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COURSE NAME: Sustainable Maritime Operations and Green Ports

Module 8 (Week 8)

Faculty of Maritime Studies, University of Rijeka

INTERPRETATION AND USE OF DATA IN OPERATIONAL DECISION-MAKING



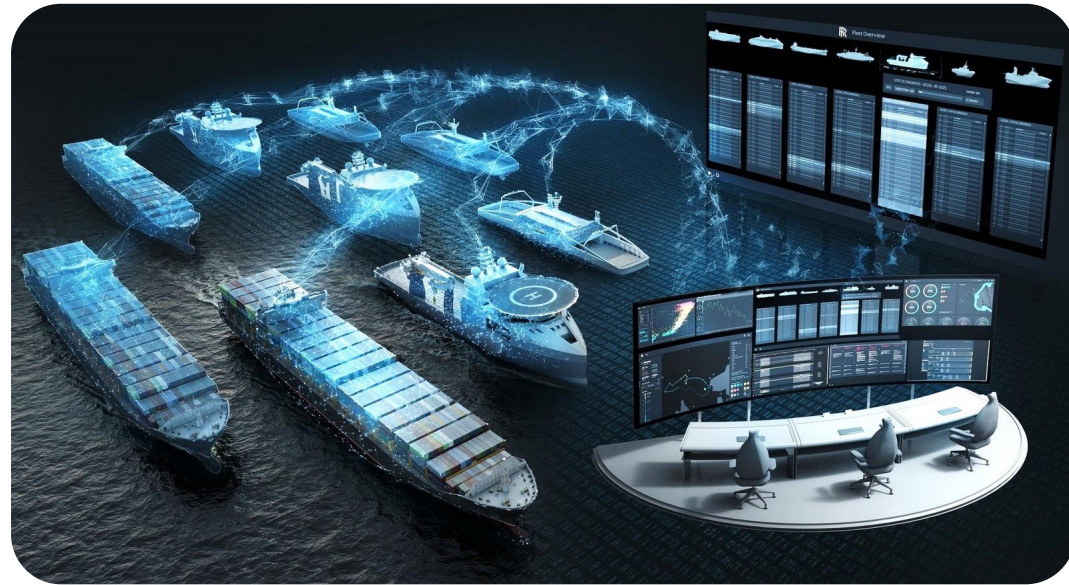
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1. Introduction

- Maritime industry as global trade backbone
- Environmental impact of shipping
- Digital transformation in shipping
- Data-driven decision making



2. Data Analysis and Visualization for Decision Support

- **Maritime industry** → unique opportunities for data-driven decision support
- **Data-driven Maritime Operations:**
 - advanced analytics + visualization → actionable insights for efficiency & compliance
- **Effective analysis and visualization of data:**
 - enhance situational awareness,
 - optimize route planning and
 - support environmental compliance

2. Data Analysis and Visualization for Decision Support

- **Stringent Environmental Regulations:**

- IMO regulations,
- Emission monitoring,
- Digital reporting



- **Integration of advanced data analysis and visualization tools provides:**

- transformative approach to maritime decision-making,
- operators to balance economic efficiency with stringent environmental requirements,
- regulatory compliance,
- drive sustainable shipping practices

3. Application of Data in Daily Operations

- **Data-Driven Shipping: Smarter Routes, Lower Emissions:**
 - IoT Sensors,
 - Automatic Identification System (AIS),
 - engine monitoring systems,
 - weather forecasts etc.



4. Data-driven Risk Management

- **Predictive Maintenance:**
 - AI detects engine anomalies to prevent failures
- **Dynamic Route Risk:**
 - weather + traffic analytics for safer navigation
- **Regulatory Compliance:**
 - real-time emission monitoring avoids penalties
- **Port & Cyber Risks**
 - Congestion forecasting + threat detection

Conclusion

- **Digital Transformation is Imperative:** The maritime industry must embrace data-driven operations to remain competitive, compliant, and sustainable—leveraging IoT, AI, and real-time analytics to optimize routes, fuel use, and risk mitigation.
- **Operational & Environmental Gains:** Advanced analytics enable tangible benefits, from cost reduction and safety improvements to meeting IMO decarbonization goals (CII, EEXI, ECA compliance).
- **Future Success = Human + Machine Collaboration:** Sustainable maritime operations will rely on balancing cutting-edge technology with crew expertise and evolving regulatory frameworks.



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