THE MARINE ADVENTURE

EVOLVING AND ADAPTING TO CHANGE IN TODAY'S PORTS

E-BROCHURE

14TH INTERNATIONAL HARBOUR MASTERS CONGRESS

2024 | TANGER MED PORT, MOROCCO

TANGER MED PORT AUTHORITY

Hosted By
TANGER MED

International Harbour Masters Association

THE MARINE ADVENTURE

EVOLVING AND ADAPTING TO CHANGE IN TODAY'S PORTS

E-BROCHURE

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WELCOME

FROM IHMA PRESIDENT

Dear Esteemed Harbour Masters, Maritime Professionals, Speakers, Delegates and our colleagues from Tanger Med Port.

It is with great pleasure and anticipation that we gather for this 14th International Harbour Masters Congress at Tanger Med Port in the beautiful Kingdom of Morrocco. I would like to thank Tanger Med Port Authority, Commandant du Port Kamal Lakhmas and his predecessor Captain Khalid Samir for graciously hosting this congress.

I wish to extend a warm and cordial welcome to each of you for the upcoming congress! Set against the backdrop of our vibrant maritime community, this gathering promises to be an enriching experience filled with insightful discussions, collaborative networking, and the exchange of best practices.

The maritime arena is changing rapidly as ports race to plan and adapt in the face of environmental and digitisation challenges. As guardians of our ports and harbours, your role is pivotal in ensuring the smooth, safe and secure operations of maritime activities at your respective ports. This congress is designed to serve as a forum where industry leaders, experts, regulators and industry visionaries can converge to share their wealth of knowledge, discuss emerging trends, and collectively address the challenges faced by our dynamic maritime landscape.

Throughout the conference, you can expect a diverse array of engaging sessions, interactive workshops, and keynote addresses from esteemed speakers who are at the forefront of innovation and excellence in harbour management. Whether you are a seasoned harbour master, a port authority representative, or a maritime industry professional, this event provides a unique opportunity to foster collaboration, gain insights into cutting-edge technologies, and build lasting connections with peers who share your dedication to maritime excellence.

In addition to the informative sessions, we have also organised social events and networking opportunities that will allow you to unwind, exchange ideas, and forge valuable connections in a relaxed and convivial atmosphere. The IHMA (our association) is proud to have over 250 members in 50 countries, this is a rare opportunity to meet face to face and exchange knowledge and expertise in an open and collegiate manner.

We look forward to hosting you at the International Harbour Master Congress and trust that your participation will contribute to the success and vibrancy of this event. Together, let us chart the course for the future of harbour management and maritime excellence.

Safe travels, and we eagerly await your arrival at this momentous gathering!

CAPTAIN PAUL O'REGAN

& ABOUT THE IHMA & THE CONGRESS

ABOUT THE IHMA

The International Harbour Masters Association (IHMA) is a professional membership association for those responsible for the safe, secure, efficient and environmentally sound conduct of marine operations in port waters. The Association brings together Harbour Masters and all those who hold a managerial position in aspects of the control of marine operations within a port. Its members include port operations managers, VTS managers, and many others, as well as of course Harbour Masters.

The IHMA unites those responsible for the safe, efficient and secure navigation of port waters with members representing more than 50 nations, extending throughout Western and Eastern Europe, Australasia, Africa, the Americas, the Middle East and Asia. Members are from ports large and small, publicly and privately owned, and represent a unique source of up-to-date, hands-on expertise in a range of port and maritime operations, including safety of navigation, vessel traffic control, shipping movements, port management, protection of the marine environment, the ship/port interface, cargo handling and safe stowage, safety management and training, and port security.

IHMA has observer status at IMO. Reports of the proceedings of IMO Committees are circulated to members and made available together with selected documents of interest to members. Members can participate in IMO Working Groups and Correspondence Groups.

IHMA works to develop information and resources for its members, and the Association supports the participation of its members in these efforts in order to ensure that relevant information is developed and made available to members.

The Association also welcomes commercial members and maintains a good relationship with companies developing products and services that may assist members in the performance of their professional duties. Commercial members have access to the key decision makers and are especially important participants in the Associations business.

ABOUT THE CONGRESS

The biennial IHMA Congress provides a unique forum in which formal Association meetings are combined with a three-day conference and an industry leading exhibition - displaying equipment, services and technical developments relevant to the ports and harbour sector. Congress brings together IHMA members plus key decision-makers from the international maritime industry responsible for global port and marine operations. At Congress, IHMA provides its members with opportunities to consult on technical and professional matters with colleagues in their region and around the world, to learn from their experiences, to share good practice and promote the professional standing and interests of its members. Government departments, regulators and industry stakeholders attend to develop relationships and build essential relationships to promote safety and efficiency in this important sector. With more than 250 members, the IHMA unites those responsible for the safe, efficient and secure navigation of port waters.

2024 KEY THEME

The Marine Adventure: Evolving and adapting to change in today's ports

We invite you to take part in the 14th IHMA Congress 2024 in Tangier, where we can work together to ensure the continued success of the Marine Adventure in the port and maritime industry for generations to come. Addressing the theme, 'Evolving and adapting to change in today's ports' the 2024 IHMA Congress will follow the journey of a vessel as it prepares for arrival in port, its time in port and finally the departure from port.

After the opening ceremonies, Day One will focus on the preparations onboard and in port which are required to ensure a safe and efficient port call. Port Call Optimisation, Just in Time arrivals and greenhouse gas emissions reduction are hot topics and the panels, discussions, and presentations on Day One will focus on the changes currently underway, or which may be required to make sure that vessel arrivals are managed in the most optimal manner.

Day Two will continue to highlight the efforts currently underway to make not just vessels more sustainable but will also provide an opportunity for port and terminal operators to outline the progress they are making in this area. How can Harbour Masters influence and assist these initiatives without compromising their primary role of maintaining safety of navigation in port areas?

Day Three wraps up the port call as the ship and shore authorities prepare for the next leg of the supply chain and provides an opportunity for stakeholders to reflect on the safety, efficiency, and sustainability of the process.

Each day also provides an opportunity to discuss how our industry is adapting and evolving to consider developments in technology, MASS, new fuels, training requirements, social inclusion and climate change as it effects the harbour master and the port call process.

The concurrent exhibition is an unparalleled opportunity for maritime businesses to showcase their services to the key customers and decision makers. It is also an opportunity for port marine professionals from around the world to network, share their experiences and update their professional knowledge.

The President of the IHMA and Host Port Chair warmly welcome you to the 14th International Harbour Masters Congress and wish you a successful and enjoyable visit to the Kingdom of Morocco.

& ABOUT THE HOST PORT CITY

About the Host City for 2024

Tangier, Morocco

Morocco is a unique country in North Africa, with the Atlantic Ocean and the Mediterranean Sea as its border. It is one of the top travel destinations in Africa. While Morocco is known for impressive geographic diversity and culture, there are so many more positive things the country is famous for that continue to attract visitors and tourists from all over the world.

With a warm and hospitable population of around 37 million, Morocco reflects a mosaic of cultures, languages, and customs. The country is acknowledged for its political stability, sustained by a robust constitutional monarchy. Respect for religious and cultural differences, coupled with values of coexistence and tolerance, lie at the heart of Morocco's social fabric.

Tangier, situated in the north of ***Morocco*** *where the Mediterranean and Atlantic waters converge. Tangier skilfully balances competing cultures, merging them into a beautiful, harmonious blend. A significant modernising push in recent years means that you can now enjoy the benefits of an aspiring Morocco while still appreciating all of its historical and cultural wonders.*

TangerMed Port

Tangier, Morocco

Tanger Med is the 1st port in Africa and in the Mediterranean. It's a global logistics gateway located on the Strait of Gibraltar and connected to more than 180 ports worldwide with handling capacities of: 9 million containers, exports of 1 million new vehicles, transit of 7 million passengers and 700,000 trucks on an annual basis. Tanger Med, the host of the 14th biennial Harbour Masters Congress in 2024, operates and develops port, logistics and industrial platforms.

It manages Tanger Med Port Complex, the leading port in the Mediterranean and Africa. Through "Marsa Maroc", it also manages 24 container and bulk terminals. The total volume handled by the Group is 146 million tons of goods and 8.5 million TEU's.

The Group is also the planner and developer of more than 2,500 hectares of economic activity zones which host more than 1,200 companies and generate a business volume of 13 billion Dollars in the automotive, aeronautics, textile, agribusiness and logistics sectors

IHMA CONGRESS 2024 PLANNER

Day 1

21 MAY 2024 || ARRIVAL IN PORT

09:00 *Opening Ceremony*
Including Exhibition opening and VIP visit

11:30 *Congress Session 1*
Smart Ports...Technology...Digitilisation...AI...Real Time Data.....
So, what does this all mean for port marine operations?

11:30 *RightPort Risk Solutions – How can ports carry out an automated Pre-Arrival Risk Assessment?*
Yucel Yildiz, Ports and Terminal Manager RightShip

11:45 *Can AI help ports unlock their smart, decarbonised future?*
David Yeo, CEO, InnovezOne

12:00 *The Rise of Advanced VTS/VTMS Systems*
Abdullah Anazi, Aramco and Evgeny Marakasov, Rimsystems

12:15 *Integrated Port Management systems*
Captain Naresh Sewnath, Chief Harbour Master, Transnet National Ports Authority

12:30 *Supporting safe and efficient navigation in Tanger Med using physics-based system.*
Simon Mortensen, Vice President, DHI Seaport

12:45 *Ask the Panel*

13:00 *Networking Lunch kindly sponsored by Elman srl*

14:00 *Congress Session 2*
Data, data, data.

14:00 *Improving ports' efficiency and sustainability through Metocean and environmental data monitoring*
Cecile Zanette, CEO, MSM

14:15 *From data to decisions: Supporting safe and sustainable shipping.*
Paul Marks, Head of Ports Partnering and Engagement, UKHO

14:30 *Expanding horizons with real time data*
Sarah Cockcroft, Oceanwise

14:45 *Smart Mooring: Handle Safety Efficiently*
Coen Eggermont and Koos Toebes, RHDHV

15:00 *Ask the Panel*

15:15 *Afternoon Tea in the Exhibition Hall*

15:35 *Congress Session 3*
Port Call Optimisation

15:35 *Port Call Optimisation in Tanger Med: Towards Just in Time*
Captain Kamal Lakhmas, Harbour Master, TangerMed Port

15:50 *Bridging The Digital Communication Gap - Tanger Med & Wartsila Port Optimization Teams Experiences of Building a Port Ecosystem*
Olga Davletalieva, Head of Ports Advisory Services, Wartsila

16:05 *Port Call Optimization - The Technology Challenge and the Opportunity*
Bjorn Coster, Market Manager, VTS and Port Systems, KONGSBERG

16:20 *Creating the global network of ports for optimized port calls*
Ben van Scherpenzeel, ITPCO

16:40 *Announcement/Preparation and discussion on future PCO meeting (July 1)*
Ben van Scherpenzeel

16:50 *Ask the Panel*

17:00 *Coaches depart for Tangier Hotels*
(Kindly sponsored by Rightship)

19:00 *Official Cocktail Reception*
La Table du Marche
Kindly sponsored by CAVOTEC

Day 2

22 MAY 2024 || VESSEL IN PORT

09:00 *Chairman's Opening Remarks*

09:05 *Congress Session 4 - Session Chair Captain Paul O'Regan*
Pilotage – Transit to the future

09:05 *ISPO – Piloting for the future*
Captain Matthew Easton, ISPO

09:25 *Can we have it all? Next generation decarbonised pilot boats that (still) deliver on exacting safety standards while improving operational performance*
John Cumming, Head of Workboats, Artemis Technology

09:40 *SmartPort: Pioneering Digital Transformation in the Global Maritime Industry*
Tommy Mikkelsen, Managing Director for Navigation and Piloting, Trelleborg

09:55 *Are ports ready for Pilot/Port Operations Quality Assurance (POQA)?*
Captain Jonathon Pearce, Business Development Manager, OMC International

10:15 *Panel Discussion*

10:30 *Morning Coffee in the Exhibition Hall*

11:00 *Congress Session 5 - Session Chair Captain Mike Magee*
Terminal Operations
How do Harbour Masters influence the change that is coming?

11:00 *Monitoring Vessel emissions in the Port, How can a Port become a catalyst for decarbonisation?*
Yucel Yildiz, Ports and Terminals Manager, RightShip

11:10 *The impact of Tanger Med Harbour Master initiatives on Terminal Operations Efficiency*
Captain Carlos Lazo, Vice President Tangier Alliance Terminals

11:25 *GHG Regulations updates and Impact on fuels and Terminals*
Alaa Ahmed, District Manager, UAE and North Africa, DNV

11:45 *Technical Aspects of the Ship/Shore interface*
Kevin Coelho, Nautical Advisor, OCIMF

12:00 *MASS and the Harbour Master*
Niels Vanlaer, Harbour Master, Port of Antwerp Bruges

12:15 *Panel Discussion*

12:30 *Networking Lunch and Exhibition Reception kindly sponsored by KNC*

14:00 *Congress Session 6*
Harbour Master preparations for new technology

14:00 *Keynote Address by Isabelle Ryckbost, Secretary General, European Sea Ports Organisation (ESPO9)*

14:30 *Drones in ports and digital airspaces over ports*
Ingrid Romers, Port of Rotterdam

14:45 *Empowering Harbour Masters: Influencing Onshore Power Supply from Planning to Operations*
Laurent Dupuis, VP of Product Management, Shore power, CAVOTEC

15:00 *Embracing AI-Powered Collaborative Intelligence - increase resource efficiency, improve port performance, optimize routes, and reduce fuel consumption and inherently GHG emissions*
Captain Jean-Francois Belzile, Harbour Master Port of Montreal, and Krista Foster, GSTS

15:15 *Panel Discussion*

15:30 *Afternoon Tea*

15:45 *Congress Session 7*
Developments in mooring and shore infrastructure

15:45 *Engineering to enhance port operational efficiency*
Amine Malti, Head of Tanger Med Engineering

15:55 *A Human Centric Approach to Safe Mooring Technology - Bridging the Gap between port operators and decision support tools*
Preema Bhautoo, Senior Marine Engineer,DHI

16:10 *Revolutionizing Port Operations: The Multifaceted Benefits of Automated Mooring*
Vikesh Dhanpat, Regional Product Manager, EMEA, CAVOTEC

16:25 *Safety ladders on open quay walls: solving cantilever installation and reducing CO_2 footprint*
Kim Haaning, Managing Director, Port Safety

16:40 *Panel Discussion*

16:50 *IHMA Towage Book Launch*

17:00 *Coaches depart for Tangier Hotels (Kindly sponsored by Rightship)*

Day 3

23 MAY 2024 || DEPARTURE FROM PORT

09:00 *Chairman's Opening Remarks*

09:05 ***Congress Session 8***
Harbour Masters in safety and incident management - A Statutory Role?

- **09:05** ***In Murky waters. The impact of illicit trade on the organizational resilience capacity of ports***
  Niels Vanlaer, Harbour Master, Port of Antwerp-Bruges
- **09:25** ***Digitalized Management of Hazardous Goods & 2D Preventive safety Tool***
  Captain Mohamed Amine Elfatmi, Harbour Master Security, Safety and Environment TangerMed
- **09:40** ***"Lithium-Ion batteries in Ports: Sustainable and Resilient (*unless damaged, in which case, good luck)"***
  Anthony van Damme, Waves Group
- **10:00** ***Port disruption has many guises***
  Captain Paul O'Regan, Harbour Master and COO, Port of Cork
- **10:15** ***Holistic analysis in Incident Management for Port authorities***
  Andreea Hronec, Strategic Products Manager, Frequentis
- **10:30** ***Do we really learn from accidents?***
  Captain Dave Watkins, CHIRP
- **10:45** ***Ask the panel***
- **11:00** ***Morning Coffee in the Exhibition Hall***

11:30 ***Congress Session 9***
Who is steering our ship?

- **11:30** ***Diversity and Inclusion in African Ports***
  Mr Jean-Marie Koffi, Secretary General, AGPAOC, Port Management Association of West & Central Africa
- **11:50** ***Advancing Gender Equality: The Contribution of Shore-based Roles in the Maritime Sector***
  Lisa Lamont, VTS Supervisor, Belfast Harbour Commissioners
- **12:05** ***Navigating Gender Equality in the Maritime Sector***
  Nancy Scheijven, Tidalis
- **12:20** ***Adapting to change in todays ports***
  Milembe Mateyo, Harbour Master, Port of Amsterdam
- **12:35** ***Safe Port Call in Rotterdam***
  Miranda Segal, Deputy Harbour Master, Port of Rotterdam
- **12:50** ***Ask the panel, suggested topic Improving diversity and promoting the ports sector to improve skills and recruitment***
  what does the sector need to do to deliver results?
- **13:00** ***Networking Lunch kindly sponsored by Tanger Alliance Terminals***
  IHMA AGM

14:00 ***Congress Session 10***
Training and development

- **14:00** ***Criticality of Human Element in a Digitalized Maritime Environment***
  Yoss Leclerc, CEO, Logistro
- **14:15** ***UNCTAD Train for Trade Programme***
  Captain Gary Wilson, Vice President, IHMA
- **14:20** ***Tanger Med Marine Simulator: A Tool Serving Port's Optimization and Key Personnel Training for the Benefit of the Continent***
  Captain Mohamed Rafouk, Chief Pilot and Director of Simulator, TangerMed Port Authority
- **14:35** ***Marine Training at RAK Ports***
  Captain Mike Magee, Harbour Master RAK Ports
- **14:45** ***RightPort Feed Back Reporting – How can Ports share information and solve ship related problems after vessel departs***
  Yucel Yildiz, Ports and Terminals Manager, RightShip
- **15:00** ***Ask the panel***

15:15 ***Congress Wrap up and summary***
IHMA President and Congress Chairman
Announcement of 2026 Host Port

- **16:00** ***Coaches depart for Tangier Hotels (Kindly sponsored by Rightship)***
- **20:00** ***Gala Dinner - Palais Moulay El Hafid***
  Kindly sponsored by TangerMed Port

OUR PARTNERS

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TANGER MED PORT AUTHORITY

CAVOTEC

RIGHTSHIP

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tanger alliance

KONGSBERG

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HORIZON TERMINALS

TIDALIS

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THE MARINE ADVENTURE

EVOLVING AND ADAPTING TO CHANGE IN TODAY'S PORTS

OUR CONGRESS SPEAKERS

OUR SPEAKERS

CONGRESS SESSION 1

Smart Ports, Technology, Digitilisation, AI, Real Time Data
What does this all mean for port marine operations?

RIGHTSHIP
YUCEL YILDIZ
Ports and Terminals Manager

Innovez One
DAVID YEO
CEO

Aramco
ABDULLAH ALANAZI
Senior Engineer

Transnet National Ports Authority
CAPTAIN NARESH SEWNAT
Senior Manager Pilotage
& VTS and Chief Harbour Master

Seaport OPX Pty Ltd
SIMON MORTENSEN
Vice President Ports & Terminals

CONGRESS SESSION 2

Data

MSM OCEAN
CÉCILE ZANETTE
CEO

UK Hydrographic Office
PAUL MARKS
Head of UK Data Partnerships

OceanWise
SARAH COCKROFT
Oceanographer

Royal HaskoningDHV (RHDHV)
COEN EGGERMONT
DMA expert

CONGRESS SESSION 3

Port Call Optimisation

Tanger Med Port
CAPTAIN KAMAL LAKHMAS
Harbour Master

Wärtsilä
OLGA DAVLETALIEVA
Head of Ports Advisory Services

Kongsberg Norcontrol
BJÖRN COSTER
Market Manager for VTS
& Port Systems

ITPCO
BEN VAN SCHERPENZEEL
Director Nautical Developments,
Policy and Plans

CONGRESS SESSION 4

Pilotage – Transit to the future

ISPO
CAPTAIN MATTHEW EASTON
Pilot, Chair IUG of ISPO / Bridge
Resource Managment for Pilots

Artemis Technologies
JOHN CUMMING
Head of business Development
for the Workboats sector

Trelleborg Marine
& Infrastructure
TOMMY MIKKELSEN
Managing Director

OMC International
CAPTAIN JONATHAN PEARCE
Business Development Manager

CONGRESS SESSION 5

Terminal Operations

RIGHTSHIP

YUCEL YILDIZ

Ports and Terminals Manager

Tanger Alliance container terminal

CAPTAIN CARLOS LAZO

Vice President

DNV

ALAA AHMED

Maritime District Manager

OCIMF

KEVIN COELHO

Nautical Advisor

Port of Antwerp-Bruges

NIELS VANLAER

Harbour Master

CONGRESS SESSION 6

Harbour Master preparations for new technology

Port of Rotterdam Authority

INGRID RÖMERS

Senior Advisor

CAVOTEC

LAURENT DUPUIS

VP of Product Management ShorePower

Port of Montreal

CAPTAIN JEAN-FRANCOIS BELZILE

Harbour Master

CONGRESS SESSION 7

Developments in mooring and shore infrastructure

Tanger Med
AMINE MALTI
Head of Tanger Med Engineering

DHI
PREMA BHAUTOO
Head of Digital Port Services

CAVOTEC
VIKESH DHANPAT
Regional Product Manager EMEA

Port-Safety
KIM HAANING
Co-Founder & Managing Director

CONGRESS SESSION 8

Harbour Masters in safety and incident management - A Statutory Role?

Port of Antwerp-Bruges
NIELS VANLAER
Harbour Master

Tanger Med Port
CAPTAIN MOHAMED AMINE ELFATMI
Director/Harbor Master in charge of Security, Safety and Environment protection

Waves Group
ANTHONY VAN DAMME
Master Mariner

IHMA
CAPTAIN PAUL O'REGAN
Vice President

FREQUENTIS
ANDREEA HRONEC
Strategic Product Manager

CHIRP
CAPTAIN DAVE WATKINS
Deputy Director Maritime

CONGRESS SESSION 9

Who is steering our ship?

PMAWCA
JEAN MARIE KOFFI
Secretary General

Belfast Harbour
LISA LAMONT
VTS Supervisor

Tidalis
NANCY SCHEIJVEN
Managing Director EMEA

Amsterdam-IJmuiden
MILEMBE MATEYO
Harbormaster

Port of Rotterdam
MIRANDA SAGEL
Deputy Harbour Master

CONGRESS SESSION 10

Training and development

Logistro Consulting International
CAPTAIN YOSS LECLERC
President & CEO

IHMA
CAPTAIN GARY WILSON
Vice President

Tanger Med Port Complex
MOHAMED RAFOUK
Chief Pilot

RAK Ports
MICHAEL MAGEE
Harbour Master

RIGHTSHIP
YUCEL YILDIZ
Ports and Terminals Manager

ELMAN operates since 1975 in the design, development and realization of Radio, AIS, GMDSS, VCS, VTS and PMIS systems with related infrastructures.

With the aid of highly qualified personnel, cutting-edge technologies and a long-term experience, ELMAN can supply turnkey solutions and realize projects in the maritime sector.

ELMAN distinctive elements:

- **hardware & software**
- **high flexibility**
- **system customisation**
- **full integration**
- **extremely responsive support**

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IHMA AWARDS

During the IHMA congress, we had the honor of presenting awards to three winners in different categories. These awards were given to recognize excellence and innovation in their respective fields. We warmly congratulate the winners for their outstanding contributions and commitment to excellence.

PORT OPERATIONS PHOTOGRAPH OF THE YEAR AWARD

Winner: *John Fallon, Regional Harbour Master, Port of Gladstone, Maritime Safety Queensland*

Photo was taken by Aerial Media Gladstone

The photo shows the LNG Carrier CESI QINGDAO being moved dead ship from the APLNG Terminal at the end of the Port of Gladstone in Central Queensland, 25 nautical miles to the Anchorage outside the harbour. Seven tugs (six visible in the photo) and three Pilots manoeuvred the vessel, which had suffered a failure of its propulsion machinery, shortly after completing loading. This manoeuvre had been simulated and the execution of the tow went as simulated. The photos show the value of thorough planning and all parties working together to achieve a common aim of safely and efficiently moving vessels in a Port. By moving the vessel to the anchorage continuity of the supply chain from wells 600 kilometres away through a pipeline to the terminal, was maintained. After a short delay, vessel traffic resumed, cargo loading resumed and there were no shutdowns of plants, wells, or the pipeline.

Award being accepted by Kylie McDonald, Deputy Harbour Master, Port of Geelong

SAFE, EFFICIENT AND SECURE PORT AWARD

Winner: *Michael McKenna, Harbour Master, Port of Dublin for the 'Dublin SafePort Initiative'*

Award being accepted by Michael McKenna

Dublin Port Company's mission is to ensure the port is a safe and healthy environment, with a commitment to ensuring the safety of its employees and other persons affected by its activities. Dublin Port Company were awarded Distinction Awards for their Health and Safety Practices at the NISO All Ireland Occupational Safety Awards for two consecutive years demonstrating their positive and proactive culture of safety management within Dublin Port.

OUTSTANDING INDIVIDUAL ACHIEVEMENT IN THE PROFESSION OF HARBOUR MASTER AWARD

Winner: *Thulani Dubeko, Harbour Master, Port of Ngqura, Transnet National Ports Authority, South Africa*

Award being accepted by Thulani Dubeko

Captain Dubeko has played a pivotal role in the establishment and operation of the African Harbour Master Committee, which unites Harbour Masters across Africa and enhances their participation in the International Harbour Master Committee (IHMA). He significantly contributed to the first conference of the committee in Tangiers, Morocco, in March 2023, aiming to integrate African Harbour Masters into the IHMA, address African maritime challenges, contribute to the African Union 2050 maritime strategy, promote exchange programs, and enhance port safety.

In South Africa, Captain Dubeko has been tackling safety challenges in the Port of Ngqura and has led innovative projects, including the implementation of Shore Tension units to counter long wave action. These innovations have improved safety, efficiency, and ship turnaround times, and will be expanded to other South African ports. Additionally, he is part of the International Association of Ports and Harbour Clean Fuels group, developing guidelines for LNG operations.

Captain Dubeko is also leading two major projects in the Port of Ngqura: the Ngqura Manganese Export Terminal and a new Liquid Bulk Terminal. Recognized as an ambassador for Transnet among 60,000 employees, he exemplifies the organization's values. Furthermore, he has organized career guidance exhibitions for underprivileged schools and actively raises funds for children with autism. His contributions made him a deserving candidate for this nomination.

TANGER MED,

LEADING PORT COMPLEX IN AFRICA & THE MEDITERRANEAN

Containers Activity
8.6 MILLION TEUs*

Overall Tonnage
122 MILLION T

Total Number of Calls
16 900 INCLUDING **1 113** MEGA-SHIPS (>290M)

Tanger Med Port Complex is a global logistics hub, located on the Strait of Gibraltar, offering processing capacities for 9 million containers, 7 million passengers, 700,000 trucks, and 1 million vehicles. Tanger Med Port Complex is a high-performing and truly integrated platform centered around transshipment and import-export activities.
Through various shipping lines, Tanger Med Port ensures regular connections to over 180 ports and 70 countries across five continents.

1ST
CONTAINER PORT IN AFRICA
(th Consecutive Year 7)

CONTAINER PORT IN THE MEDITERRANEAN
(Consecutive Year 4)

19TH/500
CONTAINER PORT WORLDWIDE
Alphaliner Ranking

4TH
MOST EFFICIENT CONTAINER PORT WORLDWIDE
The World Bank / S&P Global)
(Market Intelligence

www.tangermedport.com

DEVELOPMENT AND VALIDATION OF A FRAMEWORK FOR MODELING AND ASSESSING RESILIENCE OF PORT INFRASTRUCTURE SYSTEMS TO CLIMATE CHANGE : CASE STUDY OF TANGER MED PORT

Mohamed Amine Maskrout1
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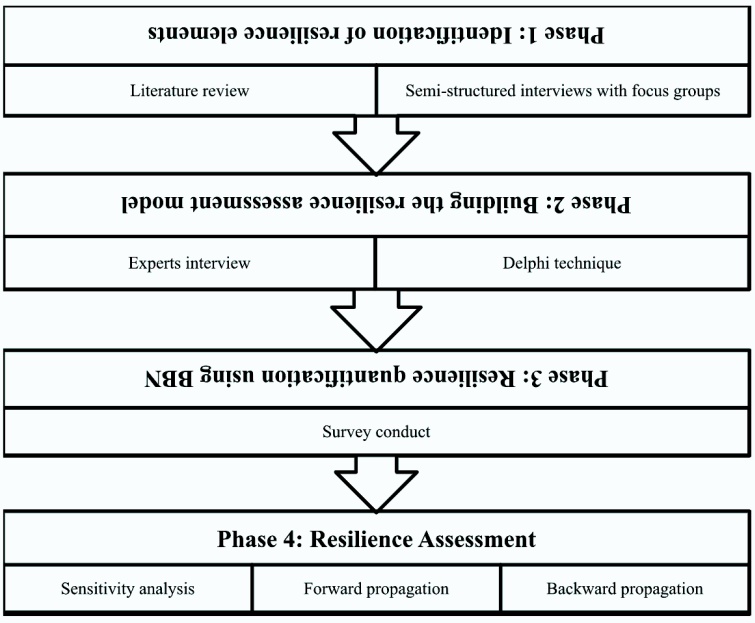
Research scope

Climate change has emerged as a significant factor contributing to port infrastructure systems (PIS) disruptions, leading to operational challenges and consequences affecting operations in seaports. In addition, the multiplicity of stakeholders in ports and the complex operational scenarios are often associated with a high level of uncertainty because they usually operate in a dynamic environment. Therefore, a growing number of researchers and practitioners have placed resilience at the forefront of their research agendas. The term 'resilience' originates from the latin word 'resil', which means to 'leap back' or 'rebound'. When applied to a PIS, resilience is the system's capability to rebound to a desired operating level within a reasonable period after being impacted by a disruption. In simpler terms, port resilience defines how collaborative efforts across the port system contribute to the successful and rapid resumption of commercial activities. (21) This definition has two key components : (1) risks decreasing the system's performance (i.e, actual or possible disruption), and (2) resilience-building capabilities resisting system's performance changes and returning it to a new normal (i.e absorption, restoraton, and adaptation capacities of the system).

Understanding such, the purpose of this study is to develop a Bayesian Belief Network (BBN) model to assess the resilience of PIS amidst the challenges posed by climate change. BBN, a commonly employed decision support tool, adeptly manages complexities and uncertainties by identifying disruptive factors, resilience-building capacities and their intricate interactions (Djalante et al 2020). The proposed model is constructed based on historical data and expert opinions from the Moroccan port industry, with the port of Tanger Med chosen as a case study to demonstrate the quantification of port resilience to climate change impacts in a deep-water transhipment port network.

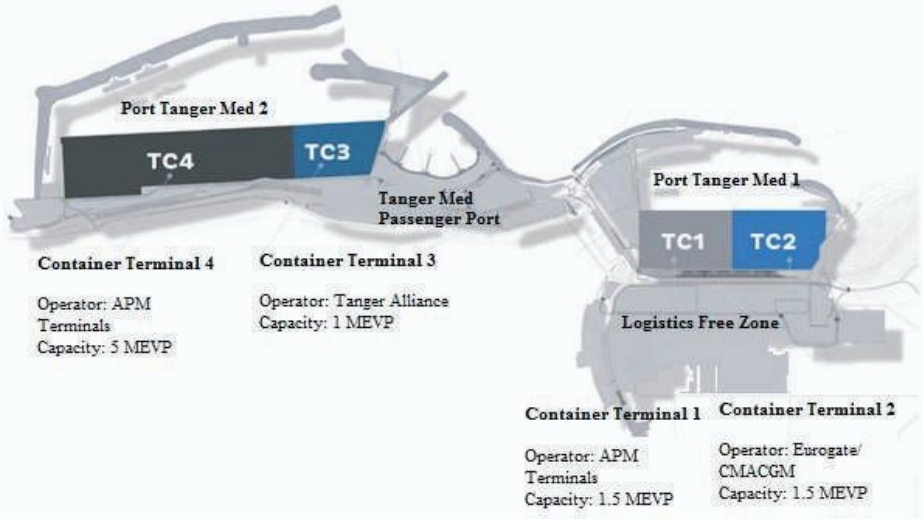
Methodology



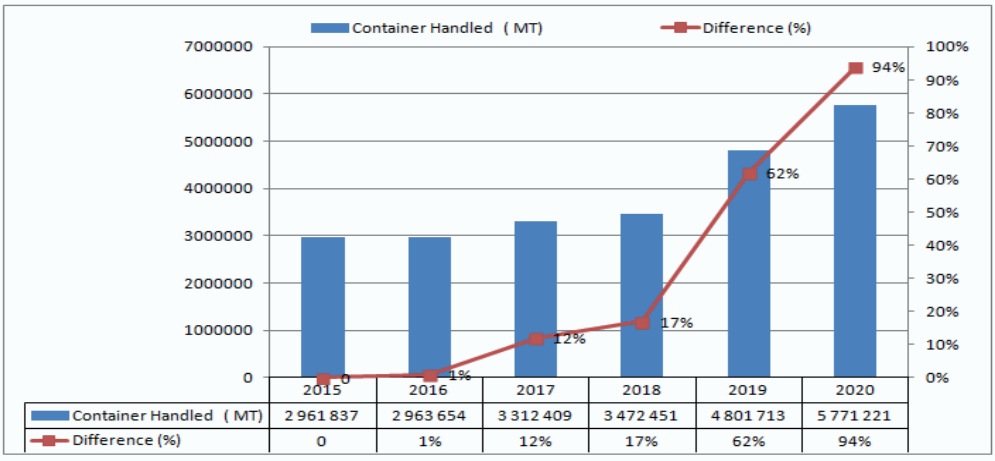
Problem definition and model formulation

STUDY AREA

The choice of the Port of Tanger Med, managed by Tanger Med Port Authority, is motivated by several factors :



(i) It is the largest seaport in the Mediteranean and consistently ranks among the top 25 container ports in terms of cargo volume.
(ii) The CTs are renowned for their high efficiency and contributes an annual container-handling capacity exceeding 8 million Twenty-Foot Equivalent Units (TEUs) through four container terminals operated by 3 distinct operators (Fig)



	2015	2016	2017	2018	2019	2020
Container Handled (MT)	2 961 837	2 963 654	3 312 409	3 472 451	4 801 713	5 771 221
Difference (%)	0	1%	12%	17%	62%	94%

Fig.5 Containers handled at the port of Tanger Med between 2015 and 2020.

(iii) It plays a vital role in the Moroccan economy with over of ... million tons of cargo passing through annually from various global regions, including Europe, Asia and America.

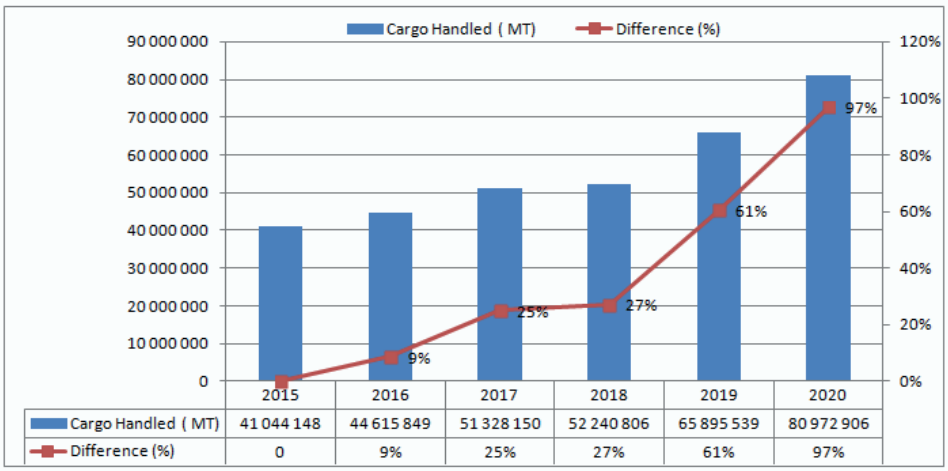


Fig6. Cargo handled at the port of Tanger Med between 2015 and 2020.

(iv) It serves as a crucial hub connecting different modes of intermodal transportation, such as train, truck, barge, facilitating global trade and business.

(v) Morocco, encouraged by the success of Tanger Med port, has the ambition to further position itself in the transhipment market in the Mediteranean basin. The latter has been also recognized as a concerning hot-spot in relation to climate change issues, drawing substantial attention from the scientific community. Consequently, there is extensive scientific literature exploring the complex relationship between climate change and its effects on the Mediterranean bassin.

Incontestably, TM port is predominantly essential to the Moroccan economy. Nevertheless, climate change poses serious challenges which could impact the entire supply chain, the global economy, the environment and the community and thus call for an exploration of the resilience capabilities of TM port in Morocco.

PORT RESILIENCE ASSESSMENT FRAMEWORK

Our objective is to provide stakeholders, managers and policy makers with a tool enabling them to evaluate how well ports can adapt to potential operational risks arising from extreme climatic and oceanic-meteorological factors associated with climate change. In contrast to approaches that are partial, not specific to ports, or qualitative, our framework seeks to establish a thorough and quantitative methodology for assessing the resilience of the ports.

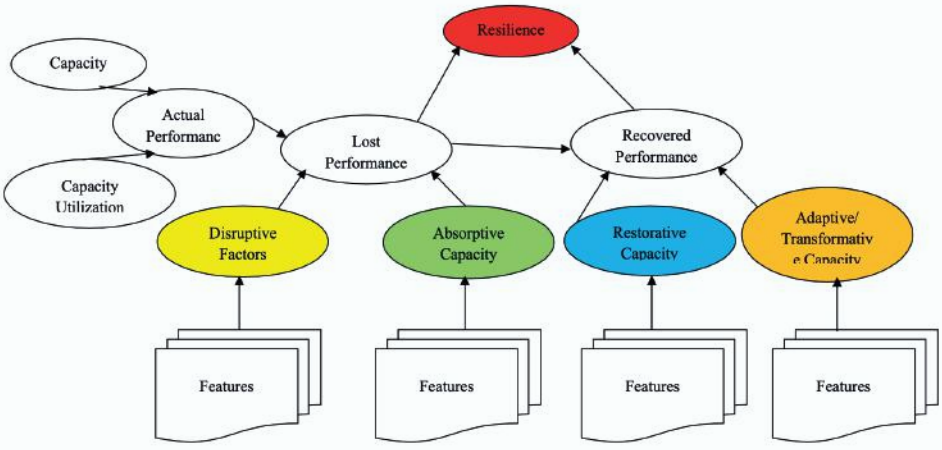


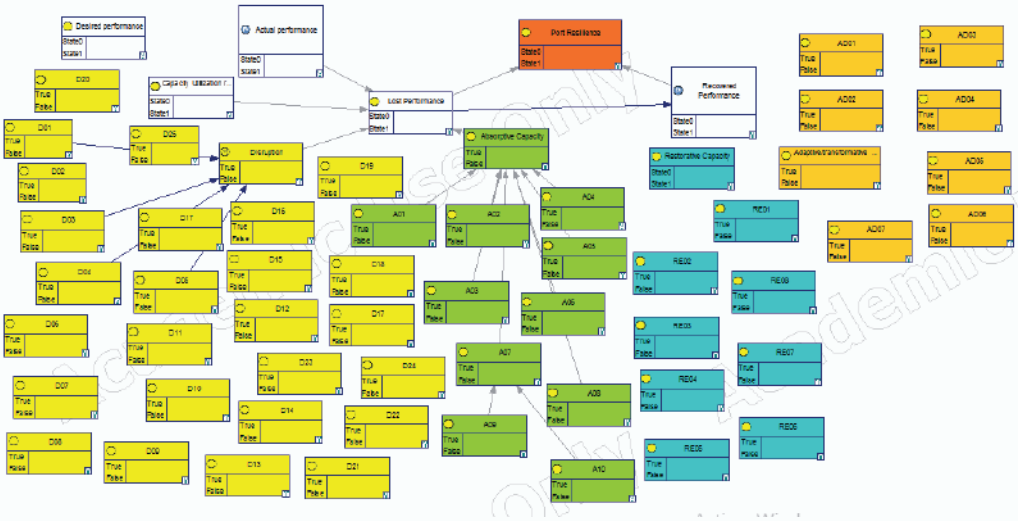
Fig. 2. Schematic view of the resilience assessment framework

To develop the model, insights gained from the literature, recent news and reports issued by international organizations played a pivotal role in guiding us to pose pertinent questions and acquire highly valuable information through semi-structured focus groups interviews with functional experts in the Moroccan port industry. In total, seven separate focus groups were conducted over a one-month period.

Focus Groups Characteristics		Number of Respondents	Percentage of Respondents
Port Entity	Port Authority	6	27%
	Terminal Operators	4	18%
	Shipping Companies	4	18%
	Intermodal Logisctic Providers	4	18%
	Researchers	4	18%
Work Experience	1-5 years	10	45%
	6-10 years	10	45%
	11-15 years	2	10%

In each case, respondents were asked a number of questions to explore their practices to mitigate current and projected port's operational vulnerabilities to identify the themes and sub-themes for different elements of the resilience assessment framework (Disruptive factors, absorptive, adaptive, and restorative capacities) and their interrelations (phase 1 and 2).

Later, the model was validated by circulating the outcomes among experts who participated in the initial phase, using the Delphi technique. Following 3 rounds of circulation, an unanimous consensus was achieved among the study participants regarding resilience elements and their interrelationships. Following the completion of phases 1 and 2, an overarching model was designed to assess the resilience of the port. This model comprises 25 nodes for disruption, 13 for absorption, 10 for recovery and 8 for adaptation/transformation elements.



QUANTIFYING RESILIENCE ELEMENTS USING BBN

To conduct phases 3 and 4, we implemented the developed model specifically on Container Terminals within the port of Tanger Med. The proposed BN depicted in fig.7 is constructed using Genie software. The interaction among the nodes is simulated through 90 connections. Genie software allows the design of various types of nodes, including discrete, continuous, rank and label nodes.

Boolean variables (BV) : *also known as discrete variables, have binary responses (true/false) indicating positive and negative outcomes.*

Continuous Variables (CV) : *Continuous variabels have a range of potential values. The choice of a truncated normal distribution is made because it is a modified form of a normal distribution, restricting the random variable from below, above, or both.*

$$\text{Availability of spare parts} \sim \text{TNORM}\ (\mu = 0.90, \sigma^2 = 0.05, LB = 0.75, UB = 1.0\ )$$

The equation outlines that, on average, the availability of spare parts is 90% with a variance of 5%. The lower and upper bounds signify that, even in the worst-case scenario ; the availability of spare parts does not fall below 75%. Conversely, in the best-case scenario, 100% of the spare parts are accessible for conducting periodic maintenance work. All the prior distributions for cotinuous variables are determined using historical data retrieved from the port's archive.

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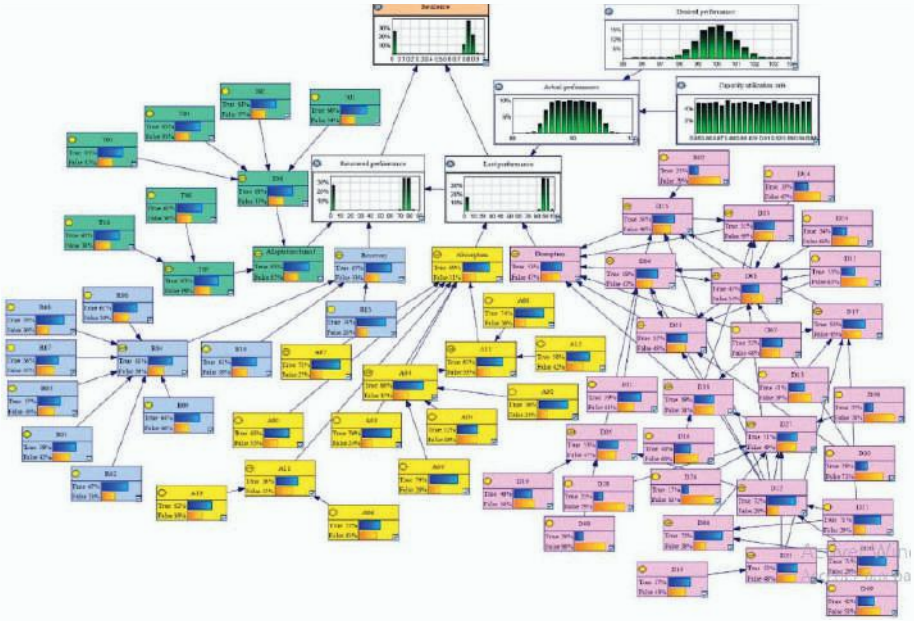
Results and discussion

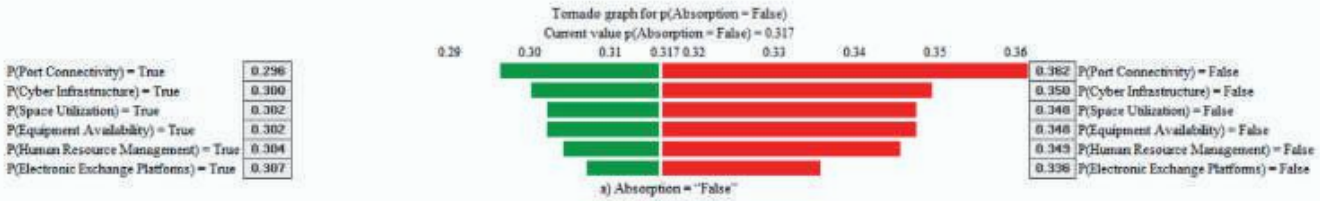
MODEL AND QUANTIFICATION

Using Genie software, the resilience assessment model for Tanger Med container terminals is illustrated in Fig.. The disruption node exhibits two primary states, with a True state indicating a 60% likelihood of TMCT experiencing disruption, while the False state implies a 40% chance of no disruption occuring. As for the absorption node, the port system demonstrates a 69% effectiveness in absorbing the impacts of disruptions based on its absorptive capacity. For adaptive and restorative capacities, the success rates are 67% and 63%, respectively based on experts judgments. To this end, the overall resilience of TMCT is determined to be 83%. Nevertheless, it is crucial to comprehend the role of different resilience variables in enhancing the overall system's resilience, enabling port and terminal decision-makers to strategically plan for the future by prioritizing current actions. This understanding can be achieved through sensitivity analysis (SA) and scenario analyses (Forward and backward propagation techniques).



SENSITIVITY ANALYSIS (SA)

Sensitivity Analysis (SA) serves as a valuable technique for validating the structure of the BN model, as suggested by Hossain et.al(2019) and Lawrence et.al (2020). This method involves assessing the influence of contributors on the target node within the same model, offering insights into the nodes with significant impact. This method is employed to determine the extent to which independent variables affect a specific dependent variable under particular conditions (Borgonovo 2016). It enables decision-makers to pinpoint areas for improvement, assess the rationality of inferences, and understand incremental effects on modeled results. In this context, Genie was employed to run the SA to focus on the causal factors influencing absorption capacity, with the latter set as the target node. (Ongoing)



TEAM RESOURCE MANAGEMENT: A COMPREHENSIVE ANALYSIS IN AIR TRAFFIC CONTROL AND MARITIME VESSEL TRAFFIC SERVICES

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Introduction

Ensuring safety in complex operational environments such as air traffic control (ATC) and maritime vessel traffic services (VTS) is a priority that relies heavily on effective team resource management (TRM). In this essay, we explore the intricate dynamics of TRM in air traffic control and maritime VTS, examining its principles, practices, and the impact it has on enhancing safety and the overall working environment.

Team Resource Management in Air Traffic Control:

Air traffic control is a critical component of aviation safety, managing the movement of aircraft within airspace and on the ground. TRM in ATC encompasses various elements aimed at optimizing teamwork, communication, decision-making, and situational awareness among controllers. A central pillar of this approach is Crew Resource Management (CRM), originally developed in aviation to address human factors and enhance overall safety.

CRM places a strong emphasis on the importance of effective communication, leadership, and decision-making within the ATC team. Controllers undergo rigorous training to develop and enhance their interpersonal skills, conflict resolution abilities, and workload management techniques. By fostering a culture of open communication and mutual respect, CRM enables controllers to collaborate seamlessly, anticipate challenges, and respond effectively to emergencies.

Moreover, ATC heavily relies on advanced technology such as radar systems, automation tools, and communication networks to support TRM efforts. These technologies provide real-time data, facilitate information sharing, and assist controllers in making informed decisions under pressure. However, it is crucial to note that even with these advancements, human operators remain central to the TRM process, as they interpret data, exercise judgment, and adapt to evolving situations.

The Role of TRM in Enhancing Safety in Air Traffic Control:

The effective implementation of TRM in ATC significantly contributes to enhancing safety in several key areas:

Risk Mitigation: *By promoting clear communication and situational awareness, TRM helps identify and mitigate potential risks, such as airspace conflicts, adverse weather conditions, and equipment failures.*

Error Management: *TRM encourages controllers to recognize and address errors promptly through techniques like error reporting, cross-checking, and collaborative problem-solving. This proactive approach helps prevent accidents and incidents.*

Crisis Management: *In high-pressure scenarios such as air emergencies or system failures, TRM equips controllers with the skills to coordinate responses, prioritize tasks, and maintain composure under stress, ensuring swift and effective crisis resolution.*

Continuous Improvement: *TRM fosters a culture of learning and feedback within ATC teams. This enables ongoing performance evaluation, skills development, and process refinement to adapt to changing operational needs and emerging challenges.*

Transition to Maritime Vessel Traffic Services:

While the operational contexts of ATC and maritime VTS differ, both share fundamental goals of ensuring safety and efficiency in transportation systems. Maritime VTS centers monitor and manage vessel traffic in ports, waterways, and coastal areas, playing a crucial role in collision avoidance, navigational assistance, and environmental protection. However, compared to ATC, the adoption of TRM principles in maritime VTS has been relatively recent and less standardized.

Adapting TRM Principles to Maritime Vessel Traffic Services:

Recognizing the value of TRM in enhancing safety and operational effectiveness, maritime authorities and VTS operators are actively working to adapt TRM principles to the unique challenges of the maritime domain. This involves integrating human factors considerations, communication protocols, and decision-making frameworks tailored to the specific needs of VTS operations.

Key aspects of TRM in maritime VTS include:

Communication Enhancement: *Effective communication is as critical in VTS as it is in ATC. Clear communication channels are essential for conveying vital information, coordinating vessel movements, and facilitating collaboration among operators, pilots, and other stakeholders.*

Situational Awareness: *VTS operators must maintain a clear understanding of vessel traffic patterns, navigational hazards, and environmental conditions. This enables them to anticipate risks and guide vessels safely through congested waterways.*

Decision Support Tools: *Advanced technologies such as radar systems, Automatic Identification System (AIS), and electronic chart displays provide VTS operators with real-time data and visualization tools to support decision-making and traffic management.*

Training and Skill Development: *Training programs for VTS personnel encompass TRM principles, human factors awareness, and scenario-based exercises. This ensures that VTS operators are equipped with the necessary teamwork, problem-solving, and crisis management skills.*

Benefits of TRM in Maritime VTS:

The implementation of TRM in maritime VTS offers several tangible benefits:

Enhanced Safety: *By promoting effective teamwork and communication, TRM helps prevent collisions, groundings, and other maritime accidents. This, in turn, improves overall safety for vessels and their crews.*

Operational Efficiency: *TRM enables VTS operators to manage vessel traffic more efficiently. This includes reducing delays, optimizing routes, and maximizing port throughput while minimizing environmental impacts and resource utilization.*

Risk Reduction: *Through proactive risk identification and management, TRM minimizes the likelihood of incidents. It enhances the resilience of maritime transportation systems against unforeseen events and emergencies.*

Professional Development: *TRM fosters a culture of continuous learning and improvement among VTS personnel. This empowers them to adapt to evolving operational demands, regulatory requirements, and technological advancements.*

Challenges and Opportunities in TRM Implementation:

While the benefits of TRM are evident, the implementation of these principles comes with its own set of challenges. In both ATC and maritime VTS, these challenges may include resistance to change, varying levels of expertise among personnel, and the need for consistent training and evaluation programs.

Resistance to Change: *TRM implementation often requires a cultural shift within organizations. Personnel may be resistant to new methodologies or reluctant to embrace changes to established workflows. Overcoming this resistance requires effective communication, leadership support, and a phased approach to implementation.*

Varying Levels of Expertise: *In both ATC and maritime VTS, teams comprise individuals with varying levels of experience and expertise. TRM programs need to be tailored to accommodate these differences, providing targeted training and support for personnel at all skill levels.*

Consistent Training and Evaluation: *TRM is most effective when it becomes an integral part of an organization's culture. This requires ongoing training programs and regular evaluations to ensure that personnel stay current with best practices and continuously refine their skills.*

Integration of Advanced Technologies: *While advanced technologies play a crucial role in supporting TRM efforts, the integration of these tools poses its own challenges. Ensuring seamless interoperability, addressing cybersecurity concerns, and providing comprehensive training on new technologies are essential aspects of successful TRM implementation.*

Conclusion:

In conclusion, Team Resource Management stands as a cornerstone in enhancing safety and operational effectiveness in both air traffic control and maritime vessel traffic services. While the principles and practices of TRM have been well-established in aviation, the maritime industry is increasingly recognizing their value and adapting similar approaches to VTS operations. By prioritizing effective communication, situational awareness, and collaboration among personnel, TRM contributes significantly to the safe and efficient management of transportation systems, ensuring the smooth flow of traffic and mitigating risks in complex and dynamic environments. As both industries continue to evolve, the ongoing development and refinement of TRM principles will play a crucial role in shaping the future of safety and operational excellence in air and maritime transportation.

RIGHTSHIP – ENHANCING PORT AND TERMINAL RESILIENCE AND SAFETY WITH DIGITAL TOOLS

Know your risk

"Ports most of the time don't get a choice of which vessels call in their harbours," explains Ports and Terminals Manager Yucel Yildiz. "We can't change that, but what we can do, is help them prepare for the arrival in advance.

"Currently, Harbour Masters receive minimal information before a port call. With the RightPort Risk Solution, they can conduct a risk assessment tailored to their criteria in just five minutes. All they need is the IMO number and they know exactly what's coming."
The RightPort database, he explains, contains crucial information on vessel and managing company's performance and any issues associated with them.

"For example, Harbour Masters can see if the vessel has experienced blackouts. If so, they can make sure there is an additional tug available on arrival to help avoid any potential incidents."

The solution features a feedback reporting function that enables a Harbour Master to directly report any issue with a vessel – or to request a RightShip investigation.

"Normally, once a vessel has left port, you have no control. With this, you maintain your control until an issue is resolved, extending safety and sustainability precautions beyond the vessel's departure."

Maritime Emissions Portal

"The MEP solution features simulations to demonstrate the impact of measures to reduce carbon footprint. For example, it can show what would happen if you reduced anchorage time, or changed anchorage location, or supplied shore power while alongside.

The whole world is talking about alternative fuels and shore power, but the required technology is yet to reach maturity. In the meantime, we need to make a start. A good way to do that is to improve operational efficiency. MEP provides valuable insights to plan and act on that."

Yucel will be attending the International Harbour Masters Association Congress 2024 in Tanger Med to present RightPort Risk Solution and MEP over three days, covering Arrival in Port, Vessel in Port and Departure solutions.

RightShip was founded in Australia in 2001. The organisation was started by Rio Tinto and BHB Billiton, and later joined by Cargill, in a concerted effort to improve maritime safety.

Zero harm in maritime

RightShip developed a world-class vetting and inspections programme, accompanied by a growing number of ESG-focused technologies and services, to achieve a maritime industry that causes zero harm.

Building a team of maritime experts, forging partnerships, and adopting state-of-the-art digital solutions, RightShip has developed an extensive database able to provide information on vessels of all types, throughout the world.

Global leader

With offices in Singapore, Australia, Malta, the UK, and Vietnam, and representatives in Brazil, China, Greece, Japan, the UAE and other countries, RightShip is the leading third-party maritime due diligence organisation internationally.

In recent years, it has added a range of services providing vital information for ports and terminals.

RIGHTSHIP

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We know as a port or terminal you face increased pressure on environmental considerations, marine ecosystems and coastal communities' health and wellbeing. But how can you measure and manage the emissions and air quality in and around your port?
Our new maritime missions portal is the first step in an ESG solution helping you develop clean air action and decarbonisation strategies. Using our robust, reliable and flexible data it measures port shipping air emissions so you can develop reduction strategies. This lets you meet regulatory standards, engage positively with local communities and attract sustainable finance. And it's verified by independent experts1.

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1 As part of its development we asked three independent bodies (the California Air Resources Board (USA); Ricardo Energy & Environment (UK) and the University of Delaware (USA)) to review and verify the MEP across various elements including data source and assumptions made, analytical methods, consistency of the modelling inputs and portal's overall methodology.

RightShip is the world's leading third party maritime due diligence organisation, providing expertise in global safety, sustainability and social responsibility best practises. We bring together years of industry expertise with the output from analytics and large data sets to provide our safety and environmental scoring systems, recommendations and consultancy services. By working with RightShip, clients are supported in making decisions in an environment that is a constant state of flux, protecting their business from risk.

SAFE SAILING

As ships reach gigantic proportions, maneuvering, docking and mooring them becomes ever more challenging. Trelleborg supports bringing these giants of the ocean into port efficiently and sustainably.

The World Economic Forum estimates that 90 percent of the world's goods are transported by sea. According to the International Chamber of Shipping, that amounts to 11 billion tons of product every year, or 1.5 tons for each person on earth.

This level of shipborne traffic puts intensified pressure on operators and ports to increase efficiency and improve sustainability. One of the main solutions to this challenge reflects a principal trend in the maritime industry: the development of mega ships.

"There are new, bigger and faster container ships every year," says Tommy Mikkelsen, Managing Director for navigation and piloting at Trelleborg, who is involved in the specification of Trelleborg's marine products to ports globally. "Ships are becoming larger and larger."

The early container ships of the mid-1950s were 137 meters or 450 feet long, six containers wide and held just four containers on top of one another above and below water — eight altogether.

Contrast that with the MSC Irina, which is currently the largest container ship in the world. Launched in April 2023 from Guangzhou Port in China, it is 400 meters or 1,312 feet in length. The MSC Irina is three times longer than a ship from the 1950s. It is also much wider and can carry at least ten 20-foot containers across its girth, 26 of which can be stacked on top of one other.

for larger ships is undoubtedly economies of scale as the bigger a ship, the more cargo it can carry. In addition, the sustainability agendas of big shipping companies, such as Mersk, MSC and CDMA, are a key factor.

"When it comes to sustainability," says Mikkelsen, "our customers are under extreme pressure. It is part of the conversation everywhere. This was not the case five or six years ago; it's really changed."

The more cargo a ship carries, the lower the carbon footprint of the goods onboard, pound for pound. However, these mega vessels can be counterproductive from an environmental point of view.

"where they have been since time immemorial," explains Mikkelsen. Many harbors in Europe are on heritage sites, sometimes even right in the middle of medieval cities. Within such locations, there are extremely limited opportunities to expand.

Dredging is the most obvious solution to allow larger ships that sit lower in the water to dock. The disturbance this creates on the seabed though has a huge negative impact on marine life.

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"This environmental issue is further exacerbated because all ships carry sacrificial anodes," says Mikkelsen. These are metal bars placed on the hulls of ships that, through the principle of electrolysis, corrode instead of a ship's hull.

"In the old days, these bars were typically made of lead but nowadays it's usually aluminum, or a compound, but nonetheless it's metals," continues Mikkelsen. "As the anodes corrode, metal particles end up in the silt at the bottom of the waterways. When you start digging in the silt, these particles well up in the water column and can end up in marine life."

To avoid dredging, maneuvering, docking and mooring needs to be as effective as possible. Moving within the confined areas of a port requires accurate and precise measurements to determine how low a ship can be before it hits the seabed. This is where Trelleborg's advanced solutions come into play, Mikkelsen says.

"One of the things that we as a technology partner and provider do is to innovate and find groundbreaking solutions that will allow larger ships into ports," he says. This provides a triple win to ship and port operators, Mikkelsen explains.

"Firstly, the deeper a ship can be in the water column, the more cargo it can carry, lowering costs for ship owners. Secondly, carrying more cargo reduces the carbon emissions from the transport of goods, helping ship operators meet their sustainability targets. And thirdly, the technology to accept larger ships into a port makes the port more competitive because it can achieve more cargo throughput."

is paramount to port owners. Not only does it make the ports more economically viable, but it also makes them more sustainable. "The longer a ship waits outside and takes to maneuver into a harbor, the more fuel it burns," says Mikkelsen. "Cut down the time of those two things and you save fuel, making the docking process more sustainable."

The maneuvering, docking and mooring technology that Trelleborg provides to ports significantly shortens times to enter and dock at port. "Without our solutions, on average it would take maybe 30 minutes to moor a ship, but with them it takes just a few minutes," Mikkelsen says.

A pilot is responsible for moving a ship into a secure location and maneuvering, docking and mooring it. Pilots used to do this just using their eyes and their knowledge. Now, however, they can use Trelleborg's portable pilot as well. This navigation system can help pilots do their job more effectively.

"One pilot in the UK says he is a 20 percent better pilot with the assistance of our maneuvering, docking and mooring technology," Mikkelsen says. "It saves a lot of fuel if a ship has the correct trajectory as it enters a port. Maneuvering burns fuel, and the fewer commands given by the pilot, the more efficient the journey will be. When pilots are using Trelleborg's equipment they give fewer commands because they have a prediction of where a ship will be five or 10 minutes ahead. They know that they are on the right track."

Not only does Trelleborg's technology speed maneuvering, docking and mooring up, it also makes the whole process safer.

"We lose lives every year due to snapped lines," says Mikkelsen. "Mooring a ship is a very dangerous job, people catch their hands and fingers. The robots that we've developed are hands-free, helping avoid accidents and increasing efficiency as well."

"There are several big projects going on that look at the development of self-sailing ships," says Mikkelsen. "It's a nice idea and I definitely see this as part of our future, but it's at least 20 years down the road. With all the technologies available today, if we just focus on creating completely autonomous ships, then we are going to lose opportunities to improve what we do with the shipping fleet we have."

This article is a reprint from an article in Trelleborg's stakeholder magazine T-Time.

NAVIGATING THE PANAMA CANAL

Tommy Mikkelsen, *Managing Director for navigation and piloting at Trelleborg, is involved in the specification of Trelleborg's marine products to ports globally. "We are currently working on the Panama Canal," he says. Built over 100 years ago and expanded recently, it is still not big enough for today's container ships to go through easily.*

"Together with the Panama Canal Authority we are working on a very special fender system that will allow larger ships through the locks. We're also fitting out all the largest ships that go through the canal with the precision SafePilot P3 technology that communicates with onshore services to ensure that vessels have centimeter-accurate navigation. The Panama Canal Authority has now mandated that all ships above a certain size need to carry this type of technology."

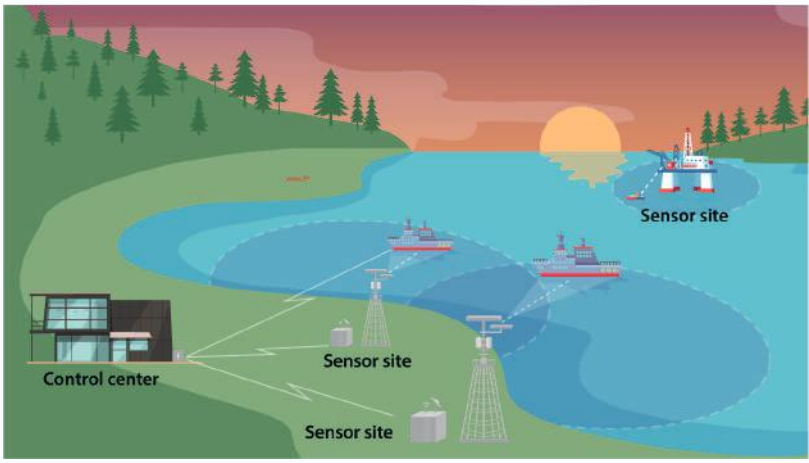
Container ship passing through the new lock at the Panama Canal.

Aerial view of the Panama Canal and the Miraflores Locks

SafePilot P3 Fixed Piloting Unit from Trelleborg

THE RISE OF ADVANCED VTS/VTMS SYSTEMS

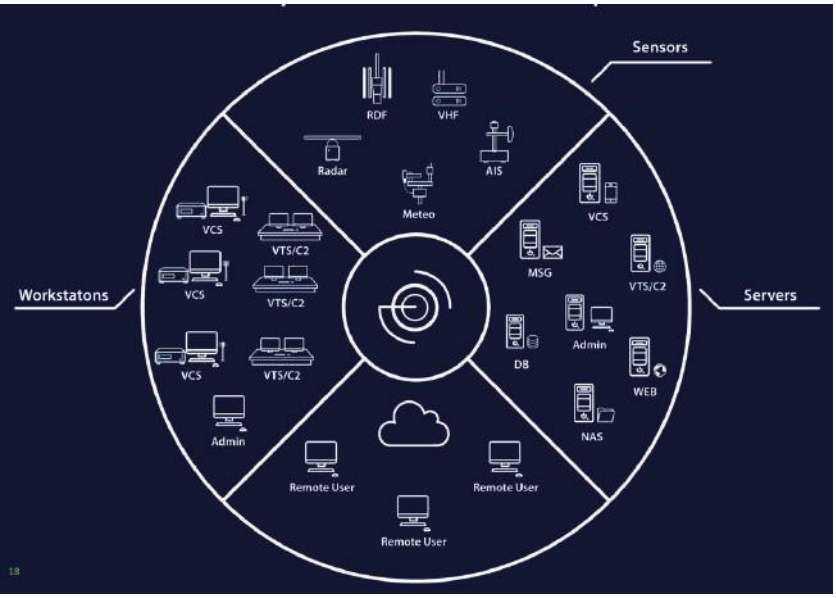
Updating Vessel Traffic Services (VTS) systems is critical for improving marine logistics, safety, and environmental protection in today's fast-evolving technological landscape. The maritime sector, under the guidance of organizations like the IMO and IALA, constantly adapts to new regulations and innovations, focusing on navigation safety and sustainable practices. Future VTMS enhancements will utilize advanced technologies to refine operations and expand capabilities. A collaborative planning involving stakeholder is crucial for addressing these challenges effectively.



VTMS systems are essential for enhancing maritime navigation and safety, helping to prevent collisions and manage vessel movements in real-time. These systems also play a key role in environmental protection and efficient port operations, adapting to increased traffic and integrating new technologies.

Regulated by leading bodies such as the IMO and IALA under the SOLAS convention, VTMS updates align with guidelines like IMO Resolution 1158(32) and IALA's VTS document G1111 to meet high functional and performance standards. Updates also support initiatives like the IMO Greenhouse Gas Strategy 2023 to reduce emissions.

VTMS optimizes maritime operations by integrating real-time data processing with advanced sensor, communication, and ICT infrastructures, including cybersecurity measures. It facilitates accurate vessel tracking and efficient data management, supported by systems such as PMIS, PCS, TOS, and ERP, alongside navigational standards like IHO's S-57 and S-63, and future S-100.



The transition to a Service-Oriented Architecture (SOA) in the maritime sector improves interoperability and scalability also ensures efficient data flow and system performance, fostering a collaborative maritime environment. We have highlighted some of the following promising areas of development:

e-Navigation: *Digital data exchanges between VTS/VTMS and vessels should optimize operations and safety, implementing e-Navigation Services like VTS Information Service (INS), Navigational Assistance Service (NAS), and Maritime Safety Information Service (MSI), Pilotage Service, Maritime Assistance Service (MAS), etc.*

Data Services: *Integrating third-party data services into VTS/VTMS significantly improves maritime operations by leveraging real-time weather data, forecasts and warnings, and satellite data including synthetic aperture radar (SAR).*

Unified Data Model of Port Call Process: *The adoption of the IMO Data Model/Compendium as a new standard ensures reliable data exchange between shore and ship systems during electronic port calls.*

S-100 standard: *Transitioning to the S-100 offers detailed maritime environment representations, enabling next-generation maritime information management and navigation capabilities.*

VHF Data Exchange System: *The marine sector is evolving with AIS 2.0, also known as VDES (VHF Data Exchange System), which improves communications by including new frequencies and messages at significantly higher speeds, allowing much more data exchange capabilities between shore and ship. Small hardware and software tweaks are likely to be made to implement VDES when it is finalized.*

Radar Processing for Oil Spill Detection and Sea Sensing: *Advanced radar technology now extends beyond vessel detection to environmental monitoring, such as oil spill detection and analysis of ocean currents, waves, and bathymetry, providing this information on a real-time coverage area that stationary sensors like data buoys do not have.*

Remote Pilotage and Autonomous Ships: *The maritime industry should implement applications such as remote pilotage and autonomous ships, enhancing safety and operational flexibility. Remote pilotage utilizes modern communication systems allowing pilots to operate vessels from afar, while autonomous ships use special control mechanisms and advanced sensors for independent navigation.*

Simulation and Predictive Analysis: *Maritime operations should benefit from simulation tools that recreate complex scenarios for training and strategy testing, and predictive analysis that uses historical data to forecast and mitigate potential maritime challenges.*

Other Expansion of Conventional Sensor Coverage VTMS: *Satellite AIS and LRIT systems extend maritime surveillance capabilities beyond traditional radar and AIS/VHF limits, offering global tracking of ships including those in remote areas. Additionally, enhancing coverage through external systems like mobile ground vehicles and various drones including aerial, surface, and underwater improves monitoring across diverse maritime regions.*

Advanced analytics (BA/BI): *Advanced analytics, employing Business Analysis (BA) and Business Intelligence (BI), is transforming the maritime sector by providing crucial insights from large datasets, aiding in enhancing safety, efficiency, and environmental practices. Through the use of key performance indicators and dashboards, these tools enable marine operators to make informed decisions and adapt strategies.*

Learning Management Systems (LMS): *LMS are essential in the maritime industry for ongoing professional development, offering courses and simulations that keep maritime professionals current with evolving industry standards and practices. This educational integration supports a culture of continuous improvement and knowledge sharing.*

Data Sharing: *Data sharing within the maritime industry is increasingly vital, improving operational efficiency, route planning, and transparency. Real-time data access is particularly crucial for vessels in remote areas, enhancing safety and operational capabilities. The potential commercial benefits of data sharing include enhanced VTS/VTMS profitability through direct charges and the sale of anonymized data.*

Artificial Intelligence (AI): *The integration of AI in VTS/VTMS operations is revolutionizing maritime surveillance and navigation by enhancing real-time monitoring and data analysis capabilities:*

AI-powered CCTV video analytics allow for continuous observation, identifying violations and vessel specifics such as type, draft, and condition

AI utilizes radar and AIS data to predict ship trajectories, detect potential collisions, and suggest optimal routes, enhancing navigational safety, especially in congested areas.

AI also plays a crucial role in communication by identifying distress signals and emotional states of negotiators, thus supporting safer and more efficient maritime operations.

AI's simultaneous analysis of diverse data sets from radars, CCTV, AIS, and Met/Hydro systems is unique to VTMS boosts situational awareness and decision-making.

Environment protection: *The integration of VTS/VTMS data into environmental monitoring highlights the maritime industry's dedication to sustainable development. This data offers insights into key atmospheric and hydrological conditions crucial for marine protection. VTS/VTMS systems are instrumental in reducing carbon emissions through detailed tracking of vessel movements and fuel usage, aiding in the pursuit of net-zero emissions. Additionally, these systems enhance oil spill detection and optimize traffic, significantly mitigating environmental impacts and pollution.*

We envision a more efficient marine sector as VTS/VTMS systems evolve from standalone to integrated, data-driven, and user-centric systems, enhancing safety, communication, and environmental sustainability. By incorporating third-party data, advanced signal processing, and AI, these systems will enhance real-time monitoring and decision-making capabilities.

Abdullah Anazi from Aramco &
Evgeny Marakasov of Rimsystems

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SAFETY FROM THE PORT PERSPECTIVE

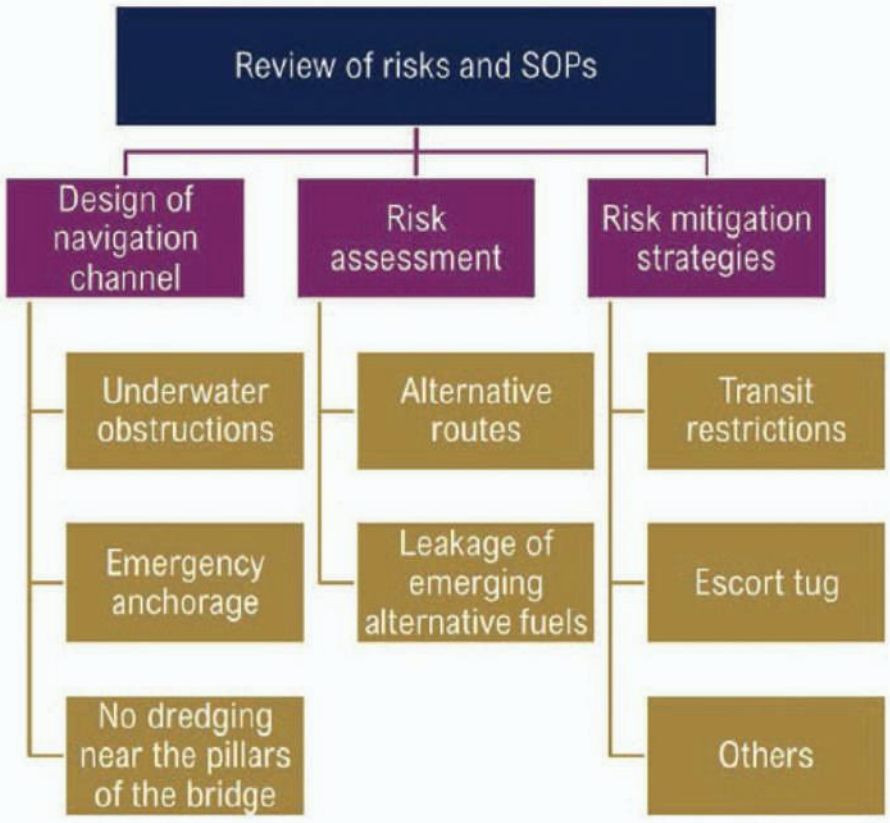
Time to review the risk assessment, design of navigational channels and SOP for safe navigation in congested waters

Recent developments in ship design and operation indicate that it is high time for port authorities to review their risk assessment and modify their Standard Operating Procedures (SOP) for safe navigation in congested waters, looking in particular at the risk of collision with other vessels or with fixed structures.

Capt Hemant Gupta
FNI

The increase in vessel size, coupled with reduced manpower, pressure on Masters to reduce overtime costs, commercial pressure to reach port on time, etc. has led to many issues. Extreme weather due to climate change has aggravated the situation, and increased automation and greater reliance on sensors have added to the list of things that could go wrong. To add fuel to the fire, faster communication means that often the Master has to seek clearance from the office for almost everything; which can delay response.

In response to these changes, ports should consider revising their procedures. Specific requirements may vary from berth to berth and from one area of the navigational channel to another. Hence, location- specific hazard and mitigation mapping has to be carried out across the whole port, taking the following points into account:



Design of navigation channel (engineering control)

When planning future infrastructure developments, consider that no underwater cable or pipeline should be installed within 0.5 to 1 mile from any critical obstructions (eg berth, heritage site, bridge, lighthouse, etc) so that anchors can be dropped in an emergency. If possible, plan an emergency anchorage area near the critical obstructions.
If the critical infrastructure is a bridge, the area near the pillars of the bridge should not be dredged. This will provide a means to reduce the speed of the vessel in the event of a collision, as it will run aground before it strikes, hence reducing the impact on the structure.

Risk assessment

Are there alternative routes available for road or human traffic in the event of the closure of any one bridge or lock? Will they be able to cope with the traffic flow?
Evaluate the risk of leakage of alternative fuels due to vessel collision (for example, methanol, LNG, ammonia).

Risk mitigation options

Potential risk mitigation strategies include:

- *Stop traffic (human or road traffic) when a vessel above a certain size is going to pass. In peak traffic hours, this may not be practical. Tug escort may be a better alternative (see below). In the worst case scenario, it may be necessary to consider banning vessel transit during peak hours.*
- *Restrict vessel transit during night time.*
- *Establish an operating envelope for wind speed/visibility and other parameters, beyond which pilot boarding and transit are not allowed. Anchorage areas should be available within the channel in case these parameters are exceeded during transit.*
- *Vessel should pass critical obstructions at the slowest possible speed at which they can be manoeuvred, with extra power available to assist if required.*
- *Mandatory two to three crew, depending on vessel size, at bow who are well versed in dropping anchor in an emergency (one person each required to drop both anchors together).*
- *Mandatory manual steering – I have seen some vessels navigating on autopilot.*
- *Port authorities may also evaluate the number of extra auxiliary generators to be operating on the vessels to mitigate the risk to some extent.*

Use of tugs

I have sailed for many years and worked in port operations for 12 years. If the usage of extra tugs is left to the Captain's discretion, they will rarely ask for them as the outlay will be questioned by owners/charterers. It is better for the port authorities to make the call, perhaps based on a points system taking into account:

- *Type of vessel. Stricter escort tug requirements are needed for tankers and gas carriers.*
- *Minimum speed to ensure safe navigation, taking into account propeller immersion, trim, current, tide, squat, underkeel clearance, wind, wave height, visibility, air draft etc.*
- *Actual displacement of the vessel (as opposed to the deadweight, which indicates cargo carrying capacity.) Note that tankers and bulkers in particular can have very different displacements upon arrival and departure.*

One thing which should not be taken into account is the presence of
a bow and/or stern thruster. Thrusters can fail, and are in any case only effective below a certain speed.
The SOP should state whether the escort tug(s) is to push or be tied up; taking into consideration that tying tugs requires additional manpower to pull the rope on board the vessel and increases hazards due to the possibility of rope snapping.

Further considerations

On the same note, the possibility of catastrophic accidents while approaching the berth also need to be reassessed. In particular, it seems safer to bring the vessel parallel to the berth and then move it bodily with tugs. This especially applies to container vessels with streamlined bodies (Seaways, August 2020).
All risk mitigation measures, whether implemented by the vessel or by the port, will have to be weighed and balanced in light of the lives/ assets to be protected against the hazards and the effort which will be incurred by doing so. There will, inevitably, be several, if not dozens, of challenges preventing the implementation of the suggested risk mitigation measures.
Bear in mind that mitigation measures still do not guarantee that no collision will take place!

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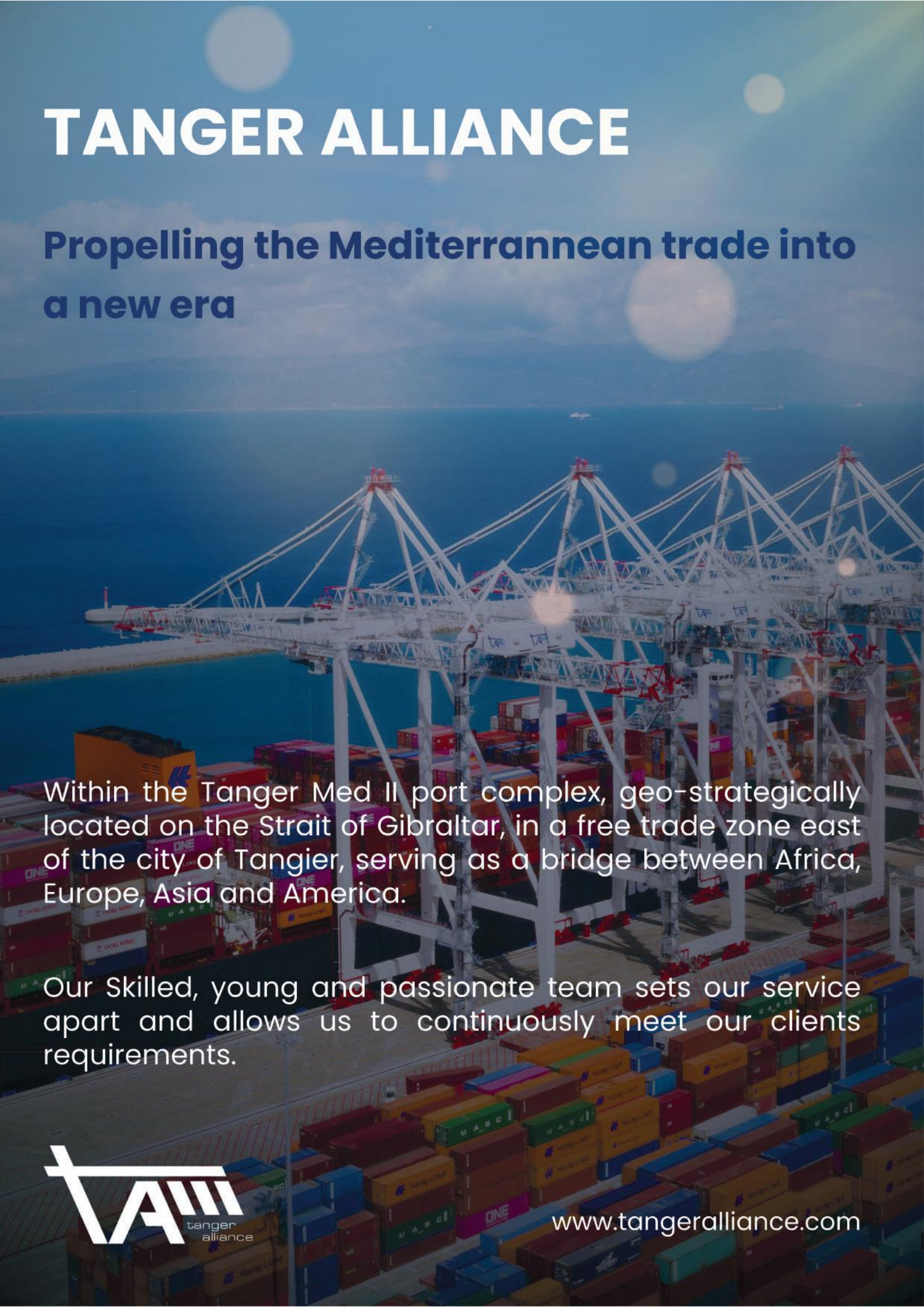

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