



Maritime Vulnerabilities

Challenges and Opportunities

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Environmental Stewardship

Existing activities:

- Vessel efficiency
- Marpol Annex VI
- Ballast water
- Sulfur limits

Current Performance:

- 2.6% CO₂ emissions
- 90% world cargo

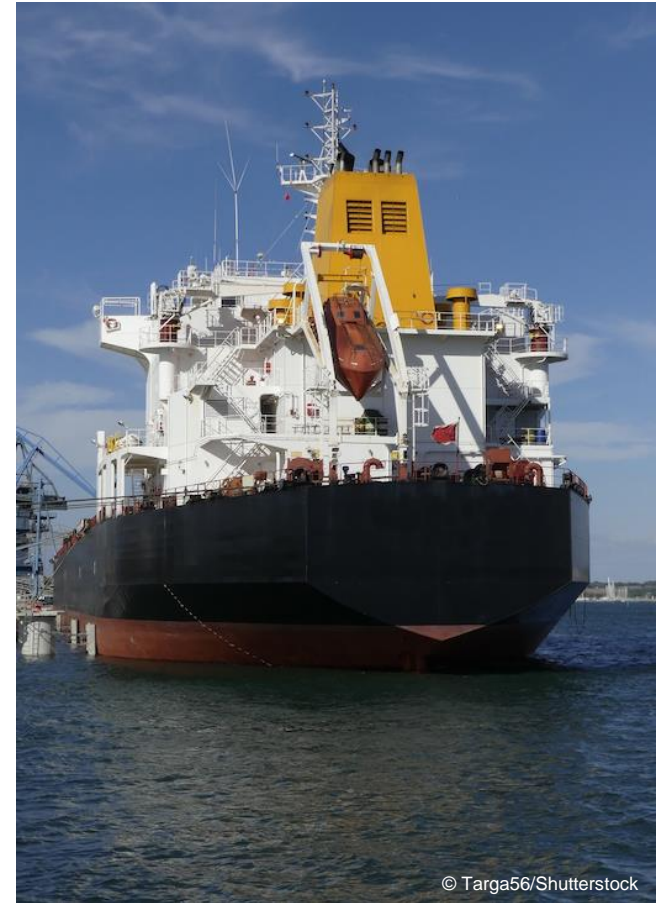
Growth:

- 0.9 – 1.4% per year

IMO Strategy:

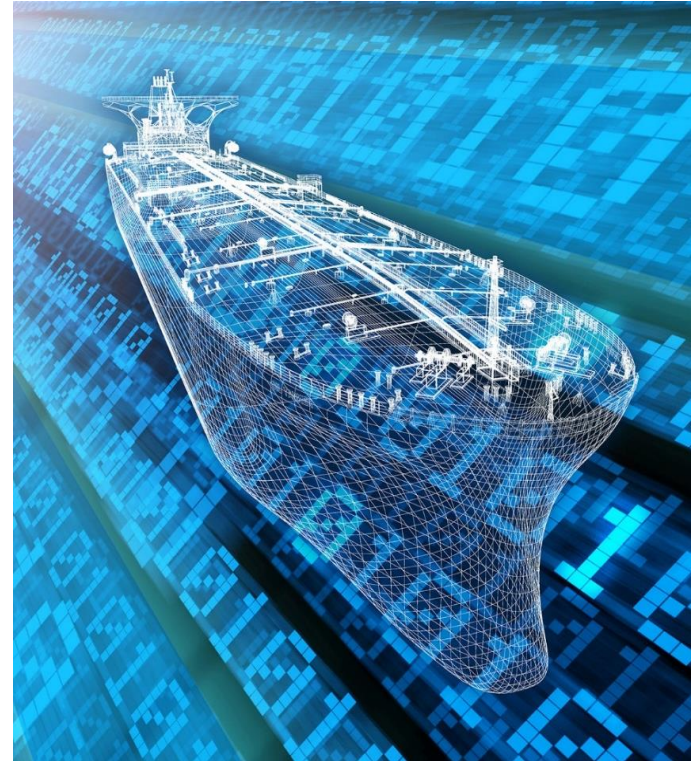
2030: 40% Reduction of CO₂ per Cargo transport

2050: 50% reduction of Greenhouse Gas



Increased Connectivity & Digitilization

- Environmental
 - EU MRV and IMO DCS
 - Performance monitoring
- Operational
 - Predictive vetting and vessel rating
 - Performance data used to evaluate vessels
 - Condition data to impact maintenance activity

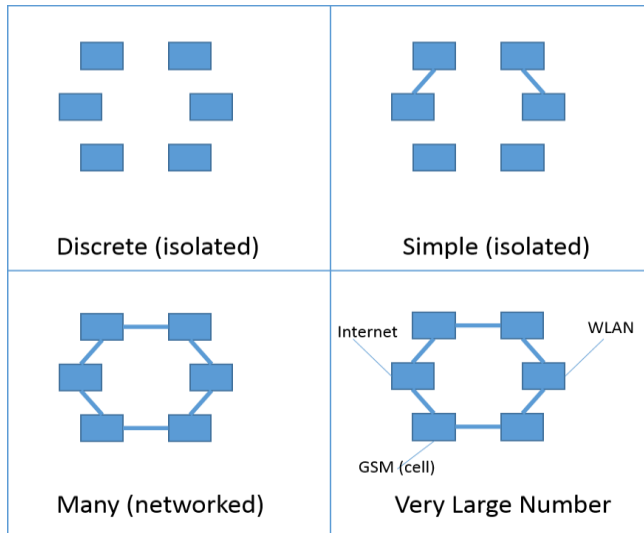


Preparing for a future where decisions will be based on data will require

- Understanding and planning data collection and management
- Data quality and cyber security as foundational elements from design to operations

Cyber

- Increasing levels of automation and increasing complexity
- Increased system **vulnerabilities** and potential operational and safety **impacts**
- Require a updated safety approach



- **Potential Impacts**
 - Loss of propulsion
 - Delays in scheduling
 - Loss of Stationkeeping
 - Costly repairs
- **Affected Systems**
 - Dynamic Positioning
 - Drilling Control
 - Ballast control
 - Power management
 - Subsea

Looking Forward

- Environmental compliance will continue to challenge the marine industry
- Increased connectivity and digitalization will help
- Cyber security remains a threat

- Business practices
- Energy sources
 - Renewables
 - New fuels & propulsion technology
- Digital innovation





Thank You

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