IMarEST Annual Conference 2024

9 July 2024

Leonardo Royal Hotel Grand Harbour in Southampton

The future of ships, shipping and environmental sustainability'

Technology | Human contributions | Environment

Sponsored by Lloyd's Register

Confirmed Speakers

1. **Prof 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**
2. **Prof John Chudley FIMarEST,** Chair, **Engineering Council**
3. **Dr Bev Mackenzie FIMarEST,** Head of Intergovernmental Engagement, **BIMCO**
4. **Dr. Andrea Coraddu,** Associate Professor, **Delft University of Technology**
5. **Tobi Menzies,** Director, Business Development, **Core Power Energy**
6. **Paul Marshall FIMarEST,** Engineer, Maritime Industry
7. **Alan Crowle FIMarEST,** Researcher, **University of Exeter**
8. **Sahan Abeysekara MIMarEST,** Principal Specialist - Environment, Technical Directorate**, Lloyds Register**
9. **Alina Prylipko SIMarEST,** Lecturer, **World Maritime University**
10. **Philip Parvin FIMarEST,** Vice Chair of Council, **IMarEST**
11. **Jake Rigby,** Global Head of Innovation and Research, **BMT**
12. **Mohammad Hoque,** Fleet Manager, **Wallenius Wilhelmsen Logistics**
13. **Dr. Anand Hiremath,** Chief Sustainability Officer, Sustainable Ship and Offshore Recycling Program (SSORP), **GMS**
14. **Ashley Noseworthy,** President / CEO, **Edgewise Environmental Ltd**
15. **Dr Richard Bucknall** *Head of Mechanical Engineer*, **UCL**, **Maritime Research and Innovation UK**
16. **Stephen Hall FIMarEST,** Head of Partnerships, **The Nippon Foundation & GEBCO Seabed 2030**
17. **Kevin Daffey FIMarEST,** Vice President NautIQ Solutions and Governmental Engineering, **Rolls-Royce Naval**
18. **Kenneth Mcelroy FIMarEST,** Director, Future Submarines Barrow, **Babcock**
19. **Reece Oliver MIMarEST** Experimentation Plans Team Leader – NavyX, **Royal Navy**
20. **Niru Dorian FIMarEST,** Co-Founder, **Whale Fish**
21. **Wouter Vuikj,** Business Manager Sustainable Transport, **Port of Rotterdam**
22. **Adam Sobey,** Program Director, **Turing Institute**
23. **Simon Graves MIMarEST,** Inspector of Marine Accidents, **MAIB**

8.15AM	Registration & networking breakfast		
9:15AM	**Chair's opening remarks** Prof 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**		
9:15AM	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. *5-minute presentation from each speaker followed by a 30-minute panel discussion with audience Q&A (15mins)* **Speakers** **Prof Ralph Rayner FIMarEST** (moderator) *Professorial Research Fellow*, Grantham Research Institute on Climate and the Environment, **London School of Economics and co-chair IMarEST Operational Oceanography SIG** **Dr Richard Bucknall** *Head of Mechanical Engineer*, **UCL**, **Maritime Research and Innovation UK**		
10 minute movement to next session			
10.10AM	**Interchangeability of current and future fuels in the shipping industry: A technical analysis**	**Learning from the past, charting a safer course: Health & safety on vessels**	**A course to cleaner seas: meeting emission targets in shipping**
	• Examine the states of various fuel options, during their use analysing their physical and chemical properties relevant to maritime applications. • Evaluate the feasibility and limitations of using ammonia as a carrier for green fuel, exploring its potential impact on logistics and infrastructure. • Analyse best practices and lessons learned from the established ammonia transportation sector within the chemical industry.	• Leveraging operational failure data and accident profiles to identify and mitigate risks, proactively improving safety culture. • The latest statistics and trends on worker fatigue, analysing its impact on accidents and implementing data-driven solutions like sleep deprivation studies. • The need for accelerated regulatory reforms, including fatigue risk management use of new technologies and clear	• The current anti-pollution measures and the impact of upcoming changes, including the EU ETS and its reporting requirements. • How major shipping companies prepare for stricter emissions regulations and potential penalties for non-compliance. **Speaker:** Anthony Linden, *Area Manager*, **DNV**

	Speaker: VACANT	standards/requirements for machinery operation. • The critical role of proper rest hours and fatigue • management/monitoring for crew well-being and operational safety. Speaker: **Simon Graves MIMarEST,** *Inspector of Marine Accidents,* **MAIB**	
	10:50AM networking break		
11.20AM	**NavyX's journey to surface ship autonomy**	**Sustainable inland shipping: how is it possible?**	**Achieving net zero carbon emissions and sustaining military capability on complex warships**
	• The journey to date using remote control with the Autonomous Pacific 24 and MADFOX • The gaps and challenges this gave to the RN and why remote is not good enough • The plan to achieve full autonomy on XV PATRICK BLACKETT **Speaker:** Reece Oliver MIMarEST *Experimentation Plans Team Leader* – **NavyX, Royal Navy**	• Considerations for ship owners when converting to alternative fuels • The Importance of modular ship design • In setting to improve business case. **Speaker:** Wouter Vuijk, *Business Manager Sustainable Transport*, **Port of Rotterdam**	• The challenge of achieving net zero carbon emissions • Achieving net zero and sustaining military capability on complex warships • Insight into the fundamental requirements for naval fuels and the potential alternatives. • The problem of no obvious direct sustainable replacement for marine gas oil • Observations to signpost and inform the direction of travel **Speaker:** Richard Partridge FIMarEST, *Chief of Naval Systems*, **Rolls-Royce Naval**
	10 minute intermission for movement to next session		
12:00	**New nuclear for maritime: the environmental & economic disruptor**	**Floating wind turbines: construction and installation considerations**	**Unveiling the ocean depths: seabed 2030 update**
	• Outlining the potential of advanced reactors in a maritime setting (esp. compared to e-Fuels) • Addressing some common misconceptions • Setting out the acceptance criteria for new nuclear technologies on a floating asset • Introducing the concept of a sustainable nuclear fuel inventory that can span	• Physical requirements of constructing and installing floating wind turbines. • Training and industrial relations, considerations • How to minimise effects on the environment with noise mitigation during pile driving and reducing the effect of damage to the seabed. **Speaker:** Alan Crowle FIMarEST, *Researcher*, **University of Exeter**	• Hear an update from The Nippon Foundation and GEBCO on the Seabed 2030 project, aiming to map the entire ocean floor by 2030. • The latest findings and advancements in bathymetric mapping, shedding light on previously hidden features of our planet's underwater landscape. • The importance of international cooperation and data sharing in achieving this ambitious global project.

	several generations of vessels, and including that concept into a look at a hypothetical • nuclear-electric bulk carrier of the future. Speaker: **Tobi Menzies,** *Director, Business Development*, **Core Power Energy**		• Potential applications of comprehensive seabed mapping, from resource • Demonstrating how this can influence commercial operations Speaker: **Stephen Hall,** *Head of Partnerships*, **The Nippon Foundation & GEBCO Seabed 2030**
10 min movement			
12:40	**New technologies in ship operations and maintenance**	**Optimising ship O&M: Lessons from leaders & emerging challenges**	**The art and science of removing plastic bottles from ships**
	• How AI and data can improve the design process and increase operational efficiency. • The latest advancements in build and repair technologies, from advanced welding techniques to 3D printing. • Seeing through the mist of Digital Twins – exploring how predictive maintenance can ensure reliable operation and reduce downtime. • Over the Horizon – Discussing the potential of quantum and autonomous technologies to change operational models and bring real benefits to end operators. Speaker: **Jake Rigby,** *Global Head of Innovation and Research*, **BMT**	• Operational failures rooted in human error and poor design and the need for emphasising thorough training and proactive risk management. • Quality Crew, Quality O&M: links between O&M costs and crew competency. • Safety challenges of new fuels and prioritise comprehensive training for safe handling and operational practices. • How industry giants like Maersk approach maintenance planning and execution • Determining who apart from the system operators need training and what that training is	The talk will introduce the BIMCO best practice guide to removing plastic bottles from cargo ships- highlighting the following: • Understanding the environmental Impact- introducing the impact of single-use plastic bottles, particularly in marine ecosystems, and the urgent need for the shipping industry to take proactive steps in reducing plastic waste. • Exploring alternatives to Single-Use Plastic Bottles – introducing the various technologies and methods that can be used to replace single-use plastic bottles on ships- selecting the best system and what to do about bottles that cannot be removed • Changing attitudes and behaviours - strategies for challenging seafarers' attitudes towards tap water and encouraging them to trust and consume water produced onboard – the role of testing regimes, engagement and dispelling misconceptions about tap water. Speaker: **Dr Bev Mackenzie FIMarEST,** *Head of Intergovernmental Engagement*, **BIMCO**
	13:10PM LUNCH		
14:00	**Leveraging data from vessels to forecast power requirements**	**Stakeholder management for sustainable maritime development**	**Collaborative strategies for mitigating industry impacts on marine mammals: perspectives from global experts**

	• Leveraging data from vessels for predictive and prescriptive analytics • -The optimal control, hydrbrid and fuel electric system, rule based approach • -Predicting the status from short to medium term • -Optimising control of power and propulsion and forecasting needs over time • -How to forecast the status of the power demand of hybrid and fuel electric drivetrains to improve control Speaker**: Dr. Andrea Coraddu**, *Associate Professor*, **Delft University of Technology**	• Specifics of stakeholder engagement in the context of sustainable maritime development; • Brief definitions of social sustainability and stakeholder management, identifying the stakeholders in social sustainability; • An overview of the unique challenges of managing stakeholders with a specific focus on social sustainability • In focus: attraction and retention of cadets as a stakeholder management issue. Speaker**: Alina Prylipko SIMarEST**, *Lecturer*, **World Maritime University**	**Fireside Chat:** Exploring innovative approaches and international collaboration efforts to mitigate industry impacts on marine mammals, including insights on marine mammal mitigation from industry operations and the significance of protected areas. Speakers: **Niru Dorian FIMarEST**, *Co-Founder*, **Whale fish** Ashley Noseworthy, *President / CEO*, **Edgewise Environmental Ltd**
	10 minute intermission for movement to next session		
14:40	**Role of machine learning and sensor data in condition monitoring and informed decision making**	**Health and safety considerations for operating with new technologies**	**LR Clean hull notations: delivering environmental and efficiency benefits**
	• How sensor data & machine learning have the possibility of shaping the future of condition based maintenance & easing process of decision-making. • -Considering the following aspects: • Expectation from AI based engine operational & sensor data analysis. • How the sensor data and machine learning can shape the predictive maintenance. Speaker: **Mohammad Hoque,**Fleet Manager, **Wallenius Wilhelmsen Logistics**	• Safety practices for large capacitors and lithium-ion batteries in ship electrification • Developing new safety standards for emerging technologies. • Maintaining safety standards without compromising operational progress, finding the right equilibrium between owner requirements, crew protection and client expectations • Training needs for safety protocols around new fuels and technologies, maintaining demanding maintenance levels as complexity increases. • The potential health and safety pitfalls of relying solely on automation, advocating for balanced human-machine interaction. VACANT	• Environmental Impact: Hull Fouling vs GHG emissions. • Biofouling as a vector for the transfer of Invasive Alien Species (IAS). • Energy efficiency during energy transition and beyond • Synergy between energy efficiency and Biofouling management • LR Clean Hull Notation Solution **Speaker:** Sahan Abeysekara, *Principal Specialist - Environment, Technical Directorate*, **Lloyds Register**
15:10	*Afternoon break*		

15:50	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 • The Risk - SCADA and Op Tech: how ships and other vessels are poorly protected • Using AI as a force for good in the maritime environment: how AI is being weaponised at state and individual level. • Critical Infrastructure: Port Security - securing riverine and port areas from illégal activity above and below the waterline. Speaker**: Philip Parvin FIMarEST,** *Vice Chair of Council*, **IMarEST**	• Developing and training young engineers specifically for the unique demands of the industry. • The potential impact of AI on employment and training within the sector. • Strategies for retaining talent and minimising training costs through effective team development, creating a motivating and rewarding work environment. Speaker**: Prof John Chudley FIMarEST,** *Chair*, **Engineering Council**	• Guidelines for decommissioning of marine infrastructure • The impact of the Hong Kong Convention's entry into force, its key provisions, and how it will reshape ships decommissioning and recycling landscape. • Best practices for safe and environmentally sound recycling, emphasising responsible waste management and worker safety. • Remaining challenges in dismantling infrastructure, financing, and ensuring compliance, exploring potential solutions and innovations. • The future design of marine assets and promoting practices that facilitate easier and more sustainable end-of-life management • Development of materials which are less hazardous to operators and the environment. Speaker: **Dr. Anand Hiremath,** *Chief Sustainability Officer* **Sustainable Ship and Offshore Recycling Program (SSORP)** **Global Marketing Systems (GMS)**
	10 minute intermission for movement to next session		
16:30 Topical Roundtables (ALL RUNNING AT THE SAME TIME,)			
16:30	**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**
	• *-Advocating for an ethical approach to AI integration, ensuring human oversight and decision-making remain central.* • *The critical role of clean, well-organized data in maximising AI's effectiveness* • *and reliability within the maritime industry.*	• *Strategies for identifying and aligning the needs of diverse stakeholders, ensuring net gains solutions for ship design and construction.* • *The need for more collaboration between engineering and design teams* • *The crucial role of soft skills like teamwork, communication, and adaptability in creating a*	• *Exposing greenwashing tactics and advocating for transparency in decarbonisation efforts within the maritime industry.* • *Realistic pathways and timelines for achieving decarbonisation goals, prioritising effectiveness over symbolic actions.* *-Industry-wide collaboration, knowledge sharing, and investment in proven technologies and*

	• *The importance of transparent and explainable AI algorithms, building trust and understanding among stakeholders.* • *International cooperation in developing AI standards and regulations for responsible use in the maritime domain.* • *The need for upskilling and reskilling initiatives to prepare the workforce for the evolving landscape of AI-powered shipping.* • *Examine the potential to use existing skills in different ways* Host**: Adam Sobey**, *Program Director*, **Turing Institute**	*successful and positive workplace culture.* • *The impact of investment funds and brokers on the ship ownership market, including potential consequences for O&M quality and new build standards.* Host: **Kenneth Mcelroy FIMarEST,** Director Future Submarines Barrow, **Babcoc**	*sustainable fuels and examination of new ideas* • *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* • *-Should we view AI as an intelligent assistant, enhancing human capabilities, or a potential* Host: **Paul Marshall**, *Engineer*, Maritime Industry	• *The negative effects of new employment contracts on ship training and O&M* • *Taking a holistic approach to talent development, providing support at all stages of the career journey, from recruitment to upskilling and career progression.* • *Strategies to attract younger generations to the marine industry, highlighting its unique offerings, career potential, and commitment to innovation.* • *The need for improved career development programs and targeted recruitment to ensure the right talent fills critical roles within the industry.* • *The necessary mindset shift, educational adaptations, and specialised training required for technicians and engineers to handle new fuels.* Host**: Helen Oldridge**, *Head of Scientific Engineering*, **NOC**	• Evolution in Regulations and *anticipation of significant changes in marine environmental regulations over the next 25 years.* • *-Global Initiatives Impacting Shipping: COP 28 outcomes and triple planetary crisis* • *High Seas Treaty and shipping responsibility* • *Challenges and opportunities for the shipping industry* • *Zero emissions and Zero harmful discharges* Host**: Sahan Abeysekara**, *Principal Specialist - Environment, Technical Directorate*, **Lloyds Register**
	Technology roundtable 3: The crew of the future -	**Human factors roundtable 6: Human-centered shipbuilding**	**Environment roundtable 8: Unlocking environmental**

	optimizing ship O&M with autonomy		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?* • *Is there currently enough high-quality, standardised* • *operational data to fully leverage the potential of autonomous technologies?* • *What new job opportunities will emerge with automation, requiring different skill sets and expertise?* • *Remote Control of the Seas: Can remote manoeuvrability for cargo exchange and docking revolutionise operational efficiency and safety?* • *How will automation truly impact personnel needs? Will it eliminate jobs, or simply shift them to remote roles?* ***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.* • *The risks and rewards associated with adopting emerging fuel technologies in shipbuilding, emphasising informed decision-making and collaboration.* • *The human element of digitisation in shipyards, ensuring successful technology adoption and workforce upskilling.* • *Inclusive approaches where designers and users work together, creating ships that prioritise efficiency, safety, and crew well-being.* • *Building effective training programs for engineers and technicians on the principles and applications of human-centred design in shipbuilding.* *Host: Edward Walker (TBC)*	• *Opportunities for collaboration between commercial and research vessels, identifying shared goals and potential avenues for joint data collection and scientific investigation.* • *The economic benefits for commercial operators participating in scientific surveys, highlighting reputational gains and potential research partnerships.* • *The effectiveness of new technologies in minimising environmental impacts of offshore surveys, exploring areas for further development and research.* • *The importance of open data sharing and collaboration between stakeholders, maximising the environmental benefits of offshore surveys.*
17:15	***End of Conference***		