

Singapore Maritime Foundation Publishes Report of the Tripartite Advisory Panel for Future-ready Maritime Workforce

Report outlines skills that a future-ready maritime workforce requires across sea-and-shore, strategies to transform the maritime workforce, and how Singapore can contribute to preparing the workforce for change

Singapore, 15 April 2024 — The Singapore Maritime Foundation (SMF) today released the report of the Tripartite Advisory Panel (TAP) for Future-ready Maritime Workforce. Formed in 2023, the objectives of the TAP are to identify the skills that the maritime workforce needs for 2030 and beyond, propose strategies to spur workforce transformation, and consider how Singapore can contribute to the effort to prepare the workforce for change as industry transformation catalysed by digitalisation and decarbonisation accelerates.

The TAP was co-chaired by Mr. Hor Weng Yew, SMF Chairman and CEO & Managing Director, Pacific Carriers Limited; and Mr. Nick Potter, SMF Board Member and General Manager, Shipping and Maritime, Shell Eastern Trading. They were joined by industry leaders from across the spectrum of the maritime ecosystem including shipowners/operators, ship managers, charterers and cargo owners, shipbrokers, marine insurers, maritime lawyers, classification societies, industry association, the union, the Maritime and Port Authority of Singapore, technology companies and Singapore's institutes of higher learning. The composition of the TAP is in Annex A.



SMF Chairman delivers the welcome address at the Launch of the Report of the Tripartite Advisory Panel for Future-ready Maritime Workforce and DNV-Menon Leading Maritime Cities of the World Global Ranking 2024

In formulating its recommendations, the TAP conducted a series of extensive focus group discussions with a wide cross section of industry leaders. Accompanying the industry consultations were a series of questionnaires responded to by industry professionals, and a study on [“The Future of Seafarers 2030: A Decade of Transformation”](#) that the Singapore Maritime Foundation co-sponsored with Norwegian classification society DNV.

Evident from the deep-dive discussions and questionnaires was a clear consensus that irrespective of sea-going or shore-based professionals, the maritime workforce has to continuously deepen its domain skills and build emerging skills in an age marked by pervasive technology and change.

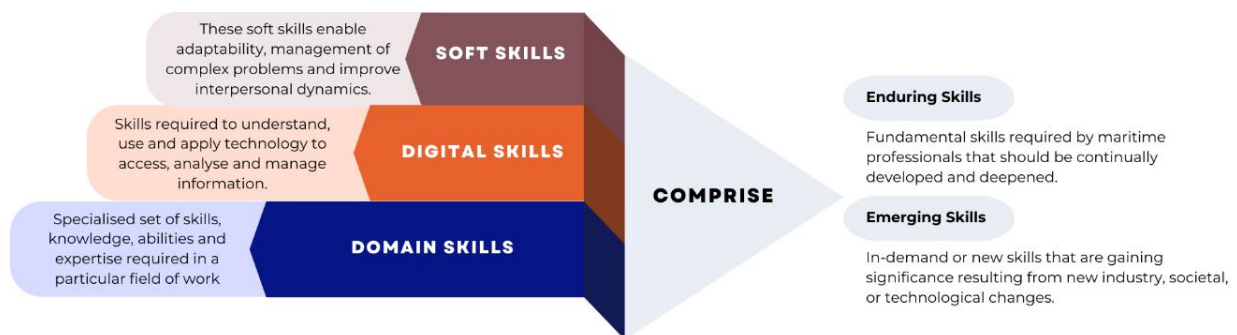
In designing the architecture across the sea-and-shore nexus and the skills typologies that the maritime workforce would need, the TAP’s intention was to keep the recommendations succinct, comprehensive, and forward-looking. To plug these skills into Singapore’s industry transformation maps, the TAP used the SkillsFuture skills frameworks as a guide in its deliberations.

A Framework for Skills Development

In identifying the skills that the maritime workforce needs to be equipped with for the future, the TAP introduced three skills categories: domain skills, digital skills and soft skills to reflect the importance of such skills as the industry transforms.

Across domain skills, digital skills and soft skills, there are (i) enduring skills that the maritime workforce should continually develop and deepen; as well as (ii) emerging skills that should be built to adapt to rapid technological, societal or industry changes.

The list of skills across sea-and-shore is in Annex B.



Framework for Skills Development

Strategies to Transform the Maritime Workforce

The TAP outlined three key strategies for developing a workforce to be better prepared for the maritime industry's future needs:

(1) Improve the way we enable maritime professionals to deepen and broaden their skillsets

Fostering a lifelong learning mindset is paramount for the maritime workforce's future readiness. This necessitates a re-imagining of education and training. The TAP proposed that IHLs and training providers start by infusing training elements as part of a re-designed education curriculum for maritime-related qualifications.

These training elements could be in the form of practical internships and/or short stints at sea, which prepares students for a maritime career, regardless of whether they choose the sea-going or shore-based route. Students entering the maritime workforce must advance their school-learned skills and stay informed about new industry developments and necessary emerging skills.

(2) Strengthen sea-to-shore transition and enable multiple career pathways within the maritime industry

In attracting and retaining talent, the TAP's consensus was that it is essential that the maritime industry is able to offer diverse opportunities across both sea-and-shore. This will allow the industry to strengthen and develop the maritime talent pipeline and workforce capabilities required to navigate the future.

To enhance the value proposition through strengthening the link between sea-and-shore, the TAP proposed that the industry review its people practices across both sea-and-shore to achieve a more integrated workforce. HR policies, for example, can pay attention to the lifecycle needs of maritime professionals and support them through their different life stages, such as marriage and family needs.

(3) Reimagine the way students and non-maritime professionals discover and strengthen their affinity with the maritime industry

As workforce dynamics evolve, the TAP's view was that it is vital for the industry to reimagine and amplify outreach efforts towards students and non-maritime professionals to attract new talent.

This will enable the sector to tap on diverse skillsets to solve complex challenges for the industry, which will require capabilities from domains outside of maritime.

Singapore's Contribution to Building a Future-ready Maritime Workforce

The TAP noted that Singapore, as a leading international maritime centre and global hub port, is well-poised to take a bold step forward in transforming the maritime workforce. Adjacent to the holistic and dynamic maritime cluster are Singapore's institutes of higher learning that are regularly ranked among the world's best, as well as a thriving technology sector. Underpinning a conducive macro-environment, supportive government policies are augmented by a positive tripartite relationship.

Proposal for Creation of a "Hub for Future Skills"

The TAP recommended the creation of a "Hub for Future Skills" with a front office as a focal point to coalesce collaboration and cooperation among the key stakeholders to offer innovative, industry-oriented stackable skills and micro-credentials to prepare the workforce for change.

The TAP recommended that the "Hub for Future Skills" look at domain skills, digital skills, and soft skills as they are complementary and reinforcing, and that its offerings cater to pre-employment training (PET) for the undergraduates who are on the cusp of entering the workforce, continuous education, and training (CET) for the professionals who are in the industry, and career conversion for those who are considering a switch into maritime.

Quote by SMF Chairman

“Fundamentally, sustainable, and substantive workforce transformation requires an ecosystem-wide approach. That many leaders from across the industry, the union, higher education, and the technology sector willingly and generously came forward to contribute to the Tripartite Advisory Panel augurs well and is an affirmation of the cohesiveness of Maritime Singapore. This cohesiveness provides an excellent springboard for the way forward,” said Mr. Hor Weng Yew, Chairman, Singapore Maritime Foundation.

Download the Tripartite Advisory Panel (TAP) Report on Future-ready Maritime Workforce

Digital copies of the TAP Report on Future-ready Maritime Workforce at <https://www.smf.com.sg/resources-publications/>.



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About the Singapore Maritime Foundation (SMF)

Established in 2004, the Singapore Maritime Foundation is a conduit between the public and private sectors to accomplish the twin mission of developing and promoting Singapore as an International Maritime Centre (IMC); and to attract, engage and grow a talent pipeline to position Maritime Singapore for continued growth. For details, visit www.smf.com.sg

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ANNEX A – TAP Composition

Name	Organisation	Title/Designation	Role in TAP
Hor Weng Yew	Singapore Maritime Foundation (SMF) / Pacific Carriers Limited (PCL)	SMF Chairman / Chief Executive Officer & Managing Director	TAP Co-Chair
Nick Potter	Singapore Maritime Foundation (SMF) / Shell Eastern Trading	SMF Board Member / General Manager, Shipping and Maritime	TAP Co-Chair & Chair of Workstream 3
Lars Kastруп	Singapore Maritime Foundation (SMF) / Pacific International Lines (PIL)	SMF Board Member / Chief Executive Officer	Chair of Workstream 1 & TAP Member
Cyril Ducau	Singapore Maritime Foundation (SMF) / Eastern Pacific Shipping (EPS)	SMF Board Member / Chief Executive Officer	Chair of Workstream 2 & TAP Member
Caroline Yang	Singapore Maritime Foundation (SMF) / Singapore Shipping Association (SSA)	SMF Board Member / President	TAP Member
Arnab Ghosh	American Bureau of Shipping (ABS)	Director, Client Relations and Business Development, Singapore and Malaysia	TAP Member
Dr. Shahrin Osman	DNV	Regional Head of Maritime Advisory, Director, Maritime Decarbonisation & Autonomy CoE (Singapore/Asia-Pac)	TAP Member
Bjarne Foldager Jensen	MAN Energy Solutions	Senior Vice President, Head of Two Stroke Business	TAP Member
Kenneth Lim	Maritime and Port Authority of Singapore (MPA)	Assistant Chief Executive (Industry & Transformation)	TAP Member
Dennis Chung	Microsoft Singapore	Chief Security Officer	TAP Member
Captain Sachin Sirsikar	Ocean Network Express (ONE)	General Manager Global Vessel Operations	TAP Member
Mary Liew Kiah Eng	Singapore Maritime Officers' Union (SMOU)	General Secretary	TAP Member
Captain Rajesh Unni	Synergy Marine Group	Founder & Chief Executive Officer	TAP Member
Olav Nortun	Thome Group	Chief Executive Officer	TAP Member
Mario Moretti	V Group	Managing Director	TAP Member
Ben Chng	Wärtsilä Marine	Director, Voyage Services Sales	TAP Member
Lee Keng Lin	Cyan Renewables	Chief Executive Officer	Member (Alternate Representative, SSA)
Adam Emilianou	Eastern Pacific Shipping (EPS)	Head of Corporate Services & General Counsel	Member (Alternate Representative, EPS)
Gwee Guo Duan	Singapore Maritime Officers' Union (SMOU)	Assistant General Secretary	Member (Alternate Representative, SMOU)
Chris Chung	Wärtsilä Marine	General Manager, Optimisation	Member (Alternate Representative, Wärtsilä Marine)

ANNEX A – TAP Workstream 1

Name	Organisation	Title/Designation	Role of Representative
Lars Kastруп	Singapore Maritime Foundation (SMF) / Pacific International Lines (PIL)	SMF Board Member / Chief Executive Officer of PIL	Chair of Workstream 1 TAP Member
Hor Weng Yew	Singapore Maritime Foundation (SMF) / Pacific Carriers Limited (PCL)	SMF Chairman / Chief Executive Officer & Managing Director	TAP Co-Chair
Nick Potter	Singapore Maritime Foundation (SMF) / Shell Eastern Trading	SMF Board Member / General Manager, Shipping and Maritime	TAP Co-Chair
Caroline Yang	Singapore Maritime Foundation (SMF) / Singapore Shipping Association (SSA)	SMF Board Member / President	TAP Member
Arnab Ghosh	American Bureau of Shipping (ABS)	Director, Client Relations and Business Development, Singapore and Malaysia	TAP Member
Dr. Gu Hai	American Bureau of Shipping (ABS)	Vice President & Head of Global Simulation Center	TAP Member
Bjarne Foldager Jensen	MAN Energy Solutions	Senior Vice President, Head of Two Stroke Business	TAP Member
Kenneth Lim	Maritime and Port Authority of Singapore (MPA)	Assistant Chief Executive (Industry & Transformation)	TAP Member
Dennis Chung	Microsoft Singapore	Chief Security Officer	TAP Member
Mary Liew Kiah Eng	Singapore Maritime Officers' Union (SMOU)	General Secretary	TAP Member
Captain Rajesh Unni	Synergy Marine Group	Founder & Chief Executive Officer	TAP Member
Ben Chng	Wärtsilä Marine	Director, Voyage Services Sales	TAP Member
Captain Tan Kim Hock	Nanyang Technological University (NTU)	Program Director (Maritime Studies)	Institutes of Higher Learning (IHLs)
Dr. Chai Kah Hin	National University of Singapore (NUS)	Vice Dean, Office of Graduate Programmes, College of Design and Engineering	Institutes of Higher Learning (IHLs)
Dr. Wang Xin	Singapore Institute of Technology (SIT)	Programme Leader & Associate Professor	Institutes of Higher Learning (IHLs)
Dr. Patrick Tan	Singapore Management University (SMU)	Senior Lecturer of Strategy and Entrepreneurship & Academic Director, International Trading Institute & Course Coordinator, Global Trade and Maritime Work Study Elective	Institutes of Higher Learning (IHLs)
Dr. Faris Hajamadideen	Singapore Polytechnic (SP)	Senior Director of Built Environment & Maritime Cluster and the Director of the School of Architecture and Built Environment	Institutes of Higher Learning (IHLs)
Lee Keng Lin	Cyan Renewables	Chief Executive Officer	Member (Alternate Representative, SSA)
Gwee Guo Duan	Singapore Maritime Officers' Union (SMOU)	Assistant General Secretary	Member (Alternate Representative, SMOU)
Chris Chung	Wärtsilä Marine	General Manager, Optimisation	Member (Alternate representative, Wärtsilä Marine)
Captain Chatur Wahyu	Singapore Polytechnic (SP)	Acting Director for SMA	Institutes of Higher Learning (IHLs) (Alternate Representative to SP)
Abhishek Chawla	Pacific International Lines (PIL)	General Manager (Operations and Procurement)	Invited Guest
Goh Chung Hun	Pacific International Lines (PIL)	General Manager (Fleet)	Invited Guest

ANNEX A – TAP Workstream 2

Name	Organisation	Title/Designation	Role of Representative
Cyril Ducau	Singapore Maritime Foundation (SMF) / Eastern Pacific Shipping (EPS)	SMF Board Member / Chief Executive Officer of EPS	Chair of Workstream 2 TAP Member
Hor Weng Yew	Singapore Maritime Foundation (SMF) / Pacific Carriers Limited (PCL)	SMF Chairman / Chief Executive Officer & Managing Director	TAP Co-Chair
Nick Potter	Singapore Maritime Foundation (SMF) / Shell Eastern Trading	SMF Board Member / General Manager, Shipping and Maritime	TAP Co-Chair
John Martin	Singapore Maritime Foundation (SMF) / Gard P&I (Bermuda)	SMF Board Member / Chief Executive Officer, Singapore	TAP Member
Gina Lee-Wan	Allen & Gledhill LLP	Consultant	TAP Member
Arnab Ghosh	American Bureau of Shipping (ABS)	Director, Client Relations and Business Development, Singapore and Malaysia	TAP Member
Rob Hewitson	Clarksons Singapore	Managing Director	TAP Member
Dr. Shahrin Osman	DNV	Regional Head of Maritime Advisory, Director, Maritime Decarbonisation & Autonomy CoE (Singapore/Asia-Pac)	TAP Member
Kenneth Lim	Maritime and Port Authority of Singapore (MPA)	Assistant Chief Executive (Industry & Transformation)	TAP Member
Dennis Chung	Microsoft Singapore	Chief Security Officer	TAP Member
Leslie Dang	Nautilus Labs	Global Head of Revenue & Managing Director	TAP Member
Captain Sachin Sirsikar	Ocean Network Express (ONE)	General Manager Global Vessel Operations	TAP Member
Alvin Cheong	Singapore Maritime Officers' Union (SMOU)	Executive Secretary and Legal Counsel	TAP Member
Larry Chan	Singapore Maritime Officers' Union (SMOU)	Training & Employability Consultant	TAP Member
John Simpson	Stephenson Harwood LLP	Partner	TAP Member
Olav Nortun	Thome Group	Chief Executive Officer	TAP Member
Mario Moretti	V Group	Managing Director	TAP Member
Shmulick Yoskovitz	X-press Feeders	Chief Executive Officer	TAP Member
Captain Tan Kim Hock	Nanyang Technological University (NTU)	Program Director (Maritime Studies)	Institutes of Higher Learning (IHLs)
Dr. Chai Kah Hin	National University of Singapore (NUS)	Vice Dean, Office of Graduate Programmes, College of Design and Engineering	Institutes of Higher Learning (IHLs)
Dr. Wang Xin	Singapore Institute of Technology (SIT)	Programme Leader & Associate Professor	Institutes of Higher Learning (IHLs)
Dr. Patrick Tan	Singapore Management University (SMU)	Senior Lecturer of Strategy and Entrepreneurship & Academic Director, International Trading Institute & Course Coordinator, Global Trade and Maritime Work Study Elective	Institutes of Higher Learning (IHLs)
Dr. Faris Hajamadideen	Singapore Polytechnic (SP)	Senior Director of Built Environment & Maritime Cluster and the Director of the School of Architecture and Built Environment	Institutes of Higher Learning (IHLs)
Adam Emilianou	Eastern Pacific Shipping (EPS)	Head of Corporate Services & General Counsel	Member (Alternate Representative, EPS)
Captain Chatur Wahyu	Singapore Polytechnic (SP)	Acting Director for SMA	Institutes of Higher Learning (IHLs) (Alternate Representative, SP)
Darin Wong	Clarksons Singapore	Head S&P	Invited Guest
Tay Gak Yong	Eastern Pacific Shipping (EPS)	Commercial Director	Invited Guest

ANNEX A – TAP Workstream 3

Name	Organisation	Title/Designation	Role of Representative
Nick Potter	Singapore Maritime Foundation (SMF) / Shell Eastern Trading	SMF Board Member / General Manager, Shipping and Maritime	Chair of Workstream 3 TAP Co-Chair
Hor Weng Yew	Singapore Maritime Foundation (SMF) / Pacific Carriers Limited (PCL)	SMF Chairman / Chief Executive Officer & Managing Director	TAP Co-Chair
Lars Kastrup	Singapore Maritime Foundation (SMF) / Pacific International Lines (PIL)	SMF Board Member / Chief Executive Officer	TAP Member (Chair of Workstream 1)
Cyril Ducau	Singapore Maritime Foundation (SMF) / Eastern Pacific Shipping (EPS)	SMF Board Member / Chief Executive Officer	TAP Member (Chair of Workstream 2)
Caroline Yang	Singapore Maritime Foundation (SMF) / Singapore Shipping Association (SSA)	SMF Board Member / President	TAP Member
Arnab Ghosh	American Bureau of Shipping (ABS)	Director, Client Relations and Business Development, Singapore and Malaysia	TAP Member
Dr. Shahrin Osman	DNV	Regional Head of Maritime Advisory, Director, Maritime Decarbonisation & Autonomy CoE (Singapore/Asia-Pac)	TAP Member
Bjarne Foldager Jensen	MAN Energy Solutions	Senior Vice President, Head of Two Stroke Business	TAP Member
Kenneth Lim	Maritime and Port Authority of Singapore (MPA)	Assistant Chief Executive (Industry & Transformation)	TAP Member
Dennis Chung	Microsoft Singapore	Chief Security Officer	TAP Member
Captain Sachin Sirsikar	Ocean Network Express (ONE)	General Manager Global Vessel Operations	TAP Member
Mary Liew Kiah Eng	Singapore Maritime Officers' Union (SMOU)	General Secretary	TAP Member
Captain Rajesh Unni	Synergy Marine Group	Founder & Chief Executive Officer	TAP Member
Olav Nortun	Thome Group	Chief Executive Officer	TAP Member
Mario Moretti	V Group	Managing Director	TAP Member
Ben Chng	Wärtsilä Marine	Director, Voyage Services Sales	TAP Member
Captain Tan Kim Hock	Nanyang Technological University (NTU)	Program Director (Maritime Studies)	Institutes of Higher Learning (IHLs)
Dr. Chai Kah Hin	National University of Singapore (NUS)	Vice Dean, Office of Graduate Programmes, College of Design and Engineering	Institutes of Higher Learning (IHLs)
Dr. Wang Xin	Singapore Institute of Technology (SIT)	Programme Leader & Associate Professor	Institutes of Higher Learning (IHLs)
Dr. Patrick Tan	Singapore Management University (SMU)	Senior Lecturer of Strategy and Entrepreneurship & Academic Director, International Trading Institute & Course Coordinator, Global Trade and Maritime Work Study Elective	Institutes of Higher Learning (IHLs)
Dr. Faris Hajamadideen	Singapore Polytechnic (SP)	Senior Director of Built Environment & Maritime Cluster and the Director of the School of Architecture and Built Environment	Institutes of Higher Learning (IHLs)
Lee Keng Lin	Cyan Renewables	Chief Executive Officer	Member (Alternate Representative, SSA)
Adam Emilianou	Eastern Pacific Shipping (EPS)	Head of Corporate Services & General Counsel	Member (Alternate Representative, EPS)

Gwee Guo Duan	Singapore Maritime Officers' Union (SMOU)	Assistant General Secretary	Member (Alternate Representative, SMOU)
Chris Chung	Wärtsilä Marine	General Manager, Optimisation	Member (Alternate Representative, Wärtsilä Marine)
Gladys Koh	National University of Singapore (NUS)	Associate Director, Centre for Maritime Studies	Institutes of Higher Learning (IHLs) (Alternate Representative, NUS)
Captain Chatur Wahyu	Singapore Polytechnic (SP)	Acting Director for SMA	Institutes of Higher Learning (IHLs) (Alternate Representative, SP)
Captain Savio Coutinho	Singapore Polytechnic (SP)	Assistant Director for Admin & Planning	Institutes of Higher Learning (IHLs) (Alternate Representative, SP)

ANNEX B - Enduring and Emerging Skills for Sea-going Professionals (Graduates)

	Domain Skills	Digital Skills	Soft Skills	
Graduates	<ul style="list-style-type: none"> • Environmental Management System Framework Development and Implementation • Greener Fuel Handling and Management • Greener Fuel Safety and Compliance • Ammonia Fuel Management and Safety • Batteries Management and Safety • Dual Fuel Management • Hydrogen Management and Safety (5-Year Timeframe) • Methanol Fuel Management and Safety • Sustainability Management • Ship Energy Efficiency • Behavioural Safety Management • Business Agility • Business Data Analysis • Business Negotiation 	<ul style="list-style-type: none"> • Business Planning • Cargo Handling and Stowage • Cargo Loading and Unloading • Change Management • Design Thinking Practice • Electrical, Electronic and Control Engineering • Fire Prevention and Fire-fighting • Innovation • Maintenance and Repair • Navigation Watch • Performance Management • Personal Survival Techniques • Project Management • Propulsion, Plant and Machinery • Ship Operations • Strategy Planning • Talent Management • Vessel Cost Management 	<ul style="list-style-type: none"> • Artificial Intelligence, Augmented Reality Virtual Reality Management • Autonomous Ship Operations • Cloud Computing • Data Analytics • Data Mining and Modelling • IoT management • Machine Learning Management • 3D Modelling (Leverage digital twins for scenario planning on board ships) • Cyber Risk Management • Cyber Security • Digital Fluency • Ship Cyber Security • Technology Integration 	<ul style="list-style-type: none"> • Diversity, Equity, and Inclusion (DEI) / Inclusivity Training and Awareness • Communication & Interpersonal skills • Creative Thinking • Learning Agility • Mental Resilience and Wellbeing • Multidisciplinary Perspective • People Management Skills • Problem Solving • Team-work

Note: Skills that are **bolded** are classified emerging skills

ANNEX B - Enduring and Emerging Skills for Sea-going Professionals (Deck)

	Domain Skills	Digital Skills	Soft Skills	
Entry Level	<ul style="list-style-type: none"> Similar to Seafarers (Deck), but at a lower proficiency level 		<ul style="list-style-type: none"> Adaptability Communication & Interpersonal skills Cross Cultural Communication Mental Resilience and Wellbeing Teamwork Diversity, Equity, and Inclusion (DEI) / Inclusivity Training and Awareness Collaboration Continuous Learning Mindset Critical Thinking Learning Agility People Management skills Problem Solving 	
Seafarers (Deck)	<ul style="list-style-type: none"> Environmental Management System Framework Development and Implementation ESG-related skills Greener Fuel Handling and Management Greener Fuel Safety and Compliance Ammonia Fuel Management and Safety Batteries Management and Safety Dual Fuel Management Hydrogen Management and Safety (5-Year Timeframe) Methanol Fuel Management and Safety Sustainability Management Behavioural Safety Management Budgeting Business Agility 	<ul style="list-style-type: none"> Business Data Analysis Business Opportunities Development Business Performance Management Business Planning Continuous Improvement Management Contract and Vendor Management Crew Management Crisis Management Documentation and Administration Dry Dock Project Management Ship Repair Management Strategy Planning Talent Management Vessel Cost Management 	<ul style="list-style-type: none"> Artificial Intelligence, Augmented Reality, Virtual Reality Management Automation Expertise Autonomous Ship Operations Cloud Computing Data Analytics IoT management Machine Learning Management Remote Team Collaboration Skills Credit Risk Management Cyber Risk Management Cyber Security Digital Fluency Technology Integration 	<ul style="list-style-type: none"> Diversity, Equity, and Inclusion (DEI) /Inclusivity Training and Awareness ESG mindset Soft Skills for AI Sustainable procurement skill set with ethical understanding Collaboration Commercial/ Financial Acumen Communication & Interpersonal skills Continuous Learning Mindset Cultural Awareness Global Perspective Leadership Skills Learning Agility Mental Resilience and Wellbeing People Management Skills Problem Solving

Note 1: Skills that are **blue** are recognised as high-priority for entry-level positions. Note 2: Skills that are **bolded** are classified emerging skills

ANNEX B - Enduring and Emerging Skills for Sea-going Professionals (Engineering)

	Domain Skills	Digital Skills	Soft Skills	
Entry Level	<ul style="list-style-type: none"> Similar to Seafarers (Engineering), but at a lower proficiency level 		<ul style="list-style-type: none"> Adaptability Communication & Interpersonal Skills Cross Cultural Communication Mental Resilience and Wellbeing Teamwork Diversity, Equity, and Inclusion (DEI) /Inclusivity Training and Awareness Collaboration Continuous Learning Mindset Critical Thinking Learning Agility People Management skills Problem Solving 	
Seafarers (Engineering)	<ul style="list-style-type: none"> Greener Fuel Handling and Management Greener Fuel Safety and Compliance Ammonia Fuel Management and Safety Batteries Management and Safety Dual Fuel Management Hydrogen Management and Safety (5-Year Timeframe) Methanol Fuel Management and Safety Sustainability Management Ship Energy Efficiency Behavioural Safety Management Business Agility Business Performance Management Cargo Handling and Stowage Cargo Loading and Unloading Change Management Continuous Improvement Management 	<ul style="list-style-type: none"> Crew Management Crisis Management /Communications Dangerous Goods Management Fire Prevention and Fire-fighting Maintenance and Repair Marine Communications Maritime Emergency Response Management Maritime Hazards Identification Maritime Incident Management Maritime Safety Performance Development Maritime Safety Policy Development Ship Medical Care Ship Operations Ship Seaworthiness and Pollution Prevention Vessel Cost Management 	<ul style="list-style-type: none"> Artificial Intelligence, Augmented Reality, Virtual Reality Management Autonomous Ship Operations Data Analytics IoT Management Machine Learning Management 3D Modelling (Leverage digital twins for scenario planning on board ships) Cyber Risk Management Cyber Security Digital Fluency Ship Cyber Security Ship Security Technology Integration 	<ul style="list-style-type: none"> Diversity, Equity, and Inclusion (DEI) /Inclusivity Training and Awareness Adaptability Collaboration Communication & Interpersonal skills Continuous Learning Mindset Critical Thinking Cross Cultural Communication Learning Agility Managing Complexity Mental Resilience and Wellbeing People Management skills Problem Solving Teamwork

Note 1: Skills that are **blue** are recognised as high-priority for entry-level positions. Note 2: Skills that are **bolded** are classified emerging skills.

ANNEX B - Enduring and Emerging Skills for Sea-going Professionals (Sea-to-Shore Transition)

	Domain Skills	Digital Skills	Soft Skills	
Sea-to-shore (Commercial)	<ul style="list-style-type: none"> • Environmental Management System Framework Development and Implementation • Greener Fuel Handling and Management • Greener Fuel Safety and Compliance • Ammonia Fuel Management and Safety • Batteries Management and Safety • Dual Fuel Management • Hydrogen Management and Safety (5-Year Timeframe) • Methanol Fuel Management and Safety • Sustainability Management • Ship Energy Efficiency • Accounting Systems • Behavioural Safety Management • Budgeting • Business Agility 	<ul style="list-style-type: none"> • Business Data Analysis • Business Opportunities Development • Business Performance Management • Business Planning • Change Management • Continuous Improvement Management • Contract and Vendor Management • Crew Management • Crisis Management • Documentation and Administration • Dry Dock Project Management • Ship Operations • Ship Repair Management • Strategy Planning • Talent Management • Vessel Cost Management 	<ul style="list-style-type: none"> • Artificial Intelligence, Augmented Reality, Virtual Reality Management • Automation Expertise • Autonomous Ship Operations • Cloud Computing • Data Analytics • Digital Trade Documentation • IoT management • Machine Learning Management • Remote Team Collaboration Skills • Credit Risk Management • Cyber Risk Management • Cyber Security • Digital Fluency • Risk Management • Technology Integration 	<ul style="list-style-type: none"> • Diversity, Equity, and Inclusion (DEI) /Inclusivity Training and Awareness • Innovation • Soft Skills for AI • Collaboration • Communication & Interpersonal skills • Continuous Learning Mindset • Cultural Awareness • Global Perspective • Leadership Skills • Learning Agility • Managing Complexity • Mental Resilience and Wellbeing • People Management Skills • Problem Solving • Stakeholder Management • Transdisciplinary Thinking
Sea-to-shore (Technical)	<ul style="list-style-type: none"> • Environmental Management System Framework Development and Implementation • ESG-related skills • Greener Fuel Handling and Management • Greener Fuel Safety and Compliance • Ammonia Fuel Management and Safety • Batteries Management and Safety • Dual Fuel Management • Hydrogen Management and Safety (5-Year Timeframe) • Methanol Fuel Management and Safety • Sustainability Management • Ship Energy Efficiency • Accounting Systems • Behavioural Safety Management 	<ul style="list-style-type: none"> • Budgeting • Business Agility • Business Data Analysis • Business Opportunities Development • Business Performance Management • Business Planning • Change Management • Continuous Improvement Management • Contract and Vendor Management • Cost Management • Crew Management • Crisis Management • Dry Dock Project Management • Ship Operations • Ship Repair Management • Strategy Planning • Talent Management • Vessel Cost Management 	<ul style="list-style-type: none"> • Artificial Intelligence, Augmented Reality, Virtual Reality Management • Automation Expertise • Autonomous Ship Operations • Cloud Computing • Data Analytics • Digital Trade Documentation • IoT management • Machine Learning Management • Remote Team Collaboration Skills • Credit Risk Management • Cyber Risk Management • Cyber Security • Digital Fluency • Risk Management • Technology Integration 	<ul style="list-style-type: none"> • Diversity, Equity, and Inclusion (DEI) /Inclusivity Training • ESG Mindset • Innovation • Soft Skills for AI • Sustainable procurement skill set with ethical understanding • Collaboration • Commercial/ Financial Acumen • Communication & Interpersonal skills • Continuous Learning Mindset • Cultural Awareness • Global Perspective • Leadership Skills • Learning Agility • Managing Complexity • Mental Resilience and Wellbeing • People Management Skills • Problem Solving • Stakeholder Management • Transdisciplinary Thinking

ANNEX B - Enduring and Emerging Skills for Shore-based Careers (Undergraduates/ Graduates)

	Domain Skills	Digital Skills	Soft Skills
Ship Owners, Operators, Managers	<ul style="list-style-type: none"> • Carbon Accounting • Environmental Management System Framework Development and Implementation • ESG Reporting & Compliance Skills • Ship Energy Efficiency • Behavioural Safety Management • Business Data Analysis • Continuous Improvement Management • Innovation • Maritime Incident Management • Maritime Safety Policy Development • Risks, Regulations and Compliance • Ship Operations • Systems Thinking Application <p>Note:</p> <ul style="list-style-type: none"> • Skills highlighted in blue are safety skills 	<ul style="list-style-type: none"> • Cyber Risk Management • Cyber Security • Data Analytics • Digital Fluency • Technology Integration <p>Note:</p> <ul style="list-style-type: none"> • Skills highlighted in blue refer to cybersecurity. • While not a skill per se, WS2 was unanimous that technological proficiency is an essential attribute for all shore-based Maritime professionals regardless of seniority 	<ul style="list-style-type: none"> • Diversity, Equity, and Inclusion (DEI) /Inclusivity Training and Awareness • Adaptability • Communication & Interpersonal skills • Creative Thinking • Critical Thinking • Cross Cultural Communication • Global Perspective (gained from an immersive experience such as a semester abroad) • Problem Solving • Transdisciplinary Thinking
Maritime / Professional Services	<ul style="list-style-type: none"> • Environmental Management System Framework Development and Implementation • Sustainability Management • Ship Energy Efficiency • Business Agility • Business Data Analysis • Business Negotiation • Crisis Management • Innovation • Networking • Risk Control and Response Planning • Risks, Regulations and Compliance 	<ul style="list-style-type: none"> • Artificial Intelligence Applications • Cloud Computing • Cyber Security • Data Analytics • Digital Fluency • Technology Integration <p>Note:</p> <ul style="list-style-type: none"> • The skill highlighted in blue refers to cybersecurity. • While not a skill per se, WS2 was unanimous that technological proficiency is an essential attribute for all shore-based Maritime professionals regardless of seniority 	<ul style="list-style-type: none"> • Diversity, Equity, and Inclusion (DEI) /Inclusivity Training and Awareness • Communication & Interpersonal skills • Critical Thinking • Global Perspective (gained from an immersive experience such as a semester abroad) • Problem Solving • Team-work

Note: Skills that are **bolded** are classified emerging skills.

ANNEX B - Enduring and Emerging Skills for Shore-based Careers (Mid-career Shore-based Professionals)

	Domain Skills	Digital Skills	Soft Skills
Ship Owners, Operators, Managers	<ul style="list-style-type: none"> • Carbon Accounting • Environmental Management System Framework Development and Implementation • ESG Reporting & Compliance Skills • Sustainability Management • Ship Energy Efficiency • Behavioural Safety Management • Business Data Analysis • Business Performance Management • Change Management • Continuous Improvement Management • Crisis Communication • Risks, Regulations and Compliance • Talent Management <p>Note:</p> <ul style="list-style-type: none"> • The skill highlighted in blue is a safety skill. 	<ul style="list-style-type: none"> • Artificial Intelligence Applications • Cloud Computing • Data Mining and Modelling • Cyber Risk Management • Data Analytics • Technology Integration <p>Note:</p> <ul style="list-style-type: none"> • The skill highlighted in blue refers to cybersecurity. • While not a skill per se, WS2 was unanimous that technological proficiency is an essential attribute for all shore-based Maritime professionals regardless of seniority 	<ul style="list-style-type: none"> • Diversity, Equity, and Inclusion (DEI) /Inclusivity Training and Awareness • Adaptability • Collaboration • Communication & Interpersonal Skills • Critical Thinking • Cross Cultural Communication • Developing People • Global Perspective (gained from an immersive experience such as an overseas posting) • Leadership Skills • People Management Skills
Maritime / Professional Services	<ul style="list-style-type: none"> • Environmental Management System Framework Development and Implementation • Sustainability Management • Ship Energy Efficiency • Budgeting • Business Data Analysis • Business Negotiation • Chartering • Crisis Management • Documentation and Administration • Financial Management • Innovation • Networking • Risk Control and Response Planning • Risks, Regulations and Compliance 	<ul style="list-style-type: none"> • Artificial Intelligence Application • Cloud Computing • Cyber Risk Management • Data Analytics • Digital Fluency • Digital Trade Documentation • Technology Integration <p>Note:</p> <ul style="list-style-type: none"> • The skill highlighted in blue refers to cybersecurity. • While not a skill per se, WS2 was unanimous that technological proficiency is an essential attribute for all shore-based Maritime professionals regardless of seniority 	<ul style="list-style-type: none"> • Diversity, Equity, and Inclusion (DEI) /Inclusivity Training and Awareness • Communication & Interpersonal skills • Creative Thinking • Critical Thinking • Global Perspective (gained from an immersive experience such as an overseas posting) • Leadership Skills • Problem Solving • Stakeholder Management

Note: Skills that are **bolded** are classified emerging skills.

ANNEX B - Enduring and Emerging Skills for Shore-based Careers (Sea-to-Shore Transition)

	Domain Skills	Digital Skills	Soft Skills
Ship Owners, Operators, Managers	<ul style="list-style-type: none"> • Environmental Management System Framework Development and Implementation • Sustainability Management • Ship Energy Efficiency • Behavioural Safety Management • Budgeting • Business Data Analysis • Change Management • Continuous Improvement Management • Crisis Management • Risks, Regulations and Compliance • Ship Operations • Talent Management • Vessel Cost Management <p>Note:</p> <ul style="list-style-type: none"> • The skill highlighted in blue is a safety skill. 	<ul style="list-style-type: none"> • Artificial Intelligence Applications • Cloud Computing • IoT Management • Cyber Risk Management • Cyber Security • Data Analytics • Digital Fluency • Technology Integration <p>Note:</p> <ul style="list-style-type: none"> • Skills highlighted in blue refer to cybersecurity. • While not a skill per se, WS2 was unanimous that technological proficiency is an essential attribute for all shore-based Maritime professionals regardless of seniority 	<ul style="list-style-type: none"> • Diversity, Equity, and Inclusion (DEI) /Inclusivity Training and Awareness • Adaptability • Communication & Interpersonal Skills • Creative Thinking • Critical Thinking • Global Perspective (gained from an immersive experience such as an overseas posting) • Innovation • Leadership Skills • Managing Complexity • People Management Skills • Stakeholder Management • Transdisciplinary Thinking
Maritime / Professional Services	<ul style="list-style-type: none"> • Sustainability Management • Ship Energy Efficiency • Budgeting • Business Data Analysis • Business Negotiation • Cash Flow Reporting • Chartering • Continuous Improvement Management • Crisis Management • Innovation • Marine Incident and Accident Investigations • Networking • Risks, Regulations and Compliance • Service Excellence • Ship Operations • Ship Safety Management Systems Audit 	<ul style="list-style-type: none"> • Artificial Intelligence Applications • Cloud Computing • Data Mining and Modelling • IoT Management • Cyber Risk Management • Data Analytics • Digital Fluency • Digital Trade Documentation • Technology Integration <p>Note:</p> <ul style="list-style-type: none"> • The skill highlighted in blue refers to cybersecurity. • While not a skill per se, WS2 was unanimous that technological proficiency is an essential attribute for all shore-based Maritime professionals regardless of seniority 	<ul style="list-style-type: none"> • Diversity, Equity, and Inclusion (DEI) /Inclusivity Training and Awareness • Adaptability • Business Negotiation • Collaboration • Communication & Interpersonal Skills • Critical/ Strategic Thinking • Global Perspective (gained from an immersive experience such as an overseas posting) • Innovation • Leadership Skills • Managing Complexity • Problem Solving • Stakeholder Management • Time Management • Transdisciplinary Thinking

Note: Skills that are **bolded** are classified emerging skills.