



IMarEST BeNeLux Branch

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Mini-symposium 2020: Data Driven Maintenance followed by the Annual General Meeting (AGM)

Speakers:	Andrea Coraddu (Strathclyde University), Patrik Strand (Wärtsilä Finland), Bart Pollmann (Royal Netherlands Navy, DMI)
Date:	Friday the 13 th of November 2020
Time:	13:00 (digital meeting room open for all attendees)
Venue:	online
Contact:	imarestbenelux@gmail.com

Dear member or friend,

You are hereby cordially invited to the coming Mini-Symposium (open to all, including non-members and students) and Annual General Meeting (members only) of the IMarEST BeNeLux Branch. Both will be held online.

The theme of the mini-symposium is "data driven maintenance" which is receiving increased attention due to the data-collection and connectivity developments, combined with the promise of artificial intelligence (AI). The perspectives of supplier, academia and one end-user (the Royal Netherlands Navy) are presented. Details of the programme and additional information can be found below.

Please inform me which of these events you will attend by filling in the [online form](#); advance registration is required, so that we can send you the login-details of the virtual meeting room. Your attendance would be much appreciated. Please register before Friday the 6th of November, and you will receive the link to the digital meeting room by email. Thank you in advance.

Yours sincerely,
E.J. Boonen – Honorary Secretary Benelux Branch.

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Programme (presentation abstracts and speaker info are provided below)

(all times GMT+1)

- 13.00 - 13.10 Digital meeting room open for all attendees
- 13.10 - 13.15 Welcome, by chairman
- 13.15 - 14.00 Presentation by Andrea Coraddu of Strathclyde University.
- 14.00 - 14.15 Coffee break
- 14.15 - 15.00 Presentation by Patrik Strand of Wärtsilä Finland
- 15.00 - 15.15 Coffee break
- 15.15 - 16.00 Presentation by Bart Pollmann (Royal Netherlands Navy)
- 16.00 - 16.15 Discussion and closure of Mini-symposium
- 16.15 - 16.30 Coffee Break. Online meeting room will remain open for those who attend the AGM
- 16.30 - 17.30 Annual General Meeting (AGM) IMarEST Benelux branch (members only)
- 17:30 - 18.00 Digital drink

Dinner

Cancelled due to COVID-19



Figure 1: The Big Data deluge - A businessman tries to crunch the numbers at his desk

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Abstracts

Digital-Twin and Novelty Detection approaches for the prediction of the Hull and Propeller Marine Fouling

by Andrea Coraddu (Stratclyde University)

Hull and propeller performance have a primary role in overall vessel efficiency. Vessel fouling is a common phenomenon where undesirable substances attach or grow on the ship hull. Marine fouling phenomenon has a profound impact since to prevent or reduce its growth which affects the ship consumption, costly drydocking for cleaning the hull and the propeller are needed. A clear understanding of the extent of the degradation of the hull will allow better management of assets and prediction of the best time for dry docking and hull maintenance work.

Intelligent data-driven approaches can be considered as a step forward in supporting both the implementation of suitable Condition Based Maintenance policies for increasing the shipping sustainability and the development of new technologies to improve performances and efficiency of the vessel.

In this presentation, firstly, Novelty Detection approaches for the prediction of the hull condition in real operations based on data measured by the on-board systems will be here presented. Machine Learning modelling technique will be introduced and discussed. Anomaly detection methods based on Support Vector Machines and the K-nearest neighbour will be described and applied to predict the hull condition using the available parameters measured on-board.

Second, a data-driven Digital-Twin of the ship will be described and discussed. The Digital-Twin, built on the large amount of information collected from the on-board sensors, is then applied for estimating the speed loss due to marine fouling. Real-world data coming from two Handymax chemical/product tankers will be used to showcase the effectiveness of the intelligent data-driven approaches to predict the speed loss.

The application of the proposed methods is beneficial both to determine the most effective intervals between maintenance, for propeller and hull cleaning and to estimate ship efficiency.

In the future, the proposed methods could also be exploited for the evaluation of the effectiveness of different energy-saving solutions, such as the case of a new propeller design or the assessment of the benefits deriving from the application of sails.

The proposed methods facilitate the verification of the impact of new technologies or vessel components, thereby allowing to increase the transparency of energy and fuels efficiency technologies by providing a method to validate fuel savings claims made by the manufacturers and providers, supporting further uptake in the shipping industry.

"Data Driven Maintenance - AI, Advanced Diagnostics and OEM expertise"

by Patrik Strand (Wärtsilä Finland)

Seizing the opportunities enabled by digitalization, in combination with leveraging the vast knowledge and experience acquired during decades from marine operations are the keys for success. Through broad co-creation and collaboration between numerous players in the marine market we'll achieve great and sustainable results.

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“Smart use of sensor data leads to modern maintenance support in future ships“

by KLTZ (TD) ret. Bart Pollmann

The Royal Netherlands Navy is planning to introduce several new ship classes within the next decade. The new ships will be technologically much more advanced than the ships currently in service. At the same time the operational availability needs to increase and the crew sizes need to get smaller. This combination leads to the necessity not only to automate many functions on board, but also to increase the level of support to the maintenance organisation. Sensor data can be used to better predict failures of machinery in order to allow the maintenance organisation to perform timely repair actions and prevent catastrophic failures. The developments include the reuse of available data used for Monitoring & Control purposes, the introduction of extra sensor technology to better detect failure modes that cannot be detected with current systems, and the introduction of AI and Machine Learning. The Royal Netherlands Navy is cooperating with Industry to ensure the timely availability of these new methods and technologies.

About the speakers

Andrea Coraddu

Dr Coraddu has been Assistant Professor in the Department of Naval Architecture, Ocean & Marine Engineering at the University of Strathclyde since October 2018. His relevant professional and academic experiences include working as Teaching Associate at the University of Strathclyde, Research Associate at the School of Marine Science and Technology at Newcastle University, Research Engineer as part of the DAMEN R&D department based in Singapore, and serving as Postdoctoral Research Fellow at the University of Genoa, where he was awarded a Laurea and a PhD in Naval Architecture and Marine Engineering.

Dr Coraddu is the leader of an international interdisciplinary research group working on developing data-driven approaches to investigate the behaviour of complex systems and their mutual interaction. Utilising the latest learning algorithms and theoretical results in Artificial Intelligence and Machine Learning his primary research involves taking advantage of data availability to assess complex systems energy performance, perform energy optimisation, and real-time monitoring.

Dr Coraddu has extensive experience of around 12 years on teaching and researching in the scientific area of marine systems engineering having been employed in various positions both in the Academia and Industry as well as in participating in large EU funded projects since 2012.

Dr Coraddu is the Work Package 1 leader of the UKRI COVID-19 project “Risk Evaluation Fast Intelligent Tool (RELIANT) for COVID19”, and he is now leading the development of the Artificial Intelligence-based framework to identify solutions for the management of people and spaces in the current pandemic and post lockdown. This project will test for the first time in the world the use of Artificial Intelligence to drive the decision-making process and provide in near real-time the assessment of risk level towards decisions that minimise the risk of contagion and optimise the use of the space.

Patrik Strand

Patrik Strand, works as General Manager, Product Management Performance Services in the Marine Power Business at Wärtsilä. Patrik has worked +10 years with Product Management of predictive maintenance, asset management and digital solutions related initiatives close to the marine market. Patrik has been +5 years at Wärtsilä in various Product / Portfolio Management positions close to asset management and digitally enabled services business development. Patrik holds a master (M.Sc.) in Engineering and Industrial Management.

Cdr (ME) ret. Bart Pollmann

Bart Pollmann has been a Marine Engineer Officer in the Royal Netherlands Navy for over 38 years. During his active service period he has fulfilled many sailing and supporting jobs in maintenance, condition monitoring and logistics. Currently he is, with a small team, involved in the development of Smart Maintenance Initiatives for future ship classes, particularly focusing on data science initiatives. His motto is: ‘Modern ships deserve modern maintenance’.

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Agenda for AGM (for members only)

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1. Opening
2. Announcements
3. Minutes of Last AGM
4. Annual Report of this year's activities
5. The Financial Account for the year up to 1 October 2020
6. Auditors Statement
7. Appointment of Auditors for the year up to 1 October 2021
8. Announcement of winner of Branch Certificate for the best presentation made to our branch over the past year
9. Election of committee members
 - a. Retirements
 - b. Election new committee members/ officers
10. Technical Programme 2021 – Programme will be announced
11. Any other business
12. Closure