# IMarEST Annual Conference 2024

## 8 July 2024

## Leonardo Royal Hotel Grand Harbour in Southampton

**Technology | Human contributions | Environment**

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| **8AM** | Registration & networking breakfast |
| **9:00** | Chair's opening remarks<br>Ralph Rayner, FIMarEST, *Professorial Research Fellow,* Grantham Research Institute *on Climate and the Environment,* **London School of Economics and co-chair IMarEST Operational Oceanography SIG** |
| **9:05** | Keynote presentation |
| **9:15** | Opening plenary presentations and panel discussion |

### Navigating the uncharted waters: Unveiling the future of ships & shipping

This opening plenary will dissect the interconnected forces of technology, human factors, and the environment, unveiling the challenges and opportunities that lie ahead. It will involve three high-level presentations with a subsequent panel discussion.

Demystifying fuel options and scrutinising the diverse fuel landscape, analysing available technologies, infrastructure capabilities, and long-term viability.

Examining the intricate web of regulations and political landscapes impacting them and the crucial role of state-led support. Determining how the fuels are perceived by the crew and also the public.

Achieving emission targets and Looking at the ripple effects of new fuel productions and evolving emission targets on the maritime industry's wider sustainability footprint and contribution to climate change mitigation.

**Speakers**

Ralph Rayner (moderator) *Professorial Research Fellow*, Grantham Research Institute on Climate and the Environment, **London School of Economics and co-chair IMarEST Operational Oceanography SIG**

Claudene Sharp-Patel, FIMarEST, *Technical Director, Marine and Offshore*, **Lloyds Register**

Senior Representative, **Maritime Research and Innovation UK**

*10:45-11:15 Morning Break*

| **11:15AM** | **LNG operations: current landscape and future challenges** | **Learning from the past, charting a safer course: Health & safety on vessels** | **A course to cleaner seas: meeting emission targets in shipping** |
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| | • A look at the operational intricacies of LNG-powered vessels through the lens of an | • Leveraging operational failure data and accident profiles to identify and mitigate risks, | • The current anti-pollution measures and the impact of upcoming changes, including |

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| | existing operational fleet<br>• Best practices, challenges, and lessons learned.<br>• The technical and regulatory issues surrounding methane slip from LNG operations, evaluating its environmental impact and mitigation strategies.<br>• The feasibility and limitations of widespread LNG adoption across diverse marine sectors, considering vessel types, infrastructure needs, and economic viability. | proactively improving safety culture.<br>• The latest statistics and trends on worker fatigue, analysing its impact on accidents and implementing data-driven solutions like sleep deprivation studies.<br>• The need for accelerated regulatory reforms, including fatigue risk management use of new technologies and clear standards/requirements for machinery operation.<br>• The critical role of proper rest hours and fatigue management/monitoring for crew well-being and operational safety. | the EU ETS and its reporting requirements.<br>• How major shipping companies prepare for stricter emissions regulations and potential penalties for non-compliance.<br>**Speaker:** Anthony Linden, *Area Manager*, **DNV** |
| | *5 minute intermission for movement to next session* | | |
| **11:50AM** | **NavyX's journey to surface ship autonomy** | **Health and safety considerations for operating with new technologies** | **Unveiling the ocean depths: seabed 2030 update** |
| | • The journey to date using remote control with the Autonomous Pacific 24 and MADFOX<br>• The gaps and challenges this gave to the RN and why remote is not good enough<br>• The plan to achieve full autonomy on XV PATRICK BLACKETT | • Safety practices for large capacitors and lithium-ion batteries in ship electrification<br>• Developing new safety standards for emerging technologies.<br>• Maintaining safety standards without compromising operational progress, finding the right equilibrium between owner requirements, crew protection and client expectations<br>• Training needs for safety protocols around new fuels and technologies, maintaining demanding maintenance levels as complexity increases.<br>• The potential health and safety pitfalls of relying solely on automation, advocating for balanced human-machine interaction. | • Hear an update from The Nippon Foundation and GEBCO on the Seabed 2030 project, aiming to map the entire ocean floor by 2030.<br>• The latest findings and advancements in bathymetric mapping, shedding light on previously hidden features of our planet's underwater landscape.<br>• The importance of international cooperation and data sharing in achieving this ambitious global project.<br>• Potential applications of comprehensive seabed mapping, from resource<br>• Demonstrating how this can influence commercial operations<br>Speaker: **Stephen Hall,** Head of Partnerships, **The Nippon Foundation & GEBCO Seabed 2030** |
| | *5 minute intermission for movement to next session* | | |

| 12:25 | The potential of nuclear shipping | Optimising ship O&M: Lessons from leaders & emerging challenges | From pixels to porpoise: transforming shipping with drone and AI technology for marine mammal protection |
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| | **Speaker:** Giulio Gennaro, *Technical Director*, **Core Power** | • Operational failures rooted in human error and poor design and the need for emphasising thorough training and proactive risk management.<br>• -Quality Crew, Quality O&M: links between O&M costs and crew competency.<br>• -Safety challenges of new fuels and prioritise comprehensive training for safe handling and operational practices.<br>Operational failures rooted in human error and poor design and the need for emphasising thorough training and proactive risk management.<br>• -Quality Crew, Quality O&M: links between O&M costs and crew competency.<br>• -Safety challenges of new fuels and prioritise comprehensive training for safe handling and operational practices. | • Introduction to marine mammal conservation in shipping and the critical need for marine mammal protection<br>• -Revolutionizing monitoring with drones<br>• -AI-powered solutions for early warning systems<br>• -Highlighting industry impact and compliance<br>• Stakeholder collaboration for sustainability<br>**Speaker:** Ashley Noseworthy, *President/CEO*, **Edgewise Environmental Ltd** |
| | *13:00-14:00 Lunch break* | | |
| **14:00** | **New technologies in ship O&M and repairs** | **3D printing and class rules/IP: navigating the ideas of innovation** | **Taming the tide: navigating plastic pollution & waste management in shipping** |
| | • The latest advancements in ship repair technology, from advanced welding techniques to 3D printing for spare parts.<br>• How AI and data can optimise docking times, saving you money and increasing operational efficiency.<br>• How predictive maintenance leverages AI and data to anticipate and prevent structural, mechanical, and obsolescence issues, ensuring reliable operation and reducing downtime.<br>• The potential of autonomous technologies and onshore remote operations for ship maintenance, considering their feasibility and impact on the industry. | • A look at the exciting possibilities for 3D printing in the maritime industry<br>• -Class rules and intellectual property (IP): existing regulations and approval processes for additively manufactured components.<br>• -Applications in ship design, spare parts fabrication, and custom components.<br>• Best practices and emerging trends: strategies for leveraging 3D printing responsibly and ethically while protecting your intellectual property. | • The challenges and advancements in onboard water treatment, addressing gray water discharge concerns and exploring potential solutions.<br>• Strategies for limiting plastic use on ships, encouraging alternative materials and responsible waste management practices.<br>• The crucial role of microplastics monitoring in understanding their impact on marine environments and developing mitigation strategies.<br>• The need for reclassifying harmful substances, analysing the potential of the Plastic Treaty, and advocating for stricter pollution regulations<br>**Speaker:** Bev Mackenzie, |

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| | **Speaker:** Jake Rigby, *Global Head of Innovation and Research*, **BMT** | | FIMarEST, *Head of Intergovernmental Engagement*, **BIMCO** |
| | *5 minute intermission for movement to next session* | | |
| **14:35** | **Leveraging data from vessels to forecast power requirements** | **Floating wind turbines: Construction and installation considerations** | **Amendments to the ballast water management systems convention** |
| | • Leveraging data from vessels for predictive and prescriptive analytics<br>• The optimal control, hydrbrid and fuel electric system, rule based approach<br>• Predicting the status from short to medium term<br>• Optimising control of power and propulsion and forecasting needs over time<br>• How to forecast the status of the power demand of hybrid and fuel electric drivetrains to improve control<br><br>**Speaker**: Dr. Andrea Coraddu, *Associate Professor*, **Delft University of Technology** | • Physical requirements of constructing and installing floating wind turbines.<br>• -Training and industrial relations, considerations<br>• -How to minimise effects on the environment with noise mitigation during pile driving and reducing the effect of damage to the seabed.<br><br>**Speaker:** Alan Crowle, FIMarEST, *Researcher*, **University of Exeter** | • Concepts for financial incentives to promote wider adoption and proper implementation of BWM regulations.<br>• Strategies for navigating regulatory implementation discrepancies and ensuring consistent BWM compliance.<br>• Technologies for detecting organisms and their use in monitoring BWM Convention adherence<br>• Knowledge sharing and PSC/crew training programs to improve understanding of BWM regulations and operational efficiency of ballast water management systems.<br>• Possible potential for use of ultrasonics in BWM |
| | *5 minute intermission for movement to next session* | | |
| **15:10** | **Data and digitisation in shipping and marine industries** | **Stakeholder management for sustainable maritime development** | **LR clean hull notations: delivering environmental and efficiency benefits** |
| | • How can AI and machine learning detect and mitigate onboard issues in real-time, improving safety and operational efficiency?<br>• Transition from time-based maintenance to predictive monitoring using advanced data analysis, minimising downtime and costs.<br>• How can AI-powered weather data analysis optimise propulsion systems and emissions, reducing fuel consumption and environmental impact?<br>• How digitisation can streamline LRIT (Long Range Information and Traffic) processes, saving time and | • Specifics of stakeholder engagement in the context of sustainable maritime development;<br>• Brief definitions of social sustainability and stakeholder management, identifying the stakeholders in social sustainability;<br>• An overview of the unique challenges of managing stakeholders with a specific focus on social sustainability;<br>• In focus: attraction and retention of cadets as a stakeholder management issue.<br><br>**Speaker:** Alina Prylipko, SIMarEST, *Lecturer*, **World Maritime University** | • Environmental Impact: Hull Fouling vs GHG emissions.<br>• Biofouling as a vector for the transfer of Invasive Alien Species (IAS).<br>• Energy efficiency during energy transition and beyond<br>• Synergy between energy efficiency and Biofouling management<br>• LR Clean Hull Notation Solution<br><br>**Speaker:** Sahan Abeysekara, *Principal Specialist - Environment, Technical Directorate*, **Lloyds Register** |

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| | resources.<br>• The potential of remote data exchange, control, and big sensor data for comprehensive condition monitoring and informed decision-making.<br>• How operational data can be used to optimise future operations, improve profitability, and enhance overall fleet management. | | |
| | *15:45-16:15 Afternoon Break* | | |
| **16:15** | **Maritime cybersecurity -the risks today and how to mitigate them** | **Shaping the future of marine engineering: training & talent** | **Decommissioning & recycling of marine infrastructure** |
| | • What IMarEST can do to highlight this 21st-century challenge<br>• The Risk - SCADA and Op Tech: how ships and other vessels are poorly protected<br>• Using AI as a force for good in the maritime environment: how AI is being weaponised at state and individual level.<br>• Critical Infrastructure: Port Security - securing riverine and port areas from illégal activity above and below the waterline.<br>**Speaker:** Philip Parvin, FIMarEST, *Vice Chair of Council*, **IMarEST** | • Developing and training young engineers specifically for the unique demands of the industry.<br>• The potential impact of AI on employment and training within the sector.<br>• Strategies for retaining talent and minimising training costs through effective team development, creating a motivating and rewarding work environment.<br>**Speaker:** John Chudley, FIMarEST, *Chair*, **Engineering Council** | • Guidelines for decommissioning of marine infrastructure<br>• The impact of the Hong Kong Convention's entry into force, its key provisions, and how it will reshape ships decommissioning and recycling landscape.<br>• Best practices for safe and environmentally sound recycling, emphasising responsible waste management and worker safety.<br>• Remaining challenges in dismantling infrastructure, financing, and ensuring compliance, exploring potential solutions and innovations.<br>• The future design of marine assets and promoting practices that facilitate easier and more sustainable end-of-life management<br>• Development of materials which are less hazardous to operators and the environment.<br>**Speaker:** Dr. Anand Hiremath**,** *Head of the SSOR,* **GMS** |
| | *5 minute intermission for movement to next session* | | |
| | ***16:50 Topical Roundtables (ALL RUNNING AT THE SAME TIME, )*** | | |
| **16:50** | **Technology roundtable 1: Looking at responsible ai in shipping** | **Human factors roundtable 4 Navigating change - culture & ownership in shipbuilding** | **Environment roundtable 7: Greenwashing or green giant? Demystifying decarbonisation in the maritime industry** |

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| | • *-Advocating for an ethical approach to AI integration, ensuring human oversight and decision-making remain central.*<br>• *The critical role of clean, well-organized data in maximising AI's effectiveness*<br>• *and reliability within the maritime industry.*<br>• *The importance of transparent and explainable AI algorithms, building trust and understanding among stakeholders.*<br>• *International cooperation in developing AI standards and regulations for responsible use in the maritime domain.*<br>• *The need for upskilling and reskilling initiatives to prepare the workforce for the evolving landscape of AI-powered shipping.*<br>• *Examine the potential to use existing skills in different ways* | • *Strategies for identifying and aligning the needs of diverse stakeholders, ensuring net gains solutions for ship design and construction.*<br>• *The need for more collaboration between engineering and design teams*<br>• *The crucial role of soft skills like teamwork, communication, and adaptability in creating a successful and positive workplace culture.*<br>• *The impact of investment funds and brokers on the ship ownership market, including potential consequences for O&M quality and new build standards.* | • *Exposing greenwashing tactics and advocating for transparency in decarbonisation efforts within the maritime industry.*<br>• *Realistic pathways and timelines for achieving decarbonisation goals, prioritising effectiveness over symbolic actions.*<br>*-Industry-wide collaboration, knowledge sharing, and investment in proven technologies and sustainable fuels and examination of new ideas*<br>• *Frameworks for monitoring and reporting decarbonisation progress, ensuring accountability and preventing misleading claims.* |
| | **Technology roundtable 2: Autonomy, security, and responsibility in maritime operations** | **Human factors roundtable 5: Building the future workforce - attracting & retaining top talent** | **Roundtable 6: navigating future marine environmental regulations** |
| | • *What is the optimal level of human involvement in autonomous operations? What type of training for personnel involved in autonomous operation*<br>• *-Should we view AI as an intelligent assistant, enhancing human capabilities, or a potential*<br><br>**Host:** Paul Marshall, *Engineer*, Maritime Industry | • *The negative effects of new employment contracts on ship training and O&M*<br>• *Taking a holistic approach to talent development, providing support at all stages of the career journey, from recruitment to upskilling and career progression.*<br>• *Strategies to attract younger generations to the marine industry, highlighting its unique offerings, career potential, and commitment to innovation.*<br>• *The need for improved career development programs and targeted recruitment to ensure the right talent fills critical roles within the industry.*<br>• *The necessary mindset shift, educational adaptations, and specialised training required* | • Evolution in Regulations and *anticipation of significant changes in marine environmental regulations over the next 25 years.*<br>• *-Global Initiatives Impacting Shipping: COP 28 outcomes and triple planetary crisis*<br>• *High Seas Treaty and shipping responsibility*<br>• *Challenges and opportunities for the shipping industry*<br>• *Zero emissions and Zero harmful discharges*<br><br>**Host:** Sahan Abeysekara, *Principal Specialist - Environment, Technical Directorate*, **Lloyds Register** |

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| | | *for technicians and engineers to handle new fuels.* | |
| | **Technology roundtable 3: The crew of the future - optimizing ship O&M with autonomy** | **Human factors roundtable 6: Human-centered shipbuilding** | **Environment roundtable 8: Unlocking environmental benefits of offshore surveys with new technology** |
| | • *How can PMS and operational data inform the optimal balance of crew and autonomous systems onboard, ensuring efficiency and safety?*<br>• *Is there currently enough high-quality, standardised*<br>• *operational data to fully leverage the potential of autonomous technologies?*<br>• *What new job opportunities will emerge with automation, requiring different skill sets and expertise?*<br>• *Remote Control of the Seas: Can remote manoeuvrability for cargo exchange and docking revolutionise operational efficiency and safety?*<br>• *How will automation truly impact personnel needs? Will it eliminate jobs, or simply shift them to remote roles?*<br>***Host:*** Kevin Daffey, Vice President NautIQ Solutions and Governmental Engineering, **Rolls-Royce Naval** | • *The feasibility and challenges of retrofitting existing ships for multi-fuel use, considering technical, economic, and logistical factors.*<br>• *The risks and rewards associated with adopting emerging fuel technologies in shipbuilding, emphasising informed decision-making and collaboration.*<br>• *The human element of digitisation in shipyards, ensuring successful technology adoption and workforce upskilling.*<br>• *Inclusive approaches where designers and users work together, creating ships that prioritise efficiency, safety, and crew well-being.*<br>• *Building effective training programs for engineers and technicians on the principles and applications of human-centred design in shipbuilding.* | • *Opportunities for collaboration between commercial and research vessels, identifying shared goals and potential avenues for joint data collection and scientific investigation.*<br>• *The economic benefits for commercial operators participating in scientific surveys, highlighting reputational gains and potential research partnerships.*<br>• *The effectiveness of new technologies in minimising environmental impacts of offshore surveys, exploring areas for further development and research.*<br>• *The importance of open data sharing and collaboration between stakeholders, maximising the environmental benefits of offshore surveys.* |
| ***17:30*** | ***End of Conference*** | | |