

PROOF OF CONCEPT CALL

MRTPA Transport and Mobility Summary

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

May 21th, Zagreb



Abbreviations

ADRION	Interreg Programme of Adriatic-Ionian region
AI	Artificial intelligence
AIR	Adriatic-Ionian region/macro-region
ATMC	Advanced Traffic Management Center
B2B	Business-to-business
B2G	Business-to-government
C-ITS	Cooperative ITS
EUSAIR	Macro-Regional Strategy of Adriatic-Ionian Region
G2G	Government-to-government
GHG	Greenhouse gases
GVCs	Global Value Chains
IoT	Internet of Things
ITS	Intelligent Transport Systems
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
R&D	Research and development
R&D&I	Research, development and innovation
S3	Smart Specialisation Strategy
TEN-T	Trans-European Transport Network
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 Transport and Mobility

The transport and mobility market has been one of priorities of majority of European countries and is highlighted as such as the RIS3 priority.

Overall level of potential cooperation between stakeholders in transport and mobility domain is considered strong, especially in the automotive sector among business sector and

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).

scientific research institutions. Industry itself is highly globalized with strong competition but giving enough space for industry newcomers due to recent disruptive industry trends.²

According to the EUSAIR, improving connectivity within the Region with the rest of the Europe is set as overall objective of pillar 2 “Connecting the Region” due to huge macro-regional infrastructure disparities. Strategy states that “better use of intermodal transport will reduce the costs of delivering goods in Central and Eastern Europe, improve the eco-balance and restore the competitive position of the North Adriatic ports as natural gateways to Central and Eastern Europe.”³

2.1. Megatrends

Transport and mobility areas are affected by several global megatrends and common to all countries and regions particularly naming most important:

1. Rapid urbanization within big cities and trade growth - growth in population has created big demand for personal mobility. Despite extensively grown transport infrastructure, growth is not adequate to meet the demand. There is a need to reduce congestions and greenhouse gasses.
2. Traffic safety - increasing transport and mobility needs leads to increased traffic fatalities thus demanding new solutions to reduce traffic accidents.
3. Climate change - one of the major global challenge and greenhouse gas (GHG) emissions from transport are a key contributor to this. The transport sector accounts for about 23 % of global energy related CO₂ emissions and its share of global energy use is increasing more rapidly than in other sectors.⁴
4. Technology advances - electrification, digitalization, shared mobility, autonomy and wireless communication technologies based on sensors and high-speed data transfer are a major stone for evolution in road, rail, air and naval smart transport systems.

² Radosevic, S., Walendowski, J. (2016), op. cit.

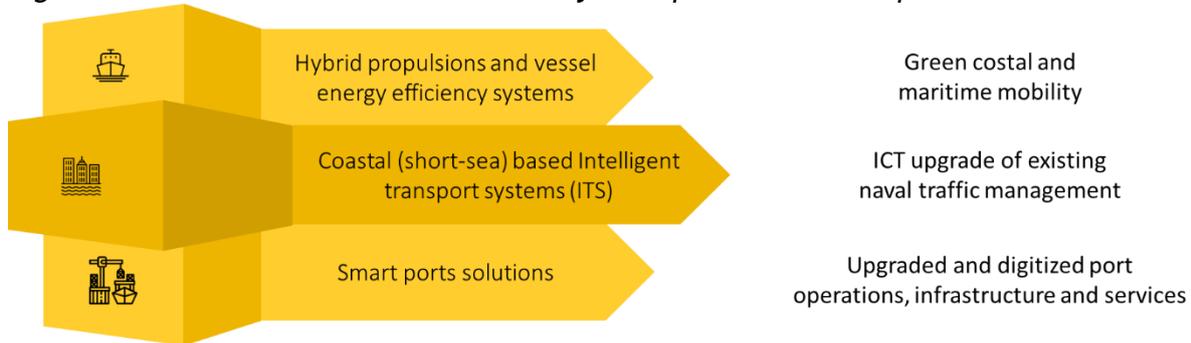
³ European Commission (2014a), op. cit.

⁴ IEA (2009), *Transport, Energy and CO₂: Moving toward Sustainability: executive summary*, <https://www.iea.org/Textbase/npsum/transport2009SUM.pdf>, retrieved: 22.1.2019

2.2. Sub-thematic priority area

Green coastal & maritime mobility

Figure 1 Green coastal & maritime mobility subtopics and their impact



Source: Authors

The area is focused on “green” technology and solutions in relation to maritime mobility of people and freight to boost economic regional development in respect to environmental issues and nature preservation of Adriatic-Ionian sea basin.

Based on proposed macro regional trajectory and described trends within EUSAIR Transport and mobility pillar (besides large regional interconnecting infrastructural projects), foresight area should be based on few of “more SME based” solutions and skills for green coastal and maritime mobility. Foresight areas subtopics might include:

1. Hybrid propulsions and vessel energy efficiency systems
2. Coastal (short-sea) based Intelligent transport systems (ITS)
3. Smart ports solutions.

Hybrid propulsions and energy efficiency systems - development of new hybrid/electrical energy efficient systems for vessels. Main focus is on development of hybrid or electrical motors, advanced energy storage technologies, battery management systems and advanced vessel energy micromanagement systems.

Coastal (short-sea) based intelligent transport systems (ITS) - maritime version of ITS solutions targeted at ICT upgrade of existing naval traffic management. It is based on real time maritime traffic data from sensors installed into vessels, data collection and Big data analysis in control traffic centers with interface to other transport modes especially to hinterland.

Smart ports solutions - upgraded and digitalized port operations, infrastructure and services in order to serve as important interface towards hinterland transport operations creating boost for transport and logistics activities. New port operations as an integration of various infrastructures, both physical and IT. Digital solutions for efficient traffic management, which is made possible by interlinking the information and communication systems. Building physical infrastructures in order to support installation of hybrid/electrical propulsion and energy efficient systems into new or retrofitting to existing vessels.

Following the idea of using mission-based policies⁵ 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

Green and smart interface to the hinterland.

4. Goals

Fostering safe, connected, automated, clean and integrated mobility solutions based on interoperability between maritime and hinterland transport modes.

Goals are about:

Safe and secure - by aiming for protection from road traffic accidents, by halving the number of serious injuries in the EU by 2030 from the 2020 baseline⁶ and enhancing the resilience of transportation systems to external shocks such as cyberattacks or extreme weather condition. With regard to vessels safety and security⁷, focus is on early identification of high-risk vessels, earlier precautionary actions, and improved emergency response to incidents or pollution, including search and rescue operations. Regarding passenger vessels, the focus is on further enhancing the level of safety and facilitating the internal market.

Connected and automated - infrastructural readiness for new ITS (Intelligent Transport Systems) and C-ITS (Cooperative ITS) critical and indispensable systems and services for imminent rollout of connected, electrical and autonomous vehicles and vessels. For example, the EU has already begun to prepare the ground, with the adoption of strategies on cooperative intelligent transport systems, as well as on future 5G communications technology.⁸ Regarding waterborne transport, additional aspects of administrative simplification, optimization and cargo flows, and better use of existing infrastructure using **digital** technologies, will be addressed in the recently established Digital Transport & Logistics Forum.⁹

⁵ Mazzucato, M. (2018), op. cit.

⁶ Council of the European Union (2017), *Council conclusions on road safety - endorsing the Valletta Declaration of March 2017*, <http://data.consilium.europa.eu/doc/document/ST-9994-2017-INIT/en/pdf>, retrieved: 2.2.2019

⁷ European Commission (2016), *SWD(2016) 326 final*, https://ec.europa.eu/transport/sites/transport/files/swd2016_326.pdf, retrieved: 2.2.2019

⁸ European Commission (2018), *COM (2018) 293 final*, https://eur-lex.europa.eu/resource.html?uri=cellar%3A0e8b694e-59b5-11e8-ab41-01aa75ed71a1.0003.02/DOC_1&format=PDF, retrieved: 2.2.2019

⁹ European Commission (2015), *COM (2015) 2259 final*, https://ec.europa.eu/transport/sites/transport/files/media/news/doc/2015-04-15-setting-up-dtlf/com%282015%292259_en.pdf, retrieved: 2.2.2019

Clean and sustainable - by reducing the environmental impact of mobility on greenhouse gases (GHG) and other polluting emissions, material usage and waste and noise, e-mobility solutions are promoted. Regarding waterborne transport, clean and sustainable shipping will be further promoted with the effective implementation of Directive 2014/94/EZ on the deployment of alternative fuels infrastructure. The new TEN-T guidelines and their main financing instrument, The Connecting Europe Facility (CEF), support the promotion of green shipping.

5. Impact and Relevance

Fostering joint Adriatic-Ionian region transnational research and implementation of specific regionally mobility products, solutions and values that can boost local and regional economies through better transport networks between ports and hinterland, traffic flows, safer transport and cleaner environment therefore providing well-being and better life of population across the region. Ports of the Ionian seas and especially the Adriatic, with their interfaces towards hinterland are considered to become main maritime transport vessel entry points to the EU from the east, especially China, Central Asia and Middle East (so-called 21st Century Maritime Silk Road)¹⁰, therefore providing great opportunity and economic impacts for Adriatic-Ionian states.

6. Solutions

Knowledge exchange promotion and information transparency among stakeholders, encouraging cooperative and multi stakeholder relationships including Business-to-Business (B2B), Business-to-government (B2G) and Government-to-Government (G2G). Raising awareness of all public, private, policy makers and other stakeholders about importance and benefits of implementing innovative ITS solutions. Comparing with traditional transport systems, digitalization and IT solutions implemented in a form of ITS solutions can provide safer, faster, cleaner and economically sustainable results without a need for additional costly investments into new road and port infrastructure facilities. Adriatic-Ionian region should be prepared with critical infrastructure readiness regarding upcoming rollout of new emission-free propulsion, connected, autonomous land (road and rail) vehicles and maritime green vessels. That includes implementing sensors, cameras, new communication networks (5G), charging infrastructure, Advanced Traffic Management Centres (ATMC), smart ports facilities, integrated with various public services, having disseminating role to public and providing transport data over open data platform as a ground base for new innovative entrepreneurial mobility business models. Synergies with TEN-T policy should be further exploited. Better coordination of maritime and inland waterways operations with ports and hinterland connections can be pursued, through the integration of ICT tools (e.g. Union Maritime Information and Exchange system SafeSeaNet, River Information Service). Technological solutions focusing on: 1) New energy efficient system and architectural concepts; 2) Filling/charging and energy and power management; 3) Smart sensors; 4) Smart

¹⁰ Bruce-Lockhart, A. (2017), *China's \$900 billion New Silk Road: What you need to know*, <https://www.weforum.org/agenda/2017/06/china-new-silk-road-explainer/>, retrieved: 3.2.2019

actuators and motors in transport systems; 5) Environment recognition; 6) Localization, maps, and positioning; 7) Control strategies; 8) Artificial intelligence in automated mobility and transportation; 9) Communication inside of and outside of vehicle; 10) Testing and dependability; 11) Functional safety and fail operational architecture and functions; 12) Swarm data collection and continuous updating; and 13) Predictive health monitoring for connected and automated mobility.

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 2021-2027.¹¹

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

1. research on batteries;
2. research on hydrogen fuel cells;
3. ecologically efficient materials;
4. understanding and improving quality control in industries which may become reliant on 3D printing;
5. requirements for developing solutions with an environmental, social and economic impact assessment;
6. design solutions for sustainable mobility of people and goods;
7. research on battery efficiency, energy storage and recovery technologies;
8. testing new mobility service solutions in pilot areas;
9. research to reduce digital exposure to critical infrastructure;
10. developing better algorithms for machine learning;
11. ICT solutions for autonomous systems, including systems developed in remote and extreme environments;
12. requirements for developing solutions with an environmental, social and economical impact assessment;
13. design solutions for sustainable mobility of people and goods;
14. testing new mobility service solutions in pilot areas;
15. research and development of new traffic control systems;
16. multilateral Transport Systems Interoperability Standards Agreements;
17. rules for autonomous transport of roads and waterways;
18. research on human-automated vehicles interfaces;
19. research on smart grid management and on the opportunities for cross-domain solutions (Smart Mobility, Smart City and Smart Grids);
20. regulation of data security and liability in the context of automated transport;
21. investigation of the mobility needs in relation with personal freedom.

¹¹ 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

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

1. green vessels and greener combustion-based ship propulsion;
2. advanced maritime structures and lightweight materials;
3. robotic automation and drive technology;
4. electro propulsion, auxiliary power supplies technologies related to electro-mobility;
5. safer waterborne transport and maritime operations (reduction of marine accidents consequences);
6. integrated power and heat systems;
7. innovative transport and logistics services;
8. cooperative systems;
9. equipment, systems and applications for traffic monitoring, management and control
10. incident management systems;
11. advanced embedded positioning and navigation.

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).¹²

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

¹² OECD (2016), op. cit.

OPTION A - KETs (from Re-finding Industry)¹³

- I) **PRODUCTION TECHNOLOGIES**
 - A) **Advanced Manufacturing Technologies**
 - 1) Process industry (processing of novel materials, structures, etc.)
 - 2) Robotics / Human machine interaction
 - 3) Monitoring and control
 - 4) High performance computing / cloud-based simulation services
 - 5) Intelligent/ sensor-based equipment
 - 6) Green propulsion technologies
 - B) **Advanced materials and Nanotechnologies**
 - 1) High performance, smart sustainable materials
 - 2) Nanomaterials
 - 3) Nanotechnology
 - 4) Materials for energy storage and generation
 - 5) Lightweight technologies
- II) **DIGITAL TECHNOLOGIES**
 - A) **Micro/Nano electronics and Photonics**
 - 1) IoT
 - 2) Smart/Intelligent sensors
 - 3) Displays (LCD, plasma) and lighting (LED, OLED)
 - 4) Photonics integrated circuits and Biophotonics
 - B) **Artificial intelligence**
 - 1) Data generation and handling,
 - 2) Big data analytics,
 - 3) Machine learning and deep learning
 - 4) Software technologies
 - 5) Decision making technologies
- III) **CYBER TECHNOLOGIES**
 - A) **Security**
 - 1) Secure and authenticated communication
 - 2) Avoiding identity thief
 - 3) Data protection and privacy
 - 4) IoT cyber security solutions
 - 5) Data/connectivity safety and security
 - 6) Human-machine-interfaces (HMI)
 - 7) 5G
 - B) **Connectivity**
 - 1) Cyber Physical Systems
 - 2) Technology assessment
 - 3) Blockchain

¹³ European Commission, Directorate-General for Research and Innovation (2018), op. cit.

OPTION B - KETs (OECD)¹⁴

- A) **DIGITAL**
 - 1) Cloud computing
 - 2) Photonics and light technologies
 - 3) Modelling simulation and gaming
 - 4) Artificial Intelligence (AI)
 - 5) Big data analytics
 - 6) IoT
 - 7) Robotics
- B) **ENERGY + ENVIRONMENT**
 - 1) Power micromanagement
 - 2) Hydrogen energy
 - 3) Autonomous vehicles
 - 4) Electric vehicles (vessels)
 - 5) Electric vehicles
 - 6) Advanced energy storage tech
- C) **ADVANCED MATERIALS**
 - 1) Nanomaterials
 - 2) Functional materials
 - 3) Additive manufacturing

¹⁴ OECD (2016), op. cit.