

## DEEP-SEA PARTNER INTERVIEW

### Aries Scarl

#### Lead Partner of DEEP-SEA project



**Aries Scarl - Lead Partner of DEEP-SEA project** - is the in-house company of the **Venezia Giulia Chamber of Commerce**, supporting the Chamber body since 1997 in its institutional tasks, in services to businesses and in the promotion of the territory.

Thanks to its **20-year experience**, Aries combines the ability to operate in complex administrative scenarios with the flexibility and expertise required by the market and its operators.

Main services offered by Aries relates to:

- entrepreneurship and orientation
- promotion of the territory, value chains development, territorial marketing and innovation
- organization of local fairs and events
- institutional support.

Specific expertise is held in managing territorial cooperation projects for valorization of coastal areas, foreseeing activities to reconcile the efficient development of services and economic growth in the nautical sector with environmental protection and cross border cooperation issues.

### *The role in the DEEP-SEA project*

**Aries is Lead Partner of DEEP-SEA project and leader of work package 1 “Project management and coordination of activities”.**

It is indeed fully engaged in ensuring a sound day-to-day management, coordinating partners in project activities and enabling an effective internal communication.

Within the “technical” work packages (WP), Aries is involved in work package 3 “Nautical marinas framework analysis and investment plan”, aimed at producing an AS IS analysis on current mobility services inside the marinas involved in the project and calculating the related energy consumptions.

In particular, Aries has been contributing to the analysis by administering questionnaires to the managers and users of selected Venezia Giulia marinas.

Results will be elaborated to define a tailor-made investment plan for each marina, thus providing a concrete instrument to mobility operators and public authorities for their future planning and investments, with a special focus on marinas features and services to achieve improved coastal, inland/maritime transport and mobility services. In WP4 “Pilots: small technological investments, equipment installations and new services start up”,

Aries is responsible for pilot implementation within marinas of the Venezia Giulia area, thus taking care and monitoring:

- the installation of 6 e-charging stations for e-cars and/or e-boats (power of 22 kWh or more) with interoperable management system;
- the installation of 3 racks with electric and muscular bicycles for bike sharing services and the purchase of at least 4 muscular bikes and 8 bicycles, including a charging system for e-bikes;
- installation of 1 micro-grid system, composed by a photovoltaic system, storage system, monitoring and power management system, display.

### *Realized activities*

Partners finalized the “AS IS analysis on current mobility services and related energy consumption”, which aims at assessing the energy consumption profile and related CO2 emissions of the mobility associated to the marina pilot sites participating to DEEP-SEA.

This activity will be the basis to guide the development of the investment plans for each pilot area of the project, and it includes:

- A complete framework of the mobility services currently provided by the marinas involved in DEEP-SEA pilot actions;
- the volume of passengers using on-road vehicles generated by each marina;
- the volume of nautical mobility activities in each pilot site.

Starting from there, the energy consumption generated by these traffic volumes and the consequent CO2 emissions were estimated based on formulas referring to the most recent indicators. The data collection was supported by questionnaires and data sheet submitted to the participating marina and their users.

In parallel, partners have been working on the elaboration of the investment plans for energy efficiency mobility at each project pilot site. Five investment plans will be soon delivered, and they will provide a clear picture on each pilot site’s vision and strategy, starting from the consideration of their baseline energy consumption profile.

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## University of Rijeka Faculty of Maritime Studies

The Faculty of Maritime Studies promotes science and research directed towards the application of contemporary scientific achievements in the area of Maritime Studies for the requirements of maritime economy in order to achieve greater economic success, as well as for fulfilling the requirements of all social factors, primarily with the goal of preserving the natural and other resources of the sea and the coast and establishing new theoretical and practical scientific insights in the complex area of Maritime Studies.

The Faculty of Maritime Studies continuously develops its cooperation with the national economy and actively participates in the development of maritime economy by conducting various development projects.

The Faculty of Maritime Studies actively participates in the preservation of objects, items, publications and documents witnessing the long and significant Croatian maritime history, the rich Croatian maritime heritage and history and it participates and supports the initiatives for the protection, preservation and revitalization of maritime and shipbuilding heritage.

### The role in the DEEP-SEA project

UniRI, with the review of all PPs, mainly the public port authorities, marinas operators and representative of pilot site, defines the fundamental pillars for best nautical ports management on the basis of European best standard and "Green port" policy. The standards were used to improve the performance and capability on investment focused on the development of efficient system for mobility of port users and quality of service for boats in accordance with the local PA planning.

UniRI coordinates the analysis of marina management system and investments model on the basis of its long term experience in this field with the support of other PPs in order to describe the state-of-art of each marina management and financial outlook.

## University of Split Faculty of Civil Engineering, Architecture and Geodesy

22 departments, 9 laboratories, 6 research centres, and a total of 130 employees with all the necessary experience and knowledge. Project and Technology Consulting Office was established in order to ensure a centralized sound management of all projects. It has all necessary institutional, human and financial capacities for implementation of the project. Faculty of Civil Engineering, Architecture and Geodesy has a strong experience in development of organizational solutions, and development of energy efficient solutions for coastal and nautical mobility in collaboration with public authorities and mobility services providers. During the CAMPsUmp (Interreg MED) project, it gained expertise in mobility analysis and mobility planning which will be essential for the implementation of the project. Participation in the project represents a continuity of work on the addressed issues. Therefore, it positions the institution as a strong partner for mobility services planning with regard to smart and energy efficient solutions in the Adriatic Croatia. It participates in DEEP-SEA as Responsible partner in WP4 and partner in WP3.

### The role in the DEEP-SEA project

Improved sustainable passengers' mobility services in the cities and connected them to nautical marinas.

Increased competences of decision makers and operators involved in marina mobility management.

Integrate management, cooperation and networking between mobility operators, public authorities and key stakeholders.

### Realized activities

3.3. - The analysis of mobility services is based on the methodology used in the framework of SECAP (Sustainable Energy and Climate Action Plan), Mobility Management Handbook and SUMP (Sustainable Urban Mobility Plan). The analysis provides a complete framework of the mobility services and the volume of passenger using private vehicles. It includes the level of nautical mobility activities in each pilot site. Each mobility value is linked to energy consumption and its environmental impact.

3.4. - The Investment plan integrates two models: i) for PA responsible for the site where marina is located; ii) for marinas operators. The two models are matching different types of PAs investments and private sectors. Both models integrates socio-economic KPIs to monitor the investment process and measures of the related results.

### Public event

June 25th is the Day of the Seafarer, an annual and international event day coordinated by the International Maritime Organisation. The Day of the Seafarer was established in 2010 by a resolution adopted at a diplomatic conference in Manila. On this day, people pay respect to Seafarers and recognize the invaluable contribution they make to international trade and the world economy.

The Faculty of Maritime Studies in Rijeka joined the celebration of this important day, and on June 25th organized a gathering with a program in which attention was paid to students and their vision of their future in maritime affairs.

The event activities were carried out from 10 am to 1 pm in cooperation with the Association of North Adriatic Captains "Queen of the Sea", IMO Ambassador, Capt. Berislav Vranić and the Student Union of the Faculty of Maritime Studies.

According to the International Maritime Organization (IMO), the celebration of World Seafarers' Day, through the media and various publications, will raise awareness of the vital role that seafarers play in the world economy. Seafarers' Day is also an opportunity to educate the public about the work and life of the modern seafarer.

### Realized activities

Definition of the methodology;

Description of the passengers' volumes per transport mode including indication of energy consumption (baseline for the further investment plan) and environmental impacts (emission factors and emission reporting unit) based on the fuel emission factors database;

Description of services offered, the equipment used in service provision and the integration with the local planning;

End- user perception of the mobility services;

Mitigation report, Monitoring Report and Adaptation Report

Ex-ante evaluation with possible intervention investments;

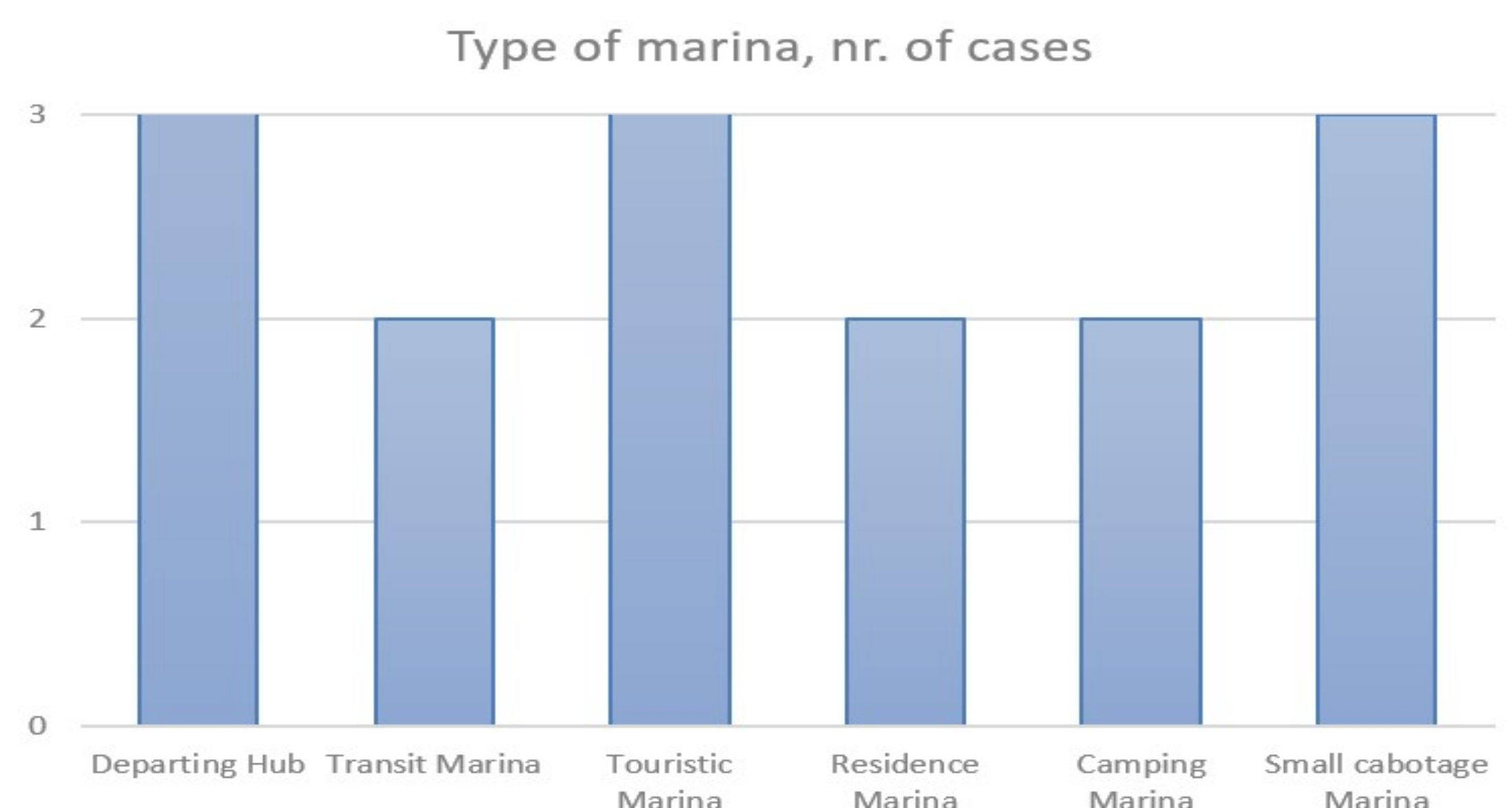


Figure 1. Results from the questionnaire administered to marinas: type of marinas.

## Project Partners



## Contacts

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## Partners' publications

### Real-time prediction of grid voltage and frequency using artificial neural networks: An experimental validation

N. Chettibi , A. Massi Pavan , A. Mellit , A.J. Forsyth d , R. Todd

In grid-connected Distributed Generation (DG) systems, with high-penetrations of renewable and energy storage assets, the prediction of grid voltage and frequency plays an important role in enabling the power quality support, the stabilization and monitoring of distribution networks. In this paper, a method based on Artificial Neural Networks (ANNs) and Deep Recurrent Neural Networks (DRNN) has been developed for very short-term prediction of grid voltage and frequency. For different time scales (183ms, 1s, 10s, 60s), one-step and multistep ahead forecasters are developed to predict the future behavior of grid parameters. This type of predictors can be used in distributed generation systems to enhance the control performance, to prevent the occurrence of grid faults and to improve the power systems stability. The data used to establish and validate the ANNs forecasters are provided from grid connected battery storage system installed at the University of Manchester. The developed prediction, models have been validated experimentally via a dSPACE real-time controller. The obtained results show that the ANNs forecasters are able to predict in real time the grid voltage and frequency with satisfactory accuracy as the largest mean absolute percent error is 0.32%.

<https://www.sciencedirect.com/science/article/abs/pii/S2352467721000734?via%3Dihub>

### Deep learning neural networks for short-term photovoltaic power forecasting

A. Mellit , A. Massi Pavan , V. Lughi

Accurate short-term forecasting of photovoltaic (PV) power is indispensable for controlling and designing smart energy management systems for microgrids. In this paper, different kinds of deep learning neural networks (DLNN) for short-term output PV power forecasting have been developed and compared: Long Short-Term Memory (LSTM), Bidirectional LSTM (BiLSTM), Gated Recurrent Unit (GRU), Bidirectional GRU (BiGRU), One-Dimension Convolutional Neural Network (CNN1D), as well as other hybrid configurations such as CNN1D-LSTM and CNN1D-GRU. A database of the PV power produced by the microgrid installed at the University of Trieste (Italy) is used to train and comparatively test the neural networks. The performance has been evaluated over four different time horizons (1 min, 5 min, 30 min and 60 min), for one-Step and multi-step ahead. The results show that the investigated DLNNs provide very good accuracy, particularly in the case of 1 min time horizon with one-step ahead (correlation coefficient is close to 1), while for the case of multi-step ahead (up to 8 steps ahead) the results are found to be acceptable (correlation coefficient ranges between 96.9% and 98%).

<https://www.sciencedirect.com/science/article/abs/pii/S0960148121003475?via%3Dihub>

### An iterative adaptive virtual impedance loop for reactive power sharing in islanded meshed microgrids

H. Sellamna, A. Massi Pavan, A. Mellit, Josep M. Guerrero

This paper proposes a control strategy for the optimization of the reactive power sharing based on an iterative adaptive virtual impedance (IAVI). The IAVI includes two elements: the first is proportional to the reactive power delivered by the distributed generation units at the current iteration, while the second is proportional to the sum of the reactive power variations at the previous iterations. The proposed control strategy has been verified under a Matlab/Simulink environment for an islanded meshed microgrid with three distributed generators. The simulation of different scenarios considering feeder impedance mismatches, different microgrid configurations, and variable loads has shown a good accuracy in the sharing of the reactive power in the microgrid. The control strategy proposed in this paper can be easily implemented as it does not require any communication link between the generators, any knowledge regarding the feeder impedances, and any local load measurement.

<https://www.sciencedirect.com/science/article/abs/pii/S235246772030326X?via%3Dihub>

### Application of multi-criteria analysis for the introduction of green port management practices: an evaluation of energy efficient mobility in nautical ports

Helena Ukić Boljat, Siniša Vilke, Neven Grubišić, Livia Maglič

In Europe, at the end of the 20th century, the growth of marinas followed the rapid development of recreational marine activities. This trend has now slowed and today the creation of new marinas or the extension of existing marinas is less common, mainly due to the enforcement of protective environmental regulations. As the port sector is facing some major sustainability challenges, like tackling the pollution generated from port activities, the "green port", or "green marina", concept has now become a requirement. Both types of nautical ports, public ports and private marinas, share the same responsibility to achieve management standards. The term "green port" in practice describes the responsible behavior of all stakeholders in the port's business, with a focus on the long-term vision towards the sustainable and climate-friendly development of the port's infrastructure. This paper aims to confirm the adequacy of multi-criteria analysis (MCA) for the evaluation and introduction of energy efficient mobility options in nautical ports. Within the paper, a multi-criteria based model for energy-efficient mobility selection is presented. This model is tested on two Croatian private marinas and obtained results indicating the most suitable action for both. The output of the model showed that by far the best energy-efficient solution was the installation of electric charging stations (ECS) for cars. The presented model can assist decision-makers in port authorities and marina administrations in planning and finding the best scenario for the development of energy efficient systems and services.

<https://repository.am.szczecin.pl/handle/123456789/2661>

# 5th Project Partners Meeting and Steering Committee

30th September  
1st October 2021

Malinska Krk (Croatia)

Between 30/09 and 1/10/2021, the 5th partner meeting was held in Malinska, Krk (Croatia).

Partners and Steering Group members had the chance to meet in person after months of webcalls and online work, and update each other on the status of all project activities and deliverables.

During day 2, partners were involved in a site visit of Krk pilots, and in an e-bike and boat tour to the island of Košljun.

## Project Partners



## Contacts

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