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Impact analysis of autonomous ship introduction in  
Mediterranean Ports

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# Autonomous Shipping: The Future of Shipping Industry

Autonomous shipping empower us with new ways of transporting goods and people with greater safety, efficiency, and sustainability. This presentation will explore what autonomous shipping is, its key technologies, challenges, current and future applications, success stories, and more.

Key Factors:

- ❖ The transition to fully or partially autonomous ships is a disruptive innovation in the sea transport sector
- ❖ Autonomous ships pose challenges in terms of safety, security, sustainability, legislation, and operations.
- ❖ EU studies are underway to update legislation and issue guidelines for the testing and operation of autonomous surface maritime vessels.





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Autonomous shipping refers to the concept of using advanced technologies and systems to operate, navigate, and manage ships without direct involvement from human operators. Such systems can enable unmanned and autonomous vessels to traverse oceans and waterways, perform tasks, make decisions on their own and interact with other actors in the industry.



## Navigation & Control

Advanced navigation and control systems leverage sensors, GPS, and other data to enable autonomous manoeuvring, speed adjustment, and route planning.



## Cargo Handling

Automation of cargo handling and loading processes increases efficiency, safety, and reliability in logistics operations.



## Unmanned Vessels

With AI, machine learning, and remote control capabilities, unmanned vessels could revolutionize the shipping industry in terms of reduced labor costs and environmental impact.



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# Key Technologies in Autonomous Shipping

## Sensors & Perception Systems

- LiDAR, cameras, radars, and other sensors scan the environment and collect data on weather, objects, and other ships.

## Artificial Intelligence & Machine Learning

- AI and ML algorithms process sensor data, make autonomous decisions, and improve performance over time.

## Communication & Connectivity

- Satellite, 5G, and other communication technologies provide connectivity and reliability for remote monitoring, control, and safety.





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# Challenges

## Regulatory & Legal Issues

As with many new technologies, there are many regulatory and legal issues surrounding autonomous shipping. Issues such as cybersecurity, marine insurance and piracy are yet to be solved globally.

## Safety & Security Concerns

Autonomous shipping will require robust safety and security measures, including risk assessment, fail-safe systems, and cybersecurity to ensure that they cannot be hacked or hijacked.

## Workforce Impact & Training

Autonomous shipping will change the way we work and impact the job market. The shift will require the workforce to acquire new skills and undergo additional training on advanced technologies that will be used in the industry.

## Port Operations

The widespread use of autonomous ships will require significant efforts in ports to assess investments, conduct cost/benefit analysis, and evaluate the impacts on port management.

# Current and Future Applications of Autonomous Shipping

1

## Cargo & Logistics

Ships carrying goods across the ocean and waterways can be automated to increase efficiency, sustainability, and lower operating costs.

2

## Passenger Transportation

Cruise ships that operate autonomous vessel technology can offer a new level of safety and comfort to their passengers, allowing them to enjoy scenic voyage without concerns of an accident.

3

## Environmental Sustainability

Autonomous shipping can help reduce carbon emissions and marine pollution by optimizing routes, reducing idle times, and allowing for cleaner fuel alternatives.

# Success Stories



## Unmanned Cargo Ship

The world's first fully electric and unmanned cargo ship was debuted in Norway.

The vessel is also doing its part for the environment, due to zero emissions being produced thanks to the electrical propulsion and battery system.

## Self-Driving Container Ship

The vessel, **Yara Birkeland**, stretching 80m, with a deadweight of approximately 3,200 tonnes, contains sensors and computers that allow the vessel to operate autonomously or via remote control.

## Smart Ports

The Chinese port of Caofeidian is the world's first fully autonomous port by adopting an AI system for ship traffic (arrivals and departures).



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# Guidelines and Standards for Autonomous Surface Maritime Vessels

## EU Guidelines and Legislation

EU studies since 2018 to adjust current legislation (VTMIS directive)

EMSA issued ad hoc guidelines for tests of autonomous surface maritime vessels

Focus on technical, regulatory, and standards level

Ensure safety at sea and protection of marine and coastal environment

EU guidelines needs to be updated and improved

## International Collaboration and Alignment

EU guidelines should be brought to the attention of the IMO and other international stakeholder fora.

Alignment of standards and common understanding is crucial for testing and operating autonomous vessels.

EU's Maritime Information and Exchange System needs to be supported for safe management and control of autonomous shipping.

Collaborative efforts are needed to address challenges and achieve alignment in ports.

Attention to local/regional policy level





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## Development of the Union's Maritime Information and Exchange System

<p>Current System</p>	<p>The Union's Maritime Information and Exchange System (MIES) is a comprehensive system that facilitates the safe management, monitoring, reporting, and control of maritime activities.</p>
<p>Need for Support</p>	<p>With the increasing adoption of autonomous shipping, the MIES requires further development and support to address the challenges and ensure alignment of standards and common understanding for the testing and operation of autonomous seagoing surface vessels, including in ports.</p>
<p>Collaboration and Upgrades</p>	<p>Efforts are being made to update and improve the MIES, taking into account the guidelines and regulations set by the European Union (EU). This includes collaboration with the International Maritime Organization (IMO) and other stakeholders to enhance the system's capabilities and effectiveness.</p>

## Conclusions (1. International Legislation & Environment)

- The transition to autonomous ships poses challenges in terms of ensuring the protection of safety at sea and the marine and coastal environment.
- EU guidelines are being updated and improved to address the impacts of autonomous shipping on the environment.
- Efforts should be made to assess the potential impacts on the marine and coastal environment and to develop strategies to mitigate any negative effects.
- Collaboration at the international level, including with the International Maritime Organization (IMO), is necessary to establish common standards and guidelines for the testing and operation of autonomous ships.



## Conclusions (2. Port Management & Operators)

- Assessment of investments needed and cost/benefit analysis are necessary for port management in the scenario of autonomous ships.
- Efforts should be made to assess the impacts of autonomous ships on port management and develop strategies to ensure smooth operations.
- Port management will need to adapt and update their operations to accommodate autonomous ships.
- Operators' Responsibilities:
  - Updating their skills and knowledge to adapt to the new technology.
  - Monitoring, managing, and controlling vessel traffic.
  - Communicating effectively with autonomous ships.
  - Ensuring the safety and security of the vessel and its cargo.





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**THANK YOU FOR YOUR ATTENTION**

