

Agri-food Value Chain Analysis Report

August, 2016



nno4agrifood



Main Authors

- ✓ Prof. Brian McKenna, Dr. Jeroen Knol (European Federation of Food Science and Technology)
- ✓ Dr. Mladen Radišić (BioSense Institute)
- ✓ Mr. Kostas Giagtzoglou, Ms. Anastasia Matonaki (Q-PLAN INTERNATIONAL LTD)

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INNO-4-AGRIFOOD

Project Information

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Website:	www.inno4agrifood.eu
Coordinator:	Q-PLAN INTERNATIONAL LTD (www.qplan-intl.com)
Contact person:	Mr. Kostas Bougiouklis, Tel.: +30 2310 411 191, E-mail: bougiouklis@qplan.gr
Project Overview:	<p>INNO-4-AGRIFOOD is an EU-funded project set on fostering and stimulating online collaboration for innovation amongst SMEs active within the European Agri-food Ecosystem. To this end, INNO-4-AGRIFOOD aims at delivering a set of demand-driven value propositions including:</p> <ul style="list-style-type: none"> • A new generation of innovation support services to be provided by specialised innovation consultants to agri-food SMEs, enabling them to capitalise on the full potential of online collaboration for innovation. • A suite of ICT tools to support the delivery of the novel online collaboration for innovation support services. • A series of e-training courses to equip innovation consultants with the knowledge and skills required to successfully support the online collaboration for innovation endeavours of agri-food SMEs. <p>All INNO-4-AGRIFOOD value propositions will be co-created, demonstrated and validated in real-life contexts. Moreover, the accumulated experience and lessons learned of the project will be diffused across Europe so as to fuel the replication of its results and thus enable SMEs in other European sectors to tap into the potential of online collaboration for innovation as well.</p>
Consortium:	<ol style="list-style-type: none"> 1. Q-PLAN INTERNATIONAL LTD (www.qplan-intl.com) - Greece 2. APRE - Agenzia per la Promozione della Ricerca Europea (www.apre.it) - Italy 3. IMP³rove - European Innovation Management Academy (www.improve-innovation.eu) - Germany 4. EFFoST - European Federation of Food Science and Technology (www.fffost.org) – The Netherlands 5. BioSense Institute (www.biosens.rs) - Serbia 6. National Documentation Centre (www.ekt.gr) - Greece 7. Europa Media Non-profit LTD (www.europamedia.org) - Hungary

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Executive summary

INNO-4-AGRIFOOD is an EU-funded project set on at fostering and facilitating online collaboration for innovation amongst SMEs which are active in the European Agri-food Ecosystem. To this end, the project aims to enhance the service portfolio and practices of innovation intermediaries and SME support networks across Europe by providing them with a blend of demand-driven value propositions. These include a novel set of innovation support services along with dedicated ICT tools to facilitate their delivery as well as e-learning courses that will enable innovation consultants to acquire the necessary knowledge and skill-set to support the online collaboration for innovation endeavours of agri-food SMEs.

In this context, an analysis of the agri-food value chain was conducted with the principal aim to identify and conclude on value chain areas which stand to benefit the most from the outcomes of the project. In particular, the analysis was based on a review of available recent Strategic Research and Innovation Agendas (SRIAs) produced by European-wide and national initiatives (e.g. ERANETs, ETPs, etc.). The focal fields of these initiatives represent dynamic value chain areas of the Agri-food Ecosystem where research and innovation efforts as well as actors are concentrated and thus the innovation support services and tools of the project would be meaningful to target with a view to enhancing online collaboration for innovation and creating the most impact. Complementary, a total of 12 interviews were conducted with value chain experts who are part of the INNO-4-AGRIFOOD Beneficiaries and Advisory Boards.

With that in mind, the review of relevant available Strategic Research and Innovation Agendas as well as existing policy documentation, indicates that both the Agri as well as the Food sector of the agri-food value chain stand to significantly benefit from online collaboration as well as from innovation support services and tools to this end.

More specifically, the following research and innovation needs were identified in the Agri sector that will benefit from enhanced online collaboration:

- The need for increased and enhanced communication between all players in the sector: In particular, technology transfer communication systems between the research providers and the farming community are needed. In addition, enhanced communication between both of these and the consumer is essential if novel and more sustainable food production methods are to be accepted and flourish. To achieve these goals, the communication must be timely and prompt while new mechanisms for knowledge transfer need to be identified.
- The need for enhanced ICT technologies: Not only are these needed to facilitate the above listed need, enhanced ICT tools are required for the delivery and management of any novel production methods. In other words, enhanced on-farm management and information tools are essential.
- Increased trans-national, multi-disciplinary and cross-sectoral research activities are essential: This is a recurring theme in all of the SRAs and should involve manufacturing sectors from outside the agri-food value chain.

Furthermore, with respect to the Food sector the research and innovation needs that were identified that will benefit from enhanced online collaboration include:

- Lack of business skills: There are major deficiencies right across the range of business skills that are necessary for successful innovation.
- Difficulties in accessing scientific knowledge: It is also clear that the lack of scientific expertise in this sector inhibits its ability to innovate.
- The need for enhanced training and development units at a local level, equipped with a range of mediators that will guide SMEs through the innovation process: While these are needed in all regions, it is not yet established whether the same model will be suited to all regions.

Financial considerations as well as the large number of micro SMEs will prevent the aforementioned from being delivered in person. Consequently, solutions which effectively utilise ICT will be key in the frame of supporting the innovation endeavours of Food SMEs.

Finally, the interviews with Advisory and Beneficiaries Boards members attest to the largely underexploited potential of online collaboration for innovation and the need for more active SME support in this respect. There are many challenges for which SMEs in the agri-food value chain need to collaborate with potential technology/knowledge providers and the potential of online collaboration to enhance their innovation capacity is apparent. European innovation intermediates and support networks, such as the Enterprise Europe Network, as well as SMEs clusters and other key stakeholders, including National Food Technology Platforms and ETPs, have a key role to play towards tapping to this potential.

1. Introduction

In the context of INNO-4-AGRIFOOD an agri-food value chain analysis was conducted in order to map and evaluate the landscape and dynamics of the Agri-food Ecosystem, with a view to identifying and concluding on the primary agri-food value chain areas upon which the project could focus. This analysis included a targeted review of recent, both national and European-wide, Strategic Research and Innovation Agendas (SRIAs) and other existing policy documentation along with a series of interviews targeting members of the INNO-4-AGRIFOOD Beneficiaries and Advisory Boards.

The current report describes the results of the analysis and is structured in 5 distinct chapters as follows:

- Chapter 1 provides introductory information with respect to the INNO-4-AGRIFOOD project, the context in which this report has been elaborated as well as its structure.
- Chapter 2 outlines the objectives and scope of this report.
- Chapter 3 provides insights gained through the survey and review of SRIAs focusing on the Agri sector.
- Chapter 4 presents the valuable insights which were gathered through the survey and review of SRIAs with emphasis on the Food sector.
- Chapter 5 includes the results which stemmed from the interviews that were conducted with Advisory and Beneficiaries Boards' members.

Finally, the Annex of the report presents the questionnaire that was utilised in the frame of the interviews.

2. Objectives and scope

The overarching objective of the agri-food value chain analysis, launched in the framework of INNO-4-AGRIFOOD, is to identify value chain areas where agri-food SMEs stand to benefit the most from the services and tools of the project.

To this end, the agri-food value chain analysis aims at:

- Shedding ample light on the widely diverse and complex Agri-food ecosystem by mapping and analysing its landscape and dynamics.
- Better understanding the research and innovation needs of SMEs within the agri-food ecosystem, as they are amongst the main drivers behind their collaborations.
- Concluding on value chain areas with unexploited on-line collaboration for innovation potential and need for SME support.

The agri-food value chain analysis encompasses the review of a wide array of SRIAs and policy documents at national and European level as well as interviews from experts from across the EU. The broad scope of the analysis is key for gathering insights from a multitude of perspectives throughout Europe and thus enabling us to draw meaningful conclusions that will effectively guide the development of well-targeted value propositions and activities in the context of INNO-4-AGRIFOOD.

3. Survey of recent European-wide as well as national Strategic Research and Innovation Agendas for the Agri sector

3.1 Overview

The EU promotes different types of platforms, networks and joint initiatives which are relevant to research and innovation in agriculture:

- [ERANETs](#): Networks of national research authorities who come together to better align their research programmes.
- [European technology platforms](#) (ETPs): Industry-led stakeholder fora that develop research and innovation agendas and roadmaps for actions at EU and national level.
- [Joint Programming Initiatives](#) (JPIs): Initiatives to pool national research efforts with the aim to optimize the use of Europe's public R&D expenditure.
- Other public-private or public-public partnerships.

A list of the most relevant initiatives is presented below by theme or sector.

Initiatives relevant to the Agri sector of the agri-food value chain

Horizontal themes

- [RURAGRI](#) - New relationships between rural areas and agriculture in Europe (ERANET).
- [ICT-AGRI 2](#) - Information and Communication Technologies and Robotics for Sustainable Agriculture (ERANET).
- [CORE Organic Plus](#) - Organic Food and Farming Systems (ERANET).
- [TP Organics](#) (ETP).

Livestock

- [FABRE TP](#) – Animal breeding (ETP).

Crops

- [Plants](#) (ETP).
- [C-IPM](#) - Integrated Pest Management (ERANET).
- [ERA-CAPS](#) - Coordinating Action in Plant Sciences (ERANET).
- [EUPHRESCO II](#) - Phytosanitary research coordination (ERANET).
- [PrestoGmo-ERANET](#) - GMO research (ERANET).

The above are organizations with particular interest to the primary production sector of the agri-food value chain. Most (but not all) include a Strategic Research and Innovation Agenda (SRIA) as part of their outputs. A detailed section dedicated to each these initiatives follows under this Chapter, which conclude with some important conclusions from their review.

3.2 RURAGRI (ERANET) - Facing sustainability: New relationships between rural areas and agriculture in Europe

RURAGRI aims to improve coordination between on-going and future European, national and regional research programmes dealing with the new relationships between rural areas and agriculture in Europe and the challenge of sustainability. While the challenges and issues are mostly common, and despite of the historical coordination at the EU level for agricultural and rural development policies, research on agriculture and rural development is mostly carried out at a national level and remains fragmented.

With the above in mind, research funding bodies (24 partners) from 20 European Member States and associated countries have decided to set up an ERA-NET in order to develop a lasting focused network that will identify and open new research fields. The aim is to work towards a common research agenda and coordinated research funding to enhance coordination of research in the field of agriculture and rural development.

Two of its work packages are relevant to INNO-4-AGRIFOOD. In particular, these are Work Package 2 on “Mapping of existing research and information exchange” and Work Package 3 on “Elaboration of a strategic trans-national research agenda”. The research needs are categorised into 14 areas within three themes:

- Ecosystem Services / Public Goods: e.g. the scarcities and provisioning of resources.
- Socio-economic development: e.g. the economic and social activities in the rural areas and the valorisation of resources.
- Land use / Land Management: e.g. conflicting targets in production vs. maintaining biodiversity or production of food and feed vs. production of bioenergy.

Moreover, several of the research areas are of relevance to INNO-4-AGRIFOOD. These mainly lie within the socio-economic theme and include the following:

- Explore economic activities, public and private services, provision of infrastructure and technology to enhance sustainability and identify best practices supporting vibrant rural areas.
- Identify barriers that hinder innovation and evaluate novel mechanisms and socioeconomic structures (networks) which encourage innovation in rural areas.
- Identify and evaluate agricultural development trajectories in different rural areas paying particular attention to the potential for specialisation and/or diversification.

All of the abovementioned will demand actions that require the provision of assistance, advice and support to rural communities and, for efficiency, are expected to be delivered primarily by electronic means.

From within the land use theme, one proposed topic will impact on other sectors of the agri-food chain, namely: Evaluate those economic networks utilising natural resources that result in increasing demands on land use; identify and explore novel resource efficient networks. This research could include consumer perspectives.

3.3 ICT-AGRI (ERANET) - ICT and robotics for sustainable agriculture

The overall goal of both iterations of ICT-AGRI is to strengthen European research within the area of precision farming and to develop a common European research agenda concerning ICT and robotics in agriculture. ICT-AGRI develops international research calls to pool fragmented human and financial resources over the boundaries of the participating countries, in order to improve both the efficiency and the effectiveness of Europe’s research efforts.

In the Strategic Research Agenda of this ERANET Innovative ICT and robotic applications can help pave the way towards more-sustainable, efficient agricultural production systems. The ICT-AGRI concept combines

several ICT and robotic solution themes for plant and animal production and farm management which contribute to the solution of the aforementioned challenges:

- Since Farm Management and Information Systems are the back-bone system for all other ICT and robotic solution domains, they provide a common user interface across solution domains and act as repositories for farm information. They normally include communication and information exchange tools for liaising with external bodies. Time-consuming and error-prone manual data collection may be replaced by automated information collection and storage.
- Variable-rate application is the site-specific application of fertilizers, pesticides or water. It requires empirical information on the current state of crop and soil, at a suitable spatial resolution, measured by sensors or human observation. Automated information exchange between different applications and components is then essential to generate decisions for optimum applications.
- Controlled-traffic farming (CTF) enables geo-positional control of field traffic in order to optimize yields and input and reduce negative environmental impacts.
- Precision livestock farming can lead to improved profitability, work ergonomics, and animal health and welfare based on sensor measurements as well as on advanced ICT systems. Innovative automation technologies for precision livestock farming are now on the market. Some, such as automatic milking and feeding systems, are well established, and boast a high degree of functionality and reliability.
- Advanced systems for automated indoor climate control should help to reduce energy consumption and greenhouse gas emissions, as well as improve the environment in greenhouses and buildings for livestock.
- Quality, safety and traceability of food and feed are the main objectives of automated quality control. This is essential for ensuring safe, high-quality food produced under animal- and environmentally-friendly conditions for a continuously growing market. Research is needed on harvest and post-harvest food- and feed-quality issues.
- Agricultural robots can replace humans in the performance of manual labour, notably in the case of hazardous work, in order to improve safety at work, labour ergonomics and efficiency, product quality, and environmental sustainability.

Implementation of all of the above solutions will require the development of a wide range of support tools, many of them delivered via ICT.

3.4 CORE ORGANICS Plus and TP Organics

The ERA-NET Core Organics Plus and the Technology Platform TP Organics have similar aims, namely, to support the development of organic agriculture. Specifically, the ERA-NET aims to provide innovative solutions in organic food and agriculture for the next generation of food systems by seeking synergies between rural development, natural resource management and the food security and quality ERA-Net Plus. However, it is in the Technology Platform, TP Organics, that a Strategic Research and Innovation Agenda has been developed.

The topics of the agenda can be summarized as follows under four headings:

- Research and innovation to overcome the challenges of the organic regulation:
 - Supporting the development of a diverse organic sector through better farming policies, better certification and market data.
 - Ensuring consumer confidence in organic food and farming.
 - Alternatives to contentious inputs used in organic agriculture.

- Availability of organic seeds – towards 100% organic seed.
- Eco-efficient production of animal feed at local level.
- Improving organic poultry systems.
- Development of innovative systems for organic aquaculture.
- Organic food processing concepts and technologies.
- Organic farming and food systems support crucial empowerment in rural areas:
 - Business models and labour dynamics of value addition through food and feed processing.
 - Strengthening the resilience and innovation capacities of the organic sector.
 - Agro-ecological and organic farming as means of improving food security and rural development in sub-Saharan Africa and South Asia.
- Eco-functional intensification enhances the productivity, stability and resilience of agro-ecosystems:
 - Improved ecological support functions.
 - Appropriate and robust livestock systems.
 - Innovative ICT tools for organic cropping systems.
 - Solutions for resource-efficient primary production, based on the “Internet-of-Things”.
 - Assessment and sustainability of new technologies for organic agriculture.
 - Ecological support in specialised and intensive plant production systems.
 - Breeding robust plant varieties and animal breeds.
- High quality foods are the basis for healthy diets, wellbeing and quality of life:
 - The contribution of the organic food system to sustainable diets.
 - Public health effects of organic food systems in Europe.
 - The effects of organic foods and foods of different quality on the risk and severity of allergies, and on the general health and wellbeing of children.

3.5 FABRE TP - Farm Animal Breeding & reproduction Technology Platform

Farm animal breeding and reproduction stands at the beginning of the animal production chain. Breeding contributes to the basis of robust, efficient and healthy animals with a reduced need for medication and increased animal welfare. At the same time, research and innovation are essential to ensure continuous improvements needed for a sustainable and competitive livestock sector. With that in mind, the FABRE TP works on supporting partnerships between the private sector and knowledge centres to tackle major challenges with sustainable farm animal breeding and reproduction technologies.

Within its Strategic Research Agenda, FABRE TP highlights a number of opportunities and goals:

- Opportunity 1 - Global Responsibility and Competitiveness: European farm animal breeding and reproduction organisations are market leaders in a competitive global environment. Opportunities originate from the global demand for food that is produced transparently and with respect for the environment. For this, a favourable competitive business and regulatory climate is a necessity. In this context, specific goals include:
 - Assure global food security and sustainability of production systems.
 - Reduce the environmental footprint and waste.

- Address consumer demands.
- Strengthen European Competitiveness.
- Develop responsible ownership and protection of new innovations.
- Opportunity 2 - Social Responsibility: Animal breeding and reproduction has an enormous potential to improve our lifestyle and prosperity. Opportunities arise from the possibilities to simultaneously improve efficiency, animal welfare, health and product quality that ensure safe animal products. However, the links with the society are important. Therefore, accessible information, full transparency and constructive dialogue are necessary. Goals in this frame encompass:
 - Produce safe animal products.
 - Enhance product quality and consistency.
 - Maintain and enhance animal welfare and health.
 - Achieve a balanced and transparent regulatory framework.
 - Maintaining genetic diversity while respecting different cultural and regional needs.
 - Improve consumer understanding of the application and potential benefits from new approaches and technologies.

Within each of the abovementioned opportunities and goals, a detailed list of research challenges is presented. However, such detail does not fall under the scope of the current report and thus is not included.

3.6 ETP Plants for the Future

The European Technology Platform (ETP) “Plants for the Future” is a stakeholder forum for the plant sector with members from industry, academia and the farming community. It serves as a platform for all stakeholders concerned with plants to provide their views and represent their interests in an open discussion process. It provides a 20-year vision, a short-, medium- and long-term Strategic Research Agenda for Europe’s plant sector and it sets up strategic action plans to promote Innovation, Research and Education in the plant sector.

The Strategic Research Agenda of the ETP Plants for the Future is based on five challenges:

- Healthy, safe and sufficient food and feed: The production of food and feed remains the primary objective of plant science. Over the past 50 years, improvements in our knowledge of plant genetics, physiology and agronomy have underpinned the large increases in crop productivity that have occurred and substantially enhanced access to a far greater diversity of food on a global scale. But new challenges are arising and, over the coming years, European plant scientists will need to pursue a number of objectives, including boosting food and feed output; improving the nutritional and sensory quality of food; ensuring the safety of the food we consume; and developing crops that are resilient to climate change.
- Plant-based products, chemicals and energy: The deployment of novel non-food crop species on a scale of tens of millions of hectares in the coming decades requires major changes at the policy, regulatory, taxation and industrial levels. Biofuel production in Europe can be cost competitive on the international market, provided that high-tech energy crops, adapted to the different climatic regions and optimised for sustainable biomass yield under low input agriculture can be realised.
- Sustainable agriculture, forestry and landscape: Agriculture and forestry have always been dedicated to providing humanity with food, animal feed, energy and biomaterials. Cultivating more and more land has been the traditional answer to addressing the growing needs of the population. However, the volatility of agricultural systems and their vulnerability to uncontrollable climatic conditions has meant that supplying the needs of the human population has never been an easy task.

- **Vibrant and competitive basic research:** Vibrant basic research is essential for EU competitiveness in plant-based industries. In the knowledge-based economy of the future, competitive and innovative new products will spring from fundamental discoveries. Knowledge and intellectual property will be critical to fulfilling the goals outlined in the other four challenges.
- **Consumer choice and governance:** If the plant science sector is successfully to innovate and bring new plant products to the marketplace, an important goal that must be achieved will be to increase the involvement of the public and consumers in discussing research and development goals. Firstly, there will be a need to increase the public's knowledge of the field, while developing within the plant sector a greater awareness of public and consumer attitudes and behaviour towards agricultural research and production systems.

3.7 C-IPM (ERANET)- Coordinated Integrated Pest Management (IPM) in Europe

The ERANET which focuses on Coordinated Integrated Pest Management (IPM) in Europe was launched established with a view to:

- Creating a forum for exchange and identification of IPM research and development priorities.
- Providing recommendations on national and European research.
- Connecting existing initiatives.
- Coordinating joint transnational research calls.

In fact, with stakeholders and researchers C-IPM aims at positioning IPM in the future European innovation landscape. To this end the C-IPM ERANET produced a Strategic Research Agenda (SRA) in June 2016. The SRA provides recommendations on future European and national IPM research in terms of challenges for agriculture and crop production.

In particular, the SRA has the following specific objectives:

- Support network IPM-related research and create synergies based on a status quo survey of existing research activities on IPM within the EU.
- Identify overlaps and gaps to avoid duplications as well as opportunities and complementarities for improved transnational coordination and joint initiatives on research.
- Enhance pre-existing and establish new linkages between research programmes and initiatives towards coordination of IPM research and development (R&D) in Europe.
- Identify future challenges for European crop protection which require IPM solutions.
- Feed emerging research demands to meet these challenges into the Horizon 2020 framework program.
- Identify opportunities and mechanisms for knowledge transfer/sharing, training and dissemination of information of IPM research.

Moreover, the detailed research suggestions and challenges of the SRA are grouped into 4 major core themes as follows:

- Core theme A: Preventive and sustainable (pest) management.
- Core theme B: Alternative to conventional pesticides and innovative control.
- Core theme C: IPM in Minor Crops.
- Core theme D: Drivers and impact of IPM.

Many of the detailed suggestions overlap with the details in other SRAs and, with minor wording changes, appear in the SRAs of other agencies. For example, the suggestions below could easily transfer to other disciplines/subject areas:

- Foster interdisciplinary research including human and social sciences to work at the level of the entire food chain.
- Develop research programmes in universities and institutes with multi-actor perspectives and transfer stakeholder input and research results to end users immediately.
- Encourage research on “lock-in” and transition phase to examine to what extent agricultural organisations are locked in by “past socio-technical choices” and identify possible mechanisms of transition to IPM that consider multi-actor perspectives.
- Consider the importance of public-driven behaviour of NGO’s across Member States and take it into account for research programmes on scientific social/political aspects.
- Communicate promptly to stakeholders about success stories of IPM based on local or regional experiences and focus on how IPM would be implemented at scales beyond the farm.
- Identify socio-technical and socio-economic impediments behind IPM implementation and means to cope with them;

3.8 ERA-CAPS (ERANET) - Coordinating Action in Plant Sciences

Plant sciences face important challenges at the European and global scale due to a burgeoning world population that requires sustenance. Reliable production of high-quality and safe food, feed and renewable Carbon supplies for green chemistry, without the use of excess land, energy, water, pesticides and chemicals is therefore essential.

In this context and in order to ensure that the EU has the scientific understanding to revolutionise agricultural capabilities to deliver higher yields with lower inputs in a changing climate, the ERA-CAPS was formed. ERA-CAPS unites the scientific and economic capabilities of Member States and enables the coordination of sustainable transnational plant science research programmes. While this ERANET has published many funding calls, it does not have its own SRA and may rely on SRAs from others within the plant science discipline.

3.9 EUPHRESCO (ERANET)

Euphresco is a network of organisations funding research projects and coordinating national research in the phytosanitary area. More specifically, amongst its main aims are to:

- Strengthen the basis for, and result in, a self-sustainable, long-term, durable network.
- Deepen the cooperation through continued transnational research that optimises limited resources, supports other plant health initiatives and coordination mechanisms, and further develops a culture of collaboration.
- Deepen the cooperation by improving processes and tools and reducing barriers.
- Enlarging the network (31 partners, plus 14 observers) to increase its critical mass, address more regional or sector-based (e.g. forestry plant health) issues and increase opportunities for international cooperation with non-European countries that are either the source of quarantine pests or share similar pest problems.

Euphresco has not produced a Strategic Research Agenda but among the topics of interest to them in the past there are forest related topics as well as topics related to potato and other solanaceae, field crops, fruit

production, specific quarantine or emerging phytosanitary pests or taxonomic groups of pests, diagnostic methods for quarantine and emerging phytosanitary pests as well as on science supporting pest risk analysis.

3.10 PreSto GMO (ERANET)

The PreSto GMO ERANET lays the groundwork for transnational research on health, environmental and techno-economic impacts of Genetically Modified Organisms (GMOs). The project engages stakeholders throughout all of its stages to ensure that future research in this area will also be highly relevant and meaningful from a broader societal perspective.

While this ERANET has not produced any document entitled as a Strategic Research Agenda, it did produce a Comprehensive list of GMO impact research topics in August 2015. This includes a listing of 380 detailed research topics that pertain to insects, plants, other animals and genetically modified micro-organisms as well as to their impact on animal/human health and the environment along with techno-economic issues. The topics, however, are so numerous and detailed that it is not possible to group them into meaningful categories in the context of this report.

3.11 Conclusions for the Agri sector

In spite of the fact that all the specific research needs from the individual ETPs and ERANETS differ according to their specific subsector of production agriculture, a number of generic cross-sectoral topics can be identified. These are:

- The need for increased and enhanced communication between all players in the sector: In particular, technology transfer communication systems between the research providers and the farming community are needed. In addition, enhanced communication between both of these and the consumer is essential if novel and more sustainable production methods are to be accepted and flourish. To achieve these goals, the communication must be timely and prompt while new mechanisms for knowledge transfer need to be identified.
- The need for enhanced ICT technologies: Not only are these needed to facilitate the above listed need, but enhanced ICT technologies are also essential for the delivery and management of any novel production methods. In other words, enhanced on-farm management and information tools are essential.
- Increased trans-national, multi-disciplinary and cross-sectoral research activities are essential: This is a recurring theme in all of the SRIAs and should involve manufacturing sectors from outside the agri-food value chain.

Online collaboration support services and tools that will facilitate and enhance technology and knowledge transfer as well as help SMEs in finding and successfully collaborating with the right innovation partner, can help towards addressing the abovementioned needs.

4. Survey of recent European-wide as well as national Strategic Research and Innovation Agendas for the Food sector

4.1 The Food and Drink industry

The European Food industry is the largest manufacturing sector of the EU (14.9% of total turnover and 12.9% of added value) as well as its largest employer with 4.2 million people being directly employed. Moreover, it is the largest food and drink products exporter in the world and the second largest importer, with a positive trade balance. It has a diverse product range with bakery, meat and meat products, dairy products and drinks being the top four sectors.

With that in mind, the present Chapter of the report provides insights into the current status of the Research and Innovation landscape of the EU Food sector, which is dominated by SMEs, many of which can be classified as falling into the micro SME range. Indeed, innovation support actions for European food SMEs all suffer from the very skewed size distribution of food manufacturers. The table below highlights this problem. For many years now, FoodDrinkEurope has published annual statistical data drawing on their own as well as Eurostat data. Further analysis of these data is presented in the following table.

Table 1 Employment in the European food manufacturing sector

Type of company	Number of employees	Number of companies	Average number of employees
Large Companies	1,541,000 (36.7% of total)	2,601 (0.9% of total)	592
SMEs (all)	2,658,600 (63.3% of total)	286,399 (99.1% of total)	9.2
Medium SMEs (50-249)	1,096,200 (26.1% of total)	10,693 (3.7% of total)	102.5
Small SMEs (20-49)	499,800 (11.9% of total)	16,473 (5.7% of total)	30.3
Small SMEs (10-19)	415,800 (9.9% of total)	31,501 (10.9% of total)	13.2
Micro SMEs (0-9)	646,800 (15.4% of total)	227,732 (78.8% of total)	2.84
TOTAL	4,200,000	289,000	14.5

Source: Further analysis of data published by FoodDrinkEurope

From the data presented by the table above, one can see that despite an overall average of 14.5 employees per company and a very significant 592 employees per company in the larger companies, the numbers fall dramatically within the SME sector. In particular, micro SMEs only average less than 3 employees per company. More importantly, these comprise almost 79% of the total number of food manufacturers in Europe and account for 6.5% of total turnover for the industry. Even when considering SMEs as a whole, the average number of employees per company is only 9.2 while they account for just under half (49.7%) of the total turnover. These are rather worrying statistics as they imply that half the food manufacturing in Europe (by turnover) comes from companies that are so small that they are unlikely to employ any scientific staff and may be incapable of assimilating scientific knowledge or technology transfer from wherever it is given. This raises the question of how such companies can hope to innovate since they will have difficulty in

assessing the latest scientific developments and, as will be seen later, have difficulty in going through the various steps required to grow their company and innovate.

In this context, while there are many published Strategic Research and Innovation Agendas (SRIAs) in the Food sector, the majority of them are “wish lists” of future research funding topics put together by combinations of academic, research and industry scientists. This is not to imply that these are not their honest perceptions of what problems need solutions if the food industry is to innovate. However, innovation support service and tools as well as online collaboration for innovation amongst SMEs, which lie at the heart of INNO-4-AGRIFOOD, are often outside the scope of strategic research and innovation plans. Rather, these are covered in subsequent Implementation Action Plans which, unfortunately, are rarely produced. Nevertheless, there are a significant range of documents that can be assessed for relevance to the aims of INNO-4-AGRIFOOD. Below, a range of important initiatives that produce relevant documents is provided and grouped by their geographical scope.

Initiatives relevant to the Food sector of the agri-food value chain

European level

- [European Technology Platform Food for Life](#)
- [JPI A Healthy Diet for a Healthy Life](#)
- [TRADEIT Project](#)

National Level

- Austrian Technology Platform
- National Food Platform Belgium, Wallonia
- National Food Platform Belgium, Flanders
- National Food Platform Finland
- National Food Platform France
- National Food Platform Greece
- National Food Platform Iceland
- National Food Platform Ireland
- National Food Platform Italy
- National Food Platform Lithuania
- National Food Platform Montenegro
- National Food Platform Switzerland
- National Food Platform Turkey
- National Food Platform Ukraine

Despite being a lengthy list of research needs, the publications of the individual country platforms tend to confine themselves to problems related to specific foods and processes and do not deal with the mechanisms for delivery of technology transfer and innovation support. Because of this, detailed information is presented only from the SRIAs produced by the European Technology Platform Food for Life, the Joint Programming Initiative (JPI) - A Healthy Diet for a Healthy Life and the TRADEIT Project, in the sections that follow.

4.2 European Technology Platform Food for Life (ETP)

The ETP Food for Life was set up in 2004 and, in addition to producing several iterations of its Strategic Research and Innovation Agenda, has also been committed to providing innovation support tools to food SMEs. Indeed, its 2014 document aims to “provide the tools to strengthen an SME innovation platform. Innovation is not just about new ideas, but how to use and combine process and material aspects in new ways. Innovation efficiency by SMEs can be improved based on infrastructural improvements reducing time to market. Often there is a gap between researchers developing new technologies and SMEs that must be more efficiently bridged. In some cases, innovation by SMEs is low and infrastructural improvements are necessary, as SMEs do not have the capacity to take up new technologies from the research community. Innovative and practical tools will be necessary to achieve this and will necessitate not only conventional open innovation but also the development of communication and support tools that will bring new possibilities to SMEs that do not necessarily have the in-house scientific capabilities of doing so unassisted”. In other words, the very online collaboration for innovation support services and tools that INNO-4-AGRIFOOD aims to generate are perceived as an important demand.

At the same time the SRIA of the ETP Food for Life also foresaw a major communication challenge for food SMEs. This was not confined to the classical areas of industry-consumer communication but was foreseen for a number of target audiences, including the companies themselves. More specifically the communication challenges foreseen for the different stakeholders are:

- For governments and policymakers: How to develop strategies for future research and innovation funding that foster applied research and innovation uptake and raise awareness about the innovation opportunities and the importance of the food and drink sector across Europe.
- For the general public: Securing a steady and continuous relationship with consumers via the “umbrella role” of consumer associations, looking forward to the acceptance of the consumers on the technology used in the context in a sustainable food production. Also assuring an important societal dialogue with governmental and non-governmental bodies with a direct or indirect agenda on food issues.
- For companies and SMEs: Exchanging reliable information and using appropriate communication technologies including direct contact on a national level between companies and associations. Enabling the National Food Technology Platforms (NTPs) as “partners of trust” and motivating companies to engage in the application of innovation processes and applied research.
- For researchers: Motivate food researchers to see their work in a larger societal context, and where their success ultimately will be determined by their ability to understand and support the interests of companies and consumers.
- For other members of the food chain: Explore collaboration opportunities with other stakeholders along the food chain.
- For other disciplines: Identify the areas for interdisciplinary collaboration with the ICT, manufacturing, energy, water, nanotechnology, transport sectors to adapt already existing solutions developed for other users and to develop new solutions to enhance innovation in the food sector.

There are also training challenges detailed in the SRIA that will also require different elements of online assistance. These include challenges such as:

- Raising the investment level in training and life-long learning in the food industry since the proportion of companies employing internal or external training as a key component of a clear innovation strategy is particularly low.
- Provision of training in innovation management to food SMEs i.e. developing the skills to convert outputs of commercially viable R&D projects to new products, processes, services and business skills, including information, knowledge and resource management. Since the majority of SMEs seem to

prefer to learn from each other, collective activities that offer the opportunity of learning through exchange of views with other industry personnel and with scientists should be promoted.

- Development of “Training and Dissemination Units” (TDU) within Food and Drink Federations equipped with a number of 'Techno-Science Mediators' (TSMs). TDUs are specified units aimed at the fostering of communication and increasing innovation awareness within companies. TSMs are specifically-trained mediators, skilled in technology audit and communication.
- Development of a European Academy for Open Innovation to secure a future to this triangle (i.e. company needs, training initiatives capable of serving the companies, efficient and pervasive innovation transfer) by networking the best available practices in Europe. The Academy would secure a two-way dialogue with existing experience and resources in diverse parts of Europe and would develop a network of national trainers.

Finally, there are technology transfer challenges that also require the same philosophical initiatives as envisaged within the context of INNO-4-AGRIFOOD. These are:

- Development of a credible partner supporting innovation system and delivering its associated solutions.
- Encouraging industry interaction and collaboration with new programmes and tools which will be implemented in the future European Innovation area.
- Promoting the success of a European Food Knowledge and Innovation Community to support innovation and training.
- Development of country, regional and Europe-wide support systems that can foster technology transfer through the use of such mechanisms as Techno-Science Mediators.
- Use of National Technology Platforms to:
 - Undertake national surveys on changing R&D needs of the food industry with specific focus to SMEs, in order to have a global view of the current situation.
 - Develop methods for the best use of collective research, marketing and supply chain resource management activities in order to enhance innovation at food SMEs.
 - Undertake a concept design study for an educational approach at all levels in order to meet industry needs more effectively and to coordinate better the existing training capacity.

4.3 Joint Programming Initiative – A Healthy Diet for a Healthy Life (JPI-HDHL)

Like in most other SRIAs, communication and technology transfer play an important role in the outputs of JPI-HDHL. However, as much of its focus is on the areas of diet and health, communication between government, industry and consumers dominate the communication needs. However, inter-industry and expert to industry communication is not ignored. For example, a direct quote states: “Neither the primary production sectors nor the Small and Medium Enterprises (SME) that dominate this sector in the EU (99.1% of the 286,000 companies were SMEs in 2011) can invest in long-term or large-scale research and development (R&D). Small food companies, in particular, are unable to take on the innovation challenge and so a joint and coordinated initiative is required. Effective partnerships built on public and private collaborations, and funding, are necessary to identify the most important research needs and to pool resources. Consideration must also be given to laws and regulations and the protection of intellectual properties (IP) arising from this research to ensure that SMEs can derive benefits from their outputs. This will foster a strong culture of investment in R&D in this sector.” This could be interpreted as being very similar to the thinking of the ETP Food for Life.

Moreover, in addition to having a focus on health and societal issues, it does address common ground with other SRIAs through its philosophy of seeking information and advice from across a broad spectrum of scientists and promoting interdisciplinary activity. “As well as having implications for quality of life, additional ramifications for an innovation trajectory can be identified. For example, there is an urgent need to translate results of scientific research more effectively into concrete and actionable policy initiatives. Closer interaction between policy actors, health professionals and scientists will ensure that policy questions can be translated into scientific activities, and vice versa. More effective interdisciplinary collaboration between the natural and social sciences is required, as many of the issues and emerging problems are caused by both biological and socio-economic factors and their interaction”.

The vision is that by 2030 all citizens will have the motivation, ability and opportunity to consume a healthy diet from a variety of foods, have healthy levels of physical activity and that the incidence of diet-related diseases will have decreased significantly. However, to achieve this, an integrated multi-sector approach will be necessary, embracing education, health care, agriculture, environment, food and drink industry, transport, advertising and commerce will be essential to position food, nutrition and related public health policy and evidence from research sufficiently high on the political agenda so that the combined effort can be translated into real health improvements. Thus, it is clear that to successfully implement the outputs of diet and health research, it will be necessary to develop a strong platform encompassing policy making, effective communication as well as knowledge and technology transfer.

However, the entire JPI-HDHL is not solely focussed on the diet and health of the consumer. One of its three research pillars has an implicit industry focus. This is the pillar on Diet and food production: developing healthy, high-quality, safe and sustainable foods. According to this pillar, the agricultural and food industries are faced with the challenge of producing safe and tasty foods that are consistent with health status, lifestyle and culture, and that meet consumer preferences. This requires research to increase the understanding of food and diet compositions for optimal health, to develop new foods and to improve production, processing, packaging and proper food chain management. New foods have to comply with health, nutritional, energy and safety needs of consumers and also with legislation, and be affordable. An additional challenge is to develop innovative products and processes in a cost-effective and sustainable way and to provide insights into the barriers and facilitators for the agricultural and food industries to develop sustainable foods that will also benefit human nutrition. Foods must originate from systems that produce, process, store, package and supply foods in a fully sustainable way.

In this context, the overall goal of this pillar is to improve the quality of foods, food production systems, distribution and marketing to provide healthier, safe, sustainable and affordable foods that also contribute to market advantages for food producers and the food and drink industry. Since the agriculture and food industries are faced with the challenge of producing tasty foods that are consistent with health status and lifestyle, and which meet consumer preferences and thus ensure repeated purchase they will need to share knowledge and data and carry out harmonised research within the area of diet and food production. Of course, they must develop innovative products and processes in a cost-effective, sustainable and affordable way and the foods must originate from systems that produce, process, store, package and supply foods in an economic and sustainable way. The agriculture and food industries will also need to adapt and incorporate modern nutritional and production philosophies, such as lean and agile manufacturing of foods with lower content of saturated fat, sugar and salt, such as those which have proved to be successful in other market sectors and which allow producers to remain at the forefront of market innovation.

With the above in mind and given the structure of the European food industry, which is dominated by micro-SMEs, it becomes evident that the achievement of this goal will require all of the same communication and technology transfer support systems that were needed by the ETP Food for Life.

4.4 TRADEIT project

The TRADEIT project is one of two sister EU funded projects aimed at providing entrepreneurship and innovation support to European food manufacturers in the traditional food area. Each is focused on different sectors, with TRADEIT focusing on bakery, meat and dairy products, whereas its sister project (i.e. [TRAFOON](#)) on fish, grain, vegetable, mushroom and olive products¹. In particular, the SRIA of the TRADEIT project focused on traditional food SMEs. In this respect, the term SME is somewhat of a misnomer as these companies are more often than not micro enterprises, averaging 3 employees. It is quite difficult (if not impossible) to have a significant internal structure with 3 employees and with the owner dealing with management, sales and distribution, there may be only 2 production employees. As such and given that these SMEs are often family enterprises, scientific expertise may be non-existent.

With the above in mind, the TRADEIT project faced several problems when embarking on its data gathering exercise, aimed at developing its SRIA. More specifically, the process typically employed to generate SRIAs is to form various working groups of relevant scientists from academia and industry and use brain-storming techniques to develop lists of urgent research topics. While this process is useful, it comes with the disadvantage of not distinguishing between the urgent research needs of the industry and the current research wishes of academic researchers. Moreover, even if the TRADEIT project opted to utilise such a process, the industry-based scientists were largely non-existent so the skewing of priorities towards academia would have been more pronounced. Consequently, an early TRADEIT decision was to interact directly with food SMEs in the framework of its data gathering exercise. As TRADEIT was organised into 9 regional hubs around Europe, a very successful survey was undertaken amongst the several hundred SMEs in focus. In addition, face-to-face meetings were held with a smaller selection of SMEs.

From the data gathering exercise it became apparent that, unless the SME was encountering a very specific technological problem, little thought was given to specific research needs in many regions. Indeed, while most wished to expand their businesses and engage in product innovation, there were several barriers preventing them from doing so, including (i) lack of time for adequate innovation; (ii) difficulties of access to finance for innovation; (iii) unsuitable size and cost of new processing equipment for delivering product innovations; (iv) problems encountered in creating adequate distribution networks; and (v) lack of innovation awareness. Moreover, it was evident that the needs of SMEs were as much in the human and organisational sciences as in food science and technology. Nevertheless, none of these findings are remarkable. With such small enterprises, the problems of day-to-day running dominate the company at the expense of innovation activities; how can an enterprise without scientific expertise access the latest developments.

In this context and even though there are a wide range of scientific needs and barriers listed in the SRIA of the TRADEIT project, this report concentrates on those deficiencies that require innovation advice and the means by which it may be delivered, as follows.

Lack of time for adequate innovation

While this is almost self-explanatory, it must be remembered that this SRIA deals with very small SMEs, mostly below the mean size of European food enterprises which is around 10 to 12 employees depending on the statistics used in its calculation. Indeed, the majority of the SMEs in the TRADEIT network were well below this size and were mostly family-based artisan enterprises of about 5 employees. The management function is generally a part-time activity of one person whose other activities are production, marketing, distribution, accounting, etc.

¹ The Strategic Research and Innovation Agenda of the TRAFOON project was not completed by the time this report has been elaborated and therefore is not included in the analysis.

Difficulties of access to finance for innovation

While this is very definitely a barrier to innovation, it is not strictly a research need. However, there is a need for research to determine the optimum support that could be put in place for very small SMEs. Such a support package need not be limited to financial matters but can cover organisational support, management support, external skills provision, etc. It is also probable that supports should differ by county and region and be integrated with other national and EU-wide support systems.

The unsuitable size and cost of new processing equipment for delivering product innovations

This was an almost universal topic raised by every SME in the TRADEIT data collection network. A recurring theme was the absence of processing equipment in the range between pilot-scale and very large industrial scale. This was compounded by the cost issue where, even where suitable size equipment existed, the high capital cost could not be justified within the economies of the SME. Particularly problematic was cutting equipment for cheese and sausage/chorizo style meat products, packaging/filling machines for cheese, meat, bread and other products, curing systems for meat products and mixers, provers and ovens in the bakery sector.

In this respect, one solution that was suggested many times during the data collection exercise was the possibility of clustering of small SMEs (either geographically or virtually) within a region so that time-share joint equipment could be operated. This could simultaneously alleviate the equipment capacity and cost issues. However, significant research will be necessary to come up with a suitable range of organisational concepts. It has been suggested that one such clustering model could develop as a new SME co-operative model while it has also been suggested that a clustering solution could be part of post-recession town centre regeneration processes.

Problems in creating adequate distribution networks

Distribution systems were noted as problematic for many innovation-driven expansions. Since the majority of the small SMEs used relatively short distance regional distribution, expansion to national level or beyond would require either a product reformulation to extend its shelf-life or a change in the distribution system to achieve a similar objective (e.g. a move from ambient to low temperature distribution).

The problem of innovation awareness

Innovation awareness is a problem that is compounded by the time issue outlined above. Time constraints militate against attendance at trade shows and seminars that would raise awareness of innovation possibilities. In addition, there is very little in-house scientific expertise in these companies so scanning the scientific literature is not an option. However, there are some efforts being made to overcome this awareness issue. For instance, the e-magazine, Taste of Science, which was launched through the TRADEIT project translates promising scientific innovations into a language that is easily understood by the non-scientific food business manager. The TRADEIT project has also set up a marketplace where food businesses can access scientific support either from each other or from third parties. In parallel, another initiative, Connect2Innovate, which constitutes a post-project continuation of the FP7 project Connect4Action is continuing the interaction between food scientists and consumer scientist so as to minimise the possibility of innovation failure that is so common with food products.

Business skills deficiencies

A list of the business and personal deficiencies as well as issues pertaining to product/process/packaging as gathered from the bakery, dairy and meat SMEs in the frame of the development of the TRADEIT project's SRIA is provided further below along with potential solutions. Overall, most of them are self-explanatory and could be solved, at least in part, by the creation of new training programmes, innovation guidance

programmes and other local/regional measures. It is also probable that solutions could be found within the food SME clustering/co-operative process mentioned earlier in this section.

- Business and Personal skills
 - Growth Management: Most food entrepreneurs have successfully set up their business based on a product concept or set up as a family initiative. However, growth management is not an inherently intuitive skill and many SMEs do not survive such a process, often because of skills deficiencies in cost control and marketing research. A robust system of local/regional training support and guidance through the innovation process is essential for many companies.
 - Personal Development: The personal development of the SME owner/manager is an essential part of the exercise and can be regarded as extension of the growth management problem. The same training programmes and innovation guidance can assist in this issue.
 - Lack of skilled workers; Lack of technical personnel: These allied issues are more difficult to overcome in the short-term as their solution may lie in the educational policies of the region. In time, such policies can overcome the skilled worker deficiencies. However, short-term training programmes for new employees in food industry issues (e.g. hygiene, food handling, processing and packaging, etc.) are more likely to lead to faster innovation success. Such basic training can be offered by appropriate public bodies and by the innovation guidance organisations mentioned above.
 - Lack of capital /access to investment: While there are many short-term solutions that can be suggested, longer-term policy changes within the financial sector will be necessary for an overall solution.
 - Poor marketing skills; Lack of information about new markets; Internationalization: While most food SMEs have a good knowledge of their local market and have the skills to introduce new products into that market, when more distant markets are considered, they immediately experience difficulties. Many have unrealistic views of such distant markets and do not have the skills to undertake effective market and consumer research. In addition, while most will acknowledge the need for market research, it often has a low priority in their financial commitments.
- Product / process / packaging issues
 - Raw Materials Costs; How to manage costs: These issues remain a significant inhibitor to innovation and, in particular, to successful product innovation.
 - Increased shelf life: During the survey process implemented in the frame of the TRADEIT project, all surveyed SMEs expressed a wish to extend the shelf-life of their product so as to facilitate the distribution process. Most considered that this was a packaging objective but because of the traditional nature of their product, there was little enthusiasm for achieving this by changes in product formulation unless the change had implied health benefits (e.g. salt and/or fat reduction).
 - No knowledge of new techniques; Lack of access to external knowledge; The need for new technologies and new products; Lack of adoption of new technologies: This emerges as a very common but quite diverse set of issues that could give rise to most of the classical food science and technology that will arise from the TRADEIT project's SRIA and which brings its outcomes closer to those commonly found in other recently published SRAs.
 - Lower energy: This is both a sustainability and a cost issue that is universal across the relatively smaller food SMEs.
 - Packaging; No knowledge on new packaging solutions: As outlined above, many SMEs regarded packaging developments as being important to shelf-life. Most were aware of the concept of

active and intelligent packaging but were unsure of what it could do for them. In many cases, packaging developments were a major innovation inhibitor, largely due to cost. In addition, the sustainability of packaging was an issue for many SMEs as traditional artisan products often have an implicit sustainability image. In the meat industry, the supply of natural edible packaging materials is an issue (e.g. sausage/chorizo casings).

- Labelling; Dealing with regulations: This was the most frequent innovation inhibitor mentioned by food SMEs during the survey process employed for the development of the TRADEIT project's SRIA. Issues included (i) the frequency of changes in labelling regulations; (ii) differences in regulations or their interpretation between geographical areas; (iii) the costs of implementing frequent labelling regulation changes; (iv) difficulties in label design to incorporate an increasing range of information; (v) and, most common of all, the difficulty of implementing changes in a very small company without the expertise or the available time for such implementation.
- Lack of rapid analysis equipment.
- Lack of expertise in developing new products and in by-product valorisation.
- Dealing with allergens.

4.5 Conclusions for the Food sector

The insights collected through the review of relevant documents which focus on the Food sector indicate that the respective part of the agri-food value chain in Europe is not well-structured and dominated by mainly micro-sized SMEs. Furthermore, major barriers to innovation appear to exist for SMEs in the sector with the primary of them being:

- Lack of business skills: There are major deficiencies right across the range of business skills that are necessary for successful innovation.
- Difficulties in accessing scientific knowledge: It is also clear that the lack of scientific expertise in this sector inhibits its ability to innovate.
- Need for enhanced training and development units at a local level, equipped with a range of mediators that will guide SMEs through the innovation process: While these are needed in all regions, no concrete conclusion can be drawn with respect to whether the same model will be suited to all regions.

Economic restraints as well as the large number of micro SMEs within the Food sector may prevent the delivery of the aforementioned in person. Under this light, solutions that will effectively leverage ICT will be essential if the more ambitious of the Food SMEs are to be guided successfully through the innovation process.

5. Interviews with Advisory and Beneficiaries Boards' members

In the framework of the agri-food value chain analysis, a total of 12 interviews were conducted with members of both the Advisory as well as the Beneficiaries Board of INNO-4-AGRIFOOD project. The goal was to gain insight into the needs of SMEs with respect to innovation support and the opportunities for online collaboration for innovation from their own perspective. The Advisory Board of INNO-4-AGRIFOOD is a small group of selected experts of the Agri-food Ecosystem, including technology and innovation providers, with knowledge and experience on the innovation needs and problems that agri-food SMEs are currently facing. The Beneficiaries Board of INNO-4-AGRIFOOD is comprised of representatives of leading organisations within the Agri-food Ecosystem, including associations of SMEs, Large Enterprises and Farmers, Agri-food Societies, Clusters, Forums, Initiatives, Centres of Excellence, etc., at national, EU and global level. With that in mind, interviewees were also asked for their views on online collaboration within the agri-food value chain and how their organizations engage in online collaboration based on their experience. All interviews were conducted in the form of a guided, semi-structured discussion. This approach enabled the interviewers to maintain the scope of the interview broad enough to capture potentially unforeseen opinions and ideas on relevant aspects of online collaboration for innovation.

The sections which follow within this Chapter present the results of the interviews. The questionnaire that was utilised to capture the responses of the interviewees is annexed this report.

5.1 How do they see online collaboration within the agri-food value chain? Are their organizations active in online collaboration and how?

The responses collected through the interviews indicate that some of the Board members are already utilising and benefiting from online collaboration, as they are involved in the ICT sector. In fact, for these organizations online collaboration is inevitable just as online communication. Online collaboration tools that are used by these organizations include, among others, cloud-based storage, intranet portals, file processing capacities, etc. Still, it appears that there are also organizations that are not aware of online collaboration platforms as they operate in the "traditional" agri-food sector. Collaboration according to these board members mostly takes place via face-2-face meetings. However, the use of social media is something that is considered as a way of online collaboration and is used by active SMEs in the sector to get in touch with consumers and/or promote their activities. Overall, Board members see potential in enhancing online collaboration, or have SMEs at least start considering online collaboration to simulate innovation.

5.2 What are their experiences with agri-food SMEs collaborating online?

It appears that the majority of the interviewed Board members have no experiences with agri-food value chain SMEs collaborating online. However, there a few Board members did indicate that they are aware of agri-food contexts in which online collaboration is utilised, such as e-shops that allow small farmers to sell to final customers, or agri-food initiatives such as the [FRACTALS](#) project. Most importantly, however, Board members seem to agree that there is significant potential for enhancing the use of online collaboration.

5.3 Where does online collaboration happen?

Several examples of platforms and tools through which online collaboration can take place were mentioned during the interviews. In particular, these include online mentoring platforms, [Trello](#), [Google Docs](#), [Slide Share](#), [Dropbox](#), [FIWARE tools](#) and even [Facebook](#).

5.4 What are the requests and offers of agri-food value chain participants?

The qualitative data that were collected from Board members during the interviews pinpoint towards the following requests and offers of companies active across the agri-food value chain:

- Facilitation of trade and exchange of resources.
- Information dissemination.
- Visibility increase.
- Cooperation with different points of the value chain.
- Farm management.

In this respect, it is important to note that the abovementioned tie well into the topics that have been identified within the Strategic Research and Innovation Agendas presented in Chapters 3 and 4 of this report.

5.5 With whom SMEs are cooperating online and for what reason(s)?

Board members who were interviewed and were aware of SMEs which are cooperating online, mentioned various examples of relevant collaboration partners and respective drivers, including:

- ICT and trading companies to facilitate the sale of their products.
- Big market chains aimed at enhancing their sales.
- Support organizations for networking and acquiring project assistance.
- Other similar SMEs to pursue common goals and exchange knowledge.
- The research community for assistance in innovation and development.
- Government agencies for support, facilitation and lobbying.

Still, some of the interviewees pointed out that they have no knowledge of SMEs collaborating online, or that still there is no common practice in the field, not even in narrow areas such as machinery vendors.

5.6 For what are SMEs using online tools?

The findings from the interviews with members of the Advisory and Beneficiaries Boards of INNO-4-AGRIFOOD, indicate that the principal reasons which drive SMEs to utilise online tools are to sell their products and interact with their customers.

5.7 What are their expectations with respect to online collaboration?

Based on the interviewees, online collaboration has just started to widely spread across all levels and sizes of SMEs in the agri-food value chain. In fact, they expect that it will become a prevalent form of collaboration, primarily but only because it “makes the world smaller” and facilitates much better and faster communication.

5.8 Conclusions from the interviews

The insights derived from the interviews with Advisory and Beneficiaries Boards’ members clearly indicate that online collaboration, at the moment, is not utilized at its fullest potential and many SME actors are not yet actively engaged in supporting or enhancing online collaboration. Still, there are many challenges faced

by agri-food SMEs for which they need to collaborate with potential technology and knowledge providers. With this in mind, the potential benefits of online collaboration in terms of enhancing the innovation capacity of SMES in the agri-food value chain and addressing their research and innovation needs become evident. In this respect, the role of innovation intermediates such as the Enterprise Europe Network as well as that of SMEs clusters and other key stakeholders (e.g. National Food Technology Platforms and ETPs) is essential.

Annex

Questionnaire

Q1: How do you see online collaboration within agri-food value chain? Are your organizations active with online collaboration and how?

Q2: What is your experience with agri-food value chain SMEs collaborating online?

Q3: If there is online collaboration, where does it happen (which platforms, tools, etc.)?

Q4: What is the request and offer going around within agri-food value chain participants?

Q5: With whom SMEs are cooperating online and for what reason(s)?

Q6: For what are they using the online tools?

Q7: What are your expectations with regard to online collaboration going forward?

Any other comment you want to share with the INNO-4-AGRIFOOD project team?