

Present & Future of Digital Maritime

Gregory S. Yovanof, Ph.D.

Managing Director, STRATEGIS - Maritime Center of Excellence

p-NET, “5G & GOVTECH”, Foundation of the Hellenic World,
Athens Greece | October 25, 2023



Outline

Present & Future of Digital Maritime

- **Trends in Shipping & Maritime**
 - Twin Transformation: Digitalization & Decarbonization
- **Technology as an enabler of Twin Transformation**
 - Smart Ships, Smart Ports, Port-Cities, Connected Maritime Ecosystem
 - Autonomous Shipping, IMO MASS Regulation
 - Maritime Surveillance
- **Networks of Innovation**
 - STRATEGIS Maritime ICT Cluster & Euroclusters

The Maritime Industry

- “Shipping - probably the most important business on the planet”
 - “Without ships there is no world trade and even the most pessimistic global economic scenario... sees a big future for shipping”
 - Nick Brown, Lloyd’s Register’s Marine Communications Manager



More than 90 per cent of global trade is carried by sea

The infographic is titled "THE MARITIME INDUSTRY" and "THE ROLE OF SHIPPING IN GLOBAL TRADE & MARITIME LAW". It features a world map with shipping routes and a pie chart showing that 90% of global trade is conducted by sea. Below this, it lists "170 MEMBER STATES", "3 ASSOCIATE MEMBERS", and "50-100s OF TREATIES AND GUIDELINES". It also highlights "MARPOL: Main international convention created by the IMO covering prevention of pollution of the marine environment from operational or accidental causes." and "MARPOL ANNEX VI: AIR POLLUTION" with a list of regulations such as limits on NOx emissions and sulfur content of marine fuels. The infographic includes logos for IMO and NAMEPA, and social media icons for Facebook, Twitter, YouTube, LinkedIn, and Pinterest.

THE MARITIME INDUSTRY
THE ROLE OF SHIPPING IN GLOBAL TRADE & MARITIME LAW

90% of global trade is conducted by sea

THAT MEANS...
90% of all of the world's food, products and energy are transported by sea.

MARITIME LAW

IMO INTERNATIONAL MARITIME ORGANIZATION
Key institution of the United Nations created in 1948 for the development of international maritime law.

IT NOW HAS...
170 MEMBER STATES, 3 ASSOCIATE MEMBERS, 50-100s OF TREATIES AND GUIDELINES

MARPOL: Main international convention created by the IMO covering prevention of pollution of the marine environment from operational or accidental causes.

MARPOL ANNEX VI: AIR POLLUTION

- Limits on NOx emissions from marine diesel engines
- Limits on sulfur content of marine fuels
- Chlorofluorocarbon (CFC) and Halon chemicals, which are found in common refrigerants and extinguishing agents, shall not be released into the air
- Most vessels now have International Air Pollution Prevention (IAPP) certificates
- PVC plastics may only be burned in specially approved shipboard incinerators
- Garbage and sludge may not be burned in ports, harbors, or estuaries

For more information on MARPOL and the marine industry, visit www.namepa.net.

NAMEPA NATIONAL ASSOCIATION OF MARITIME ENVIRONMENTAL PROTECTION AGENCIES

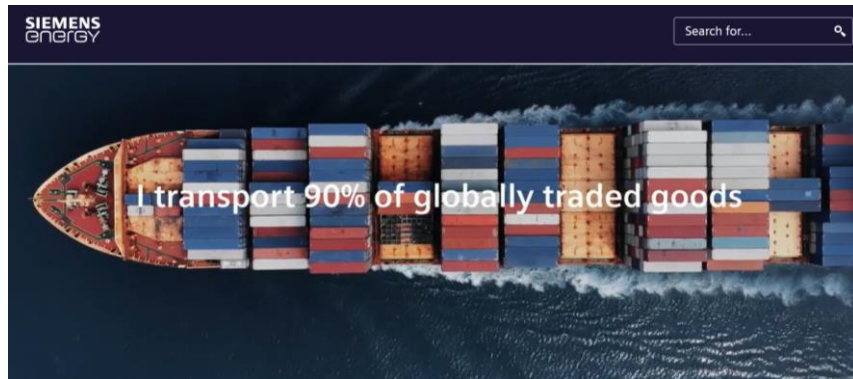
Global Maritime Trends



- UNCTAD calls for a “just and equitable transition” to a decarbonized shipping industry in its **Review of Maritime Transport 2023**
 - It highlights the pressing need for cleaner fuels, digital solutions and an equitable transition to combat rising carbon emissions and regulatory uncertainty in the shipping industry
 - But this comes with substantial costs

Decarbonization in Maritime

3 DECARBONIZING SHIPPING



UNESCO Ocean @IocUnesco

Ocean and #SGD 9

Shipping contributes significantly to the emissions that cause #climatechange.

Without action, shipping could be responsible for 10-13% of global emissions within a few decades.

ioc.unesco.org

#SDGs #BuildSustainableNow #SDG9

Of globally traded goods, 90% travel by sea, and shipping contributes almost 3% of global greenhouse-gas emissions.

unesco Intergovernmental Oceanographic Commission

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Sustainable Development Goals

Sources: Economic Impact, IMO, Nature

12:00 PM - May 13, 2023 - 220 Views

ABB Home Agenda

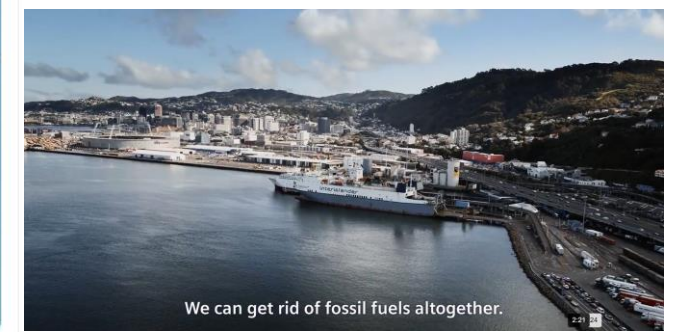
Samsung Heavy showcases new ship design divi.it/SpHG19

31/05 14:00 - 14:30

Reveal of the latest innovation by ABB Marine & Ports

Top risks for maritime leaders

Fuel cell projects are the “wave” of the future in decarbonizing the maritime sector



- VIDEO: Siemens Energy, [“Decarbonizing the sea: it’s time to turn the tide”](#) May 9, 2023

BCG Tells Carriers to Digitize or Die *

(Feb. 5, 2018)

- The container shipping industry must join the **Digital Revolution** or face being sidelined *
 - “Digital opens the door for carriers to strengthen their direct **relationships with end customers**,
 - further **reduce their costs** (including for fuel, vessel operation, and customer service),
 - & pursue **new revenue streams** beyond traditional shipping services,”



Boston Consulting report tells carriers to digitise or die splash247.com/boston-consult... via [@Splash_247](https://twitter.com/Splash_247)



Boston Consulting report tells carriers to digitise or die -
The container shipping industry must join the digital revolution or face being sidelined, a new report from Boston Consulting Group posits. “Digital opens the door for carriers to strengthen their...
splash247.com

10:22 AM - 5 Feb 2018

1 Retweet 1 Like [Splash](#)

🗨️ 🔄 1 ❤️ 1 ||

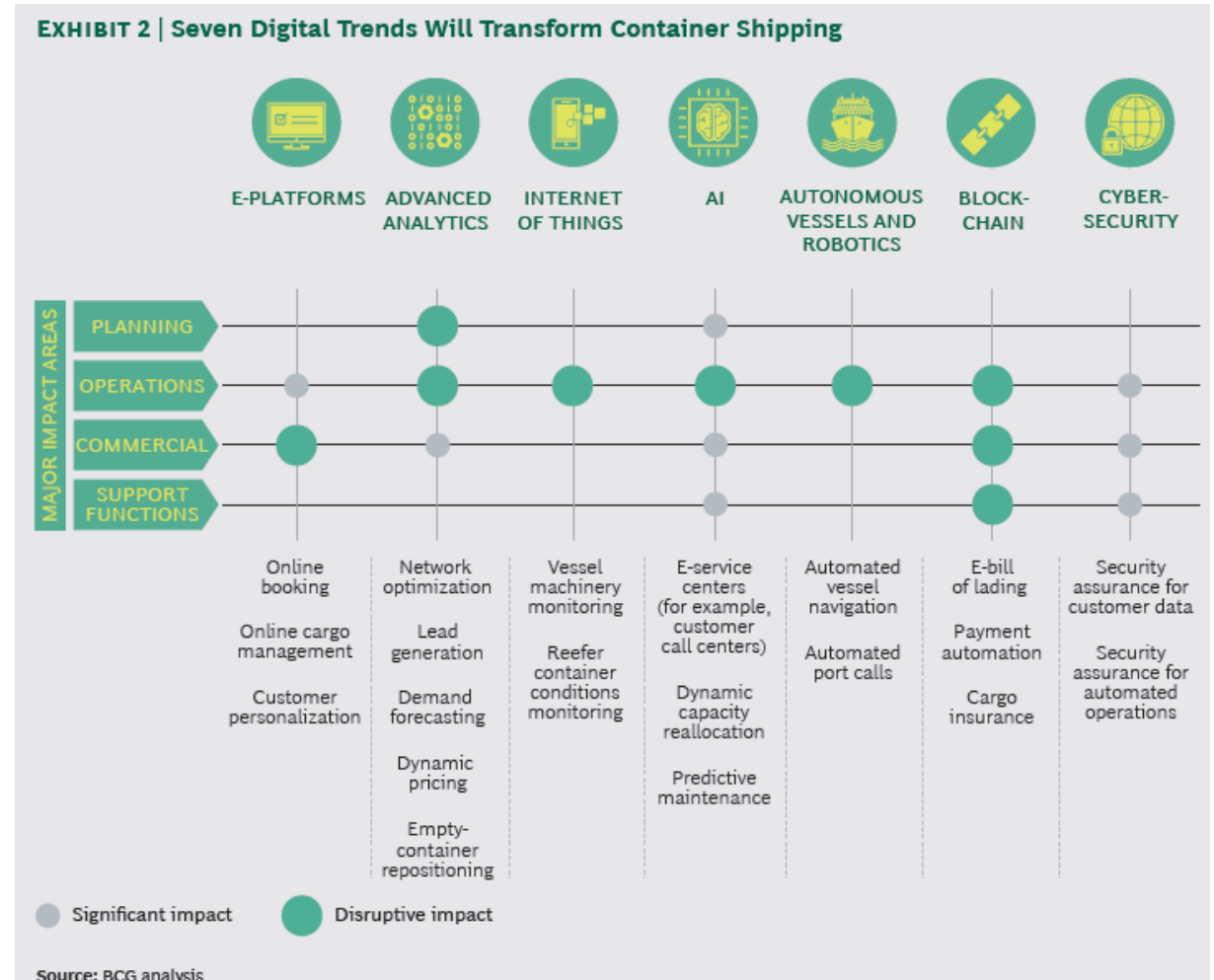
Sam Chambers, [Splash247](#), “Boston Consulting report tells carriers [to digitize or die](#),” Feb. 5, 2018

* [BCG, “The Digital Imperative in Container Shipping”](#), Feb. 5, 2018

BCG, “The Digital Imperative in Container Shipping” (Feb. 5, 2018)

Seven Digital Trends Will Transform Container Shipping

- e-Platforms
- Advanced Analytics
- Internet of Things
- Artificial Intelligence (AI)
- Autonomous Vessels & Robotics
- Blockchain
- Cyber-Security



Creating Value From Data in Shipping



MARITIME

CREATING VALUE FROM DATA IN SHIPPING

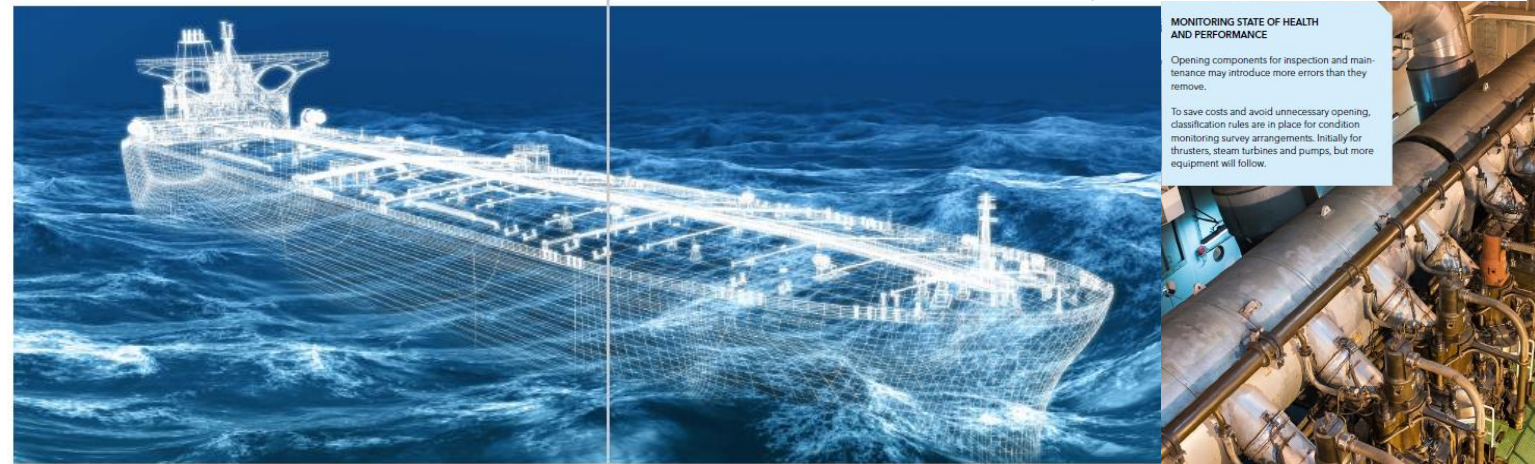
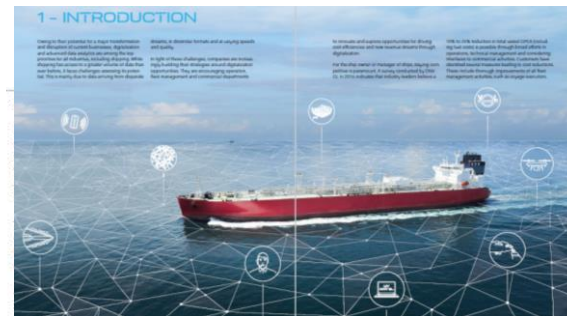
Practical Guide

Example: Improving ALERT Management System

Use of Connectivity and Sharing of Data for Competitive Advantage

USE OF CONNECTIVITY AND SHARING OF DATA FOR COMPETITIVE ADVANTAGES
Shipping companies are already utilizing Bluetooth by making use of the connectivity available through the wireless technology. Shipping companies are providing continuous monitoring of their cargo. This includes not only monitoring of location but also temperature and other parameters that require focus on the cargo itself. In addition, other stakeholders in the supply chain, like the regulatory provider, can plan their fleets and loading equipment to track optimum efficiency and use of resources.

EXAMPLE: IMPROVING ALERT MANAGEMENT SYSTEMS
Over the years, the alert management system on the bridge has become a distraction rather than a tool that can help support the crew. The integrated data can be a huge asset for improving the quality of alert management systems and encouraging data sharing as a means of cooperation across teams.
In 2016, DNV-GL initiated and facilitated a joint industry project (JIP) with several stakeholders from the industry with the goal to improve the quality of alert management systems.
A key recommendation from this JIP is to support the system integrator as the responsible partner for the design, development and commissioning of the alert management system, including the right to be alerted in the event of bridge alerts. The project outcome concerning a decision tree to help determine which alerts should be passed on to other parties.
In addition, the increased amount of data can be made available to those, where it is needed by various support systems. The system logs can include system support functions as a distributor also can receive, diagnose and handle information and alerts for the bridge crew that are necessary to avoid critical events.



MONITORING STATE OF HEALTH AND PERFORMANCE
Opening components for inspection and maintenance may introduce more errors than they remove. To save costs and avoid unnecessary opening, classification rules are in place for condition monitoring survey arrangements. Initially for thrusters, steam turbines and pumps, but more equipment will follow.

IoT Brings Future-ready Communications Solutions to the Maritime Sector



“IoT Brings Future-ready Communications Solutions To The Maritime Sector”

[IEC – Telecom](#), 04 Oct 2022


- From voice applications to M2M devices enabling value-added services over satellite connectivity, today IoT solutions can help the maritime sector to
 - identify the most energy-efficient routes,
 - plan the most optimal engine configurations,
 - lower carbon and GHG emissions,
 - reduce fuel consumption (which represents 50-60% of total vessel operating costs), and much more.
- While earlier voice and data transmissions were dependent on costly VSAT relays, the creation of **LEO satellites** in the microwave **Ka-band** has enabled higher data rates and security.
 - Along with 5G capabilities, this is expected to revolutionize connectivity at sea.

MTIS i-Platform: A Digital-Ship Platform




**Digitalizing Shipping:
ALL HANDS ON DECK**

i-Platform© Indicative screenshot



"We empower, we innovate, and we have a strong sense of pride in everything we do. MTIS has kept up with the latest technologies and our work and business expertise is recognized globally."

i-Platform©

- Business Intelligence
- Optimized Operation
- Improved Performance
- Remote Electronic Monitoring
- Maritime Cyber Security
- Integrated communication
- Spare parts 3D printing
- Aerial drones

- SPEED / FUEL CONSUMPTION**: Dashboard showing speed and fuel consumption metrics over time.
- ENGINE Performance**: Dashboard showing engine performance metrics and trends.
- FLEET/VESSEL Environment Performance**: Dashboard showing environmental performance metrics for a fleet of vessels.
- CII [Carbon Intensity Indicator]**: Dashboard showing Carbon Intensity Indicator (CII) metrics and trends.
- 3D Printed GEAR | Delivery by DRONE**: Dashboard showing 3D printed gear and drone delivery capabilities.

Hamburg Port Authority - A Network for Water, Roads & Rail

IT-supported traffic management, data exchange and video & telco all run on the same system

This means cargo containers can be forwarded more quickly by water, road & rail



© Hamburg Port Authority

Port of Rotterdam Joins Forces With IBM to Become Smartest Port in the World

- Port of Rotterdam teams with IBM Internet of Things to digitize operations and build a connected, smart port of the future
 - IBM is helping reshape Europe's largest port with Digital Twin, predictive weather insights, 3D printing, & connected devices



8:36 PM - 7 Mar 2018

The Connected Maritime Ecosystem



Representation of the Connected Maritime Ecosystem

- Today, the maritime industry is at the cusp of a new era—one driven by increased **digitalization** and innovation, in particular, **automated ships**
 - This evolution has the potential to impact all aspects of operations and business in the industry
- The “**Connected Maritime Ecosystem**” aims to
 - utilize the full potential of autonomous ships,
 - maximize their business impact on different activities and
 - create new opportunities for all parties in the maritime ecosystem

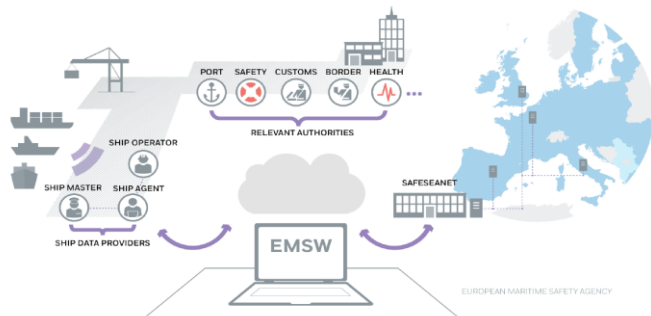


DNV: D-INF [Data collection infrastructure and vessel connectivity]



[“DNV approves maritime digital infrastructure projects,”](#)
MarineLink, June 6, 2022.

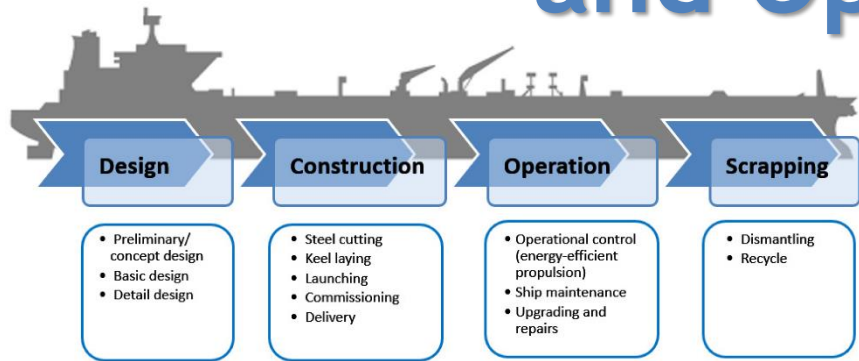
Maritime Single Window



<http://www.emsa.europa.eu/related-projects/emsw.html>

- Classification society DNV has published **D-INF (data collection infrastructure and vessel connectivity)** class notation which addresses a key challenge in maritime connectivity (**interoperability**),
 - by setting out the requirements for the complete data collection infrastructure, including onboard data servers, data relay components and remote data servers, covering the full **ship-to-shore communication framework**
 - **DNV Approves Maritime Digital Infrastructure Projects [MarineLink Jun. 6, 2022]**: Classification society DNV has recently approved several projects for digital infrastructure solutions developed by COSCO, Kongsberg Digital & Samsung Heavy Industries (SHI)

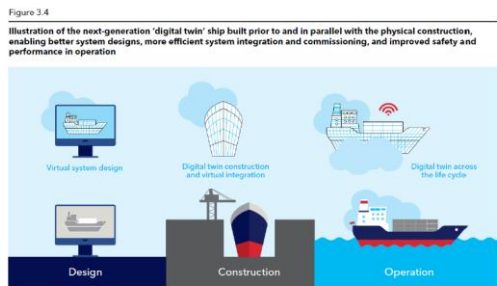
Closed-Loop Ship Design, Manufacturing and Operation Framework *



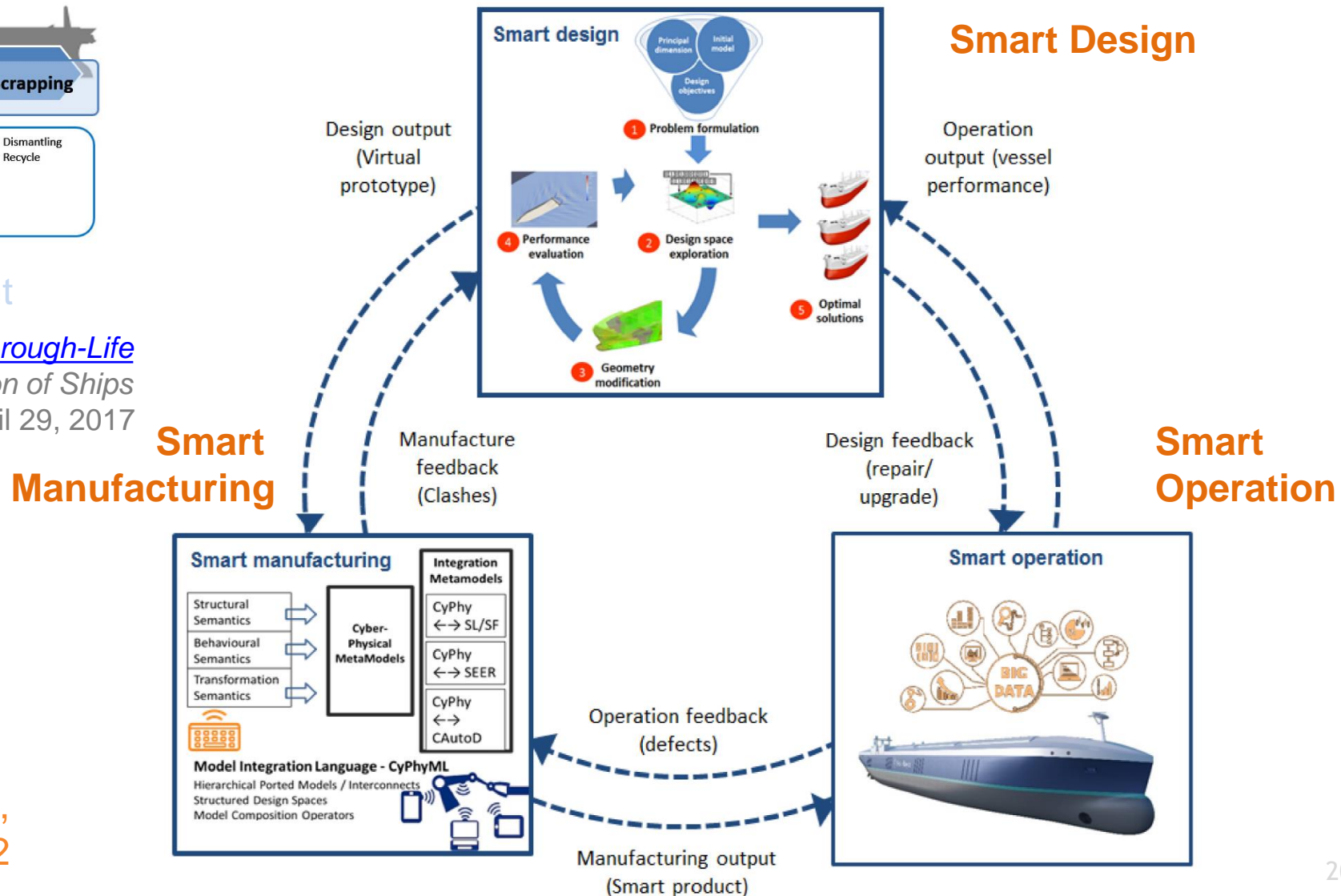
Ship Lifecycle Management

* Joo Hock Ang, et al., "[Energy-Efficient Through-Life Smart Design](#)", *Manufacturing and Operation of Ships in an Industry 4.0 Environment*", MDPI, April 29, 2017

Use of a 'Digital Twin' in Ship Building



DNV [Maritime Forecast 2050](#), 2023 Edition, Sep. 19, 20232



Autonomous Ships Are Almost Here!

- Oskar Levander, SVP Concepts & Innovation, Rolls-Royce, **“Forget Autonomous Cars — Autonomous Ships Are Almost Here”**
Jan. 28, 2017
 - IEEE Spectrum, “*Autonomous Ships on the High Seas*”, Feb. 2017
 - Although robotic ships are some ways off in the future, it’s not a question of *if* they will happen but *when*



Shore Control Centre (SCC)



Autonomous, Unmanned Ship of the Future - MUNIN

- EU-funded project **MUNIN**
 - Maritime Unmanned Navigation through Intelligence in Networks
 - Concept study of a fully unmanned handymax dry bulk carrier on intercontinental voyage
 - The MUNIN project relies on an advanced sensor system that gathers information from **onboard**, **ashore** and **offshore** to enable vessels to act autonomously



<http://www.unmanned-ship.org/munin/>



MUNIN – FP7 GA-No 314286
Sep 1, 2012 – Aug 31, 2015
Budget: 3.8 million EUR

Autonomous Ships & Smart Ports

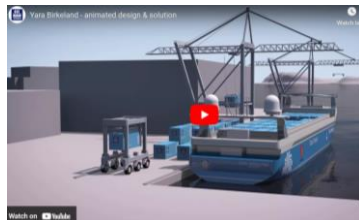
- According to the IMO, "Maritime Autonomous Surface Ship (MASS)" refers to a ship which, to a varying degree, can operate independent of human interaction.
 - The IMO's Maritime Safety Committee (MSC 100) in December 2018, approved the framework and methodology for the regulatory scoping exercise on Maritime Autonomous Surface Ships (MASS).

Maritime Autonomous Surface Ships: A critical 'MASS' for legislative review



YARA Birkeland

The first ever zero emission, autonomous ship - enters service after the christening ceremony in Norway [[APR 29, 2022](#)]



Fleet Operation Center Completed for Crewless Maritime Autonomous Surface Ship Project.

The DFFAS (Designing the Future of Full Autonomous Ship) project comprises 30 Japanese companies



Digital twins for the maritime sector



The Maritime Autonomous Surface of Ships (MASS) market is expected to grow at an average annual rate of over 22.0%, reaching approximately KRW 340 trillion (US\$ 246 billion) in 2025 and KRW 509 trillion (US\$ 368 billion) in 2028.

Finland joins the international pioneering network of Maritime Autonomous Surface Ships (MASS) in ports



A cargo ship in Helsinki (Photo: Shutterstock)

Maritime Autonomous Surface Ships (MASS) in Korea



Maritime Autonomous Surface Ships (Photo: source: MASS Project)



A container equipped with the DFFAS system will be installed on Suzaku, a 749 GT container vessel, in a demonstration trial of a crewless maritime autonomous surface ship.

Demonstration trial



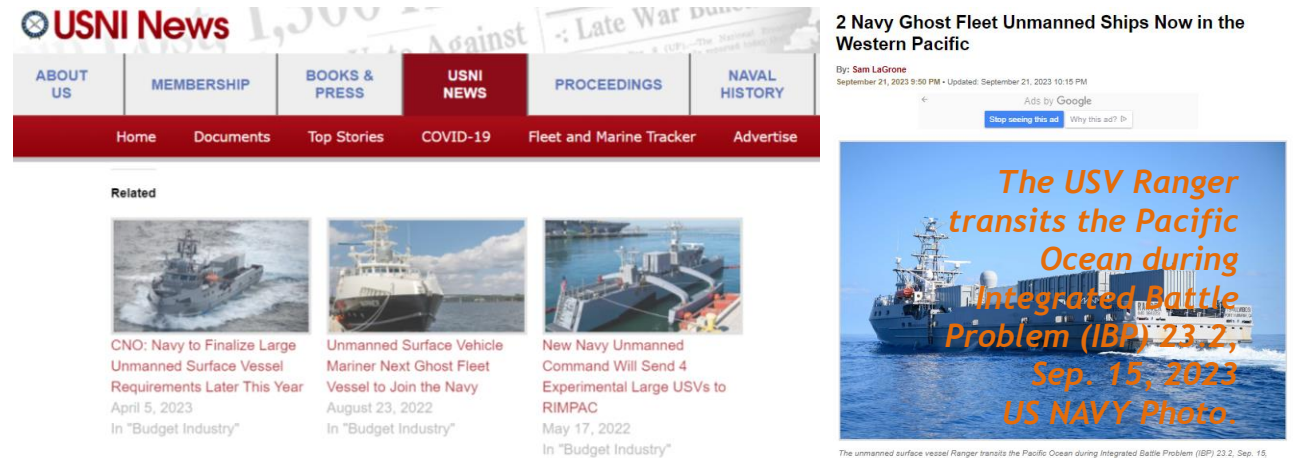
The Port of Rotterdam, Netherlands, aims to be prepared for autonomous ships by 2030

The Port of Rotterdam, Netherlands, aims to be prepared for autonomous ships by 2030. But how will ports elsewhere fare? Credit: Eric Bakker/Port of Rotterdam.

'Sea-Hunter' a drone ship with no crew, just joined the U.S. Navy fleet [Feb. 2018] *



- DARPA hands autonomous sub-hunter prototype over to the US Navy * ([DigitalTrends](#), Feb. 2018)
 - Following the successful completion of its Anti-Submarine Warfare (ASW) Continuous Trail Unmanned Vessel (ACTUV) program, DARPA has officially transferred the technology demonstration vessel, christened **Sea Hunter**, to the Office of Naval Research (ONR) [Credit: DARPA [VIDEO](#)]



The screenshot shows the USNI News website. The main article is titled "2 Navy Ghost Fleet Unmanned Ships Now in the Western Pacific" by Sam LaGrone, dated September 21, 2023. The article is part of a "Related" section with three other articles: "CNO: Navy to Finalize Large Unmanned Surface Vessel Requirements Later This Year", "Unmanned Surface Vehicle Mariner Next Ghost Fleet Vessel to Join the Navy", and "New Navy Unmanned Command Will Send 4 Experimental Large USVs to RIMPAC". A large image on the right shows the USV Ranger transiting the Pacific Ocean during Integrated Battle Problem (IBP) 23.2, with the text "The USV Ranger transits the Pacific Ocean during Integrated Battle Problem (IBP) 23.2, Sep. 15, 2023 US NAVY Photo." overlaid.

- **2 Navy Ghost Fleet Unmanned Ships now in the Western Pacific ([USNI News](#), Sep. 21, 2023)**
- USVs *Mariner* and *Ranger* and the staff Unmanned Surface Vessel Division ONE (USVDIV-1) left California last month and sailed to Hawaii as part of a wide-ranging testing program for the Navy's future USV fleet.
- The service [believes](#) unmanned or optionally manned vessels will be key to how the Navy's surface fleet will operate in the future by extending the awareness and deepening the magazines of manned ships” - Cmdr. Jeremiah Daley said.

Autonomous ships on the horizon



“Autonomous ships are on the horizon: here’s what we need to know” [NATURE, 27 Feb. 2023]

- Ships and ports are ripe for operation without humans – but only if the maritime industry can work through the practical, legal and economic implications first.

- [Rudy R. Negenborn](#), [Floris Goerlandt](#), [Tor A. Johansen](#), [Peter Slaets](#), [Osiris A. Valdez Banda](#), [Thierry Vanellander](#) & [Nikolaos P. Ventikos](#)

- By 2024, the Norwegian container ship Yara Birkeland is expected to carry fertilizer autonomously from plant to port with zero emissions.

- Credit: Torstein Bøe/NTB/AFP via Getty

JAPAN: MEGURI 2040 Phase Two

The Nippon Foundation MEGURI2040 Fully Autonomous Ship Program



The 749-gross-ton container ship Mikage



The Sunflower Shiretoko, a large car ferry of more than 10,000 gross tons being used for demonstration testing



The land-based Fleet Operation Center, currently under construction



The 749-gross-ton SUZAKU, the coastal container ship used in the demonstration test

- The Nippon Foundation's **MEGURI2040** project has envisioned the fully autonomous navigation program.
 - The project was launched in 2020 with the aim to reach a full-scale commercialization of fully autonomous ship technology by 2025.
- Japanese autonomous ship project moves on to second stage [[Safety4sea](#), Aug. 30, 2023]
 - MEGURI2040 Phase Two will focus on demonstrating ship-shore operations using four different vessel types including a newly built container ship equipped with a fully autonomous operation system, an **existing container ship**, **Ro-Ro vessel**, and remote island route ship equipped for partial autonomous operations, as well as two fleet operation centres.

KASS: Korea Autonomous Surface Ship Project

TECHNOLOGY



Engine automation system

As a technology that predicts and diagnoses ship failures through performance monitoring of key engine systems of autonomous ships, it supports decision...



Short-Sea Shipping Autonomous Ships & Smart Ports

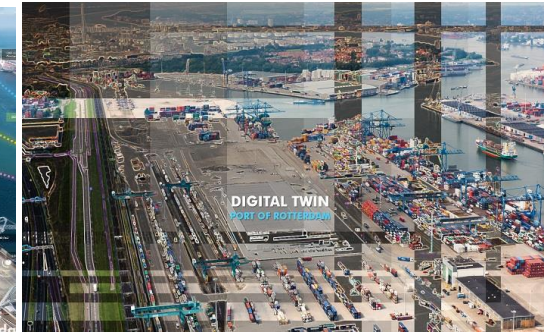


The **DocksTheFuture** Network of Excellence

- Supports ports to develop innovative projects to achieve their sustainable targets.
- The core topics of the network
 - Energy efficiency (e.g., cold ironing, smart grid)
 - Alternative fuels (e.g., bio-fuels, hydrogen)
 - Sustainable and resilient transport infrastructure
 - Emerging technologies and digitalization across the logistic chain
 - Cyber security
 - Innovative financing tools
 - Multimodal transport
 - City-Port relation
 - Circular economy



Europe's Largest Port
Prepares for Autonomous Ships
Port of Rotterdam - [DIGITAL TWIN](#)



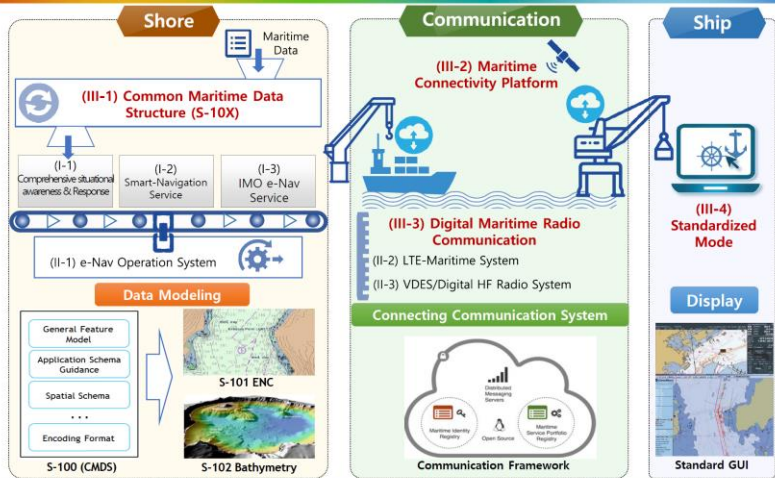
Smart Port Initiatives Worldwide

S. Korea Strategy of Smart Ship & Ocean

- S. Korea eager to lead the way in autonomous ship market



Introduction to Developing International Standard



The Vision of Singapore Port 2030

- Smarter, greener and automated, these will be the key features in the next generation port (NGP) by 2030, as Singapore embraces automation, digitization and artificial intelligence in its maritime vision

Singapore Port 2030

Smarter, greener and automated, these will be the key features in the next generation port (NGP) by 2030, as Singapore embraces automation, digitization and artificial intelligence in its maritime vision. *The Business Times* takes a look at how the future port may look like.

The Port of Singapore faces unique challenges that other ports may not have, such as land and sea space constraints, and a limited pool of manpower. To remain competitive and stay relevant in a maritime market, Singapore needs to take the maritime world towards smart shipping, in which ship operators are able to maximize the application of digital and predictive analytics to lower operating costs and improve efficiencies.

By increasing container turnover from four to six times where the multi-purpose jacking platform and mooring systems are used, Singapore is able to design and build a maritime port for the future from scratch, incorporating new ideas and technologies. Consolidating port operations at one location will also improve connectivity and economies of scale, thus reducing costs by eliminating inter-terminal haulage.

Another challenge for Singapore is building a maritime-ready workforce. By 2030, it is envisaged the labour force will be a mix of Singaporeans and highly skilled technicians and engineers with specialised training. The new generation port will feature lighter, higher-tech and more secure infrastructure, and Singapore signed a bilateral agreement with IBM in August 2015 to support a unified platform to manage real-time data and provide a common view across data points to help port operators make more informed decisions. The blue print of NGP will also look at rethinking and re-designing the level of sustainability and connecting with the community.

Terminal operations and machinery will be automated, and technologies such as automated guided vehicles and trucks (AGVs) are being tested and developed to increase the efficiency of port operations. Automation will reduce manpower needs and boost productivity of port operations.

Real-time information from multiple smart sensors and cameras will be used to provide data for analysis. The data will then be fed through advanced maritime sense-making systems that can process, mine and extract useful information for decision and policy making, along with contingency planning.

A green port will be heavily promoted - especially targeted coastal gas LNG as a fuel for the new port operations. More community spaces will be built around the port to bring for people access to the maritime facility to stay connected with the masses.

Big data and predictive analytics An unprecedented amount of data - from operational, financial and management data, traffic data, maritime and machinery performance data, data on cargo flows, across the world, maritime accident data and other management and industry personnel data - will be shared among the next-gen ship operators, port operators and other players in the maritime eco-system.

Intelligent port system Built-in algorithm devices "activated" when they are needed are coming together at the jacking point or the jacking system, alerting port operators to possibilities of data analysis, such as: slowing down or changing directions and alert port operators of possible hijacking or piracy.

Multi-tiered concept Building a platform above part of the container port on which port related and related developments, such as container repair stations, logistic hubs and other facilities, can be developed.

Community spaces All efforts will be made to better understand its needs.

Next-gen Vessel Traffic Management System Smart data communications and information to the port operators are enhanced sensors, smart buoys, satellites and radar detect ships due to arrival of arrival times and schedules, production analytics will allow them to plan their arrival, accelerate. This helps the port to better manage its anchorage areas and plan ahead for loading or unloading.

Automated Guided Vehicles (AGVs) Unmanned, wireless free transportation systems used for shuttling containers between the gantry and container yard.

Automatic yard storage system Instead of the conventional system where containers are stacked one on top of the other, the AGVs will stack the containers into the operating efficiency, so operators no longer have to remove the top-level containers to reach the bottom-most ones.

Autonomous truck platooning Unmanned truck platooning is a human-driven truck platoon that is led by one or more autonomous trucks.

"By harnessing technology, by our willingness to experiment, and by learning from others, we will push the boundaries of what defines a port."

— ANDREW TAN, CHIEF EXECUTIVE, MARITIME AND PORT AUTHORITY OF SINGAPORE

Smart Port-Cities

GLOBAL MARITIME MEGACITIES

The steady growth of the global trade volume drives the development of major port cities. A joint study of DNV GL and Menon Economics ranks the world's leading maritime capitals, revealing strengths, challenges and future potential.

1
SINGAPORE
Top shipping centre, best port and logistics, attractive and competitive

Rank	Shipping centres	Finance and law	Maritime technology	Ports and logistics	Attractiveness and competitiveness	Overall ranking
1	Singapore	London	Oslo	Singapore	Singapore	Singapore
2	Hamburg	Oslo	Singapore	Shanghai	Oslo	Hamburg
3	Athens	New York	Tokyo	Rotterdam	Copenhagen	Oslo
4	London	Singapore	Shanghai	Hong Kong	Hamburg	Shanghai
5	Hong Kong	Shanghai	Busan	Hamburg	Dubai	London

Source: Menon Economics - The leading maritime capitals of the world 2017

Shanghai is the world's largest container port.

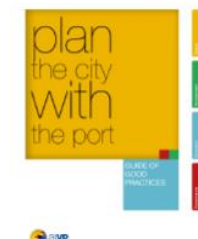
Many of the largest and most advanced ship and offshore newbuilding projects have been classed by DNV GL.

Roger Stein, Managing Director China Regional Manager, DNV GL - Marine

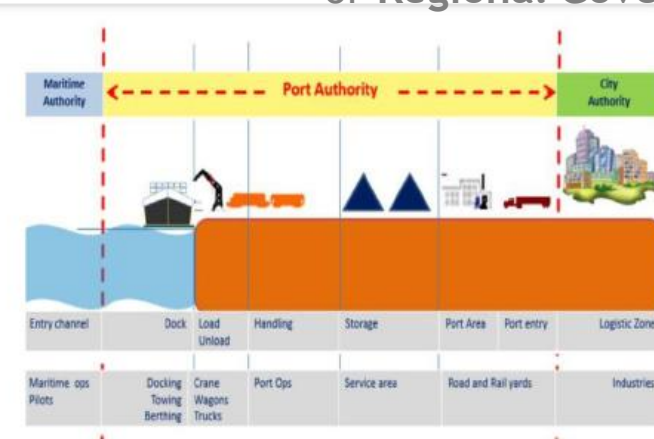


Some ports go beyond the concept of smart ports and work towards the “**Smart City**” concept

- One of the main challenges of [Smart Port-Cities](#) is the establishment of effective policies between the **Port Authorities & the Municipality or Regional Governments**



- 01 - CLIMATE CHANGE ADAPTATION
Preparing city ports for the consequences of climate change
- 02 - ENERGY TRANSITION & CIRCULAR ECONOMY
Innovative sustainable energy and industry for city port use
- 03 - SUSTAINABLE MOBILITY
Enabling new mobility connecting city and port
- 04 - RESILIENT GOVERNANCE
Strong executive governance for sustainable port cities
- 05 - WELFARE OF URBAN CAPITALS
Marine capital for port and social development
- 06 - PORT SECURITY & RESILIENCE
Long-term security as a key asset for a sustainable relationship
- 07 - QUALITY FOOD FOR ALL
City ports are essential for sustainable food distribution
- 08 - SMART CITY INTERFERENCE
Port city interfaces as a resource to build different programs
- 09 - HEALTH & LIFE QUALITY
Healthy port-city conditions as a priority for the city port
- 10 - PROTECTION AND RESILIENCE
City port interfaces that are permanent and protected



- [Cross View of the Port with the city](#)
[The Future of Ports](#) Jan. 23, 2021

Realizing Global Maritime Surveillance

The Challenge

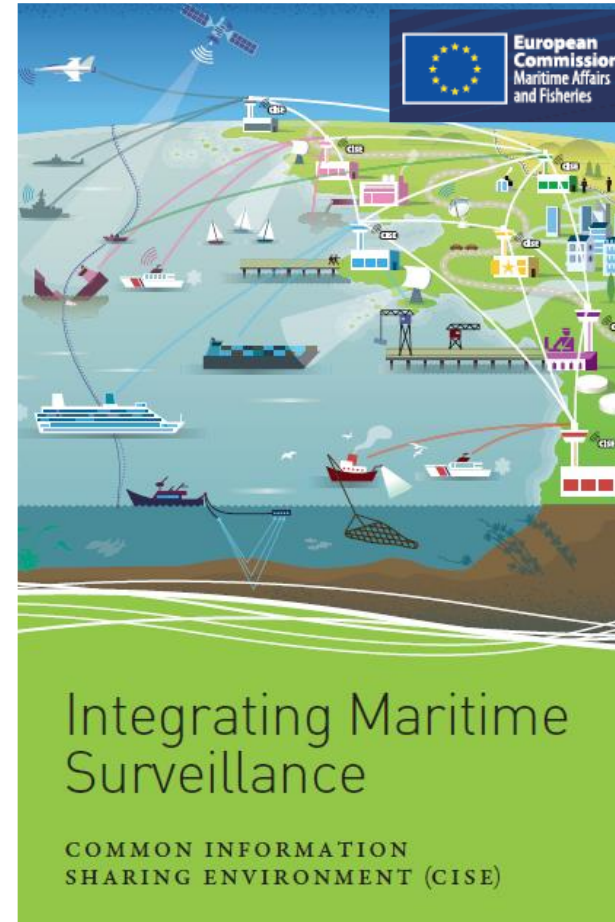
- The variety or structural variability of data from ocean observing may be among the most compelling problems for the ocean science and management communities



Common Information Sharing Environment CISE

Integrating Maritime Surveillance

- **Common Information Sharing Environment for the surveillance of the EU maritime domain**
 - COM(2010) 584 final Directorate-General Communication from the Commission to the Council & the European Parliament on a Roadmap towards establishing CISE



ARESIBO project: Connectivity in Maritime Surveillance

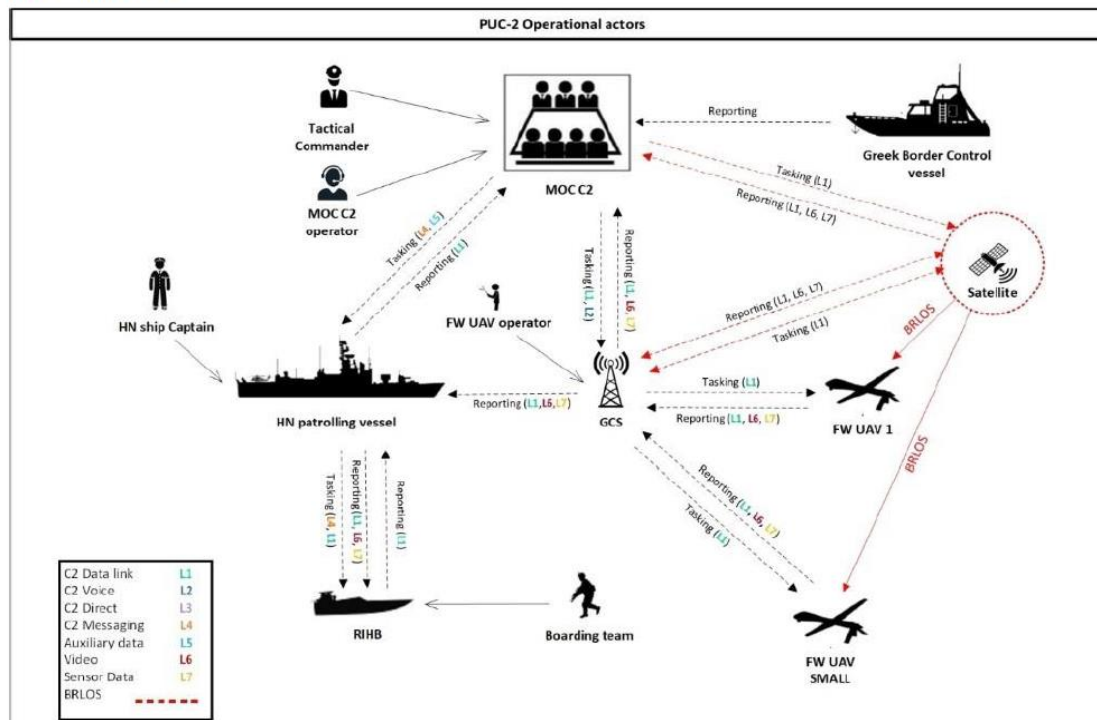
ARESIBO is an innovative system for improved situation awareness in the border security domain



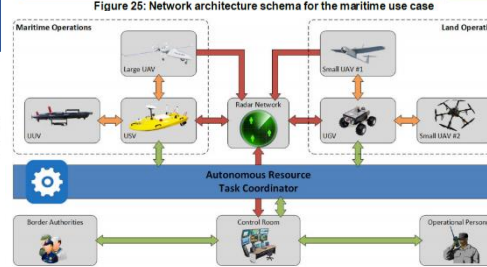
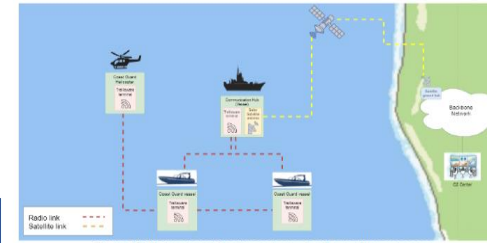
D3.3



7.2 PUC2



<https://aresibo.eu/sites/default/files/documents/d3.3.pdf>



Connectivity

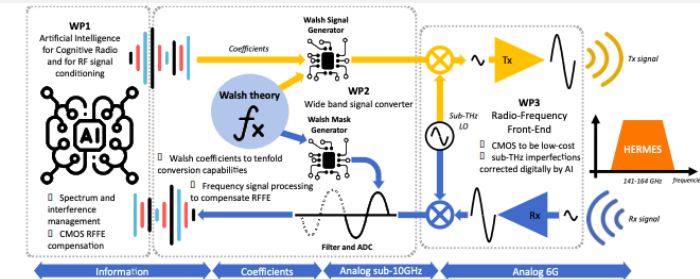
Wi-Fi and Wi-Fi + Cellular:
 Wi-Fi 802.11 a/b/g/n/ac; dual channel (2.4 GHz and 5 GHz); HT80 with MIMO
 Bluetooth 4.2[3]
 Wi-Fi + Cellular:
 GPS & GLONASS
 GSM
 UMTS/HSDPA
 850, 900, 1700, 1900, 2100 MHz
 GSM/EDGE
 850, 900, 1800, 1900 MHz
 CDMA
 CDMA/EV-DO Rev. A and B.
 800, 1900 MHz
 12.9-inch Wi-Fi + Cellular:
 LTE
 Multiple bands
 1, 2, 3, 4, 5, 7, 8, 13, 17, 18, 19, 20, 25, 26, 28, 29 and TD-LTE 38, 39, 40, 41



<http://www.h2020-hermes.eu/>

HERMES proposes the fusion of Artificial Intelligence (AI) and deep sub-micron CMOS technology to open a new generation of WALSH-transform based 6G wireless transceivers.

Cognitive Radio at Sub-THz frequencies

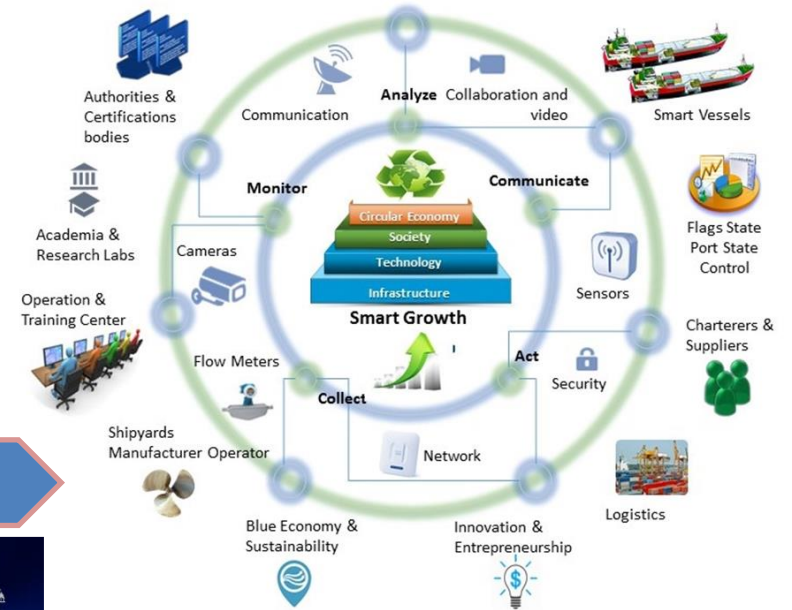


Walsh-transform based
 Spectrum Sensing for
 Maritime Surveillance

STRATEGIS Maritime ICT Cluster

Contributing to Piraeus Maritime Cluster & Blue-Growth Digital Innovation Hub (BG-DIH)

MARITIME Digital Transformation



Knowledge



Established, Feb. 2016
www.strategis-cluster.net

Strategic Partnerships/Collaborations

- Maritime Surveillance [[PROTeus](#) Cluster]
- Blue Energy [[PELAGOS](#) Cluster]
- Blue Biotechnology [[BIONIAN](#) Cluster]
- Defence & Dual-Use Technologies [[EDSP](#), [AUG Signals Hellas](#)]
- Marine & Maritime - [MARE Technology Cluster](#), **FVG** (MoU, Feb. 19, 2021)
- Blue Technologies - [Blue Italian Growth TC](#) (BiG Cluster) (MoU, Sep. 28, 2021)
- [MedBAN](#) Cluster Alliance [Rome, Jul. 6, 2022]
- [ENMC](#) - European Network of Maritime Clusters [Seville, Oct. 5, 2023]
- Euroclusters Joint Initiative [Sep. 2022]
 - [MedBAN](#) [Mediterranean Blue Acceleration Network]; [IKAT Tourism](#)



Conclusions



The twin transformation of **Digitalization** and **Decarbonization** (Greening) shapes the future of Maritime Industry. Digitalization of the maritime industry is set to radically enhance the **operational efficiency, safety and environmental performance** of ships.



Autonomous vessels and robotic systems will play a key role in the Digital Maritime of the future. **Maritime connectivity** underpins these disruptive technologies and is an enabler for the digital future of shipping.



The adaptation of the **legislative and regulatory framework** and the upgrading of maritime infrastructure lag technological progress for the widespread adoption of the disruptive innovations.



5G technology will play an important role in the connectivity & remote control of autonomous ships in the future, while already playing a key role in the digital transformation of smart ports.



Gregory S. Yovanof

e: director@strategis-cluster.net

m: +30 6973 696 408

w: www.strategis-cluster.net

Thank You!