



PROOF OF CONCEPT CALL

MRTPA Agro-Bioeconomy Summary

OIS-AIR project
*Open Innovation System of the
Adriatic-Ionian Region*

May 21th, Zagreb



Abbreviations

ADRION	Interreg Programme of Adriatic-Ionian region
AIR	Adriatic-Ionian region/macro-region
B2B	Business-to-business
EUSAIR	Macro-Regional Strategy of Adriatic-Ionian Region
GVCs	Global Value Chains
IoT	Internet of Things
KETs	Key enabling technologies
MRS3 AIR	Macro-Regional Smart Specialisation Strategy of Adriatic-Ionian Region
MRSTPA	Macro-Regional Sub-Thematic Priority Area
MRTPA	Macro-Regional Thematic Priority Area
OIS-AIR	Open Innovation System of the Adriatic-Ionian Region
POs	EU Policy Objectives
R&D	Research and development
R&D&I	Research, development and innovation
S3	Smart Specialisation Strategy
TPA	Thematic priority area

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1. About OISAIR Project

The OIS-AIR Project pursues the final goal of establishing the Open Innovation System of the Adriatic-Ionian Region (OIS-AIR), a single competitive and attractive marketplace for technology and innovation at macro-regional level. OIS-AIR intends to strengthen the development of industrial and entrepreneurial activities within a virtuous circle involving relevant stakeholders, from research institutions to SMEs and public administration in the Adriatic-Ionian Region. Coordinated by Area Science Park (Italy), the OIS-AIR project is co-funded by the Interreg ADRION Programme and is developed in collaboration with six partners based in the Adrion Region: University of Basilicata; HR - National Chamber of Economy; RS - Belgrade Technology Park; SI - Ljubljana Technology Park; AL - Ministry of Finance and Economy; GR - Centre for Research & Technology Hellas.

In particular, the project wants to:

- Improve skills and competencies of innovation centers in stimulating the creation of innovation networks beyond borders;
- Stimulate SMEs¹ access to research infrastructures and facilities and increase business investments in R&I, with a specific focus on those sectors characterizing the competitive advantage of the partner regions;
- Valorize research results and establish durable links and synergies between enterprises, R2B centers and research infrastructures;
- Exploit the research results and new technologies taking into account the output of the pilot macro-regional Smart specialization strategy.

So far, based on a pilot macro-regional analysis of the Smart specialization strategies of the Adriatic-Ionian regions, the following three thematic- priority areas have been identified as project main intervention fields:

- Agro-Bioeconomy;
- Transport & Mobility;
- Energy & Environment.

Developed within the project, the INNOVAIR platform (<https://www.oisair.net/>) will support all project activities and manage the collection of applications to the Proof of Concept Call.

2. MRTPA Agro-Bioeconomy

“The Bioeconomy encompasses the production of renewable biological resources and their conversion into **food**, feed, bio-based products and bioenergy. It includes **agriculture**, forestry, **fisheries**, **food** and pulp and paper production, as well as parts of chemical, biotechnological and energy industries. Its sectors have a strong innovation potential due to their use of a wide range of sciences (life sciences, agronomy, ecology, food science and social sciences), enabling and industrial technologies (biotechnology, nanotechnology,

¹ Small and medium-sized enterprises (SMEs) are defined by the European Commission as having less than 250 persons employed. They should also have an annual turnover of up to EUR 50 million, or a balance sheet total of no more than EUR 43 million (Commission Recommendation of 6 May 2003).

information and communication technologies (ICT), and engineering), and local and tacit knowledge.”²

Known for creating particularly strong forward and backward linkages within the economy, looking alone, food sector has often been the focus of economic development strategies for countries in transition. In fact, the growth of agro-processing firms has been associated with strong multiplier effects, with some estimates of the creation of 25 indirect jobs for every job created within an agro-processing firm.³

2.1. Megatrends

Having in mind some megatrends that are driving economy and changing sectoral operations, OECD Science, Technology and Innovation Outlook 2016,⁴ gives clear direction where certain sectors will go and which technologies will help that shifts.

Megatrend areas that are already present at the market and which will become more and more obvious and thus influencing later proposed foresight area are:

1. demography
2. natural resources and energy
3. climate change and environment
4. globalization
5. health, inequality and well-being.

Above stated trends have significant impact on Agro-Bioeconomy and nutrition sectors in the future. Thus, having megatrends on radar will be extremely important in establishing and managing future business models in given sectors.

Except that, at the same time technologies are rapidly changing and influence all sorts of operations and even nature of doing business in certain sectors. Among ten key and emerging technologies for the future, that are stated in OECD Science, Technology and Innovation Outlook 2016, several can be interesting and important to track.

Internet of Things; big data analytics; artificial intelligence; neuroethologies; nano/microsatellites; nanomaterials; additive manufacturing; advanced energy storage technologies; synthetic biology and blockchain. All these technologies will find multiple purpose in various sectors across economy and some of them, if not already, certainly will have significant impact on agro-bioeconomy and nutrition industry.

² European Commission (2012), *Innovating for Sustainable Growth: A Bioeconomy for Europe: COM(2012) 60 final*, https://ec.europa.eu/research/bioeconomy/pdf/official-strategy_en.pdf, retrieved: 21.1.2019

³ IFC (2013), *IFC Jobs Study: Assessing Private Sector Contributions To Job Creation And Poverty Reduction*, https://www.ifc.org/wps/wcm/connect/0fe6e2804e2c0a8f8d3bad7a9dd66321/IFC_FULL+JOB+STUDY+REPORT_JAN2013_FINAL.pdf?MOD=AJPERES, retrieved: 22.1.2019

⁴ OECD (2016), *OECD Science, Technology and Innovation Outlook 2016*, http://dx.doi.org/10.1787/sti_in_outlook-2016-en, retrieved: 25.1.2019

2.2. Sub-thematic priority area

Healthy and functional food (Blue) - emphasis on seafood (including freshwater food)

Figure 1 Healthy and functional food (Blue) subtopics and their impact



Source: Authors

Healthy and functional foods - by definition, functional food is whole foods along with fortified, enriched or enhanced foods that have a potentially beneficial effect on health when consumed as part of a varied diet on regular basis at effective levels based on significant standard of evidence. ⁵

Basically, that is the food that provide a health benefit in addition to macro and micronutrients. Certain food can be functional by itself, containing bigger amount of ingredients that have positive health effects (e.g. whole grains, nuts, fruits), or it can be regular food that is enriched with certain ingredients and thus have positive health effects (e.g. probiotic yogurt, omega 3 fatty acids or protein enriched products). Except broad usage and general health benefits, functional food can be adjusted and modified for different groups of people with specific nutrition requirements.

Based on proposed macro regional trajectory and described trends within EUSAIR, foresight area should be based on few of “more SME based” solutions and skills for healthy and functional food. Foresight areas subtopics might include:

1. Advanced processing and packaging solutions
2. Food safety & traceability
3. Smart solutions for personalized diet.

Advanced processing and packaging solutions - key to maintain food quality and perishability.

Food safety and traceability - create important factor for public health in cases of preparedness, response, recovery and prevention of certain food related issues and problems.

⁵ Academy of Nutrition and Dietetics, <https://www.eatright.org/food/nutrition/healthy-eating/functional-foods>, retrieved: 21.1.2019

Smart solutions for personalized diet - make personalization possible for broad scope of people, enhance its quality, and enable quick and affordable monitoring and adjustment.

Following the idea of using mission-based policies⁶ framework, proposed MRSTPA is embedded within strategy-based components such as mission, goals and solutions that define more focused approach to the success of the strategy.

3. MRSTPA mission

Fresh and safe Mediterranean diet delivered from its source.

4. Goals

Creating and securing sustainable value chain based on regional fresh seafood marketed for healthier lifestyle.

Goals are about:

Fresh and safe seafood - requires highly efficient cold chain management within logistic operations of the value chain that is usually connected to high technology (e.g. traceability, block chain, cold chain, processing, packaging, etc.)

Regional source and specific diet - long tradition of Mediterranean region and specific healthy seafood diet is recognized in Europe and beyond. Sources are fisheries and aquaponics originating from Adriatic and Ionian Sea resources.

Healthier lifestyle - based on healthy, fresh, traceable seafood diet supported by smart innovative solutions for personalized diet to meet citizen's nutritional and allergenic requirements that relies on healthy Mediterranean food from the source.

5. Impact and Relevance

Given its favorable geostrategic position, Adriatic-Ionian region may economically prosper by creating sustainable new value chain based on specific lucrative marketed segment based on healthy seafood. Innovate solutions and creation which rely on new business models along value chain activities are essential to meet consumers' increasing demand for transparency, smarter fish farming practices, food ethics, information on origin of produce, together with smart personalized diet solutions as important value added model. Ability to innovate business processes and production, traceability, cold chain logistics, sales, management practices and marketing along the value chain across the Adriatic-Ionian region would steer the whole region towards more competitive position as a resilient provider of safe, healthy and sustainable food.

⁶ Mazzucato, M. (2018), op. cit.

In this context, the Adriatic-Ionian region has excellent preconditions to develop specific sustainable model in order to preserve sustainability of its natural resources for long-term benefit and raise competitiveness by providing better and healthier lifestyle.

6. Solutions

Technological innovations such as life science technologies, precision farming, artificial intelligence, blockchain, security and connectivity along the value chain activities, which would improve production and distribution efficiency while also providing better food quality are crucial for the success. Knowing that major health issues and chronic diseases come from unhealthy or inappropriate diet, having knowledge about food origin and other information stated on food declarations is a massive step towards disease prevention and health. Therefore, increasing food transparency and traceability is a major concern that can be tackled with new digital tools such as sensors, artificial intelligence, security and connectivity, data-driven planning along the cold supply chain, taking into account forecast information on food production and demand, thereby reducing wastes while also meeting personalized demand, all of which could lead to regional competitive advantages. Other technological innovations could be focused on reducing greenhouse gas emissions associated with the food value chain, reducing food and packaging waste along the production and value chain and using new biotechnologically processes that can turn agricultural waste into valuable recyclable products, thereby strengthening the green economy.

7. R&D topics

Horizon Europe R&D foresight - BOHEMIA study is the main EU strategic foresight study in support of the Commission's proposal for Horizon Europe - the EU framework programme for research and innovation 2021-2027.⁷

Important R&D topics can be associated with foresighted R&D topics from BOHEMIA study:

1. developing and testing new circular bio-economic processes;
2. understanding and managing systems of sustainable agriculture and aquaculture;
3. villages as resources and processing hubs for energy and food businesses (agro-center with resources and processing);
4. organizational and social innovations for optimizing food supply systems from farming to consumption;
5. healthy, personalized and sustainable diets;
6. biotechnology research for agriculture and food production.

Several other important R&D topics can be associated in addition to foresighted R&D topics from BOHEMIA study:

1. innovative technologies and processes for high quality food production;

⁷ European Commission, https://ec.europa.eu/info/research-and-innovation/strategy/support-policy-making/support-eu-research-and-innovation-policy-making/foresight/activities/current/bohemia_en, retrieved: 1.2.2019

2. food safety;
3. preservation of products;
4. integrated supply and value chain solutions;
5. innovative processing of by-products;
6. ecosystem based approach in the fisheries instead of single stock approach;
7. smart fishing gears and protection of critical habitats; protection of marine areas;
8. impact of climate change and invasive species to the ecosystem and fisheries;
9. post harvesting methods to maintain the value of catch and diversification of fishing activities;
10. introduction of new species and use of environmentally friendly technology;
11. development of added value aquaculture products;
12. development of innovative uses for undesired catches and new breeding technologies;
13. aquaponics;
14. natural health products;
15. dietary supplements;
16. functional and enriched food.

8. Supporting technologies (KETs)

As regards future technologies, several foresight studies have indicated that the current set of KETs are still among the technologies that are most likely to disrupt economies and societies over the next 10-15 years. The OECD, based on several technology foresight exercises in its member countries and Russia, identified 40 key and emerging technologies that might best tackle the various ‘grand challenges’ the world faces (e.g. ageing, climate change, natural resource depletion, health inequality).⁸

The most applicable key enabling technologies (KETs) that are proposed as most supportive ones for the Agro-Bioeconomy foresighted area proposal are given in the following list.

OPTION A - KETs (Re-finding Industry)⁹

- I) PRODUCTION TECHNOLOGIES
 - A) Advanced Manufacturing Technologies
 - 1) Smart Manufacturing / Industry 4.0
 - 2) Robotics / Human machine interaction
 - 3) Process industry (processing of novel materials, structures, etc.)
 - 4) Monitoring and control
 - 5) High performance computing/cloud-based simulation services
 - 6) High-performance production (flexibility, productivity, precision and zero defect)
 - 7) High-performance, high precision processing
 - 8) Intelligent/ sensor-based equipment

⁸ OECD (2016), op. cit.

⁹ European Commission, Directorate-General for Research and Innovation (2018), op. cit.

- B) Advanced materials and Nanotechnologies
 - 1) High performance, smart sustainable materials
 - 2) Nanomaterials
 - 3) Nanotechnology
 - 4) Biomaterials
- C) Life science technologies
 - 1) Industrial biotechnology
 - 2) High throughput biology
 - 3) Automation for biology
- II) DIGITAL TECHNOLOGIES
 - A) Micro/Nano electronics and Photonics
 - 1) IoT
 - 2) Smart/Intelligent sensors
 - B) Artificial intelligence
 - 1) Data generation and handling
 - 2) Big data analytics
 - 3) Machine learning and deep learning
 - 4) Smart robots.

OPTION B - KETs (OECD)¹⁰

- A) DIGITAL
 - 1) Internet of Things (IoT)
 - 2) Big data analytics
 - 3) Artificial intelligence (AI)
 - 4) Blockchain
 - 5) Robotics
 - 6) Cloud computing
 - B) BIOTECHNOLOGIES
 - 1) Bioinformatics
 - 2) Health monitoring technology
 - C) ADVANCED MATERIALS
 - 1) Nanomaterials
- Functional materials.

¹⁰ OECD (2016), op.cit.