SWG partners have been confronted with very different breakthrough pathways, research programs, policy measures, living lab opportunities, interesting cases around Europe, etc. But which are relevant in a specific context? A clear need for a methodology has been expressed which permits the prioritization of the different options. The scenario methodology described here has been considered as a potentially interesting tool to utilize in this respect. In order to become familiar with the scenario methodology, the workshop has been split into two parts, scenario building (part 1; day 1) and working with the scenarios (part 2; day 2).

2.1 Scenario building (day 1, part 1)

First, the scenario development methodology was introduced (in Annex 1, p.14 the presentation is included). In Annex 3, p. 28 the overview of the full methodology chart is included; however, during the workshop we focused on the following activities:

1. *A **core question** is posed to which the scenarios refer.*
2. ***Two axes** (horizontal and vertical) are defined that are relevant to answering the core question.*
3. *The two axes allow **positioning of contrasting scenarios**: see Fig. 1 with a blue, green, red and grey scenario.*

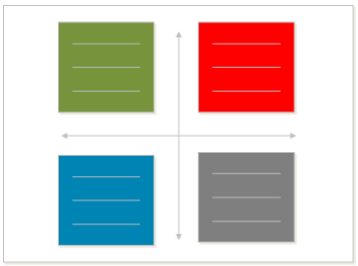

Fig. 1: Four contrasting scenarios

An example of a simplified core question, 2 axes and 4 scenarios is shown here. This was one of those presented to the participants of the workshop (Fig.2).

[3] E.g. https://fit4food2030.eu/trends-in-the-food-system/

Fig. 2 'a core question, 2 axes and 4 scenarios (with a name, an image and short explanation)

The activities are described here in more detail:

Activity 1 concerns the definition of a **core question** that is related to Sustainable Food Systems and Policies. Such a core question is important because it should address an important challenge or opportunity for stakeholder(s) and it focuses the process of developing scenarios. The organizers and moderators had proposed the following core questions:

Question 1. How will European urban citizens eat healthy and sustainably tomorrow?
Question 2. How can we develop sustainable agrifood systems with limited resources and facing extreme conditions?
Question 3. How can we enhance the contribution of food value chains to sustainable territorial development?
Question 4. How can we create corona-virus-resilient sustainable food sub-systems in 5 EU regions?
Question 5. How will I reduce the food waste in my country by half in 2030?

These were debated in the working groups and partially reformulated.

Activity 2 was focused on the **selection of an appropriate set of 2 axes** – a horizontal and a vertical axis – which allow the development of contrasting scenarios (blue, green, red and grey; see Fig. 1). For each core question, the working groups were provided with a set of axes. These had been debated and modified if another set was deemed to be more relevant. In general, numerous sets of axes could be considered such as: local versus global, economy-focused vs nature-focused, single vs multiple (e.g. resources or products), autonomy vs dependence, public vs private, high-tech vs low-tech, fast food vs home-made, controlled vs uncontrolled, etc.

Activity 3 The two-dimensional plot of a vertical and horizontal axes permits the positioning of **four contrasting scenarios** (see Fig. 1); each group discussed four scenarios for their specific core question and set of 2 axes. They described and provided each scenario with an image of a potential future. For the six groups, a colourful list of 6 x 4 scenarios was delivered.

The outcomes of the discussions in each of the six working groups – each one dealing with 1 core question, a set of 2 axes and 4 scenarios – was presented in the plenary session with the support of pre-formatted slides for each group.

The outcomes are presented in Annex 2, p.15 as 6 slides from 6 working groups (the reader is reminded of the disclaimer on the content in the introduction of this report).

In summary, the core questions and the axes enabled the utilisation of the scenario development methodology.

During the introduction, also, the next steps for the second day were described; these are mentioned below (see section 2.2)

Proposed future actions:

- The 6 slides will be discussed in the SCAR FS SWG, in particular in Action Line 1 on Future Food Systems.
- The coordinators of Action Line 1 of the FS SWG will consider further elaboration by a group of experts in case the outcomes presented here may be of high relevance for future activities in the SCAR FS SWG.

- Each participant will decide by her/himself if the outcome will be relevant for further use in their home country context. Several participants have already indicated their intentions to take action.

2.2 Scenarios to prioritize R&I breakthroughs (day 2; part 2)

First, the 22 potential R&I breakthrough pathways[4], elaborated in FIT4FOOD2030 by different organizations, were introduced. FIT4FOOD2030 has defined R&I breakthroughs as potential, significant achievements that may lead to an increased impact of the current initiatives in the field of Food Nutrition Security and a step towards/radical changes in food systems, making them more sustainable and resilient. They are summarized in the following figure with their name (Fig 3).

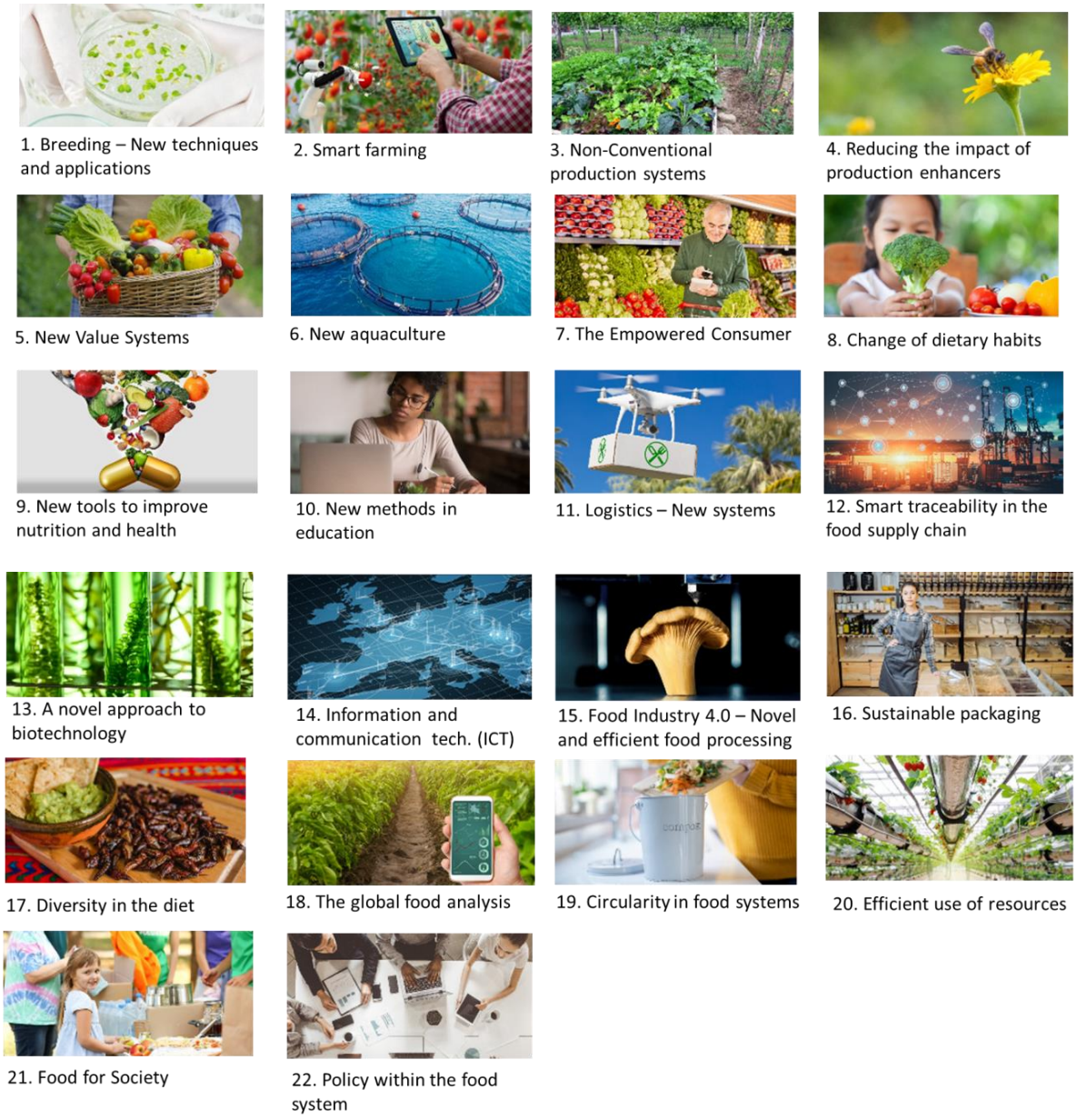

Fig. 3. The 22 potential R&I breakthrough pathways developed in the FIT4FOOD2030 project.

[4] https://fit4food2030.eu/inventory-of-possible-ri-breakthroughs-in-food-systems

Activity 4 concerns working with scenarios to prioritize options. These options can be R&D programs, demonstrators, policy measure, etc. In this workshop, the options were the R&I breakthrough pathways developed in the FIT4FOOD2030 project. The process of prioritizing is called wind-tunneling and is explained in the following figure (Fig. 4).

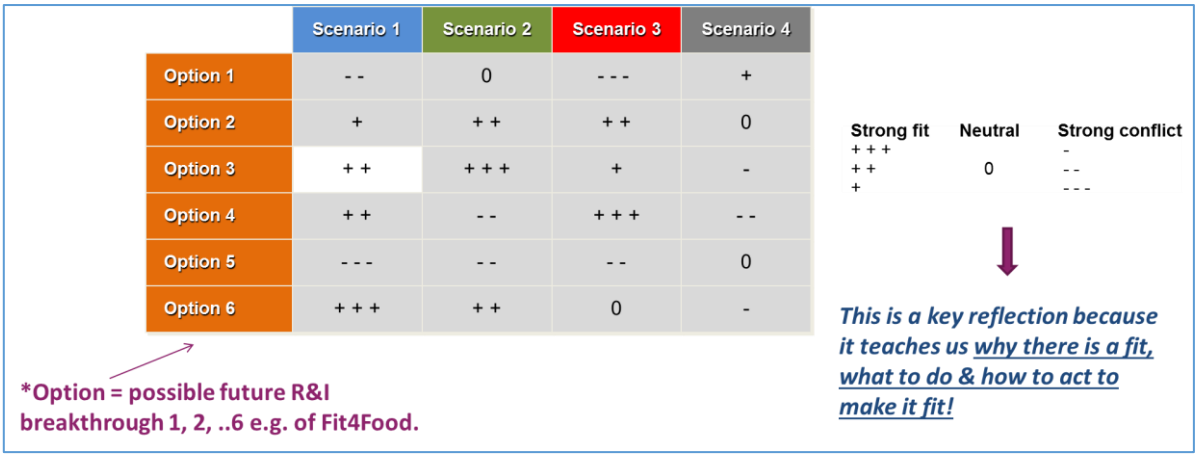

Fig. 4. The process 'wind-tunneling' to prioritize options (like R&I breakthroughs) via checking their relevance with the four scenarios.

The groups continued their work on "utilising their developed scenarios to prioritize 6 breakthrough innovations that they considered as most relevant for their core question, their set of axes and scenarios". Each R&I breakthrough was scored within each scenario for its level of fitness or conflict. Hence each group presented 1 slide based on the template illustrated in Fig. 4 for their core question.

Activity 5, as last activity, dealt checking if the prioritized R&I pathways were of relevance in the home countries (or organisations) of the participants; thus, assessing if they fit in the policy agenda of their country/community/cluster. For each group, this meant the filling in the following tables (Fig. 5).

Fig. 5. The prioritized R&I breakthroughs are cross-checked with the policy agendas of each country represented by the participants within a working group.

3. AN EXAMPLE OF A WORKING GROUP IN ACTION

An example of working group 1 is here presented with moderators Niels Halberg (Denmark) and Rosina Malagrida (Spain).

The question to be dealt with was: "**How will European urban citizens eat healthy and sustainably tomorrow?"**

The group discussion started by reflecting around the crucial/core challenges behind the question, which could lead to very different situations and should then help to define the scenarios (***Activity 1)***. The reflection focused on the following aspects:

- **CONSENSUS ON DEFINITION:** Under which conditions (diets) is there a **synergy between "eat healthy AND sustainably**" or is a compromise needed?
- **FORMAT of INFORMATION:** Does (evaluation of) sustainability of food consumption need to consider the whole food system, from primary production through to processing, packaging, retailing, consumption and recycling? If so, it is **difficult for citizens to assess sustainability without proper information**. What type of information would provide insights about the degree of sustainability of a product? This raised questions re. availability of trustworthy methods for measuring sustainability and whether to provide general vs. product specific information.
- **MOTIVATION:** What proportion of **consumers will be willing to consider healthy and sustainable diets/foods**? Can this be increased by changing the model of education to become more collaborative and systemic?
- **EDUCATION/COMMUNICATION:** Do consumers need more information (education or labels ...) to find synergies between health & sustainability?
- **ACCESSIBILITY AND AFFORDABILITY:** Will there still be "attractive" products on the market, which are not healthy & sustainable and probably cheaper?
- **POWER DYNAMICS:** Will the challenges be addressed with a focus on the responsibility of a single consumer or on a shared responsibility of different stakeholders?
- **ALTERNATIVE PROTEINS: TRADITIONAL VS INNOVATION** Will development towards reduced meat intake be significant or will there be a demand for other innovations such as in-vitro meat?

Next, the facilitators launched the most pertinent questions for the scenario process: Which overall developments could give healthier diets and/or more sustainable food production and consumption? What are the most important but uncertain conditions and drivers for this development? These uncertain conditions could provide inspiration for the axes to be chosen for the scenarios.

Before debating on the axis to select, the facilitators shared some examples of axes that they had previously defined ***(Activity 2):***

- Axis ONE distinguishes two situations consumers might face in future food markets: whether there will be "Easy and clear access to (information on) healthy and sustainable food" vs. a situation where it will be "Difficult to combine healthy and sustainable food due to unclear information from producers".
- Axis TWO distinguishes between two assumptions regarding the majority of consumers in the future: "Citizens will not change diets but production forms/technology and products will improve with regards to sustainability" OR "Citizens will change diets

consciously, eat less meat, less fat, sugar, salt, and/or fashionable food trends such as vegan, etc.", see Fig. 6.

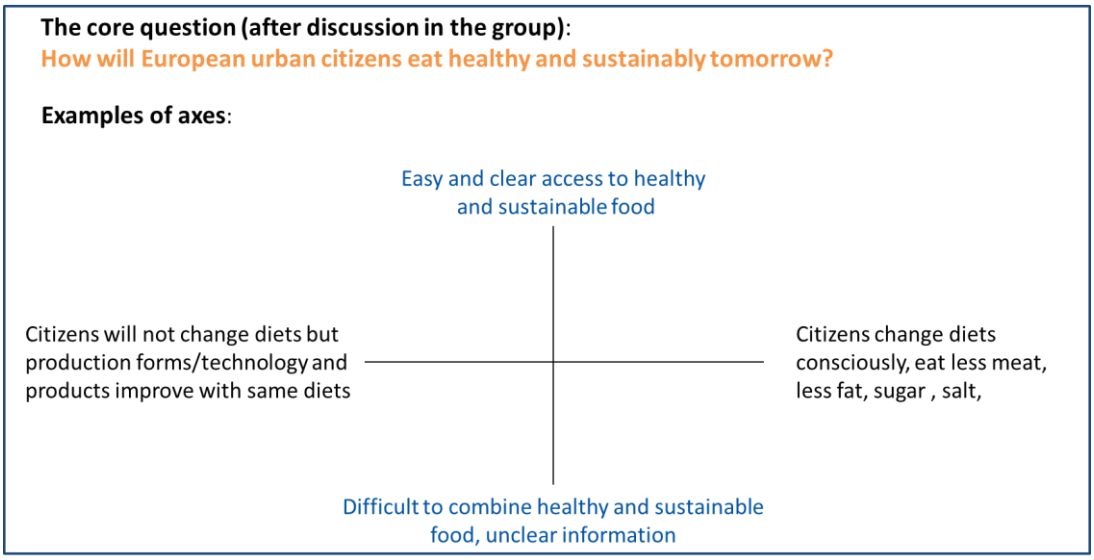

Fig. 6 Core question and axes

Next the facilitators also shared four possible scenarios describing the four combinations of these extremes (***Activity 3***). Possible situations were:

1. Consumers are consciously changing diets to eat more healthily and sustainably because there is an abundance and diversity of sustainable food AND citizens are empowered to choose healthy diets, partly due to easy access of necessary information and available food products.
2. Citizens in general do not consciously change their diets for neither health nor sustainability reasons, however, due to developments in other parts of the food system, many consumers are nudged into better eating. This may be due to the development of High tech livestock and food production taking place under strict climate and environmental regulation, such as for in-vitro meat, closed systems, recirculation, upgrading of waste streams.
3. The other sides of these scenarios are situations where it is less likely that synergy is created between healthy and sustainable eating, namely if consumers are in general not interested AND non-healthy convenience food dominate the food market. The prevalence of obesity continues to increase. Education has a low impact,…).
4. Information about food products is unclear and the food system is uncoordinated; then, citizens will follow their intuition, belief and personal preferences for healthy or natural food and the resulting scenario is messy with consumers eating food with only random characteristics of healthy diets or sustainable products.

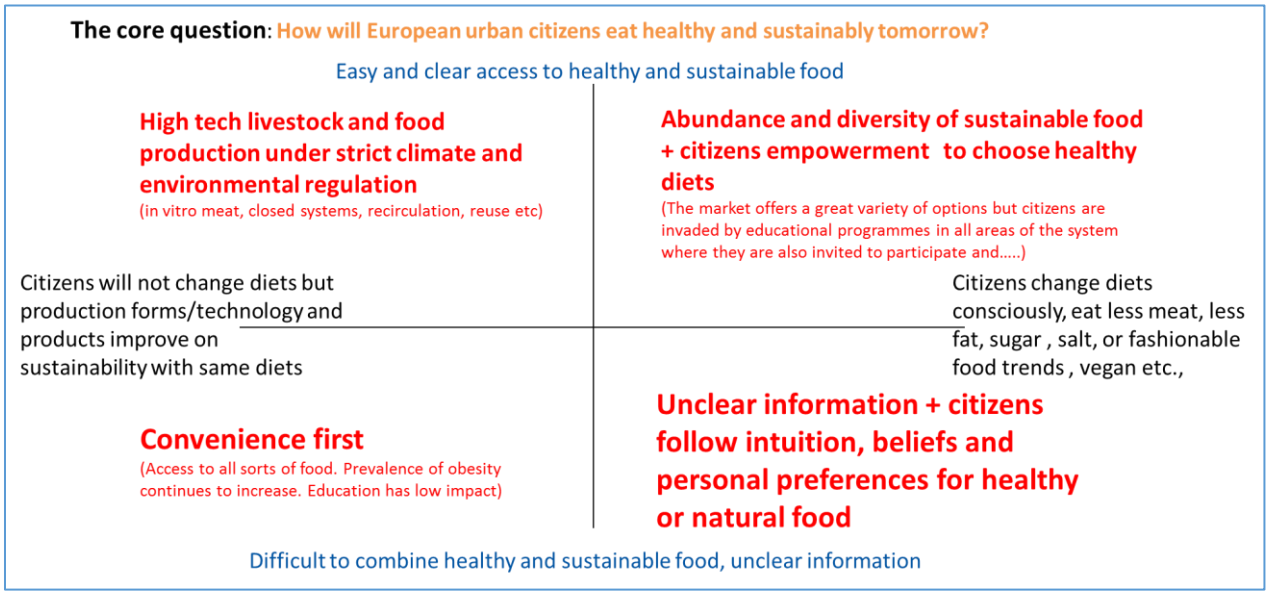

Fig. 7 Descriptions of 4 scenarios

After presenting those examples, the group arrived at a consensus on the axes they would like to select. They agreed to maintain axis one, but they modified axis two:

- Axis one continues to distinguish two situations consumers might face in future food markets: whether there will be "Easy and clear access to (information on) healthy and sustainable food" vs a situation where it will be "Difficult to combine healthy and sustainable food due to unclear information from producers".

- Axis two distinguishes two assumptions with regards to governance and power dynamics: a situation where "Responsibility is on consumers" vs a situation where there is a "Shared Responsibility", meaning that all the different stakeholders share spaces for mutual learning and shared decision making leading to scenarios where the effort for change is shared among different sectors and stakeholders.

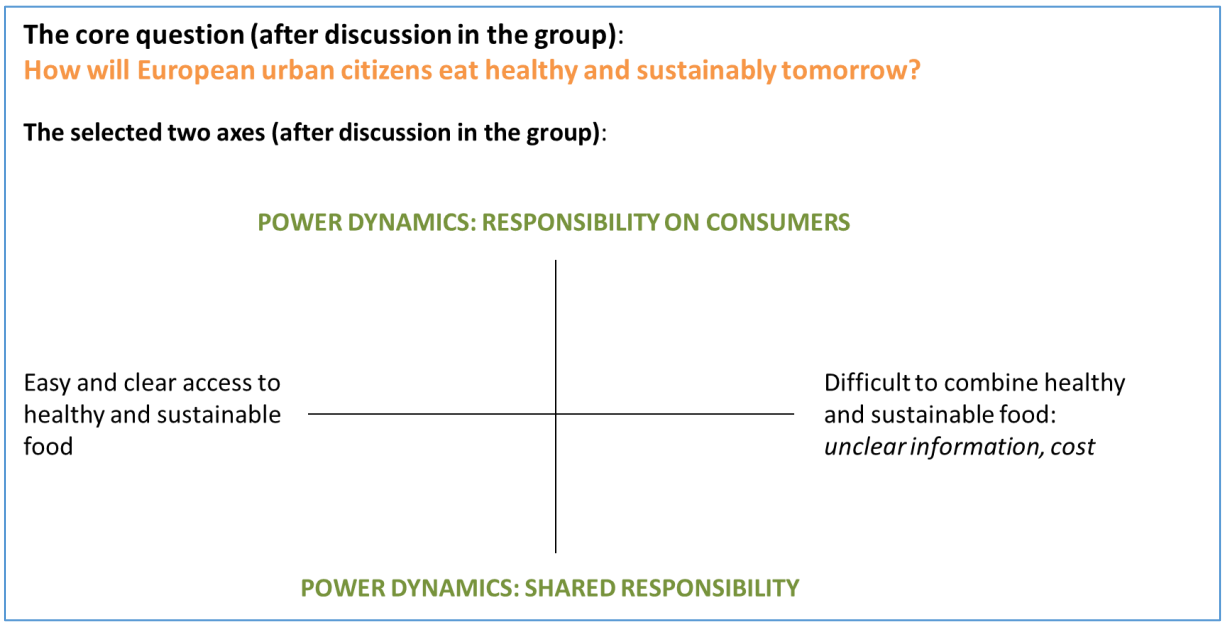

Fig. 8 A modified vertical axis, after discussing the scenarios.

Based on these axes, four scenarios were defined:

Scenario 1: **Healthy eating under consumer control/motivation.** Easy access to convenient, healthy and sustainable food, strong focus on education and information, transparency, cooking techniques, habits. Empowered consumers will make the right choices.

Scenario 2: **Citizen activism.** Companies do not change behaviour but citizens demand healthy and sustainable food and frame the food environment and put pressure for regulation. Green washing, unclear information, low transparency.

Scenario 3: **Food environment encourages healthy and sustainable diets.** Easy and cheap access to convenient, healthy and sustainable food, retailing facilitates accessibility and affordability, we all have access to participate in the definition of our food environment, the food industry shares responsibility for collective benefits, multi-stakeholder system thinking initiatives are promoted.

Scenario 4: **Anti-system thinking.** Disconnected improvements, conflicting interests, no strategic coherence, changes isolated/compartmentalized, green washing, system thinking emerges slowly.

Fig. 9 The final set of four scenarios and axes in line with the core question

In the next Phase (***Activity 4***) the discussion focused on identifying which are the key R&I breakthroughs that may make those scenarios possible. The catalogue of breakthroughs[5] developed within the European project FIT4FOOD2030 was presented and participants prioritized 6 as the more relevant for the four scenarios.

The prioritized R&I breakthroughs are listed below together with the introductory text that the catalogue facilitates[2]:

1. **Empowered consumer:** Engagement extends the role of consumers beyond passive purchasers of what supply chains provide into active and self-organising players who shape the food system and develop solutions based on their values and preferences. R&I

[5] https://fit4food2030.eu/inventory-of-possible-ri-breakthroughs-in-food-systems/

focuses on food labelling, formal and informal education and co-creation through living labs.

2. **Change of dietary habits:** Innovation in ingredient research, product development, and new insights in consumer behaviour, education and policy making, are some of the levers to drive this trend.
3. **New methods of education:** From Living Labs to Massive Open Online Courses (MOOCs), and tailor-made webinars to design-sprint hackathons, networks from academia, research, industry, and civil society are developing innovative opportunities to attract, develop, collaborate and empower individuals to transform food systems of the future.
4. **Smart traceability:** In food systems, traceability has become a critical element in supply chain management. It is now considered a new quality index in food. Innovation in the use of information and communication technologies is required to provide transparency and trust through the value chain and improvements in food supply.
5. **Food industry 4.0:** New approaches for sourcing, processing and manufacturing systems for foods and food ingredients are constantly on the rise. Several sector-specific technologies are emerging; common goals across this innovation area include reducing environmental impact and increasing nutritional quality while maintaining food safety, and the enjoyable experience of consuming food.
6. **Food for society:** Access to safe, nutritious, affordable, and sufficient food is key to providing rural and urban communities with good health, sustainable jobs, and self-fulfillment. Key R&I to achieve these goals are: community-driven social innovations where citizens participate in research projects, green public procurement, responsible social entrepreneurship promoting fair trade, reduced waste, fair treatment of laborers…

Next, the participants filled in the table below scoring the degree of relevance of each of the breakthroughs for each scenario on a predetermined 7-point scale from "Strong fit" to "Strong conflict". For example it was considered that R&I in most of the selected breakthroughs was a necessary condition to achieve scenario 1 except for R&I in "food for society" as this scenario lacked the participatory approach (responsibility on consumers only). In contrast, scenario 2 would require all of the R&I breakthroughs including those with a broader food systems engagement.

However, if we continue to under-invest in those R&I breakthroughs, it is very likely that we will end in scenarios 3 and 4, with little access to food, which consumers may not know is healthy and sustainable, partly due to unclear information. However, in scenario 3, as there is citizen activism, some R&I will be needed to facilitate those activities. In scenario 4, there will be a need for (limited) investment in some of the R&I breakthroughs focusing on education and improvement in the production of healthy and sustainable food and in social innovation, but not sufficient to make information clear enough and to achieve a true shared responsibility. Overall, the exercise demonstrated the strong need for a portfolio of R&I breakthroughs to be supported in order to facilitate a significant and conscious change towards scenarios where "**European urban citizens eat healthy and sustainably tomorrow".**

Core Q: How will European urban citizens eat healthy and sustainably tomorrow?

Strategic Potential R&I Breakthrough

	Scenario 1 My control/motivation	Scenario 2 Food environment encourages	Scenario 3 Citizen activism	Scenario 4 Anty system-thinking
1. Empowered consumer	++	++	-	-
2. Change of dietary habits	+++	+++	-	+
3. New methods in education	+++	+++	--	+
4. Smart traceability	++	+++	--	-
5. Food industry 4.0	++	+++	--	-
6. Food for society	-	+++	++	+

Strong fit	Neutral	Strong conflict
+ + +		-
+ +	0	- -
+		- - -

Fig. 10 Windtunneling: the crossing of R&I Breakthrough pathways with the four scenarios

The time allocated to the workshop exercise was limited (thus the planned ***Activity 5*** 'checking the relevance of outcomes in home countries of participants' was not carried out) and not all scenarios were internally fully consistent with the axes and assumed consequences in relation to the overall question (and scenario 4 did not have the same interpretation by all group members at the end). However, as it turned out, the initial discussions on the scenarios seemed sufficient for initiating a discussion on the necessary R&I Breakthroughs. Thus, the exercise demonstrated scenario thinking as a fruitful contribution to prioritization of research needs, even though the results would require more iterations between the scenario descriptions and the R&I prioritization to be consistent.

4. CONCLUSIONS

The following conclusions have been drawn:

- The participants mentioned that the workshop on scenario development and its utilization for priorizing breakthrough R&I pathways was interesting and relevant for their work.
- The process of developing and utilizing scenarios was considered useful by all participants.
- The process provided more in-depth insights on the R&I breakthrough pathways, particularly their potential value in specific contexts.
- A short introduction to the scenario methodology seem to be sufficient to stimulate fruitful discussions and to achieve creative output.
- The pre-prepared template was helpful in structuring and guiding the process as well as in achieving presentable outcomes in a coherent manner.
- Some participants expressed their interest in using the methodology to enrich their toolbox for strategy development.

The success of the workshop in particular was related to the limited numbers in each discussion group, which enabled all participants to actively participate, and to the duration of discussions, which enabled information to be digested and also the concrete elaboration of options within different scenarios.

The workshop didn't provide sufficient time to check the robustness of the scenarios or the relevance of prioritized breakthroughs in each country.

Overall, the 1 day scenario workshop was considered as an additional tool to rapidly, easily and inclusively (with all members in a team) construct and utilize a first set of scenarios for their strategy.

5. FOLLOW-UP ACTIONS

The follow-up actions, that had been formulated, were:

- The methodology and the slides were presented during the FIT4FOOD2030 final conference on the 24th and 25th of November 2020. The joint action between the SCAR FS SWG and the FIT4FOOD2030 project was underlined, and the wider public was informed about a methodology that may be relevant to use in their own context. The event had more than a hundred participants during the presentation of this specific activity.
- A presentation about this workshop and the usage of the methodology will be given in the next SCAR FS SWG meeting in Spring 2021.
- The relevance of the prioritization of R&I breakthroughs for action line 1 of the SCAR FS SWG will be discussed at the next SCAR plenary meeting in spring 2021. In particular, the following topics will get attention:
    - The usability of the methodology for each member of the SCAR will be analysed.
    - The consequences of using this methodology for reflections on leverage points and sustainability indicators for food systems will be debated.

ANNEX 1- Plenary presentations (additional slides)

The additional slides to the ones presented above of the two plenary introductory sessions are shown below.
It should be noted that these slides do not cover the entire scenario development methodology (see Annex 3, p.28), which would take at least 3 days of group discussions.

Additional slides for the introduction of the scenario development process:

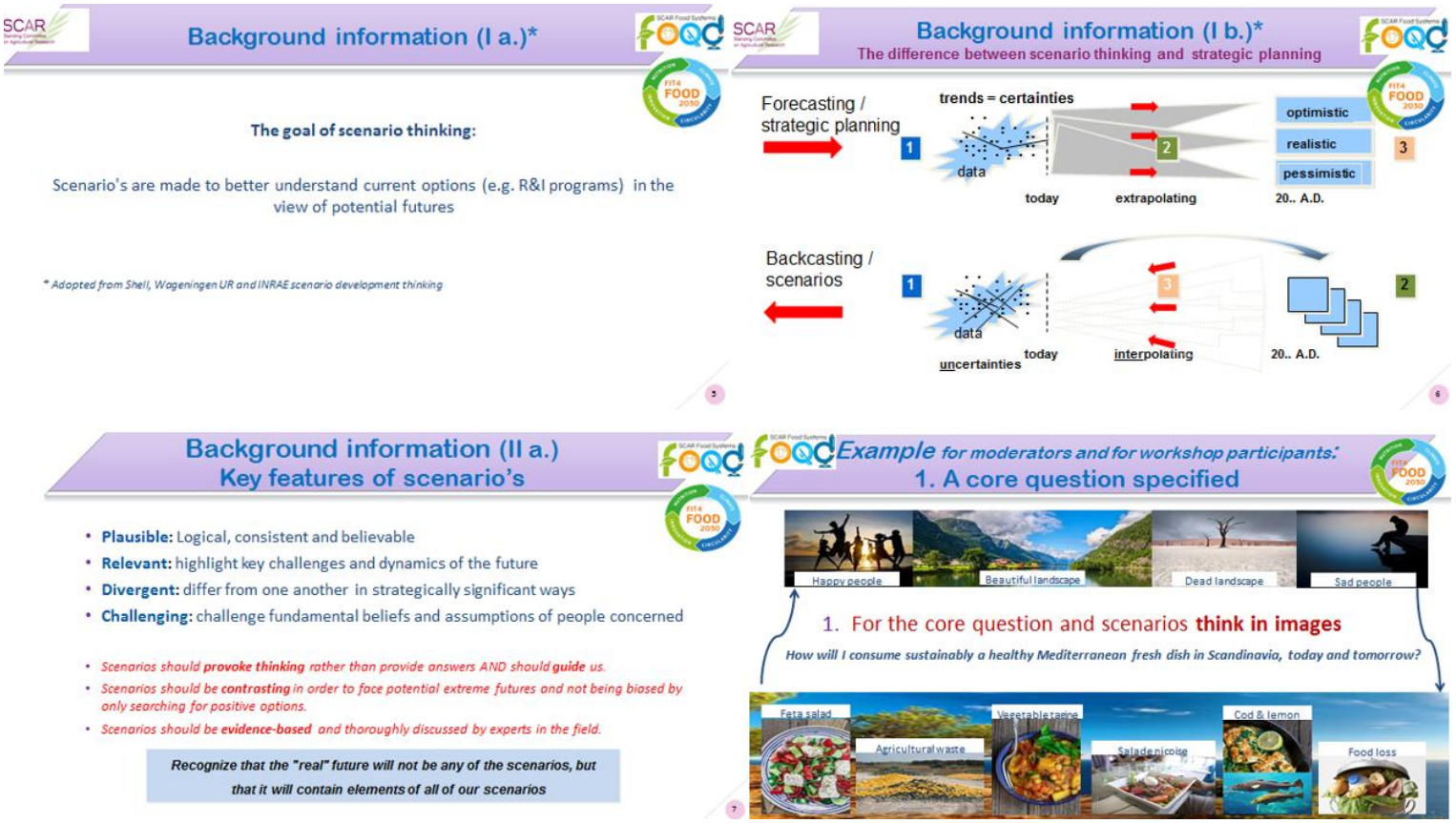

Fig. 11 Four additional slides were presented at the start of the workshop to explain the goal of scenario thinking, their features, the process of backcasting and the value of using images to become familiar with a core question.

ANNEX 2- Interactive sessions (schemes summarizing the discussions)

The discussions of each group resulted in a set of 2-4 slides (pre–formatted templates to be filled in; see the example of Group 1 in chapter 3), which summarize the finally agreed upon core question, the two most relevant axes related to the core question, the 4 resulting scenarios and the prioritization of 6 R&I breakthroughs with regard to the 4 scenarios. The last table reveals their relevance for each country.

DISCLAIMER: The slides below only serve as illustrations of the process to discuss and utilize scenarios; the duration of the workshop of 6 hours is far too short to have fully elaborated scenarios and well-argumented priorities; this normally takes 1 week of intensive discussions along with preparation time for becoming familiar with the scenario development methodology.

GROUP 1: Moderators: **Niels Halberg**, *Danish Center for Food and Agriculture, DK* and **Rosina Malagrida,** *Living Lab for Health at IrsiCaixa, ES*

Slides: see example in main text of the report (chapter 3, page 7)

GROUP 2: Moderators: **Beatrix Wepner**, *Austrian Institute of Technology, AT* and **Gemma Tacken**, *WuR, NL*

Slides: Addressing the question of "How to develop sustainable agrifood systems with limited resources and facing extreme contitions" quickly led to the definition of the two axis: one addressing the political and climate related conditions and one related to the availability of resources. Addressing the questions in four different scenarios gave a good insight into strengths and weaknesses, positive and negative aspects of each of the scenarios. The selection and discussion of five breakthroughs, that were considered as most relevant for the topic, namely new value sytems, food for healthy society, reducing the impact of production enhancers, the combination of circularity & efficient use of resources and ICT / smart farming, illustrated very well the impact such breakthroughs could have on a scenario and thus lead to a desireable or undesirable future. Differences were seen in respect to countries, depending on their status regarding systems thinking and already established instruments and ongoing activities.

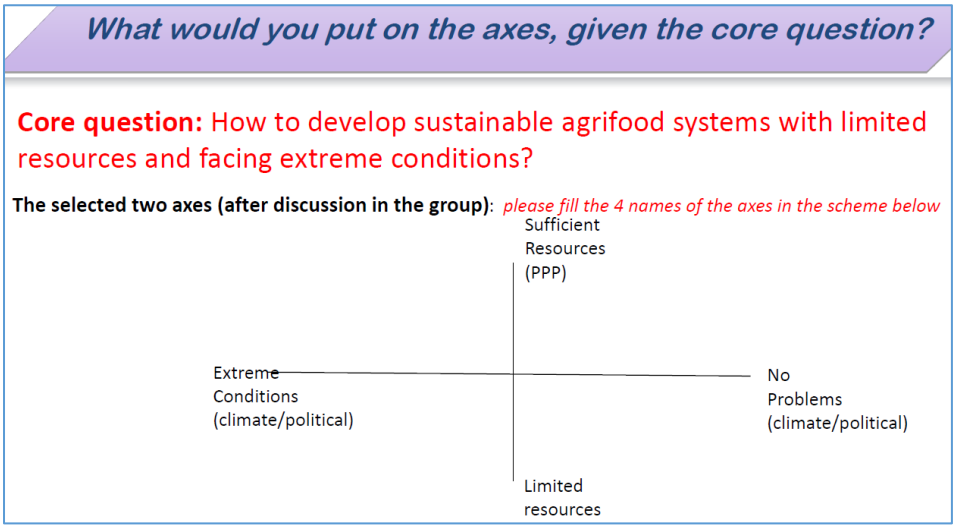

Fig. 12 The core question and 2 axes

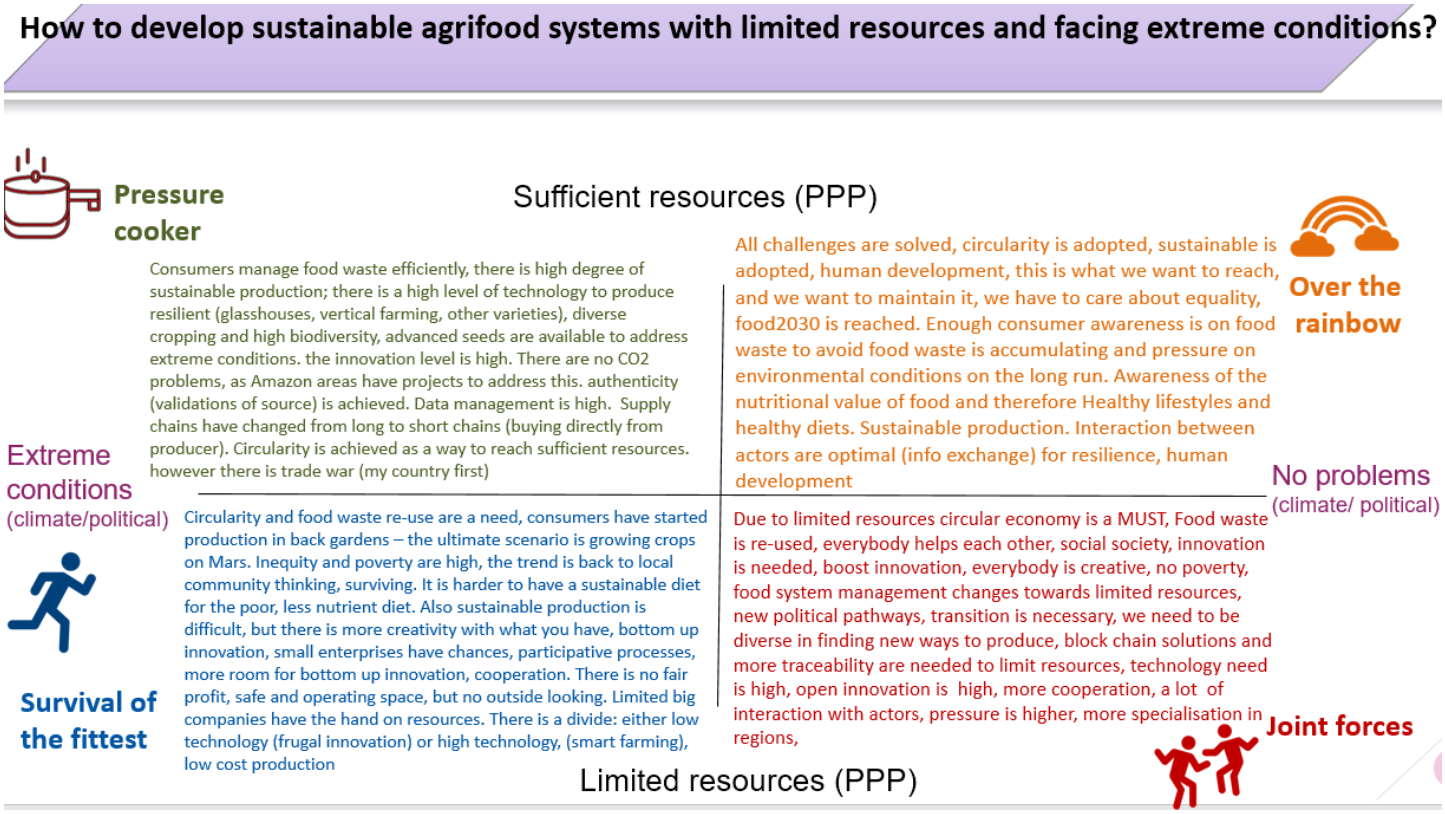

Fig. 13 Description of the four scenarios.

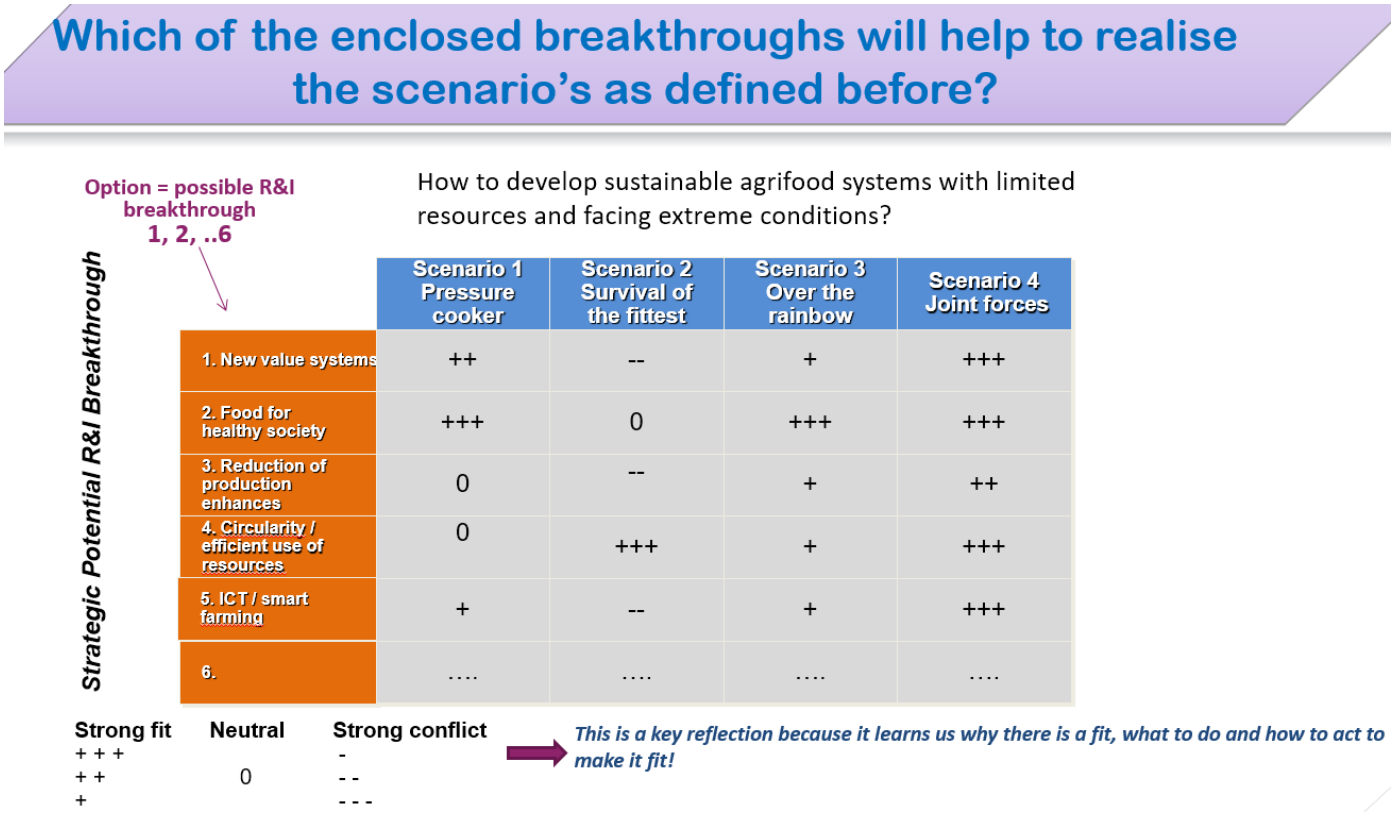

Fig. 14 Windtunneling: priorizing R&I breakthrough pathways using the four scenarios.

Strategic Potential R&I Breakthrough	Scenario 1 Pressure cooker	Scenario 2 Survival of the fittest	Scenario 3 Over the rainbow	Scenario 4 Joint forces	Lithuania (4)	Italy (x-axe)	Ireland (1 little 4 most)	Netherlands (4 obj, 1-2)
1. New value systems	++	--	+	+++	+++	++	+	+++
2. Food for healthy society	+++	0	+++	+++	+++	+++	++	0
3. Reduction of production enhances	0	--	+	++	++	++	++	--
4. Circularity / efficient use of resources	0	+++	+	+++	+++	+++	+++	++
5. ICT / smart farming	+	--	+	+++	+++	+++	+++	++
6.	….	….	….	….	….	….	….	….

Strong fit	Neutral	Strong conflict
+ + +		-
+ +	0	- -
+		- - -

Fig. 15 The relevance of R&I breakthrough pathways in different countries

GROUP 3: Moderators: **Paweł Chmieliński**, *Institute of Agricultural and Food Economics, PL* and **Hugo De-Vries**, *INRAE, FR*

Group 3 participants reflected on the issue of *How to enhance the contribution of food value chains to sustainable territorial development?* The debate revolved around two axes, one related to global and local approaches to the problem, and the other related to the role of public institutions and private entities in creating food value chains.

A lively discussion emerged on four scenarios for future developments as a result of the realisation of the different axes, with particular emphasis on the place of communities and changes in consumption in shaping future food systems. Therefore, four scenarios were identified. The first assumes the development of new circular agribusiness, involving the creation of new ventures in local food systems, but also development of circular networks, agri-parks or agri-industrial clusters. Also a potential scenario was discussed regarding participatory approaches and the resulting importance of family farming in connection to local communities, the development of urban food initiatives or open garden schemes, etc. In the context of globalisation of food systems, attention was drawn to the homogenisation of consumption patterns and the global exchange of knowledge and practices. Another scenario dealt with a radical shift in thinking about food systems and the resulting strategic approach of public administration, transnational and supra-regional actors and territories, but also the competing interests of different actors in global value chains.

An exciting debate then identified the six breakthroughs that may be crucial for future transformations of the above mentioned scenarios, ie. new techniques and applications in breeding, changes in information and communication technologies (ICT), new value systems, food for society, reducing the impact of production enhancers and the policy within the food system. Their importance of the potential transformation towards each of the four scenarios was assessed that pointed out some differences in these processes, with reference to the four countries (DE, IT, FR, PL) represented by members of this group. Details of the excersise can be found in the slides below.

Fig. 16. Four scenarios and two axis responding to the core question.

Q3: potential R&I Breakthroughs

• **1. Breeding – New techniques and applications**	• 18. The global food analysis
• 2. Smart farming	• **22. Policy within the food system**
• 3. Non-Conventional production systems	• **1. Breeding – New techniques and applications**
• **4. Reducing the impact of production enhancers**	• **14. Information and communication tech. (ICT)**
• **5. New Value Systems**	• **5. New Value Systems**
• **14. Information and communication tech. (ICT) = 12.Smart traceability and 11. Smart Logistics**	• **21. Food for Society**
• 20. Efficient use of resources	• **4. Reducing the impact of production enhancers**
• **21. Food for Society**	• **22. Policy within the food system**

Fig. 17 The selection process for most relevant R&I Breakthrough pathways

Action 4: From scenarios to priorizing options via windtunneling: please fill in the table while discussing

Option = possible R&I breakthrough
1, 2, ..6

Axes

Strategic Potential R&I Breakthrough	Public/Local Scenario 1 Participatory schemes	Private/Local Scenario 2 New circular agribusiness	Private/Global Scenario 3 Globalised food systems	Public/Global Scenario 4 Radical change
1.Breeding – New techniques and applications	+	+	+++	+
2. Reducing the impact of product. enhancers	++	+	-	++
3. New Value Systems	++	+++	+++	++
4. ICT	++	++	+++	++
5. Food for Society	+++	++	-	++
6. Policy within the food system	+	0	--	+++

Objective of windtunneling:
Use the scenarios to priorize possible future R&I breakthrough in FS (= options)

Strong fit	Neutral	Strong conflict
+ + + + + +	0	- - - - - -

This is a key reflection because it learns us why there is a fit, what to do and how to act to make it fit!

Fig. 18 Windtunneling of R&I Breakthrough pathways with respect to scenarios

Additional action 5: Check rapidly if such an option (= possible 'R&I breakthrough') could be explored in your country

Scenarios

Countries

Strategic Potential R&I Breakthrough	Public/Local Scenario 1 Participatory schemes	Private/Local Scenario 2 New circular agribusiness	Private/Global Scenario 3 Globalised food systems	Public/Global Scenario 4 Radical change	DE	IT	FR	PL
1.Breeding – New techniques and applications	+	+	+++	+	+	+++	+	+
2. Reducing the impact of product. enhancers	++	+	-	++	++	++	+++	+
3. New Value Systems	++	+++	+++	++	+++	++	++	++
4. ICT	++	++	+++	++	++	+++	+++	++
5. Food for Society	+++	++	-	++	++	++	+	+
6. Policy within the food system	+	0	--	+++	++	++	+	+++

Strong fit	Neutral	Strong conflict
+ + + + + +	0	- - - - - -

Strong fit	Neutral	Strong conflict
+ + + + + +	0	- - - - - -

Fig. 19 The relevance of R&I Breakthrough pathways in four countries

<u>GROUP 4</u>: Moderators: **Jonas Lazaro Mojica**, *FoodDrinkEurope* and **Monique Axelos**, *INRAE*, *FR*

Group 4 participants addressed the question 'How to create corona-virus-resilient sustainable food sub-systems in 5 EU regions?', which was quickly reformulated into the question 'How to create epidemic-resilient sustainable food sub-systems in 5 EU regions' with a strong emphasis on the need to define "food sub-systems". The discussion on the possible axes provided different viewpoints, quite some debates about the final choices because multiple sets of axes were considered of interest. Finally, the axes 'Reactive (business as usual) vs Proactive (science driven)' and 'High intermediated chains vs Low intermediated chains' were chosen. The description of the scenarios delivered a short phrase of each scenario namely: '1. Local chain'. '2. Business as usual', '3. Business driven', and '4. Convenient chain'. The choice of pictures was extremely useful for the creation of the scenarios (as shown in the slide below). Activity 4, i.e. crossing possible R&I breakthroughs with the scenarios, was challenging. First, the moderators had the task of making participants familiar with the 22 possible R&I breakthroughgs, as the exercise required knowledge of the proposed innovation solutions. Nevertheless, six possible R&I breakthroughs (or roadmaps, innovation plans) were chosen and analysed for each scenario. The debates helped many of the participants to share concerns about the right choices and the trade-offs when selecting topics for possible funding. The second challenge related to the analysis of the results, which showed polarization of the scenarios, revealing R&I that favoured mostly the positive aspects of a given scenario (Convenient chain), and R&I that favoured the negative ones (Business as usual). A very good outcome was reached when the best options were crossed with the National priorities of Hungary, Spain, France and Lithuania, putting the discussion of the relevant R&I strategies into the perspectives of each country. Overall the exercise was very positively received; a final remarks was made that more time for analysis and development of the exercise would have been welcomed. Interest in developing this activity further was indicated by the participants.

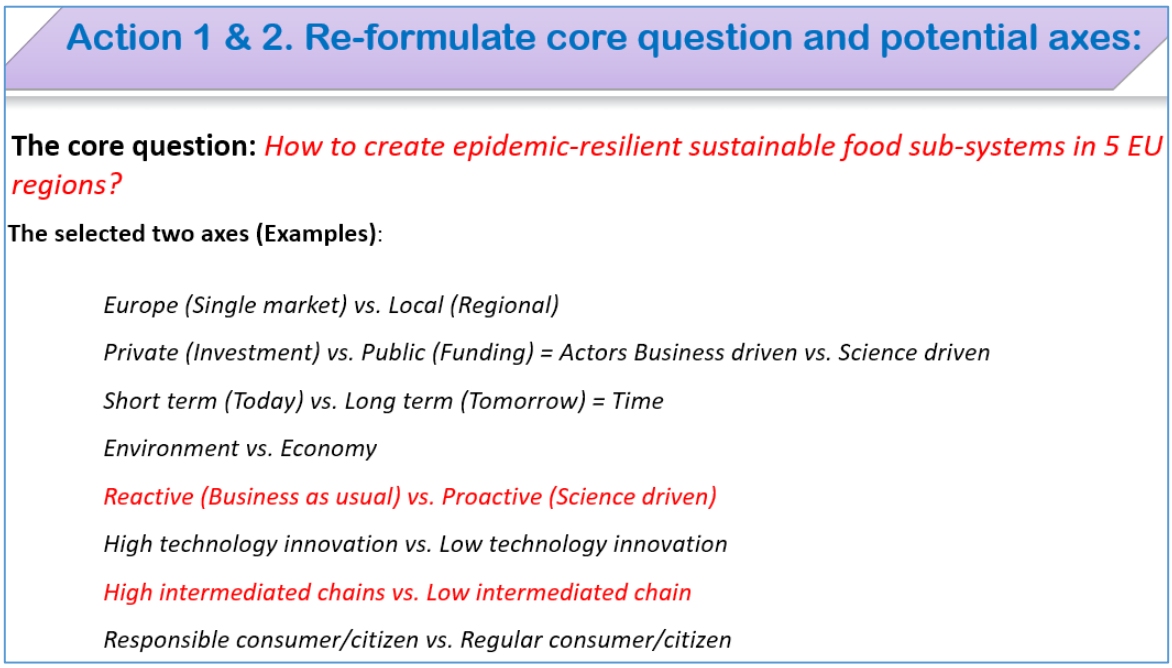

Fig. 20 The selection process of a set of two axes

Fig. 21 The four scenarios and two axis

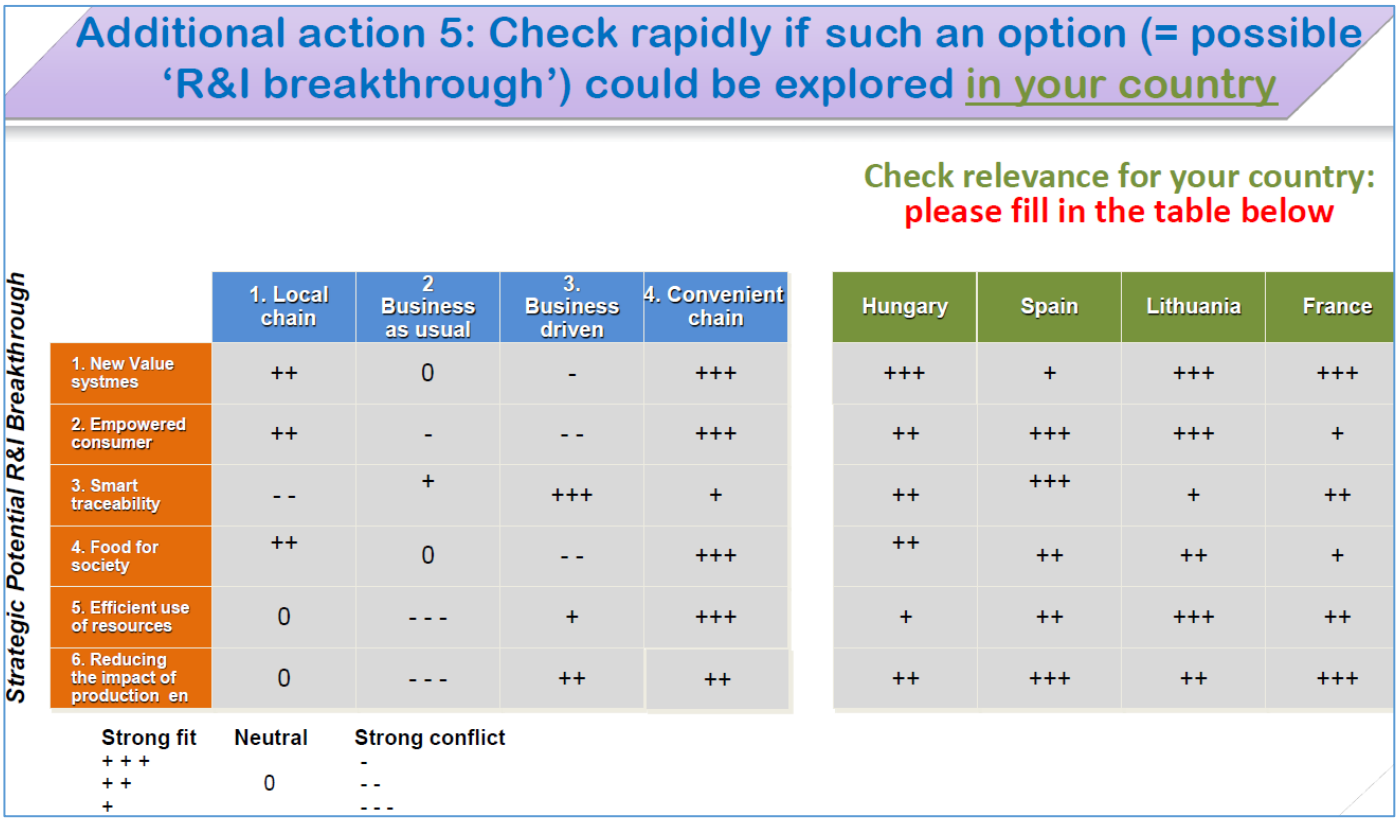

Fig. 22 The outcomes of windtunneling for R&I Breakthrough pathways, and their relevance in four countries.

GROUP 5: Moderators: **Nastasia Belc**, *National Institute of Research and Development for Food Bioresources, RO* and **Matthieu Flourakis**, *ILSI Europe*

For group 5, the core question defined before the workshop was "How to reduce food waste by ½ in my country by 2030?" Discussions within the group identified different management tools that can be applied to reduce food waste, including increasing resource use efficiency in order to prevent waste generated along the food chain. The discussion led to a modification of the core question into "How to develop an efficient Circular Food System by 2030"? The Circular Economy concept is one of the tools that could be used for reducing food waste and it is one of the 4 priorities within the EU FOOD2030 Strategy.

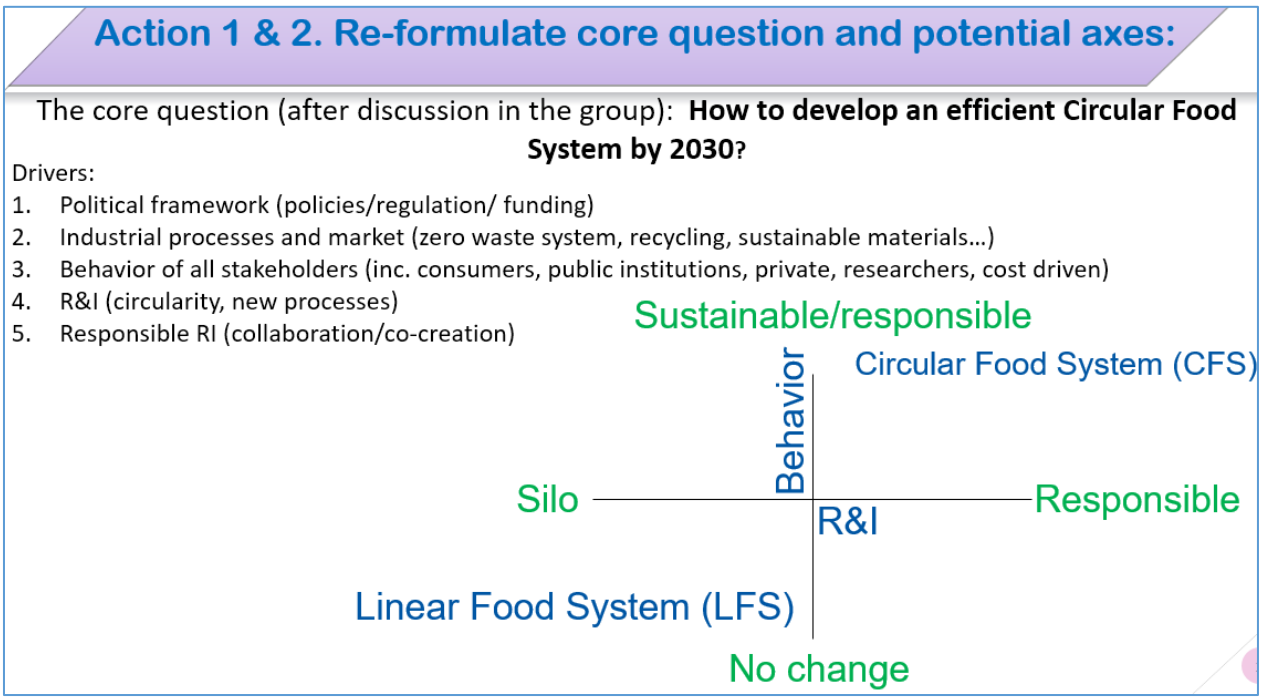

Fig. 23 The drivers, core question and axes

During discussions, 5 main drivers were found to define the potential axes.

1. **Political framework** is a very important condition that should be defined by a country for a specific initiative, in order to guarantee that an initiative is implemented at all levels of the society. For example, the Circular Economy concept should be based on a legislative framework, including different economical aspects for the agro-food area, to which our topic, reducing food waste, is related.
2. **Industrial processes and markets** are influenced and stimulated by the first driver and these should be transformed in terms of transforming food systems into responsible, competitive, resistant, sustainable and inclusive ones.
3. **Behaviour of all food system stakeholders** should be changed and they should be aware about the societal grand challenges, the new EU strategies and policies included in the Green Deal, climate change, sustainability, food security, and so on, in order to improve human health.
4. **Research and Innovation** has an important role in this transformation and in changing behaviours. Research results should be transferred to society and innovation should be increased in order to better exploit research and development activities.

5. **RRI, Responsible Research and Innovation** in Food System Research, is an integrative process in which ethical acceptability and sustainability will play an important role for Food System Stakeholders.

The set of 2 axes were:

1. Sustainable/Responsible vs No Change
2. RRI vs Silo.

After re-formulation of the core question and setting up the potential axes that are related to 4 potential scenarios, the next action, Action 3, was to define scenarios and, to prioritize the R&I breakthroughs.

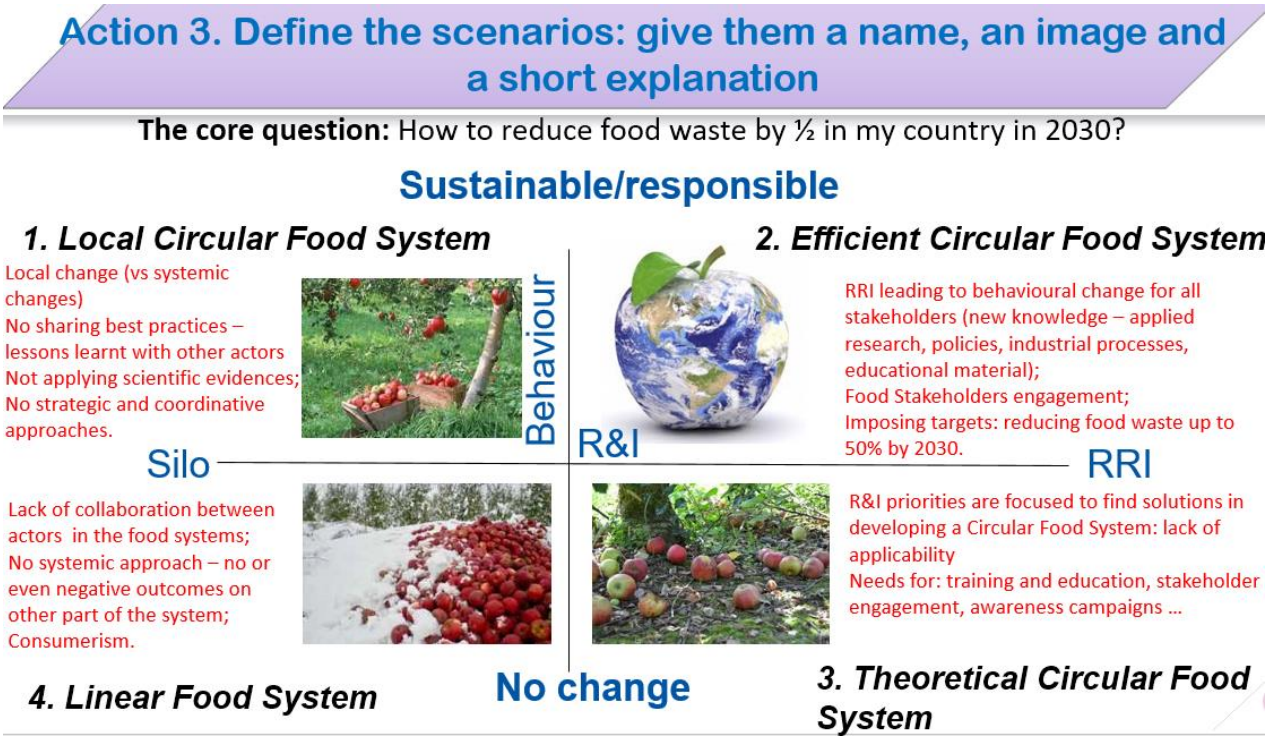

Fig. 24 The four scenarios described

As can be seen in the above picture, the 4 scenarios are named, and provided with a short explanation:

1. **Local Circular Food System**

   This scenario emerges when the Food System Stakeholders are aware of Food System transformations. However, due to a lack of supportive legislation, this transformation could happen very slowly, locally, without a strategic and coordinating process. The future actions that should be taken are related to improving and implementing the Circular Food System legislation.

2. **Efficient Circular Food System**

   This is the best scenario in which the RRI approach leads to behavioural changes at all societal levels of the Food System. The Circular Economy legislation is in force and the multidisciplinarity, co-creation and One Health approaches are used in day-by day activities. The future actions that should be taken in maintaining an efficient Circular Food System are related to defining KPIs, monitoring and periodic evaluation processes.

3. **Theoretical Circular Food System**

   This scenario is the beginning of building a Circular Food System. Research is the main driver in setting up the priorities for a Circular System.

This scenario could happen when legislation is not adequate and Food System Stakeholders, including citizens, are not sufficiently aware of the need for setting up a Circular Food System to overcome the grand challenges related to climate change, food security and safety.

4. Linear Food System

The worst scenario is to keep Linear Food Systems and not beginning the transformative process. In this system no systemic approaches are implemented (ex. RRI) and there is no collaboration between actors within the food systems. Resources are consumed without any regenerative process and environmental, animal, plant and human health is compromised.

The next action, Action 4 was the prioritisation of possible R&I breakthroughs.

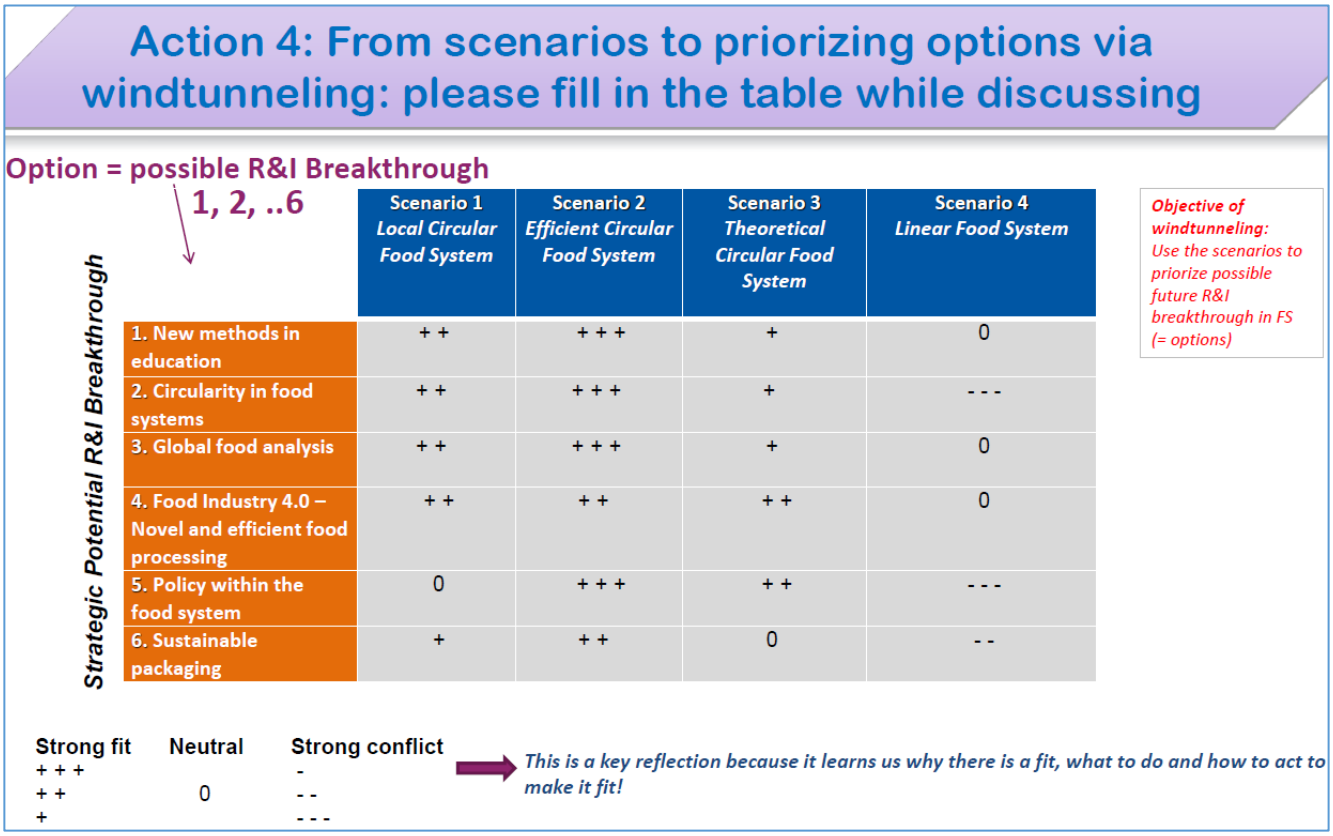

Fig. 25 Windtunneling to cross the R&I Breakthrough pathways with scenarios

The six selected Strategic Potential R&I Breakthroughs are:

1. **New methods in education and professional training**, which could help in awareness of Food System Stakeholders about Food Security and Safety in the climate change context, sustainability and, as a managing tool - the Circular Food System. Education also helps in changing the behaviour of Food System Stakeholders and, in general, the entire society;
2. **Circularity in Food System** is related to research achievements, development and innovation, as well as improvements in their exploitation and valorization;
3. **Global food analysis** is an important topic for entire food chains, in order to better characterize any agro-food source, including by-products that will re-enter the food system as new food raw materials, thereby reducing food waste.
4. **Food industry 4.0** – Novel and efficient food processing is in favor of resource efficiency which implies prevention of food waste.

5. **Policy within the food system** should be improved for introducing the Circular Food System approach and setting up the rules, recommendations and other management tools to implement and develop this approach.
6. **Sustainable packaging** is a tool to prevent food waste.

It can be seen from the prioritizing options via windtunneling that the the six Strategic Potential R&I Breakthroughs all have the strongest fit with Scenario 2, 'Efficient Circular Food System'. The breakthroughs 1 (new methods in education), 3 (global food analysis) and 4 (food industry 4.0) score the highest number of '+', and thus can be considered as priority breakthroughs.

The Additional action 5: Check rapidly if such an option (= possible 'R&I breakthrough') could be explored in your country, resulted in the table below. Our group represents 4 countries – Belgium, Greece, Italy and Romania.

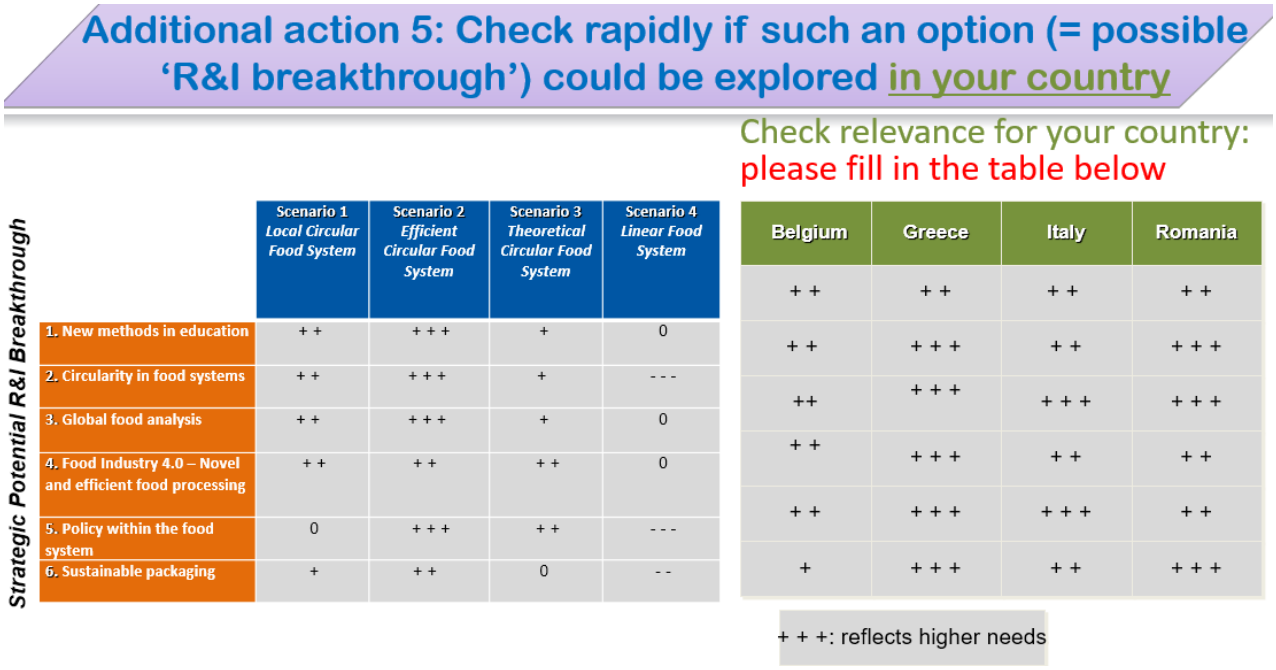

Fig. 26 R&I Breakthrough pathways and their relevance for 4 countries

The Additional action 5 table shows that there research is needed in almost all six Strategic Potential R&I Breakthroughs in Greece and Romania, followed by Italy. Belgium has a good position for Sustainable packaging and also better positions than the rest of the countries for subjects such as: Circularity in food systems, Global food analysis, Food Industry 4.0 – Novel and efficient food processing and Policy within the food system.

Conclusion

Circular Food System could help in reducing food waste but, to achieve such a system, some actions should be taken related to food policies, education and trainings at all societal levels, improving the quality of measurements (laboratory analysis) and new food processing technologies activities.

GROUP 6: Moderators: **Jacqueline Broerse** and **Kris Kok**, *VU University Amsterdam, NL*

In group 6, participants addressed the question 'How will European citizens eat affordable, healthy and sustainable food in 2030?' This question was reformulated from the original question ('How will

European citizens eat healthy and sustainable food tomorrow?') in an effort to include the affordability of foods, as well as a clear timeline (towards 2030).

Participants provided a large variety of possible sets of axes (see Figure 27). Based on a voting exercise where each participant could assign 3 points, 2 points and 1 point respectively to their top three most desired axes-sets, axes were selected. This led to the following pairs being selected: "Circular vs Linear" and "Plant-based vs Animal-based". After a discussion, the following scenarios were formulated: '1. Business as usual', '2. Health shift', '3. Full system transformation', '4. Sustainable shift'. As was argued by participants, shifting towards plant-based diets would in particular entail a shift towards healthy foods, while only shifting to circular models, would mainly focus on the sustainability-aspects in food systems. For each scenario, different keywords were put forward to characterize the scenario, such as 'consumers more engaged' or 'less biodiversity'. As a final exercise, the three key elements of our initial question (affordable, healthy and sustainable) were color-coded in each scenario. Red meant that the scenario would not benefit a particular element, while green meant that it would. This is explicated in Figure 28.

After developing the different scenarios, different breakthroughs were selected and discussed. Through a consensus-building exercise, where participants could also vote those breakthroughs that they considered most relevant, a total of 10 breakthroughs were selected and evaluated for different scenarios. As can be seen in Figure 29, the scenario 1. 'business as usual' scored particularly low for all breakthroughs, while scenario 3. 'full system transformation' scored maximum evaluations for each breakthrough. In scenarios 2. 'health shift' and 4. 'sustainable shift' more mixed evaluations were presented. What is emphasized through this exercise again is that in order to fully transform food systems towards supplying affordable, healthy and sustainable diets for all citizens in 2030, there are many different axes along which transformation is needed. Full system transformation is both a 'win-win' as well as an 'and-and' process, requiring coordinated efforts throughout the entire food system to set in motion different transformation pathways.

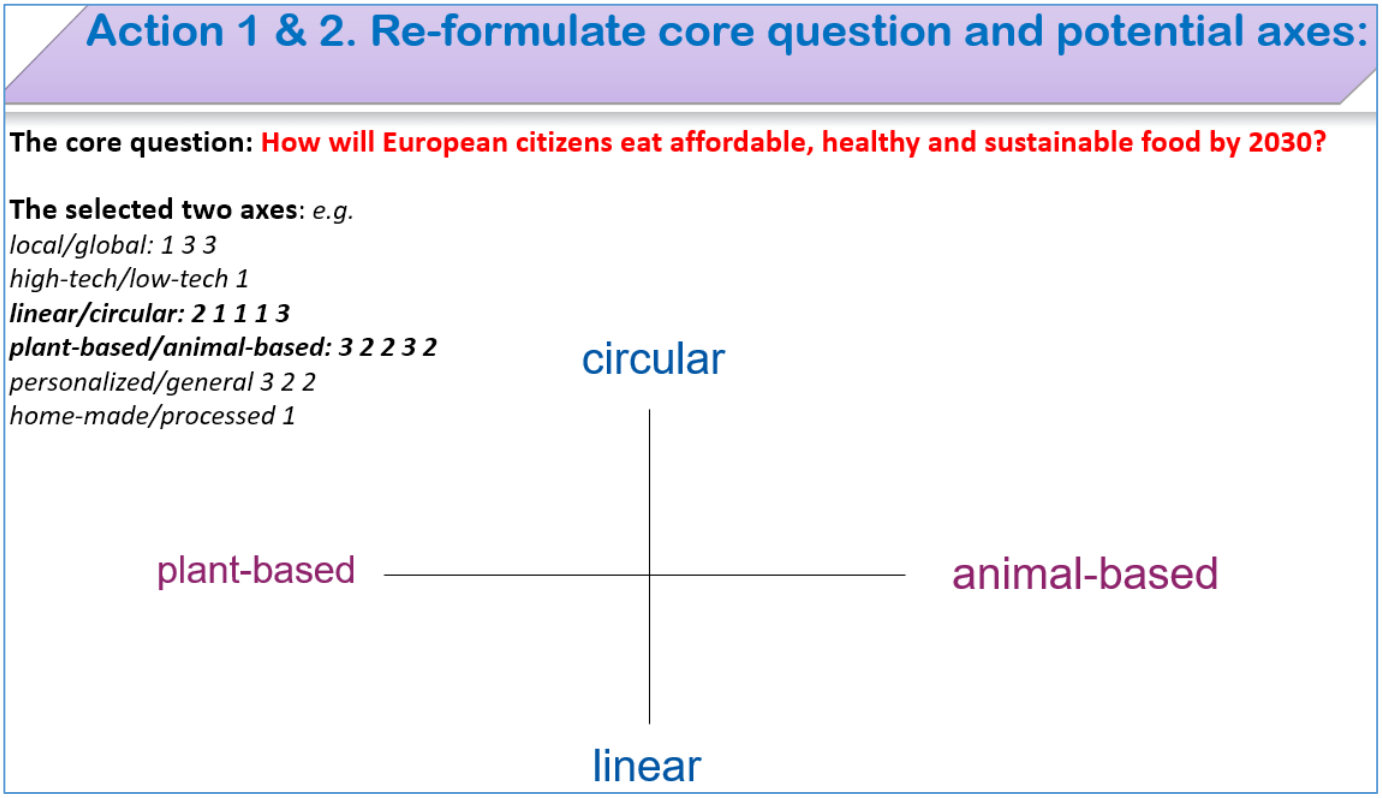

Fig. 27 the core question and two axes.

Action 3. Define the scenarios

The core question: How will European citizens eat affordable, healthy and sustainable food by 2030?

plant-based

2. HEALTH SHIFT

affordable, healthy and sustainable

food wasted (at home)
healthier (less NCDs, caution for micronutrients)
resource intensive plant production
less biodiversity
soil depletion
reduced water use
unclear on affordability

3. FULL SYSTEM TRANSFORMATION

affordable, healthy and sustainable

healthier (less NCDs, caution for micronutrients)
green + agroecology
nutrient resilient (input/production side in particular)
reduced water use
increase biodiversity, air quality, quality of life, soil quality
higher affordability (cutting cost on production side, less pesticides)
less food waste (redistribution of foods)
consumers more engaged

linear

circular

1. BUSINESS AS USUAL

affordable, healthy and sustainable

todays food, business-as-usual
resource intensive / earth depletion
NCDs (not very healthy),
less affordable
high-carbon (GHG)
food wasted
consumers not engaged

4. SUSTAINABLE SHIFT

affordable, healthy and sustainable

still NCDs, not necessarily healthy
still unclear on GHG
high water & energy & land use
expensive to mitigate externalities (impact on affordabilit
animal welfare taken into account
less food wasted (redistribution of foods)
consumers more engaged

animal-based

Fig. 28 The four scenarios elaborated

Action 4: From scenarios to prioritizing options via windtunneling: please fill in the table while discussing

Strategic Potential R&I Breakthrough

	1. BUSINESS AS USUAL	2. HEALTH SHIFT	3. FULL SYSTEM TRANSFORMATION	4. SUSTAINABLE SHIFT
1. Smart Farming	++	0	+++	++
2. Empowered Consumer	-	++	+++	++
3. Change of Dietary Habits	--	+++	+++	++
4. Diversity in the Diet	+	+++	+++	+++
5. Circularity in Food Systems	---	0	+++	+++
6. New tools to improve nutrition and health	---	+++	+++	-
7. Non-conventional production systems	+	+	+++	++
8. Reducing impact of production enhancers	0	+	+++	++
9. Food Industry 4.0	+	+++	+++	++
10. Efficient Use of Resources	---	0	+++	+++

Fig. 29 Windtunneling of the R&I Breakthrough pathways

ANNEX 3- A schematic overview of the full scenario development process

The scheme of the full scenario development process is shown in the next figure (as previously explored by Shell, Wageningen UR and INRAE). Phases 1 and 2 were prepared before the workshop by the organizers and moderators. They shared examples of scenario dimensions, which were discussed with participants, modified and specified during the workshop. Phases 3 and 4 were fully worked out by all participants of the workshop.

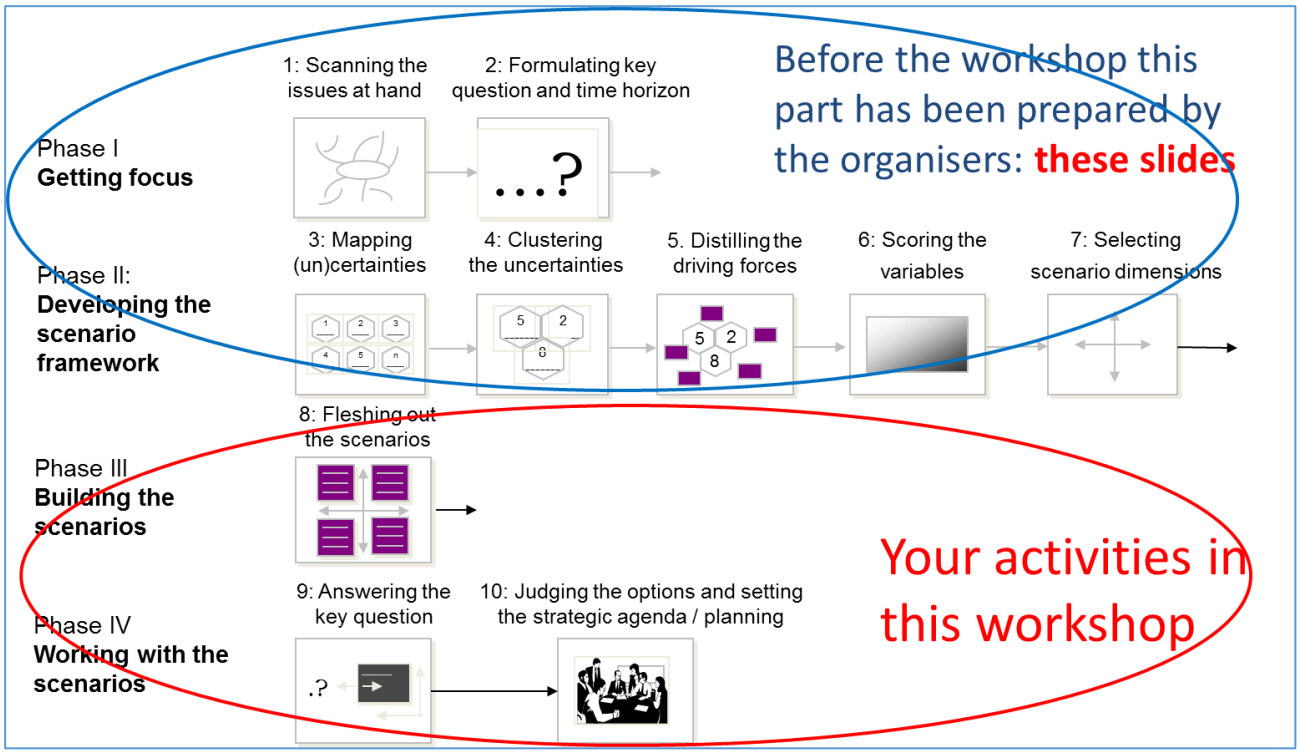

Fig. 30 The full scenario methodology, with 4 phases and different steps to be taken (adapted version of the design developed by Shell and Wageningen UR).

ANNEX 4- Agenda of the meeting – Day 1 and 2

DAY 1- October 28th, from **14.30** to **17.15**

14.30 – 15.05 Introduction of the scenario process (plenary)- *Hugo De-Vries, INRAE*

15.05 – 15.15 Forming the groups and "step into a virtual room"

15.15 – 16.30 First session in working groups on "Working and specifying contrasting scenarios related to a challenging question in the food domain" *(including 5 min. break)*

16.30 – 17.15 Presenting the outcomes – *partially in images* – of each group (plenary) and Q+A.

DAY 2 - October 29th, from **9.30** to **12.15**

9.30 -9.40 Introduction of Breakthrough innovations – *Jonas Lazaro-Mojica, FIT4FOOD2030*

9.40 – 10.45 Continue to work in groups on "utilising the scenarios for prioritising breakthrough innovations"

10.45 – 11.30 Still in working groups: 'Check if the prioritised breakthroughs may fit in the policy agenda of your country/community/cluster' *(including 5min. break)*

11.30 – 12.15 Presenting the 'prioritised breakthroughs and their relevance in different contexts' by each group (plenary) and final conclusions.

ANNEX 5- List of participants

	Family Name	First Name	Country	Name of the organisation/ institution	Group
1	Albertini	Alice	IT	MIPAAF	5
2	Ax	Erika	SE	Formas	5
3	Axelos	Monique	FR	INRAE	4
4	Bagni	Marina	IT	Ministry of Health	3
5	Baralla	Silvia	IT	MIPAAF	5
6	Belc	Nastasia	RO	Bioeresurse	5
7	Blija	Anita	LV	Latvia Univ. of Life Sciences & Technologies	5
8	Bogdanski	Anne	IT	FAO	3
9	Braun	Susanne	DE	University of Hohenheim	3
10	Brierly	Chrissie		JPI HDHL	1
11	Brisabois	Anne	FR	ANSES	4
12	Broerse	Jacqueline	NL	VU	6
13	Carlin	Andrew	UK	EIT Food	1
14	Carrasco	Violeta	ES	National Institute for Agricultural and Food Research and Technology (INIA)	4
15	Chmieliński	Paweł	PL	Institute of Agricultural and Food Economics National Research Institute (IAFE-NRI)	3
16	Comer	James		Higher Scientific Officer at Department for Environment, Food and Rural Affairs (UK)	6
17	Corekoglu	Barbaros		EIT FOOD	6
18	Cotillon	Christophe	FR	ACTIA	6
19	De Ruyck	Hendrik	BE	ILVO	1
20	De Vries	Hugo	FR	INRAE	3
21	Floor	Geerling-Eiff	NL	WUR	2

22	Flores	Eda	IT	IZSLT-Istituto Zooprofilattico Sperimentale del Lazio e della Toscana	3
23	Flourakis	Matthieu		ILSI Europe	5
24	Grando	Stefano	IT	MIPAAF	3
25	Halberg	Niels	DK	Danish Center for Food & Agriculture	1
26	Lazaro-Mojica	Jonas		ETP Food4Life/ FIT4FOOD	4
27	Kok	Kristiaan	NL	FIT4FOOD2030/VU University Amsterdam	6
28	Korme	Ingeborg		JPI OCEANS	5
29	Loconto	Allison	FR	INRAE/ One planet Network	4
30	Malagrida	Rosina	ES	Living Lab for Health at IrsiCaixa	1
31	McDonald	Noeleen	IE	Dep. of Agriculture, Food and the Marine	2
32	Morio	Béatrice	FR	JPI HDHL	6
33	Ortolani	Livia	IT	MIPAAF	1
34	Pihlanto	Anne	FI	Natural Resources Institute Finland (LUKE)	5
35	Riviou	Katerina	GR	Ellinogermaniki Agogi	5
36	Rizzetto	Lisa	IT	Fondazione Edmund Mach	2
37	Salaseviciene	Alvija	LT	KTU	2
38	Sinnaeve	George	BE	Centre Wallon de Recherches Agronomiques	5
39	Søndergaard	Henrik	DK	Lund University	3
40	Szakal	Diana	HU	Environmental Social Science Res. Group	4
41	Szűcs	Viktória	HU	NAK	1
42	Tacken	Gemma	NL	WuR	2
43	Tueros	Itziar	ES	AZTI	6
44	Turrini	Aida	IT	Council for Agricultural & Economics-Research centre for Food and Nutrition	6
45	Wepner	Beatrix	AT	AIT Austrian Institute of Technology	2
46	Zigmas	Medingis	LT	Economics Department at Ministry of Agriculture of Lithuania	4
47	Zimmermann	Karin	NL	Wageningen University and Research	2