Underwater inspection of hull condition

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LOOKING TO THE FUTURE
NEW SERVICES FOR SHIPPING AND PORTS

Underwater inspections of ship hulls - so far divers have been required, or a stay in a dry dock. But also the real-time capable, foresighted depth measurement of fairways to avoid ground contact is nowadays only sporadic due to the technological complexity. Difficult and costly operations for maintenance, salvage or repair under water as well as navigation in demanding, dynamic waters could be carried out in a more targeted manner through the use of small autonomous units for information retrieval.
The project partners of RoboVaaS - Robotic Vessels as a Service - have

set themselves the goal of developing such units.
Since June 2018, researchers at CML have been developing a combination of autonomous surface vehicles (ASV) and remotely operated vehicles (ROV) together with Kraken Robotik GmbH (Munich), Hamburg Port Authority AöR, SIGNET research group (Padova), SmartPORT research group (TU Hamburg) and SonarSim Ltd. (Limerick).
The ASV serves both as a communication interface for the ROV and as a platform for topographic surveys. The ROV can be used by optical and laser-based systems for

underwater inspections. The three services Anti Grounding, Underwater Inspection and Environmental Data Gathering are at the forefront of RoboVaaS. They will be made available to maritime stakeholders for later implementation.
The steering software for the ASV and a web-based control software will be developed at the CML and an existing prototype will be built further.
RoboVaaS is funded over three years in the MarTERA programme (Maritime and Marine Technologies for a new ERA) as part of Horizon 2020.

MORE EFFICIENCY AND SAFETY THROUGH
NAUTICAL SEAWAY ANALYSIS

By evaluating historical AIS data, the researchers at the CML have already determined exciting information and forecasts for the arrival times of seagoing ships in port. These AIS data, which have been mandatory since 2004 for the transmission of the most important master data and movement information of merchant ships and have been stored since 2010, can be used to determine arrival times more accurately than before. In addition to distance and speed, other influences such as current, weather and traffic conditions are also taken into account when determining the travel time. On the basis of these results, scientists from the CML, together with the federal waterways and shipping administration (WSV) and the federal maritime
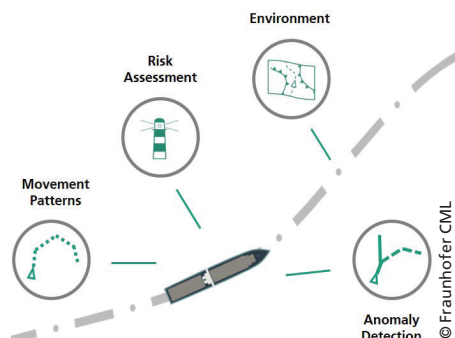
and hydrographic agency (BSH), have investigated possibilities for automated nautical seaway analysis. In the research project „TINA" (Techniques for Interactive Nautical AIS Data Analysis), funded by the Federal Ministry of Transport and Digital Infrastructures (BMVI), correlations of maritime traffic and environmental data were analyzed and possible potentials were estimated. Four focal points were of most interest:
• The determination of movement patterns of ships in specific sea areas.
• The risk and safety assessment of different encounter situations of ships in narrow fairways.
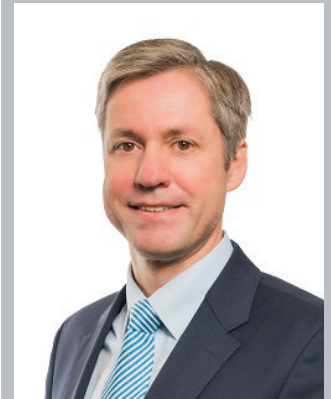• The anomaly detection of

historical and current ship movements.
• The Impact of shipping on the environment.
In addition, ship movements are correlated with meteorological and oceanographic data and their influence is analyzed.

Functional diagram of TINA

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Personnel on board ships have many maintenance tasks - e.g. in the engine room

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OPTIMIZED PLANNING OF MAINTENANCE *AND* PERSONNEL DEPLOYMENT THROUGH THE PLAIN PROJECT

The operation of a ship is determined by a multitude of complex parameters and framework conditions. In addition to the actual tasks of stowing, transporting and discharging cargo, the components of the overall ship system must be serviced and maintained at regular intervals. The planning of these maintenance tasks requires an efficient ship management, which adapts to the constantly changing framework conditions of a fleet and at the same time controls all parameters affecting the daily operation of the ships.

The advancing digitalization on board and the new possibilities of data exchange between ship and shore now offer the opportunity to network individual areas of ship management even more strongly than in the past. With the help of data-based procedures, improved situation-specific recommendations for action can be developed.

In addition to personnel, maintenance represents a major cost factor for ship operation.

The central task of a situation- and demand-oriented maintenance regime is to optimally cover the short and medium-term maintenance tasks (maintenance, inspection, repair) with the limited personnel capacities available on board. Here it is important to consider both the boundary conditions of the ship's schedule and the requirements of condition-oriented maintenance strategies in an appropriate manner.

The aim of the PLAIN project is to develop decision support for the integrated, optimized planning of maintenance tasks and personnel deployment. PLAIN is funded by the Hamburg Authority for Economics, Transport and Innovation (BWVI) over a period of one year.

EFFECTIVE CONTAINER CHECKS
USE OF NON-INTRUSIVE INSPECTION

More than 90 million TEUs are handled annually in European ports. As this large number of containers means that only random checks can be carried out, the EU-funded project C-BORD (Effective Container Inspection at Border Control Points) was launched. Since 2016, the project partners have been developing solutions for Non-Intrusive Inspection (NII). 18 European companies, including technology developers, scientists and customs institutions, focused on the examination of containers to detect smuggling, drug trafficking or the transport of dangerous or illegal substances.

Important goals for the operational process at the terminals are:
• Increasing the throughput capacity of the containers per time unit
• Reducing the need for costly, time-consuming and hazardous

manual container inspections
• Reduction of false negative and false positive alarm rates.

C-BORD has used five technological solutions to enable the next generation of container NII at EU maritime and land borders. The proof of performance was provided by tests in three application cases under real conditions at different border control points.

A C-BORD toolbox and framework will help customs in the future to analyse the need for container NII, design integrated NII solutions and provide answers to important functional and safety issues.

Millions of containers cross the borders in seaports

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+++DATES+++

- **CrewConnect Europe Conference,** April 10-11, 2019, Hamburg

- **Supply Chain Day,** April 11, 2019, Hamburg

- **IT Career Day,** May 17, 2019, Hamburg