MPA Commissions MariOT Training Facility
*Inaugural MariOT Exercise to Train Maritime Professionals
and Strengthen Shipboard Cybersecurity*

The Maritime and Port Authority of Singapore (MPA) has commissioned the Maritime Testbed of Shipboard Operational Technology (MariOT) system, the world's first industrial-grade cyber-physical platform designed to strengthen shipboard cybersecurity training and testing for technologies. Supported by the Singapore Maritime Institute (SMI) and developed in collaboration with the Singapore University of Technology and Design (SUTD) and industry partners, the launch of the SUTD-based facility marks an important milestone in efforts to address cybersecurity challenges impacting shipboard Operational Technology systems.

Enhancing Cybersecurity Training for the Maritime Sector

2.   MariOT's industrial-grade design delivers high-fidelity simulations of key maritime systems, including navigation, propulsion, and power management systems. These realistic training scenarios enable trainees to gain hands-on practice and experience with potential cyber threats, bridging the gap between theoretical knowledge and real-world operational challenges.

3.   MariOT strengthens the quality and rigour of cybersecurity training while reducing reliance on physical shipboard infrastructure. It fosters a collaborative environment where engineers, IT specialists, and maritime personnel can share expertise, refine best practices, and accelerate the testing of cybersecurity technologies and adoption of cybersecurity incident response protocols.

4.   MPA plans to integrate MariOT training scenarios into academic curricula for maritime-related courses through partnerships with Institutes of Higher Learning. Through access to state-of-the-art simulations, students will enhance their learning outcomes, supported by structured internships and cross-disciplinary research projects to offer students pathways for specialisation in maritime cybersecurity.

5.   MPA and its partners will continue to expand MariOT's capabilities to address evolving cyber threats and conduct regular training exercises. The facility will also play a key role in advancing research on maritime cybersecurity, with SMI leading the initiative. Further collaborations with international partners will be explored to strengthen the facility's simulation capabilities and support the development of global cybersecurity standards.

6.   Over the next three years, it is expected that more than 300 students and professionals, including ship crew, cybersecurity professionals, and port operators, will benefit from this cutting-edge facility.

Inaugural MariOT Cybersecurity Exercise Brings Together Global Partners

7.   SUTD, in partnership with MPA, will host the inaugural MariOT cybersecurity training exercise from 27 to 28 March 2025. The exercise will simulate cyber threats targeting OT systems onboard vessels, testing participants' ability to detect cyber intrusions and carry out the appropriate incident response protocols. Exercise observers include senior officials from international port authorities from the Port Authority Chief Information Officers Cybersecurity Network (PACC-Net) and chainPORT Cyber Resilience Working Group (CRWG).

8.   The exercise is supported by experts from iTrust, SUTD's centre for research in cybersecurity, as well as the Maritime Cybersecurity Centre [1] at the Estonian Maritime Academy, and the School of IT at Tallinn University of Technology (TalTech).

9.   Mr David Foo, Assistant Chief Executive (Operations Technology), MPA, said: "MariOT offers cyber solution providers a practical platform to test and develop their solutions in a realistic maritime environment. At the same time, it plays a key role in upskilling our workforce to address the growing cybersecurity challenges in the industry. We welcome partners to use MariOT and work with us to enhance its capabilities, ensuring it remains effective in tackling evolving cyber threats."

10.   Professor Chua Chee Kai, Associate Provost for Research at SUTD said: "We are thankful for the support from MPA, SMI and industry partners for collaborating with us to bring MariOT to fruition. The MariOT is the first of its kind industrial-grade cyber-physical testbed that will provide real-world scenarios for cybersecurity training and testing of maritime operations. We believe that with its capabilities, we will be able to nurture a new generation of talents with deep expertise in maritime cybersecurity."

11.   Dr Chen Xinwei, Deputy Executive Director of SMI, said: "With the increasing digitalisation and enhanced connectivity between ship and shore-based systems, concerns over cyberattacks on shipping operations are growing. In response, SMI has supported iTrust at SUTD to develop MariOT, a cutting-edge facility designed to provide a secure and collaborative environment for industry and researchers. This testbed will enable stress-testing of systems, the development of robust cyber defences, and the strengthening of maritime operations' resilience against emerging cyber threats. SMI will work closely with iTrust to leverage the testbed for research and development, driving the advancement of new capabilities in maritime cybersecurity."

12.   Professor Sanja Bauk, the ERA Chair Holder of Maritime Cybersecurity (MariCybERA) at the Estonian Maritime Academy, Tallinn University of Technology (TalTech), said: "This cooperation with Singapore's esteemed partner institutions in the field of maritime cyber

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[1] *The Maritime Cybersecurity Centre at the Estonian Maritime Academy, part of Tallinn University of Technology (TalTech), was established in January 2021 under the European Commission's MariCybERA project, to address the growing cybersecurity challenges in the maritime industry.*

security is a great pleasure and honour for us to further our joint efforts as the experts from the Maritime Cybersecurity Centre within the Estonian Maritime Academy and from the School of IT have supported the Singaporean partners in the MoU with research and training activities."

About the Maritime and Port Authority of Singapore (MPA)

MPA was established on 2 February 1996 with the mission to develop Singapore as a premier global hub port and international maritime centre, and to advance and safeguard Singapore's strategic maritime interests. MPA is the driving force behind Singapore's maritime and port development, taking on the roles of maritime and port regulator and planner, international maritime centre champion, national maritime representative, and a champion of digitalisation and decarbonisation efforts at regional and international fora such as at the International Maritime Organization and the International Organization for Marine Aids to Navigation. MPA partners industry, research community and other agencies to enhance safety, security, and environmental protection, facilitate maritime and port operations and growth, expand multi-domain capabilities, and support the cluster of maritime ancillary services and manpower development. MPA is responsible for the overall development and growth of the maritime multi-domain and the Port of Singapore.

For more information, please visit www.mpa.gov.sg/

About Singapore Maritime Week 2025

SMW is an annual gathering of the international maritime community to advance key industry issues and exchange ideas to bring the sector forward. Driven by MPA, in collaboration with industry stakeholders and research and educational institutions, SMW brings together key opinion leaders and industry leaders through conferences, dialogues and forums.

The range of activities and events organised by MPA, industry stakeholders and research and educational institutions, as well as the cosmopolitan profile of participants, reflect the vibrancy and diversity of Singapore as a global hub port and leading international maritime centre.

For more information, please visit www.smw.sg/

About the Singapore University of Technology and Design (SUTD)

Singapore University of Technology and Design (SUTD) was one of the first universities in the world to incorporate the art and science of design and technology into a holistic interdisciplinary education and research experience.

On 11 March 2024, SUTD unveiled a new growth strategy called SUTD Leap with the aim of redesigning higher education with an even greater focus on design and artificial intelligence (AI), whilst nurturing the next generation of design x tech innovators and innovator leaders.

Its pivot towards AI this year will make it the world's first university to specialise in design and AI across education and research, for both undergraduates and postgraduates. Central to focus is the principle that AI should no longer be viewed as a technological tool to be used by humans, but as part of a human-machine team, working together hand-in-hand and leveraging on each other's strengths to find innovative solutions for real-world problems.

About the Singapore Maritime Institute (SMI)

SMI is a joint effort by the MPA, the Agency for Science, Technology and Research (A*STAR) and the Singapore Economic Development Board.

Established in April 2011, SMI develops strategies and programmes to achieve its mission with key focus areas in sectors such as port, shipping and maritime services. SMI charts the maritime research strategy and promotes greater industry-academia research and development (R&D) collaborations to be undertaken in Singapore.

Through a whole-of-government approach, SMI drives initiatives with industry-wide impacts to enhance the overall competitiveness of the local maritime industry, and to strengthen R&D capabilities in support of Singapore as a global maritime knowledge hub.

For more information, please visit www.maritimeinstitute.sg

About the Maritime Cybersecurity Centre within the Estonian Maritime Academy (TalTech)

The Maritime Cybersecurity Centre has been established at the Estonian Maritime Academy (TalTech) in 2021. Numerous high-impact publications have been published by the Center's researchers. These publications analyze threat modeling, risk assessment, early intrusion detection systems (IDS) and the use of various simulation techniques and artificial intelligence (AI) tools to simulate and neutralize IT/OT cyber-attacks on the real test autonomous sea surface vessel (ASV) model in MATLAB Simulink environment. Additionally, the studies and publications include the development of human skills in cyber defiance in extended reality (XR). Within the Maritime Cybersecurity Centre, a virtual cyber lab has been developed for both research and training purposes. This center is established within the European Commission MariCybERA project.

For more information, please visit: https://taltech.ee/en/estonian-maritime-academy/areas-of-advance/maritime-cyber-security

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