FIT4FOOD2030

Towards FOOD 2030 – future-proofing the European food systems through Research & Innovation

Deliverable 4.4

Report on instruments for the identification of R&I breakthroughs for the future

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Document History and Information

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Content

1   Summary

The focus of this working group (for task 4.4) has been on the instruments for the identification of R&I breakthroughs for the future. In this deliverable, we (1) reflect on the outcome of the methods developed through the project, (2) try to set the recommendations that could be made for anyone attempting a similar task, and (3) provide materials that could be used in workshops, events, or educational modules in which a similar exercise is performed.

This deliverable builds on the results provided in other deliverables of the FIT4FOOD2030 project. To avoid duplication, not all the concepts already explored within that work are included in this deliverable, thus the reader is expected to know part of the project and its activities.

2   Introduction

One of the aims of the FIT4FOOD2030 project is to provide recommendations to stakeholders on how to identify possible R&I breakthroughs for the future, based on the experience obtained through the project activities of the Work Package 4 (Exploration of roadmaps for R&I breakthroughs). These recommendations were built based on the analysis of the reports on the 'Identification of research and innovation breakthroughs' (D4.1) and 'Critical success factors for implementation of breakthroughs' (D4.2), which are summarised in this deliverable.

The first section of this document 'Analysis of the tools for scoping possible future R&I breakthroughs' tries to synthesise the different approaches taken to obtain the inventory of possible R&I breakthroughs (as developed by D4.1). This includes the development of the Multi-Level Perspective (MLP) theoretical framework as interpreted by the FIT4FOOD2030 project; the reasons why an analysis of past breakthroughs was investigated; how the inventory was developed; and the links to tools developed by WP2 (trends) and WP3 (show-cases). Moreover, we reflect on the workshops developed by the City Labs, where different activities were performed not only to acquire but also to disseminate this knowledge. A set of recommendations were extracted from this analysis.

To validate the set of recommendations, a targeted consultation in the form of a survey was sent to selected participants of the project as well as related participants involved in the project through the City Labs, the EU Think Tank and the Advisory Board. The second section of this document 'Results from targeted consultation on recommendations' briefly analyses the results obtained and the final set of recommendations by agreement and relevance. The survey and its results are included in **Appendix 1** and **Annex 1** (Separate document)**,** respectively.

A final section is included to describe how the 'Breakthrough cards' were developed. The aim of this material is to be used in future workshops aiming to discuss strategies and roadmaps towards future R&I breakthrough topics. **Annex 2**, provided separately but also available in the FIT4FOOD2030 website ([link](#)), contains the 22 developed "breakthrough cards".

The outcome of this work was provided thanks to the collaborative effort of the project team of the Work Package: VU, AIT, IrsiCaixa, INRAE, ZON, ILSI, UniBO, WeCR, and EIT-Food under the leadership of the partner ETP F4L. Collaboration from EUFIC and OsloMet was also appreciated, as well as the participation of the respondents to the survey.

3   Analysis of the tools for scoping possible future R&I breakthroughs

One of the objectives of the FIT4FOOD2030 project was to obtain an inventory of possible future R&I breakthroughs and reflect on the key success factors with the final aim of constructing R&I strategic roadmaps. To achieve this goal, the following activities were defined (see D4.1 and D4.2 for further detail):

- Building the Multi-Level Perspective theoretical framework.
- Reflecting on breakthroughs of the past.
- Reflecting on common factors defining a R&I breakthrough.
- Constructing the inventory of possible future R&I breakthroughs.
- Reflecting on key success factors when considering R&I breakthrough topics.

This section will briefly analyse the outcome of each of the abovementioned activities.

3.1   Multi-level Perspective theoretical framework

From the beginning of the FIT4FOOD2030 project some major questions were raised: What is a future R&I breakthrough? What are trends? What are showcases? How do they interlink? Not only were those questions critical for the right execution of the project, but they also showed the lack of common grounds regarding the existing definitions and the understanding of those abstract concepts. These concepts were related to a model that could integrate them in a coherent system and is based on the Multi-Level Perspective (MLP) theoretical framework.

The definition of the Multi-Level Perspective used in this project was adapted from existing definitions from Geels and Schot (2007)[1], Loorbach and Rotmans (2010)[2], and Grin (2010)[3]. Certainly, other definitions do exist in the vast peer-reviewed literature regarding R&I breakthroughs. However, certain elements of this approach favoured the understanding of the different interactions between concepts such as 'trends' (also named 'landscape'), 'regimes' (the dominant culture, structure and practices), showcases and breakthroughs (also named 'niche experiments'). It is not the intention of this analysis to review again those concepts and their interactions, but to stress the relevance of this model to understand the FIT4FOOD2030 project outcomes.

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[1] Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. Research Policy, 36(3), 399–417. doi:10.1016/j.respol.2007.01.003

[2] Loorbach, D., & Rotmans, J. (2010). The practice of transition management: Examples and lessons from four distinct cases. Futures, 42(3), 237–246. doi:10.1016/j.futures.2009.11.009

[3] Grin, J., Rotmans, J., & Schot, J. (2010). Transitions to sustainable development; new directions in the study of long term transformative change. New York, NY: Routledge.

The relevance of the MLP theoretical framework comes from the understanding and definition of the terms 'trends', 'showcases' and 'breakthroughs', and the relationship between these concepts, which are repeatedly used in FIT4FOOD2030. Below a reminder of those definitions and the graphical interpretation of their interaction (Fig 1) describe the understanding within the FIT4FOOD2030 project:

Breakthroughs: Potential, significant achievements that may lead to an increased impact of the current initiatives in the field of Food Nutrition Security (FSN) and a step towards radical change of the food system, making it more sustainable and resilient.

Trends: A general tendency or direction of a development or change over time related to macro-scale social or natural processes. Trends are therefore the landscape where showcases and breakthroughs emerge.

Showcases: Showcases are initiatives, key findings, social movements, good practices, networks, (nationally- or internationally-funded) projects, case studies, demonstrations, technological inventions, process procedure improvements (e.g. in logistics/distributions), innovative educational approaches, new business models, etc. which offer opportunities for learning and inspiration (even if they might have ultimately failed to deliver on initial expectations) and have contributed to, or affected, the food system in some way.

Although it could be argued whether those definitions and conceptual mindsets were the most suitable for the project, it was not the intention of the FIT4FOOD2030 project to reject other theories or perspectives on these concepts (such as the funnel tunnel innovation, He et al., 2008)[4], but to create a framework of common understanding among the project participants. Therefore, the definitions achieved were functional within the project and were equally relevant when using or disseminating the materials of the FIT4FOOD2030 Platform.

Furthermore, this perspective has been followed in recent publications, which also proves its usefulness and impact (e.g. SCAR Food Systems[5], 2020). Therefore, one key recommendation on using the tools and materials developed by the FIT4FOOD2030 project, is to understand and explore the Multi-Level Perspective (MLP) theoretical framework.

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[4] X. He, D. R. Probert and R. Phaal, "Funnel or tunnel? A tough journey for breakthrough innovations," 2008 4th IEEE International Conference on Management of Innovation and Technology, Bangkok, 2008, pp. 368-373, doi: 10.1109/ICMIT.2008.4654392.

[5] SCAR Food Systems (2020). The added value of a Food Systems Approach in Research and Innovation. Policy Brief by Standing Committee on Agricultural Research (SCAR) Strategic Working Group on Food Systems. https://scar-europe.org/index.php/food-deliverables
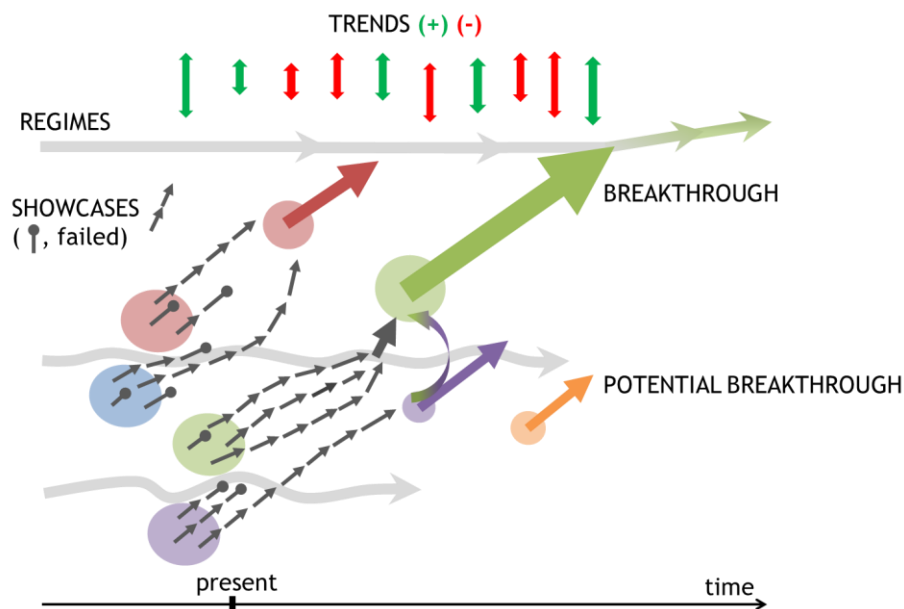
Fig. 1. The multi-level perspective applied to the FIT4FOOD2030 project. Different areas of activity are represented by different colours.

3.2 R&I Breakthrough examples

One of the main challenges faced when interacting with any kind of audience was finding a common understanding of R&I breakthroughs through examples. One of the first approaches adopted was trying to understand past R&I breakthroughs from the past. The selected themes were:

- The discovery of fire and cooking
- Domestication of animals and plants
- Fermentation
- Discovery of the Americas / new raw materials
- Canning
- The supermarket
- Flash-freezing
- The discovery of vitamins
- Extrusion
- Microwave heating
- Freeze-drying
- Third agricultural revolution
- Microcredits
- Food e-commerce

The use of examples from the past is recommended to align participants (e.g. in workshops) on the nature and characteristics of breakthroughs, and to make them more confident on such a theoretical concept by offering concrete examples from all historical times. However, our experience derived from the workshops showed that using only recent breakthroughs (from flash-freezing onwards) enables the participants not only to better familiarise with the concept, but also to stimulate a

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proactive thinking and learning activity that could potentially enrich the list of examples by taking into account contributions from partners from even different backgrounds. Indeed, the variety of the participants' backgrounds has enabled the inclusion of socio-economic breakthroughs in the list, which turns out to be successful especially when encouraging participants to approach a systemic vision, despite the fact that technical breakthroughs have proven easier to be explained.

3.3 Common factors defining an R&I breakthrough

The rough idea behind the analysis of common factors of past breakthroughs is often that, while understanding them, we can instrumentalize those factors in order to support desirable breakthroughs in the future. Arguably, this has major drawbacks:

1. desirability of an R&I breakthrough is unlikely to be shared by everyone.
2. extracting patterns from highly contextualized historical development pathways results in common factors that remain far too abstract to be instrumentalized; and
3. in complex systems like food systems, straightforward single actors or even large organisations of actors can only be facilitators of change.

Having these caveats in mind, we may learn from a system transformation perspective and ask what kind of factors (facilitators) support changes for the good (and the bad). Thereby, insights can come from two directions: firstly, by analysing historical breakthroughs (ex post analysis); and secondly, by anticipating future developments in asking what changes would be necessary in order to make the transformation happen (ex ante analysis, foresighting). In this project we applied both perspectives in different tasks of WP 4, notably with WP 4.1 analysis in view of historical breakthroughs and WP 4.2 ex ante view.

3.3.1 Ex-post observations of historical breakthroughs

The Deliverable 4.1 extracted some common factors of past breakthroughs. In order to accommodate such diverse breakthroughs (e.g. the discovery of fire and the introduction of the microwave), they bear the characteristics of ex-post observations and naturally remain very abstract. The following characteristic developments of historical breakthroughs can be observed:

Box 1: Common factors from ex-post observations of historical breakthroughs (Source: WP 4.1)

- Impact on the regime
- Sustainability over time
- Transversality
- Continuity
- Contextuality
- Different pathways
- Human resources
- Financial resources / Investment
- Window of opportunity

- *Impact on the regime*. The clearest point on breakthrough definition is to have an impact at the regime level of knowledge. 'Regime' is the state-of-the-art established in a system, the status-quo achieved in a sociotechnical environment with a shared area of knowledge (i.e. the dominant

culture, structure and practice). What all historical breakthroughs analysed in W4.1 had in common was that they impact the regime to some degree.

- *Sustainability over time.* R&I breakthroughs are all recognised through time. There was no way back, they were not forgotten, they became mainstream. However, at the same time there had been other R&I breakthroughs that may have had an impact for a certain period of time but have now been overcome and forgotten for different reasons.
- *Transversality*. Breakthroughs have a transversal impact on different areas, they do not stay in a niche. Still, breakthroughs require niche innovations and trends that provide the appropriate context for the step forward (see Geels 2004).
- *Continuity*. Breakthroughs need time to happen. For instance, domestication of plant and animal varieties took an evolutionary stage ranging from 1,000 to 5,000 years, while the breeding technology applied on the Third agricultural revolution just took several decades of research.
- *Contextuality*. For a disruption to take place, there should often be a process in which the environment provides the context and resources for it to take place and sustain.
- *Different pathways*. There are different outcomes and paths to achieve an R&I breakthrough. In some cases, a causal discovery can be observed, in others applied research was causal, in some there was a transfer of knowledge, in others a brilliant insight, and some were highly competitive.
- *Human resources*. Single individuals or organisations (focal actors) are possibly key factors for a R&I breakthrough to take place: indeed, there are cases in history where prominent personalities played a promoting role.
- *Financial resources/investment*. The roots to nurture a breakthrough had different resources in terms of funding and investments, e.g. the Green revolution was pushed forward by governmental plan, microwaves required private investment from a single company, flash freezing was the result of the effort of an initial inventor, freeze-drying required multiple companies to develop, vitamins were researched mostly by universities, e-commerce was promoted by start-ups.
- *Window of opportunity*. Right timing is a decisive factor for disruptive developments to be taken up or not.

The reflections behind the development of those factors can shape our understanding of how system transformations happen. There is certainly "**not** one right impact pathway" linked to the challenge of a 'breakthrough'. However, the large variety of factors that depend on the variety of contexts playing together make some impacts happen on the regime level (i.e. some system transformations emerge) and others not.

3.3.2   Ex-ante view on change and system transformation

By adopting a different approach, in Task 4.2, the project team analysed potential breakthroughs in different areas on the basis of expert knowledge and information, especially those factors that determine their possible success (drivers and barriers). Then, these factors were grouped to identify patterns of success factors for potential breakthroughs. Thus, we pursued an ex-ante view on change and system transformation and their associated common success factors.

Box 2: Common factors from an ex-ante perspective (Source: Task 4.2)

▪ Introducing novelty	▪ Role of NGOs and media

- Coping with major uncertainties
- Involving citizens
- Adapting existing regulation
- Overcoming inertia

- *Introducing novelty*. Undoubtedly, without introducing novelty, breakthroughs and hence system transformations cannot happen. However, there are different approaches: some lines of thinking consider any kind of novelty as positive, while other lines of thinking prefer those kinds of novelty that promote social inclusiveness, eco-friendliness etc. and respond to societal challenges. Learning, flows of knowledge, networks, research, organisational change, (social) start-ups, etc. are important drivers for technological, social, and economic change and vehicles for introducing new artefacts, services, that may result in new practices. This represents the base for funding of research, universities and research organisations, but also citizen science projects, pilots and demonstration projects, testing, networking of scientists, firm employees among each other, with each other, funding of networks in general, and communication of success with awards, science communication, conferences, publications etc.

- *Coping with major uncertainties*. It is in the nature of events that large uncertainties go along with young technologies. In the early stages, no one knows if the advantages of the new solutions relative to the old ones will actually unfold. The compatibility of the novel solution with existing values and other practices is unclear, and its complexity and unknown side-effects reduce the willingness to invest by local actors. The variety of possibilities to turn technologies into products is huge and there are no dominant designs. Moreover, consequences of choices and scaling up are often unclear. In order to overcome these uncertainties, it would be necessary for consumers to learn about the new products and their features, functions, and best use. Through this process, they would in theory come to discover which of their characteristics are of most value. However, this is a time-consuming process and a good part of the selection takes place during the course of development, which is mostly hidden, unconscious, and implemented by actors all over the planet. The solution for coping with the uncertainties of young technologies is related to public discourse, testing and follow-up, and informed investment decisions by a variety of actors.

- *Involving citizens.* Associated with the above uncertainties is the participation of a wide variety of actors in the public discourse, inclusion of citizens, collection of evidence, but also forward-looking activities in order to build on a distributed intelligence. Furthermore, from the theory and the discussions that took place also in the context of the City Labs, we know that involvement of consumers, education of citizens and awareness raising are central factors for breakthroughs. Responsible Research and Innovation (RRI) plays a critical role, and should be well devised to make sure that citizen concerns are taken into consideration during the scaling up from niche level, and that communities who might feel threatened by the change are involved, accept the process and receive the support they need in the transition. For example, a rise in minimum wages - connected with food poverty, which still exists in Europe, and the importance of pricing in determining consumer choices - could result in more people affording food from niche production despite their higher cost.

- *Role of research, NGOs, and media.* Research can help to destabilize current practices that lead to many environmental and health-related practices. Statistical evidence and studies on food behaviour, waste amounts, waste disposal, health, state of oceans, dying of animals, climate

change etc. initiate public discourse, enable education, link up different actors, and raise awareness in general (e.g. images of plastics in oceans endangering animals brings the issues closer to consumers, who otherwise do not perceive the impacts of their behaviour). The role of NGOs in shaping the discourse, putting topics on the agenda (through images and campaigns) and assembling critical masses of allies is huge. Also, media have a critical role in raising awareness and disseminating good practices around FNS (see also City Lab Athens). Of course, also NGOs and media are prone to *attention economics*, i.e. have to choose where to put efforts in and focus attention on. Social media can be helpful but dangerous at the same time, because of fake news and the channelling of attention on certain topics while forgetting others.

▪ *Adapting existing regulation.* Existing regulation is generally perceived to work in favour of incumbent regime. Policy is frequently seen as being too hesitant in changing these regulations in order to enable novelty/breakthroughs/system transformation. The expectation is often that consumer choice is the factor driving change and transformation. This view may put too much pressure on the consumer. Steps need to be taken towards the economic sustainability of new practices, namely subsidies, either newly created or being redirected from conventional parts of the food system.

▪ *Overcoming inertia.* A mix of education, empowerment, and regulation is needed, which leads to the question: Why has change not taken place earlier? After all, our project is hardly the first to think of these steps/factors as being necessary/important. Some thorny factors seem to prevail:
  ▪ Inertia is naturally embedded in systems – in the regime and landscape levels. It is hard to affect because there is an institutional and infrastructure set-up associated with it that benefits from the current practices and resists change.
  ▪ Hence, power struggles go along with system transformation: power is embedded in geographical and economic scale (contrast conventional agriculture being available at every neighbourhood corner versus land use at a massive scale by conventional agriculture).
  ▪ Mindset change only happens with new generations, which takes time and is yet uncertain.

In an ex-ante view of system transformation, the above common factors do not provide a clear recipe of how to achieve change, Butthey rather have to be born in mind by policy and governments to work as (lead) system builder and organizer (Smits und Kuhlmann, 2004). As governments are not omniscient by nature, steering is not possible. Governments and policy rather act as mediators, orchestrators, facilitating alignment and seeking pathways to enable transformation. They support processes reframing stakeholders' perspectives and follow an iterative approach.

3.4   Constructing the inventory of possible R&I breakthroughs

The inventory of possible R&I breakthroughs was constructed using different elements (see D4.1) such as the EC FOOD 2030 Strategy, a trends inventory (from WP2 of the project), and the showcases list (from WP3 of the project). However, the main element to initiate the process was a survey among members of the FIT4FOOD2030 platform (different from the survey mentioned in this deliverable regarding recommendations). The participants in this consultation included experts from different disciplines and sectors, allowing for a multi-stakeholder approach. Participants in the first round represented the following sectors:
  - Education and research (47%)

- Business (21%)
- Policy making of governmental organisations (17%)
- Non-governmental organizations or civil society organisations (10%)
- Funding agencies (2%)
- Other (3%)

There was a second round of inputs provided by FIT4FOOD2030 participants, who were able to give further insights on missing gaps from the inventory. This exercise was done during internal meetings mainly involving the partners of this dedicated work package (WP4). Another important contributor was the Barcelona City Lab, which provided inputs to the inventory covering some areas already established, but also adding new ones mainly in the area of social innovation and regulatory measures. In particular, this City Lab performed a dedicated workshop on R&I breakthroughs and asked participants to build a mural using the challenges of the current food system, linked to trends and showcases that were relevant for a R&I roadmap. This mural ended up with 5 columns (challenges, trends facilitating, trends not facilitating, showcases and R&I breakthroughs). These findings were incorporated into the inventory. Other City Labs also provided further information through workshops (those are explained later in this chapter).

The outputs from the work packages regarding trends (WP2) and showcases (WP3) were also relevant in the development of the inventory. WP2 provided the inventory of 66 trends (see D2.1). As the food system is an integrated and connected system, trends affecting the food system cannot be considered individually, but must be looked at as interlinked, influencing and driving one another into various directions, producing complex social and ecological effects. Trends could be linked to the possible R&I breakthroughs and gave the opportunity to better understand what were the challenges and the resources that the proposed breakthrough was addressing. To what extent a single trend, or a set of trends influence a breakthrough can only be anticipated, but not directly manipulated. Linking possible R&I breakthroughs to trends leads to a better understanding of the expected impact of the suggested R&I breakthrough, but also provided a very good set of materials for insight at any possible dedicated workshop. For example, in the domain of 'The tools for a future proof food system', the proposed breakthrough 'Smart traceability in the food supply chain' could be linked to the well-defined challenges/trends: Economic globalisation, Blockchain Technology, Destabilised consumer trust, Concentration in food retail markets and Food regulation.

The output from WP3 (D3.1) was relevant to understand the applications and ongoing implementation of a given possible breakthrough. WP3 provided 150 cases brought from web research on ongoing activities along the Food System innovations' scenario. The link between those cases and the possible R&I breakthroughs provided a picture of the state of the art that certainly made theory meet reality in a factual scenario. For example, in the domain of 'A sustainable and dynamic value-based food system', the topics on Reduction of waste (Zero waste), New uses of waste, New recycling business models, and New structure in food system were reinforced by the number of projects, enterprises and product that are currently under development.

3.5   Key success factors for the realisation of breakthroughs

A considerable part of the work done to investigate critical success factors for the implementation of breakthroughs was achieved through workshops, many of those practiced at City Labs level (results were attached to Deliverable 4.2).

A workshop exercise on success key factors was performed in October 2018, Brussels, as a side activity of the annual FIT4FOOD2030 project meeting with the project participants, the advisory board, the EU Think Tank, City Lab and Policy Lab representatives, and European Commission members. This workshop helped to set the grounds for some of the workshops that followed, mainly to the methodology applied five months later in Brussels with partners from the work package team. Implementation of the applied methodologies was summarised in guidelines that were distributed to City Labs. Many of the City Labs applied some of the elaborated methodologies and materials to scope and identify possible R&I breakthroughs and to explore the key success factors for its realisation. Those multi-stakeholder workshops were performed at the City Labs in Barcelona, Budapest, Tartu, Sofia, Athens, and Milan.

3.5.1   Identification of critical success factors - Brussels Workshop

The Workshop in Brussels held on the 21st of February 2019 aimed to put some methodologies into practice to explore the identification of critical success factors using possible R&I breakthrough topics as examples (a further explanation of this workshop can be found in Deliverable 4.2).

From an elaborated inventory of possible R&I breakthroughs (as explained above), the work package participants had defined four domains of work: 1) the new approach of primary food production and distribution; 2) an engaged and healthy consumer; 3) the tools of a future proof food system; and 4) a sustainable and dynamic value-based food system. One specific topic per domain was used to incentivise problem-solving thinking, therefore four groups were formed to interact through three activity sessions. The topics chosen were: 1) AQIculture 4.0 (new, non-conventional forms of agriculture and aquiculture) – in reference to the new methodologies used in aquiculture for growing plants on water, 2) Consumer perspectives in production and distribution, 3) Dietary shift - considering the shift from animal-based to plant-based proteins including new food sources into diets, and 4) Sustainable packaging – in reference to new systems and new materials towards a sustainable way of food packaging (D4.2 has an exhaustive explanation of those topics of choice). The working groups followed three sessions with the aim to respond to key questions that had the intention to deliver specific insights on the implementation of those topics and to gain insight into key driving forces, patterns, and focal actors. The first session imagined a foresight scenario where the breakthrough had been achieved, and reflections where gathered on how it was achieved, considering a STEEPV framework (STEEPV stands for Social, Technological, Economical, Environmental, Political factors and Values). The second session gathered insights from the point of view of required R&I policies to achieve the highest impact on the timeline of the possible breakthrough, including considerations on Responsible Research and Innovation (RRI). The third session was a wrap up of the previous discussed items. Below we give a summary of the session dynamics and questions:

Session 1 Group work on breakthroughs was dedicated to the following questions:

- Imagine the goal of the breakthrough has been successfully achieved: Which factors were decisive for the achievement? Consider all STEEPV.
- Who were the focal actors? Who/what were driving forces?
- Which incentives were helpful? Which barriers had to be overcome?
- Which new relations/interactions were necessary?

Session 2 Dynamics of and policies for breakthroughs elaborated further on the breakthroughs and worked on the issues of:

- Patterns
Which were relevant interactions and interdependencies/synergies
Which factors are connected, influence each other?
- Dynamics
Was there a timeline (important first steps, critical events, etc.)
- Policy
What can the role of research and R&I policy be to achieve success in breakthrough?
How and where can RRI be a main factor to achieve success?
Where can R&I policy have the highest impact?

The results obtained from the Workshop gave specific insights on the topics provided. This outcome already represented a successful exercise, where participants were able to discuss timelines, policies, technical issues, social issues, regulatory issues, ethical issues, economic issues, and much more from a multi-stakeholder and systemic approach, giving useful recommendations on R&I policies.

Those inputs where clustered into specific factors related to RRI, intending to find synergies, to name some: Introducing novelty (Start ups), Role of citizens, Role of research, NGOs and media, Regulatory framework, and the Inertia existing in the current landscape. This exercise was also useful, but less specific on the outcomes for implementation as an overall recommendation, mostly it got relegated to a case by case bases, where each topic required its own relevant specificities.

3.5.2   Identification of critical success factors – City Lab Workshops

This section summarises some of the findings and activities performed in the City Labs regarding the identification and the research of critical success factors regarding R&I breakthroughs.

Barcelona, Spain

One of the first City Labs to perform workshops related to possible R&I breakthroughs and its critical success factors was **Barcelona**. The first cycle of workshops was named 'Analysis of the food system for healthy and sustainable diets and identification of needs in R&I', which involved four sessions on the preparation of a 'Preliminary R&I Agenda for the promotion of healthy and sustainable diets at the regional level'. Those had three key elements: (1) Visioning the desired transformation in the R&I System towards FOOD 2030; (2) System analysis: identification of challenges, opportunities, needs from the different actors to move towards the suggested vision; and (3) Identifying disruptive R&I solutions: taking into account systemic elements (trends developed by FIT4FOOD2030's WP2, breakthroughs and showcases identified by participants and results from points 1&2). At each stage in the sessions, results were analysed and clustered in a group setting. Participants were asked to build a mural using: the problems detected, trends that facilitated the resolution of the problems, trends that were an obstacle for their resolution, and showcases and R&I topics (disruptive and incremental ones). Barcelona gathered an extensive dataset of proposed possible R&I breakthrough topics in the area of healthy diets, from the concept and promotion of healthy diets, prevention of non-communicable diseases, education and training, understanding sustainable diets and food security and traceability concepts. Some examples provided of potential future R&I topics were: the research of the microbiome and health, the research of protein and the satiation potential, research on the implementation of dietary guidelines towards consumers, nutrigenomics and personalised nutrition, digitalisation in the

health sector, research of consumer behaviour and interaction with new communication channels, research in the concept of sustainable diets, implementation of reformulation for healthier products, application of blockchain technology for traceability, research in sustainable packaging, implementation of artificial intelligence into the management of data, application of Responsible Research and Innovation principles into the sector, or the use of new sustainable production methods.

The results obtained in the first cycle of workshops from Barcelona was inserted into the inventory of possible R&I breakthroughs developed by the FIT4FOOD2030 partners on the dedicated work package (WP4, D4.1). Further three workshops were organised by the City Lab of Barcelona in March 2019 to promote changes in a healthy and sustainable food system in 2030 by designing R&I roadmaps through the development of future scenarios and system thinking methods. During 2020 further iterations took place at this City Lab trough a community of practice that promotes transformative change while exploring innovative methodologies.

Athens, Greece

The agenda of the workshop organised by the **Athens** City Lab included activities on trends, showcases and breakthroughs. The main success factor that was discussed in the workshop was education, particularly on specific ideas on how to promote nutrition education in a multi-disciplinary way in school curricula. Examples of good practices were given from different schools, but links were also given to entrepreneurial behaviour, the use of ICT, food waste, or Corporate Social Responsibility (CSR) schemes. Education was also addressed from the point of view of the critical role that media have in the awareness on and dissemination of ideas such as health, dietary shift, and cultural influence on diets. Discussions occurred also regarding the role of psychology in understanding nutrition, and other areas such as changes in consumer behaviour on diets, connexion to health and physical exercise, and food waste disposal.

This City Lab participants saw themselves as enablers of actions at municipal and school levels, with the view to raising awareness of nutrition and the value of food. The Athens City Lab reflected on specific actions at local level, suggesting education and social sciences as key enablers of food system transformation. Some specific actions were mentioned as system transformation possibilities at local level, for example training at workplace and the multiplier effect of students and children towards families through school education.

Budapest, Hungary

The entire session at the Workshop of the City Lab of **Budapest** was dedicated to breakthroughs. The participants voted the most relevant possible R&I breakthroughs related to the City Lab vision from a deck of options. From this voting, three topics where discussed: New value systems – New business models (e.g. short value chains); Empowered and conscious consumers; and Social Innovations – social entrepreneurship and community driven social innovations. The scope was to have a positive foresight where the possible R&I breakthroughs had been achieved, and questions were raised on how the breakthrough could be accomplished. This methodology was challenged at this workshop from the point of view of overlooking threats and crises: participants suggested that it was more efficient to discuss it in terms of inaction. In other words, the social and environmental costs of not performing well towards the referred breakthrough could have negative impact that should be accounted for. This was an interesting insight on the methodology.

The topic on *New business models* was centred on social initiatives consumer-driven and local, with a larger cooperation of small actors in a short value chain frame. The group outlined the success factors and barriers, stated as challenges and incentives. The challenges for this particular breakthrough were: Supporters of the status quo, disappearance of jobs, food security and lack of consumer awareness. The incentives were: Social innovations, population growth, climate change, supportive regulatory framework, subsidies, development of new technologies, change of consumer and social expectations, and the cooperation of small actors. Some of the global challenges, such as increasing demography and climate change, were considered incentives in the sense of drivers pulling for action.

The topic on *Empowered and conscious consumers* had a similar setting as the previous topic on New business models. One of the main areas of discussion was the local reality vs. global systems and the role of education in system transformation. The challenges found by the participants were: The role of media, misconceptions and myths on nutrition, inadequate regulatory system, dichotomy of biotechnology vs. ecology, and dichotomy of natural vs. artificial. The drivers or incentives were recognised as: Simplification of available choices, change and extension of the national curricula for public school, simultaneous top-down and bottom-up R&I policies, funding in the form of tax benefits and tender opportunities, stricter regulations, new-community based applications, health consciousness and 'minimal' approach to consumption.

The last topic, *Social Innovations* related to social entrepreneurship and community-driven social innovations, was perceived as a difficult exercise regarding the vision of a system transformation pathway. Challenges were perceived in the areas of a self-centred society, stereotypes between social groups, scarcity of natural resources, social media, and influencers (positive and negative influence), lack of trust, fear of change, and political and power-based dependence. The incentive factors were identified as a flexible regulatory system supporting specific policies for change, the drive of migration, the increase on transparency, the promotion of trust, education, and the existence of private-public partnerships.

This City Lab particularly discussed the description of competences needed to achieve food system transformation (see D4.3). A full list of 17 competences was developed (see D4.2 Annex), from which a prioritisation was made by selecting four major educational modules: 1) Cooperation, 2) Analytical thinking, 3) Ability to learn and change, 4) Future studies and responsible long-term thinking. Other competences proposed were IT skills, involvement of stakeholders in research design, fundraising and financial knowledge and conflict management.

Milan, Italy

The City Lab of **Milan** performed a Workshop entitled "Training and competences for the sustainable innovation of the Food system. Breakthroughs, barriers, and incentives". It dedicated the first part of the workshop on education, food policy and Responsible Research and Innovation, while the second part focused on breakthroughs, particularly on the identification of expected big challenges and the new competences needed to realise them.

It is relevant to mention here that this particular workshop was the third of a series of workshops based on food system transformation. The previous two workshops held in Milan had already provided a set of new ideas on the mapping of possible R&I breakthroughs. During those, the City Lab had already proposed five macro areas on: Ecosystem approach, Communication, R&I, Education and Social innovation. This third workshop allowed for further thought on those specific areas: the ideas were diverse, mostly coming from the point of view of educators, researchers, and

policy makers. Taking the example of ecosystem approach, the ideas developed addressed food system awareness, the relevance of multidisciplinary knowledge, complexity of diversity, community cohesion, less plastic on food products, and the effect of vending machines.

The Milan City Lab developed a whole set of new areas of research, including communication, social innovation, and ecosystem approach, with specific activities to achieve system transformation. Perhaps, and also linked to other City Labs, there is a mix of activities which are related to R&I policies, and activities which are pure regulatory approaches at local level (e.g. content of vending machines as ecosystem approach, or higher salaries for teachers and education as social innovation). It is a general perception from the workshops that often it is difficult for participants to separate what should be the content of an R&I strategy and what should be the content of local policies.

Sofia, Bulgaria

The Workshop organised by the **Sofia** City Lab was entitled 'Potential Breakthroughs – How will they improve our food system'. It dedicated the entire workshop to the identification of further possible R&I breakthroughs and discussed barriers and enablers focusing on the regional perspective of the City Lab. This City Lab also set priorities within the breakthroughs given, mainly on precision farming, non-conventional production systems and on novel approaches to biotechnology. It provided insights on two new breakthrough topics: Art farming as a new form of social innovation centralised on abandoned buildings, and Promotion of superfoods typical of Bulgaria that can raise awareness of health and innovation.

Regarding success factors, three topics were chosen: Smart farming, Urban farming/Vertical agriculture, and novel approaches to biotechnology. In all the topics, challenges and incentives were selected. In the first topic, Smart farming, challenges were found on the specialisation of the sector on the skills needed to achieve the proper ICT level of the new farmers' generation. Incentives were found in the attractiveness of the sector for new technology seekers and entrepreneurs, the increase in ICT specialists in the sector and the delivery of training to farmers and trainers.

On urban farming/vertical agriculture, challenges were found on the step from a niche practice to common practice in cities regarding the volume of business and users to make the step, and on the quality of products being produced at urban level (environmental effects). Incentives were found on consumer demand for agroecology, citizen awareness on gardening and in-house cropping, and on the use of less pesticides on the citizens own production.

The last topic, Novel approaches to biotechnology, challenges were found on scalability of technologies, consumer acceptance, investment on the technology, and regulatory frame. Incentives were proposed on the consumers will to decrease pesticides, improve production in a more environmentally friendly manner, and on the role of policy makers to achieve these goals.

Tartu, Estonia

The Workshop in **Tartu** was fully dedicated to the exploration of possible R&I breakthroughs and the discussions of success factors on a single topic. The participants of the workshop provided new insights into the sustainable packaging and smart traceability in the food supply chain and provided a new topic to be included: Smart best-before labelling.

From the point of view of new business models, the Sustainable packaging topic was aimed at the re-use and refill of containers, thus reducing packaging. The insights on smart traceability were discussed in terms of investment related to the overall benefits for suppliers and consumers; in other words, whether the funding of R&I in this area would have a high impact, low return of investment.

The topic of Smart-before labelling was addressed as a new proposition to the possible R&I breakthroughs inventory, and also deeply discussed in terms of challenges and incentives. Challenges were found on technological availability, regulatory issues, consumer acceptance, adoption by businesses and entrepreneurs (no added value for them), lack of knowledge on consumer behaviour, more use of resources and new waste, and not addressing the issue of over-packaging. The incentives were found on the possibility of incremental innovation to achieve the breakthrough, the use of City Labs to engage stakeholders, the technical possibility of the innovation without creating waste, the right context to improve product development in packaging, and finally, the overall goal of increasing traceability.

Amsterdam, The Netherlands

The Amsterdam City Lab organized two (online) workshops dedicated to developing a preliminary food related 'transformation' and R&I agenda for Amsterdam and the region, for which several important R&I breakthrough domains were identified and discussed. The first workshop, entitled 'Our Food System in Amsterdam and the Region in 2040' started with the question: ''How do you envision a healthy, social and sustainable food system in Amsterdam and the region in 2040?'' This resulted in a general vision with several aspects, such as 'in 2040, Dutch children are the healthiest children in the world' and 'in 2040, food is less or barely processed'. Based on this general vision transition pathways were developed. Participants were asked where money and resources should be used for in order to realize this vision for 2040. Several R&I breakthrough domains or topics were emphasized, including 'alternative types of agricultural production systems' (e.g. stimulating circular agricultural systems and cooperatives), 'healthy food environment' (stimulating an environment where the healthy choice is they easy choice), 'regional production and distribution' (e.g. increasing the self-sufficiency of Amsterdam and the region and improving logistics), 'communication and education' (effectively engaging with different population groups) and 'deliberative governance' (e.g. stimulating citizen engagement and empowerment and stimulating transdisciplinary or inter-sectoral collaboration). Subsequently, participants discussed facilitators and barriers for realizing these R&I breakthrough domains or topics and made use of the trend cards of the project. Finally, this resulted in a preliminary transformation and R&I agenda, including e.g. (research on how to stimulate) healthy and sustainable public procurement in different settings and research on the governance of food system transformation.

The second workshop entitled 'The role of consumers in the transition towards a healthy, social and sustainable food system in Amsterdam and the region' was a follow up of the first workshop and was aimed to further refine the R&I agenda for this specific topic. The need for and importance of active citizen engagement and transdisciplinary collaboration to stimulate healthy and sustainable food consumption were clearly highlighted during the workshop.

3.6   Analysis on City Lab outputs on Breakthroughs

The City Labs were highly involved in the activities regarding the analysis of possible R&I breakthroughs. They succeeded in bringing a variety of stakeholders not usually involved in R&I consultations and offered diverse and heterogenous views. Most of the participants came from the policy making, NGOs, research, and education (mostly from secondary schools) backgrounds, with the presence of small businesses and consultancies at some City Labs. This could be considered a representation of citizens at different levels of engagement with society. Overall, the City Labs provided relevant inputs into the inventory of possible R&I policies and supplied a good set of insights on the challenges and incentives that can boost the realisation of a given breakthrough. Their recommendations brought different approaches, mainly in the areas of education and social innovation.

There were differences in the set up of each City Lab, bringing distinct inputs depending on the stakeholders' group reached: from lecturers and teachers at University and School level, to policy makers, researchers, local NGOs and businesses. In all the cases, the cultural and particularities of each region emerged and were taken into account. Those differences were not perceived as a negative input, on the contrary, this would be an intended outcome from the City Labs.

A step forward for future research could be to focus on the exploration of how different methods led to distinct outcomes and how the specific characteristics of each City Labs could be elevated to collaborate at local, national and international level to collectively achieve results and therefore have more probabilities for an overall impact using common perspectives.

Overall, the City Labs offered a different perspective on R&I agendas and raised awareness including citizen engagement at regional level in different countries. This exercise was complementary to other stakeholder consultation activities, but definitely provided relevant and constructive inputs.

3.7   Recommendations for Scoping R&I breakthroughs

Considering the previous discussions, a set of recommendations was drafted by the work package team:

Consider the Multi-Level Perspective (MLP) when using FIT4FOOD2030 tools to identify R&I breakthroughs.
The MLP is relevant to understand the theoretical concepts used within the FIT4FOOD2030 project that help visualise and understand food system transformation and use the set of tools developed within the FIT4FOOD2030 project in the best fashion.

Consult different stakeholders for the mapping of R&I breakthroughs (focus groups, workshops, surveys, and interviews).
Surveys, focus groups and workshops have proven to be effective tools as long as a balanced multi-stakeholder and multidisciplinary approach is followed. Other tools, such as interviews, would also be recommended to collect different stakeholder opinions.

Use of collaborative reflection on success factors for the realisation of breakthroughs as a key tool for R&I policy (e.g. in City Labs and Policy Labs).

Drawing together distributed intelligence and accounting for local specificities makes it necessary to have formats that can be used to reflect and anticipate future developments. e.g. FIT4FOOD2030 has developed workshop tools which are useful to gather insights on success factors for the realisation of breakthroughs. Materials are available and have been tested by participants of the project and City Labs in several workshops.

Use examples of past breakthroughs when there is a need to visualise / understand better what a breakthrough is.
It is useful to discuss the concept of breakthrough using examples, for e.g. from FIT4FOOD2030 tools, such as those available in Deliverable 4.1 and in the breakthrough cards (to be published soon in the project website). The examples have to be tailored to different formats or events, e.g. choosing topics of interest for a possible workshop with stakeholders or selecting an example sensitive for a particular region or country. Information are available here https://fit4food2030.eu/inventory-of-breakthroughs/.

Use short illustrative summaries of trends and challenges in order to stimulate debate and trigger systems thinking in the context of FOOD2030 R&I (e.g. FIT4FOOD2030 trend cards).
The set of trend cards can be key to understand the current challenges and trends to steer the discussion. They can be used to stimulate the process for visioning exercises of the food system for the future. Cards or descriptions of disruptive events could also be used in this context, an example of card games can be found in https://fit4food2030.eu/trends-in-the-food-system/.

Identify and review cases (showcases) that show evidence of application and impact of possible R&I breakthroughs.
Showcases are an example of niche events, businesses, and projects, which usually are short lived but represent the evidence of impact. They become breakthroughs when they become extensive, therefore showcases become fundamental to understand R&I priorities. FIT4FOOD2030 already offers a set of cases that are linked to breakthroughs. Showcases are key to understand the state of the art. The more information gathered, the better the decision making on prioritising R&I topics. Therefore, the recommendation is to regularly have an 'up to date' set of cases linked to the possible R&I breakthroughs.

Use foresight methodologies to visualise whether a specific breakthrough topic can be achieved.
Visualisation and projection of how a specific breakthrough could shape/influence the future food system can support stakeholders' reflection on the present situation and stimulate new ideas on R&I strategy making.

Analyse drivers and barriers for specific possible R&I breakthroughs with the aim of realising impact and/or offering market opportunities.
Using a methodology that explores drivers and barriers is useful for addressing impact and market opportunities for given possible breakthroughs. This helps setting R&I roadmaps from different perspectives. FIT4FOOD2030 has developed such methods for a Workshop format.

4   Results from targeted consultation on recommendations

The set of recommendations drafted from the learnings acquired on the activities performed in FIT4FOOD2030 were challenged for validation using a survey that was issued to persons with a thorough knowledge of the project. This included the project partners, City Lab and Policy Lab coordinators, the EU Think Tank, and the Advisory Board of FIT4FOOD2030.

The survey was developed by the partners of work package 4 and launched through a web platform where the information of the participants remained confidential (**Appendix 1** of this document). The survey and data analysis were managed by the partner AIT, who also managed the analysis of the data (**Annex 1**, Milestone 27). The following discussion is a summary of these findings.

The targeted consultation was sent to 70 possible respondents, of which 27 replied, 4 of them partially (38% participation) during a two-month period in July-August 2020. The participation included different types of respondents, mainly from Universities (26%), Research and Technology organisations (18%), associations (15%), non-governmental organisations (7%), governmental institutions (4%) and funders (4%). There was a high percentage that answered "other", those stated their affiliation as: City Lab, Cultural institution, International Public Health Organisation, Nutrition movement, Small enterprise, and a Foundation (see Fig. 2).
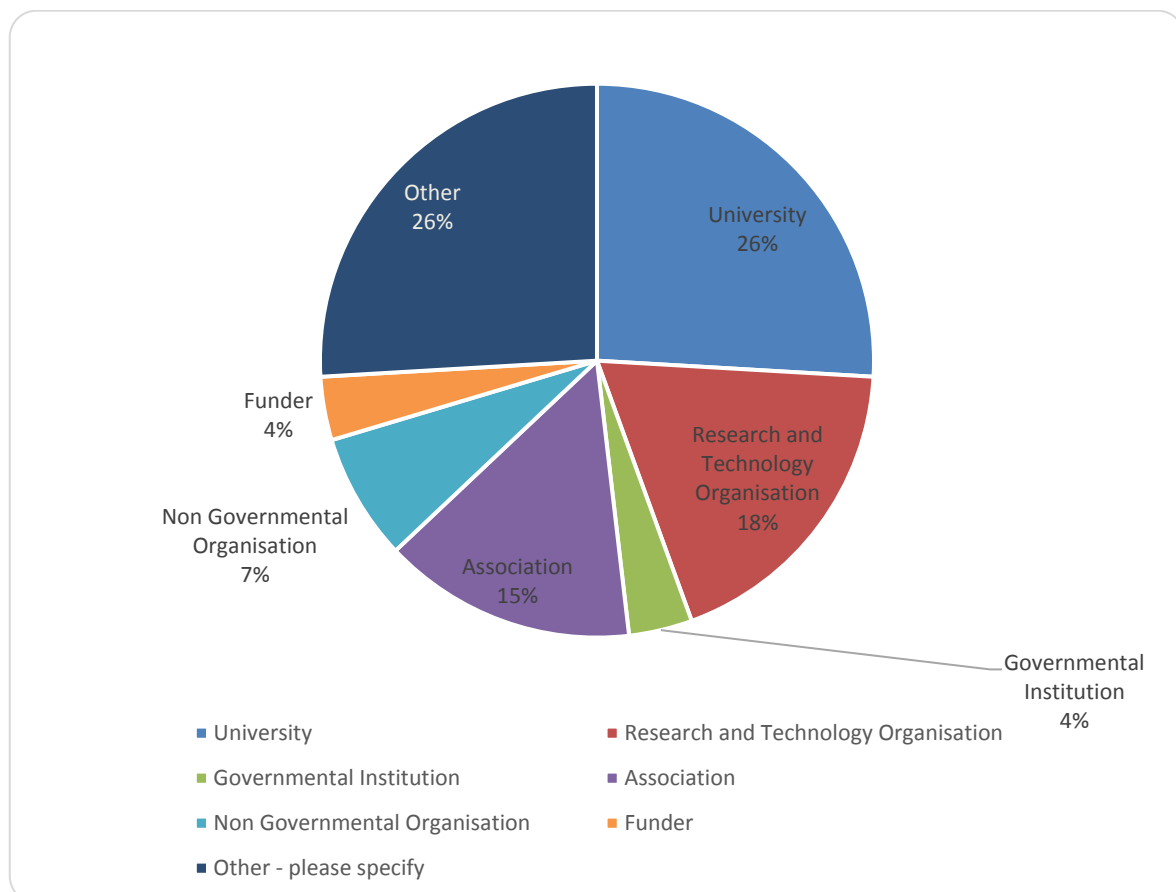
Fig. 2: Participants to the targeted consultation on recommendations.

Regarding the involvement of respondents in the project, 52% answered that they had not participated directly in the activities of the FIT4FOOD2030 project concerning breakthroughs. Those that answered positively, had contributed to the project mainly as project partners or participants of one of the workshops dedicated to breakthroughs.

The survey consisted of questions on the 8 recommendations, each had two quantification parameters, one related to the degree of agreement with the stated recommendation, the other related to the relevance of the recommendation. These were intended to obtain some opinion and prioritisation on the set of recommendations. The answers were provided in a 7 point Likert scale, from 'Strongly disagree' to 'Strongly agree' on the level of agreement towards the recommendation; and a 5 point scale from 'not important at all' to 'extremely important' on the relevance of the recommendation. The following figures summarise the responses obtained. It has to be noted that no participant answered strongly disagree with any recommendation or considered it not important.
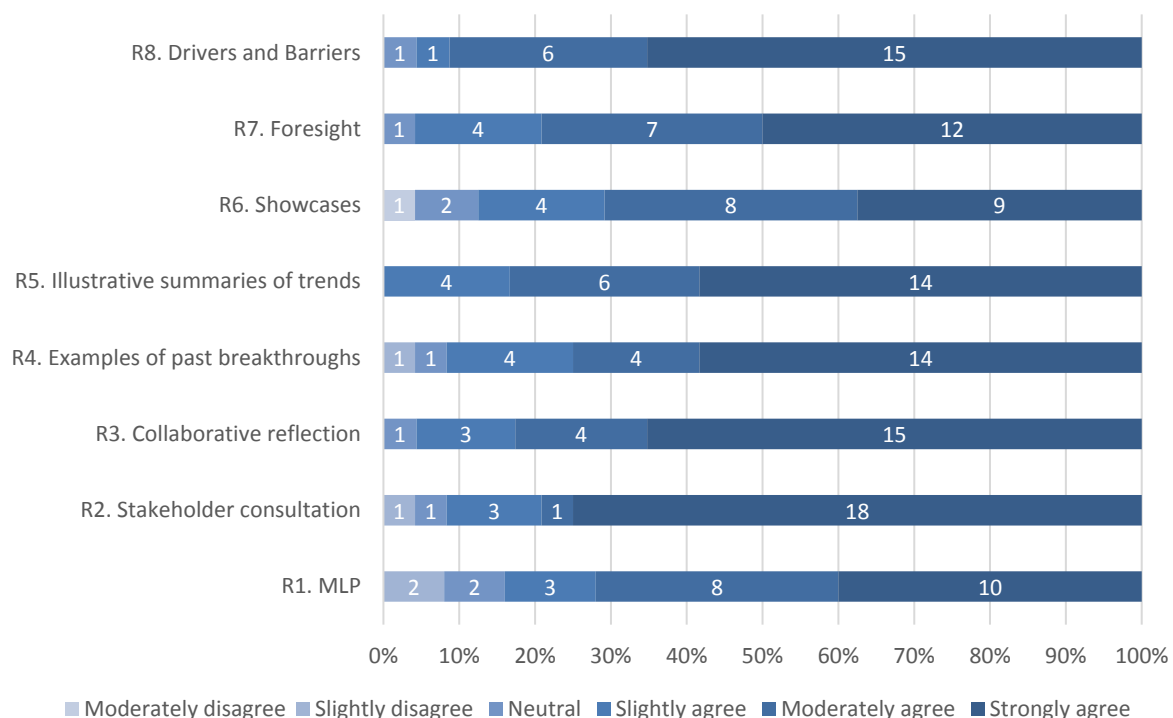
Fig 3: Level of agreement (7-level scale) with the recommendation sorted by 'strongly agree'. Note: No respondent strongly or moderately disagreed with any recommendation.

How important do you think this recommendation is?
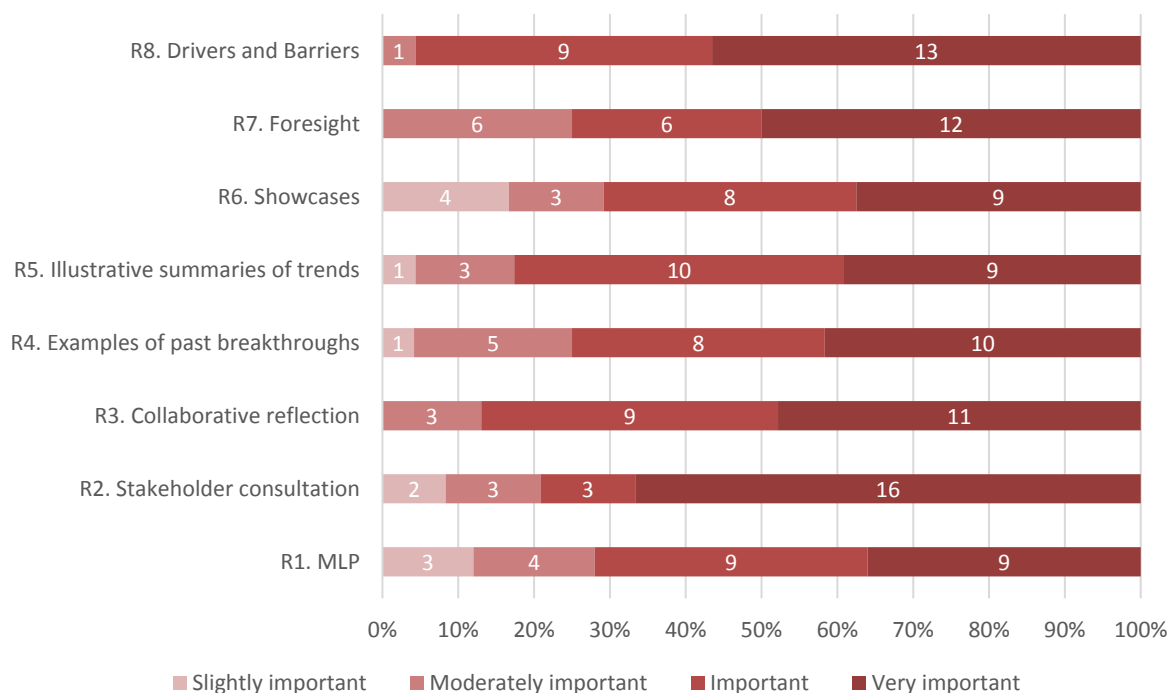

Fig. 4: Assessment of the importance (5-level scale) of the recommendation sorted by 'very important'. No respondent assessed a recommendation as 'not important'
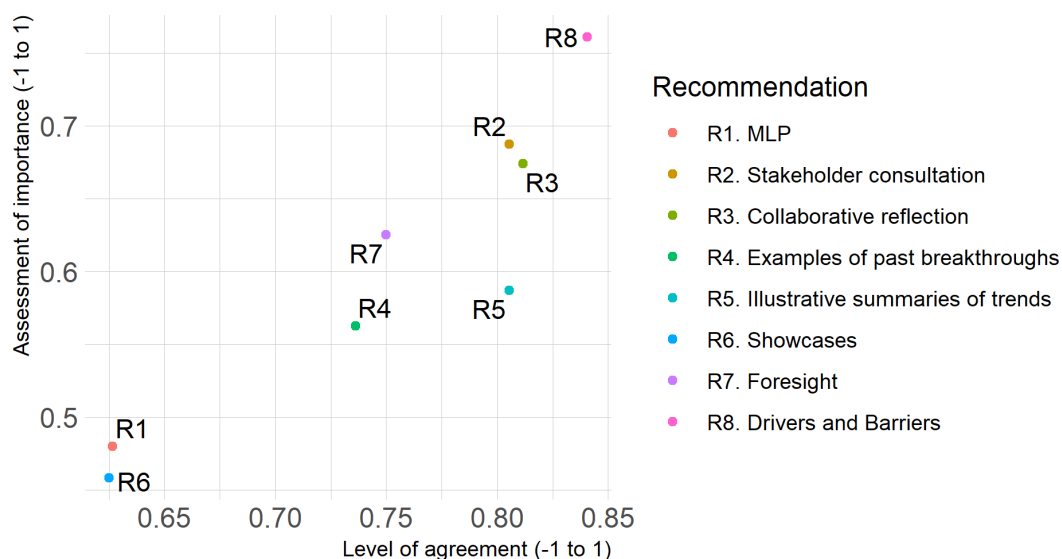

Fig. 5: Assessment of importance versus the level of agreement (standardized to a -1 to 1 interval)

According to these results (see Figures 3, 4 and 5), the recommendations 1 and 6 were considered the least agreed and important, whilst recommendation 8 followed by recommendations 2 and 3 the most agreed and important. To understand these results, it is relevant to analyse some of the answers provided by the participants.

Recommendation 1 related to the Multi-Level Perspective Framework (MLP) received comments such as 'The MLP and the graph explaining how it was applied to the concepts used in FIT4FOOD2030 are helpful to visualise the food system transformation and the role of the different concepts on this'; 'There are other models that could be recommended. However, this model is relevant to understand how breakthroughs were defined through the FIT4FOOD2030 project'; or 'Different audiences react differently to graphs/diagrams/figures in my experience. This will work for some people but not others. The main point for me is that you need to start considering a lot of options and recognise that not all will succeed'. These answers synthethise the idea that, although this model was useful for the FIT4FOOD2030 project partners, it has limitations on the application according to the context and audiences selected when discussing R&I breakthroughs. Thus this model requires careful explanation and exploration when used, as positive results have also been observed.

Recommendation 6 on the use of showcases that show evidence of application and impact of possible R&I breakthroughs received different comments. Some considered them fundamental: 'The showcases act as evidence of possible R&I breakthroughs. They are very relevant when analysing what R&I agenda has to be put forward. Particularly in concepts such as possible impact, investment, time to market and return of investment', while some considered them of difficult application: 'However, what is in fact quite difficult, as we also experienced during the project, is to 'assess/review' cases based on criteria. So I feel that although showcases are really important, the 'reviewing' part of this recommendation can be more explicit as to HOW we/others should/could identify, select and review cases to be(come) showcases'. In brief, showcases could bias the outcome of an R&I roadmap, so although they were considered highly relevant by some, the process on how showcases are researched and selected was of concern. Thus this recommendation ranked low in comparison with the others, but remains a key aspect on the understanding of R&I agendas.

Recommendation 8: 'Analyse drivers and barriers for specific possible R&I breakthroughs with the aim of realising impact and/or offering market opportunities' received the highest agreement and ranking in importance. Some comments such as: 'Barriers and enablers are crucial for understanding the impact of a possible R&I breakthrough. This analysis should be as clear and documented as possible', or 'Drivers and barriers can be further built upon with actions identified by workshop participants for themselves and for other agents, resulting in an action plan or agenda'. The answers evidenced how this knowledge is key to understand possible R&I breakthroughs and set a strategic Research and Innovation agenda or action plan.

Recommendations 2 and 3 were also highly rated. Recommendation 2 addressed the consultation of different stakeholders for the mapping of R&I breakthroughs (focus groups, workshops, surveys, and interviews), and recommendation 3, the use of collaborative reflection on success factors for the realisation of breakthroughs as key tool for R&I policy (e.g. in City Labs and Policy Labs). Although they might seem similar, the first one stressed the relevance of the consultation to different groups of interest, while the second focuses on the need to analyse success factors, both in Living lab formats. In general the comments received gave high relevance to both approaches: 'Consulting a diversity of stakeholders is essential since they bring different perspectives and experiences which are all

necessary to understand what works and what doesn't. You need to approach the selection of stakeholders in a systematic way though'; 'A multi-stakeholder approach is always very relevant. Here it would be of interest to know how to balance the different inputs from stakeholders (including consumers/citizens)'; 'Learning and reflection, especially collectively in multi-stakeholder settings is really important, also to inform and/or co-create transformative (innovation) policies and engaging in action-research. The R&I breakthrough-thinking in this regard I think is useful to 'categorize' parts of the visions in the Labs, as a future/action oriented concept that could serve as a tool to design action-pathways towards those visions of future food systems'.

Recommendations 4, 5 and 7 where related to tools. Recommendation 4 on the use of examples of past breakthroughs when there is a need to visualise / understand better what a breakthrough is; recommendation 5 on the use of short illustrative summaries of trends and challenges in order to stimulate debate and trigger systems thinking in the context of FOOD2030 R&I (e.g. FIT4FOOD2030 trend cards); and recommendation 7 on the use of foresight methodologies to visualise whether a specific breakthrough topic can be achieved. These recommendations were ranked in the middle regarding the levels of agreement and relevance, pointing out that these are tools that help on the visualisation and the understanding of breakthroughs, but it is relevant depending on the context and frame in which they are used.

5   Development of tools for possible R&I breakthrough mapping

The success of the 'trend cards' (D2.1) as a tool for systemic thinking in workshops and related events discussing R&I policy in the context of FOOD 2030 policy, has encouraged this working group to develop similar materials inspired in the inventory of possible R&I breakthroughs. The aim of these 'breakthrough cards' should be to inspire the visualisation of possible R&I roadmaps during multi-stakeholder collaborative reflexions and learning activities. They synthetise the findings of the work package through the construction of the inventory of possible R&I breakthroughs, adding insights on its possible topics, barriers and enablers, market opportunities and link to other FIT4FOOD2030 outcomes such as the trends and showcases. However, they should be considered as inspirational materials, not final conclusions, on the related topics, suggesting that there is an authorship subjectivity on the construction of the contents.

The summary of this materials can be found as an **Annex 2** of this deliverable, but also as a working material on the FIT4FOOD2030 website: https://fit4food2030.eu/inventory-of-breakthroughs/

6   Prioritisation of recommendations

The final set of recommendations has been sorted according to the targeted consultation results. As there was not a strong disagreement with any of the propositions made, all have been selected, but placed in order according to the level of agreement and importance selected by the survey respondents.

1. **Analyse drivers and barriers for specific possible R&I breakthroughs with the aim of realising impact and/or offering market opportunities.**
Using a methodology that explores drivers and barriers is useful for addressing impact and market opportunities for given possible breakthroughs. This helps setting R&I roadmaps from different perspectives. FIT4FOOD2030 has developed such methods for a Workshop format.

2. **Consult different stakeholders for the mapping of R&I breakthroughs (Focus groups, workshops, surveys, and interviews).**
Surveys, focus groups and workshops have proven to be effective tools as soon as a balanced multi-stakeholder and multidisciplinary approach is followed. Other tools such as interviews would also be recommended to collect different stakeholder opinions.

3. **Use of collaborative reflection on success factors for the realisation of breakthroughs as key tool for R&I policy (e.g. in City Labs and Policy Labs).**
Drawing together distributed intelligence and accounting for local specificities makes it necessary to have formats that can be used to reflect and anticipate future developments. e.g. FIT4FOOD2030 has developed workshop tools which are useful to gather insights on success factors for the realisation of breakthroughs. Materials are available and have been tested by participants of the project and City Labs in several workshops.

4. **Use foresight methodologies to visualise whether a specific breakthrough topic can be achieved.**
Visualisation and projection of how a specific breakthrough could shape/influence the future food system can support stakeholders' reflection on the present situation and stimulate new ideas on R&I strategy making.

5. **Use short illustrative summaries of trends and challenges in order to stimulate debate and trigger systems thinking in the context of FOOD2030 R&I (e.g. FIT4FOOD2030 trend cards).**
The set of trend cards can be key to understand the current challenges and trends to steer the discussion. They can be used to stimulate the process for visioning exercises of the food system for the future. Cards or descriptions of disruptive events could also be used in this context, an example of card games can be found in https://fit4food2030.eu/trends-in-the-food-system/.

6. **Use examples of past breakthroughs when there is a need to visualise / understand better what a breakthrough is.**
It is useful to discuss the concept of breakthrough using examples, for example from Fit4Food2030 tools, such as those available in Deliverable 4.1 of FIT4FOOD2030 and in the breakthroughs cards (to be published soon in the project website). The examples have to be tailored for different formats or events, for example choosing topics of interest to a possible workshop with stakeholders, or selecting

an example sensitive for a particular region or country. Information available here https://fit4food2030.eu/inventory-of-breakthroughs/.

7. Consider the Multi-Level Perspective (MLP) when using FIT4FOOD2030 tools to identify R&I breakthroughs.
The MLP is relevant to understand the theoretical concepts used within the FIT4FOOD2030 project that help visualise and understand food system transformation and to use the set of tools developed within the FIT4Food2030 project in the best fashion.

8. **Identify and review cases (showcases) that show evidence of application and impact of possible R&I breakthroughs.**
Showcases are an example of niche events, businesses, and projects, which usually are short lived but represent the evidence of impact. They become breakthroughs when they become extensive, therefore showcases become fundamental to understand R&I priorities. FIT4FOOD2030 already offers a set of cases that are linked to breakthroughs. Showcases are key to understand the state of the art. The more information gathered, the better the decision making on prioritising R&I topics. Therefore, the recommendation is to regularly have an 'up to date' set of cases linked to the possible R&I breakthroughs.

Appendix 1: Targeted Consultation on Fit4Food2030 recommendations (MS27)

FIT4FOOD2030 D4.4 Survey

Targeted consultation on recommendations

The FIT4FOOD2030 project aims to give recommendations on tools for stakeholders working in food systems to identify R&I breakthroughs. To set up those recommendations we aim to gather the perspective of individuals who are familiar with the activities of the project, with the objective to obtain an aligned vision.

This survey is held in the context of the task T4.4 'Appropriate instruments for the identification of R&I breakthroughs for the future', which intends to highlight tools developed during the project and reflect on their usefulness in food system transformations.

Breakthroughs are defined in the FIT4FOOD2030 project as potential, significant achievements that may lead to an increased impact of the current initiatives in the field of Food Nutrition Security (FNS) and a step towards/radical change of the food system, making it more sustainable and resilient. Further information related to the contents asked in this survey can be found in the Deliverables 4.1 and 4.2 of the project (see: https://fit4food2030.eu/reports-publications/#Breakthroughs).

Name

First name   Last name

Organisation

Type of organisation
☐University
☐Research and Technology Organisation
☐Governmental Institution
☐Platform
☐Association
☐Business
☐Non Governmental Organisation
☐Funders
☐Other (text box prompted if selected 'Please, specify')

Have you participated directly in the activities of the FIT4FOOD2030 project concerning breakthroughs?
☐Yes
☐No

If yes, could you specify how? e.g. aspect of the discussion (identification, discussion of key enablers and barriers) and format (workshop)

Please read this set of recommendations on the identification of breakthroughs:

1. **Consider the Multi-Level Perspective (MLP) when using FIT4FOOD2030 tools to identify R&I breakthroughs.**

   The MLP is relevant to understand the theoretical concepts used within the FIT4FOOD2030 project that help visualise and understand food system transformation and to use the set of tools developed within the FIT4Food2030 project in the best fashion.
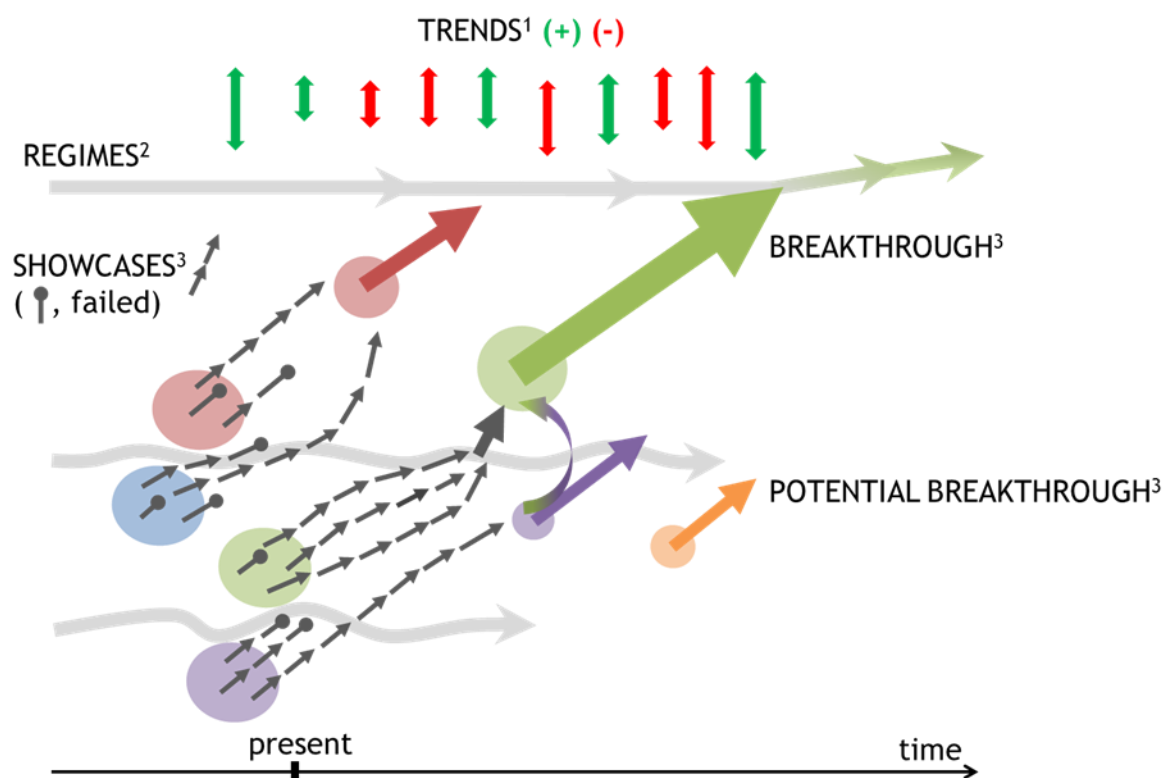
The multi-level perspective applied to the FIT4FOOD2030 project.

Would you agree with the recommendation?

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
☐	☐	☐	☐	☐	☐	☐

How important do you think this recommendation is?

Not important at all	Not important	Slightly not important	Moderately important	Slightly important	Important	Extremely important
☐	☐	☐	☐	☐	☐	☐

Would you like to comment on this recommendation?
☐Yes (text box prompted if 'yes')
☐No
☐I do not have an opinion

2. **Consult different stakeholders for the mapping of R&I breakthroughs (Focus groups, workshops, surveys, and interviews).**

Surveys, focus groups and workshops have proven to be effective tools as soon as a balanced multi-stakeholder and multidisciplinary approach is followed. Other tools such as interviews would also be recommended to collect different stakeholder opinions.

Would you agree with the recommendation?

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
☐	☐	☐	☐	☐	☐	☐

How important do you think this recommendation is?

Not important at all	Not important	Slightly not important	Moderately important	Slightly important	Important	Extremely important
☐	☐	☐	☐	☐	☐	☐

Would you like to comment on this recommendation?
☐Yes (text box prompted if 'yes')
☐No
☐I do not have an opinion

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3. **Use of collaborative reflection on success factors for the realisation of breakthroughs as key tool for R&I policy (e.g. in City Labs and Policy Labs).**

   Drawing together distributed intelligence and accounting for local specificities makes it necessary to have formats that can be used to reflect and anticipate future developments. e.g. *FIT4FOOD2030 has developed workshop tools which are useful to gather insights on success factors for the realisation of breakthroughs. Materials are available and have been tested by participants of the project and City Labs in several workshops.*

Would you agree with the recommendation?

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
☐	☐	☐	☐	☐	☐	☐

How important do you think this recommendation is?

Not important at all	Not important	Slightly not important	Moderately important	Slightly important	Important	Extremely important
☐	☐	☐	☐	☐	☐	☐

Would you like to comment on this recommendation?
☐Yes (text box prompted if 'yes')
☐No
☐I do not have an opinion

4. **Use examples of past breakthroughs when there is a need to visualise / understand better what a breakthrough is.**

   It is useful to discuss the concept of breakthrough using examples, for example from Fit4Food2030 tools, such as those available in Deliverable 4.1 of FIT4FOOD2030 and in the breakthroughs cards (to be published soon in the project website). The examples have to be tailored for different formats or events, for example choosing topics of interest to a possible workshop with stakeholders, or selecting an example sensitive for a particular region or country. Information available here https://fit4food2030.eu/inventory-of-breakthroughs/.

Would you agree with the recommendation?

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
☐	☐	☐	☐	☐	☐	☐

How important do you think this recommendation is?

Not important at all	Not important	Slightly not important	Moderately important	Slightly important	Important	Extremely important
☐	☐	☐	☐	☐	☐	☐

5. **Use short illustrative summaries of trends and challenges in order to stimulate debate and trigger systems thinking in the context of FOOD2030 R&I (e.g. FIT4FOOD2030 trend cards).**

   The set of trend cards can be key to understand the current challenges and trends to steer the discussion. They can be used to stimulate the process for visioning exercises of the food system for the future. Cards or descriptions of disruptive events could also be used in this context, an example of card games can be found in https://fit4food2030.eu/trends-in-the-food-system/*.*

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
☐	☐	☐	☐	☐	☐	☐

How important do you think this recommendation is?

Not important at all	Not important	Slightly not important	Moderately important	Slightly important	Important	Extremely important
☐	☐	☐	☐	☐	☐	☐

Would you like to comment on this recommendation?
☐Yes (text box prompted if 'yes')
☐No
☐I do not have an opinion

6. **Identify and review cases (showcases) that show evidence of application and impact of possible R&I breakthroughs.**

   Showcases are an example of niche events, businesses, and projects, which usually are short lived but represent the evidence of impact. They become breakthroughs when they become extensive,

therefore showcases become fundamental to understand R&I priorities. FIT4FOOD2030 already offers a set of cases that are linked to breakthroughs. Showcases are key to understand the state of the art. The more information gathered, the better the decision making on prioritising R&I topics. Therefore, the recommendation is to regularly have an 'up to date' set of cases linked to the possible R&I breakthroughs.

Would you agree with the recommendation?

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
☐	☐	☐	☐	☐	☐	☐

How important do you think this recommendation is?

Not important at all	Not important	Slightly not important	Moderately important	Slightly important	Important	Extremely important
☐	☐	☐	☐	☐	☐	☐

Would you like to comment on this recommendation?
☐Yes (text box prompted if 'yes')
☐No
☐I do not have an opinion

7. **Use foresight methodologies to visualise whether a specific breakthrough topic can be achieved.**

Visualisation and projection of how a specific breakthrough could shape/influence the future food system can support stakeholders' reflection on the present situation and stimulate new ideas on R&I strategy making.

Would you agree with the recommendation?

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
☐	☐	☐	☐	☐	☐	☐

How important do you think this recommendation is?

Not important at all	Not important	Slightly not important	Moderately important	Slightly important	Important	Extremely important
☐	☐	☐	☐	☐	☐	☐

Would you like to comment on this recommendation?
☐Yes (text box prompted if 'yes')
☐No
☐I do not have an opinion

8. **Analyse drivers and barriers for specific possible R&I breakthroughs with the aim of realising impact and/or offering market opportunities.**

   Using a methodology that explores drivers and barriers is useful for addressing impact and market opportunities for given possible breakthroughs. This helps setting R&I roadmaps from different perspectives. FIT4FOOD2030 has developed such methods for a Workshop format.

Would you agree with the recommendation?

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
☐	☐	☐	☐	☐	☐	☐

How important do you think this recommendation is?

Not important at all	Not important	Slightly not important	Moderately important	Slightly important	Important	Extremely important
☐	☐	☐	☐	☐	☐	☐

Would you like to comment on this recommendation?
☐Yes (text box prompted if 'yes')
☐No
☐I do not have an opinion

FIT4FOOD2030

Towards FOOD 2030 – future-proofing the European food systems through Research & Innovation

Annex 1: Report on Targeted Consultation on Fit4Food2030 recommendations

Report On Targeted Consultation on recommendations (MS27)

Contents

1 Respondent characteristics

1.1 Response Statistics
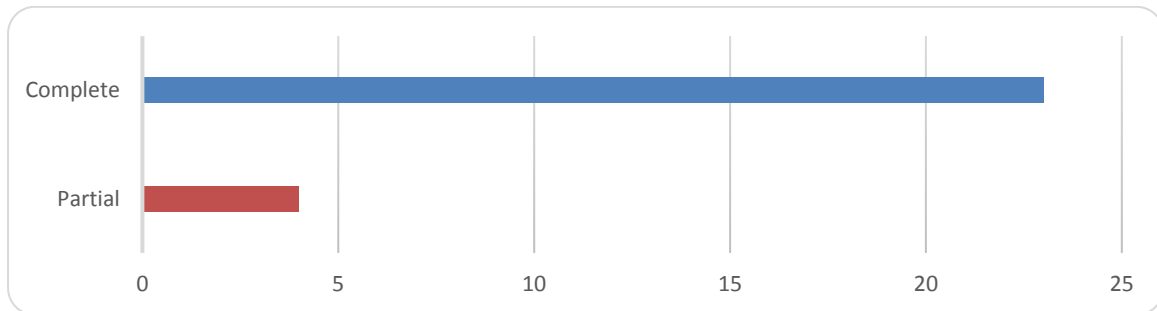
	Count	Percent
Complete	23	85.2
Partial	4	14.8
Totals	27	

1.2 1.Type of organisation
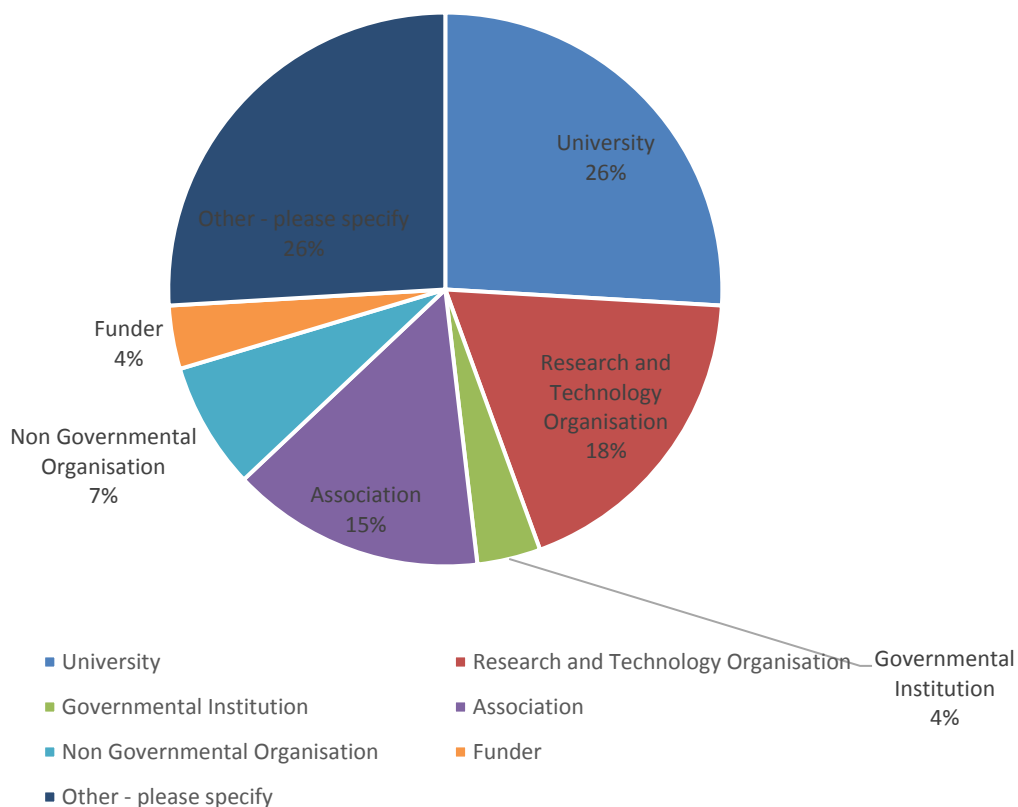
Value	Percent	Count
University	25.9%	7
Research and Technology Organisation	18.5%	5
Governmental Institution	3.7%	1
Association	14.8%	4
Non Governmental Organisation	7.4%	2
Funder	3.7%	1
Other - please specify	25.9%	7
	Totals	27

Other - please specify	Count
City Lab within research organisation	1
Cultural Institution	1
International Public Health Organisation	1
Nutrition Movement	1
Public Private Partnership	1
SME	1
foundation	1
Totals	7

1.3   2. Active involvement in Fit4Food2030

Have you participated directly in the activities of the FIT4FOOD2030 project concerning breakthroughs?

Yes
48%

No
52%

■ Yes ■ No
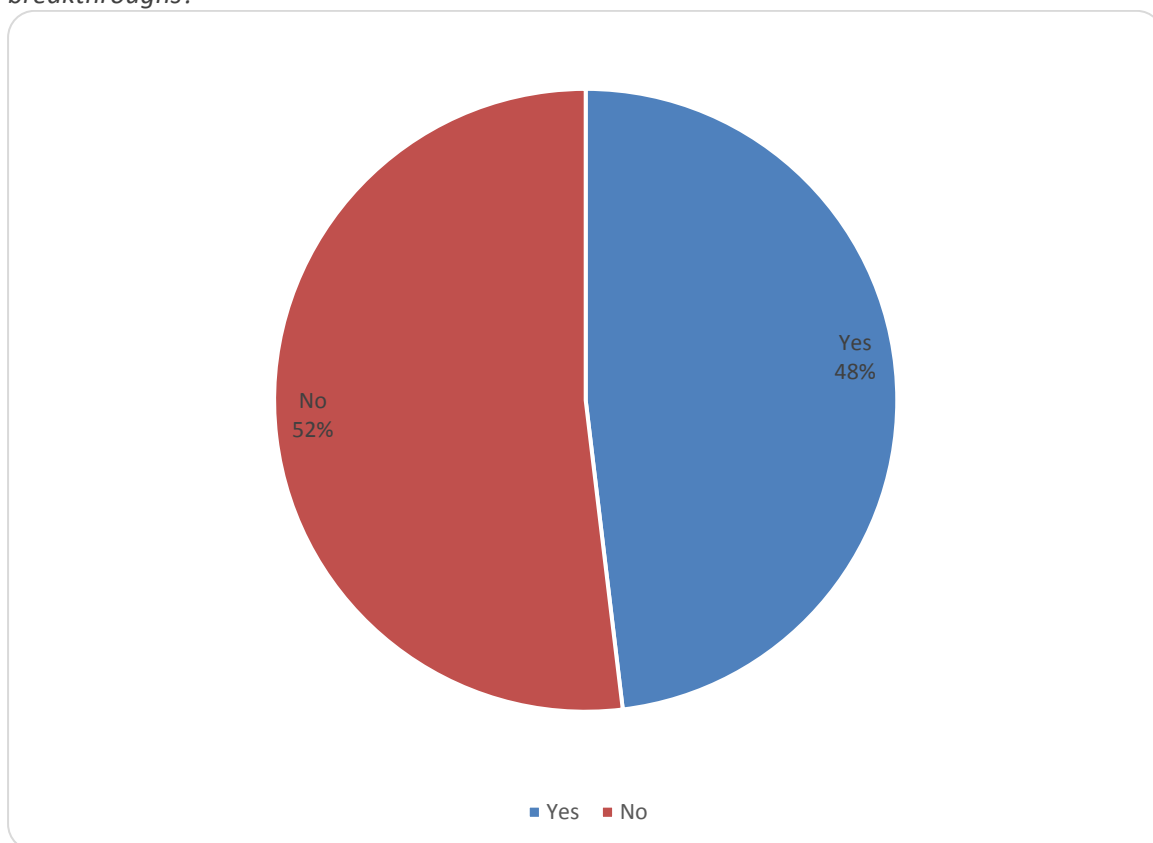
Value	Percent	Count
Yes	48.1%	13
No	51.9%	14
	Totals	27

1.4   3. Specification of participation

Please specify how you participated e.g. aspect of the discussion (identification, discussion of key enablers and barriers) and format (workshop)

Table 1: Participation in Fit4Food2030

ResponseID	Response
17	Identification, discussion of key enablers and barriers, deliverables...
24	Participation in all the activities through WP4 of the project
25	We have run different series of workshops where we have identified breakthroughs. We have shared them with Jonas. We have also contributed to define this survey and other tasks in this WP.
26	Aspect: Analysis of 3 potential breakthrough topics. Format: Elaboration of 3 breakthrough cards.
27	Identification of potential R&I Breakthroughs (D4.1); particiation to the workshop for the identification of critical success factors; Review of Deliverable 4.3 "Research and innovation policy for future-proofing the food system"; Review of Deliverable 4.4 draft; Development of Breakthrough Cards.
28	We set the discussion for during a citylab workshop to identify breakthrough and corresponding barriers
29	Project Partner, actively involved
32	Facilitator of a discussion on identification of breakthroughs relevant to the particular community, enablers in this environment, what stakeholder considered barrier
33	I am a partner of the project and I was therefore involved in the definition of breakthroughs and in the preparation of the material for the first workshops.
35	conceptualization, identification, discussion of key enablers and barriers
36	Topic: Identification, discussion of key enablers and barriers Format: Consultation workshop
38	Workshop on identifying the breakthroughs

2 Recommendations

2.1 Overall agreement and assessment of importance

Would you agree with the recommendation?
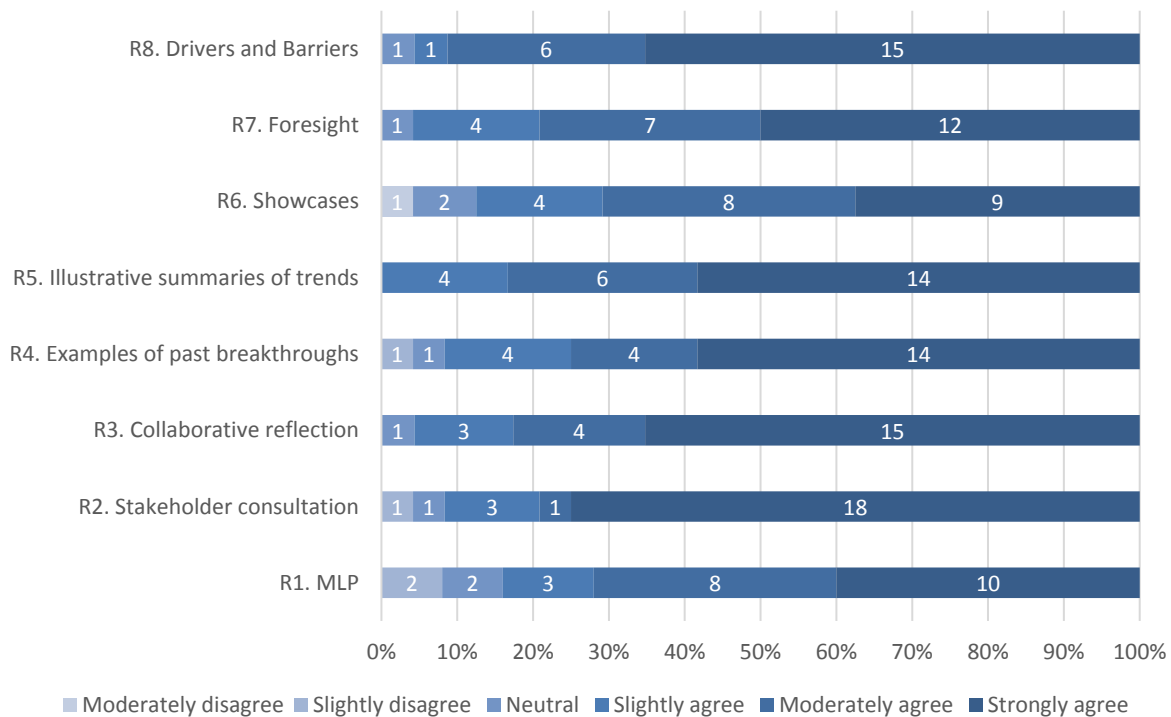
Figure 1: Level of agreement (7-level scale) with the recommendation sorted by 'strongly agree'.
Note: No respondent strongly or moderately disagreed with any recommendation

How important do you think this recommendation is?
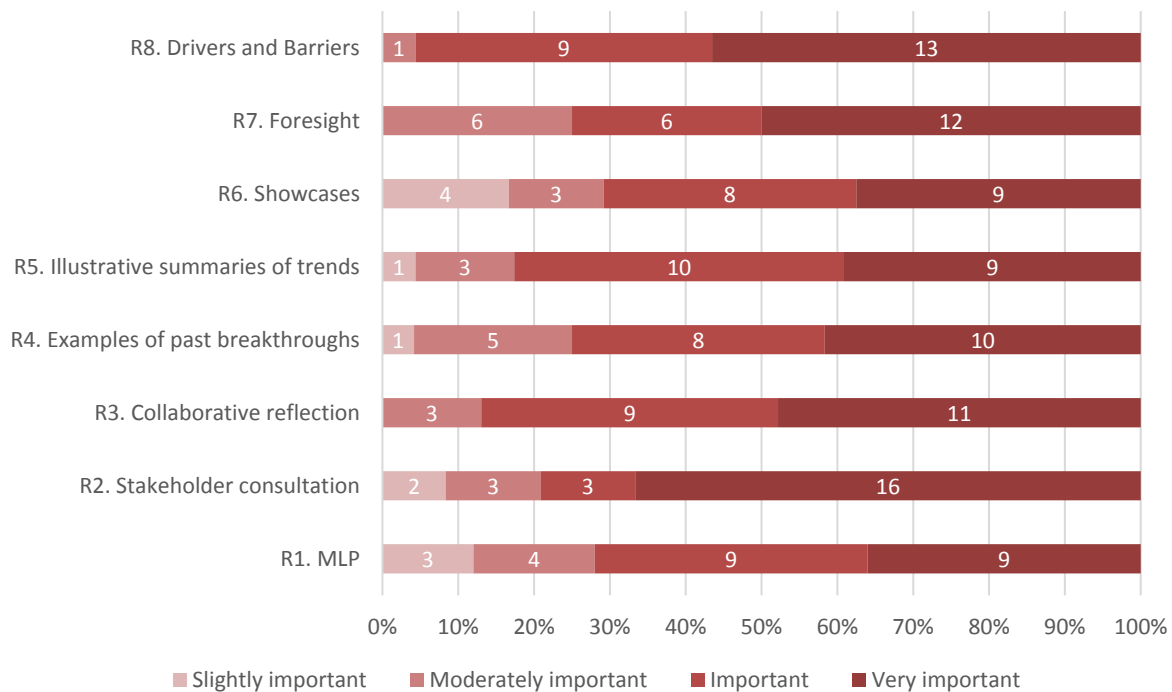
Figure 2: Assessment of the importance (5-level scale) of the recommendation sorted by 'very important'. No respondent assessed a recommendation as 'not important'

Figure 3: Assessment of importance versus the level of agreement (standardized to a -1 to 1 interval)

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Table 2: Level of agreement and assessment of importance for the 8 recommendations. The mean and standard deviation of the agreement and importance values are shown for responses scaled to the -1 to 1 interval.
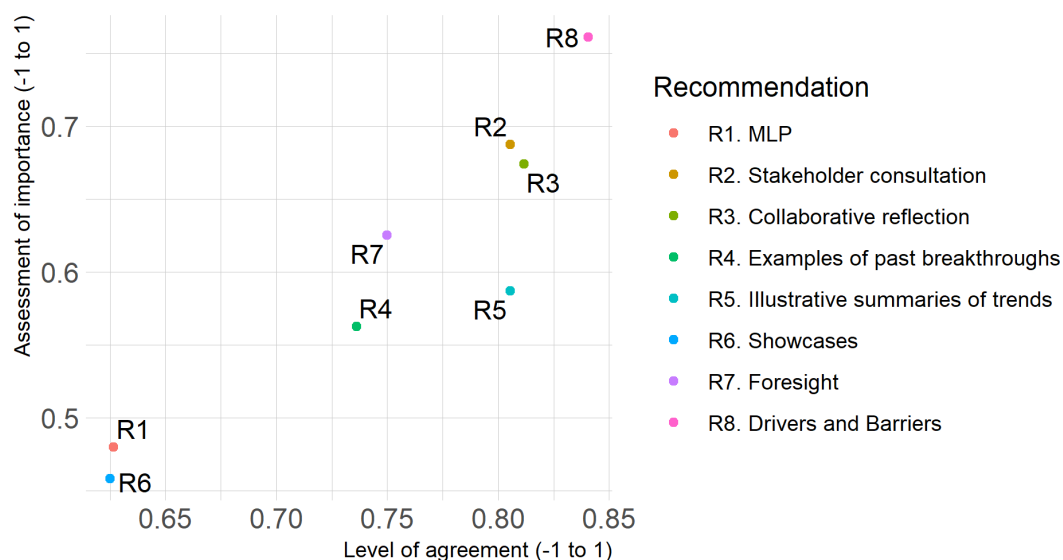
Abbreviation	Full recommendation	Agreement		Importance	
		Mean	Std	Mean	Std
R1. MLP	Consider the Multi-Level Perspective (MLP) when using FIT4FOOD2030 tools to identify R&I breakthroughs.	0.627	0.423	0.480	0.510
R2. Stakeholder consultation	Consult different stakeholders for the mapping of R&I breakthroughs (Focus groups, workshops, surveys, and interviews).	0.806	0.380	0.688	0.507
R3. Collaborative reflection	Use of collaborative reflection on success factors for the realisation of breakthroughs as key tool for R&I policy (e.g. in City Labs and Policy Labs).	0.812	0.299	0.674	0.357
R4. Examples of past breakthroughs	Use examples of past breakthroughs when there is a need to visualise / understand better what a breakthrough is.	0.736	0.380	0.563	0.450
R5. Illustrative summaries of trends	Use short illustrative summaries of trends and challenges in order to stimulate debate and trigger systems thinking in the context of FOOD2030 R&I (e.g. FIT4FOOD2030 trend cards).	0.806	0.259	0.587	0.417
R6. Showcases	Identify and review cases (showcases) that show evidence of application and impact of possible R&I breakthroughs.	0.625	0.421	0.458	0.550
R7. Foresight	Use foresight methodologies to visualise whether a specific breakthrough topic can be achieved.	0.750	0.299	0.625	0.423
R8. Drivers and Barriers	Analyse drivers and barriers for specific possible R&I breakthroughs with the aim of realising impact and/or offering market opportunities.	0.841	0.263	0.761	0.297

2.2 R1. Multi-Level Perspective (MLP)

Consider the Multi-Level Perspective (MLP) when using FIT4FOOD2030 tools to identify R&I breakthroughs.

The MLP is relevant to understand the theoretical concepts used within the FIT4FOOD2030 project that help visualise and understand food system transformation and to use the set of tools developed within the FIT4FOOD2030 project in the best fashion.

The multi-level perspective applied to the FIT4FOOD2030 project.
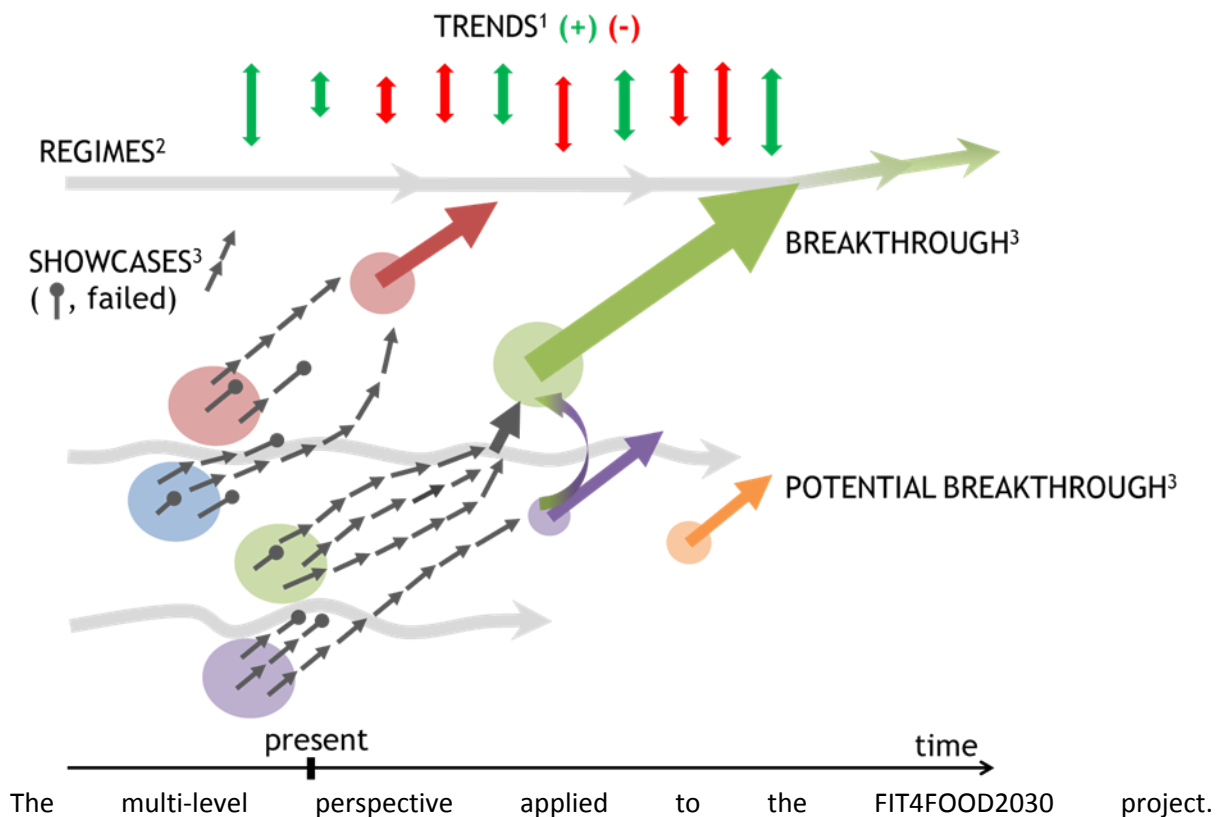
Table 3: Comments on R1. Multi-Level Perspective

ResponseID	Response
16	Different audiences react differently to graphs/diagrams/figures in my experience. This will work for some people but not others. The main point for me is that you need to start considering a lot of options and recognise that not all will succeed.
24	There are other models that could be recommended. However, this model is relevant to understand how breakthroughs were defined through the FIT4FOOD2030 project.
25	I imagine you were already going to do so, but I would always show the image of the MLP above with definitions of what we mean by regime, breakthrough, showcase, trend...

28	Is a very general model, it has to be related to very specific question in order to be useful
33	The MLP and the graph explaining how it was applied to the concepts used in FIT4FOOD2030 are helpful to visualise the food system transformation and the role of the different concepts on this
35	The (FIT4FOOD2030 version of the) MLP is not the panacea to understanding food system transformation, but it serves as a useful tool to help understand the relation between novelties, incumbency, macro-scale dynamics and transformation.
36	This model's implications for change (& strategies for change) need to be shared more widely and in a way that is adapted to different stakeholders and their work.
38	Not very clearly formulated as a recommendation: recommended in what context?
39	more important then ever, to focus on the potential of concrete solutions and results from different perspectives dealing with people and planet alike.

2.3 **R2. Stakeholder Consultation**

Consult different stakeholders for the mapping of R&I breakthroughs (Focus groups, workshops, surveys, and interviews).

Surveys, focus groups and workshops have proven to be effective tools as soon as a balanced multi-stakeholder and multidisciplinary approach is followed. Other tools such as interviews would also be recommended to collect different stakeholder opinions.

Table 4: Comments on R2. Stakeholder Consultation.

ResponseID	Response
14	A very good approach to achieve a holistic picture.
16	Consulting a diversity of stakeholders is essential since they bring different perspectives and experiences which are all necessary to understand what works and what doesn't. You need to approach the selection of stakeholders in a systematic way though.
17	Linking this mapping of R&I breakthroughs with the MLP will enrich the conversation between participants.
24	A multi-stakeholder approach is always very relevant. Here it would be of interest to know how to balance the different inputs from stakeholders (including consumers/citizens).
25	focus groups, workshops, surveys and interviews are not tools but methodologies. I would mention them as methods and I would list them as examples, as there are other methods that can be used.
28	The variety could become an obstacle if the objectives are not well defined, and the stakeholder group does not have already a shared agenda.
35	I think that involving and actually, engaging, stakeholders through a wide variety of (depending on the specific need/context) tools in these processes is very important. I also think that (so far) it has resulted in interesting results!
36	The multi-stakeholder and multidisciplinary approach to relatively well-known methodologies should be stressed and further elaborated on.

2.4 R3. Collaborative Reflection

Use of collaborative reflection on success factors for the realisation of breakthroughs as key tool for R&I policy (e.g. in City Labs and Policy Labs).

Drawing together distributed intelligence and accounting for local specificities makes it necessary to have formats that can be used to reflect and anticipate future developments. e.g. FIT4FOOD2030 has developed workshop tools which are useful to gather insights on success factors for the realisation of breakthroughs. Materials are available and have been tested by participants of the project and City Labs in several workshops.

Table 5: Comments on R3. Collaborative Reflection

ResponseID	Response
16	I agree it is essential to get local perspectives - the difficulty is getting a balance of stakeholders to ensure an overall objective local assessment and not one that is skewed by activists or lobbyists peddling specific agendas.
24	The setting in each country is relevant for this outcome. The FIT4FOOD2030 project has put effort on implementing similar formats for the collaborative reflection.
35	Learning and reflection, especially collectively in multi-stakeholder settings is really important, also to inform and/or co-create transformative (innovation) policies and engaging in action-research. The R&I breakthrough-thinking in this regard I think is useful to 'categorize' parts of the visions in the Labs, as a future/action oriented concept that could serve as a tool to design action-pathways towards those visions of future food systems.
36	This recommendation appears to be similar to the previous one. It could be interesting to stress here the importance of accounting for local and national specificities, as done through the City and Policy Labs, for R&I policy that can move forward in a more concerted fashion.

2.5   R4. Examples of past breakthroughs

Use examples of past breakthroughs when there is a need to visualise / understand better what a breakthrough is.

It is useful to discuss the concept of breakthrough using examples, for example from FIT4FOOD2030 tools, such as those available in Deliverable 4.1 of FIT4FOOD2030 and in the breakthroughs cards (to be published soon on the project website). The examples have to be tailored for different formats or events, for example choosing topics of interest to a possible workshop with stakeholders, or selecting an example sensitive for a particular region or country. Information available here https://fit4food2030.eu/inventory-of-breakthroughs/.

Table 6: Comments on R4. Examples of past breakthroughs

ResponseID	Response
14	I suggest to avoid project speak - Deliverable 4.1, and instead use the name of the report. I feel saying "The examples have to be tailored to different contexts, for instance different formats or events, ..." explains better the recommendation.
21	Learning from the past does not directly translate into the future.
24	Past breakthroughs or examples of a breakthrough are relevant to understand the context of discussion. The topic and detail should be given depending on the background of participants (e.g. in a workshop)
25	the link provided does not work, so I cannot check examples, but I strongly agree with this recommendation. Examples are key
35	I do think this is valuable and important, also to show how from historical breakthroughs 1) how diverse breakthroughs can be 2) the context-specificity and normative dimensions (desirability) of those past breakthroughs and 3) help to understand the specific dynamics that gave rise to those particular breakthroughs. I am not quite sure though, as studying historical breakthroughs is not by itself necessarily a transformative effort, whether it requires multi-stakeholder settings to DO these analyses, or whether it requires more traditional modes of transformation research. However, using these historical analysis in engaging exercises can help to foster the three points mentioned above I think.

2.6   R5. Illustrative summaries of trends

Use short illustrative summaries of trends and challenges in order to stimulate debate and trigger systems thinking in the context of FOOD2030 R&I (e.g. FIT4FOOD2030 trend cards).

The set of trend cards can be key to understand the current challenges and trends to steer the discussion. They can be used to stimulate the process for visioning exercises of the food system for the future. Cards or descriptions of disruptive events could also be used in this context, an example of card games can be found in https://fit4food2030.eu/trends-in-the-food-system/.

Table 7: Comments on R5. Illustrative summaries of trends

ResponseID	Response
16	By introducing trends you run the risk of biasing the outcome depending on which trends to choose to share.
24	The trend card tools of the FIT4FOOD2030 is one of the best outputs of the project. It helps to visualise the context and engage participants of a workshop very effectively.
25	the last sentence says that descriptions of disruptive events could be used but then the link leads to trend cards. Perhaps a bit confusing. Do you mean that a part from trend cards other cards with disruptive events could be developed? are those in this link? what would be a disruptive event?
35	Fully agree with recommendation, "gamification" of such topics can be very engaging.

2.7 R6. Showcases

Identify and review cases (showcases) that show evidence of application and impact of possible R&I breakthroughs.

Showcases are an example of niche events, businesses, and projects, which usually are short lived but represent the evidence of impact. They become breakthroughs when they become extensive, therefore showcases become fundamental to understand R&I priorities. FIT4FOOD2030 already offers a set of cases that are linked to breakthroughs. Showcases are key to understand the state of the art. The more information gathered, the better the decision making on prioritising R&I topics. Therefore, the recommendation is to regularly have an 'up to date' set of cases linked to the possible R&I breakthroughs.

Table 8: Comments on R6. Showcases

ResponseID	Response
16	Difficult to comment on this one but selection of showcases could bias the outcomes. I would want to see evidence of your analysis of stakeholder response to looking at showcases.
24	The showcases act as evidence of possible R&I breakthroughs. They are very relevant when analysing what R&I agenda has to be put forward. Particularly in concepts such as possible impact, investment, time to market and return of investment.
25	No link provided. Will those be in the website?
35	I think it is really important to have best practices, or showcases, to illustrate possible pathways for future action, and also to trigger inspiration and imagination about future food systems and the breakthroughs contributing to those future food systems. However, what is in fact quite difficult, as we also experienced during the project, is to 'assess/review' cases based on criteria. So I feel that although showcases are really important, the 'reviewing' part of this recommendation can be more explicit as to HOW we/others should/could identify, select and review cases to be(come) showcases.

2.8   R7. Foresight

Use foresight methodologies to visualise whether a specific breakthrough topic can be achieved.

Visualisation and projection of how a specific breakthrough could shape/influence the future food system can support stakeholders' reflection on the present situation and stimulate new ideas on R&I strategy making.

Table 9: Comments on R7. Foresight

ResponseID	Response
16	Anything to help stakeholders think "outside the box" is useful in stimulating ideas.
24	The use of foresight exercises is relevant to understand the impact of R&I actions. It has not been used extensively in the project FIT4FOOD2030, although there will be a specific session with this aim in October 2020. It should be recommended to use foresight exercises further.
25	could we give examples of foresight methodologies such as future scenarios and links to already developed?
36	The project could propose further resources in this direction.

2.9 R8. Drivers and Barriers

Analyse drivers and barriers for specific possible R&I breakthroughs with the aim of realising impact and/or offering market opportunities.

Using a methodology that explores drivers and barriers is useful for addressing impact and market opportunities for given possible breakthroughs. This helps setting R&I roadmaps from different perspectives. FIT4FOOD2030 has developed such methods for a Workshop format.

Table 10: Comments on R8. Drivers and Barriers

ResponseID	Response
16	If this is similar to using a Theory of Change methodology or pathways to impacts then I would have scored this more highly. I say that because I think they encapsulate the people element more strongly than how you have described it.
24	Barriers and enablers are crucial for understanding the impact of a possible R&I breakthrough. This analysis should be as clear and documented as possible.
35	This I think is indeed an important recommendation, as these exercises I think really helped to better understand the (context of) the potential breakthrough and how to steer (policies, markets, etc.) towards those particular futures. But perhaps even more importantly, I think that such exercises can really help in fostering reflexivity and they help (quite concretely) to think about normative dimensions of particular R&I breakthroughs: how does the system look like, how do barriers and enablers compare/add up, and considering all this, do we (still) want to move in this specific direction?
36	Drivers and barriers can be further built upon with actions identified by workshop participants for themselves and for other agents, resulting in an action plan or agenda.