

# Strategic Research and Innovation Agenda for fostering innovation and knowledge transfer to SMEs, farmers and other national food businesses

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*European Collaboration of the National Food Technology Platforms.*

## 1. Introduction

Small and medium sized enterprises<sup>1</sup> make up 99.1% of the European food and drink businesses. These 285 000 companies generate 49.5% of food and drink turnover and employ 62.8% of the workforce in the sector (Food Drink Europe 2016). Considering their significant share in the total activity of the food industry, their role is crucial for the local supply. SMEs and farmers have to be integrated into a system approach for provision of sufficient quantity of food for all, which is safe and nutritious for healthy and sustainable diets. The intensive involvement of SMEs into innovation is one of the really important tasks. There are some differences within the EU member states in the definition of the SMEs by turnover and number of employees and in the focus of the national innovation supporting policies to different sizes and/or groups of SMEs. In some countries medium size businesses are seen as the main potential actors of innovation, in other countries micro size companies, “craftsmen” are seen as the main assets for development and innovation in the food supply.

In the food value chain there are two distinct groups of innovative SMEs:

- Food manufacturers, whose aim of innovation is to produce food with new or improved properties and augmented services and increased benefits (increased food safety, sustainability, ethical aspects, better consumer/customer information, supporting healthy diet, etc.) and/or with more efficient use of resources at lower costs.  
They need input typically from knowledge and solution providers for creating the innovative idea, and also through the other steps of the innovation process from identification of the unsatisfied needs till commercialisation and market launch together with innovation management advice and financial support for innovation, as necessary.
- Solution and service providers, ingredient manufacturers, whose strength to create innovative ideas for not satisfied customer and consumer needs. They need reliable food manufacturing partners for developing and testing the first food applications in an area and also management advice, financial support for innovation as necessary.

The innovation behaviour of these two groups is different. While food manufacturing SMEs are usually more “conventional” and their innovation activity is less frequent, knowledge and solutions providers see innovation as an element of their core business. For achieving a real change in the food system the innovation of the “conventional” food businesses must also be enhanced.

In this challenging environment, SMEs are holding their stand in the European Food Market by developing solutions based on different approaches. In the past the strategies applied included: increasing diversity and multifunction activities, concentrating on local specialities,

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<sup>1</sup> Defined by the EU as having less than 250 employees and an annual turnover not exceeding 50 million Euros and/or an annual balance sheet total not exceeding 43 million Euros.

exploiting novel marketing ways, improving management of compliance with legal and quality standards, and optimizing and integrating production, logistic and sales.

However different segments of SMEs have several constraints, They have limited resources, which have an impact on their research, development and innovation capacities. Moreover their innovation behaviour and their priorities for different technical and organisational topics related to food systems differs. Therefore for enhancing their involvement into research and innovation activities the consequences of these above mentioned factors have to be considered and specific approaches have to be applied to help them in exploiting their innovation capacities and to tackle their barriers of innovation.

Farmers producing food, but also many “large” national food businesses have more than 250 employees, but their majority is made of unskilled operators, typically have similar constraints of innovation, therefore the relevance of the proposed actions for involving and engaging them into the innovation is considered also.

The objective of this document is to summarize the proposed actions, which can increase the involvement and engagement of SMEs into the innovation of the food systems. Within this document the following method is followed:

- First the needs of the food SMEs, farmers producing food and other national food businesses are analysed together with the constraints of their involvement and engagement into innovation.
- This is followed by summarizing the approaches, methods and solutions to serve their needs by meeting their preferences and to overcome the constraints and to foster their innovation activities.
- In the next step the proposed strategic research and innovation activities are described. A decimal cross reference system is applied showing the links between the proposed actions the approaches, methods and solutions for overcoming the constraints of innovation and the needs of food SMEs and farmers producing food.

## **2. Needs of food SMEs, farmers producing food, national food businesses for approaches, ideas, methods, solutions to get their key jobs done better through innovation**

As important contributors of the food system food SMEs and farmers producing food are exposed to the same global trends and challenges as any other members of the food value chain, which can be grouped under the following 4 priorities also based on Food 2030 background document, 2016:

**”(1) NUTRITION for sustainable and healthy diets:** Ensuring that nutritious food and water is available, accessible and affordable for all. Reducing hunger and malnutrition, ensuring high levels of food safety and traceability, reducing the incidence of non-communicable diet related diseases, and helping all citizens and consumers adopt sustainable and healthy diets.

**(2) CLIMATE smart and environmentally sustainable food systems:** Building food systems adaptive to climate change, conserving natural resources and contributing to

climate change mitigation. Ensuring diversity in food systems (including raw materials, production, processing, distribution and logistics) including in terms of cultural and environmental diversity. Sustainable use of natural resources (water, soil, land and sea).

**(3) CIRCULARITY and resource efficiency of food systems:** Implementing sustainability circular economy principles across the whole food system to make it resource-efficient and minimize food losses and waste.

**(4) INNOVATION and empowerment of communities:** Market creating innovation and investment, while empowering communities. Application of new business models and development of value-added products, goods and services, meeting the needs, values and expectations of the society in a responsible and ethical way. More and better jobs across the EU, fostering thriving urban, rural and coastal economies and communities. Application of fair trade and pricing.”

They have to:

- meet the rapidly changing consumers' needs and demand within an appropriate and attractive choice of food products and enable informed consumer choices;
- provide healthy and safe foods and diets for all;
- improve the sustainability and competitiveness of the agri-food industry through resource-efficient food production, processing and distribution and sale integrated into a flexible and resilient food system and value added products;
- developing and maintaining skills, knowledge in food products, processing, distribution, retail, food service and Innovation services.

However they have specific constraints caused by their limited resources and specific business and innovation culture influenced by the vulnerability of their business.

Therefore some research based innovation activities, typically those, which require less resources, enable faster implementation and return on investment, are more relevant and applicable for them than those, which need more resources, investment, long return time and more complex knowledge beyond their core competence.

SMEs and farmers producing food need also specific technical management, innovation service and financial support to enable them to use their available innovative capacities and resources in an optimal way. At the same time, it has to be taken care of that the absorptive capacity for research results is increased all over the European Union.

SMEs/farmers producing food needs and constraints (2.1 – 2.15):

- 2.1 To be made aware of the new research results and solutions in an easy, clear, user friendly format;
- 2.2 To access to new approaches, new and complementary knowledge beyond their main competence, new solutions, data and technical information from the food sector and from other disciplines (such as ICT, advanced manufacturing, diet and health, energy, water, logistics, etc.) in an easily understandable, user friendly, concise format prepared for application. Research results have to be converted into practical

solutions, knowledge, information and data and offered in such format, that the SMEs/food producing farmers should understand how they can use these to carry out their key tasks better (Ulwick 2014), and solve the specific challenges, problems, faced by the business. SMEs and farmers producing food have to collaborate, with each other to combine their knowledge and research systematically;

- 2.3 To have access to technical and management advice for adaptation and adjustment of the solution; for problem solving and for emotional support and management of the implementation through regular personal dialogue complemented by other services and methods throughout the whole innovation project.

SMEs prefer to have this information, dialogue, support (2.1; 2.2; 2.3) locally, in mother tongue and being contacted first (“knocking the door”) by people (intermediaries, knowledge providers and suppliers), whom they trust. Food businesses and farmers producing food are not aware of the capabilities of the ICT, advanced manufacturing and other solutions. Similarly solution providers from the ICT and advanced manufacturing sectors are not aware of the problems of the food chain, where their innovative solutions can be applied.

Constraints related to 2.1; 2.2; 2.3:

- Limited internal human resources and lack of time to look for new knowledge, to interpret too complex research results and explore what is relevant from the whole information load for the business.
- Lack of time to attend meetings, particularly in abroad, in a foreign language, cost of travelling. The needs of SMEs, farmers producing food and other national food businesses having limited resources are frequently poorly articulated. While large businesses have specialised staff having the necessary skills to carry out these tasks, SMEs, farmers producing food and other national food businesses do not have such specialists, they need support.
- Limited dialogue and collaboration to the businesses, knowledge providers and intermediaries and services of the other steps of the food value chain, lack of access to their knowledge beyond the boundaries of their own activities.
- Lack of understanding the need for and the principles of system approach of food provision.

- 2.4 Proofs of benefits and feasibility of investing time and resources into innovation projects based on research results.

Constraints related to 2.4:

- Many food SMEs, farmers producing food and other national food businesses are reluctant to participate in research and innovation projects, since they do not believe in the timely practical applicability of research results within a relatively short time, acceptable for their business.
- They try to reduce the risks of developing new products, technologies and services and the failure of innovation projects. They prefer to follow successful examples and learning from each other.

- The proportion of technology pioneers (Innovators) is in general lower than 3%, that of the Loading Technology Users (Early Adopters) is lower than 10%, the proportion of Technology Adopting Enterprises (less innovative SMEs, adopting existing technologies is around 20%, and Basic SMEs, which have no or very limited R+I activities represent around 70% (EURAB 2004). The typical willingness of food SMEs, farmers producing food for innovation is lower than these general figures for all sectors.
- Fear that innovative products are copied by others before they can exploit properly the benefits of their innovations.

## 2.5 Access to reliable research and innovation partners

### Constraint related to 2.5:

- Concerns about the performance of knowledge providers, researchers and suppliers.

## 2.6 To achieve practical results, implementation, and return from investment into research and innovation within a relatively short time.

### Constraints related to 2.6:

- Limited financial resources to finance projects for longer time without short term return, even if the longer term activities may be more profitable.

## 2.7 To test new technical solutions, new varieties, new production machinery, new products and technologies at reasonable costs.

### Constraints related to 2.7:

- Lack of experimental and pilot plant facilities caused by their relative high cost, compared to the time, they are used.

## 2.8 Access to new and complementary facilities, machinery, technical solutions for production of innovative products, application of innovative technologies at affordable price, particularly to those, which can result in reduction of energy, water consumption, loss of food and packaging material and labour and/or enabling to develop new product, and packaging properties and related value added services. Flexibility in changing, modifying production facilities.

### Constraints related to 2.8

High cost of purchasing new machinery and limited availability of advanced machinery for lower scale food production.

- Limited stock of available machinery within the business. Available facilities, machinery are focused mainly on the current technology.

## 2.9 Access to new varieties (animal and vegetal), new raw materials, ingredients with new, improved properties, new packaging material with new, improved functions

Constraints related to 2.9:

- Although some of these needs are served, SMEs/farmers producing food use relatively low volumes, therefore the attractiveness for their suppliers to serve their specific needs is low, and their bargaining power is weak.
- Access to information on new varieties, breeds, ingredients, packaging materials.

2.10 Access to management, marketing, innovation management services, business plan development, commercialisation of R+D skills, access to knowledge and skills on resource efficient, eco-solutions, ICT, advanced manufacturing, diet and health and other disciplines.

Constraints related to 2.10:

- Lack of competence, trained, skilled staff beyond the core competence of the business.

2.11 Financing innovation projects.

Constraints related to 2.11:

- High cost of innovation projects related to the available capital and financial resources.
- Lack of awareness of external public and private funding opportunities fitting to the conditions, the innovation behaviour, risk perception and risks taking capability of the SMEs/farmers producing food.
- Only a small proportion of SMEs and farmers producing food collaborate with each other.
- Lower proportions of food SMEs/farmers producing food collaborating with their peers than in the high-tech sectors.

2.12 Finding the appropriate solutions, knowledge and skills to match the problem of the business and the reliable knowledge provider.

Constraints related to 2.12:

- The non-linear nature of application of research based solutions are a problem to be solved.
- The market uptake of results, solutions from research and development may take up to 10-20 years.
- Limited availability of knowledge providers or suppliers with reference, whom SMEs/farmers producing food can trust that they are able to provide practical solutions, meeting the needs of the business at reasonable cost, within the expected, reasonable time. Without targeted orientation the matching process is incidental and may take several years.

2.13 Access to trained, skilled staff .

Constraints related to 2.13:

- Lower proportion of staff with systematic training on product, process development, innovation management, business development than is the high-tech sector.

2.14 Access to information on consumer needs, preferences and behaviour, market trends, changes and opportunities.

Constraints related to 2.14:

- Lack of customer and retailer receptiveness.
- Lack of information on new methods of consumer research.
- High cost of consumer research.
- Low bargaining power in discussions with large customers and retailers

2.15 Compliance to legal requirements and quality standards.

Constraints related to 2.15:

- Complex legal requirements related to several areas of production and innovation, such as nutrition and health claims, novel foods, food contact materials, etc.
- High costs of providing evidences to verify the compliance of the results of the innovation project to the legal requirements
- High costs and pressure and documentation to comply with private quality standards and certifications demanded by the retail sector, and related inspections management

**3. Solutions, methods approaches to serve the needs and overcome the barriers of food SMEs, farmers producing food and other food businesses and to foster their innovation activities**

3.1 Awareness of new research results, solutions.

National Food Technology Platforms (NFTPs), innovation clusters, national innovation networks, membership based food industry research organisations. technical centres and Innovation services can collect new research results and solutions. They involve different stakeholders of the food innovation and facilitate thematic working groups, collective research projects whilst applying a multi-stakeholder approach. They convert this information into clear, understandable, user-friendly format focused on the aspects of the benefits and practical applicability. The knowledge providers participating in these networks can significantly contribute to creating awareness on new results and solutions. Dissemination by intermediaries or suppliers is crucial at national level on mother tongue. The cooperation of these networks at European level increases the efficiency of these activities.

The systematic cooperation of the NFTP's and EFFoST networks at the European and national level can provide the combination of the European overview and the national contacts in mother tongue.

3.2 Access to new technology solutions, technical informations. The role of national entities.

3.2.1 National intermediaries with food industry/farming background and experience can significantly support the access to information, knowledge solutions, and data from the food sector and from the other disciplines and subsequently transfer knowledge. These networks use frequently a multi-stakeholder approach. Research results will be converted by the intermediaries to easily understandable, concise, practical information as described in 3.1. The enabling functions of the new, advanced solutions shall be defined by the networks, communities of new knowledge providers, collected into inventories and provided to the users' community.

The food businesses and farmers producing food have to collect the problems, challenges in their activities, where the enabling functions of the ICT and advanced manufacturing solutions and that of the solutions from other high-tech sectors can help. These have to be described and collected into inventories, which will be provided to solution provider communities.

NFTP's typically have developed and updated their national Strategic Food Research and Innovation Agendas and Implementation Plans, which are publicly available for all national stakeholders of food research and innovation and provide input to European initiatives if requested.

A systematic dialogue between the users' and solution providers' communities will be facilitated at European, national and local level by the networks of NFTP's and their intermediaries and EFFoST to define the value propositions represented by the new enabling functions of the new solutions and to improve the understanding of the problems to be solved by the solution providers. Intermediaries of industry based, national innovation networks transfer knowledge in mother tongue.

Collective shared cost knowledge transfer, innovation services provided and collective research projects facilitated by networks, membership based industry food research organisations, clusters, NFTP's are catalysers of open innovation and promote multi-stakeholder approach.

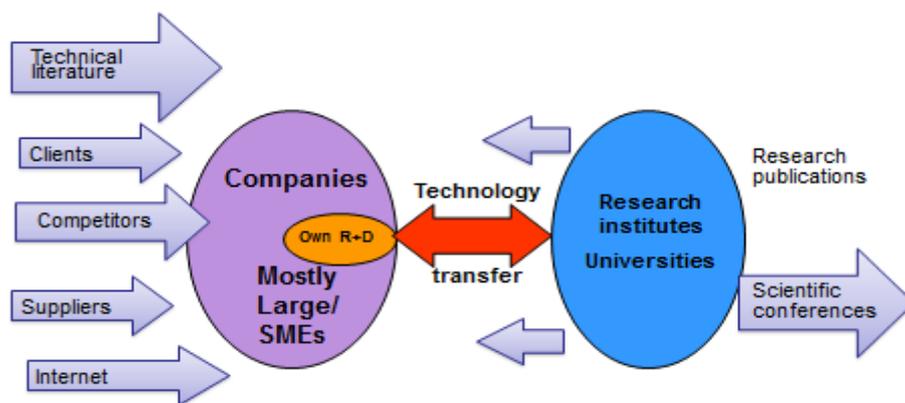
3.2.2 Application of system approach of food provision, the value chain management concept to access complementary resources, capabilities and competences of value chain partners. There is a significant potential, which is not exploited yet properly in the systematic collaboration of food processing SMEs and farmers producing foods on exchanging information on their needs, constraints of their technologies, capacities, factors influencing the quality of their products and on systematic strive for combining their complementary resources, capabilities, competences for mutual benefits to develop new competitive products, technologies and services. Specific advantages can be achieved in local food supply and for serving niche markets, with added value premium products (traditional foods and foods with specific new

properties and benefits, local and new recipe foods, premium quality foods, etc.). SMEs and farmers producing foods can identify the areas of innovation where they have common interest. The bottom up approach of the EIP- AGRI, RDP and ERDF can be used for strengthening the innovation through national and regional operational groups involving local farmers and food processors leading to enhancing the system approach of food supply and provision. Their collaboration will be made through a multi-stakeholder approach.

Intermediaries, researchers, solution providers should be trained on the concept of “Outcome driven innovation” to meet the needs of the SMEs/farmers for their “key jobs to be done”.

### 3.3 Advice for implementation of the innovation projects. The role of intermediaries.

3.3.1 Intermediaries, innovation facilitators, innovation brokers of the industry based innovation networks and services can contact SMEs/farmers producing food, carry out personal visits, consultations and help the members of the networks through advice by themselves or recommending reliable, experienced providers of technical and management support services. All of these services will be provided locally in mother tongue.



Source: A. Sebők, (2007 TRUEFOOD)

Figure 1/a Sources of innovation

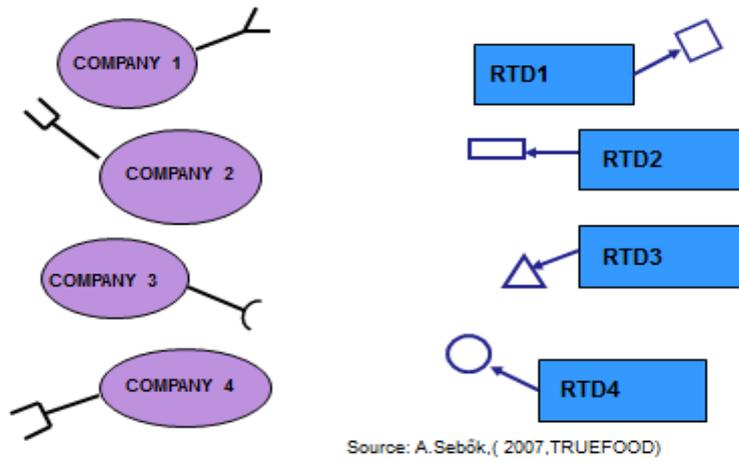


Figure 1/b Knowledge transfer, technology push

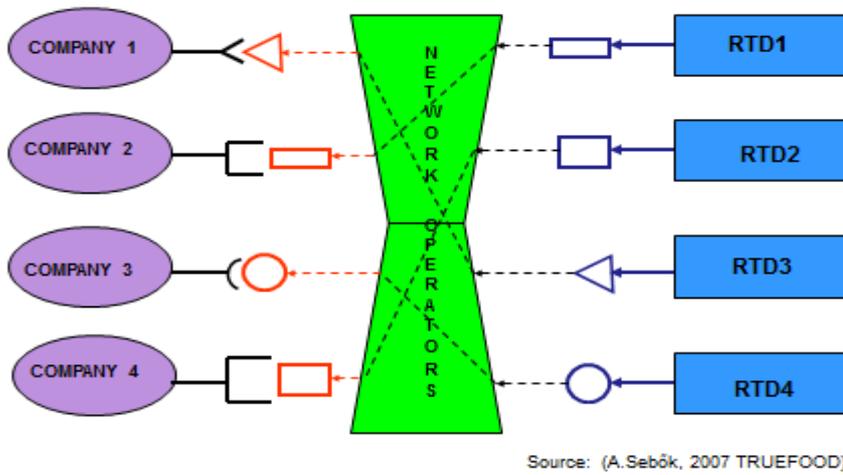


Figure 1/c Knowledge transfer – technology pull

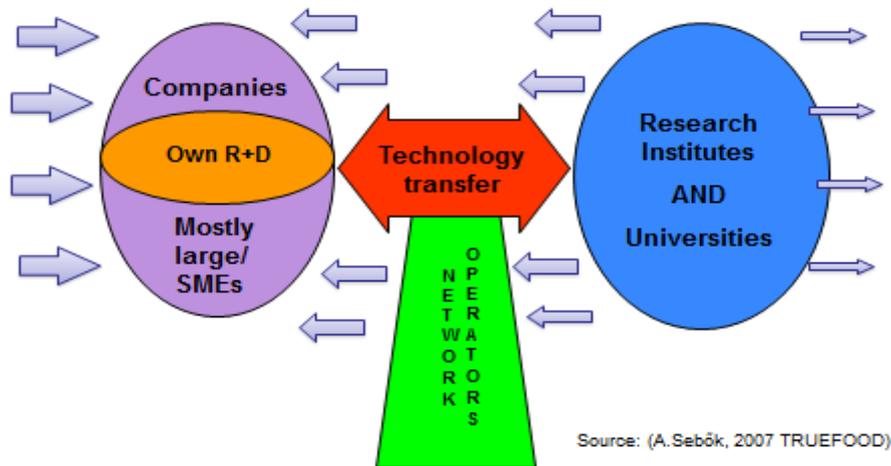


Figure 1/d The solution

**Figure 1: Role of intermediaries in improving knowledge transfer (Sebök, 2007)**

- 3.3.2 Capacity building and training food businesses/farmers producing food and intermediaries on the system approach of food supply innovation management, commercialisation, technical subjects, eco-solutions, knowledge and information management, intellectual property management, collective research; businesses on business skills, resource management, financial and business management, food chain management, marketing management; intermediaries on knowledge transfer. Shared cost services provided by the innovation networks, intermediaries.
- 3.3.3 Application of the concept applied in the Future Internet PPP. The concept of the Future Internet PPP is aimed at accelerating the development and adoption of Future Internet Technologies, advancing the EU market for smart infrastructures, increasing the effectiveness of the business process through the internet. It brings together the demand and supply sides and involves users early into the R+D+I process. The "platform technologies" are used and validated by many users (SMEs). It applies a 3 phases approach of : (1) defining the technological foundation and create use- case projects (on agri-food chain/ SmartAgriFood), defining and developing the Enabling Functions of Key Enabling Technologies; making inventories of available (public) infrastructure, provision of integrated programme support – for better governance and dissemination; (2) develop large use scale pilots and platforms (on agrifood&logistics to test and improve these Key Enabling Functions and making them more user-friendly); (3) focused on entrepreneurs, startups, SMEs. Expansion of use cases through applications, services. Application of Accelerator Projects, where the project partners develop calls for small applications with a limited amount of public co-funding for solution providers and users jointly (30-150 000 Euros/project for 31 projects at the end of the FI - PPP), provide mentoring support to the projects on the applications including assistance in developing business models,

dissemination, involving investors, monitor the performance of the supported small projects, etc. and disseminate the results to a wide audience.

3.4 Increasing trust in benefits and feasibility of innovation projects. The supportive actions.

3.4.1 Development of inventories of successful cases, good practice guides.

3.4.2 Intermediaries owned by food businesses (food industry federations, farmers associations, chambers, membership based industry research organisation, clusters, innovation agencies), provide innovation platforms and joint services

- on references, recommendations of reliable research organisations, knowledge solution providers in different topics, disciplines,
- collective research, demonstration projects,

3.4.3 Segmentation of SMEs/farmers producing food by innovation behaviour and readiness in acceptance of new ideas, solutions from external sources as RTD providers (EURAB 2004) and provision of incentives, project schemes matching their preference. Technology Pioneers and Leading Technology Users<sup>2</sup>, (which use new technologies at an early stage and develop the respective techniques with their own research capacities), exploring new ideas from external sources like suppliers, customers and technical journals.

Technology Pioneers need support for participation in large international projects, support for risk capital, mobility awards for recruiting, training scientific staff.

Leading Technology Users can benefit from collaboration with external RTD providers, suppliers, technology developers, participation in simple international R+D collaboration schemes, like EUROSTARS, EUREKA, Fast Track to innovation, European and national and regional bottom-up schemes support in seeking and using intellectual property rights and support for market oriented R+D projects.

Technology Adopting Enterprises need SMEs support by ideas competition combined with implementation awards, support for technology transfer actions, involvement in pilot projects and participation in collective research measures. Basic food SMEs can benefit from measures to stimulate innovation – e.g. information, education and training on innovation management, coaching in the innovation process, ideas competition, and improved knowledge transfer.

Collective research / collective marketing and collective supply chain management activities reduce the barriers represented by relatively high costs for SMEs. Collective research in the pre-competitive phase of innovation is an efficient tool for involving those SMEs into a shared cost research, which have less intensive innovation activities and which do not have research capabilities on their own. In shared cost collective research in addition to the lower costs, they can also benefit from the collective learning from each other. Collective research can serve as a first step to involve SMEs into R+D+I activities, to understand the concepts and potential of

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<sup>2</sup> Terminology used by EURAB (2004)

application of new methods, and prepare the confidential close to market innovation projects.

### 3.5 Reliable research and innovation partners

3.5.1 Intermediaries owned by the food businesses and farmers producing food provide innovation platforms and joint services on references, recommendations on reliable research organisations, knowledge, solution providers in different topics, disciplines (the same as 3.4.2). The intermediaries of the food processors and the farmers can combine their services to foster the application of the food system approach.

3.5.2 Intermediaries, R+I networks can contribute to involving external knowledge and fostering open innovation.

### 3.6 Results, return from investment in relatively short time

3.6.1 Development of industry best practice guides, inventories of successful cases.

3.6.2 To provide risk finance, loans, co-finance.

3.6.3 Use of knowledge, solution providers having references for practical approach

### 3.7 Access to experimental and test facilities

3.7.1 Provision of experimental and pilot plant facilities and services with skilled staff to operate these facilities of knowledge and technology providers for hire, or as contracted services.

3.7.2 To establish research infrastructure for the “Food Factory of the Future” and for the “Farms for Tomorrow”.

3.7.3 Providing access to Living labs for food applications of ICT and establish shared cost joint test facilities for ICT and advanced manufacturing solutions.

3.8. Access to new and additional facilities, machinery, technical solutions at reasonable cost

3.8.1 Development of new business models for accessing new machinery (payment by use, payment by availability, upgrade opportunities etc.).

3.8.2 Development of low scale food processing machinery for advanced technologies.

### 3.9 Access to new varieties, raw materials, ingredients, packaging materials

Organisation of platforms by intermediaries, networks, to distribute information on available new varieties, breeds, ingredients, packaging materials, to collect users' needs related to them and to facilitate the dialogue between suppliers and users and other service providers and contribute to the application of the multi-stakeholder approach and foster involving external knowledge to exploit the advantages of the open innovation. Collaboration of the intermediaries and innovation services of food processing SMEs and farmers for mutual benefits.

### 3.10 Management, marketing, innovation management, business development support and skills

Joint shared services of intermediaries, capacity building, training, knowledge transfer involving personal contacts, visits by innovation facilitators, innovation brokers (see. 3.3.2)

Procedure manuals, advisory services, recommending reliable specialist service providers.

Systematic collaboration with innovation networks, interest groups, clusters, technology platforms from other disciplines on preparing inventories of enabling functions of new solutions, methods and on problems, where the solutions, enabling functions of other disciplines can help.

### 3.11 Making financing of innovation projects easier

#### 3.11.1 Collective research (see 3.4.3)

#### 3.11.2 Joint monitoring services provided by intermediaries, innovation networks, clusters on available innovation funding schemes

#### 3.11.3 New business models for SMEs for financing innovation projects and reducing the risks related to innovation. Provision of different innovation funding schemes to different segments of SMEs/farmers fitting to their innovation behaviour and risk taking capacity (see 3.4.3). Public co-funding of bottom-up projects.

#### 3.11.4 Collaboration along the food chain with chain partners- particularly food processing SMEs, farmers, local traders -, peers and other disciplines to combine complementary resources, capabilities and competences for joint benefits.

### 3.12 Enhancing matching of industry problems and applicable results, solutions

Services of the intermediaries like NFTP's jointly with EFFoST and networks from other disciplines on collecting available knowledge and solutions, structuring the new knowledge, enabling functions, lessons learned into inventories, collection of successful examples. NFTP's and other innovation network are tools for implementing open innovation.

In parallel collecting the customers/consumers, users' needs and preparing inventories of problems of the food industry SMEs on a targeted area.

These networks create awareness, facilitate matching of problems/users and solutions and solution providers. Personal visits of innovation facilitators of the intermediaries can significantly increase the efficiency of the support. The matching should be followed by adoption of the solution to the specific problem; testing, adjustment and evaluation of the tailor solutions, evaluation of the market opportunities and feasibility studies before practical implementation and exploitation can take place.

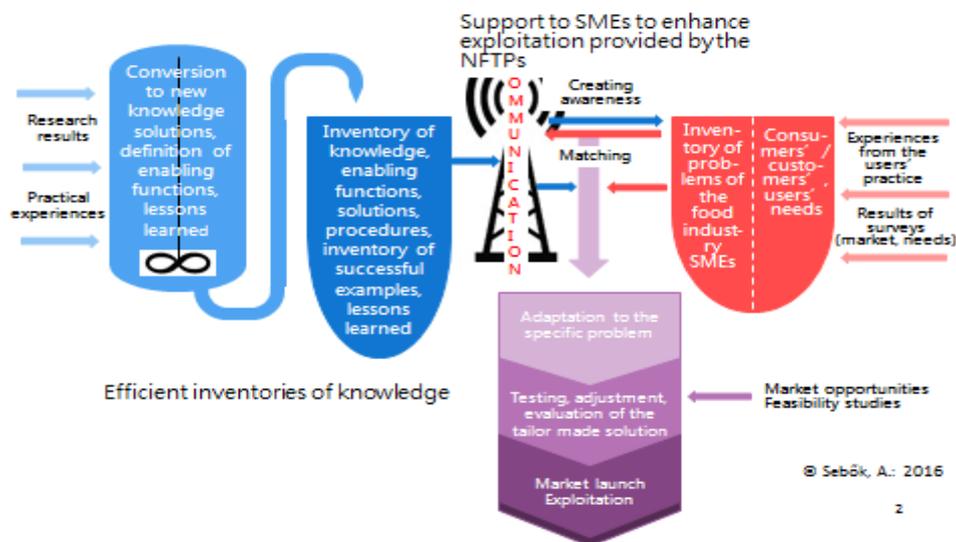


Figure 2: Process of exploitation of the knowledge solutions – supporting tools

### 3.13 Trained, skilled staff

Capacity building, systematic vocational education and training of the staff of the food businesses with particular focus on product, process development and also on innovation management, commercialisation, technical subjects, eco-solutions, knowledge and information management, intellectual property management, collective research, business skills, resource management, financial and business management, food chain management, marketing management. (similar to 3.3.2 with some extension). Strengthening the dialogue and cooperation between the education organisations and businesses will improve practical skills of young graduates and young skilled workers (see ISEKI).

### 3.14 Access to information on consumer, customer needs

3.14.1 Shared cost services, market research, statistics provided by the food industry federations, associations, chambers of agricultures, farmers associations.

3.14.2 Provision of easily understandable description of the new methods of consumer research, their benefits, applicability, limitations, cost by innovation networks, like the collaboration of the NFTP's and EFFoST.

3.14.3 Establishing joint local, regional networks of food SMEs and farmers producing food to explore the needs of the local communities and involve and engage them into the development of the food systems

3.15 Compliance to legal requirements and quality standards

3.15.1 For members of the food industry federations and their branch associations, farmers associations using the information with practical explanations provided by these organisations. For other SMEs/farmers using shared cost legal information services

3.15.2 Making legal and quality standards requirements simpler and more harmonized, together with the certifications compliance.

#### **4. Proposed strategic research and innovation activities to foster involvement and engagement of SMEs and farmers producing food to innovation**

4.1 (Related to 3.1; 3.2.1; 3.3.1 ;)

4.1.1. New approaches for the dialogue with SMEs, farmers producing foods and other national stakeholders of food research and innovation through the combination of conventional methods – personal contacts, networking with new enabling functions of digital methods and collaborative tools.

4.1.2 Methods of operating multi-stakeholder platforms for research and innovation projects – ensuring the sound balance of involvement of stakeholders and protecting IPR.

4.2 (Related to 3.2.1; 3.9; 3.12; 3.14)  
Methods to explore the real needs of the SMEs, farmers and other users of research and innovation on the food chain to enable them to get their jobs done better, using the results of EU projects (Truefood, Trafoon, Tradeit).

4.3 (Related to 3.1; 3.2.1; 3.3.3; 3.7.2; 3.7.3; 3.8; 3.10)  
Application of ICT and advanced manufacturing in the food value chain.

4.4 (Related to 3.2.1; 3.2.2; 3.14.2)  
Delivery of nutritional and pleasurable food products that meet dietary needs and prevent non-communicable diseases.

- 4.5 (related to 3.2.1; 3.7; 3.12)  
Establishing open testing labs for the ICT and advanced manufacturing solutions, sensors, solution of the Food Factory of the Future, and for the food producing Farm for Tomorrow.
- 4.6 (Related to 3.4.3; 3.11.1)  
Collective research using conventional methods in combination with the new enabling functions of digitalisation and new collaborative tools.
- 4.7 (related to 3.7.1; 3.7.2; 3.7.3; 3.8.1)  
New business models for enhancing access to new machinery and experimental facilities of SMEs/farmers producing food for innovation projects.
- 4.8. (Related to 3.8.2)  
Machinery for small scale food processing.
- 4.9 (Related to 3.10; 3.13)  
New approaches to capacity building of SMEs and practical on-the-job training of the staff using the combination of conventional methods and digital solutions.
- 4.10 (related to 3.2.1; 3.2.2; 3.7.1)  
Decision support and modelling tools on
  - food safety
  - quality
  - diet and health
  - sustainability and reducing environmental impact
  - cost reduction
  - by products and generating added value from waste and evaluation of feasibility.
  - Legal and standards requirements and compliance management
- 4.11 (related to 3.4.3, 3.6.1; 3.6.2.; 3.6.3)  
Understanding the motivations of SMEs and farmers with different types of innovation behaviour for investing into research and of innovation.
- 4.12 (related to 3.7.1,3.7.2, 3.7.3, 3.11.1, 3.11.2, 3.11.3, 3.11.4)  
New business models for SMEs to manage the risks and finance the costs of innovation It includes the reduction of risks and the costs by collective research and

collective services in the pre-competitive phase and risk finance and shared technical facilities in the close-to-market phase.

4.13 (related to 3.2.2, 3.14.3)

New joint approaches of food SMEs and farmers producing food to involve local communities in the innovations for improving the food systems.

## 5. Strategic Research and Innovation Priorities of the NFTP's with specific focus to the needs of SMEs

1. A resource efficient food supply, including food processing, advanced and environmental -friendly technologies, through food chain approach, increasing consumer acceptance of food products and industry best practices.  
(4.3; 4.5; 4.7; 4.8; 4.10)

Research and application of improved and new technologies, advanced process control, manufacturing and ICT solutions, management systems, innovative solutions are necessary for:

- enabling productive, flexible food manufacturing practices, with low cost and low scale technologies;
- efficient use of energy, materials, water and labour to promote nexus and reduce waste and losses and to maintain existing/current environmental impact of food products and packaging;
- systematic approach to optimise the exploitation of limited raw material and other biological resources;
- reduction of production costs without compromising food safety and quality;
- improve and retain consumer confidence and trust in food supply chain processes and practices;
- development of accessible, affordable technologies and equipment for SMEs which can deliver the above listed functions.

2. Delivering nutritional and pleasurable food products that meet dietary needs and prevent non-communicable diseases.  
(4.4; 4.3; 4.10)

Food products should contribute to the improvement of consumer health and well-being through understanding of the relationship between diet and health for individuals, groups and populations, at the genomic to physiological level. Food products, assisting a balanced diet, should maintain the pleasure from eating. To achieve this, research should be carried out on:

- enhancing nutritional potential of new and not properly exploited raw materials and ingredients;
- to preserve and enhance nutritional value and sensory properties in processing, distribution and sale through optimisation of existing and new processes and technologies;
- reformulation of existing products and development of new concepts to create healthier alternatives without compromising product safety or quality and guidance and information for that;
- helping consumption decisions through better understanding of consumer perception of nutrition and health issues and trade-offs with pleasure from eating and associated behaviours

to facilitate innovation

3. Promotion of transfer and accessibility of new and advanced knowledge and solutions and provision of skilled staff with updated, relevant competences.  
(4.1.1; 4.1.2; 4.2; 4.3; 4.5; 4.6; 4.9; 4.10; 4.11, 4.12, 4.13)

There is a need for sustainable business models, systems and networks which convert research results into practically applicable solutions data, information for SMEs on:

- efficient use of material, energy, water and labour resources and relative nexus on circular economy;
- adaptation and application of advanced process control including safety control, manufacturing, ICT, energy management solutions and value chain management methods for the food supply chain;
- preserving and enhancing nutritional value and pleasurable sensory properties in processing, distribution and sale and on reformulation of products to deliver food products which contribute to healthy life styles and prevent non-communicable diseases, and
- methods, tools and operational models which support to maintain and develop skills, knowledge and competence of staff in manufacture, distribution and sale of food.

## 6. References

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