

## FUTURE OF MARITIME RESEARCH AND TRAINING

### VIRTUAL MANEUVERS IN THE SIMULATOR NETWORK

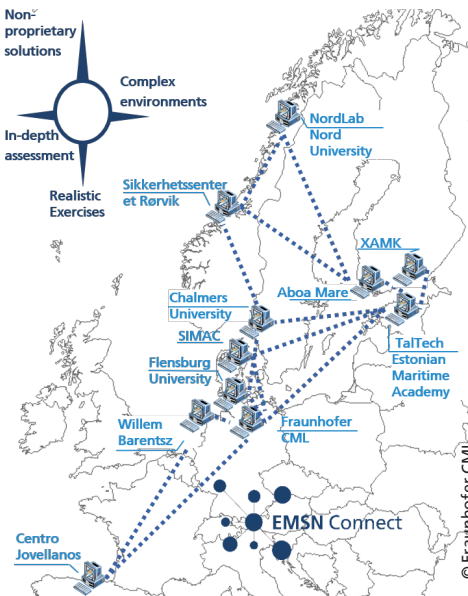
The European Maritime Simulator Network, or EMSN Connect for short, has been running for over two years, mainly as a platform for nautical training and testing of new maritime applications in ship control and communication. 10 partners with more than 40 ship handling simulators are now members of the network. EMSN

Connect links the virtual ships in a common simulation environment. In this way, complex and realistic traffic situations can be designed and driven in real time. The expansion of the European network towards Asia is due to the success of the EMSN. The Asia-Pacific Maritime Simulator Network APMSN integrates

setup of the successful simulation.

During running simulations, EMSN Connect collects all quantitative data of a manoeuvre. Qualitative information can be collected e.g. by interviewing simulation participants or by external expert evaluations. This provides an important opportunity to evaluate a simulated manoeuvre in retrospect and to identify potential for improvement for more safety, efficiency and sustainability of maritime transport.

The EMSN was developed in the European funded research project MONALISA 2.0. At that time, the CML for the first time connected ship handling simulators from different manufacturers for the implementation of joint maneuvers. This allows virtual ships to interact with each other from different locations and ship handling simulators and allows scenarios to be tested that could not be replicated in the real world. Read more about EMSN Connect at <https://emsn.connect.fraunhofer.de/>.



further simulators in South Korea. In February 2020, the Korea Research Institute Ships & Ocean Engineering (KRISO), Chalmers University of Technology/ Department of Mechanics and Maritime Sciences (Chalmers) and Fraunhofer CML were able to conduct the first global simulation in EMSN and APMSN. A ship steered by Chalmers was assisted by a Korean pilot at KRISO in a port arrival and berthing scenario at Busan port. The pilot's instructions were carried out by the „crew“ in Sweden. In its role as technical coordinator of the EMSN, the CML controlled the technical

## COMMUNICATION IN MARITIME EMERGENCIES

### ARTUS IMPROVES VHF RADIO COMMUNICATION

In maritime transport, VHF radio is the number one communication channel, where officers of seagoing vessels coordinate their behavior in individual traffic situations with each other and with coastal radio stations. Even if there are traffic rules at sea, the different speed, size and maneuverability of ships regularly lead to a situation-specific need for information. The conditions prevailing at sea and on board make communication difficult. Ambient noise or bad weather conditions in the form of rain or storm can negatively affect the intelligibility and transmission of radio messages. For this reason, the German Maritime Search and Rescue Association DGzRS, together with the Fraunhofer CML and Fraunhofer IAIS as well as Rhothetha Elektronik GmbH, launched the ARTUS research project (short for „Automated Transcription of Maritime VHF Radio Communication for Search and Rescue (SAR) Mission Coordination“) last year. The aim of ARTUS is the automatic

transcription of VHF radio messages and the simultaneous localization and identification of ships in order to make the coordination of rescue operations more efficient.

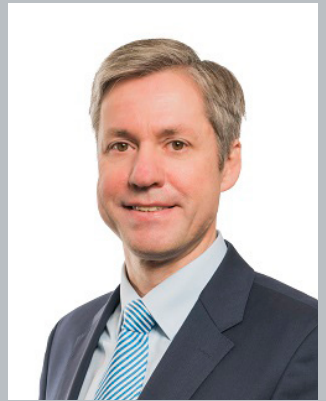
The first solutions have already been implemented: a draft of the localization algorithm is being tested and the error rate in the transcription of maritime radio messages can be improved - initially under laboratory conditions. In situations in which loud background noise overlays speech or a radio operator has a distinctive dialect, the technology is confronted with special challenges. These are countered by the use of artificial intelligence in the context of speech recognition training.

In the further course of the project, the results of the automatic radio message transcription and localization will be prepared for different users and visually displayed on their own user interfaces. The most important information for the SAR cruiser's crew is the position and bearing of the

casualty. The coordinator of an operation in the MRCC (Maritime Rescue Coordination Center) needs during a rescue operation above all a general overview of the available radio message content and ships in the region. And instructors who carry out rescue missions in the ship handling simulator to train SAR forces need their own user interface to process and display relevant information and situations as part of the debriefing.

The project partners have sufficient time to implement the complex technical solutions: ARTUS is funded by the BMBF under the Federal Government's „Research for Civil Security“ programme until the end of February 2022.

## FOREWORD



Dear Readers,

*what changes has our professional and private life made in the past months! Many of us have been working mainly in home office for three months now. Personal contact has been replaced by calls and virtual meetings, and digital events are replacing traditional conferences.*

*In this new normality, we want to increase our communication with you and provide you with even more information about our activities on our social media channels, in webinars and on our homepage.*

*We will present many of our projects and solutions on LinkedIn, Twitter and Xing. In-depth articles and current topics can still be found in our proven newsletter format. To make sure you don't miss our information in your home office, follow us at LinkedIn & Co. and register on our homepage for our electronic newsletter.*

*We look forward to seeing you!*

*Enjoy reading,*

*Your Prof. Carlos Jahn  
Head of Fraunhofer CML*



The analysis of data for weather routing is relevant for a safe and efficient voyage.

## IMPORTANT FOR THE VALUE CHAIN: THE DIGITAL DATA TREASURE

Trucks arriving at terminal gates in an uncoordinated manner, difficulties in manning the crew on board in the right number and with the required qualifications, ships lying at anchorage after weeks of sailing - in the maritime transport chain, frictional losses and inefficiencies can lead to avoidable costs and reduced productivity. In many cases, a targeted analysis of existing information reveals weaknesses and optimization potential. We at Fraunhofer CML accept this challenge and develop solutions for practical applications.

Maritime companies accumulate digital data in many different forms and formats in their business activities - sometimes systematically, sometimes unintentionally. The data come from various sources, for example from ship sensors or fleet management systems, and additionally navigational and technical operation data are available. Much of this data often lies unnoticed and scattered on the servers, but it can be used to gain capital for optimizing further operations. After all, the correctly assembled combination of this data provides information that can form an important basis for future decisions.

**Customized data evaluation**  
The Fraunhofer CML has the competence and the methodology to analyze and interpret data in a targeted manner. Because even though much can be done with algorithms in data analysis, the art lies in knowing how to prepare the data. This requires process knowledge. By recogni-

zing similarities and patterns in data sets, for example, an unmanageable database can be categorized and made accessible.

However, apart from the question of what data is available or how to access it, entrepreneurs often have no concrete idea of the benefits that data analysis can bring. Especially in maritime logistics there are many areas of application.

**Optimized truck handling**  
Data can be used, for example, to better forecast truck arrival times and thus improve traffic flow in the port. For this purpose, the Fraunhofer CML developed a model that uses a digital image of the handling processes of logistics nodes such as port terminals to achieve optimized handling by predicting truck arrivals. This method uses historical and current data and is based on an artificial neural network, which can take into account further influencing factors in the form of so-called predicted values. This can reduce planning uncertainties and achieve optimal truck scheduling for terminals, forwarders and truckers, which reduces avoidable costs.

**Flexible crew planning on board**  
In another project, the software solution SCEDAS® was developed to plan the deployment of personnel on board a ship efficiently and in accordance with legislative regulation as well as company specific rules, using mathematical optimization methods. In addition to the special demands of a specific voyage on the crew and their qualifications, SCEDAS® takes into account

legal requirements and thus supports the complex task of crew management on land and on board. In the meantime, the SCEDAS® crewing software has been further developed so that maintenance and service tasks are integrated optimally in the work schedule.

**Safe and efficient sea voyages**  
The analysis of data from the Automatic Identification System (AIS), which among other parameters transmits position, speed and course data of ships at sea, enables route optimization and the forecast of ship arrivals. Based on historical data (AIS has been used by all merchant ships since 2002), optimal voyages can be determined, but also critical sections with heavy traffic can be identified where increased attention by nautical officers is required. The correlation of AIS data with weather data allows improved up-to-date route optimization, which can significantly increase the safety and efficiency of a voyage.

**Talk to us!**  
These are just a few examples from the maritime industry where data analysis has been able to create added value for our customers. In further projects the evaluation is also always user-oriented and driven by the question: How can the analysis help the customer to optimize his decisions, or how can he use his data in a meaningful way?

## IN BRIEF

HMM Algeciras, one of the world's largest container ships, has just visited the Port of Hamburg, demonstrating that Germany's largest universal port is up to the challenges. But what exactly does this mean for the economy? In order to determine the regional and overall economic significance of the Port of Hamburg, the CML is working on a new study commissioned by the Hamburg Port Authority HPA together with the Institute of Shipping Economics and Logistics (ISL), ETR - Economics Trend Research and Ramboll. For this we would like to get your support: Please take part in our survey at <https://befragung-hafen-hamburg.fraunhofer.de/> (in German) and give the Port of Hamburg your vote!

Our first digital event together with the Digital Hub Logistics and IBM took place in mid-May. Three team leaders from CML and an IBM employee presented solutions for the use of quantum computing and AI for applications in logistics that are expected to lead to leaps in efficiency. Over 70 viewers followed the webinar and then took the opportunity for an informative discussion with the experts.

## +++DATES+++

- **Crew Connect Europe**, 15-16 September 2020, Digital Event
- **International Supply Chain Conference**, 21-23 October 2020, Berlin
- **VPO Forum at Posidonia 2020**, 29 October 2020, Athens
- **European Navigation Conference ENC 2020**, 22-25 November 2020, Dresden

## IMPRINT

Fraunhofer Center for Maritime Logistics and Services CML  
a unit of Fraunhofer IML

Am Schwarzenberg-Campus 4,  
Building D  
21073 Hamburg, Germany  
Tel.: +49 40 428 78-44 51  
Fax: +49 40 427 31-44 78  
[info@cml.fraunhofer.de](mailto:info@cml.fraunhofer.de)  
[www.cml.fraunhofer.de](http://www.cml.fraunhofer.de)