



WHEN TRUST MATTERS



Closing the Safety Gap in an Era of Transformation

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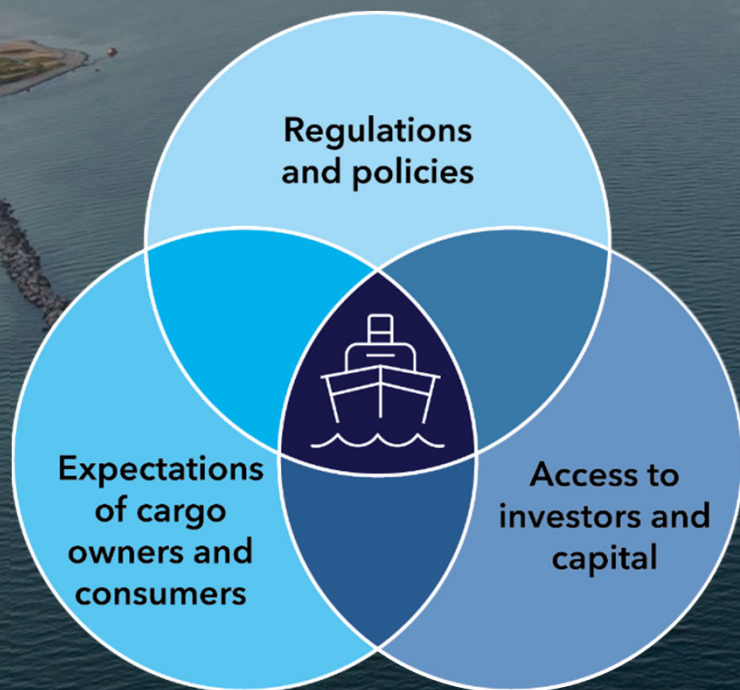
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Maritime Forecast to 2050

Energy Transition Outlook 2021



Three fundamental key drivers are increasing the pressure for decarbonization



IMO regulations on carbon intensity are taking effect from 2023.

Commercial pressure may push shipowners to aim for a leading position in decarbonization.

Poorly performing shipping companies will be less attractive on the charter market and may also struggle to gain access to capital.

Maritime Forecast to 2050 – key highlights

Owners must identify their own "decarbonization stairway" to manage carbon risk

Understanding the **costs** associated with the "decarbonization stairway" is vital to stay competitive

Knowing the technical design implications of the "decarbonization stairway" is crucial to eliminate showstoppers and reduce cost

The fuel transition in shipping has started, but key fuel technologies needed will be available in 4-8 years

Incorporating basic measures at newbuild stage is key to accommodating fuel flexibility

An analysis of 12 scenarios shows that capital for onboard technology investments and the energy needs to produce the new fuels are key barriers



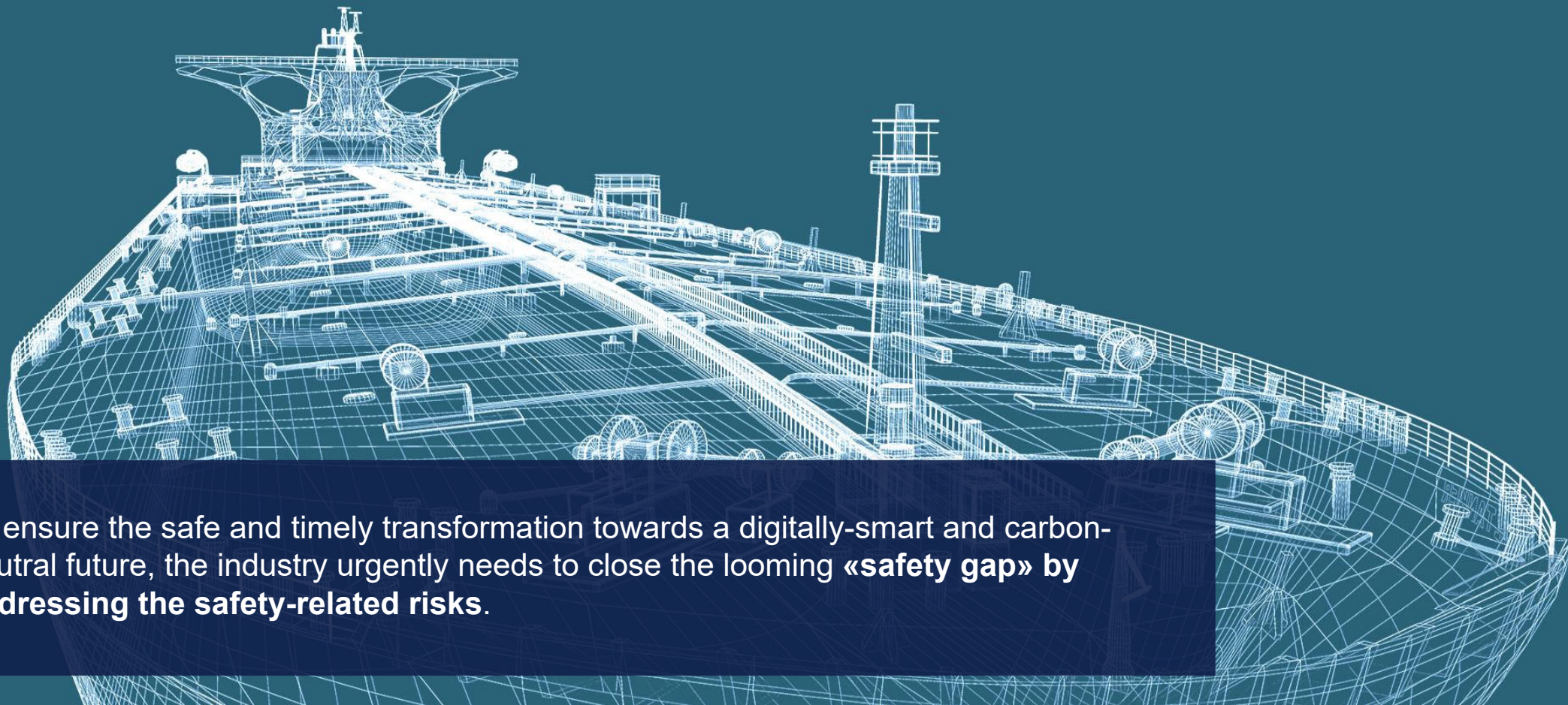
DNV's White Paper on safety in an era of transformations

DNV: A trusted voice to safeguard the maritime industry as it is rapidly transforming to meet its ambitions for digitalization and decarbonization

CLOSING THE SAFETY GAP IN AN ERA OF TRANSFORMATION

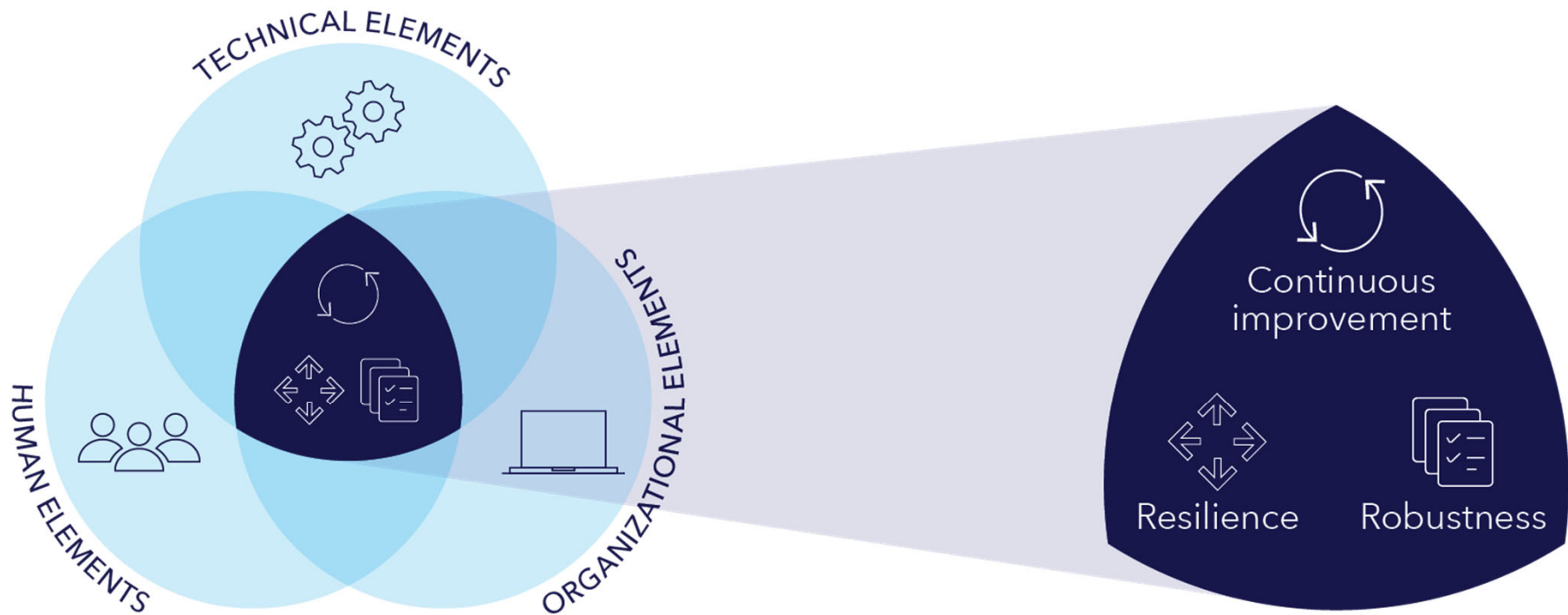


With all eyes focused on Digitalization and Decarbonization, the industry must continue to meet its commitment to safety



To ensure the safe and timely transformation towards a digitally-smart and carbon-neutral future, the industry urgently needs to close the looming «**safety gap**» by **addressing the safety-related risks.**

Safe maritime systems depend on the interaction between the H-O-T elements



Safety hurdles and recommendations related to greater system complexity



Traditional **risk-management methods** will be insufficient



Centralized and dispersed teams will **change how people work**



Organizations are becoming a patchwork of **multiple stakeholders**



Focus on **system performance** rather than component reliability to manage increasingly complex ship systems



Support **people's roles/needs** through human-centred design and a balanced function allocation



Establish **digital transformation strategies** for how organizations should manage emerging risks

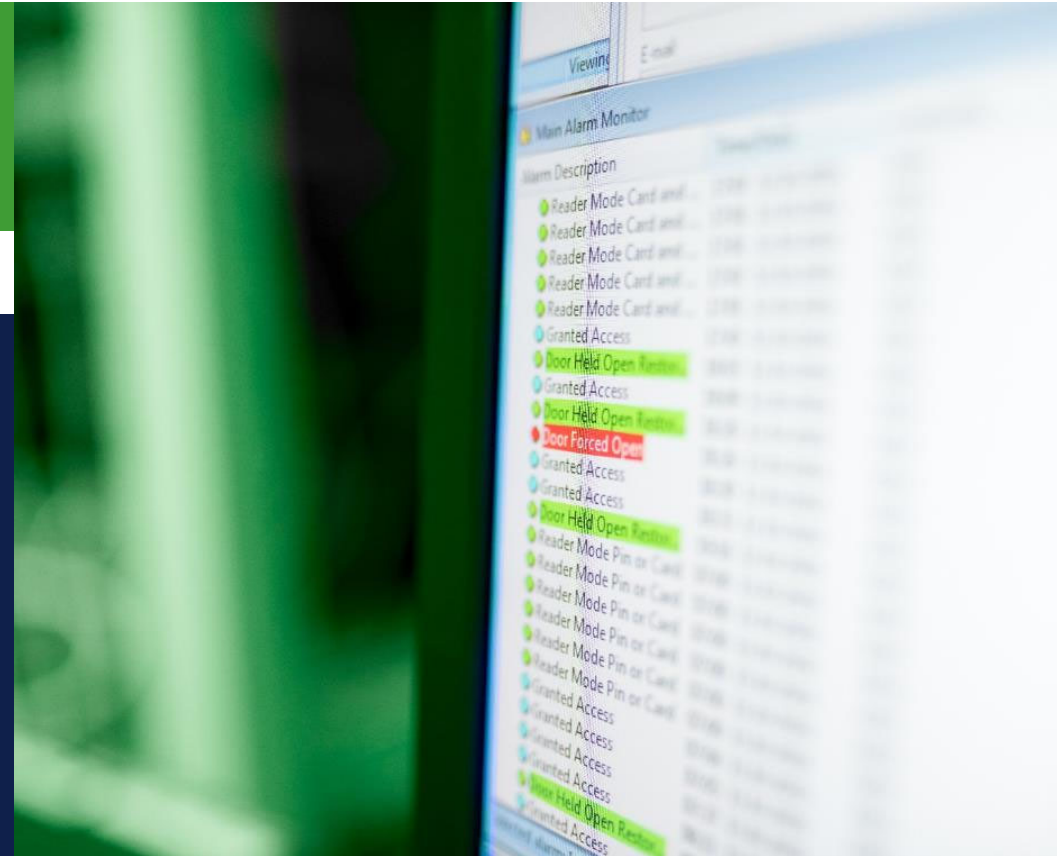
System integration is essential for improving the user-centred design of alert management systems

Problem identified:

The alert management system is **least effective** when it is needed the most

Recommendations from DNV:

1. Appoint a **system integrator** as the «spider in the web», overseeing the design of alert management systems
2. Reduce the number of alerts
3. Improve the presentation of alerts



Safety hurdles and recommendations related to alternative fuels and operations



Stakeholders work in **silos** focused on subsystems



Regulatory frameworks cannot match pace of technology development



Suppliers and end users lack maritime and fuel-specific **competence**



System integration to enable **collaboration and transparency**



Collective commitment to contribute with knowledge and experience to supplement missing regulations



Develop lacking competences and a culture of **continuous improvement**

Collaboration and continuous improvement is essential for the safe introduction of new carbon-neutral fuels

DNV has been at the forefront of initiatives towards adopting **LNG as fuel**.

We continue to lead the way in generating knowledge to supplement regulatory gaps for other alternative fuels.

DNV in **MarHySafe** to:

1. Remove regulatory and approval barriers
2. Develop the knowledge required for safe and reliable onboard hydrogen storage, bunkering and operations with hydrogen in shipping.



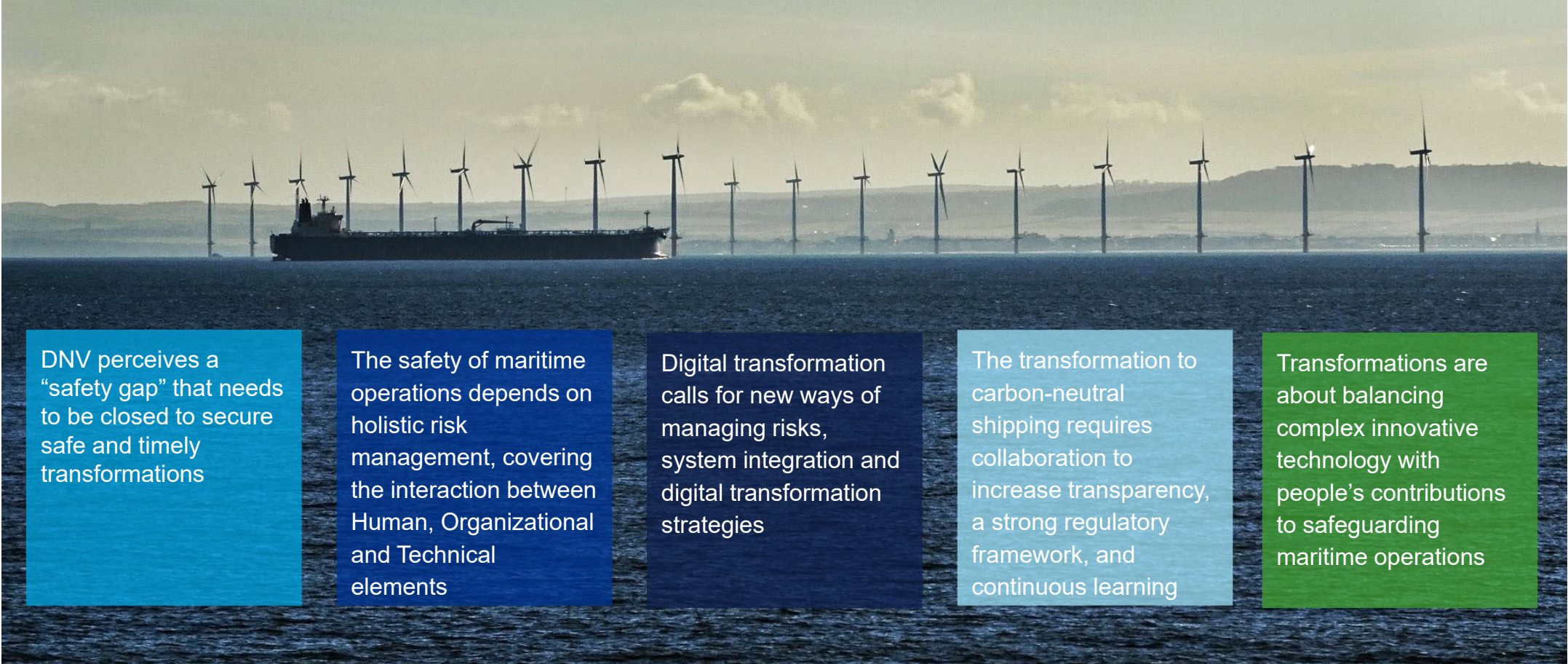
To reap the benefits of transformation, the industry needs to collaborate to support people's performance



Successful transformations depend on the creativity, problem-solving ability and resourcefulness of people.

Every maritime organization has a part to play in facilitating the safe and efficient performance of its people.

The industry have both the responsibility and the ability to close the safety gap



DNV perceives a “safety gap” that needs to be closed to secure safe and timely transformations

The safety of maritime operations depends on holistic risk management, covering the interaction between Human, Organizational and Technical elements

Digital transformation calls for new ways of managing risks, system integration and digital transformation strategies

The transformation to carbon-neutral shipping requires collaboration to increase transparency, a strong regulatory framework, and continuous learning

Transformations are about balancing complex innovative technology with people’s contributions to safeguarding maritime operations

MANAGING THE RISKS OF BLACKOUT

For passenger ship owners and operators

Guidance paper out in April



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